IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: < 200 ms in case of instantaneous release: L1: L2: L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:		N/A
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark		
	Type designation or serial number		
	Sample no:		
	Rated operational voltage: Ue (V)		
	Rated current: In (A)		
	Ambient temperature 10-40 °C :		N/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		N/A
	Range of adjustable setting current. (A)		N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the maximum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1c	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated current: In (A)	25 A	
	For releases dependent of ambient air temperature: Reference temperature	40°C	P
	Test ambient temperature (°C)	40°C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	40°C	P
	Range of adjustable setting current: (A)	-	N/A
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C		N/A
	Test ambient air temperature:	40°C	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	N/A
	Releases, independent of ambient air temperature: at 30°C		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	21 A	P

ВЯРНО С ОРИГИНАЛА

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	26 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Test current: 105% of the maximum adjustable setting current: (A)	26,25 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the maximum adjustable setting current: (A)	32,5 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	Test current: 105% of the maximum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the maximum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	Short-circuit release ±20% Inverse time-delay Releases ±30%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	Yes	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)		N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		N/A
			N/A
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1d	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated current: In (A)	32 A	
	Ambient temperature 10-40 °C :	40°C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	320 A	P
	Range of adjustable setting current. (A)	160-320 A	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	128 A	P

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 80% of the maximum adjustable setting current: (A)	256 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	192 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2:- L1-L3: L2-L3:		N/A

ВЯРНО С ОРИГИНАЛА

ELECTRIS LTD * ЕЛЕКТРИС ЕООД *

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 120% of the maximum adjustable setting current: (A)	384 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: tripping current declared for single pole operation (A)	320 A	P
	Operating time: < 200 ms in case of instantaneous release: L1: L2: L3:	 operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:		N/A
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark		
	Type designation or serial number		
	Sample no:		
	Rated operational voltage: Ue (V)		
	Rated current: In (A)		
	Ambient temperature 10-40 °C :		N/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		N/A

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ELECTRIS LTD * ЕЛЕКТРИС ЕООД *

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Range of adjustable setting current. (A)		N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the maximum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1d	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated current: In (A)	32 A	

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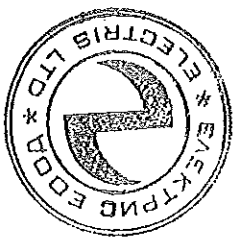
ELECTRIS LTD * ЕЛЕКТРИС ЕООД

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	For releases dependent of ambient air temperature: Reference temperature	40°C	P
	Test ambient temperature (°C)	40°C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	40°C	P
	Range of adjustable setting current: (A)	-	N/A
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C		N/A
	Test ambient air temperature:	40°C	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	N/A
	Releases, independent of ambient air temperature: at 30°C		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	26,25 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	26 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Test current: 105% of the maximum adjustable setting current: (A)	32,5 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the maximum adjustable setting current: (A)	41,6 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)		N/A

ВЯРНО С ОРИГИНАЛА



IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	Test current: 105% of the maximum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the maximum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	P
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	Short-circuit release ±20% Inverse time-delay Releases ±30%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	Yes	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)		N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		N/A
	Manufacturer's name or trademark	OEZ s.r.o.	

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Type designation or serial number	BC 160N	
	Sample no:	1e	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated current: In (A)	40 A	
	Ambient temperature 10-40 °C :	40°C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	400 A	P
	Range of adjustable setting current. (A)	200-400 A	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	160 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 80% of the maximum adjustable setting current: (A)	320 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	240 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the maximum adjustable setting current: (A)	480 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: tripping current declared for single pole operation (A)	400 A	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: < 200 ms in case of instantaneous release: L1: L2: L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:		N/A
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark		
	Type designation or serial number		
	Sample no:		
	Rated operational voltage: Ue (V)		
	Rated current: In (A)		
	Ambient temperature 10-40 °C :		N/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		N/A
	Range of adjustable setting current. (A)		N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the maximum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1e	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690V AC	
	Rated current: In (A)	40 A	
	For releases dependent of ambient air temperature: Reference temperature	40°C	P
	Test ambient temperature (°C)	40°C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	40°C	P
	Range of adjustable setting current: (A)	-	N/A
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C		N/A
	Test ambient air temperature:	40°C	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	N/A
	Releases, independent of ambient air temperature: at 30°C		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	33,6 A	P

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	41,6 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Test current: 105% of the maximum adjustable setting current: (A)	42 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the maximum adjustable setting current: (A)	52 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	Test current: 105% of the maximum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the maximum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	P

С ОРИГИНАЛА

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	short-circuit release ±20% Inverse time-delay releases ±30%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	Yes	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)		N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		N/A
			N/A
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1f	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated current: In (A)	50 A	
	Ambient temperature 10-40 °C :	40°C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	50 A	P
	Range of adjustable setting current. (A)	250-500 A	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	200 A	P

ВЕРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 80% of the maximum adjustable setting current: (A)	400 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	300 A	
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 120% of the maximum adjustable setting current: (A)	600 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: operate of the release L1-L3: operate of the release L2-L3: operate of the release		P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: tripping current declared for single pole operation (A)	500 A	P
	Operating time: < 200 ms in case of instantaneous release: L1: operate of the release L2: operate of the release L3: operate of the release		P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:		N/A
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark		
	Type designation or serial number		
	Sample no:		
	Rated operational voltage: Ue (V)		
	Rated current: In (A)		
	Ambient temperature 10-40 °C :		N/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		N/A

ВЯРНО С ОРИГИНАЛА

ELECTRIS * ЕЛЕКТРИС ЕООД *

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Range of adjustable setting current. (A)		N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the maximum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1f	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V, 690 V AC	
	Rated current: In (A)	50 A	

ВЕРНО С ОРИГИНАЛА

ЕЛЕКТРИС ЕООД * ELECTRIS LTD *

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	For releases dependent of ambient air temperature: Reference temperature	40°C	P
	Test ambient temperature (°C)	40°C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	40°C	P
	Range of adjustable setting current: (A)	-	
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C		N/A
	Test ambient air temperature:	40°C	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	N/A
	Releases, independent of ambient air temperature: at 30°C	N/A	N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	42 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	52 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Test current: 105% of the maximum adjustable setting current: (A)	52,25 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the maximum adjustable setting current: (A)	65 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)		N/A

ВЕРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	Test current: 105% of the maximum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the maximum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	P
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	short-circuit release ±20% Inverse time-delay releases ±30%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	Yes	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)		N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		N/A
	Manufacturer's name or trademark	OEZ s.r.o.	

ВЯРНО С ОРИГИНАЛА

ELEKTRIS * ЕЛЕКТРИС ЕООД * LTD

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Type designation or serial number	BC 160N	
	Sample no:	1g	
	Rated operational voltage: Ue (V)	230 V,415 V,500V,690 V AC	
	Rated current: In (A)	63 A	
	Ambient temperature 10-40 °C :	40°C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	630 A	P
	Range of adjustable setting current. (A)	315-630 A	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	252 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: No operate of the release L1-L3: No operate of the release L2-L3: No operate of the release		P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 80% of the maximum adjustable setting current: (A)	504 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: No operate of the release L1-L3: No operate of the release L2-L3: No operate of the release		P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	409,5 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the maximum adjustable setting current: (A)	756 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: tripping current declared for single pole operation (A)	630 A	P

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: < 200 ms in case of instantaneous release: L1: L2: L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:		N/A
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark		
	Type designation or serial number		
	Sample no:		
	Rated operational voltage: Ue (V)		
	Rated current: In (A)		
	Ambient temperature 10-40 °C :		N/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		N/A
	Range of adjustable setting current. (A)		N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the maximum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1g	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V, 690 V AC	
	Rated current: In (A)	63 A	
	For releases dependent of ambient air temperature: Reference temperature	40°C	P
	Test ambient temperature (°C)	40°C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	40°C	P
	Range of adjustable setting current: (A)	-	N/A
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C		N/A
	Test ambient air temperature:	40°C	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	N/A
	Releases, independent of ambient air temperature: at 30°C		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	52,5 A	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	65 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Test current: 105% of the maximum adjustable setting current: (A)	66,15 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the maximum adjustable setting current: (A)	81,9 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	Test current: 105% of the maximum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the maximum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	short-circuit release ±20% Inverse time-delay releases ±30%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	Yes	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)		N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		N/A
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC160N	
	Sample no:	1h	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated current: In (A)	80 A	
	Ambient temperature 10-40 °C :	40°C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	800 A	P
	Range of adjustable setting current. (A)	400-800 A	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	320 A	P

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 80% of the maximum adjustable setting current: (A)	640 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	480 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 120% of the maximum adjustable setting current: (A)	960 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: tripping current declared for single pole operation (A)	800 A	P
	Operating time: < 200 ms in case of instantaneous release: L1: L2: L3:	 operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:		N/A
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark		
	Type designation or serial number		
	Sample no:		
	Rated operational voltage: Ue (V)		
	Rated current: In (A)		
	Ambient temperature 10-40 °C :		N/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Range of adjustable setting current. (A)		N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the maximum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1h	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V 690V AC	
	Rated current: In (A)	80 A	

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	For releases dependent of ambient air temperature: Reference temperature	40°C	P
	Test ambient temperature (°C)	40°C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	40°C	P
	Range of adjustable setting current: (A)	-	N/A
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C		N/A
	Test ambient air temperature:	40°C	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	N/A
	Releases, independent of ambient air temperature: at 30°C		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	66,15 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	81,9 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Test current: 105% of the maximum adjustable setting current: (A)	84 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the maximum adjustable setting current: (A)	104 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)		N/A

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	Test current: 105% of the maximum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the maximum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	P
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	short-circuit release ±20% Inverse time-delay releases ±30%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	Yes	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)		N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		N/A
			N/A
	Manufacturer's name or trademark	OEZ s.r.o.	

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Type designation or serial number	BC 160N	
	Sample no:	1i	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated current: In (A)	100 A	
	Ambient temperature 10-40 °C :	40°C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	1000 A	P
	Range of adjustable setting current. (A)	500-1000 A	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	400 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 80% of the maximum adjustable setting current: (A)	800 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	600 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the maximum adjustable setting current: (A)	1200 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: tripping current declared for single pole operation (A)	1000 A	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: < 200 ms in case of instantaneous release: L1: L2: L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:		N/A
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark		
	Type designation or serial number		
	Sample no:		
	Rated operational voltage: Ue (V)		
	Rated current: In (A)		
	Ambient temperature 10-40 °C :		N/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		N/A
	Range of adjustable setting current. (A)		N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the maximum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1i	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated current: In (A)	100 A	
	For releases dependent of ambient air temperature: Reference temperature	40°C	P
	Test ambient temperature (°C)	40°C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	40°C	P
	Range of adjustable setting current: (A)	-	N/A
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C		N/A
	Test ambient air temperature:	40°C	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	N/A
	Releases, independent of ambient air temperature: at 30°C	N/A	N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	84 A	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	104 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Test current: 105% of the maximum adjustable setting current: (A)	105 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the maximum adjustable setting current: (A)	130 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	Test current: 105% of the maximum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the maximum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	P

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	short-circuit release ±20% Inverse time-delay releases ±30%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	Yes	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)		N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		N/A
			N/A
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1j	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated current: In (A)	125 A	
	Ambient temperature 10-40 °C :	40°C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	1250 A	P
	Range of adjustable setting current. (A)	625-1250 A	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	500 A	P

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 80% of the maximum adjustable setting current: (A)	1000 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	750 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A

ВЯРНО С ОРИГИНАЛ

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 120% of the maximum adjustable setting current: (A)	1500 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: tripping current declared for single pole operation (A)	1250 A	P
	Operating time: < 200 ms in case of instantaneous release: L1: L2: L3:	 operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:		N/A
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark		
	Type designation or serial number		
	Sample no:		
	Rated operational voltage: Ue (V)		
	Rated current: In (A)		
	Ambient temperature 10-40 °C :		N/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Range of adjustable setting current. (A)		N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the maximum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1j	
	Rated operational voltage: Ue (V)	230 V,415 V,500V,690V AC	
	Rated current: In (A)	125 A	

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	For releases dependent of ambient air temperature: Reference temperature	40°C	P
	Test ambient temperature (°C)	40°C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	40°C	P
	Range of adjustable setting current: (A)	-	N/A
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C		N/A
	Test ambient air temperature:	40°C	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	N/A
	Releases, independent of ambient air temperature: at 30°C	N/A	N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	105 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	130 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Test current: 105% of the maximum adjustable setting current: (A)	131,25A	
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the maximum adjustable setting current: (A)	162,5 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)		N/A

BARRO CUPERTINO

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	Test current: 105% of the maximum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the maximum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	P
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	short-circuit release ±20% Inverse time-delay releases ±30%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	Yes	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)		N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		N/A
			N/A
	Manufacturer's name or trademark	OEZ s.r.o.	

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Type designation or serial number	BC 160N	
	Sample no:	1k	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated current: In (A)	160 A	
	Ambient temperature 10-40 °C :	40°C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	1600 A	P
	Range of adjustable setting current. (A)	800-1600 A	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	640 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 80% of the maximum adjustable setting current: (A)	1280 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	960 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the maximum adjustable setting current: (A)	1920 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: tripping current declared for single pole operation (A)	1600 A	P

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Operating time: < 200 ms in case of instantaneous release: L1: L2: L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:		N/A
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark		
	Type designation or serial number		
	Sample no:		
	Rated operational voltage: Ue (V)		
	Rated current: In (A)		
	Ambient temperature 10-40 °C :		N/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		N/A
	Range of adjustable setting current. (A)		N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the maximum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BC 160N	
	Sample no:	1k	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated current: In (A)	160 A	
	For releases dependent of ambient air temperature: Reference temperature	40°C	P
	Test ambient temperature (°C)	40°C	P
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:	40°C	P
	Range of adjustable setting current: (A)	-	N/A
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C		N/A
	Test ambient air temperature:	40°C	N/A
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	N/A
	Releases, independent of ambient air temperature: at 30°C		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	131,25 A	P

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	162,5 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Test current: 105% of the maximum adjustable setting current: (A)	168 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the maximum adjustable setting current: (A)	208A	
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: 105% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the rated, or minimum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	Test current: 105% of the maximum adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the maximum adjustable setting current: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40°C	P

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	short-circuit release ±20% Inverse time-delay releases ±30%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	Yes	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)		N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		N/A
8.3.3.1.4	Additional test for definite time-delay releases		
a)	Time delay		
	Test is made at a current equal to 1,5 times the current setting		
	overload releases: (all phase poles loaded)		N/A
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.		N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time, overload releases: (s)		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Operating time, short-circuit releases: (s) L1-L2: L1-L3: L2-L3:		N/A

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Time-delay: between the limits stated by the manufacturer:		N/A
	Test current: 1,5 times of the maximum adjustable setting current: (A)		N/A
	Operating time, overload releases: (s)		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Operating time, short-circuit releases: (s) L1-L2: L1-L3: L2-L3:		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
b)	Non-tripping duration		
	Firstly, the test current equal to 1,5 times the current setting is maintained for a time interval equal to the non-tripping duration stated by the manufacturer.		
	overload releases: (all phase poles loaded)		N/A
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.		N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)		N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)		N/A
	Operating time, overload releases: the circuit-breaker does not trip:		N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 1,5 times of maximum adjustable setting current: (A)		N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)		N/A
	Operating time, overload releases: the circuit-breaker does not trip:		N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:		N/A

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Then, the current is reduced to the rated current and maintained at this value for twice the time-delay stated by the manufacturer. The circuit-breaker shall not trip.		
	Test current: of the rated, or minimum adjustable setting current: (A)		N/A
	Time interval: twice the delay-time stated by the manufacturer: (s)		N/A
	Operating time, overload releases: the circuit-breaker does not trip:		N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:		N/A
	Test current: maximum adjustable setting current: (A)		N/A
	Operating time, overload releases: the circuit-breaker does not trip:		N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:		N/A
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	8 kV main circuits 4 kV auxiliary circuits	P
	- sea level of the laboratory:	340 m	P
	- test Uimp main circuits (kV) :	9,6 kV	P
	- test Uimp auxiliary circuits (kV) :	4,8 kV	P
	- test Uimp control circuits (kV) :		N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	14,5 kV	P
a)	Application of test voltage		P
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.	Meets	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	ii) Between all terminals of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.	Meets	P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit	Meets	P
	- other circuits	Meets	P
	- exposed conductive parts	Meets	P
	- enclosure of mounting plate	Meets	P
	iv) equipment suitable for isolation	Meets	P
	equipment not suitable for isolation		N/A
	- no unintentional disruptive discharge during the test's	no	P
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		
	- rated insulation voltage (V) :		N/A
	- main circuits, test voltage for 1 min (V)		N/A
	- auxiliary circuits, test voltage for 1 min (V)		N/A
	- control circuits, test voltage for 1 min (V)		N/A
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .	Meets	P
	- between each pole and all the other poles connected to the frame of the circuit-breaker	Meets	P
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.		P
	- between all live parts of all poles connected together and the frame of the circuit-breaker.	Meets	P
	- between the terminals of one side connected together and the terminals of the other side connected together.	Meets	P
b)	Control and auxiliary circuits		
1)	- between all the control and auxiliary circuits which are not normally connected to the main circuit, connected together, and the frame of the circuit-breaker.	Meets	P

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2)	- where appropriate, between each part of the control an auxiliary circuits which may be isolated from the other parts during normal operation and all the other parts connected together.	Meets	P
	No unintentional disruptive discharge during the test's	no	P
8.3.3.2	For circuit-breaker suitable for isolation, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 Ue, and shall not exceed 0,5mA.	0,015 mA	P
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		
a)	Construction		
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1		N/A
	A circuit-breaker with stored energy operation shall be checked for compliance with 7.2.1.1.5, regarding the charge indicator and the direction of operation of manual energy storing		N/A
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3		N/A
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer		N/A
	A circuit-breaker with stored energy operation shall comply with the requirements stated in 7.2.1.5 with the auxiliary supply voltage at 85% and 110% of the rated control supply voltage.		N/A
	It shall also be verified that the moving contacts cannot be moved from the open position when the operating mechanism is charged to slightly below the full charge as evidenced by the indicating device		N/A
	For a trip-free circuit-breaker it shall not be possible to maintain the contacts in the touching or closed position when the tripping release is in the position to trip the circuit-breaker	Satisfy	P
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values	Satisfy	P

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Clause	Requirement – Test	Result – Remark	Verdict
c)	Undervoltage releases		
	Undervoltage releases shall comply with the requirements of 7.2.1.3 of Part 1. For this purpose, the release shall be fitted to a circuit-breaker having the maximum current rating for which the release is suitable	Satisfy	P
i)	Drop out voltage		
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified	Satisfy	P
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s	Satisfy	P
	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil	Satisfy	P
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range	Satisfy	P
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles of the circuit-breaker	Satisfy	P
	This test may be combined with the temperature-rise test of 8.3.3.6	Satisfy	P
	In the case of a release with a range of rated voltages, this test is made at both the minimum and maximum rated control supply voltages	Satisfy	P
ii)	Test for limits of operation		
	Starting with the circuit-breaker open, at the temperature of the test room, and with the supply voltage at 30% rated maximum control supply voltage, it shall be verified that the circuit-breaker cannot be closed by the operation of the actuator	Satisfy	P
	When the supply voltage is raised to 85% of the minimum control supply voltage, it shall be verified that the circuit-breaker can be closed by the operation of the actuator	Satisfy	P

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Clause	Requirement – Test	Result – Remark	Verdict
iii)	Performance under overvoltage conditions		
	With the circuit-breaker closed and without current in the main circuit, it shall be verified that the undervoltage release will withstand the application of 110% rated control supply voltage for 4 h without impairing its functions	Satisfy	P
d)	Shunt releases		
	Shunt releases shall comply with the requirements of 7.2.1.4 of Part 1. For this purpose, the release shall be fitted to a circuit-breaker having the maximum rated current for which the release is suitable	Satisfy	P
	It shall be verified that the release will operate to open the circuit-breaker at 70% rated control supply voltage when tested at an ambient temperature of + 55 °C ± 2 °C without current in the main poles of the circuit-breaker	Satisfy	P
	In the case of a release having a range of rated control supply voltages, the test voltage shall be 70% of the minimum rated control supply voltage	Satisfy	P
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	BC 160N	
	Sample no:	1	
	Rated current In (A)	160 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated control supply voltage of closing mechanism: Uc (V)	N/A	
	Rated control supply voltage of shunt releases: Uc (V)	230 V AC	
	Rated control supply voltage undervoltage releases: Uc (V)	230 V AC	
	Ambient temperature 10-40 °C :	23°C	P
	Number of operating cycles per hour	180/hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	20000	P
	Number of cycles without current (without releases)	16000	P
	Applied voltage: closing mechanism (V)		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc	2000	P
	Applied voltage: shunt releases (V)	400 V AC	P
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc	2000	P
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)	Meets	P
	Applied voltage: undervoltage releases (V)	400 V AC	P
	Electrical components do not exceed the value indicated in tab. 7.		N/A
8.3.3.3.4	Operational performance capability with current.		
	Rated current: In (A)	160 A	
	Maximum rated operational voltage: Ue (V)	690 V	
	Conductor cross-sectional area (mm^2) :	70 mm^2	P
	Number of operating cycles per hour	180/hour	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	4000	P
	Applied voltage: closing mechanism (V)		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	Satisfy	P
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	690 V 690 V 690 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	160 A 160 A 160 A	P
	- power factor/time constant:	0,8	P
	- frequency: (Hz)	50 Hz	P
	- on-time (ms):	60 ms	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- off-time (s):	20 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Meets	P
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100		N/A
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.		N/A
8.3.3.4	Overload performance		
	this test applies to circuit-breaker of rated current up to and including 630 A		
	Type designation or serial number	BC 160N	
	Sample no:	1	
	Rated current In (A)	160 A	
	Rated operational voltage: Ue (V)	690 V AC	
	Rated control supply voltage of closing mechanism: Uc (V)	N/A	
	Rated control supply voltage of shunt releases: Uc (V)	230 V AC	
	Rated control supply voltage undervoltage releases: Uc (V)	230 V AC	
	Ambient temperature 10-40 °C :	22°C	P
	Number of operating cycles per hour	180/hour	P
	Maximum rated operational voltage: Ue (V)	690 V	P
	Number of operating cycles per hour	180/hour	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	12	P
	Applied voltage: closing mechanism (V)		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.	Satisfy	P
	Conditions, overload operations:		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	725 V 725 V 725 V	P

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Clause	Requirement – Test	Result – Remark	Verdict
	- test current AC/DC: I/Ie = 6,0/2.5 (A) ..... L1: ..... L2: L3:	 960 A AC 960 A AC 960 A AC	P
	- power factor/time constant:	0,5	P
	- Number of cycles manually opened: 9	-	
	- Number of cycles automatically opened by an overload release: 3	12	P
	- frequency: (Hz)	50 Hz	P
	- on-time max 2s:	Satisfy	
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1380 V	P
	- no breakdown or flashover	Meets	P

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
8.3.3.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	Meets	P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	Max. 68 K	P
	conductor cross-sectional area (mm^2) :	70 mm^2	P
	test current Ie (A) :	160 A	P
8.3.3.7	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	232 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	6'23"	P
8.3.3.8	Verification of undervoltage and shunt releases		
	Circuit-breaker fitted with undervoltage releases. The release shall not operate at 70% of the minimum control supply voltage -	Satisy	P
	and shall operate at 35% of the maximum control supply voltage.	Satisfy	P
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.	Satisfy	P

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		
	actuating force for opening (N)	55 N	—
	test force with blocked main contacts for 10 s (N)	165 N	—
	Dependent power operation		
	Supply voltage of 110% of rated voltage (V).....:		N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.		N/A
	Independent power operation		
	Three attempts to operate the equipment by the stored energy.	Satisfy	P
	Lockability of driving mechanism in OFF-position at test force and blocked main contacts	165 N	P
	Position indicator does not show OFF-position after capture of test force at blocked main contacts	Meets	P
8.3.4	TEST SEQUENCE II (Ics):		
8.3.4.1	Test of rated service short-circuit breaking capacity		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number	BC 160	
	Sample no:	2, 3, 4,5	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	230 A,415 V,500 V,690 V AC	
	Rated service short-circuit breaking capacity: (kA)	20 kA/23 0V, 13 kA/415 V, 6 kA/500 V, 3 kA/690 V	
	Rated control supply voltage of closing mechanism: Uc (V)	--	
	Rated control supply voltage of shunt release: Uc (V)	--	
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Satisfy	P

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Clause	Requirement – Test	Result – Remark	Verdict
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Satisfy	P
	Test made in free air:	Satisfy	P
	Distances of the metallic screen's: (all sides)	Vide catalogue	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal	Yes	P
	- ratio hole area/total area: 0,45-0,65	Satisfy	P
	- size of hole: <30mm^2	Satisfy	P
	- finish: bare or conductive plating	Satisfy	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Satisfy	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	70 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)	6 Nm	P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V)..... L1: ..... L2: L3:	250 V 250 V 250 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	20,6 kA AC 19,9 kA AC 20,8 kA AC	P
	power factor/time constant :	0,27	P
	- Factor "n"	2,0	P
	- peak test current (A) :	41,0 kA	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	8,75 kA 11,6 kA 6,54 kA	P
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	122000 A^2s 287000 A^2s 86300 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	11,2 kA 9,84 kA 5,79 kA	P
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	231000 A^2s 268000 A^2s 91900 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	8,56 kA 5,16 kA 12,0 kA	P
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	144000 A^2s 434000 A^2s 298000 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V)..... L1: ..... L2: L3:	436 V 436 V 436 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	13,5 kA AC 13,0 kA AC 13,4 kA AC	P
	power factor/time constant :	0,28	P
	- Factor "n"	2,0	P
	- peak test current (A) :	25,8 kA	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	5,94 kA 11,3 kA 9,25 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	76700 A^2s 448000 A^2s 23500 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	11,4 kA 9,38 kA 6,72 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	504000 A^2s 276000 A^2s 974000 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	7,5 kA 11,4 kA 6,59 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	135000 A^2s 48500 A^2s 218000 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V)..... L1: ..... L2: L3:	550 V 550 V 550 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	6,19 kA AC 6,13 kA AC 6,38 kA AC	P
	power factor/time constant :	0,66	P
	- Factor "n"	1,5	P
	- peak test current (A) :	9,69 kA	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	5,0 kA 7,03 kA 6,41 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	120000 A^2s 184000 A^2s 203000 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	5,0 kA 7,27 kA 6,09 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	140000 A^2s 213000 A^2s 186000 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	72,7 kA 6,01 kA 5,63 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	249000 A^2s 105000 A^2s 140000 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V)..... L1: ..... L2: L3:	725 V 725 V 725 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	3,1 kA AC 3,08 kA AC 3,0 kA AC	P
	power factor/time constant :	0,8	P
	- Factor "n"	1,5	P
	- peak test current (A) :	4,5 kA	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	3,6 kA 4,42 kA 4,43 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	98700 A^2s 117000 A^2s 98800 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	4,361 kA 4,32 kA 3,78 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	109600 A^2s 96400 A^2s 91300 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	3,95 kA 4,32 A 4,58 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	99300 A^2s 116000 A^2s 110000 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	160 A	
	Maximum rated operational voltage: Ue (V)	230 V 415 V 500V 690 V	
	Conductor cross-sectional area (mm^2) :	70 mm^2	
	Number of operating cycles per hour	180/hour	P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50	P
	Applied voltage: closing mechanism (V)		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	Satisfy	P
	Conditions, make/break operations:		
	Sample no 2 3 4 5		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	230 V 415 V 500 V 690 V 230 V 415 V 500 V 690 V 230 V 415 V 500 V 690 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	160 A 160 A 160 A	P
	- power factor/time constant:	0,8	P
	- frequency: (Hz)	50 Hz	P
	- on-time (ms):	60 ms	P
	- off-time (s):	20 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Satisfy	P
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	Satisfy	P
	- no breakdown or flashover		P
	Sample no	2 3 4 5	
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	0,1 mA 0,08 mA 0,1 mA 0,17 mA	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.	Satisfy	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	Max. 73 K	P
	conductor cross-sectional area (mm²) :	70 mm²	P
	test current Ie (A) :	160 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	232 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	8'01" 6'15" 9'35" 7'49"	P

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
8.3.4.1	Test of rated service short-circuit breaking capacity		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		
	Rated service short-circuit breaking capacity: (kA)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		N/A
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N/A
	Test made in free air:		N/A
	Distances of the metallic screen's: (all sides)		N/A
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		N/A
	- size of hole: <30mm^2		N/A
	- finish: bare or conductive plating		N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm²):		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)		N/A
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		N/A
	- Operation time: (s) ..... L1: ..... L2: L3:		N/A
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	power factor/time constant :		
	- Factor "n"		N/A
	- peak test current (A) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Pause, t: (min)		
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Pause, t: (min)		N/A

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Melting of the fusible element		N/A
	Holes in the PE-sheet for test sequence "O"		N/A
	Cracks observed		
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)		
	Maximum rated operational voltage: Ue (V)		
	Conductor cross-sectional area (mm^2) :		
	Number of operating cycles per hour		N/A
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)		N/A
	Applied voltage: closing mechanism (V)		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:		N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:		N/A
	- power factor/time constant:		N/A
	- frequency: (Hz)		N/A
	- on-time (ms):		N/A
	- off-time (s):		N/A
	Electrical components do not exceed the value indicated in tab. 7.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V		N/A
	- no breakdown or flashover		N/A
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)		N/A
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.		N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :		N/A
	conductor cross-sectional area (mm²) :		N/A
	test current Ie (A) :		N/A
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	Except where the combined test sequence applies, this test sequence applies to circuit-breaker of utilization category A and to circuit-breaker of utilization B having a rated ultimate short-circuit breaking capacity higher than the rated short-time withstand current.		
	For circuit-breakers of utilization B having a rated short-time withstand current equal to their rated ultimate short-circuit breaking capacity, this test sequence need not be made, since, in this case, the ultimate short-circuit breaking capacity, is verified when carrying out test sequence IV.		
	For integrally fused circuit-breakers, test sequence V applies in place or this sequence.		
	Type designation or serial number	BC 160N	
	Sample no:	6, 7, 8, 9	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	230 V,415 V,500 V,690 V AC	
	Rated ultimate short-circuit breaking capacity: (kA)	40 kA/230 V, 25 kA/415 V 12 kA/500 V, 6 kA/690 V	
	Rated control supply voltage of closing mechanism: Uc (V)	N/A	
	Rated control supply voltage of shunt release: Uc (V)	N/A	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	1'17"	P
	Sample no:	6 7 8 9	
	- Operation time: (s) ..... L1: ..... L2: L3:	1'26 1'45" 1'11" 1'25" 1'32" 1'24" 1'41" 1'31" 1'23" 1'40" 1'19" 1'20"	P
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t - CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Satisfy	P

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Clause	Requirement – Test	Result – Remark	Verdict
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Satisfy	P
	Test made in free air:	Satisfy	P
	Distances of the metallic screen's: (all sides)	Vide catalogue	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal	Yes	P
	- ratio hole area/total area: 0,45-0,65	Satisfy	P
	- size of hole: <30mm^2	Satisfy	P
	- finish: bare or conductive plating	Satisfy	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Satisfy	P
	Circuit is earthed at: (load-star- or supply-star-point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	70 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening, torques: (Nm)	6 Nm	P
	Test sequence of operation: O – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	250 V 250 V 250 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	41,7 kA 38,6 kA 40,7 kA	P
	power factor/time constant :	0,24	P
	- Factor "n"	2,1	P
	- peak test current (Amax) :	84,4 kA	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	10,9 kA 15,0 kA 7,8 kA	P
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	139000 A^2s 350000 A^2s 96300 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	6,25 kA 14,5 kA 10,9 kA	P
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	43800 A^2s 315000 A^2s 143000 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
	Test sequence of operation: O – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	440 V 440 V 440 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	25,7 kA 24,9 kA 25,7 kA	P
	power factor/time constant :	0,20	P
	- Factor "n"	2,1	P
	- peak test current (Amax) :	55,4 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	9,47 kA 16,4 kA 12,5 kA	P
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	153000 A^2s 785000 A^2s 381000 A^2s	P
	Pause, t: (min)	3 min	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	13,1 kA 6,25 kA 15,6 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	434000 A^2s 65200 A^2s 664000 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
	Test sequence of operation: O – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	525 V 525 V 525 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	12,2 kA 12,0 kA 12,1 kA	P
	power factor/time constant :	0,27	P
	- Factor "n"	2,0	P
	- peak test current (Amax) :	24,6 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	11,04 kA 10,1 kA 5,16 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	519000 A^2s 337000 A^2s 59380 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	10,08 kA 10,09 kA 9,48 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	313000 A^2s 638000 A^2s 302000 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequence of operation: O – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	725 V 725 V 725 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	6,12 kA 6,03 kA 6,0 kA	P
	power factor/time constant :	0,7	P
	- Factor "n"	1,5	P
	- peak test current (Amax) :	9,25 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	5,67 kA 7,24 kA 5,72 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	98400 A^2s 258000 A^2s 109900 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	7,12 kA 5,89 kA 6,13 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	236000 A^2s 102000 A^2s 178000 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
8.3.5.3	Verification of dielectric withstand		
	Sample no:	6 7 8 9	
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V 1000 V 1100 V 1380 V	P
	- no breakdown or flashover		P
	Sample no:	6 7 8 9	
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	0,09mA 0,42mA 0,59mA 0,1mA	P

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.5.6	Verification of temperature-rise		
	Sample no:	6 7 8 9	
	- the values of temperature-rise do not exceed the those specified in tab. 7.	sStisfy	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	Max 71 K 75 73 K 70 k	P
	conductor cross-sectional area (mm²) :	70 mm²	P
	test current Ie (A) :	160 A	
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	65"	P
	Sample no:	6 7 8 9	
	- Operation time: (s) .....L1: ..... L2: L3:	62" 68" 64" 62" 64" 67" 68" 63" 62" 69" 67" 67"	P
8.3.6	TEST SEQUENCE IV		
	Rated short-time withstand current		
	Except where the combined test sequence applies, this test sequence applies to circuit-breakers of utilization category B and to those circuit-breaker of category A covered by note 3 of table 4, and comprises the following tests:		
	Where integrally fused circuit-breaker are of utilization category B, they shall meet the requirements of this sequence.		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		
	Rated short-time withstand current: (kA/s)		
	Rated frequency: (Hz)		
8.3.6.1	Verification of overload releases		

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Clause	Requirement – Test	Result – Remark	Verdict
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		N/A
	- Operation time: (s) ..... L1: ..... L2: L3:		N/A
8.3.6.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)		N/A
	- duration of the test: (s)		N/A
	- test frequency: (Hz)		N/A
	- power factor / time constant (ms):		N/A
	- factor "n"		N/A
	- test voltage: (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current: (kA)..... L1: ..... L2: L3:		N/A
	- highest peak current: (kA)		N/A
8.3.6.3	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.		N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :		N/A
	conductor cross-sectional area (mm²) :		N/A
	test current Ie (A) :		N/A
8.3.6.4	Test of short-circuit breaking capacity at the max. short-time withstand current.		
	Rated short-time withstand current: (kA/s)		
	Test sequence: O – t – CO		
	max. available time setting of the short–time delay short-circuit release. (s)		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	- test frequency: (Hz)		N/A
	- power factor / time constant (ms):		N/A
	- factor "n"		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Pause, t: (min)		N/A
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -		N/A
	- the instantaneous override, if any, shall not operate.		N/A
	-pause: t (s)		N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Pause, t: (min)		N/A
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -		N/A
	- the instantaneous override, if any, shall not operate.		N/A
	- if the circuit-breaker has a making current release, this requirement does not apply to the CO operation, if the prospective current exceeds the pre-determined value, since it will then operate.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
8.3.6.5	Verification of dielectric withstand		N/A
	- equal to twice the rated operational voltage with a minimum of 1000 V		
	- no breakdown or flashover		N/A
8.3.6.6	Verification of overload releases		N/A
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:		N/A
8.3.7	TEST SEQUENCE V		
	Performance of integrally fused circuit-breakers		
	STAGE 1		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		
	Value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)		
	Type of integrated fuses (all details)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		
8.3.7.1	Short-circuit at the selectivity limit current		
	Test sequences "O"		N/A
	Fuses shall be fitted		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		
	closing mechanism energized with 85% at the rated Uc: (V)		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N/A
	Test made in free air:		N/A
	Distances of the metallic screen's: (all sides)		N/A
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		N/A
	- size of hole: <30mm^2		N/A
	- finish: bare or conductive plating		N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm²) :		N/A
	If terminals unmarked: line-connected at: (underside/upside)		N/A
	Tightening torques: (Nm)		N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	power factor/time constant :		N/A
	- factor "n"		N/A
	- peak test current (Amax) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	- fuses shall still intact ..... L1: ..... L2: L3:		N/A
8.3.7.2	Verification of temperature-rise		N/A
	- the values of temperature-rise do not exceed the those specified in tab. 7.		N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :		N/A
	conductor cross-sectional area (mm^2) :		N/A
	test current Ie (A) :		N/A
8.3.7.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V		N/A
	- no breakdown or flashover		N/A

	STAGE 2		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		
	1.1 time the value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)		
	Type of integrated fuses (all details)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		
8.3.7.4	Verification of overload releases		

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Clause	Requirement – Test	Result – Remark	Verdict
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:		N/A
8.3.7.5	Short-circuit at 1,1 times the take-over current		
8.3.7.1	Short-circuit at the selectivity limit current		
	Test sequences "O"		
	Fuses shall be fitted		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N/A
	Test made in free air:		N/A
	Distances of the metallic screen's: (all sides)		N/A
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		N/A
	- size of hole: <30mm^2		N/A
	- finish: bare or conductive plating		N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0.8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm^2) :		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)		N/A
	1.1 time the value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	power factor/time constant :		N/A
	- factor "n"		N/A
	- peak test current (Amax) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	- at least two of the fuses shall have blown .... L1: ..... L2: L3:		N/A
8.3.7.6	Short-circuit at ultimate short-circuit breaking capacity		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		
	Rated ultimate short-circuit breaking capacity. (kA)		
	Type of integrated fuses (all details)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		

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Clause	Requirement – Test	Result – Remark	Verdict
	Test sequences: O – t – CO		
	Fuses shall be fitted		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N/A
	Test made in free air:		N/A
	Distances of the metallic screen's: (all sides)		N/A
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		N/A
	- size of hole: <30mm^2		N/A
	- finish: bare or conductive plating		N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm^2) :		N/A
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)		N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	power factor/time constant :		N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- factor "n"		N/A
	- peak test current (A) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Pause: t (s)		N/A
	new fitted fuses		N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
8.3.7.7	Verification of dielectric withstand		
	- equal twice time rated operational voltage with a minimum of 1000 V (new fuses fitted)		N/A
	- no breakdown or flashover		N/A
8.3.7.8	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:		N/A

8.3.8	Combined test sequence		
	At the discretion of, or in agreement with the manufacturer, this sequence may be applied to circuit-breaker of utilization cat. B:		
	Type designation or serial number		N/A
	Sample no:		N/A

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Rated current: In (A)		N/A
	Rated operational voltage: Ue (V)		N/A
	Rated short-time withstand current: (kA/s)		N/A
	Rated frequency: (Hz)		N/A
8.3.8.1	Verification of overload releases		
	The operation of overload releases shall be verified twice times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:		N/A
8.3.8.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)		N/A
	- duration of the test: (s)		N/A
	- test frequency: (Hz)		N/A
	- power factor / time constant (ms):		N/A
	- factor "n"		N/A
	- test voltage: (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:		N/A
	- highest peak current: (kA)		N/A
8.3.8.3	Test of rated service short-circuit breaking capacity		
	At the highest voltage applicable to the rated short-time current.		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Rated operational voltage: Ue (V)		
	Rated service short-circuit breaking capacity: (kA)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N/A
	Test made in free air:		N/A
	Distances of the metallic screen's: (all sides)		N/A
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		N/A
	- size of hole: <30mm^2		N/A
	- finish: bare or conductive plating		N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm^2) :		N/A
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)		N/A
	Test sequence of operation: O – t – CO – t – CO		N/A
	The highest voltage applicable to the rated short-time current.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	power factor/time constant :		N/A
	- Factor "n"		N/A
	- peak test current (A) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Pause, t: (min)		N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Pause, t: (min)		N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	The circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short-time delay short-circuit release.		N/A
	During this test the instantaneous override shall not operate		N/A
	- and the making current release shall operate		N/A

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
8.3.8.4	Operational performance capability with current.		
	Rated current: In (A)		N/A
	Maximum rated operational voltage: Ue (V)		N/A
	Conductor cross-sectional area (mm²) :		N/A
	Number of operating cycles per hour		N/A
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)		N/A
	Applied voltage: closing mechanism (V)		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		N/A
	Conditions, make/break operations:		N/A
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:		N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:		N/A
	- power factor/time constant:		N/A
	- frequency: (Hz)		N/A
	- on-time (ms):		N/A
	- off-time (s):		N/A
	Electrical components do not exceed the value indicated in tab. 7.		N/A
8.3.8.5	Verification of dielectric withstand		N/A
	- equal to twice the rated operational voltage with a minimum of 1000 V		
	- no breakdown or flashover		N/A
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)		N/A
8.3.8.7	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.		N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :		N/A

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	conductor cross-sectional area (mm²) :		N/A
	test current Ie (A) :		N/A
8.3.8.7	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: L3:		N/A
Annex B	Circuit-breakers incorporating residual current protection		
B.3	Classification etc....		
Annex C	Individual pole short-circuit test sequence		
	Circuit-breaker for use on phase-earthed systems		
C.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made with a value of prospective current (Isu) equal to 25% of the ultimate rated short-circuit breaking capacity (Icu) .		
	Type designation or serial number	BC 160N	
	Sample no:	10	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated ultimate short-circuit breaking capacity: (kA)	12 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	N/A	
	Rated control supply voltage of shunt release: Uc (V)	N/A	

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	The test sequence of operations is O – t - CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Satisfy	P
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Satisfy	P
	Test made in free air:	Satisfy	P
	Distances of the metallic screen's: (all sides)	Vide catalogue	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal	Yes	P
	- ratio hole area/total area: 0,45-0,65	Satisfy	P
	- size of hole: <30mm^2	Satisfy	P
	- finish: bare or conductive plating	Satisfy	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Satisfy	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	70 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)	6 Nm	P
	Test sequence of operation: O – t – CO		
	Test circuit according figure: 9	Satisfy	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	525 V 525 V 525 V	P
	short-circuit test current (Isu): equal to 25% of the ultimate rated short-circuit breaking capacity (Icu)		
	- r.m.s. test current AC/DC: (A):	3 kA AC	P
	power factor/time constant :	0,9	P

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- Factor "n"	1,46	P
	- peak test current (Amax) :	4,38 kA	P
	Test sequence "O" L1		
	- max. let-through current: (kApeak) L1:	4,22 kA	P
	- Joule integral I^2dt (A^2s) L1:	98000 A^2s	P
	Pause, t: (min)	3min	P
	Test sequence "CO" L1		
	- max. let-through current: (kApeak) L1:	4,37kA	P
	- Joule integral I^2dt (A^2s) L1:	111000 A^2s	P
	Test sequence "O" L2		
	- max. let-through current: (kApeak) L2:	4,18 kA	P
	- Joule integral I^2dt (A^2s) L2:	105000 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L2		
	- max. let-through current: (kApeak) L2:	4,41 A	P
	- Joule integral I^2dt (A^2s) L2:	109000 A^2s	P
	Test sequence "O" L3		
	- max. let-through current: (kApeak) L3:	4,14 kA	P
	- Joule integral I^2dt (A^2s) L3:	94000 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L3		
	- max. let-through current: (kApeak) L3:	3,63 kA	P
	- Joule integral I^2dt (A^2s) L3:	114000 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
C.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover		P

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
C.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	65"	
	- Operation time: (s).....L1: .....L2: L3:	69" 67" 65"	P
Annex F	Additional tests for circuit-breakers with electronic over-current protection		N/A
F.4.	Immunity tests		N/A
F.4.1.	Tests regarding non-sinusoidal currents resulting from harmonics		N/A
F.4.1.1.	Test conditions		N/A
	Option b)		N/A
	Desired values:		N/A
	Third harmonic >60%		N/A
	Fifth harmonic >14%		N/A
	Seventh harmonic >7%		N/A
	Actual values:		N/A
	Third harmonic		N/A
	Fifth harmonic		N/A
	Seventh harmonic		N/A
F.4.1.3.	Test procedure		N/A
	Non-tripping current 0,9Ir		N/A
	Testing time		N/A
	Tripping current 2 Ir		N/A
	Release time		N/A
	Tripping current 2x Ir		
	Release time		
	Performance criterion A of F.2.1.2.		N/A
			N/A
			N/A

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IEC 60 947-2			
Clause	Requirement -- Test	Result – Remark	Verdict
F.4.2.	Current dips		N/A
	The test circuit shall be in accordance with figure F.2. IEC60947-2,		N/A
	The current applied according to figure F.5 and to table F.1		
	Performance criterion B of F. 2.1.2.		N/A
F.4.3. IEC61000-4-2	Electrostatic discharges		N/A
	At level		N/A
Annex J.2.2.	Test voltage		N/A
	Non-tripping current 0,9xIr		N/A
	Test data		N/A
	Tripping current 2xIr		
	Release time		N/A
	Performance criterion B of F. 2.1.2.		N/A
F.4.4.IEC61000-4-3	Radiated radio-frequency electromagnetic fields		N/A
Annex J.2.3.	Non-tripping current 0,9xIr		N/A
	Test data		N/A
	Tripping current 2xIr		N/A
	Release time		N/A
	Performance criterion A of F. 2.1.2.		N/A
F.4.5.	Electrical fast transients/bursts (EFT/B)		N/A
F.5.2.2.1. IEC61000-4-4 Annex J.2.4.	Non-trippng current 0,9xIr		N/A
	Testing time		N/A
	Tripping current 2xIr		N/A
	Release time		N/A
	Performance criterion A of F. 2.1.2.		N/A
F.4.6. IEC61000-4-5 Annex J.2.5.	Surges		N/A
	Non-trippng current 0,9xIr		N/A
	Total number of pulses		N/A
	Tripping current 2xIr		N/A
	Release time		N/A
	Performance criterion B of F. 2.1.2.		N/A

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
F.4.7. Annex J.2.6.	Conducted disturbances induced by radio-frequenci fields (common mode)		N/A
	Non-tripping current 0,9xIr		N/A
	Test data		N/A
	Tripping current 2 xIr		N/A
	Release time		N/A
	Performance criterion A of F. 2.1.2		N/A
F.5.4. AnnexJ.3.3 .	Radiated RF disturbances (30MHz -1GHz)		N/A
Figure F.3.	Meet the condions for classes "B"		N/A
F.6.	Suitability for multiple frequencies		N/A
F.6.	Suitability for multiple frequencies		N/A
F.7.	Dry heat test		N/A
	Ambient temperature		N/A
	Testing time		N/A
	Test data		N/A
F.7.3.	Verificatin of overload releases:		N/A
7.2.1.2.4.b)	Instanteanous release:		N/A
	setting release		N/A
	Tripping current		N/A
	Inverse time-delay releases :		N/A
	Ambient temperature		N/A
	Non-tripping current 1,05xIr		N/A
	Testing time		N/A
	Tripping current 1,3xIr		N/A
	Release time		N/A
	Ambient temperature		N/A
	Non-tripping current 1,05xIr		N/A
	Testing time		N/A
	Tripping current 1,3xIr		N/A
	Release time		N/A

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
F .8. IEC 60068-2-30	Damp heat test		N/A
	The upper temperature The number of cycles		N/A
F.8.2.	Verification of overload releases		N/A
7.2.1.2.4.b)	Instanteanous release:		N/A
	setting release 8xIr		N/A
	Tripping current		N/A
	setting release 4xIr		N/A
	Tripping current		N/A
	Inverse time-delay releases :		N/A
	Ambient temperature		N/A
	Non-tripping current 1,05xIr		N/A
	Testing time		N/A
	Tripping current 1,3xIr		N/A
	Release time		N/A
	Ambient temperature		N/A
	Non-tripping current 1,05xIr		N/A
	Testing time		N/A
	Tripping current 1,3xIr		N/A
	Release time		N/A
F .9. IEC60068-2-14	Temperature variation cycles at a specified		N/A
	Number of operating		N/A
	Test data		N/A
F.8.2.	Verification of overload releases:		N/A
7.2.1.2.4.b)	Instanteanous release:		N/A
	setting release 8xIr		N/A
	Tripping current		N/A
	setting release 4xIr		N/A
	Tripping current		N/A
	Inverse time-delay releases :		N/A
	Ambient temperature		N/A

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Non-tripping current 1,05xIr		N/A
	Testing time		N/A
	Tripping current 1,3xIr		N/A
	Release time		N/A
	Ambient temperature		N/A
	Non-tripping current 1,05xIr		N/A
	Testing time		N/A
	Tripping current 1,3xIr		N/A
	Release time		N/A
Annex G	Power loss		
	Phase L1	15 W	
	L2	15 W	
	L3	15 W	
Annex H	Individual pole short-circuit test sequence		
	Circuit-breaker for use in IT systems		
H.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made on the individual poles of a multipole circuit-breaker at a value of prospective current (I_{IT}) equal to 1,2 times the max. setting of the short-time delay release tripping current or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release, or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.		
	Type designation or serial number	BC 160N	
	Sample no:	11	
	Rated current: In (A)	160 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated ultimate short-circuit breaking capacity: (kA)	1600 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	N/A	
	Rated control supply voltage of shunt release: Uc (V)	N/A	
	The test sequence of operations is O – t - CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Satisfy	P

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Satisfy	P
	Test made in free air:	Satisfy	P
	Distances of the metallic screen's: (all sides)	Vide catalogue	P
	The characteristics of the metallic screen:		
	- woven wire mesh	N/A	N/A
	- perforated metal	N/A	N/A
	- expanded metal	Yes	P
	- ratio hole area/total area: 0,45-0,65	Satisfy	P
	- size of hole: <30mm^2	Satisfy	P
	- finish: bare or conductive plating	Satisfy	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Satisfy	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	70 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)	6 Nm	P
	Test sequence of operation: O – t – CO		
	Test circuit according figure: 9	Satisfy	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	725 V 725 V 725 V	P
	Short-circuit test current (I_{nt}): equal to 1,2 times the max. setting of the short-time delay release tripping current,		N/A
	or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release,		N/A
	or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.	Satisfy	P

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IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	- r.m.s. test current AC/DC: (A)	2110 A AC	P
	power factor/time constant :	0,89	P
	- Factor "n"	1,5	P
	- peak test current (Amax) :	3010 A	P
	Test sequence "O" L1		
	- max. let-through current: (kApeak) L1:	2,97 kA	P
	- Joule integral I^2dt (A^2s) L1:	72000 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L1		
	- max. let-through current: (kApeak) L1:	2,77 kA	P
	- Joule integral I^2dt (A^2s) L1:	132000 A^2s	P
	Test sequence "O" L2		
	- max. let-through current: (kApeak) L2:	3,01 kA	P
	- Joule integral I^2dt (A^2s) L2:	87000 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L2		
	- max. let-through current: (kApeak) L2:	2,85 kA	P
	- Joule integral I^2dt (A^2s) L2:	75000 A^2s	P
	Test sequence "O" L3		
	- max. let-through current: (kApeak) L3:	3,01 kA	P
	- Joule integral I^2dt (A^2s) L3:	82000 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L3		
	- max. let-through current: (kApeak) L3:	2,62 kA	P
	- Joule integral I^2dt (A^2s) L3:	63000 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
H.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1380 V	P
	- no breakdown or flashover		P

ВЯРНО С ОРИГ

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
H.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	65"	
	- Operation time: (s) ..... L1: ..... L2: L3:	67" 66" 63"	P
H.5	Marking		
	Circuit-breaker for which all values of rated voltage have not been tested according to this annex or are not covered by such testing, shall be identified by the symbol ⊗ which shall be market on the circuit-breaker immediately following these values of rated voltage	Satisfy	P
Annex M	Modular residual current devices (without integral current breaking device)		
M.8.3	Operating characteristics		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		
	Rated frequency (Hz)		
	Terminal type or through conductor type		
	MRCD with sensing means and processing device combined or separate	Combined/separate	
	MRCD with voltage source		
	Operating automatically in case of failure of the voltage source.	Yes/no	
	Rated insulation voltage (*Ui*)		
	Rated impulse withstand voltage (*Uimp*)		
	Characteristics of the voltage source of MRCDs		
	Rated values of the voltage source of MRCDs (*Us*)		

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated values of the frequencies of the voltage source of MRCDs		
	Rated insulation voltage (*Ui*)		
	Rated impulse withstand voltage (*Uimp*)		
M.4.1.3	Characteristics of auxiliary contacts		
M.4.2	Characteristics of MRCDs concerning their residual current function		
M.4.2.2	Operating characteristic in case of residual current with d.c. component		
	Type AC MRCD		
	Type A MRCD		
	Type B MRCD		
M.4.3	Behaviour under short-circuit conditions		
	Rated conditional short-circuit current (*Icc*)		
	Rated conditional residual short-circuit current (*IΔc*)		
	Rated short-time withstand current (*Icw*)		
	Rated residual short-time withstand current (*IΔw*)		
	Peak withstand current		
M.4.4	Preferred and limiting values		
	Preferred values of the rated residual operating current (*IΔn*)		
	Minimum value of the rated residual non-operating current (*IΔno*)		
	Limiting value of the non-operating overcurrent in the case of a single-phase load in a multiphase circuit		
	Preferred values of rated voltage of the voltage source of MRCDs		
	Compliance with constructional requirements		N/A
MI	Test sequence MI		
M.8.3.4.2	Verification of operating in case of steady increase of the residual current (figure M.1)		N/A
	Increase the residual current from 0,2 IΔn to IΔn in 30 sec. Required: value between 0,2 IΔn and IΔn		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Min. setting IΔn.(mA): Interm. setting IΔn.(mA): Max. setting IΔn.(mA):		N/A
M.8.3.4.3	Verification of operating in case of closing on residual current (figure M.2)		N/A
	The MRCD is closes on IΔn or each specified setting Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
M.8.3.4.4	Verification of operating in case of a sudden appearance of the residual current (figure M.2 and M3)		N/A
	A residual current is sudden appear on the MRCD of IΔn Required : no value exceeds the specified limiting value of Table B1:.300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn Required : no value exceeds the specified limiting value of Table B1: 150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1: 40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	A residual current is sudden appear on the MRCD of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms)		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 10 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 20 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 50 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	A residual current is sudden appear on the MRCD of IΔn: 100 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 200 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 500 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
M.8.3.4.5	Verification of the limiting non-operating time of time delayed type MRCDs (figure M3)		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn for a time declared by the manufacturer Required : The MRCD shall not operated		N/A
	Min. setting IΔn. Min. setting time delay (ms): Min. setting IΔn. Max. setting time delay (ms):		N/A
M.8.3.5	Tests at the temperature limits		N/A
M.8.3.5.1	General (clause B.8.2.5 applies)		
	Minimum temperature (°C)		
	Maximum temperature (°C)		
M.8.3.5.2	Verification of operating in case of a sudden appearance of the residual current at –5°C or minimum temperature limit (figure M.2 and M3)		

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Clause	Requirement – Test	Result – Remark	Verdict
	A residual current is sudden appear on the MRCD of IΔn Required : no value exceeds the specified limiting value of Table B1:.300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn Required : no value exceeds the specified limiting value of Table B1: 150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1: 40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	Verification of the limiting non-operating time of time delayed type MRCDs at – 5°C or minimum temperature limit (figure M3)		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn for a time declared by the manufacturer Required : The MRCD shall not operated		N/A
	Min. setting IΔn. Min. setting time delay (ms): Min. setting IΔn. Max. setting time delay (ms):		N/A
M.8.3.5.3	Verification of operating in case of a sudden appearance of the residual current at +40°C (figure M.2 and M3)		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Load :	_____ A	
	Torque :	_____ Nm	
	Connection :	_____ mm^2	
	A residual current is sudden appear on the MRCD of IΔn Required : no value exceeds the specified limiting value of Table B1:.300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn Required : no value exceeds the specified limiting value of Table B1: 150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1: 40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn for a time declared by the manufacturer Required : The MRCD shall not operated		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Min. setting IΔn. Min. setting time delay (ms): Min. setting IΔn. Max. setting time delay (ms):		N/A
M.8.4.	Verification of dielectric properties		N/A
M.8.4.1	Verification of rated impuls withstand voltage		N/A
	rated impulse withstand voltage		
	test impulse voltage (see table 12 part 1)		
	test impulse voltage for isolating (see table 14 part 1)		
M.8.4.1.2	Verification of rated impulse withstand voltage with respect to the monitored circuit		N/A
M.8.4.1.2.1	Test for terminal type MRCD		N/A
M.8.4.1.2.2	Tests for MRCDs of through-conductor type		N/A
M.8.4.1.3	Verification of rated impulse withstand of the voltage source circuit (if applicable)		N/A
M.8.5	Verification of the operation of the test device at the limits of the rated voltage		N/A
	For MRCDs having an adjustable time-delay the test is made at the maximum setting of time-delay:	_____ s	
M.8.5.a	Setting IΔn or minimum setting of IΔn	_____ A	
	Test voltage (1,1 x Ue max)	_____ V	
	Number of operations	25	
	Interval time	5 s	
	Tripping	☐ Yes / ☐ No	N/A
M.8.5.b	Setting IΔn or minimum setting of IΔn	_____ A	
	Test voltage 0,85 x Ue max)	_____ V	
	Number of operations	3	
	Interval time	5 s	
	Tripping	☐ Yes / ☐ No	N/A
M.8.5.c	Setting IΔn or minimum setting of IΔn	_____ A	
	Test voltage (1,1 x Ue max)	_____ V	
	Number of operations	1	
	Operating means of the test device held in close position	5 s	
	Tripping	☐ Yes / ☐ No	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
M.8.6	Verification of the limiting value of non-operating current under overcurrent conditions , in case of a single phase load.		N/A
M.8.6	Circuit diagram	Fig. M4 ____	
	Setting IΔn or minimum setting of IΔn if adjustable	_____ A	
	Test current equal to the lower value of: ☐ 6 x In or ☐ 80 % of the maximum short-circuit release current setting	_____ A	
	Test voltage: ☐ rated voltage or ☐ any convenient voltage	_____ V	
	Test frequency	_____ Hz	
	Power factor (0,5)	_____	
	Current flow time	2 s	
	Interval time	60 s	
	Calibration plot number	____	
	No tripping / change of state		N/A
M.8.7	Resistance against unwanted tripping due to surge currents resulting from impulse voltages		N/A
M.8.7.2	Verification of the resistance to unwanted tripping in case of loading of the network capacitance		N/A
B.8.6.1	Current surge test for RMCDs (0,5 µs / 100kHz ring wave test)		
	One pole of the MRCD is submitted to 10 applications of a surge current according to the following requirements:		
	- peak value: 200 A + 10/0%		
	- virtual front time: 0,5 µs ± 30%		
	- period of the following oscillatory wave: 10 µs ± 20%		
	- each successive peak: about 60% of the preceding peak		
	The polarity shall be inverted after every two applications		
	The interval between two consecutive applications shall be about 30 s		

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Clause	Requirement – Test	Result – Remark	Verdict
	During the test the MRCD shall not trip:	-	N/A
M.8.7.3	Verification of the resistance to unwanted tripping in case of flashover without follow-on current.		N/A
B.8.6.2	Verification of behaviour at surge current up to 250 A (8/20 µs surge current test)		N/A
	One pole of the MRCD is submitted to 10 applications of a surge current according to the following requirements:		
	- peak value: 250 A + 10/0%		
	- virtual front time: 8 µs ± 20%		
	- virtual time to half value: 20 µs ± 20%		
	- peak of reverse current:: less than 30% of peak value		
	The polarity shall be inverted after every two applications		
	The interval between two consecutive applications shall be about 30 s		
	During the test the MRCD shall not trip:		N/A
M.8.8	Verification of the behaviour in case of an earth fault current comprising a d.c. component.		N/A
M.8.8.2	Type A MRCD		N/A
	For MRCDs the operation of which depends on a voltage source the test are made at 1,1 and 0,85 times the rated voltage of the voltage source (Us).		
M.8.8.2.2	Verification of operation in case of a continuous rise of a residual pulsating direct current		N/A
	Rated voltage	_____ V	
B.8.7.2.1	- steady increase from zero to: 1,4 IΔn for IΔn > 0,01 A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- steady increase from zero to: 2 IΔn for IΔn < 0,01 A with 2 IΔn/30 A/s (mA)	_____ mA	
	- angle = 0 (+/-) :		
	- angle = 90 (+/-) :		
	- angle = 135 (+/-) :		
	No value exceeds the relevant specified limiting values		N/A
M.8.8.2.3	Verification of operation in case of a suddenly appearing residual pulsating direct current		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
B.8.7.2.2	Verification of the correct operation in case of suddenly appearing residual pulsating direct currents by closing S2 (angle = 0°)		N/A
	Rated voltage	_____ V	
	RCCB's with Iδn > 0,015 A:		
	- maximum break time (ms) at: 1,4 IΔn (+/-) :		
	- maximum break time (ms) at: 2,8 IΔn (+/-) :		
	- maximum break time (ms) at: 7 IΔn (+/-) :		
	- maximum break time (ms) at: 14 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
	RCCB's with IΔn = 0,015 A:		N/A
	- maximum break time (ms) at: 2 IΔn (+/-) :		
	- maximum break time (ms) at: 4 IΔn (+/-) :		
	- maximum break time (ms) at: 10IΔn (+/-) :		
	- maximum break time (ms) at: 20 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
M.8.8.2.4	Verification of operation with load at reference temperature		N/A
	Rated voltage	_____ V	
B.8.7.2.1	- steady increase from zero to: 1,4 IΔn for IΔn > 0,015 A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- steady increase from zero to: 2 IΔn for IΔn < 0,015 A with 2 IΔn/30 A/s (mA)	_____ mA	
	- angle = 0 (+/-) :		
	- angle = 90 (+/-) :		
	- angle = 135 (+/-) :		
	No value exceeds the relevant specified limiting values		N/A
M.8.8.2.5	Verification of operation of a residual pulsating direct current superimposed by a smooth direct current of 6 mA.		N/A
	Rated voltage	_____ V	
B.8.7.2.1	- steady increase from zero to: 1,4 IΔn for IΔn > 0,015 A with 1,4 IΔn/30 A/s (mA) + 6 mA	_____ mA	

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Clause	Requirement – Test	Result – Remark	Verdict
	-steady increase from zero to: 2 IΔn for IΔn < 0,015 A with 2 IΔn/30 A/s (mA) + 6 mA	_____ mA	
	- angle = 0 (+/-) :		
	No value exceeds the relevant specified limiting values		N/A
M.8.8.3	Type B MRCD		N/A
M.8.8.3.2	Verification of operation in case of a slowly rising residual smooth direct current		
	Rated voltage (1,1*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
	Rated voltage (0,85*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)		
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
M.8.8.3.3	Verification of operation in case of a suddenly appearing residual smooth direct current		N/A
B.8.7.2.2	Verification of the correct operation in case of suddenly appearing a smooth residual direct currents by closing S2		
	Rated voltage (1,1*Un)	_____ V	
	RCCB's with IΔn > 0,015 A:		
	- maximum break time (ms) at: 2 IΔn (+/-) :		
	- maximum break time (ms) at: 4 IΔn (+/-) :		
	- maximum break time (ms) at: 10 IΔn (+/-) :		
	- maximum break time (ms) at: 20 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
B.8.7.2.2	Verification of the correct operation in case of suddenly appearing a smooth residual direct currents by closing S2		N/A
	Rated voltage (0,85*Un)	_____ V	
	RCCB's with IΔn > 0,015 A:		
	- maximum break time (ms) at: 2 IΔn (+/-) :		

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Clause	Requirement – Test	Result – Remark	Verdict
	- maximum break time (ms) at: 4 IΔn (+/-) :		
	- maximum break time (ms) at: 10 IΔn (+/-) :		
	- maximum break time (ms) at: 20 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
M.8.8.3.4	Verification of operation in case of a slowly rising residual current resulting from a fault in a circuit fed by a three-pulse star or a six-pulse connection.		N/A
	Rated voltage (1,1*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
	Rated voltage (0,85*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
M.8.8.3.5.	Verification of operation in case of a slowly rising residual current resulting from a fault in a circuit fed by two-pulse bridge connection line-to-line.		N/A
	Rated voltage (Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 0 (+/-) :		
	Operation shall occur between 0,5 and 1,4Idn		N/A
M.8.8.3.6	Verification of operation with load at the reference temperature		N/A
M.8.8.3.6-M.8.8.3.2	Verification of operation in case of a slowly rising residual smooth direct current		N/A
	Rated voltage (1,1*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
	Rated voltage (0,85*Un)	_____ V	

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Clause	Requirement – Test	Result – Remark	Verdict
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
M.8.8.3.6-M.8.8.3.4	Verification of operation in case of a slowly rising residual current resulting from a fault in a circuit fed by a three-pulse star or a six-pulse connection		N/A
	Rated voltage (1,1*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
	Rated voltage (0,85*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
M.8.8.3.6-M.8.8.3.5.	Verification of operation in case of a slowly rising residual current resulting from a fault in a circuit fed by two-pulse bridge connection line-to-line.		N/A
	Rated voltage (Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 0 (+/-) :		
	Operation shall occur between 0,5 and 1,4Idn		N/A
			N/A
M.8.9.	Verification of the behaviour of MRCDs with separate sensing means in case of a failure of the sensing means connection		N/A
M.8.9.2	Test method 1		N/A
	Rated voltage of the sensing means		
	Interval time Required <5 sec		N/A
M.8.9.3	Test method 2		N/A
	Test shall be carried out as follows: - The test device is activated - The sensing means are disconnected and the test device is activated. The MRCD shall not operate		

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Clause	Requirement – Test	Result – Remark	Verdict
	Rated voltage of the sensing means		
	Test device activated MRCD shall operate		N/A
	Rated voltage of the sensing means		
	Sensing device disconnected and Test device activated MRCD shall not operate		N/A
M.8.10	Verification of temperature-rise of terminal type MRCDs		N/A
M.8.10.2	Tambient: _____°C		
8.3.2.5	Main circuits		
	Conventional thermal current I_{th}	_____ A	
	Conventional thermal current for enclosure I_{the}	_____ A	
	Conventional thermal current for the neutral pole	_____ A	
	Cabling characteristics		
	Cable	_____ mm^2	
	Bar / number / length	_____ mm / ___ / ____ m	
	Arrangement	☐ 3 phase - ☐ poles on serie	
	Tightening torque	_____ Nm	
	Neutral pole (if applicable)		
	Cable	_____ mm^2	
	Bar / number / length	_____ mm / ___ / ____ m	
	Tightening torque	_____ Nm	
	Terminals(see table 2)		
	Manual operating means		
	Parts which need not be touched but not hand held		
	Parts which need not be touched during normal operation		
M.8.11	Verification of mechanical and electrical endurance		N/A
	500 off-load operations controlled by the test device		
	Rated voltage:	_____ V ☐ ac ☐ dc	
	Result:	after___ operations,	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	500 off load operations by passing the rated residual operating current IΔn through one current path		
	Rated voltage:	_____ V ☐ ac ☐ dc	
	Rated residual current	____ mA	
	Result:	after___ operations,	N/A
	500 on-load operations controlled by the test device		
	Rated voltage:	_____ V ☐ ac ☐ dc	
	Test current	_____ A	
	Power factor	_____	
	Test circuit		
	Result:	after___ operations,	N/A
	500 on-load operations by passing the rated residual operating current IΔn through one current path.		
	Rated voltage:	_____ V ☐ ac ☐ dc	
	Test current	_____ A	
	Power factor	_____	
	Test circuit		
	Rated residual current	____ mA	
	Result:	after___ operations,	N/A
	Show no damage		N/A
	High voltage test: twice rated voltage	Test voltage: _____ V	N/A
	A residual current is sudden appear on the MRCD of IΔn (_____ mA) Required : no value exceeds the specified limiting value of Table B1:.300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
M.8.12.	Verification of the behaviour of MRCDs in case of failure of the voltage source for MRCDs classified under M.3.2.2.1		N/A
M.8.12.2	Determination of the limiting value of the voltage source		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Time period of voltage decreasing	30 s or a period enough with respect to delayed opening	
	Min voltage to automatic opening (U > 0,85 x Us)		
	A residual current is sudden appear on the MRCD of IΔn (_____ mA) at a value just above highest measured value Required : no value exceeds the specified limiting value of Table B1:.300 ms		N/A
	It's not possible to switch "ON" by manual operating means at a lower value than the lower measured value.		N/A
M.8.12.3	Verification of automatic opening in case of voltage source failure		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Time period	Max 1 s or max. 1 s+time delay setting	
	Time period to automatic opening		
	No value exceeds the relevant specified limiting value		N/A

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict

M.8.13	Verification of the behaviour of MRCDs with voltage source as classified under M.3.2.2.2 in case of failure of the voltage source.		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Switch off and reclosed Sa or S1 and reduced the source voltage to 70 %	70% Us = _____ V ☐ac ☐ dc	N/A
	Time period to automatic opening		N/A
MII	Test sequence MII		N/A
M.8.14	Verification of the behaviour of the MRCD under short-circuit conditions		N/A
	Type designation or serial number		
	Sample no:		
M.8.14.3	Verification of the rated conditional short-circuit current (I_{∞})		N/A
	Verification of the coordination between the MRCD and the SCPD		
	Test circuit according to figure :		
	Point of test circuit which is directly earthed :		
	Grid distance "a" (mm) :		
	Silver wire diameter (mm) :		
	Used SCPD during the tests		
	Prospective current (A) :		
	Prospective current obtained (A) :		
	Power factor / ratio *n* :		
	Power factor / ratio *n* obtained :		
	Plot no.		
	Test sequence: O-t-O		

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	I^2t (kA^2s); Ip (kA) :	First O: Ip :_____kA I^2t; _____kA^2s Plot no. _____	
		Second O: Ip :_____kA I^2t; _____kA^2s Plot no.: _____	
	If tested at separate testing station see report	No.: _____ of _____ testing station	
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		N/A
	After the tests no damage Impairing further use		N/A
8.3.3.5	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		
	Test voltage		N/A
B.8.10.3.2	The RCCB shall trip with a test current of 1,25 IΔn (ms) in minimum setting:	I test: _____ mA trip time: ____ ms	N/A
M.8.12.3	Verification of automatic opening in case of voltage source failure		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Time period	Max 1 s or max. 1 s+time delay setting	
	Time period to automatic opening		N/A
	No value exceeds the relevant specified limiting value		N/A
	The polyethylene sheet shows no holes		N/A
			N/A
M.8.14.4	Verification of rated short-time withstand current (I_{cw})		N/A

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Test circuit according to figure :		
	Point of test circuit which is directly earthed :		
	Grid distance "a" (mm) :		
	Prospective current (A) :		
	Prospective current obtained (A) :		
	Power factor / ratio *n* :		
	Power factor / ratio *n* obtained :		
	Plot no.		
	Test sequence: O		
	I^2t (kA^2s); Ip (kA) :	Ip : _____kA I^2t; _____kA^2s Test duration: _____ms Plot no. _____	
	If tested at separate testing station see report	No.: _____ of _____ testing station	
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		N/A
	After the tests no damage impairing further use		N/A
8.3.3.5	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		N/A
	Test voltage	-	N/A
B.8.10.3.2	The RCCB shall trip with a test current of 1,25 IΔn (ms) in minimum setting :	I test: _____ mA trip time: _____ ms	N/A
			N/A
M.8.12.3	Verification of automatic opening in case of voltage source failure		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Time period	Max 1 s or max. 1 s+time delay setting	

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	Time period to automatic opening		N/A
	No value exceeds the relevant specified limiting value		N/A
	The polyethylene sheet shows no holes		N/A
			N/A
M.8.14.5	Verification of the rated conditional residual short-circuit current (IΔc)		N/A
	Test circuit according to figure :		
	Point of test circuit which is directly earthed :		
	Grid distance "a" (mm) :		
	Silver wire diameter (mm) :		
	Used SCPD during the tests		
	Prospective current (A) :		
	Prospective current obtained (A) :		
	Power factor / ratio *n* :		
	Power factor / ratio *n* obtained :		
	Plot no.		
	Test sequence: O-t-O		
	I^2t (kA^2s); Ip (kA) :	First O: Ip :_____kA I^2t; _____kA^2s Plot no. _____	
		Second O: Ip :_____kA I^2t; _____kA^2s Plot no.: _____	
	If tested at separate testing station see report	No.: _____ of _____ testing station	
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		N/A
	After the tests no damage impairing further use		N/A
8.3.3.5	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		N/A

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
		-	N/A
	Test voltage	I test: _____ mA	N/A
B.8.10.3.2	The RCCB shall trip with a test current of 1,25 IΔn (ms) in minimum setting:	trip time: _____ ms	
M.8.12.3	Verification of automatic opening in case of voltage source failure		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Time period	Max 1 s or max. 1 s+time delay setting	
	Time period to automatic opening		N/A
	No value exceeds the relevant specified limiting value		N/A
	The polyethylene sheet shows no holes		N/A
			N/A
M.8.14.6	Verification of rated residual short-time withstand current (IΔw)		N/A
	Test circuit according to figure :		
	Point of test circuit which is directly earthed :		
	Grid distance "a" (mm) :		
	Prospective current (A) :		
	Prospective current obtained (A) :		
	Power factor / ratio *n* :		
	Power factor / ratio *n* obtained :		
	Plot no.		
	Test sequence: O		
	I^2t (kA^2s); Ip (kA) :	Ip :_____kA I^2t; _____kA^2s Test duration: _____ms Plot no. _____	

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict
	If tested at separate testing station see report	No.: _____ of _____ testing station	
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		N/A
	After the tests no damage impairing further use		N/A
8.3.3.5	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		N/A
	Test voltage	-	N/A
B.8.10.3.2	The RCCB shall trip with a test current of 1,25 IΔn (ms) in minimum setting:	I test: _____ mA trip time: _____ ms	N/A
			N/A
M.8.12.3	Verification of automatic opening in case of voltage source failure		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Time period	Max 1 s or max. 1 s+time delay setting	N/A
	Time period to automatic opening		N/A
	No value exceeds the relevant specified limiting value		N/A
	The polyethylene sheet shows no holes		N/A
M.III	Test sequence MIII		N/A
M.8.15	Verification of effects of environmental conditions		N/A
	Type designation or serial number		
	Sample no:		
B.8.10.3.2	The RCCB shall trip with a test current of 1,25 IΔn (ms) in minimum setting:	I test: _____ mA trip time: _____ ms	N/A
			N/A
M.IV	Test sequence MIV		N/A
M.8.16	Verification of electromagnetic compatibility		

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict

	TABLE: Heating Test		
	Test voltage (V)..... :	20 V	
	Ambient (°C) ..... :	40°C	

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
Terminals for external connections	97	110
Manual operating means non-metalic	51	65
Parts intended to be touched non-metelic	61	80
Parts which no need be touched for normal operation non-metelic	78	90

	TABLE: dielectric strength	
test voltage applied between:	test potential applied (V)	breakdown / flashover (Yes/No)
Between all theterminals main circuit	1890 V	no
Between each pole of the main circuit and the other poles and to the mounting plate	1890 V	no
Between each control and auxiliary circuit not normally connected to the main circuit and the maincircuit	1890 V	no
Between each control and auxiliary circuit not normally connected to the main circuit and the other circuit	1890 V	no
Between each control and auxiliary circuit not normally connected to the main circuit and the mounting platre	1890 V	no
For equipment suitable for isolation, acros s the poles of the main circuit	1890 V	no
supplementary information:		

ВЕРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict

	TABLE: impact resistance			N/A
impacts per surface	surface tested	impact energy (Nm)	comments	
-	-	-	-	
supplementary information:				

	TABLE: electrical data (in normal conditions)						
fuse #	I rated (A)	U (V)	P (W)	I (mA)	I fuse (mA)	condition/status	
X	160 A	690 V	15 W	X	X	-40 - +55°C	
supplementary information:							

	TABLE: clearance and creepage distance measurements					
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
-	976 V	690 V	8mm	13	9 mm	11 mm
supplementary information: distance auxiliary circuits from live partes is 16 mm						

	TABLE: distance through insulation measurements				N/A
distance through insulation di at/of:	U r.m.s. (V)	test voltage (V)	required di (mm)	di (mm)	
-	-	-	-	-	
supplementary information:N/A					

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict

	TABLE: ball pressure test of thermoplastics		N/A
	allowed impression diameter (mm) .....:		—
part		test temperature (°C)	impression diameter (mm)
-		-	-
supplementary information:			

	TABLE: threaded part torque test		
threaded part identification	diameter of thread (mm)	column number (I, II, or III)	applied torque (Nm)
connector	6 mm	I,II and III	6 Nm
supplementary information:			

	TABLE: over-voltage and under-voltage test				N/A
test	operating condition	rated voltage (V)	test voltage (V)	temperature (°C)	comments
-	-	-	-	-	-
supplementary information: Isn't dependent upon outer power supply					

ВЯРНО С ОРИГИНАЛА

IEC 60 947-2			
Clause	Requirement – Test	Result – Remark	Verdict

TABLE: Resistance to fire (Glow wire test)

no.	Specimen							Verdict
	Description	Colour	Thick (mm)	Temp. °C	burning after t (s)	drops	support burning	
1	Base circuit breaker	blue	2mm	960°C	0	EN60695 -2-11	-	P
2	Enclosure terminals	Black	1,5 mm	960°C	0	EN60695 -2-11	-	P
3	actuator	black	6 mm	960°C	0	EN60695 -2-11	-	P
4	Frame arc chute	white	1,2 mm	960°C	0	EN60695 -2-11	-	P
5	Rotating shaft	black	1,1 mm	960°C	0	EN60695 -2-11	-	P
6	Base release	black	1, 2mm	960°C	0	EN60695 -2-11	-	P

TABLE: Resistance to tracking (tracking test)

no.	Specimen							Verdict
	Description	Colour	Drops (no.)	Impress (mm)	Burning	Current (A)	Result	
1	-	-	-	-	-	-	-	N/A
2								N/A
3								N/A
4								N/A
5								N/A
6								N/A
7								N/A
8								N/A
9								N/A
10								N/A

National Differences for (country name)			
			N/A
	..... :		N/A
	..... :		N/A
			N/A
			N/A
	..... :		N/A
			N/A
			N/A
			N/A
			N/A
	..... :		N/A
			N/A
			N/A
			N/A
			N/A
	..... :		N/A
			N/A
			N/A
			N/A
			N/A
			N/A
			N/A
	..... :		N/A

IEC IECEE CB SCHEME

Ref. Certif. No.

CZ-1752

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

SYSTÈME CEI D'ACCEPTATION MUTUELLE DE CERTIFICATS D'ESSAIS DES ÉQUIPEMENTS ÉLECTRIQUES (IECEE) MÉTHODE OC

CB TEST CERTIFICATE
CERTIFICAT D'ESSAI OC

Product Produit	Circuit-breaker
Name and address of the applicant Nom et adresse du demandeur	OEZ s. r. o. Šedivská 339, 561 51 Letohrad, Czech Republic
Name and address of the manufacturer Nom et adresse du fabricant	OEZ s. r. o. Šedivská 339, 561 51 Letohrad, Czech Republic
Name and address of the factory Nome et adresse de l'usine	OEZ s. r. o. Šedivská 339, 561 51 Letohrad, Czech Republic
Ratings and principal characteristics Valeurs nominales et caractéristiques principales	In = 100, 160, 250 A, Un = 690 V
Trademark (if any) Marque de fabrique (si elle existe)	
Model / Type Ref. Ref. De type	BD250
Additional information (if necessary) Information complémentaire (si nécessaire)	

	PUBLICATION	EDITION
A sample of the product was tested and found to be in conformity with Un échantillon de ce produit a été essayé et a été considéré conforme à la	IEC 60947-2	2003
As shown in the Test Report Ref. No. which forms part of this Certificate Comme indiqué dans le Rapport d'essais numéro de référence qui constitue partie de ce Certificat	604548-01/01 of: 06.03.2007	

This CB Test Certificate is issued by the National Certification Body
Ce Certificat d'essai OC est établi par l'Organisme National de Certification

Elektrotechnický zkušební ústav
Pod lisem 129, 171 02 Praha 8 – Troja
Czech Republic

Date: 14.3.2007

Signature: Pavel Kudrna
Certification and Inspection Manager

TEST REPORT
IEC 60 947-2
Low-voltage switchgear and controlgear
Part 2: Circuit - breakers

Report Reference No. ..... :	604548-01/01
Tested by (name+signature) ..... :	Rezková Alena
Witnessed by (name+signature) .. :	Hlavatý Jan
Supervised by (name+signature) . :	Hlavatý Jan
Approved by (name+signature) .... :	Hlavatý Jan
Date of issue ..... :	06.03.2007

CB Testing Laboratory ..... :	Elektrotechnický zkušební ústav, s.p.
Address ..... :	Pod Lisem 129, 171 02 Praha 8-Troja Czech Republic
Testing location/ procedure ..... :	CBTL [X] RMT [ ] SMT [ ] WMT [ ] TMP [ ]
Testing location/ address ..... :	Elektrotechnický zkušební ústav, s.p.
Applicant's name ..... :	OEZ s.r.o
Address ..... :	OEZ s.r.o. Šedivská 339 56151 Letohrad, Czech Republic
Test specification:	
Standard ..... :	IEC 60 947 - 2 : 2003 (3rd Edition)
Test procedure ..... :	CB
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC60947_2D
Test Report Form(s) Originator .... :	KEMA Nederland B.V.
Master TRF ..... :	Dated 2006-04

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

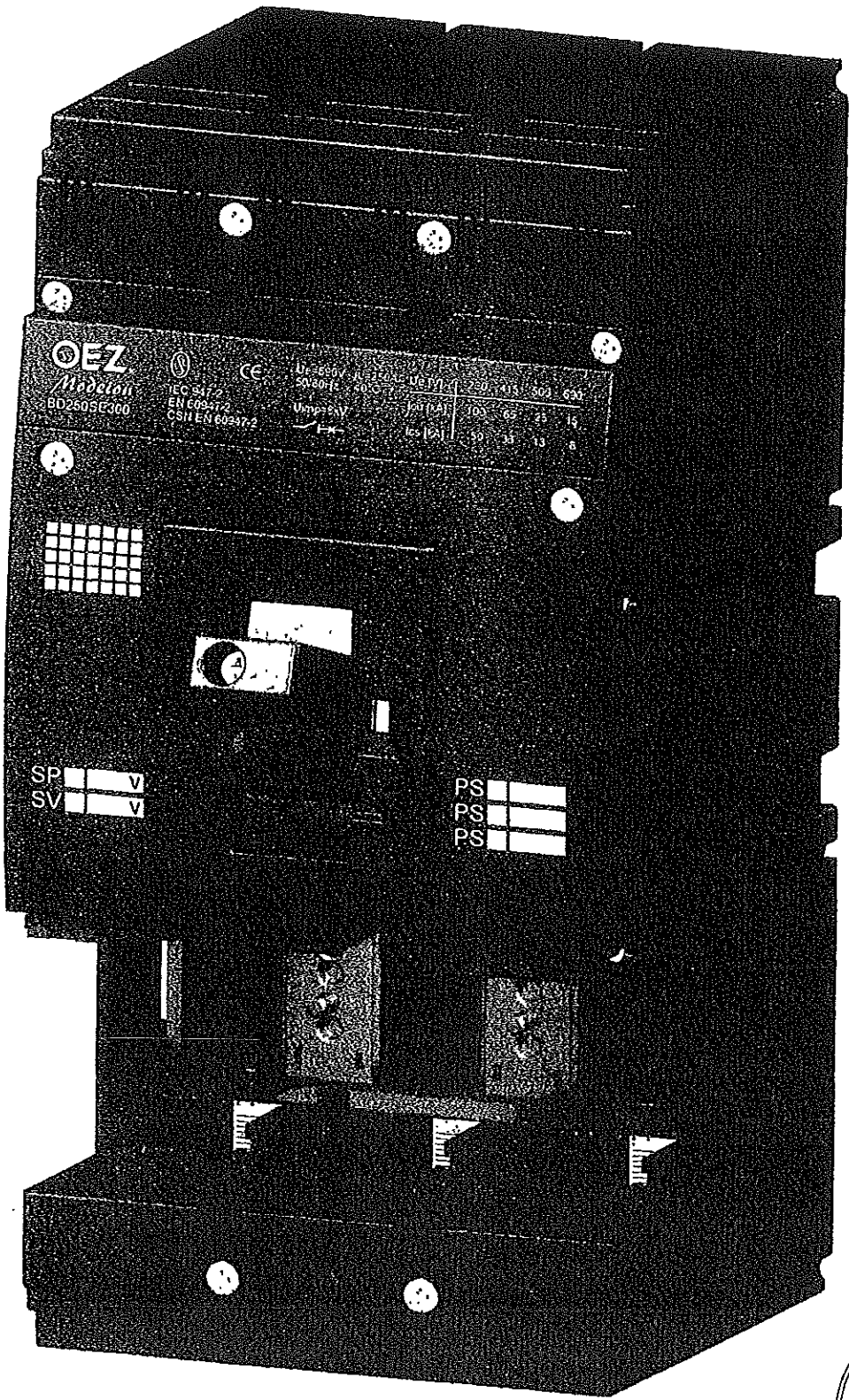
Test item description..... :	Circuit - breakers
Trade Mark..... :	OEZ.
Manufacturer..... :	OEZ s.r.o.
Model/Type reference..... :	OEZ s.r.o. Šedivská 339 56151 Letohrad, Czech Republic
Ratings..... :	BD250

Particulars: test item vs. test requirements	
3 Classification	
3.1. Utilization category: (A or B)..... :	A
3.2. Interruption medium: (air, vacuum, gas Break)..... :	Air
3.3. Design: (open construction, moulded case)..... ..... :	moulded case
3.4. Method of controlling the operation mechanism: (dependent manual, independent manual, dependent power, independent power) ..... :	independent manual operation
3.5. Suitability for insulation: (suitable, not -suitable) .... ..:	suitable
3.6. Provision for maintenance: (maintainable, non maintainable)..... :	non maintainable
3.7. Method of installation: (fixed, plug in, withdrawable:	withdrawable
3.8. Degree of protection: (IP code)..... :	IP20
4.8. Integral fuses (integrally fused circuit-breakers) Type and characteristics of SCPD..... :	N/A
4.9. Switching overvoltages: (when Uimp. is declared) . ..:	Yes
7.3 Electromagnetic compatibility (EMC) Environment A or B..... :	Yes
Circuit-breaker for use on phase-earthed systems..... :	Yes
Circuit-breaker for use in IT systems..... :	Yes
Rated and limiting values, main circuit .... :	
- rated operational voltage: Ue (V)..... :	415 V/500 V/690 V AC
- rated insulation voltage: Ui (V)..... :	690 V
- rated impulse withstand voltage: Uimp (kV)..... :	8 kV
- rated operational current: Ie (A)..... :	250 A
- kind of current..... :	AC
- conventional free air thermal current: Ith (A)..... :	250 A
- conventional enclosed thermal current: Ithe (A)..... :	N/A
- current rating for four-pole circuit-breakers: (A)..... :	N/A
- number of poles..... :	3
- rated frequency: (Hz)..... :	50/60 Hz
- integral fuses (rated values) ..... :	No

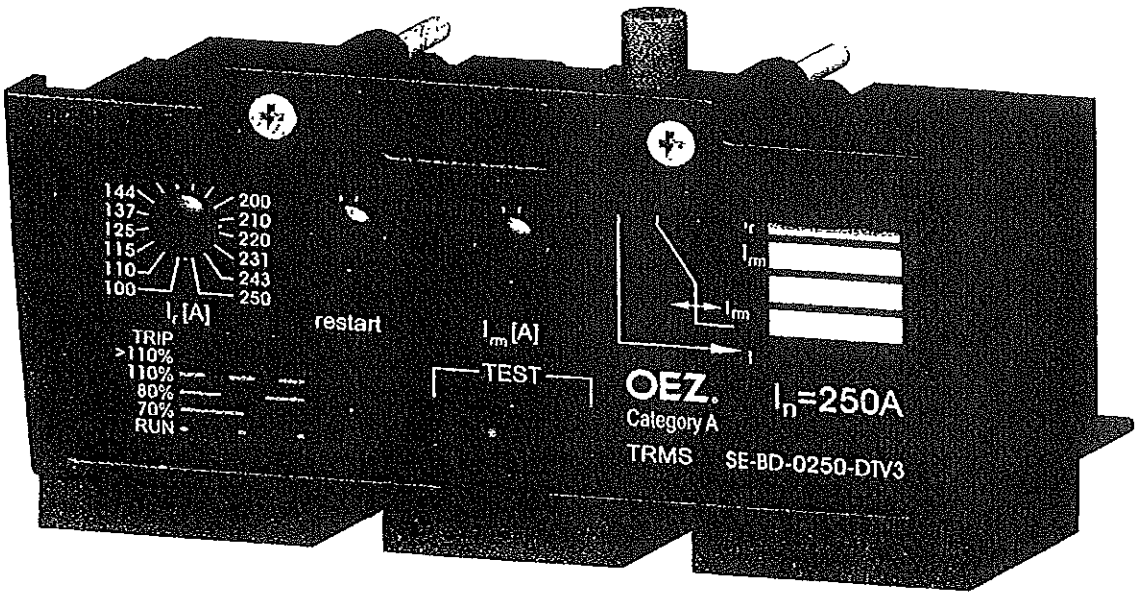
Rated duty :	
- eight-hour duty ..... :	Yes
- uninterrupted duty: Iu (A) ..... :	250 A
Short-circuit characteristic :	
rated short-time making capacity: Icm (kA) ..... :	415 V 76 kA
rated ultimate short-circuit breaking capacity: Icu (kA):	415 V 36 kA, 500 V 16 kA, 690 V 10 kA
rated service short-circuit breaking capacity: Ics (kA) ..:	415 V 18 kA, 500 V 8 kA, 690 V 5 kA
rated short-time withstand current: Icw (kA/s) ..... :	2,5 kA/1 s
Control circuits :	N/A
Electrical control circuits :	
- kind of current: (AC, DC) ..... :	--
- rated frequency: (Hz)..... :	--
- rated control circuit voltage: Uc (nature, frequency, V):	--
- rated control supply voltage: Us (nature, frequency V):	--
Air supply control circuits:(pneumatic or electro-pneumatic) :--	
- rated pressure and its limit ..... :	--
- volumes of air, at atmospheric pressure, required for each closing and each opening operation ..... :	--
Auxiliary circuits	
Rated and limiting values, auxiliary circuits ..... :	
- rated operational voltage Ue (V)..... :	500 V AC 240 V DC
- rated insulation voltage: Ui (V) ..... :	500 V AC 240 V DC
- rated operational current: Ie (A)..... :	2 A AC 0,2 A DC
- kind of current..... :	AC/DC
- rated frequency: (Hz)..... :	50/60 HZ
- number of circuits ..... :	1
- number and kind of contact elements ..... :	1a or 1b
- rated uninterrupted current: Iu (A) ..... :	10 A
- utilization category: (AC, DC, current and voltage) ..... :	2 A/500 V/AC15 0,2 A /240 V/DC13
Short-circuit characteristic :	--
- Rated conditional short-circuit current (kA) ..... :	--
- Co-ordination of short-circuit protective devices ..... :	--
- kind of protective device ..... :	--

Releases	
1) shunt release.....:	Yes
2) Over-current release .....:	Yes
a) instantaneous .....:	Yes
b) definite time delay.....:	X
c) inverse time delay .....:	X
- independent of previous load.....:	X
- dependent on previous load; (for example thermal type release).....:	X
3) Undervoltage release (for opening) .....:	Yes
4) Other releases.....:	X
Characteristics :	
1) Shunt release and undervoltage release (for opening).:	
- rated control circuit voltage: Uc (nature, frequency, V) :	AC 24 V, 48 V, 110 V, 230 V, 400 V,500 V DC 24 V,48 V, 110 V,220 V
- kind of current.....:	AC/DC
- rated frequency: (if AC).....:	50/60 Hz
2) Over-current release .....:	
- rated current.....:	250 A
- kind of current.....:	AC
- rated frequency: (if AC).....:	50/60 Hz
- current setting (or range of settings).....:	0,4 –1 Ir
- time settings (or range of settings).....:	X

Copy of marking plate



Summary of testing:



Test item particulars.....:	
Classification of installation and use.....:	X
Supply Connection.....:	X
.....:	
.....:	
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P(Pass)
- test object does not meet the requirement.....:	F(Fail)
Testing .....:	
Date of receipt of test item .....:	08.01.2007
Date (s) of performance of tests .....:	25.01.2007 – 06.03.2007

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

General product information:

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
5.2	MARKING		
a)	The following data shall be marked on the circuit-breaker itself or on a name plate or nameplates attached to the circuit-breaker, and located in a place such that they are visible and legible when the circuit-breaker is installed.		
	- rated current:	250 A	
	- suitability for isolation, if applicable, with the symbol		P
	- indication of the open and closed position: with O and I respectively, if symbols are used		P
b)	Marking on equipment not needed to be visible after mounting:		
	- manufacturer's name or trademark	OEZ	P
	- type designation or serial number	BD250	P
	- IEC 60947-2 if the manufacturer claims compliance with this standard.		P
	- utilization category	A	P
	- rated operational voltage(s) Ue	415 V, 500 V, 690V AC	P
	- Circuit-breaker for use in IT systems: Circuit-breaker for which all values of rated voltage have not been tested according to annex H or are not covered by such testing, shall be identified by the symbol which shall be marked on the circuit-breaker immediately following these values of rated voltage	Circuit-breaker is suitable for use in IT systems 415 V, 500 V, 690 V	P
	- value (or range) of the rated frequency and/or the indication DC (or symbol)	50/60Hz	P
	- rated service short-circuit breaking capacity. Ics	18 kA/415 V, 8 kA/500 V, 5 kA/690 V	P
	- rated ultimate short-circuit breaking capacity. Icu	36 kA/415 V, 16 kA/500 V, 10 kA/690 V	P
	- rated short-time withstand current, (Icw) and associated short-time delay, for utilization category B		N/A
	- line and load terminals, unless their connection is immaterial		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- neutral pole terminals, if applicable, by the letter N		N/A
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1		N/A
	- ref. temperature for non-compensated thermal releases, if different from 30°C	+40°C	P
c)	Marked on the circuit-breaker as specified in item b), or shall be made available in the manufacturer's published information:		
	- rated short-circuit making capacity (Icm) (if higher than specified in 4.3.5.1)	75 kA/415 V	P
	- rated insulation voltage. (Ui) if higher than the maximum rated operational voltage)	690 V	P
	- rated impulse withstand voltage (Uimp), when declared.	8 kV	P
	- pollution degree if other than 3	3	P
	- conventional enclosed thermal current (Ithe) If different from the rated current:	Ith=In	P
	- IP Code, where applicable:	IP20	P
	- minimum enclosure size and ventilation data (if any) to which marked ratings apply:		N/A
	- details of minimum distance between circuit-breaker and earthed metal parts for circuit-breaker intended for use without enclosure:	Vide catalogue	P
	- r.m.s sensing if applicable, according to F.4.1.1		P
	- suitability for environment A or B	B	P
d)	The following data concerning the opening and closing devices of the circuit-breaker shall be placed either on their own nameplates or on the nameplate of the circuit-breaker:		
	- rated control circuit voltage of the closing device, and rated frequency for AC:		N/A
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:	24,48,110,230,400,500 V AC 24,48,110,220 V DC 50/60Hz	P
	- rated current of indirect over-current releases:		N/A
	- number and type of auxiliary contacts and kind of current, rated frequency (if AC) and rated voltages of the auxiliary switches, if different from those of the main circuit.	Vide catalogue	P

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Clause	Requirement + Test	Result - Remark	Verdict
e)	Terminal shall be clearly and permanently identified in acc. with IEC 60445 and annex L :		
	- line terminal		P
	- load terminal		P
	- neutral pole terminal "N"		N/A
	- protective earth terminal ⏚		N/A
	- terminal of coils (A/B)		N/A
	- terminal of shunt release (B)		P
	- terminals of under-voltage release (D)		P
	- terminals of interlocking electromagnets (E)		N/A
	- terminals of indicated light devices (X)		N/A
	- terminals of contact elements for switching devices (no)		N/A
7.1	CONSTRUCTION		
7.1.1	Withdrawable circuit-breaker		P
	In the disconnected position (main- and auxiliary circuits)		
	Isolating distances for circuit-breaker suitable for isolating warranted:	16 mm	P
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.		P
	Mechanism fitted with interlocks which only permit the isolating contacts to be separate or re-closed when main contacts are open		P
	Mechanism fitted with interlock, which only permit the main contacts to be closed when the isolating contacts are fully closed.		P
	Mechanism fitted with interlock, which only permit the main contacts to be closed when in disconnected position.		P
	The isolating distances between the isolating contacts cannot be inadvertently reduced.		P
7.1.1.1 part 1	Resistance to abnormal heat and fire	IEC 60947-1	P

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Clause	Requirement + Test	Result - Remark	Verdict
7.1.2 part 1	Current-carrying parts and their connection	IEC 60947-1	P
7.1.3	Clearances and creepage distances:		
	For circuit-breakers for which the manufacturer has declared a value of rated impulse withstand voltage. (Uimp.)		
	Clearances distances:	20 mm	
	- Uimp is given as:	8 kV	
	- max. value of rated operational voltage to earth	400 V	
	- nominal voltage of supply system:		
	- overvoltage category:	IV	
	- pollution degree:	3	
	- field-in or homogeneous:	inhomogeneous	
	- minimum clearances (mm):	8 mm	
	- measured clearances (mm):	19,4 mm	P
	Creepage distances:		
	- rated insulation voltage Ui (V)	690 V	
	- pollution degree	3	
	- comparative tracking index (V)	400 V	
	- material group	2	
	Minimum creepage distances (mm)	9 mm	
	Measured creepage distances (mm)	23,7 mm	P
7.1.4 part 1	Actuator		
7.1.4.1 part 1	Insulation		
	The actuator of the equipment shall be insulated from the live parts for the rated insulation voltage and, if applicable, the rated impulse withstand voltage		P
	If it is made of metal, it shall be capable of being satisfactorily connected to a protective conductor unless it is provided with additional reliable insulation		P

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Clause	Requirement + Test	Result - Remark	Verdict
	If it is made of or covered by insulating material, any internal metal part, which might become accessible in the event of insulation failure, shall also be insulated from live parts for the rated insulation voltage		P
7.1.4.2	Direction of movement		
	The direction of operation for actuators of devices shall normally conform to IEC 60447.		P
	Where devices cannot conform to these requirements, e.g. due to special applications or alternative mounting positions, they shall be clearly marked such that there is no doubt as to the "I" and "O" positions and the direction of operation		P
7.1.5 part 1	Indication of contact position		
7.1.5.1 part 1	Indicating means		
	When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated		P
	This is done by means of a position indicating device (see 2.3.18)		P
	If symbols are used, they shall indicate the closed and open position respectively, in accordance with IEC 60417-2:		
	- 60417-2-IEC-5007 I On (power)		P
	- 60417-2-IEC-5007 O Off (power)		P
	For equipment operated by means of two push-buttons, only the push-button designated for the opening operation shall be red or marked with the symbol "O"		N/A
	Red colour shall not be used for any other push-button		N/A
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073		N/A
7.1.5.2 part 1	Indication by the actuator		

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Clause	Requirement + Test	Result - Remark	Verdict
	When the actuator is used to indicate the position of the contacts, it shall automatically take up or stay, when released, in the position corresponding to that of the moving contacts; in this case, the actuator shall have two distinct rest positions corresponding to those of the moving contacts, but for automatic opening a third distinct position of the actuator may be provided		P
7.1.6	Additional safety requirements for equipment suitable for isolation		
7.1.6.1	Additional constructional requirements for equipment suitable for isolation (Ue > 50 V):		
	Equipment suitable for isolation shall provide in the open position an isolation distance in acc. with the requirements necessary to satisfy the isolating function. Indication of the main contacts shall be provide by one or more of the following means:		
	- the position of the actuator		P
	- a separate mechanical indicator		N/A
	- visibility of the moving contacts		P
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position		P
	Actuator front-plate fitted to the equipment in a manner which ensures correct contact position indication and locking		P
	The indicated open position is the only position in which the specified isolation distances between the contacts is ensured.		P
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm) :	8 mm	
	- measured clearances (mm) :	20 mm	P
	- test Uimp across gap (kV) :	8 kV	P
7.1.6.2	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers:		
	auxiliary switch shall be rated according to IEC 60 947-5-1		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	If equipment suitable for isolation is provided with an auxiliary switch for the purpose of electrical interlocking with contactor (s) or circuit-breaker(s) and intended to be used in motor circuits, the following requirements shall apply unless the equipment is rated for AC-23 utilization category		N/A
	The time interval between the opening of the contacts of the auxiliary switch and the contacts of the main poles shall be sufficient to ensure that the associated contactor or circuit-breaker interrupts the current before the main poles of the equipment open		N/A
	Unless otherwise stated in the manufacturer's technical literature, the time interval shall be not less than 20 ms when the equipment is operated according to the manufacturer instructions		N/A
	Compliance shall be verified by measuring the time interval between the instant of opening of the auxiliary switch and the instant of opening of the main poles under no-load conditions when the equipment is operated according to the manufacturer's instructions		N/A
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles		N/A
	A suitable opening time interval may also be provided by an intermediate position (between the ON and OFF position) at which the interlocking contact(s) is (are) open and the main poles remain closed		N/A
7.1.6.3	Supplementary requirements for equipment provided with means for padlocking the open position:		
	the locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed		P
	Alternatively, the design may provide padlockable means to prevent access to the actuator		N/A
	test force F applied to the actuator in an attempt to operate to the closed position (N) :	60 N	P
	rated impulse withstand voltage (kV) :	8 kV	P
	test Uimp on open main contacts at the test force		P

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Clause	Requirement + Test	Result - Remark	Verdict
7.1.7	Terminals		
7.1.7.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength		P
	Terminal connections shall be such that necessary contact pressure is maintained		P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal		P
	Terminal shall not allow the conductor to be displaced or to be displaced themselves in a manner detrimental to the operator of equipment and the insulation voltage shall not be reduced below the rated value		P
7.1.7.2	Connection capacity		
	type of conductors :	cable	P
	minimum cross-sectional area of conductor (mm^2) :		N/A
	maximum cross-sectional area of conductor (mm^2) :	120 mm^2	P
	number of conductors simultaneously connectable to the terminal :	1	P
7.1.7.3	Connection		
	terminals for connection to external conductors shall be readily accessible during installation		P
	clamping screws and nuts shall not serve to fix any other component		P
7.1.7.4	Terminal identification and marking		
	terminal intended exclusively for the neutral conductor		N/A
	protective earth terminal		N/A
	other terminals		N/A
7.1.8 part 1	Additional requirements for equipment provided with a neutral pole		
	When an equipment is provided with a pole intended only for connecting the neutral, this pole shall be clearly identified to that effect by the letter N (see 7.1.7.4.).		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A switched neutral pole shall break not before and shall make not after the other poles		N/A
	For equipment having a value of conventional thermal current (free air or enclosed, see 4.3.2.1 and 4.3.2.2) not exceeding 63 A, this value shall be identical for all poles		N/A
	For higher conventional thermal current values, the neutral pole may have a value of conventional thermal current different from that of the other poles, but not less than half that value or 63 A, whichever is the higher		N/A
	if a pole with a appropriate making and breaking capacity is used as a neutral pole, then all poles, incl. the neutral pole, shall operate substantially together.		N/A
7.1.9	Provisions for protective earthing		
7.1.9.1	The exposed conductive parts (e.g. chassis, framework and fixed parts of metal enclosures) other than those which cannot constitute a danger shall be electrically interconnected and connected to a protective earth terminal for connection to an earth electrode or to an external protective conductor		N/A
part 1	This requirement can be met by the normal structural parts providing adequate electrical continuity and applies whether the equipment is used on its own or incorporated in an assembly		N/A
	Exposed conductive parts are considered not to constitute a danger if they cannot be touched on large areas or grasped with the hand or if they are of small size (approximately 50 mm x 50 mm) or are so located as to exclude any contact with live parts		N/A
7.1.9.2 part 1	Protective earth terminal		
	The protective earth terminal shall be readily accessible and so placed that the connection of the equipment to the earth electrode or to the protective conductor is maintained when the cover or any other removable part is removed		P
	The protective earth terminal shall be suitably protected against corrosion		P

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Clause	Requirement + Test	Result - Remark	Verdict
	In the case of equipment with conductive structures, enclosures, etc., means shall be provided, if necessary, to ensure electrical continuity between the exposed conductive parts the equipment and the metal sheathing of connecting conductors		P
	The protective earth terminal shall have no other function, except when it is intended to be connected to a PEN conductor (see 2.1.1.5 – Note). In this case, it shall also have the function of a neutral terminal in addition to meeting the requirements applicable to the protective earth terminal		P
7.1.9.3	Protective earth terminal marking and identification		
	The protective earth terminal shall be clearly and permanently identified by its marking		P
	The identification shall be achieved by colour (green-yellow mark) or by the notation PE, or PEN, as applicable, in accordance with IEC 60445, subclause 5.3, or, in the case of PEN, by a graphical symbol for use on equipment		P
	Graphical symbol to be used: 60417-2-IEC-5019 ⏚ Protective earth (ground) in accordance with IEC 60417-2		P
7.1.10	Enclosure for equipment		
7.1.10.1	Design		
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible		N/A
	Sufficient space shall be provided inside the enclosure		N/A
	The fixed parts of a metal enclosure shall be electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor		N/A
	Under no circumstances shall a removable metal part of the enclosure be insulated from the part carrying the earth terminal when the removable part is in place		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The removable parts of the enclosure shall be firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations		N/A
	When an enclosure is so designed as to allow the covers to be opened without the use of tools, means shall be provided to prevent loss of the fastening devices		N/A
	If the enclosure is used for mounting push-buttons, it shall not be possible to remove the buttons from the outside of the enclosure		N/A
7.1.10.2	Insulation		
	If, in order to prevent accidental contact between a metallic enclosure and live parts, the enclosure is partly or completely lined with insulating material, then this lining shall be securely fixed to the enclosure		P
7.1.11	Degree of protection of enclosed equipment		
	Degree of protection.	IP20	
	Test for first characteristic.	IP20	
	Test for first numeral .....:	2	P
	Test for second characteristic	IP20	
	Test for second numeral .....:	0	P
7.1.12 part 1	Conduit pull-out, torque and bending with metallic conduits		
	Polymeric enclosures of equipment, whether integral or not, provided with threaded conduit entries, intended for the connection of extra heavy duty, rigid threaded metal conduits complying with IEC 60981, shall withstand the stresses occurring during its installation such as pull-out, torque, bending		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.2	Performance requirements		
7.2.1	Operating condition		
7.2.1.1	Closing		
	For a circuit-breaker to be closed safely on to the making current corresponding to its rated short-circuit making capacity, it is essential that it should be operated with the same speed and the same firmness as during the type test for proving the short-circuit making capacity		P
7.2.1.1.1	Dependent manual closing		
	For a circuit-breaker having a dependent manual closing mechanism, it is not possible to assign a short-circuit making capacity rating irrespective of the conditions of mechanical operation		N/A
	Such a circuit-breaker should not be used in circuits having a prospective peak making current exceeding 10 kA		N/A
	However, this does not apply in the case of a circuit-breaker having a dependent manual closing mechanism and incorporating an integral fast-acting opening release which causes the circuit-breaker to break safely, irrespective of the speed and firmness with which it is closed on to prospective peak currents exceeding 10 kA; in this case, a rated short-circuit making capacity can be assigned		N/A
7.2.1.1.2	Independent manual closing		
	A circuit-breaker having an independent manual closing mechanism can be assigned a short-circuit making capacity rating irrespective of the conditions of mechanical operation		P
7.2.1.1.3	Dependent power closing		
	At 110% of the rated control supply voltage, the closing operation performed on no-load shall not cause any damage to the circuit-breaker.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	At 85% of the rated control supply voltage, the closing operation shall be performed when the current established by the circuit-breaker is equal to its rated making capacity within the limits allowed by the operation of its relays or releases and, if a maximum time is stated for the closing operation, in a time not exceeding this maximum time limit.		N/A
7.2.1.1.4	Independent power closing		
	A circuit-breaker having an independent power closing operation can be assigned a rated short-circuit making capacity irrespective of the conditions of power closing		N/A
	Means for charging the operating mechanism, as well as the closing control components, shall be capable of operating in accordance with the manufacturer's specification		N/A
7.2.1.1.5	Stored energy closing		
	Capable ensuring closing of the circuit-breaker in any condition between no-load and its rated making capacity		N/A
	- when the stored energy is retained within the circuit-breaker, a device is provided which indicates when the storing mechanism is fully charged.		N/A
	- means for charging the operating mechanism and closing control components operates when auxiliary supply voltage is between 85% and 110% of the rated control supply voltage.		N/A
	- not possible for the moving contacts to move from the open position, unless the charge is sufficient for satisfactory completion of the closing operation.		N/A
	- by manually operated circuit-breaker is the direction of operation indicated. (not for circuit-breaker with an independent manual closing operation.)		N/A
	- For trip free circuit-breaker it shall not be possible to maintain the contacts in the touching or closed position when the release is in the position to trip the circuit-breaker.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.1.2	Opening		
7.2.1.2.1	Circuit-breakers which open automatically shall be trip-free and, unless otherwise agreed between manufacturer and user, shall have their energy for the tripping operation stored prior to the completion of the closing operation		
7.2.1.2.2	Opening by undervoltage releases		
7.2.1.3. a part.1	Operating voltage		
	An under-voltage relay or release, when associated with a switching device, shall operate to open the equipment even on a slowly falling voltage within the range between 70% and 35% of its rated voltage		P
	An under-voltage relay or release shall prevent the closing of the equipment when the supply voltage is below 35% of the rated voltage of the relay or release; it shall permit closing of the equipment at supply voltages equal to or above 85% of its rated value		P
	Unless otherwise stated in the relevant product standard, the upper limit of the supply voltage shall be 110% of its rated value		P
7.2.1.3. b part 1	Operating time		
	For a time-delay under-voltage relay or release, the time-lag shall be measured from the instant when the voltage reaches the operating value until the instant when the relay or release actuates the tripping device of the equipment		N/A
7.2.1.2.3	Opening by shunt releases		N/A
7.2.1.4 part 1	Limits of operation of shunt releases		
	A shunt release for opening shall cause tripping under all operating conditions of an equipment when the supply voltage of the shunt release measured during the tripping operation remains between 70% and 110% of the rated control supply voltage and, if a.c., at the rated frequency		P
7.2.1.5 part 1	Limits of operation of current operated relays and released		
	Limits of operation of current operated relays and releases shall be stated in the relevant product standard		P

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.1.2.4	Opening by over-current releases		
a)	Opening under short-circuit conditions		
	The short-circuit release shall cause tripping of the circuit-breaker with an accuracy of 20% of the tripping current value of the current setting for all values of the current setting of the short-circuit current release		P
	Where necessary for over-current co-ordination the manufacturer shall provide information (usually curves) showing		P
	- maximum cut-off (let-through) peak current as a function of prospective current (r.m.s. symmetrical)		P
	- I^2t characteristics for circuit-breakers of utilization category A and, if applicable, B for circuit-breakers with instantaneous override (see note to 8.3.5)		P
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation		
	The release shall cause tripping of the circuit-breaker with an accuracy of ± 10% of the tripping current value of the current setting for all values of current setting of the overload release		P
2)	Inverse time-delay operation		
	At the reference temperature and at 1,05 times the current setting with the conventional non-tripping current, the opening release being energized on all poles, tripping shall not occur in less than the conventional time from the cold state, i.e. with the circuit-breaker at the reference temperature		P
	Moreover, when at the end of the conventional time the value of current is immediately raised to 1,30 times the current setting, i.e. with the conventional tripping current, tripping shall then occur in less than the conventional time later		P
	If a release is declared by the manufacturer as substantially independent of ambient temperature, the current values of table 6 shall apply within the temperature band declared by the manufacturer, within a tolerance of 0,3%/K		P
	The width of the temperature band shall be at least 10 K on either side of the reference temperature		

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.4.2	Operational performance capability		
7.2.4.2 part 1	The operational performance off-load for which the tests are made with the control circuits energized and the main circuit not energized, in order to demonstrate that the equipment meets the operating conditions specified at the upper and lower limits of supply voltage and/or pressure specified for the control circuit during closing and opening operations		P
	The operational performance on-load during which the equipment shall make and break the specified current corresponding, where relevant, to its utilization category for the number of operations stated in the relevant product standard		P

8	TESTS		
8.2.4	Mechanical properties of terminals		
	Mechanical strength of terminals		
	maximum cross-sectional area of conductor (mm^2) :	120 mm^2	
	diameter of thread (mm) :	8 mm	
	torque (Nm) :	15 Nm	
	5 times on 2 separate clamping units		P
	Testing for damage to and accidental loosening of conductor (flexion test)		
	conductor of the smallest cross-sectional area (mm^2) :	10	
	number of conductors of the smallest cross section :	1	
	diameter of bushing hole (mm) :	25	
	height between the equipment and the platen :	280 mm	
	mass at the conductor(s) (kg) :	2,0	
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		
	force (N) :	90	

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Clause	Requirement + Test	Result - Remark	Verdict
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	meets	P
	conductor of the largest cross-sectional area (mm^2) :	240	
	number of conductors of the largest cross section :	1	
	diameter of bushing hole (mm) :	25	
	height between the equipment and the platen :	464 mm	
	mass at the conductor(s) (kg) :	20	
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		
	force (N) :	578 N	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	meets	P
	conductor of the largest and smallest cross-sectional area (mm^2) :	--	
	number of conductors of the smallest cross section, number of conductors of the largest cross section :	--	
	diameter of bushing hole (mm) :	--	
	height between the equipment and the platen :	--	
	mass at the conductor(s) (kg) :	--	
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
	Pull-out test		
	force (N) :		
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS		
8.3.3.1	Tripping limits and characteristic		
8.3.3.1.2	Opening under short-circuit conditions		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BD250	
	Sample no:	1	
	Rated operational voltage: Ue (V)	415 V,500 V,690 V AC	
	Rated current: In (A)	250 A	
	Ambient temperature 10-40 °C :		P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	2500 A	P
	Range of adjustable setting current. (A)	2500 A	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	2000 kA	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	 No operate of the release No operate of the release No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 80% of the maximum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	3000 kA	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3		N/A
	Test current: 120% of the maximum adjustable setting current: (A)		N/A
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3:		N/A
	Test current: tripping current declared for single pole operation (A)	2500 A	P
	Operating time: < 0,2 s in case of instantaneous release: L1: L2: L3:	operate of the release operate of the release operate of the release	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BD250	
	Sample no:	1	
	Rated operational voltage: Ue (V)	415 V,500 V,690 V AC	
	Rated current: In (A)	250 A	
	Ambient temperature 10-40 °C :		P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	1000 A - 2000 A	P
	Range of adjustable setting current. (A)	1000 A - 2000 A	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)	900 A	P
	Operating time: >0,2s in case of instantaneous releases:	No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the maximum adjustable setting current: (A)	1800 A	P
	Operating time: >0,2s in case of instantaneous releases	No operate of the release	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	1100 A	P N/A
	Operating time: <0,2s in case of instantaneous releases:	operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	2200 A	P N/A
	Operating time: <0,2s in case of instantaneous releases	operate of the release	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	OEZ s.r.o.	
	Type designation or serial number	BD250	
	Sample no:	1	
	Rated operational voltage: Ue (V)	415 V, 500 V, 690 V AC	
	Rated current: In (A)	250 A	
	For releases dependent of ambient air temperature: Reference temperature		N/A
	Test ambient temperature (°C)		N/A
	If test made at a difference ambient temperature: Acc. manufacturer's correction temperature/current data:		N/A
	Range of adjustable setting current: (A)		N/A
	For releases independent of ambient temperature: Test made at 30°C and/or at 20/40°C		P
	Test ambient air temperature:	30°C	P
	Releases, dependent of ambient air temperature: Reference temperature (°C)		N/A
	Releases, independent of ambient air temperature: at 30°C		P
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	105 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	130 A	P

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Clause	Requirement + Test	Result - Remark	Verdict
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Test current: 105% of the maximum adjustable setting current: (A)	263 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the maximum adjustable setting current: (A)	325 A	P
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	40°C	P
	Test current: 105% of the rated, or minimum adjustable setting current: (A)	105 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	130 A	P
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	Test current: 105% of the maximum adjustable setting current: (A)	263 A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	No operate of the release	P
	Test current: 130% of the maximum adjustable setting current: (A)	325 A	P

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Clause	Requirement + Test	Result - Remark	Verdict
	For circuit-breakers having an Identifled neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	Operate of the release	P
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)		N/A
	Releases, independent of ambient air temperature: at 30°C	30°C	P
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	Instantaneous release±20% short-circuit release ±10% Inverse time-delay releases ±30%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	40°C	P
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	Instantaneous release±20% short-circuit release ±10% Inverse time-delay releases ±30%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.1.4	Additional test for definite time-delay releases		
a)	Time delay		
	Test is made at a current equal to 1,5 times the current setting		
	overload releases: (all phase poles loaded)		N/A
	for circuit-breakers having an identified neutral pole provided with an overload release, the test current for this release shall be 1,5 times the current setting;		N/A
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.		N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time, overload releases: (s)		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Operating time, short-circuit releases: (s) . L1-L2: L1-L3: L2-L3:		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Test current: 1,5 times of the maximum adjustable setting current: (A)		N/A
	Operating time, overload releases: (s)		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Operating time, short-circuit releases: (s) . L1-L2: L1-L3: L2-L3:		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
b)	Non-tripping duration		
	Firstly, the test current equal to 1,5 times the current setting is maintained for a time interval equal to the non-tripping duration stated by the manufacturer.		
	overload releases: (all phase poles loaded)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	short-circuit releases: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.		N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)		N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)		N/A
	Operating time, overload releases: the circuit-breaker does not trip:		N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:		N/A
	Test current: 1,5 times of maximum adjustable setting current: (A)		N/A
	Time interval: non-tripping duration stated by the manufacturer: (s)		N/A
	Operating time, overload releases: the circuit-breaker does not trip:		N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:		N/A
	Then, the current is reduced to the rated current and maintained at this value for twice the time-delay stated by the manufacturer. The circuit-breaker shall not trip.		
	Test current: of the rated, or minimum adjustable setting current: (A)		N/A
	Time interval: twice the delay-time stated by the manufacturer: (s)		N/A
	Operating time, overload releases: the circuit-breaker does not trip:		N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L1-L2: L1-L3: L2-L3:		N/A
	Test current: maximum adjustable setting current: (A)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time, overload releases: the circuit-breaker does not trip:		N/A
	Operating time, short-circuit releases: the circuit-breaker does not trip: L 1-L2: L1-L3: L2-L3:		N/A
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	8 kV main circuits 6 kV auxiliary circuits	P
	- sea level of the laboratory:	340 m	P
	- test Uimp main circuits (kV) :	9,6 kV	P
	- test Uimp auxiliary circuits (kV) :	7,2 kV	P
	- test Uimp control circuits (kV) :		N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	14,5 kV	P
a)	Application of test voltage		
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.		P
	ii) Between all terminals of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.		P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit		P
	- other circuits		P
	- exposed conductive parts		P
	- enclosure of mounting plate		P
	iv) equipment suitable for isolation		P
	equipment not suitable for isolation		N/A
	- no unintentional disruptive discharge during the test's		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		
	- rated insulation voltage (V) :		N/A
	- main circuits, test voltage for 1 min (V)		N/A
	- auxiliary circuits, test voltage for 1 min (V)		N/A
	- control circuits, test voltage for 1 min (V)		N/A
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .		P
	- between each pole and all the other poles connected to the frame of the circuit-breaker		P
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.		P
	- between all live parts of all poles connected together and the frame of the circuit-breaker.		P
	- between the terminals of one side connected together and the terminals of the other side connected together.		P
b)	Control and auxiliary circuits		
1)	- between all the control and auxiliary circuits which are not normally connected to the main circuit, connected together, and the frame of the circuit-breaker.		P
2)	- where appropriate, between each part of the control an auxiliary circuits which may be isolated from the other parts during normal operation and all the other parts connected together.		P
	No unintentional disruptive discharge during the tests		P
8.3.3.2	For circuit-breaker suitable for isolation, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 Ue, and shall not exceed 0,5mA.	0,02 mA	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		
a)	Construction		
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1		P
	A circuit-breaker with stored energy operation shall be checked for compliance with 7.2.1.1.5, regarding the charge indicator and the direction of operation of manual energy storing		N/A
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3		N/A
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer		N/A
	A circuit-breaker with stored energy operation shall comply with the requirements stated in 7.2.1.5 with the auxiliary supply voltage at 85% and 110% of the rated control supply voltage.		N/A
	It shall also be verified that the moving contacts cannot be moved from the open position when the operating mechanism is charged to slightly below the full charge as evidenced by the indicating device		N/A
	For a trip-free circuit-breaker it shall not be possible to maintain the contacts in the touching or closed position when the tripping release is in the position to trip the circuit-breaker		P
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values		P
c)	Undervoltage releases		
	Undervoltage releases shall comply with the requirements of 7.2.1.3 of Part 1. For this purpose, the release shall be fitted to a circuit-breaker having the maximum current rating for which the release is suitable		P

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Clause	Requirement + Test	Result - Remark	Verdict
i)	Drop out voltage		
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified		P
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s		P
	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil		P
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range		P
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles of the circuit-breaker		P
	This test may be combined with the temperature-rise test of 8.3.3.6		P
	In the case of a release with a range of rated voltages, this test is made at both the minimum and maximum rated control supply voltages		P
ii)	Test for limits of operation		
	Starting with the circuit-breaker open, at the temperature of the test room, and with the supply voltage at 30% rated maximum control supply voltage, it shall be verified that the circuit-breaker cannot be closed by the operation of the actuator		P
	When the supply voltage is raised to 85% of the minimum control supply voltage, it shall be verified that the circuit-breaker can be closed by the operation of the actuator		P
iii)	Performance under overvoltage conditions		
	With the circuit-breaker closed and without current in the main circuit, it shall be verified that the undervoltage release will withstand the application of 110% rated control supply voltage for 4 h without impairing its functions		P

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Clause	Requirement + Test	Result - Remark	Verdict
d)	Shunt releases		
	Shunt releases shall comply with the requirements of 7.2.1.4 of Part 1. For this purpose, the release shall be fitted to a circuit-breaker having the maximum rated current for which the release is suitable		P
	It shall be verified that the release will operate to open the circuit-breaker at 70% rated control supply voltage when tested at an ambient temperature of + 55 °C ± 2 °C without current in the main poles of the circuit-breaker		P
	In the case of a release having a range of rated control supply voltages, the test voltage shall be 70% of the minimum rated control supply voltage		P
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	BD250	
	Sample no:	1	
	Rated current In (A)	250 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated control supply voltage of closing mechanism: Uc (V)	--	
	Rated control supply voltage of shunt releases: Uc (V)	230 V AC	
	Rated control supply voltage undervoltage releases: Uc (V)	230 V AC	
	Ambient temperature 10-40 °C :	23°C	P
	Number of operating cycles per hour	180/hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	30000	P
	Number of cycles without current (without releases)	27000	P
	Applied voltage: closing mechanism (V)		N/A
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc	3000	P
	Applied voltage: shunt releases (V)	500 V AC	P

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Clause	Requirement + Test	Result - Remark	Verdict
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc	3000	P
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)		P
	Applied voltage: undervoltage releases (V)	24 V AC	P
	Electrical components do not exceed the value indicated in tab. 7.		N/A
8.3.3.3.4	Operational performance capability with current.		
	Rated current: In (A)	250 A	
	Maximum rated operational voltage: Ue (V)	690 V	
	Conductor cross-sectional area (mm^2) :	120 mm^2	P
	Number of operating cycles per hour	120/hour	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	3000	P
	Applied voltage: closing mechanism (V)		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		P
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	750 V 750 V 750 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	250 A 250 A 250 A	P
	- power factor/time constant:	0,8	P
	- frequency: (Hz)	50 Hz	P
	- on-time (ms):	60 ms	P
	- off-time (s):	20 s	P
	Electrical components do not exceed the value indicated in tab. 7.		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100		P
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.		P
8.3.3.4	Overload performance		
	this test applies to circuit-breaker of rated current up to and including 630 A		
	Type designation or serial number	BD250	
	Sample no:	1	
	Rated current In (A)	250 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated control supply voltage of closing mechanism: Uc (V)	--	
	Rated control supply voltage of shunt releases: Uc (V)	230 V AC	
	Rated control supply voltage undervoltage releases: Uc (V)	230 V AC	
	Ambient temperature 10-40 °C :	22°C	P
	Number of operating cycles per hour	120	P
	Maximum rated operational voltage: Ue (V)	690 V AC	P
	Number of operating cycles per hour	120	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	12	P
	Applied voltage: closing mechanism (V)	725 V AC	P
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.		P
	Conditions, overload operations:		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	725 V AC 725V AC 725V AC	P
	- test current AC/DC: I/Ie = 6,0/2.5 (A) ..... L1: ..... L2: L3:	 1500 A 1500 A 1500 A	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- power factor/time constant:	0,8	P
	- Number of cycles manually opened: 9		P
	- Number of cycles automatically opened by an overload release: 3		P
	- frequency: (Hz)	50 Hz	P
	- on-time max 2s:		P
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1380 V	P
	- no breakdown or flashover		P
8.3.3.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.		P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	Max. 63 K	P
	conductor cross-sectional area (mm²) :	120 mm²	P
	test current Ie (A) :	250 A	P
8.3.3.7	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	362,5 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	31´18"	P
8.3.3.8	Verification of undervoltage and shunt releases		
	Circuit-breaker fitted with undervoltage releases. The release shall not operate at 70% of the minimum control supply voltage -		P
	and shall operate at 35% of the maximum control supply voltage.		P
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.		P
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		
	actuating force for opening (N) ..... :	20 N	

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Clause	Requirement + Test	Result - Remark	Verdict
	test force with blocked main contacts for 10 s (N) ..... :	60 N	
	Dependent power operation		
	Supply voltage of 110% of rated voltage (V).....:		N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.		P
	Independent power operation		
	Three attempts to operate the equipment by the stored energy.		P
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts ..... :	60 N	P
	Position indicator does not show OFF-position after capture of test force at blocked main contacts		P

8.3.4	TEST SEQUENCE II (Ics):		
8.3.4.1	Test of rated service short-circuit breaking capacity		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number	BD250	
	Sample no:	2, 3, 4	
	Rated current: In (A)	250 A	
	Rated operational voltage: Ue (V)	415 V,500 V,690 V AC	
	Rated service short-circuit breaking capacity: (kA)	18 kA/415 V, 10 kA/500 V, 5 kA/690 V	
	Rated control supply voltage of closing mechanism: Uc (V)	--	
	Rated control supply voltage of shunt release: Uc (V)	--	
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		P
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test made in free air:		P
	Distances of the metallic screen's: (all sides)	Vide catalogue	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		P
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm^2		P
	- finish: bare or conductive plating		P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	120 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)	15 Nm	P
	Test sequence of operation: O – t – CO – t – CO		P
	- test voltage U/Ue = 1,05 (V)..... L1: ..... L2: L3:	440 V 440 V 440 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	17,8 kA AC 17,8 kA AC 18,5 kA AC	P
	power factor/time constant :	0,26	P
	- Factor "n"	2,03	P
	- peak test current (A) :	36,1 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	10,4 kA 15,8 kA 18,8 kA	

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	$0{,}57\ 10^6\ A^2s$ $1{,}04\ .10^6\ A^2s$ $1{,}1\ .10^6\ A^2s$	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	18,1 kA 12,3 kA 17,2 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	$1{,}01\ .\ 10^6\ A^2s$ $0{,}51\ .10^6\ A^2s$ $1{,}32\ .10^6\ A^2s$	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	12,8 kA 16,6 kA 18,8 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	$0{,}6\ .\ 10^6\ A^2s$ $1{,}18\ .10^6\ A^2s$ $1{,}16.10^6\ A^2s$	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
	Test sequence of operation: O – t – CO – t – CO		
	- test voltage U/Ue = 1,05 (V)..... L1: ..... L2: L3:	550 V 550 V 550 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	8,2 kA AC 8,3 kA AC 8,4 kA AC	P
	power factor/time constant :	0,49	P
	- Factor "n"	1,7	P
	- peak test current (A) :	14,0 kA	P
	Test sequence "O"		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	8,5 kA 10,9 kA 10,6 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	0,27. 10^6 A^2s 0,57 .10^6 A^2s 0,48.10^6 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		P
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	11,4 kA 8,1 kA 10,0 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	0,32 10^6 A^2s 0,54 .10^6 A^2s 0,41.10^6 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		P
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	10,3 kA 11,0 kA 7,6 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	0,66. 10^6 A^2s 0,58 .10^6 A^2s 0,27.10^6 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
	Test sequence of operation: O – t – CO – t – CO		P
	- test voltage U/Ue = 1,05 (V)..... L1: ..... L2: L3:	770 V 770 V 770 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	5,2 kA AC 5,1 kA AC 5,1 kA AC	P
	power factor/time constant :	0,68	P
	- Factor "n"	1,5	P
	- peak test current (A) :	7,9 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "O"		P
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	6,4 kA 7,6 kA 6,9 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	0,191 . 10^6 A^2s 0,34 .10^6 A^2s 0,28.10^6 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		P
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	7,9 kA 5,7 kA 7,2 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	0,34 . 10^6 A^2s 0,19.10^6 A^2s 0,22.10^6 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		P
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	7,0 kA 7,9 kA 6,0 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	0,22 . 10^6 A^2s 0,39 .10^6 A^2s 0,22.10^6 A^2s	P
	Melting of the fusible element		N/A
	Holes in the PE-sheet for test sequence "O"		N/A
	Cracks observed		P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	250 A	
	Maximum rated operational voltage: Ue (V)	690 V	
	Conductor cross-sectional area (mm^2) :	120 mm^2	
	Number of operating cycles per hour	120/hour	P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	50	P
	Applied voltage: closing mechanism (V)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		P
	Conditions, make/break operations:		
	Sample no	2 3 4	
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	415 V 500 V 690 V 415 V 500 V 690 V 415 V 500 V 690 V	P
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:	250 A 250 A 250 A	P
	- power factor/time constant:	0,8	P
	- frequency: (Hz)	50 Hz	P
	- on-time (ms):	60 ms	P
	- off-time (s):	20 s	P
	Electrical components do not exceed the value indicated in tab. 7.		P
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1380 V	P
	- no breakdown or flashover		P
	Sample no	2 3 4	
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	0,01 mA 0,1 mA 0,1 mA	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.		P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	Max. 64 K	P
	conductor cross-sectional area (mm²) :	120 mm²	P
	test current Ie (A) :	250 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	362,5 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	31'21" 30'45" 32'07"	P

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Clause	Requirement + Test	Result - Remark	Verdict

8.3.4	TEST SEQUENCE II/III (Ics=Icu):		
8.3.4.1	Test of rated service short-circuit breaking capacity		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		
	Rated service short-circuit breaking capacity: (kA)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		N/A
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N/A
	Test made in free air:		N/A
	Distances of the metallic screen's: (all sides)		N/A
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		N/A
	- size of hole: <30mm^2		N/A
	- finish: bare or conductive plating		N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm²) :		N/A
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)		N/A
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :		N/A
	Test sequence of operation: O – t – CO – t – CO		N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	power factor/time constant :		N/A
	- Factor "n"		N/A
	- peak test current (A) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:		N/A
	Pause, t: (min)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Pause, t: (min)		N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Melting of the fusible element		N/A
	Holes in the PE-sheet for test sequence "O"		N/A
	Cracks observed		N/A
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)		
	Maximum rated operational voltage: Ue (V)		
	Conductor cross-sectional area (mm^2) :		
	Number of operating cycles per hour		N/A
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)		N/A
	Applied voltage: closing mechanism (V)		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		N/A
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:		N/A
	- test current I/Ie = 1,0 (A) ..... L1: ..... L2: L3:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- power factor/time constant:		N/A
	- frequency: (Hz)		N/A
	- on-time (ms):		N/A
	- off-time (s):		N/A
	Electrical components do not exceed the value indicated in tab. 7.		N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V		N/A
	- no breakdown or flashover		N/A
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)		N/A
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.		N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :		N/A
	conductor cross-sectional area (mm²) :		N/A
	test current Ie (A) :		N/A
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		N/A
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu)		
	Rated ultimate short-circuit breaking		
	Except where the combined test sequence applies, this test sequence applies to circuit-breaker of utilization category A and to circuit-breaker of utilization B having a rated ultimate short-circuit breaking capacity higher than the rated short-time withstand current.		
	For circuit-breakers of utilization B having a rated short-time withstand current equal to their rated ultimate short-circuit breaking capacity, this test sequence need not be made, since, in this case, the ultimate short-circuit breaking capacity, is verified when carrying out test sequence IV.		
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.		
	Type designation or serial number	BD250	
	Sample no:	5, 6, 7	
	Rated current: In (A)	250 A	
	Rated operational voltage: Ue (V)	415,500,690 V AC	
	Rated ultimate short-circuit breaking capacity: (kA)	36 kA/415V, 16 kA/500 V, 10 kA/690 V	
	Rated control supply voltage of closing mechanism: Uc (V)	--	
	Rated control supply voltage of shunt release: Uc (V)	--	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	3´52"	P
	Sample no:	5 6 7	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	3´42" 3´47" 3´41" 3´44" 3´45" 3´48" 3´42" 3´45" 3´41" -	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5.2	Test of rated ultimate short-circuit breaking capacity		
	The test sequence of operations is O – t - CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		P
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		P
	Test made in free air:		P
	Distances of the metallic screen's: (all sides)	Vide catalogue	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		P
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm^2		P
	- finish: bare or conductive plating		P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		P
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2) :	120 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening, torques: (Nm)	15 Nm	P
	Test sequence of operation: O – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	440 V 440 V 440 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	37,0 kA 36,7 kA 37,4 kA	

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Clause	Requirement + Test	Result - Remark	Verdict
	power factor/time constant :	0,20	P
	- Factor "n"	2,16	P
	- peak test current (Amax) :	79,2 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	12,65 kA 22,2 kA 28,8 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	0,29 . 10^6 A^2s 1,21 .10^6 A^2s 1,97 . 10^6 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	27,8 kA 12,8 kA 21,4 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	1,97 . 10^6 A^2s 0,51 . 10^6 A^2s 1,46 . 10^6 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
	Test sequence of operation: O – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	548 V 548 V 548 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	16,3 kA 17,0 kA 15,8 kA	P
	power factor/time constant :	0,28	P
	- Factor "n"	2,1	P
	- peak test current (Amax) :	36,5 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	8,0 kA 13,7 kA 15,6 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	0,14. 10^6 A^2s 0,58.10^6 A^2s 0,82. 10^2 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	14,7 kA 13,4 kA 13,7 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	0,76 . 10^6 A^2s 0,58 . 10^6 A^2s 1,26 .10^6 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
	Test sequence of operation: O – t – CO		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	740 V 740 V 740 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: L3:	10,3 kA 10,4 kA 10,3 kA	P
	power factor/time constant :	0,45	P
	- Factor "n"	1,73	P
	- peak test current (Amax) :	18,0 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	10,2 kA 13,4 kA 13,0 kA	P
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	0,48 . 10^6 A^2s 1,02. 10^6 A^2s 0,74 . 10^6 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	14,2 kA 13,0 kA 11,4 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:	$0{,}91 \cdot 10^6$ A^2s $0{,}77 \cdot 10^6$ A^2s $0{,}63 \cdot 10^6$ A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
8.3.5.3	Verification of dielectric withstand		
	Sample no:	5 6 7	P
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V 1000 V 1380 V	P
	- no breakdown or flashover		P
	Sample no:	5 6 7	P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	0,76 mA 0,09 mA 0,58mA	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	1'22"	P
	Sample no:	5 6 7	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	1'26" 1'22" 1'21" 1'22" 1'24" 1'25" 1'17" 1'21" 1'19" --	P
8.3.6	TEST SEQUENCE IV		N/A
	Rated short-time withstand current		
	Except where the combined test sequence applies, this test sequence applies to circuit-breakers of utilization category B and to those circuit-breaker of category A covered by note 3 of table 4, and comprises the following tests:		
	Where integrally fused circuit-breaker are of utilization category B, they shall meet the requirements of this sequence.		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated operational voltage: Ue (V)		
	Rated short-time withstand current: (kA/s)		
	Rated frequency: (Hz)		
8.3.6.1	Verification of overload releases		
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		N/A
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :		N/A
8.3.6.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)		N/A
	- duration of the test: (s)		N/A
	- test frequency: (Hz)		N/A
	- power factor / time constant (ms):		N/A
	- factor "n"		N/A
	- test voltage: (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:		N/A
	- highest peak current: (kA)		N/A
8.3.6.3	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.		N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :		N/A
	conductor cross-sectional area (mm²) :		N/A
	test current Ie (A) :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.6.4	Test of short-circuit breaking capacity at the max. short-time withstand current.		
	Rated short-time withstand current: (kA/s)		
	Test sequence: O – t – CO		
	max. available time setting of the short–time delay short-circuit release. (s)		N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	- test frequency: (Hz)		N/A
	- power factor / time constant (ms):		N/A
	- factor "n"		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	PAUSE, T: (MIN)		
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -		N/A
	- the instantaneous override, if any, shall not operate.		N/A
	-pause: t (s)		N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	PAUSE, T: (MIN)		
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- the instantaneous override, if any, shall not operate.		N/A
	- if the circuit-breaker has a making current release, this requirement does not apply to the CO operation, if the prospective current exceeds the pre-determined value, since it will then operate.		N/A
8.3.6.5	Verification of dielectric withstand		N/A
	- equal to twice the rated operational voltage with a minimum of 1000 V		
	- no breakdown or flashover		N/A
8.3.6.6	Verification of overload releases		N/A
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :		N/A
8.3.7	TEST SEQUENCE V		N/A
	Performance of integrally fused circuit-breakers		
	STAGE 1		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		
	Value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)		
	Type of integrated fuses (all details)		
	Rated control supply voltage of closing mechanism: Uc (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated control supply voltage of shunt release: Uc (V)		
8.3.7.1	Short-circuit at the selectivity limit current		
	Test sequences "O"		
	Fuses shall be fitted		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N/A
	Test made in free air:		N/A
	Distances of the metallic screen's: (all sides)		N/A
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		N/A
	- size of hole: <30mm^2		N/A
	- finish: bare or conductive plating		N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm²) :		N/A
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)		N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	power factor/time constant :		N/A
	- factor "n"		N/A
	- peak test current (Amax) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	- fuses shall still intact ..... L1: ..... L2: L3:		N/A
8.3.7.2	Verification of temperature-rise		N/A
	- the values of temperature-rise do not exceed the those specified in tab. 7.		N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :		N/A
	conductor cross-sectional area (mm^2) :		N/A
	test current Ie (A) :		N/A
8.3.7.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V		N/A
	- no breakdown or flashover		N/A

	STAGE 2		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	1.1 time the value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)		
	Type of integrated fuses (all details)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		
8.3.7.4	Verification of overload releases		N/A
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :		N/A
8.3.7.5	Short-circuit at 1,1 times the take-over current		
8.3.7.1	Short-circuit at the selectivity limit current		
	Test sequences "O"		
	Fuses shall be fitted		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N/A
	Test made in free air:		N/A
	Distances of the metallic screen's: (all sides)		N/A
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- size of hole: <30mm^2		N/A
	- finish: bare or conductive plating		N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0.8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm²) :		N/A
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)		N/A
	1.1 time the value of prospective current equal to the selectivity limit current, as declared by the manufacturer. (kA)		
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	power factor/time constant :		N/A
	- factor "n"		N/A
	- peak test current (Amax) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:		N/A
	- at least two of the fuses shall have blown . L1: ..... L2: L3:		N/A
8.3.7.6	Short-circuit at ultimate short-circuit breaking capacity		
	Type designation or serial number		

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Clause	Requirement + Test	Result - Remark	Verdict
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		
	Rated ultimate short-circuit breaking capacity. (kA)		
	Type of integrated fuses (all details)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		
	Test sequences: O – t – CO		
	Fuses shall be fitted		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N/A
	Test made in free air:		N/A
	Distances of the metallic screen's: (all sides)		N/A
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		N/A
	- size of hole: <30mm^2		N/A
	- finish: bare or conductive plating		N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Conductor cross-sectional area (mm²) :		N/A
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)		N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	power factor/time constant :		N/A
	- factor "n"		N/A
	- peak test current (A) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Pause: t (s)		N/A
	new fitted fuses		N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
8.3.7.7	Verification of dielectric withstand		
	- equal twice time rated operational voltage with a minimum of 1000 V (new fuses fitted)		N/A
	- no breakdown or flashover		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.7.8	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :		N/A
8.3.8	Combined test sequence		N/A
	At the discretion of, or in agreement with the manufacturer, this sequence may be applied to circuit-breaker of utilization cat. B:		
	Type designation or serial number		N/A
	Sample no:		N/A
	Rated current: In (A)		N/A
	Rated operational voltage: Ue (V)		N/A
	Rated short-time withstand current: (kA/s)		N/A
	Rated frequency: (Hz)		N/A
8.3.8.1	Verification of overload releases		
	The operation of overload releases shall be verified twice times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :		N/A
8.3.8.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)		N/A
	- duration of the test: (s)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- test frequency: (Hz)		N/A
	- power factor / time constant (ms):		N/A
	- factor "n"		N/A
	- test voltage: (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:		N/A
	- highest peak current: (kA)		N/A
8.3.8.3	Test of rated service short-circuit breaking capacity		
	At the highest voltage applicable to the rated short-time current.		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		
	Rated service short-circuit breaking capacity: (kA)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt release: Uc (V)		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		N/A
	Test made in free air:		N/A
	Distances of the metallic screen's: (all sides)		N/A
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		N/A
	- size of hole: <30mm^2		N/A
	- finish: bare or conductive plating		N/A
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		N/A
	Circuit is earthed at: (load-star- or supply-star point)		N/A
	Conductor cross-sectional area (mm²) :		N/A
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)		N/A
	Test sequence of operation: O – t – CO – t – CO		N/A
	The highest voltage applicable to the rated short-time current.		N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:		N/A
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:		N/A
	power factor/time constant :		N/A
	- Factor "n"		N/A
	- peak test current (A) :		N/A
	Test sequence "O"		
	- max. let-through current: (kApeak ..... L1: ..... L2: L3:		N/A
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Pause, t: (min)		N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	Pause, t: (min)		N/A
	Test sequence "CO"		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:		N/A
	- Joule integral I^2dt (A^2s) ..... L1: ..... L2: L3:		N/A
	The circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short-time delay short-circuit release.		N/A
	During this test the instantaneous override shall not operate		N/A
	- and the making current release shall operate		N/A
8.3.8.4	Operational performance capability with current.		
	Rated current: In (A)		N/A
	Maximum rated operational voltage: Ue (V)		N/A
	Conductor cross-sectional area (mm^2) :		N/A
	Number of operating cycles per hour		N/A
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)		N/A
	Applied voltage: closing mechanism (V)		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		N/A
	Conditions, make/break operations:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- test voltage U/Ue = 1,0 (V)..... L1: ..... L2: L3:		N/A
	- test current I/Ie = 1,0 (A)..... L1: ..... L2: L3:		N/A
	- power factor/time constant:		N/A
	- frequency: (Hz)		N/A
	- on-time (ms):		N/A
	- off-time (s):		N/A
	Electrical components do not exceed the value indicated in tab. 7.		N/A
8.3.8.5	Verification of dielectric withstand		N/A
	- equal to twice the rated operational voltage with a minimum of 1000 V		
	- no breakdown or flashover		N/A
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)		N/A
8.3.8.7	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.		N/A
	Temperature rise of main circuit terminals. ≤ 80 K (K) :		N/A
	conductor cross-sectional area (mm²) :		N/A
	test current Ie (A) :		N/A
8.3.8.7	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:		
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex B	Circuit-breakers incorporating residual current protection		N/A
B.3	Classification		
B.3.1			
B.3.1.1	CBR functionally independent of line voltage		
B.3.1.2	CBR functionally dependent on line voltage		
B.3.1.2.1	Opening automatically in the case of failure of the line voltage with or without delay.		
B.3.1.2.2	Not opening automatically in the case of failure of line voltage.		
B.3.2	*THE RESIDUAL OPERATING CURRENT*		
B.3.2.1	*CBR WITH SINGLE RATED RESIDUAL OPERATING CURRENT*		
B.3.2.2	*CBR WITH MULTIPLE SETTINGS OF RESIDUAL OPERATING CURRENT*	Fixed steps/continuous	
B.3.3	*CLASSIFICATION ACCORDING TO TIME-DELAY OF THE RESIDUAL CURRENT FUNCTION*		
B.3.3.1	*CBR WITHOUT TIME-DELAY: NON-TIME-DELAYED TYPE*		
B.3.3.2	*CBR WITH TIME-DELAY: TIME-DELAYED TYPE*		
B.3.3.2.1	CBR with non-adjustable time-delay		
B.3.3.2.2	CBR with adjustable time-delay	Fixed steps/continuous	
B.3.4	Classification according to behaviour in presence of a d.c. component	CBR of type AC / type A	
B.4	Characteristics of CBRs concerning their residual current function		
B.4.1.1	$I\Delta$		
B.4.1.2	$I\Delta$		
B.4.1.3	$I\Delta$		
B.4.2	Preferred and limiting values		
	Preferred values of the rated residual operating current ($I\Delta n$)		
	Limiting value of the non-operating overcurrent in the case of a single-phase load in a multiphase circuit		
B.4.2.4	Operating characteristics		

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Clause	Requirement + Test	Result - Remark	Verdict
	The value of the rated voltage of the voltage source of CBRs		
	For a time-delay type, the limiting non-actuating time is defined at 2 /Δn and shall be declared by the manufacturer.		N/A
	For CBR's having a limiting non-actuating time higher than 0,06 s, the manufacturer shall declare the maximum break time at /Δn, 2 /Δn, 5 /Δn, and 10 /Δn.		N/A
	In the case of a CBR having an inverse current/time characteristic, the manufacturer shall state the residual current/break time characteristic.		N/A
B.4.3	/Δ		
	The minimum value of $I_{\Delta m}$ is 25 % of I_{cu}.		N/A
			N/A
B.5.	Marking		N/A
	Data according B.5. section a) shall be marked on integral CBRs (see B.1.1), in addition to the marking specified in 5.2, and be clearly visible in the installed position		N/A
	Data according B.5. section b) shall be marked on r.c. units and be clearly visible in the installed *POSITION*		N/A
	Data according B.5. section c) shall be marked on r.c. units and be visible after assembly with the *CIRCUIT-BREAKER:*		N/A
	Data according B.5.section d) shall be marked on integral CBRs or r.c. units, as applicable, or made available in the manufacturer's literature:		N/A
	Data according section B.5. section e) shall be made available in the manufacturer's literature:		N/A
B.8.	Tests		
	This clause specifies tests for CBRs having a rated residual operating current /Δn up to and *INCLUDING 30 A.*		
	The applicability of the tests specified in this clause when /Δn > 30 A is subject to agreement *BETWEEN MANUFACTURER AND USER.*		

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Clause	Requirement + Test	Result - Remark	Verdict
	The instruments for the measurement of the residual current shall be at least class 0,5 *(SEE IEC 60051) AND SHALL SHOW (OR PERMIT TO DETERMINE) THE TRUE R.M.S. VALUE.*		N/A
	The instruments for the measurement of time shall have a relative error not greater than 10 % *OF THE MEASURED VALUE.*		N/A
B.8.1.1			
	OPERATIONAL PERFORMANCE CAPABILITY		
	During the operating cycles with current a third of the breaking operations shall be performed by actuating the test device, and a further third by applying a residual current of value IΔn (or, if applicable, of the lowest setting of the residual operating current) to any one pole.		N/A
	In the case of a reset-CBR, it is not possible to reclose the CBR after tripping without the intentional resetting action. This verification shall take place at the beginning and at the end of the operational performance capability test with current		N/A
	NO FAILURE TO TRIP SHALL BE ADMITTED.		
	RATED SERVICE SHORT-CIRCUIT BREAKING CAPACITY (TEST SEQUENCE II)		
	Following the tests of 8.3.4, verification of the correct operation of the CBR in case of residual *CURRENT SHALL BE PERFORMED IN ACCORDANCE WITH B.8.2.4.1.*		
B.8.2.4.1	Verification of operating in case of steady increase of the residual current (figure B.1)		
	Increase the residual current from 0,2 IΔn to IΔn in 30 sec. Required: value between IΔno and IΔn		N/A
	Min. setting IΔn.(mA): Interm. setting IΔn.(mA): Max. setting IΔn.(mA):		N/A
	The correct operation of the overload releases of 8.3.5.1 and 8.3.5.4 by two-pole tests, on all possible combinations of phase poles in turn		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Following the tests of 8.3.5, verification of the correct operation of the CBR shall be performed *IN ACCORDANCE WITH B.8.2.4.3.*		N/A
B.8.2.4.3	Verification of operating in case of a sudden appearance of the residual current (figure B.1)		N/A
	A residual current is sudden appear on the CBR of IΔn Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	a) Behaviour during rated short-time withstand current test *NO TRIPPING SHALL OCCUR DURING THE TEST OF 8.3.6.2 OR 8.3.8.2, AS APPLICABLE.*		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Verification of overload releases test sequence IV For the purpose of verifying the correct operation of the overload releases in accordance with 8.3.6.1 and 8.3.6.6, the single pole tests specified in 8.3.5.1 shall be replaced by two-pole tests, made on all possible combinations of phase poles in turn.		N/A
	b) Verification of overload releases for combined test sequence. For the purpose of verifying the correct operation of the overload releases in accordance with 8.3.8.1, the single pole test specified in 8.3.5.1 shall be replaced by two-pole tests made on all possible combinations of phase poles in turn.		N/A
	b) For the purpose of verifying the correct operation of overload releases in accordance with 8.3.8.6, the test specified in 8.3.3.7 shall be made using a three-phase supply.		N/A
	c) Verification of the residual current tripping device Following the tests of 8.3.6 or 8.3.8, as applicable, verification of the residual current tripping device shall be performed in accordance with B.8.2.4.3.		N/A
B.8.2.4.3	Verification of operating in case of a sudden appearance of the residual current (figure B.1)		N/A
	A residual current is sudden appear on the CBR of IΔn Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A residual current is sudden appear on the CBR of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	For the purpose of verifying the correct operation of the overload releases, the single-pole tests specified in 8.3.7.4 and 8.3.7.8 shall be replaced by two-pole tests, on all possible combinations of phase poles in turn, the test conditions being as specified in 8.3.7.4 and 8.3.7.8 but applicable to two poles.		N/A
	Following the tests of 8.3.7, verification of the correct operation of the CBR shall be performed in accordance with B.8.2.4.3.		N/A
B.8.2.4.3	Verification of operating in case of a sudden appearance of the residual current (figure B.1)		N/A
	A residual current is sudden appear on the CBR of IΔn Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	COMBINED TEST SEQUENCE		N/A
	Following the tests of 8.3.8, verification of the correct operation of the CBR shall be performed in accordance with B.8.2.4.3.		N/A
B.8.2.4.3	Verification of operating in case of a sudden appearance of the residual current (figure B.1)		N/A
	A residual current is sudden appear on the CBR of IΔn Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A residual current is sudden appear on the CBR of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
			N/A
B I			
			N/A
	Tests shall be made at the following values of voltage applied to the relevant terminals: - 0,85 times the minimum rated voltage for the tests specified in B.8.2.4 and B.8.2.5.1; - 1,1 times the maximum rated voltage for the tests specified in B.8.2.5.2.		N/A
	CBRs with more than one rated frequency or a range of rated frequencies shall be tested in each case at the highest and lowest rated frequency. However, for CBRs rated at 50 Hz and 60 Hz, tests at 50 Hz or 60 Hz are considered to cover the requirements.		N/A
B.8.2.4			N/A
B.8.2.4.1	Verification of operating in case of steady increase of the residual current (figure B.1)		N/A
	Increase the residual current from 0,2 IΔn to IΔn in 30 sec. Required: value between IΔno and IΔn		N/A
	Min. setting IΔn.(mA): Interm. setting IΔn.(mA): Max. setting IΔn.(mA):		N/A
B.8.2.4.2	Verification of operating in case of closing on residual current (figure B.1)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The CBR is closes on IΔn or each specified setting Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
B.8.2.4.3	Verification of operating in case of a sudden appearance of the residual current (figure B.1)		N/A
	A residual current is sudden appear on the CBR of IΔn Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	Verification of the limiting non-operating time of time delayed type CBRs		N/A
	A residual current is sudden appear on the CBR of 2 IΔn for a time declared by the manufacturer Required : The CBR shall not operate		N/A
	Min. setting IΔn. Min. setting time delay (ms): Min. setting IΔn. Max. setting time delay (ms):		N/A
B.8.2.5	Tests at the temperature limits		N/A
	General		
	Minimum temperature (°C)		
	Maximum temperature (°C)		N/A
B.8.2.5.1	Verification of operating in case of a sudden appearance of the residual current at –5°C or minimum temperature limit		N/A
	A residual current is sudden appear on the CBR of IΔn Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1: (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A residual current is sudden appear on the CBR of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	Verification of the limiting non-operating time of time delayed type CBRs at – 5°C or minimum temperature limit		N/A
	A residual current is sudden appear on the CBR of 2 IΔn for a time declared by the manufacturer Required : The CBR shall not operate		N/A
	Min. setting IΔn. Min. setting time delay (ms): Min. setting IΔn. Max. setting time delay (ms):		N/A
B.8.3.5.2	Verification of operating in case of a sudden appearance of the residual current at +40°C		N/A
	A residual current is sudden appear on the CBR of IΔn Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of 2 IΔn for a time declared by the manufacturer Required : The CBR shall not operate		N/A
	Min. setting IΔn. Min. setting time delay (ms): Min. setting IΔn. Max. setting time delay (ms):		N/A
B.8.3	Verification of dielectric properties		N/A
B.8.3.3.2	Verification of rated impuls withstand voltage		N/A
	rated impulse withstand voltage		
	test impulse voltage (see table 12 part 1)		
	test impulse voltage for isolating (see table 14 part 1)		
B.8.4	Verification of the operation of the test device at the limits of the rated voltage		N/A
	For CBRs having an adjustable time-delay the test is made at the maximum setting of time-delay:	_____ s	
B.8.4.a	Setting IΔn or minimum setting of IΔn	_____ A	
	Test voltage (1,1 x Ue max)	_____ V	
	Number of operations	25	
	Interval time	5 s	
	Tripping	☐ Yes / ☐ No	N/A
B.8.4.b	Setting IΔn or maximum setting of IΔn	_____ A	
	Test voltage (0,85 x Ue min)	_____ V	
	Number of operations	3	
	Interval time	5 s	

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Clause	Requirement + Test	Result - Remark	Verdict
	Tripping	☐ Yes / ☐ No	N/A
B.8.4.c	Setting IΔn or minimum setting of IΔn	_____ A	
	Test voltage (1,1 x Ue max)	_____ V	
	Number of operations	1	
	Operating means of the test device held in close position	5 s	
	Tripping	☐ Yes / ☐ No	N/A
B.8.5	Verification of the limiting value of non-operating current under overcurrent conditions, in case of a single phase load.		N/A
	Setting IΔn or minimum setting of IΔn if adjustable	_____ A	
	Test current equal to the lower value of: ☐ 6 x In or ☐ 80 % of the maximum short-circuit release current setting	_____ A	
	Test voltage: ☐ rated voltage or ☐ any convenient voltage	_____ V	
	Test frequency	_____ Hz	
	Power factor (0,5)	_____	
	Current flow time	2 s	
	Interval time	60 s	
	Calibration plot number	_____	
	No tripping / change of state		N/A
B.8.6	Resistance against unwanted tripping due to surge currents resulting from impulse voltages		N/A
B.8.6.1	Verification of the resistance to unwanted tripping in case of loading of the network capacitance		N/A
	Current surge test for CBR (0,5 µs / 100kHz ring wave test)		
	One pole of the CBR is submitted to 10 applications of a surge current according to the following requirements:		
	- peak value: 200 A + 10/0%		

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Clause	Requirement + Test	Result - Remark	Verdict
	- virtual front time: 0,5 µs ± 30%		
	- period of the following oscillatory wave: 10 µs ± 20%		
	- each successive peak: about 60% of the preceding peak		
	The polarity shall be inverted after every two applications		
	The interval between two consecutive applications shall be about 30 s		
	During the test the CBR shall not trip:	-	N/A
B.8.6.2	Verification of the resistance to unwanted tripping in case of flashover without follow-on current.		N/A
	Verification of behaviour at surge current up to 250 A (8/20 µs surge current test)		N/A
	One pole of the CBR is submitted to 10 applications of a surge current according to the following requirements:		
	- peak value: 250 A + 10/0%		
	- virtual front time: 8 µs ± 20%		
	- virtual time to half value: 20 µs ± 20%		
	- peak of reverse current:: less than 30% of peak value		
	The polarity shall be inverted after every two applications		
	The interval between two consecutive applications shall be about 30 s		
	During the test the CBR shall not trip:		N/A
B.8.7	Verification of the behaviour in case of an earth fault current comprising a d.c. component.		N/A
	Type A CBR		N/A
	For CBRs the operation of which depends on a voltage source the test are made at 1,1 and 0,85 times the rated voltage of the voltage source (Us).		
B.8.7.2.1	Verification of operation in case of a continuous rise of a residual pulsating direct current		N/A
	Rated voltage	_____ V	

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Clause	Requirement + Test	Result - Remark	Verdict
	- steady increase from zero to: 1,4 IΔn for IΔn > 0,015 A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- steady increase from zero to: 2 IΔn for IΔn ≤ 0,015 A with 2 IΔn/30 A/s (mA)	_____ mA	
	- angle = 0 (+/-) :		
	- angle = 90 (+/-) :		
	- angle = 135 (+/-) :		
	No value exceeds the relevant specified limiting values		N/A
B.8.7.2.2	Verification of operation in case of a suddenly appearing residual pulsating direct current		N/A
	Verification of the correct operation in case of suddenly appearing residual pulsating direct currents by closing S2 (angle = 0°)		N/A
	Rated voltage	_____ V	
	RCCB's with IΔn > 0,015 A:		
	- maximum break time (ms) at: 1,4 IΔn (+/-) :		
	- maximum break time (ms) at: 2,8 IΔn (+/-) :		
	- maximum break time (ms) at: 7 IΔn (+/-) :		
	- maximum break time (ms) at: 14 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
	RCCB's with IΔn ≤ 0,015 A:		N/A
	- maximum break time (ms) at: 2 IΔn (+/-) :		
	- maximum break time (ms) at: 4 IΔn (+/-) :		
	- maximum break time (ms) at: 10IΔn (+/-) :		
	- maximum break time (ms) at: 20 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
B.8.7.2.3	Verification of operation with load at reference temperature		N/A
	Rated voltage	_____ V	
B.8.7.2.1	- steady increase from zero to: 1,4 IΔn for IΔn > 0,015 A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- steady increase from zero to: 2 IΔn for IΔn ≤ 0,015 A with 2 IΔn/30 A/s (mA)	_____ mA	

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Clause	Requirement + Test	Result - Remark	Verdict
	- angle = 0 (+/-) :		
	- angle = 90 (+/-) :		
	- angle = 135 (+/-) :		
	No value exceeds the relevant specified limiting values		N/A
B.8.7.2.2	Verification of operation in case of a suddenly appearing residual pulsating direct current		N/A
	Verification of the correct operation in case of suddenly appearing residual pulsating direct currents by closing S2 (angle = 0°)		N/A
	Rated voltage	_____ V	
	RCCB's with IΔn > 0,015 A:		
	- maximum break time (ms) at: 1,4 IΔn (+/-) :		
	- maximum break time (ms) at: 2,8 IΔn (+/-) :		
	- maximum break time (ms) at: 7 IΔn (+/-) :		
	- maximum break time (ms) at: 14 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
	RCCB's with IΔn ≤ 0,015 A:		N/A
	- maximum break time (ms) at: 2 IΔn (+/-) :		
	- maximum break time (ms) at: 4 IΔn (+/-) :		
	- maximum break time (ms) at: 10IΔn (+/-) :		
	- maximum break time (ms) at: 20 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
B.8.7.2.4	Verification of operation of a residual pulsating direct current superimposed by a smooth direct current of 6 mA.		N/A
	Rated voltage	_____ V	
	- steady increase from zero to: 1,4 IΔn for IΔn > 0,015 A with 1,4 IΔn/30 A/s (mA) + 6 mA	_____ mA	
	-steady increase from zero to: 2 IΔn for IΔn ≤ 0,015 A with 2 IΔn/30 A/s (mA) + 6 mA	_____ mA	
	- angle = 0 (+/-) :		
	No value exceeds the relevant specified limiting values		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
B.8.8			N/A
	For CBRs having an adjustable residual operating current, the test is made at the lowest *SETTING.*		
	FOR CBRS WITH AN ADJUSTABLE TIME-DELAY, THE TEST IS MADE AT ANY ONE OF THE TIME-DELAY SETTINGS.		
			N/A
	A voltage equal to the rated voltage is applied to the line terminals of the CBR and is then progressively lowered to zero over a time period corresponding to the longer of the two values given hereinafter until automatic opening occurs: – about 30 s; – a period long enough with respect to the delayed opening of the CBR, if any (see B.7.2.11).		
	Three measurements are made. All the values shall be less than 0,85 times the minimum rated voltage of the CBR.		N/A
	A residual current is sudden appear on the CBR of IΔn (_____ mA) at a value just above highest measured value Required : no value exceeds the specified limiting value of Table B1: 300 ms		N/A
	For any value of voltage less than the lowest value measured, it is not be possible to close the CBR by manual operating means.		N/A
	The CBR being closed, a voltage equal to its rated voltage, or, in the case of a range of rated voltages, any one of the rated voltages is applied to its line terminals. The voltage is then switched off. The CBR shall trip. The time interval between the switching off and the opening of the main contacts is measured.		N/A
	for CBRs opening without delay no value shall exceed 0,2 s;		N/A
	for CBRs opening with delay the maximum and minimum values shall be situated within the range indicated by the manufacturer.		N/A
			N/A
B.8.9			

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Clause	Requirement + Test	Result - Remark	Verdict
	For CBRs having an adjustable residual operating current, the test is made at the lowest setting. For CBRs having an adjustable time-delay the test is made at any one of the time-delay settings.		N/A
B.8.9.1			
	The CBR is connected according to figure B.3 and is supplied on the line side at 0,85 times the rated voltage, or, in the case of a range of rated voltages, at 0,85 times the lowest value of rated voltage.		N/A
	Verification with one phase is switched off		N/A
B.8.2.4.3	Verification of operating in case of a sudden appearance of the residual current		N/A
	A residual current is sudden appear on the CBR of IΔn Required: no value exceeds the specified limiting value of Table B1: (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A residual current is sudden appear on the CBR of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
			N/A
	Verification with other phase switched off		N/A
B.8.2.4.3	Verification of operating in case of a sudden appearance of the residual current (figure B.1)		N/A
	A residual current is sudden appear on the CBR of IΔn Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the CBR of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A residual current is sudden appear on the CBR of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	Test is repeated with resistor connected to other two phases in turn.		N/A
	The CBR is connected according to figure B.3 and is supplied on the line side with the rated voltage or, in the case of a range of rated voltages, with the lowest rated voltage.		
	The supply is switched off. The CBR shall not trip.		N/A
	With supply connected the voltage is reduced as follows: a) for CBRs for use with a three-phase supply: to 70 % of the lowest rated voltage;		
	b) for CBRs for use with a single phase supply: to 85 V applied as follows: -- for single-pole and two-pole CBRs: between poles; – for three-pole and four-pole CBRs, declared as suitable for use with a single-phase supply (see B.5 e)): between each combination of two poles, connected according to the manufacturer's specification.		
	A current of value Δn is then applied to a) and/or b), as applicable. The CBR shall trip.		N/A
BII	Test sequence BII		
	Where applicable, the CBR is adjusted at the lowest setting of residual operating current and at the maximum setting of time-delay.		

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Clause	Requirement + Test	Result - Remark	Verdict
	If the CBR has more than one value of I_{cu}, each one having a corresponding value of $\cos\varphi_m$, the test is made at the maximum value of $\cos\varphi_m$, at the corresponding phase-to-neutral voltage.		
	maximum value of $\cos\varphi_m$		
	Type designation or serial number		
	Sample no:		
	Point of test circuit which is directly earthed:		
	Grid distance "a" (mm):		
	Fine wire diameter (mm):		
	Prospective current (A):		
	Prospective current obtained (A):		
	Power factor / ratio *n*:		
	Power factor / ratio *n* obtained:		
	Plot no.		
	Test sequence: O-t-CO		
	I^2t (kA^2s); Ip (kA):	O operation: Ip :_____kA I^2t; _____kA^2s Plot no. _____	
		CO operation: Ip :_____kA I^2t; _____kA^2s Plot no.: _____	
	If tested at separate testing station see report		
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		N/A
			N/A
	After the tests no damage impairing further use		N/A
	Dielectric strength test of the main circuit at test voltage of 2 Un for 5 s:		N/A
	Test voltage		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Making and breaking its rated current at its maximum rated operational voltage.		N/A
	The CBR shall be capable of performing satisfactorily the tests specified in B.8.2.4.3, but at a value of 1,25 IΔn and without measurement of break time. The test is made on any one pole, taken at random.		N/A
	If the CBR has an adjustable residual operating current, the test is made at the lowest setting, at a current of a value of 1,25 times that setting.		N/A
	Where applicable the CBR shall also be submitted to the test of B.8.2.4.4.		N/A
	Verification of the limiting non-operating time of time delayed type CBRs		N/A
	A residual current is sudden appear on the CBR of 2 IΔn for a time declared by the manufacturer Required : The CBR shall not operate		N/A
	Min. setting IΔn. Min. setting time delay (ms): Min. setting IΔn. Max. setting time delay (ms):		N/A
	CBRs functionally dependent on line voltage shall also satisfy the tests of B.8.8 or B.8.9, as applicable.		N/A
			N/A
B III	Test sequence B III		
			N/A
B.8.11	*VERIFICATION OF THE EFFECTS OF ENVIRONMENTAL CONDITIONS*		
	THE TEST IS CARRIED OUT ACCORDING TO IEC 60068-2-30.		
	The upper temperature shall be 55 °C ± 2 °C (variant 1) and the number of cycles shall be – 6 for IΔn > 1 A – *28 FOR IΔn ≤ 1 A*		
	At the end of the cycles the CBR shall be capable of complying with the tests of B.8.2.4.3, but with a residual operating current of 1,25 IΔn and without measurement of break time. Only one *VERIFICATION NEED BE MADE.*		N/A
	Where applicable the CBR shall also comply with the test of B.8.2.4.4. Only one verification *NEED BE MADE.*		N/A
	Verification of the limiting non-operating time of time delayed type CBRs		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	A residual current is sudden appear on the CBR of 2 IΔn for a time declared by the manufacturer Required : The CBR shall not operate		N/A
	Min. setting IΔn. Min. setting time delay (ms): Min. setting IΔn. Max. setting time delay (ms):		N/A
B.8.12	Verification of electromagnetic compatibility (EMC)		
	See report:		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

Annex C	Individual pole short-circuit test sequence		
	Circuit-breaker for use on phase-earthed systems		
C.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made with a value of prospective current (Isu) equal to 25% of the ultimate rated short-circuit breaking capacity (Icu)		
	Type designation or serial number	BD250	
	Sample no:	8	
	Rated current: In (A)	250 A	
	Rated operational voltage: Ue (V)	500 V	
	Rated ultimate short-circuit breaking capacity: (kA)	25 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	--	
	Rated control supply voltage of shunt release: Uc (V)	--	
	The test sequence of operations is O – t - CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		P
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		P
	Test made in free air:		P
	Distances of the metallic screen's: (all sides)	Vide catalogue	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		N/A
	- expanded metal		P
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm^2		P
	- finish: bare or conductive plating		P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		P
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²):	120 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)	15 Nm	P
	Test sequence of operation: O – t – CO		
	Test circuit according figure: 9		P
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: L3:	558 V 558 V 558 V	P
	short-circuit test current (Isu): equal to 25% of the ultimate rated short-circuit breaking capacity (Icu)		P
	- r.m.s. test current AC/DC: (A):	4,1 kA AC	P
	power factor/time constant:	0,77	P
	- Factor "n"	1,51	P
	- peak test current (Amax):	6,2 kA	P
	Test sequence "O" L1		
	- max. let-through current: (kApeak) L1:	6,07 kA	P
	- Joule integral I^2dt (A^2s) L1:	0,36 . 10^6 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L1		
	- max. let-through current: (kApeak) L1:	5,57 kA	P
	- Joule integral I^2dt (A^2s) L1:	0,285 . 10^6 A^2s	P
	Test sequence "O" L2		
	- max. let-through current: (kApeak) L2:	6,05 kA	P
	- Joule integral I^2dt (A^2s) L2:	0,342 . 10^6 A^2s	P
	Pause, t: (min)	3 min	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "CO" L2		
	- max. let-through current: (kApeak) L2:	5,92 kA	P
	- Joule integral I^2dt (A^2s) L2:	0,32 . 10^6 A^2s	P
	Test sequence "O" L3		
	- max. let-through current: (kApeak) L3:	5,98 kA	P
	- Joule integral I^2dt (A^2s) L3:	0,344 . 10^6 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L3		
	- max. let-through current: (kApeak) L3:	5,61 kA	P
	- Joule integral I^2dt (A^2s) L3:	0,299 . 10^6 A^2s	P
	Melting of the fusible element		P
	Holes in the PE-sheet for test sequence "O"		P
	Cracks observed		P
C.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V	P
	- no breakdown or flashover		P
C.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	1'22"	
	- Operation time: (s) .....L1: .....L2: .....L3: .....N:	1'18" 1'20" 1'18"	P
Annex F	Additional tests for circuit-breakers with electronic over-current protection		P
F.4.	Immunity tests		P
F.4.1.	Tests regarding non-sinusoidal currents resulting from harmonics		P
F.4.1.1.	Test conditions		P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Option b)		P
	Desired values:		P
	Third harmonic >60%		P
	Fifth harmonic >14%		P
	Seventh harmonic >7%		P
	Actual values:		P
	Third harmonic	72,49%	P
	Fifth harmonic	34,3%	P
	Seventh harmonic	8,21%	P
F.4.1.3.	Test procedure		P
	Non-tripping current 0,9Ir	225 A	P
	Testing time	Non-tripping 2380 sec.	P
	Tripping current 2 Ir	500 A	P
	Release time	3´42 "	P
	Tripping current 2x Ir	500 A	P
	Release time	3´51"	P
	Performance criterion A of F.2.1.2.		P
F.4.2.	Current dips		P
	The test circuit shall be in accordance with figure F.2. IEC60947-2,		P
	The current applied according to figure F.5 and to table F.1	It did not trip	P
	Performance criterion B of F. 2.1.2.		P
F.4.3. IEC61000-4-2	Electrostatic discharges		P
	At level	4	P
Annex J.2.2.	Test voltage	8 kV	P
	Non-tripping current 0,9xIr	225 A	P
	Test data	it did not trip	
	Tripping current 2xIr	500 A	

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Release time	3´54"	P
	Performance criterion B of F. 2.1.2.		P
F.4.4.IEC61 000-4-3	Radiated radio-frequency electromagnetic fields		P
Annex J.2.3.	Non-tripping current 0,9xIr	225 A	P
	Test data	it did not trip	P
	Tripping current 2xIr	500 A	P
	Release time	3´59"	P
	Performance criterion A of F. 2.1.2.		P
F.4.5.	Electrical fast transients/bursts (EFT/B)		P
F.5.2.2.1. IEC61000-4-4 Annex J.2.4.	Non-tripping current 0,9xIr	225 A	P
	Testing time	1´	P
	Tripping current 2xIr	500 A	P
	Release time	3´95"	P
	Performance criterion A of F. 2.1.2.		P
F.4.6. IEC61000-4-5 Annex J.2.5.	Surges		P
	Non-tripping current 0,9xIr	225 A	P
	Total number of pulses	20	P
	Tripping current 2xIr	500 A	P
	Release time	4´00"	P
	Performance criterion B of F. 2.1.2.		P
F.4.7. Annex J.2.6.	Conducted disturbances induced by radio-frequenci fields (common mode)		P
	Non-tripping current 0,9xIr	225 A	P
	Test data	it did not trip	P
	Tripping current 2 xIr	500 A	P
	Release time	3´53"	P
	Performance criterion A of F. 2.1.2		P
F.5.4. AnnexJ.3.3.	Radiated RF disturbances (30MHz -1GHz)		P
Figure F.3.	Meet the conditions for classes "B"		
F.6.	Suitability for multiple frequencies		N/A
F.6.	Suitability for multiple frequencies		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
F.7.	Dry heat test		P
	Ambient temperature	+40°C	P
	Testing time	168 h	P
	Test data	it did not trip	P
F.7.3.	Verification of overload releases:		P
7.2.1.2.4.b)	Instantaneous release:		P
	setting release	2 kA	P
	Tripping current	2,1 kA	P
	Inverse time-delay releases :		P
	Ambient temperature	+30°C	P
	Non-tripping current 1,05xIr	263 A	P
	Testing time	>2h	P
	Tripping current 1,3xIr	325 A	P
	Release time	33´01"	P
	Ambient temperature	+50°C	P
	Non-tripping current 1,05xIr	263 A	P
	Testing time	>2h	P
	Tripping current 1,3xIr	325 A	P
	Release time	33´51"	P
F .8. IEC 60068-2-30	Damp heat test		P
	The upper temperature The number of cycles	+55°C 6	P
F.8.2.	Verification of overload releases		P
7.2.1.2.4.b)	Instantaneous release:		P
	setting release 8xIr	2000 A	P
	Tripping current	1990 A	P
	setting release 4xIr	1000 A	P
	Tripping current	990 A	P
	Inverse time-delay releases :		P
	Ambient temperature	+30°C	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Non-tripping current 1,05xIr	263 A	P
	Testing time	>2 h	P
	Tripping current 1,3xIr	325 A	P
	Release time	34´12"	P
	Ambient temperature	+50°C	P
	Non-tripping current 1,05xIr	263 A	P
	Testing time	>2 h	P
	Tripping current 1,3xIr	325 A	P
	Release time	35´45"	P
F .9. IEC60068-2-14	Temperature variation cycles at a specified		P
	Number of operating	28	P
	Test data	it did not trip	P
F.8.2.	Verification of overload releases:		P
7.2.1.2.4.b)	Instantaneous release:		P
	setting release 8xIr	2000 A	P
	Tripping current	2070 A	P
	setting release 4xIr	1000 A	P
	Tripping current	970 A	P
	Inverse time-delay releases :		P
	Ambient temperature	+30°C	P
	Non-tripping current 1,05xIr	263 A	P
	Testing time	>2h	P
	Tripping current 1,3xIr	325 A	P
	Release time	34´37"	P
	Ambient temperature	+50°C	P
	Non-tripping current 1,05xIr	263 A	P
	Testing time	>2h	P
	Tripping current 1,3xIr	325 A	P
	Release time	34´58"	P
Annex G	Power loss		

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

	Phase L1	17,5 W	
	L2	7,8 W	
	L3	17,9 W	

Annex H	Individual pole short-circuit test sequence		
	Circuit-breaker for use in IT systems		
H.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made on the individual poles of a multipole circuit-breaker at a value of prospective current (I_{IT}) equal to 1,2 times the max. setting of the short-time delay release tripping current or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release, or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.		
	Type designation or serial number	BD250	
	Sample no:	9	
	Rated current: In (A)	250 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated ultimate short-circuit breaking capacity: (kA)	2,0 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt release: Uc (V)	-	
	The test sequence of operations is O – t - CO		
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		P
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		P
	Test made in free air:		P
	Distances of the metallic screen's: (all sides)	Vide catalogue	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- perforated metal		N/A
	- expanded metal		P
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm^2		P
	- finish: bare or conductive plating		P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		P
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm^2):	120 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)	15 Nm	P
	Test sequence of operation: O – t – CO		P
	Test circuit according figure: 9		P
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: L3:	760 V 760 V 760 V	P
	Short-circuit test current (I_{nt}): equal to 1,2 times the max. setting of the short-time delay release tripping current,		N/A
	or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release,		P
	or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.		N/A
	- r.m.s. test current AC/DC: (A)	2400 A AC	P
	power factor/time constant:	0,85	P
	- Factor "n"	1,5	P
	- peak test current (Amax) :	3,5 kA	P
	Test sequence "O" L1		
	- max. let-through current: (kApeak) L1:	3,5 kA	

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I²dt (A²s) L1:	183000 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L1		
	- max. let-through current: (kApeak) L1:	3,48 kA	P
	- Joule integral I²dt (A²s) L1:	137000 A^2s	P
	Test sequence "O" L2		
	- max. let-through current: (kApeak) L2:	3,48 kA	P
	- Joule integral I²dt (A²s) L2:	187000 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L2		
	- max. let-through current: (kApeak) L2:	3,37 kA	P
	- Joule integral I²dt (A²s) L2:	117000 A^2s	P
	Test sequence "O" L3		
	- max. let-through current: (kApeak) L3:	3,45 kA	P
	- Joule integral I²dt (A²s) L3:	177000 A^2s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO" L3		
	- max. let-through current: (kApeak) L3:	3,37 kA	P
	- Joule integral I²dt (A²s) L3:	141000 A^2s	P
	For 4-pole circuit-breakers with a protected neutral pole, the test voltage for that pole shall be phase-to-phase voltage divided by √3. This test is applicable only where the construction of the protected neutral pole differs from that of the phase poles.		N/A
	Test sequence "O" N		
	- max. let-through current: (kApeak) .....N:		N/A
	- Joule integral I²dt (A²s) .....N:		N/A
	Pause, t: (min)		N/A
	Test sequence "CO" N		
	- max. let-through current: (kApeak) .....N:		N/A
	- Joule integral I²dt (A²s) .....N:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Melting of the fusible element		N/A
	Holes in the PE-sheet for test sequence "O"		N/A
	Cracks observed		N/A
H.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1380 V	P
	- no breakdown or flashover		P
H.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2.5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	1´22"	P
	- Operation time: (s) .....L1: .....L2: .....L3: .....N :	1´22" 1´18" 1´20" 1´18" 1´19" 1´19" 1´24" 1´25" 1´23" -	P
H.5	Marking		
	Circuit-breaker for which all values of rated voltage have not been tested according to this annex or are not covered by such testing, shall be identified by the symbol ⊗ which shall be market on the circuit-breaker immediately following these values of rated voltage		
Annex M	Modular residual current devices (without integral current breaking device)		N/A
M.8.3	Operating characteristics		
	Type designation or serial number		
	Sample no:		
	Rated current: In (A)		
	Rated operational voltage: Ue (V)		
	Rated frequency (Hz)		
	Terminal type or through conductor type		

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Clause	Requirement + Test	Result - Remark	Verdict
	MRCD with sensing means and processing device combined or separate	Combined/separate	
	MRCD with voltage source		
	Operating automatically in case of failure of the voltage source.	Yes/no	
	Rated insulation voltage (*Ui*)		
	Rated impulse withstand voltage (*Uimp*)		
	Characteristics of the voltage source of MRCDs		
	Rated values of the voltage source of MRCDs (*Us*)		
	Rated values of the frequencies of the voltage source of MRCDs		
	Rated insulation voltage (*Ui*)		
	Rated impulse withstand voltage (*Uimp*)		
M.4.1.3	Characteristics of auxiliary contacts		
M.4.2	Characteristics of MRCDs concerning their residual current function		
M.4.2.2	Operating characteristic in case of residual current with d.c. component		
	Type AC MRCD		
	Type A MRCD		
	Type B MRCD		
M.4.3	Behaviour under short-circuit conditions		
	Rated conditional short-circuit current (*Icc*)		
	Rated conditional residual short-circuit current ($I_{\Delta c}$)		
	Rated short-time withstand current (*Icw*)		
	Rated residual short-time withstand current ($I_{\Delta w}$)		
	Peak withstand current		
M.4.4	Preferred and limiting values		
	Preferred values of the rated residual operating current ($I_{\Delta n}$)		
	Minimum value of the rated residual non-operating current ($I_{\Delta no}$)		

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Clause	Requirement + Test	Result - Remark	Verdict
	Limiting value of the non-operating overcurrent in the case of a single-phase load in a multiphase circuit		
	Preferred values of rated voltage of the voltage source of MRCDs		
	Compliance with constructional requirements		N/A
MI	Test sequence MI		
M.8.3.4.2	Verification of operating in case of steady increase of the residual current (figure M.1)		N/A
	Increase the residual current from 0,2 IΔn to IΔn in 30 sec. Required: value between 0,2 IΔn and IΔn		N/A
	Min. setting IΔn.(mA): Interm. setting IΔn.(mA): Max. setting IΔn.(mA):		N/A
M.8.3.4.3	Verification of operating in case of closing on residual current (figure M.2)		N/A
	The MRCD is closes on IΔn or each specified setting Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
M.8.3.4.4	Verification of operating in case of a sudden appearance of the residual current (figure M.2 and M3)		N/A
	A residual current is sudden appear on the MRCD of IΔn Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms)		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 10 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 20 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 50 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 100 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 200 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of IΔn: 500 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
M.8.3.4.5	Verification of the limiting non-operating time of time delayed type MRCDs (figure M3)		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn for a time declared by the manufacturer Required : The MRCD shall not operated		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Min. setting IΔn. Min. setting time delay (ms): Min. setting IΔn. Max. setting time delay (ms):		N/A
M.8.3.5	Tests at the temperature limits		N/A
M.8.3.5.1	General (clause B.8.2.5 applies)		
	Minimum temperature (°C)		
	Maximum temperature (°C)		
M.8.3.5.2	Verification of operating in case of a sudden appearance of the residual current at –5°C or minimum temperature limit (figure M.2 and M3)		
	A residual current is sudden appear on the MRCD of IΔn Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	Verification of the limiting non-operating time of time delayed type MRCDs at –5°C or minimum temperature limit (figure M3)		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn for a time declared by the manufacturer Required : The MRCD shall not operated		N/A
	Min. setting IΔn. Min. setting time delay (ms): Min. setting IΔn. Max. setting time delay (ms):		N/A
M.8.3.5.3	Verification of operating in case of a sudden appearance of the residual current at +40°C (figure M.2 and M3)		N/A
	A residual current is sudden appear on the MRCD of IΔn Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of ☐ 5 IΔn or ☐ 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A residual current is sudden appear on the MRCD of ☐10 IΔn or ☐ 0,5 A Required : no value exceeds the specified limiting value of Table B1 (40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms		N/A
	Min. setting IΔn.(ms): Interm. setting IΔn.(ms): Max. setting IΔn.(ms):		N/A
	A residual current is sudden appear on the MRCD of 2 IΔn for a time declared by the manufacturer Required : The MRCD shall not operated		N/A
	Min. setting IΔn. Min. setting time delay (ms): Min. setting IΔn. Max. setting time delay (ms):		N/A
M.8.4.	Verification of dielectric properties		N/A
M.8.4.1	Verification of rated impuls withstand voltage		N/A
	rated impulse withstand voltage		
	test impulse voltage (see table 12 part 1)		
	test impulse voltage for isolating (see table 14 part 1)		
M.8.4.1.2	Verification of rated impulse withstand voltage with respect to the monitored circuit		N/A
M.8.4.1.2.1	Test for terminal type MRCD		N/A
M.8.4.1.2.2	Tests for MRCDs of through-conductor type		N/A
M.8.4.1.3	Verification of rated impulse withstand of the voltage source circuit (if applicable)		N/A
M.8.5	Verification of the operation of the test device at the limits of the rated voltage		N/A
	For MRCDs having an adjustable time-delay the test is made at the maximum setting of time-delay:	_____ s	
M.8.5.a	Setting IΔn or minimum setting of IΔn	_____ A	
	Test voltage (1,1 x Ue max)	_____ V	
	Number of operations	25	
	Interval time	5 s	
	Tripping	☐ Yes / ☐ No	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
M.8.5.b	Setting IΔn or minimum setting of IΔn	_____ A	
	Test voltage (0,85 x Ue max)	_____ V	
	Number of operations	3	
	Interval time	5 s	
	Tripping	☐ Yes / ☐ No	N/A
M.8.5.c	Setting IΔn or minimum setting of IΔn	_____ A	
	Test voltage (1,1 x Ue max)	_____ V	
	Number of operations	1	
	Operating means of the test device held in close position	5 s	
	Tripping	☐ Yes / ☐ No	N/A
M.8.6	Verification of the limiting value of non-operating current under overcurrent conditions , in case of a single phase load.		N/A
M.8.6	Circuit diagram	Fig. M4 ____	
	Setting IΔn or minimum setting of IΔn if adjustable	_____ A	
	Test current equal to the lower value of: ☐ 6 x In or ☐ 80 % of the maximum short-circuit release current setting	_____ A	
	Test voltage: ☐ rated voltage or ☐ any convenient voltage	_____ V	
	Test frequency	_____ Hz	
	Power factor (0,5)	_____	
	Current flow time	2 s	
	Interval time	60 s	
	Calibration plot number	____	
	No tripping / change of state		N/A
M.8.7	Resistance against unwanted tripping due to surge currents resulting from impulse voltages		N/A
M.8.7.2	Verification of the resistance to unwanted tripping in case of loading of the network capacitance		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
B.8.6.1	Current surge test for RMCDs (0,5 µs / 100kHz ring wave test)		
	One pole of the MRCD is submitted to 10 applications of a surge current according to the following requirements:		
	- peak value: 200 A + 10/0%		
	- virtual front time: 0,5 µs ± 30%		
	- period of the following oscillatory wave: 10 µs ± 20%		
	- each successive peak: about 60% of the preceding peak		
	The polarity shall be inverted after every two applications		
	The interval between two consecutive applications shall be about 30 s		
	During the test the MRCD shall not trip:	-	N/A
M.8.7.3	Verification of the resistance to unwanted tripping in case of flashover without follow-on current.		N/A
B.8.6.2	Verification of behaviour at surge current up to 250 A (8/20 µs surge current test)		N/A
	One pole of the MRCD is submitted to 10 applications of a surge current according to the following requirements:		
	- peak value: 250 A + 10/0%		
	- virtual front time: 8 µs ± 20%		
	- virtual time to half value: 20 µs ± 20%		
	- peak of reverse current:: less than 30% of peak value		
	The polarity shall be inverted after every two applications		
	The interval between two consecutive applications shall be about 30 s		
	During the test the MRCD shall not trip:		N/A
M.8.8	Verification of the behaviour in case of an earth fault current comprising a d.c. component.		N/A
M.8.8.2	Type A MRCD		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For MRCDs the operation of which depends on a voltage source the test are made at 1,1 and 0,85 times the rated voltage of the voltage source (Us).		
M.8.8.2.2	Verification of operation in case of a continuous rise of a residual pulsating direct current		N/A
	Rated voltage	_____ V	
B.8.7.2.1	- steady increase from zero to: 1,4 IΔn for IΔn > 0,015 A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- steady increase from zero to: 2 IΔn for IΔn ≤ 0,015 A with 2 IΔn/30 A/s (mA)	_____ mA	
	- angle = 0 (+/-) :		
	- angle = 90 (+/-) :		
	- angle = 135 (+/-) :		
	No value exceeds the relevant specified limiting values		N/A
M.8.8.2.3	Verification of operation in case of a suddenly appearing residual pulsating direct current		N/A
B.8.7.2.2	Verification of the correct operation in case of suddenly appearing residual pulsating direct currents by closing S2 (angle = 0°)		N/A
	Rated voltage	_____ V	
	RCCB's with IΔn > 0,015 A:		
	- maximum break time (ms) at: 1,4 IΔn (+/-) :		
	- maximum break time (ms) at: 2,8 IΔn (+/-) :		
	- maximum break time (ms) at: 7 IΔn (+/-) :		
	- maximum break time (ms) at: 14 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
	RCCB's with IΔn ≤ 0,015 A:		N/A
	- maximum break time (ms) at: 2 IΔn (+/-) :		
	- maximum break time (ms) at: 4 IΔn (+/-) :		
	- maximum break time (ms) at: 10IΔn (+/-) :		
	- maximum break time (ms) at: 20 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
M.8.8.2.4	Verification of operation with load at reference temperature		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated voltage	_____ V	
B.8.7.2.1	- steady increase from zero to: 1,4 IΔn for IΔn > 0,015 A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- steady increase from zero to: 2 IΔn for IΔn ≤ 0,015 A with 2 IΔn/30 A/s (mA)	_____ mA	
	- angle = 0 (+/-) :		
	- angle = 90 (+/-) :		
	- angle = 135 (+/-) :		
	No value exceeds the relevant specified limiting values		N/A
M.8.8.2.5	Verification of operation of a residual pulsating direct current superimposed by a smooth direct current of 6 mA.		N/A
	Rated voltage	_____ V	
B.8.7.2.1	- steady increase from zero to: 1,4 IΔn for IΔn > 0,015 A with 1,4 IΔn/30 A/s (mA) + 6 mA	_____ mA	
	-steady increase from zero to: 2 IΔn for IΔn ≤ 0,015 A with 2 IΔn/30 A/s (mA) + 6 mA	_____ mA	
	- angle = 0 (+/-) :		
	No value exceeds the relevant specified limiting values		N/A
M.8.8.3	Type B MRCD		N/A
M.8.8.3.2	Verification of operation in case of a slowly rising residual smooth direct current		
	Rated voltage (1,1*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
	Rated voltage (0,85*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)		
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
M.8.8.3.3	Verification of operation in case of a suddenly appearing residual smooth direct current		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
B.8.7.2.2	Verification of the correct operation in case of suddenly appearing a smooth residual direct currents by closing S2		
	Rated voltage (1,1*Un)	_____ V	
	RCCB's with IΔn > 0,015 A:		
	- maximum break time (ms) at: 2 IΔn (+/-) :		
	- maximum break time (ms) at: 4 IΔn (+/-) :		
	- maximum break time (ms) at: 10 IΔn (+/-) :		
	- maximum break time (ms) at: 20 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
B.8.7.2.2	Verification of the correct operation in case of suddenly appearing a smooth residual direct currents by closing S2		N/A
	Rated voltage (0,85*Un)	_____ V	
	RCCB's with IΔn > 0,015 A:		
	- maximum break time (ms) at: 2 IΔn (+/-) :		
	- maximum break time (ms) at: 4 IΔn (+/-) :		
	- maximum break time (ms) at: 10 IΔn (+/-) :		
	- maximum break time (ms) at: 20 IΔn (+/-) :		
	No value exceeds the relevant specified limiting value		N/A
M.8.8.3.4	Verification of operation in case of a slowly rising residual current resulting from a fault in a circuit fed by a three-pulse star or a six-pulse connection.		N/A
	Rated voltage (1,1*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
	Rated voltage (0,85*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
M.8.8.3.5.	Verification of operation in case of a slowly rising residual current resulting from a fault in a circuit fed by two-pulse bridge connection line-to-line.		N/A
	Rated voltage (Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 0 (+/-) :		
	Operation shall occur between 0,5 and 1,4Idn		N/A
M.8.8.3.6	Verification of operation with load at the reference temperature		N/A
M.8.8.3.6-M.8.8.3.2	Verification of operation in case of a slowly rising residual smooth direct current		N/A
	Rated voltage (1,1*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
	Rated voltage (0,85*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
M.8.8.3.6-M.8.8.3.4	Verification of operation in case of a slowly rising residual current resulting from a fault in a circuit fed by a three-pulse star or a six-pulse connection		N/A
	Rated voltage (1,1*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A
	Rated voltage (0,85*Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 90 (+/-) :		
	Operation shall occur between 0,5 and 2Idn		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
M.8.8.3.6-M.8.8.3.5.	Verification of operation in case of a slowly rising residual current resulting from a fault in a circuit fed by two-pulse bridge connection line-to-line.		N/A
	Rated voltage (Un)	_____ V	
B.8.7.2.1	- steady increase from zero to: 2 IΔn A with 1,4 IΔn/30 A/s (mA)	_____ mA	
	- angle = 0 (+/-) :		
	Operation shall occur between 0,5 and 1,4Idn		N/A
			N/A
M.8.9.	Verification of the behaviour of MRCDs with separate sensing means in case of a failure of the sensing means connection		N/A
M.8.9.2	Test method 1		N/A
	Rated voltage of the sensing means		
	Interval time Required <5 sec		N/A
M.8.9.3	Test method 2		N/A
	Test shall be carried out as follows: - The test device is activated - The sensing means are disconnected and the test device is activated. The MRCD shall not operate		
	Rated voltage of the sensing means		
	Test device activated MRCD shall operate		N/A
	Rated voltage of the sensing means		
	Sensing device disconnected and Test device activated MRCD shall not operate		N/A
M.8.10	Verification of temperature-rise of terminal type MRCDs		N/A
M.8.10.2	Tambient: _____°C		
8.3.2.5	Main circuits		
	Conventional thermal current I_{th}	_____ A	
	Conventional thermal current for enclosure I_{the}	_____ A	
	Conventional thermal current for the neutral pole	_____ A	
	Cabling characteristics		
	Cable	_____ mm^2	

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Clause	Requirement + Test	Result - Remark	Verdict
	Bar / number / length	_____ mm / ___ / ____ m	
	Arrangement	☐ 3 phase - ☐ poles on serie	
	Tightening torque	_____ Nm	
	Neutral pole (if applicable)		
	Cable	_____ mm^2	
	Bar / number / length	_____ mm / ___ / ____ m	
	Tightening torque	_____ Nm	
	Terminals(see table 2)		
	Manual operating means		
	Parts which need not be touched but not hand held		
	Parts which need not be touched during normal operation		
M.8.11	Verification of mechanical and electrical endurance		N/A
	500 off-load operations controlled by the test device		
	Rated voltage:	_____ V ☐ ac ☐ dc	
	Result:	after___ operations,	N/A
	500 off load operations by passing the rated residual operating current IΔn through one current path		
	Rated voltage:	_____ V ☐ ac ☐ dc	
	Rated residual current	____ mA	
	Result:	after___ operations,	N/A
	500 on-load operations controlled by the test device		
	Rated voltage:	_____ V ☐ ac ☐ dc	
	Test current	_____ A	
	Power factor	_____	
	Test circuit		
	Result:	after___ operations,	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	500 on-load operations by passing the rated residual operating current IΔn through one current path.		
	Rated voltage:	_____ V ☐ ac ☐ dc	
	Test current	_____ A	
	Power factor	_____	
	Test circuit		
	Rated residual current	____ mA	
	Result:	after___ operations,	N/A
	Show no damage		N/A
	High voltage test: twice rated voltage	Test voltage: _____ V	N/A
	A residual current is sudden appear on the MRCD of IΔn (_____ mA) Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms		N/A
M.8.12.	Verification of the behaviour of MRCDs in case of failure of the voltage source for MRCDs classified under M.3.2.2.1		N/A
M.8.12.2	Determination of the limiting value of the voltage source		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Time period of voltage decreasing	30 s or a period enough with respect to delayed opening	
	Min voltage to automatic opening (U > 0,85 x Us)		
	A residual current is sudden appear on the MRCD of IΔn (_____ mA) at a value just above highest measured value Required : no value exceeds the specified limiting value of Table B1: 300 ms		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	It's not possible to switch "ON" by manual operating means at a lower value than the lower measured value.		N/A
M.8.12.3	Verification of automatic opening in case of voltage source failure		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Time period	Max 1 s or max. 1 s+time delay setting	
	Time period to automatic opening		
	No value exceeds the relevant specified limiting value		N/A

M.8.13	Verification of the behaviour of MRCDs with voltage source as classified under M.3.2.2.2 in case of failure of the voltage source.		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Switch off and reclosed Sa or S1 and reduced the source voltage to 70 %	70% Us = _____ V ☐ac ☐ dc	N/A
	Time period to automatic opening		N/A
MII	Test sequence MII		N/A
M.8.14	Verification of the behaviour of the MRCD under short-circuit conditions		N/A
	Type designation or serial number		
	Sample no:		
M.8.14.3	Verification of the rated conditional short-circuit current (I_{cc})		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Verification of the coordination between the MRCD and the SCPD		
	Test circuit according to figure:		
	Point of test circuit which is directly earthed:		
	Grid distance "a" (mm):		
	Silver wire diameter (mm):		
	Used SCPD during the tests		
	Prospective current (A):		
	Prospective current obtained (A):		
	Power factor / ratio *n*:		
	Power factor / ratio *n* obtained:		
	Plot no.		
	Test sequence: O-t-O		
	I^2t (kA^2s); Ip (kA):	First O: Ip :_____kA I^2t; _____kA^2s Plot no. _____	
		Second O: Ip :_____kA I^2t; _____kA^2s Plot no.: _____	
	If tested at separate testing station see report	No.: _____ of _____ testing station	
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		N/A
	After the tests no damage impairing further use		N/A
8.3.3.5	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		N/A
	Test voltage		N/A
B.8.10.3.2	The RCCB shall trip with a test current of 1,25 IΔn (ms) In minimum setting:	I test: _____ mA trip time: _____ ms	N/A
M.8.12.3	Verification of automatic opening in case of voltage source failure		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Time period	Max 1 s or max. 1 s+time delay setting	
	Time period to automatic opening		N/A
	No value exceeds the relevant specified limiting value		N/A
	The polyethylene sheet shows no holes		N/A
			N/A
M.8.14.4	Verification of rated short-time withstand current (I_{cw})		N/A
	Test circuit according to figure:		
	Point of test circuit which is directly earthed:		
	Grid distance "a" (mm):		
	Prospective current (A):		
	Prospective current obtained (A):		
	Power factor / ratio *n*:		
	Power factor / ratio *n* obtained:		
	Plot no.		
	Test sequence: O		
	I^2t (kA^2s); Ip (kA):	Ip :_____kA I^2t; _____kA^2s Test duration: _____ms Plot no. _____	
	If tested at separate testing station see report	No.: _____ of _____ testing station	
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	After the tests no damage impairing further use		N/A
8.3.3.5	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		N/A
	Test voltage	-	N/A
B.8.10.3.2	The RCCB shall trip with a test current of 1,25 IΔn (ms) in minimum setting:	I test: _____ mA trip time: ____ ms	N/A
			N/A
M.8.12.3	Verification of automatic opening in case of voltage source failure		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Time period	Max 1 s or max. 1 s+time delay setting	
	Time period to automatic opening		N/A
	No value exceeds the relevant specified limiting value		N/A
	The polyethylene sheet shows no holes		N/A
			N/A
M.8.14.5	Verification of the rated conditional residual short-circuit current (IΔc)		N/A
	Test circuit according to figure:		
	Point of test circuit which is directly earthed:		
	Grid distance "a" (mm):		
	Silver wire diameter (mm):		
	Used SCPD during the tests		
	Prospective current (A):		
	Prospective current obtained (A):		
	Power factor / ratio *n*:		
	Power factor / ratio *n* obtained:		
	Plot no.		

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence: O-t-O		
	I^2t (kA^2s); Ip (kA):	First O: Ip :_____kA I^2t; _____kA^2s Plot no. _____	
		Second O: Ip :_____kA I^2t; _____kA^2s Plot no.: _____	
	If tested at separate testing station see report	No.: _____ of _____ testing station _____	
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		N/A
	After the tests no damage impairing further use		N/A
8.3.3.5	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		N/A
	Test voltage	-	N/A
B.8.10.3.2	The RCCB shall trip with a test current of 1,25 IΔn (ms) in minimum setting:	I test: _____ mA trip time: ____ ms	N/A
M.8.12.3	Verification of automatic opening in case of voltage source failure		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	
	Adjustable time-delay setting	_____ s	
	Time period	Max 1 s or max. 1 s+time delay setting	
	Time period to automatic opening		N/A
	No value exceeds the relevant specified limiting value		N/A
	The polyethylene sheet shows no holes		N/A
			N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
M.8.14.6	Verification of rated residual short-time withstand current (IΔw)		N/A
	Test circuit according to figure:		
	Point of test circuit which is directly earthed:		
	Grid distance "a" (mm):		
	Prospective current (A):		
	Prospective current obtained (A):		
	Power factor / ratio *n*:		
	Power factor / ratio *n* obtained:		
	Plot no.		
	Test sequence: O		
	I^2t (kA^2s); Ip (kA):	Ip :_____kA I^2t; _____kA^2s Test duration: _____ms Plot no. _____	
	If tested at separate testing station see report	No.: _____ of _____ testing station _____	
	During tests no endangering of operator, no permanent arcing, no flashover and no melting of fuse F		N/A
	After the tests no damage impairing further use		N/A
8.3.3.5	Dielectric strength test of the main circuit at test voltage of 2 Un for 1 min:		N/A
	Test voltage	-	N/A
B.8.10.3.2	The RCCB shall trip with a test current of 1,25 IΔn (ms) in minimum setting:	I test: _____ mA trip time: ____ ms	N/A
			N/A
M.8.12.3	Verification of automatic opening in case of voltage source failure		N/A
	Source voltage (Us)	Max Us: _____ V ☐ac ☐ dc	
		Min Us: _____ V ☐ac ☐ dc	
	Adjustable residual current setting	_____ mA (lowest)	

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Adjustable time-delay setting	_____ s	
	Time period	Max 1 s or max. 1 s+time delay setting	N/A
	Time period to automatic opening		N/A
	No value exceeds the relevant specified limiting value		N/A
	The polyethylene sheet shows no holes		N/A
M.III	Test sequence MIII		N/A
M.8.15	Verification of effects of environmental conditions		N/A
	Type designation or serial number		
	Sample no:		
B.8.10.3.2	The RCCB shall trip with a test current of 1,25 IΔn (ms) in minimum setting:	I test: _____ mA trip time: ____ ms	N/A
			N/A
M.IV	Test sequence MIV		
M.8.16	Verification of electromagnetic compatibility		
	See report		N/A
			N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:		N/A
	.....:		—
	.....:		—
supplementary information: N/A			

	TABLE:						N/A
							Comments
supplementary information: N/A							

	TABLE:		N/A
	.....:		—
	.....:		—
	.....:		—
	.....:		—
supplementary information: N/A			

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:			N/A
				result code
supplementary information: N/A				

	TABLE:		N/A
	.....:		—
	.....:		—

Supplementary information: N/A

	TABLE: Heating Test		P
	Test voltage (V):	20V	—
	Ambient (°C):	40°C	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
Terminals for external connections	105	110
Manual operating means non-metalic	51	65
Parts intended to be touched non-metelic	59	80
Parts which need be touched for normal operation non-metelic	72	90

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:					N/A
supplementary information: N/A						

	TABLE: dielectric strength		P
test voltage applied between:		test potential applied (V)	breakdown / flashover (Yes/No)
Between all theterminals main circuit		1890 V	no
Between each pole of the main circuit and the other poles and to the mounting plate		1890 V	no
Between each control and auxiliary circuit not normally connected to the main circuit and the maincircuit		1890 V	no
Between each control and auxiliary circuit not normally connected to the main circuit and the other circuit		1890 V	no
Between each control and auxiliary circuit not normally connected to the main circuit and the mounting platre		1890 V	no
For equipment suitable for isolation, acros s the poles of the main circuit		1890 V	no
supplementary information:P			

	TABLE: impact resistance			N/A
impacts per surface	surface tested	impact energy (Nm)	comments	
-	-	-	-	
supplementary information: N/A				

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: electrical data (in normal conditions)						P
fuse #	I rated (A)	U (V)	P (W)	I (mA)	I fuse (mA)	condition/status	
X	250 A	690 V	18 W	X	X	-40 - +50°C	
supplementary information:P							

	TABLE: clearance and creepage distance measurements					P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
	976 V	690 V	8 mm	19,4 mm	9 mm	23,7 mm
supplementary information: P distance auxiliary circuits from live partes is 25mm						

	TABLE: distance through insulation measurements				N/A
distance through insulation di at/of:	U r.m.s. (V)	test voltage (V)	required di (mm)	di (mm)	
-	-	-	-	-	
supplementary information: N/A					

	TABLE: ball pressure test of thermoplastics		N/A
	allowed impression diameter (mm) ..... :		—
part	test temperature (°C)	impression diameter (mm)	
-	-	-	
supplementary information: N/A			

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: threaded part torque test			P
threaded part identification		diameter of thread (mm)	column number (I, II, or III)	applied torque (Nm)
connector		8 mm	I,II and III	15 Nm
supplementary information:P				

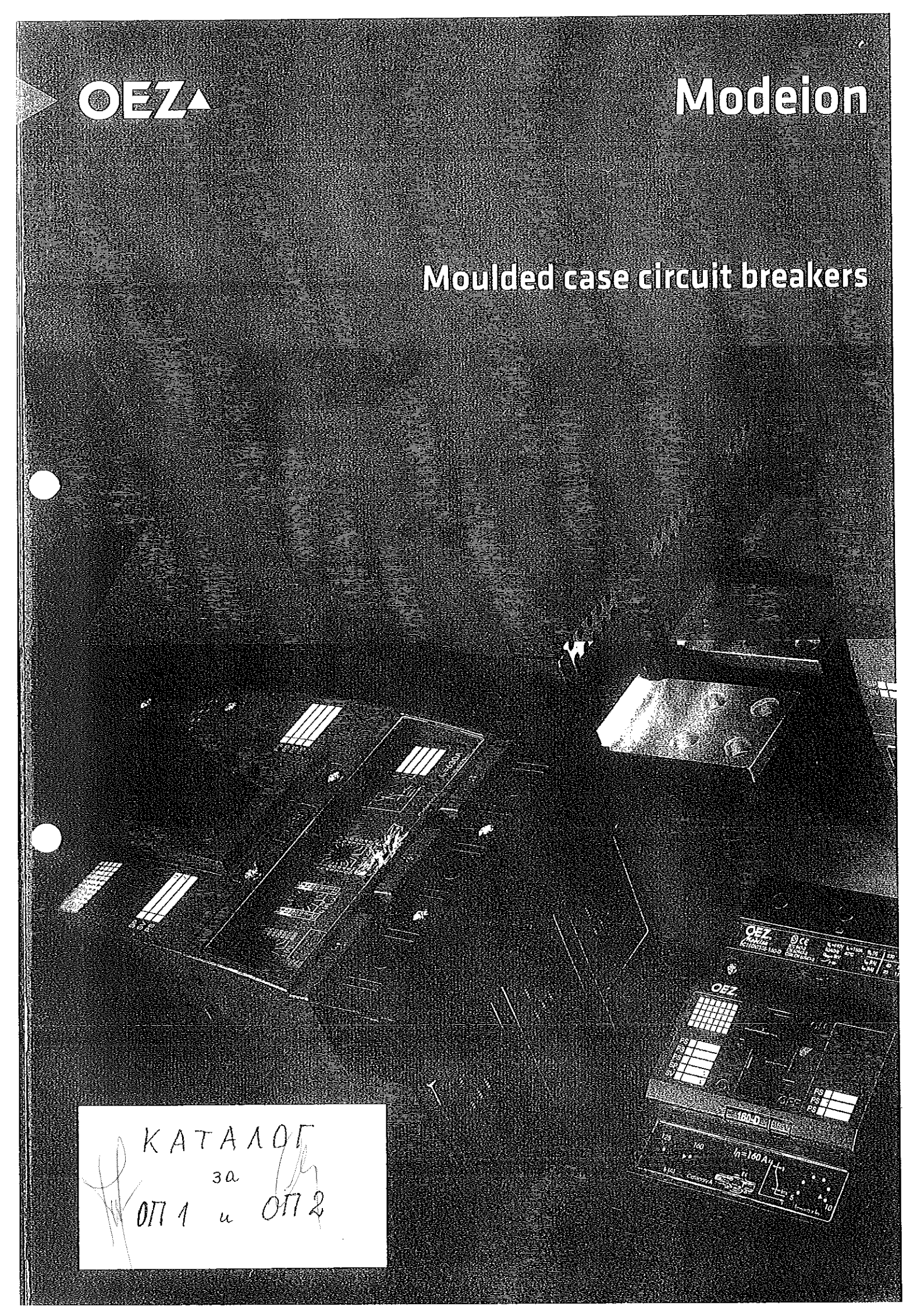
	TABLE: over-voltage and under-voltage test					N/A
test	operating condition	rated voltage (V)	test voltage (V)	temperature (°C)	comments	
-	-	-	-	-	-	
supplementary information: Isn't dependent upon outer power supply N/A						

IEC 6xxxx			
Clause	Requirement + Test	Result - Remark	Verdict
	National Differences for (country name)		
			N/A
	.....:		N/A
	.....:		N/A
			N/A
			N/A
	.....:		N/A
			N/A
			N/A
			N/A
	.....:		N/A
			N/A
			N/A
			N/A
			N/A
	.....:		N/A
			N/A
			N/A
			N/A
			N/A
			N/A
			N/A
			N/A
	.....:		N/A

OEZ

Modeion

Moulded case circuit breakers



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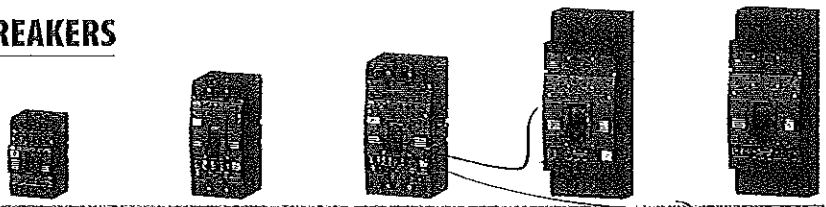
SPECIFICATIONS TO SELECT CIRCUIT BREAKERS

››› for AC operation



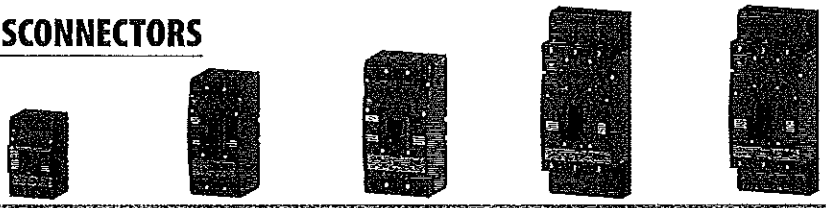
Type			BG160N	BD250N, BD250S	BH630N, BH630S	BG1000S	BH1600S
Rated normal current	I_n		160 A	250 A	630 A	1 000 A	1 600 A
Rated operating voltage	U_e		max. 690 V a.c., 250 V d.c.	max. 690 V a.c.	max. 690 V a.c.	max. 690 V a.c.	max. 690 V a.c.
Rated frequency	f_n		50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Utilization category (selectivity)			A	A	A	A,B	A,B
Rated short-circuit ultimate breaking capacity [1]	I_{cu}/U_e	NORMAL	25 kA / 415 V a.c.	36 kA / 415 V a.c.	36 kA / 415 V a.c.	–	–
		SUPERIOR	–	65 kA / 415 V a.c.	65 kA / 415 V a.c.	65 kA / 415 V a.c.	65 kA / 415 V a.c.
Rated short-time withstand current at U_e = 690 V a.c.	I_{cw}/t		–	2,5 kA / 1 s	8 kA/50 ms, 7 kA/300 ms, 6,5 kA/1 s	15 kA / 1 s	20 kA / 1 s
Dimensions W x H x D			75 x 135 x 70 mm	105 x 225 x 105 mm	140 x 275 x 105 mm	210 x 350 x 135 mm	210 x 350 x 135 mm
Number of poles			3, 4	3, 4	3, 4	3	3
Residual current device			•	–	–	–	–
Additional cover for overcurrent release			–	•	•	–	–
Plug-in design			–	•	•	–	–
Withdrawable design			–	•	•	•	•
Front/rear connection			•/•	•/•	•/•	•/•	•/•
Connection - busbars/cable lugs/cables			•/•/•	•/•/•	•/•/•	•/•/•	•/•/•
Potential terminals			•	•	•	•	•
Switches - auxiliary/relative/signal/early			•/–/•/–	•/•/•/•	•/•/•/•	•/•/–/–	•/•/–/–
Shunt trip			•	•	•	•	•
Undervoltage release/with early contact			•/–	•/•	•/•	•/–	•/–
Hand drive/with adjustable lever			•/•	•/•	•/•	•/•	•/•
Motor drive/with counter of cycles			•/+	•/•	•/•	•/•	•/•
Lever with locking			•	•	•	•	•
Mechanical interlocking - for hand drive/with Bowden cable			•/–	•/•	•/•	•/•	•/•
Terminal cover IP20			•	•	•	•	•

• available, – unavailable, + being prepared

[1] - in case circuit breaker connection is reversed (input terminals 2, 4, 6, output terminals 1, 3, 5) I_{cu} does not change

SPECIFICATIONS TO SELECT SWITCH-DISCONNECTORS

››› for AC and DC operation



Type		BG160N	BD250N	BH630N	BG1000S	BH1600S
Rated operating current	I_e	160 A	250 A	630 A	1 000 A	1 600 A
Rated operating voltage	U_e	max. 690 V a.c., 440 V d.c.	max. 690 V a.c., 440 V d.c.	max. 690 V a.c., 440 V d.c.	max. 690 V a.c., 440 V d.c.	max. 690 V a.c., 440 V d.c.
Rated frequency	f_n	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Utilization category (switching mode)		AC - 23B / 690 V a.c.	AC - 23B / 690 V a.c. DC - 23B / 440 V d.c.	AC - 23B / 690 V a.c. DC - 23B / 440 V d.c.	AC - 23B / 690 V a.c. DC - 23B / 440 V d.c.	AC - 23B / 690 V a.c. DC - 23B / 440 V d.c.
Rated short-time withstand current at U_e = 690 V a.c.	I_{cw}/t	2 kA / 1 s	3 kA / 5 s	8 kA / 5 s	15 kA / 1 s	20 kA / 1 s
Rated short-circuit making capacity	I_{cm}/U_e	2,8 kA / 415 V a.c.	4 kA / 415 V a.c.	13 kA / 415 V a.c.	30 kA / 415 V a.c.	40 kA / 415 V a.c.
Dimensions W x H x D		75 x 130 x 70 mm	105 x 225 x 105 mm	140 x 275 x 105 mm	210 x 350 x 135 mm	210 x 350 x 135 mm
Number of poles		3, 4	3, 4	3, 4	3	3
Residual current device		•	–	–	–	–
Plug-in design		–	•	•	–	–
Withdrawable design		–	•	•	•	•
Front/rear connection		•/•	•/•	•/•	•/•	•/•
Connection - busbars/cable lugs/cables		•/•/•	•/•/•	•/•/•	•/•/•	•/•/•
Potential terminals		•	•	•	•	•
Switches - auxiliary/relative/signal/early		•/–/•/–	•/•/•/•	•/•/•/•	•/•/–/–	•/•/–/–
Shunt trip		•	•	•	•	•
Undervoltage release/with early contact		•/–	•/–	•/•	•/–	•/–
Hand drive/with adjustable lever		•/•	•/•	•/•	•/•	•/•
Motor drive/with counter of cycles		•/+	•/•	•/•	•/•	•/•
Lever with locking		•	•	•	•	•
Mechanical interlocking - for hand drive/with Bowden cable		•/+	•/•	•/•	•/•	•/•
Terminal cover IP20		•	•	•	•	•

• available, – unavailable, + being prepared

FUNCTIONS AND PROPERTIES OF THE OVERCURRENT RELEASES

Introduction

Overcurrent release which measures/monitors the current passing through the circuit breaker is part of every circuit breaker. Its main task is to get an impulse for circuit breaker switching off if the value of current which is given by tripping characteristic of each circuit breaker or overcurrent release is exceeded. The switching off itself based on the impulse from the overcurrent release is ensured by the switching system – another main part of each circuit breaker.

Division

Overcurrent releases can be divided into two basic types - electronic and thermomagnetic (bimetallic) ones. Electronic releases can be solved by discrete components and integrated circuits. Thermomagnetic releases use bimetal for the evaluation of overload and magnetic circuit for the evaluation of short-circuit.
BC160 circuit breaker has a thermomagnetic release.
BD250, BH630, BL1000, BL1600S circuit breakers have an electronic release.

Properties, specifications

The circuit breakers with both the thermomagnetic and overcurrent releases protect against overload and short-circuit respectively. Circuit breaker tripping-is given by the tripping characteristic of the overcurrent release. Tripping characteristic defines the time when the circuit breaker switches off in passage of a current higher than the rated current In or reduced current I_R.

The tripping characteristic can be divided into two principal ranges:

1st range:

- in this range a „dependent time release" (also called thermal release) ensures device protection against „Overload"
- the dependent time release means that the breaking time depends indirectly on the strength of current, i.e. the higher is the current (overload), the shorter is the releasing time - the releasing time is given by the tripping characteristic of the overcurrent release
- overload limit is given by rated current In or reduced current I_R - the value of I_R can be set for most types of the overcurrent releases - I_n or I_R must be never higher than the rated current of the protected device
- EN 60 947-2 sets two fixed values of time and current that must be always met by the circuit breaker:

Conventional non-tripping current
- the circuit breaker must not break 1.05 I_n or I_R in 2 hours

Conventional tripping current
- The circuit breaker must break 1.3 In or I_R in 2 hours (1.2 I_n or I_R shall apply for protection of motors)
- circuit breakers with In or I_R lower than 63 A have conventional non-breaking an breaking time of 1 hour
- remaining part of the tripping characteristic is given by the manufacturer (the standard states max. tolerances of values for individual ranges)

- for some overcurrent releases it is possible to set the cut-off time of thermal release at 7.2 I_R - parameter t_R – so called thermal release delay, to enable, for instance, start of a motor (the start can last up to 30 s, and the current reaches on average 7.2 I_n)

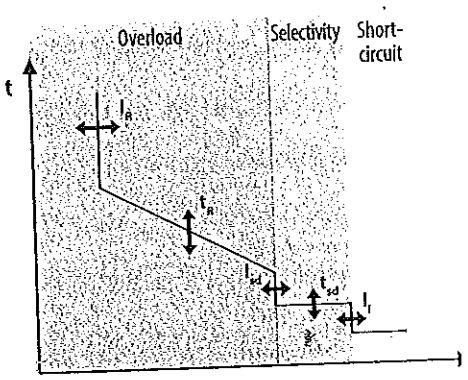
2nd range:

- in this range an „independent time release" (also called short-circuit release) ensures device protection against „Short-circuit" - parameter I_i
- independent time release means that the cut-off time is independent of the value of current; as soon as current reaches certain value, the circuit breaker will immediately trip (the cut-off time is 10 to 30 ms; some overcurrent releases enable setting of delay 50 ms) - the value of the short-circuit release I_i can be set for most types of overcurrent releases, and thus to adapt it to the impedance loop and enable start of a motor

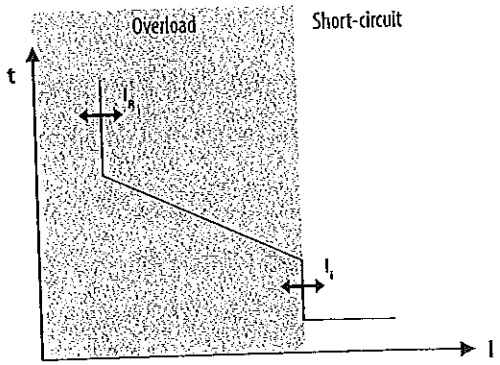
Special overcurrent releases

- the short-circuit protection range is further divided; it contains, beside the short-circuit release also a selective release
- according to EN 60 947-2 this range is called independent time-delayed release – parameter Isd
- unlike the short-circuit release, the selective release can have delay of up to 1000 ms – parameter t_{sd} - thus it can reach a higher or full selectivity with assigned or backup circuit breakers or fuses

Tripping characteristic of the special overcurrent release



Tripping characteristic of the basic overcurrent release



FUNCTIONS AND PROPERTIES OF THE OVERCURRENT RELEASES

Basic overcurrent releases

D, DTV3 – for protection of distribution transformers and lines with a minimum motor load

- it is possible to set reduced current I_R and the value of short-circuit release I_i

M – for protection of motors

- it is possible to set reduced current I_R
- The value of short-circuit release is fixed at 10x I_n

MTV8 – TV mode -- for protection of distribution transformers and lines feeding motors

- it is possible to set reduced current I_R
- it is possible to set thermal release delay t_R to enable motor starting
- it is possible to set the short-circuit release value I_i and its delay to enable motor starting

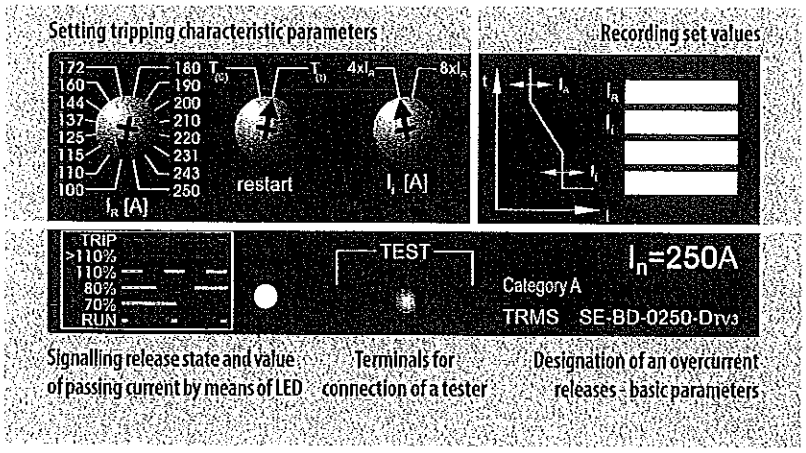
– M mode – for protection of motors (complete protection of motors)

- it is possible to set reduced current I_R
- it is possible to set thermal release delay t_R to enable motor starting
- undercurrent release is active, and will switch off the circuit breaker in 4 s in phase failure
- it is possible to set the short-circuit release value I_i and its delay to enable motor starting

L, L001 – for protection of lines with small current impulses

- the value of rated current In is fixed (the circuit breakers are manufactured in standardized series of currents)
- the value of short-circuit release I_i is fixed at 4 I_n

Overcurrent release label



FUNCTIONS AND PROPERTIES OF THE OVERCURRENT RELEASES

Overcurrent release setting

Reduced current I_R

✓ reduced current I_R shall be set according to the rated current of the protected device or, for instance, permissible load current of the cable

↓ undesired circuit breaker trip will take place during normal operation

↑ overload of the protected device or cable can occur

Thermal memory T (restart)

Thermal memory provides protection of the protected device against repeated overload, in particular in attempt at restart after switching off by overload

■ **thermal memory switched on** - the circuit breaker „remembers" previous thermal overload

- after circuit breaker switching off by overload it is not possible to switch it on again for a time; it is necessary to wait until the both protected device and the circuit breaker will „cool down"
- the circuit breaker remembers previous thermal overload even after drop of current in the circuit below I_n or I_R, and at next thermal overload the releasing time of the thermal release is shortened (the time follows from the tripping characteristic in so called „hot" state)
- the thermal memory must remain active in protection of distribution transformers, lines and motors

■ **thermal memory switched off** - the circuit breaker „does not remember" previous thermal overload

- after circuit breaker switching off by overload the thermal memory will reset, and the circuit breaker can be immediately switched on again, and in the next overload the releasing time is not shortened (the time follows from the tripping characteristic in so called „cold" state)
- after drop of current in the circuit below the set value of I_R the thermal memory is reset, and in next overload the releasing time is not shortened (the time follows from the tripping characteristic in so called „cold" state)
- thermal memory can be switched off only in certain cases, when the protected device is rated for repeated overload (e.g. spot welding machines or rail cranes)

TV/M mode

TV – mode for protection of distribution transformers and lines feeding mainly motors

– undercurrent release is not active

M – mode for direct protection of motors

– undercurrent release is active (in phase failure the circuit breaker trips in 4 s)

Thermal release delay t_R

✓ in protection of motors or lines with prevailing motor load it is necessary to set the thermal release delay t_R correctly and thus enable motor starting

↓ undesired circuit breaker switching off will take place in motor starting

↑ overload of the motor or cable can occur

Short-circuit release value I_i

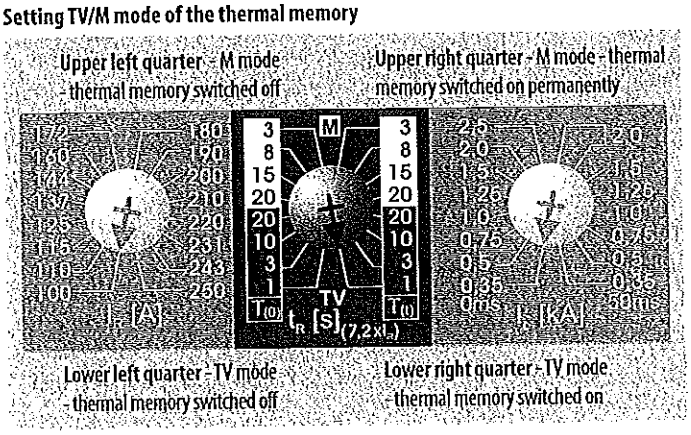
✓ the short-circuit release value I_i must be set higher than the maximum peak current in the circuit (making current of the protected device) and at the same time it must be set to fulfil the conditions of automatic disconnection from the power supply in failure

↓ undesired circuit breaker switching off will take place (e.g. in motor starting)

↑ circuit breaker will not disconnect the circuit from power supply in case of failure (short-circuit) in prescribed time

■ in protection of motors or lines with motor or capacitive load it is suitable to set a delay of the short-circuit release to enable motor starting (e.g. a motor can take up to 15 I for 10 ÷ 15 ms in starting)

Setting TV/M mode of the thermal memory



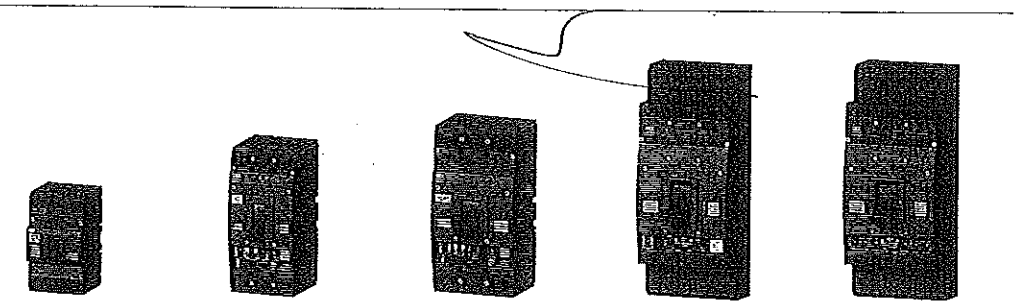
Legend:

✓ correct setting

↓ wrong setting - low value

↑ wrong setting - high value

OVERVIEW OF BASIC OVERCURRENT RELEASES

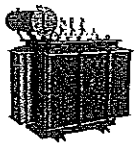


BC160 | BD250 | BH630 | BL1000 | BL1600

Lines

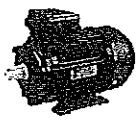
	12 ÷ 160 A	40 ÷ 250 A	100 ÷ 630 A	125 ÷ 1 000 A	315 ÷ 1 600 A
OPTIMUM	F	MTV8	MTV8	MTV8	MTV8
EXPANDED		MTV8 - TV mode	MTV8 - TV mode	MTV8 - TV mode	MTV8 - TV mode
SIMPLE	L	L001	L001		

Distribution transformers



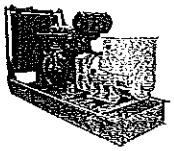
	25 kVA 50 kVA 63 kVA	63 kVA 100 kVA 160 kVA	160 kVA 250 kVA 400 kVA	250 kVA 400 kVA 630 kVA	400 kVA 630 kVA 1 000 kVA
OPTIMUM	F	MTV8	MTV8	MTV8	MTV8
EXPANDED		MTV8 - TV mode	MTV8 - TV mode	MTV8 - TV mode	MTV8 - TV mode

Motors



	7.5 ÷ 55 kW	22 ÷ 132 kW	75 ÷ 315 kW	75 ÷ 315 kW	75 ÷ 315 kW
OPTIMUM	M	MTV8 - M mode	MTV8 - M mode	MTV8 - M mode	MTV8 - M mode

Generators



	30 ÷ 150 kVA	80 ÷ 400 kVA	100 ÷ 630 kVA	250 ÷ 1 000 kVA
OPTIMUM	MTV8 - TV mode	MTV8 - TV mode	MTV8 - TV mode	MTV8 - TV mode

OVERVIEW OF SPECIAL OVERCURRENT RELEASES

Short-circuit protection

BC160 - overcurrent release N

Circuit breaker BC160 with overcurrent release of N type protects against short-circuit only

- it does not protect in the overload range – it does not react to low over-currents
- it is possible to set the value of the short-circuit release from 5 to 10 I_n
- suitable for protection of e.g. motors with own overload protection
- overcurrent release indicates switching off by short-circuit

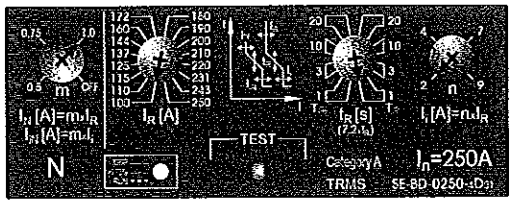
Protection in TN-S, TN-C-S networks - 4-pole design of circuit breakers

BC160 - overcurrent release D

BC160 circuit breaker of 4-pole design can have an overcurrent release, which reacts also to the value of current in the fourth/N pole

- the value of reduced current I_R and of short-circuit release I_i for the fourth pole is the same as for the other three poles
- all the other properties and parameters are identical to those of the standard overcurrent release of type D

BD250, BH630 - overcurrent release 4D01

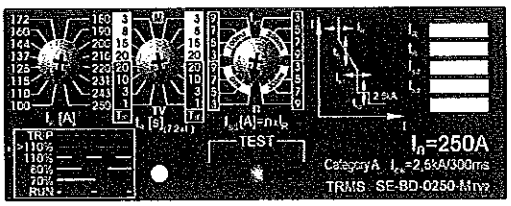


BD250 and BH630 circuit breakers of 4-pole design can have an overcurrent release of type 4D01, which reacts also to the value of current in the fourth/N pole

- protects against both overcurrent and short-circuit
- setting of reduced current $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $t_{(t)}$, OFF = $t_{(s)}$)
- setting of delay of the thermal release 1 s, 3 s, 10 s a 20 s
- setting of the value of the short-circuit release I_i in 4 steps
- I_R setting, t_R and I_i by means of rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED

Time selective protection

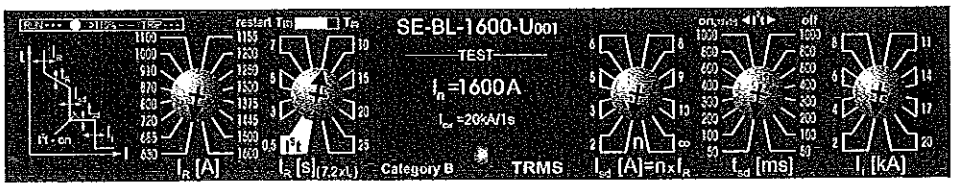
BD250, BH630 - overcurrent release MTV9



It is designed for demanding applications with a complicated load and required high selectivity with fuses or circuit breakers

- the MTV9 release is based on MTV8 release, and in addition enables setting a value of the selective release including delay
- protects against both overcurrent and short-circuit
- setting of reduced current $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(s)}$)
- TV mode - for protection of lines and distribution transformers (undercurrent release is not active)
- M mode - for protection of motors (undercurrent release is active)
- setting of delay of thermal release t_R
- setting of the value of selective release I_{sd} in 4 steps (independent time-delayed release)
- setting of delay of the selective release t_{sd} 0 ms, 100 ms, 200 ms or 300 ms
- setting of I_R, t_R, I_{sd} and t_{sd} by means of rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED

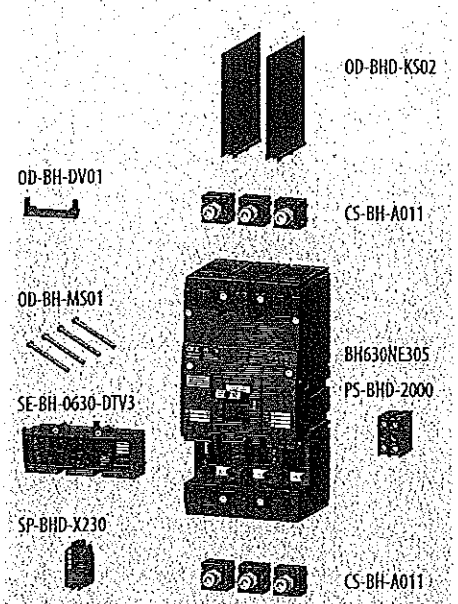
BL1000, BL1600 - overcurrent release U001



It is designed for demanding applications with a complicated load and required high selectivity with fuses or circuit breakers

- protects against both overcurrent and short-circuit
- setting of reduced current $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(s)}$)
- setting of delay of the thermal release t_R in 8 steps, possibility of setting of gradient of characteristic of the thermal release I^2t (adaptation of time-current characteristic of the fuse)
- setting of the value of selective release I_{sd} in 8 steps (independent time-delayed release)
- setting of delay of the selective release t_{sd} 50 to 1 000 ms including possibility of setting of a gradient of characteristic I^2t (adaptation of the tripping characteristic of the fuse)
- setting of the value of the short-circuit release I_i in 8 steps
- setting of I_R, t_R, I_{sd}, t_{sd} and I_i by means of rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED

PURCHASE ORDER EXAMPLE

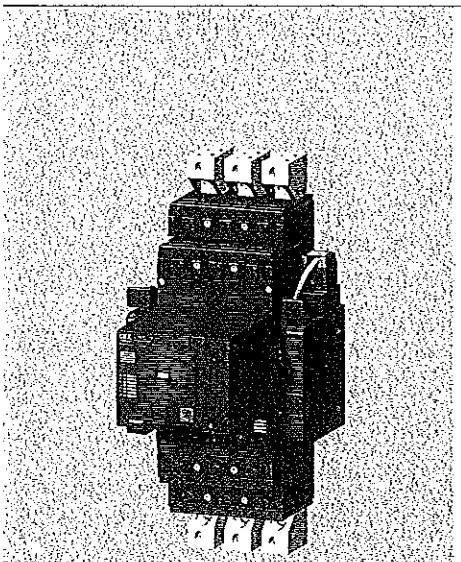


Example: You need circuit breaker for a transformer of power output 400 kVA, nominal current 577 A and maximum short-circuit current up to 36 kA. The incoming and outgoing lines of the circuit breaker will be formed by Cu busbars. Further requirements: signalization of main contacts and remote control of the circuit breaker.

Your purchase order:
(do not enter text from grey area into your purchase order)

NUMBER	TYPE	PRODUCT CODE	
1 pc	BH630NE305	14412	- switching unit with rated current 630 A and rated short-circuit ultimate capacity 36 kA - components of the switching unit are ■ connecting sets for connecting Cu/Al busbars or cable lugs (CS-BH-A011) ■ insulating barriers (OD-BHD-KS02) ■ mounting bolts set for installing switching unit (OD-BH-MS01) ■ conductor holder (OD-BH-DV01)
1 pc	SE-BH-0630-DTV3	25100	- overcurrent release for protection of transformers and lines with the rated current up to 630 A and its regulation 0 ÷ 60 %
1 pc	PS-BHD-2000	13689	- auxiliary switch (2x make contact)
1 pc	SP-BHD-X230	24420	- undervoltage release (230 V a.c., 400, 500 V/220 V d.c.)

CUSTOM ASSEMBLY OF CIRCUIT BREAKERS



- **at customer's request**
- **warranty not only for components, but for the entire configuration**
- **after consulting with OEZ company, based on particular specification of your configuration**
- **the delivery terms in 1 - 4 weeks**
- **extra charge for completion and special packing**

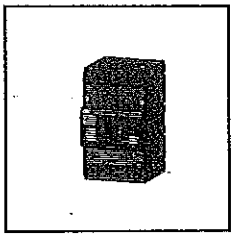
Your order should include the following specification:

- type of circuit breaker switching unit
- type, rated current and adjustment of the electronic release
- types of connecting terminal
  - for input terminals of circuit breaker
  - for output terminals of circuit breaker
- Installation requirements, type and function of auxiliary switches
- Installation requirement and type of auxiliary releases, including rated voltage
- requirements for fitting circuit breaker with drive
  - type of hand drive, including accessories (control lever, bearing, shaft)
  - motor drive type including control voltage and your demand for counter of cycles, extension cable and sealable cover of switch on button
- required withdrawable or plug-in design of circuit breakers
- requirement for fitting withdrawable device with signalling of individual positions
- requirement for sealing the overcurrent release

Auxiliary circuits of the withdrawable design will be installed according to the wiring diagram supplied by the customer.

NOTES

MOULDED CASE CIRCUIT BREAKERS BC160N



COMMERCIAL INFORMATION

3P 4P

TECHNICAL INFORMATION

SUMMARY OF MODELS AND ACCESSORIES

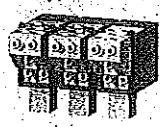
3P 4P

CONNECTING SETS

Double block terminals

CS-BC-B021

Output terminals



CS-BC-B014

Front connection

CS-BC-A011

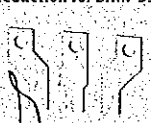
Rear connection

CS-BC-A021

Potential terminals

CS-BC-PS01

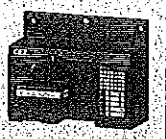
Reduction for BA...*33



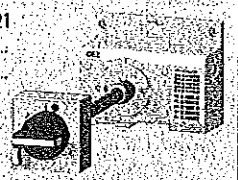
CS-BC-A033

HAND DRIVES

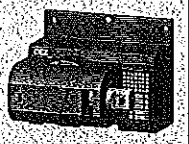
Hand drive unit - front
RP-BC-CK20
RP-BC-CP..



Hand drive unit - front
RP-BC-CK21
RP-BC-CH...
RP-BC-CN...



Hand drive unit - right side
RP-BC-CK30



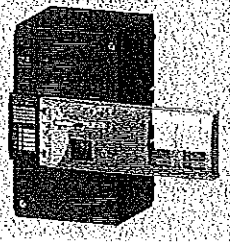
Hand drive unit - left side
RP-BC-CK31

Mechanical parallel switching
RP-BC-CD10

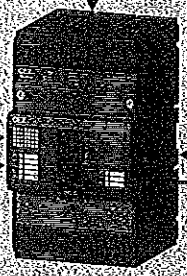
Mechanical interlocking
RP-BC-CB10

MOTOR DRIVES

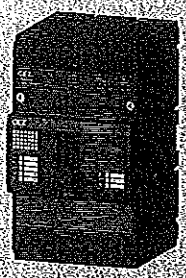
Motor drive - side MP-BC-X...B



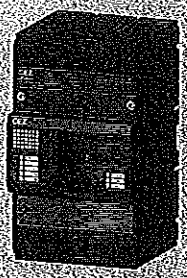
CIRCUIT BREAKERS



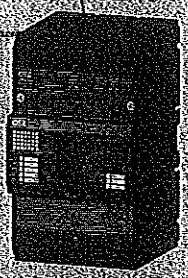
BC160NT305-160-D



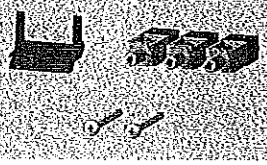
BC160NT305-160-L



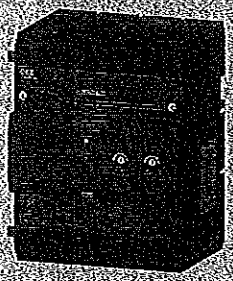
BC160NT305-100-M



BC160NT305-160-N

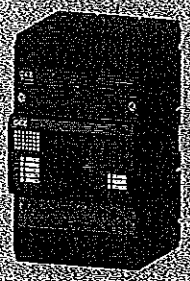


RESIDUAL CURRENT DEVICE



RCD-BC4-EA16

SWITCH-DISCONNECTOR



BC160NT305-160-V

AUXILIARY RELEASES

Shunt trip

SV-BC-X...

Undervoltage release

SP-BC-X...

SWITCHES

Signal switch

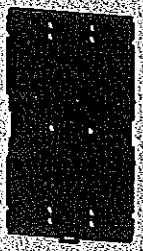
NS-BC-0010

Auxiliary switch

PS-BC-0010

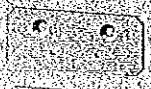
MOUNTING SETS

Adapter for „U" rail 35 mm



OD-BC-DIN1

Reduction for BA...*33



OD-BC-MS33

ACCESSORIES

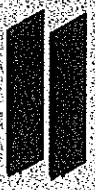
Lever with locking

OD-BC-UP01

Terminal cover - IP20

OD-BC-KS03

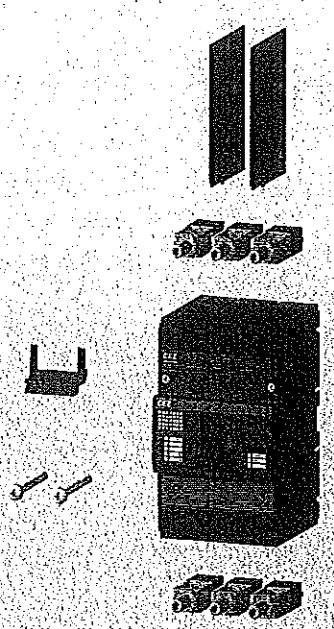
Insulating barriers



CS-BC-KS02

CIRCUIT BREAKERS

3P



- Circuit breaker includes:
  - 2 connecting sets for connecting Cu/Al cables with cross-sections 2.5 ÷ 95 mn
  - in case of the connection of the fine stranged conductor, we recommend using of the end sleeve (connecting sets are installed in the circuit breake
  - insulating barriers OD-BC-KS02
  - mounting bolts set OD-BC-MS01 (2x M3x30)
  - conductor holder OD-BC-DV01

- the method of power circuit connection must observe recommendations, see page D18 as well as deionizatio space, see page D21

1) - for connecting in another way, one may use CS-BC-... connecting sets, see page D10, D11

Characteristic D - distribution

- protection lines and transformers

I_n [A]	Type	Product code	I_r setting [A]	I_s [A]	Weight [kg]	Package [pc]
16	BC160NT305-16-D	20209	12.5 ÷ 16	160 ÷ 240	1.00	1
20	BC160NT305-20-D	20211	16 ÷ 20	200 ÷ 300	1.00	1
25	BC160NT305-25-D	20212	20 ÷ 25	250 ÷ 375	1.00	1
32	BC160NT305-32-D	20213	25 ÷ 32	160 ÷ 320	1.00	1
40	BC160NT305-40-D	20215	32 ÷ 40	200 ÷ 400	1.00	1
50	BC160NT305-50-D	20217	40 ÷ 50	250 ÷ 500	1.00	1
63	BC160NT305-63-D	20219	50 ÷ 63	315 ÷ 630	1.00	1
80	BC160NT305-80-D	20222	63 ÷ 80	400 ÷ 800	1.00	1
100	BC160NT305-100-D	20204	80 ÷ 100	500 ÷ 1 000	1.00	1
125	BC160NT305-125-D	20206	100 ÷ 125	625 ÷ 1 250	1.00	1
160	BC160NT305-160-D	20208	125 ÷ 160	800 ÷ 1 600	1.00	1

- TECHNICAL INFORMATION, see page D15, D37

Characteristic M - motor

- motors protection

I_n [A]	Type	Product code	I_r setting [A]	I_s [A]	Weight [kg]	Package [pc]
16	BC160NT305-16-M	20243	12.5 ÷ 16	160	1.00	1
20	BC160NT305-20-M	20244	16 ÷ 20	200	1.00	1
25	BC160NT305-25-M	20245	20 ÷ 25	250	1.00	1
32	BC160NT305-32-M	20246	25 ÷ 32	320	1.00	1
40	BC160NT305-40-M	20247	32 ÷ 40	400	1.00	1
50	BC160NT305-50-M	20248	40 ÷ 50	500	1.00	1
63	BC160NT305-63-M	20249	50 ÷ 63	630	1.00	1
80	BC160NT305-80-M	20250	63 ÷ 80	800	1.00	1
100	BC160NT305-100-M	20242	80 ÷ 100	1 000	1.00	1

- TECHNICAL INFORMATION, see page D15, D37

Characteristic L - lines

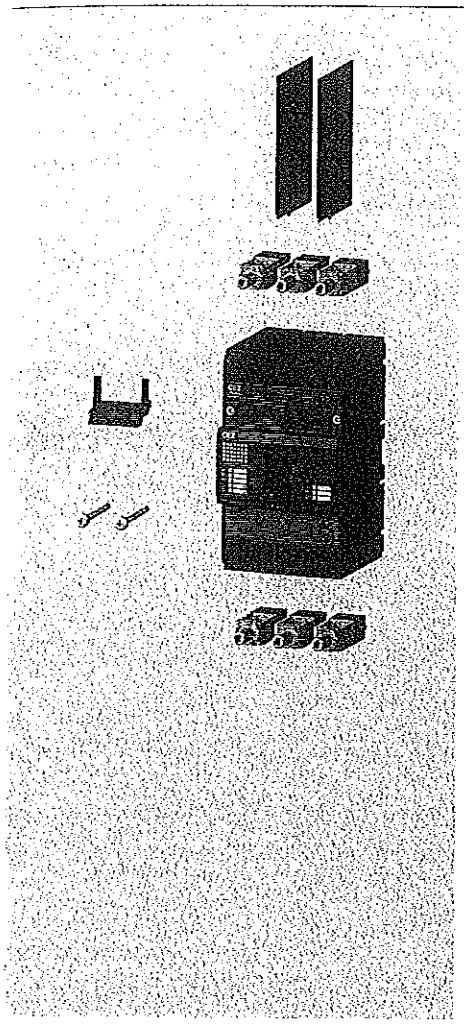
- protection lines with low starting currents
- without I_r setting

I_n [A]	Type	Product code	I_s [A]	Weight [kg]	Package [pc]
40	BC160NT305-40-L	20214	160	1.00	1
50	BC160NT305-50-L	20216	200	1.00	1
63	BC160NT305-63-L	20218	252	1.00	1
80	BC160NT305-80-L	20221	320	1.00	1
100	BC160NT305-100-L	20203	400	1.00	1
125	BC160NT305-125-L	20205	500	1.00	1
160	BC160NT305-160-L	20207	640	1.00	1

- TECHNICAL INFORMATION, see page D15, D37

CIRCUIT BREAKERS

3P



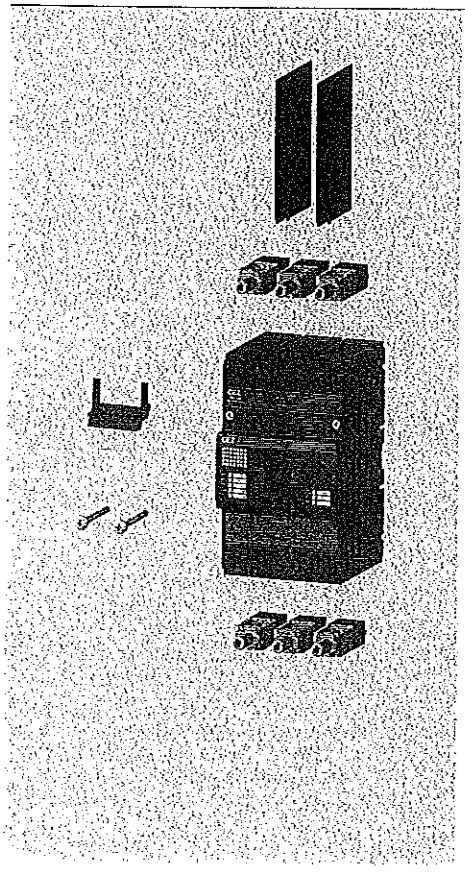
Characteristic N - only short-circuit release

I_n [A]	Type	Product code	I_r [A]	I_m [A]	Weight [kg]	Package [pc]
32	BC160NT3O5-32-N	20641	-	160 ÷ 320	1.00	1
40	BC160NT3O5-40-N	20642	-	200 ÷ 400	1.00	1
50	BC160NT3O5-50-N	20643	-	250 ÷ 500	1.00	1
63	BC160NT3O5-63-N	20644	-	315 ÷ 630	1.00	1
80	BC160NT3O5-80-N	20645	-	400 ÷ 800	1.00	1
100	BC160NT3O5-100-N	20646	-	500 ÷ 1 000	1.00	1
125	BC160NT3O5-125-N	20647	-	625 ÷ 1 250	1.00	1
160	BC160NT3O5-160-N	20621	-	800 ÷ 1 600	1.00	1

- TECHNICAL INFORMATION, see page D15, D37

SWITCH-DISCONNECTOR

3P



- Switch-disconnector includes:
  - 2 connecting sets for connecting Cu/Al cables with cross-sections 2.5 ÷ 95 mm² [1]
  - in case of the connection of the fine stranged conductor, we recommend using of the end sleeve (connecting sets are installed in the switch-disconnector)
  - insulating barriers OD-BC-KS02
  - mounting bolts set OD-BC-MS01 (2x M3x30)
  - conductor holder OD-BC-DV01

[1] - for connecting in another way, one may use CS-BC-... connecting sets, see page D10, D11

I_n [A]	Type	Product code	Weight [kg]	Package [pc]
160	BC160NT3O5-160-V	20585	1.00	1

- TECHNICAL INFORMATION, see page D15

CIRCUIT BREAKERS

3P + N

Circuit breaker includes:
- connecting terminals for connecting cu/Al cables with cross-sections 2.5 ÷ 95 mm² 1)
- in case of the connection of the fine stranged conductor, we recommend using of the end sleeve (connecting terminals are installed in the circuit breaker)
- insulating barriers OD-BC-KS02 and OD-BC-KS42
- 2 sets of mounting bolts OD-BC-MS01 (4x M3x30)
- conductor holder OD-BC-DV01 (it is installed in the circuit breaker)

- the method of power circuit connection must observe recommendations, see page D18 as well as deionization space, see page D21

1) - for connecting in another way, it is necessary to use CS-BC-... connecting sets, see page D10, D11

Characteristic D - distribution

3P + N - for unprotected N conductor

- protection lines and transformers

I_n (A)	Type	Product code	I_a setting (A)	I (A)	Weight (kg)	Package (pc)
16	BC160NT405-16-D	33617	12.5 ÷ 16	160 ÷ 240	1.3	1
20	BC160NT405-20-D	33616	16 ÷ 20	200 ÷ 300	1.3	1
25	BC160NT405-25-D	33615	20 ÷ 25	250 ÷ 375	1.3	1
32	BC160NT405-32-D	33614	25 ÷ 32	160 ÷ 320	1.3	1
40	BC160NT405-40-D	33613	32 ÷ 40	200 ÷ 400	1.3	1
50	BC160NT405-50-D	33611	40 ÷ 50	250 ÷ 500	1.3	1
63	BC160NT405-63-D	33609	50 ÷ 63	315 ÷ 630	1.3	1
80	BC160NT405-80-D	33607	63 ÷ 80	400 ÷ 800	1.3	1
100	BC160NT405-100-D	33605	80 ÷ 100	500 ÷ 1 000	1.3	1
125	BC160NT405-125-D	33603	100 ÷ 125	625 ÷ 1 250	1.3	1
160	BC160NT405-160-D	33601	125 ÷ 160	800 ÷ 1 600	1.3	1

- TECHNICAL INFORMATION, see page D15, D37

Characteristic L - lines

3P + N - for unprotected N conductor

- protection lines with low starting currents
- without I_a setting

I_n (A)	Type	Product code	I_a setting (A)	I (A)	Weight (kg)	Package (pc)
40	BC160NT405-40-L	33612	-	160	1.3	1
50	BC160NT405-50-L	33610	-	200	1.3	1
63	BC160NT405-63-L	33608	-	252	1.3	1
80	BC160NT405-80-L	33606	-	320	1.3	1
100	BC160NT405-100-L	33604	-	400	1.3	1
125	BC160NT405-125-L	33602	-	500	1.3	1
160	BC160NT405-160-L	33600	-	640	1.3	1

- TECHNICAL INFORMATION, see page D15, D37
- custom production

Characteristic N - only short-circuit release

3P + N - for unprotected N conductor

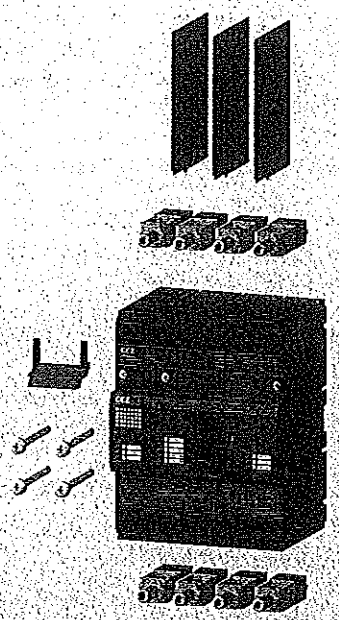
- without I_a setting

I_n (A)	Type	Product code	I_a setting (A)	I (A)	Weight (kg)	Package (pc)
32	BC160NT405-32-N	33625	-	160 ÷ 320	1.3	1
40	BC160NT405-40-N	33624	-	200 ÷ 400	1.3	1
50	BC160NT405-50-N	33623	-	250 ÷ 500	1.3	1
63	BC160NT405-63-N	33622	-	315 ÷ 630	1.3	1
80	BC160NT405-80-N	33621	-	400 ÷ 800	1.3	1
100	BC160NT405-100-N	33620	-	500 ÷ 1 000	1.3	1
125	BC160NT405-125-N	33619	-	625 ÷ 1 250	1.3	1
160	BC160NT405-160-N	33618	-	800 ÷ 1 600	1.3	1

- TECHNICAL INFORMATION, see page D15, D37
- custom production

CIRCUIT BREAKERS

4P



Circuit breaker includes:
- connecting terminals for connecting cu/Al cables with cross-sections 2.5 ÷ 95 mm² 1)
- in case of the connection of the fine stranged conductor, we recommend using of the end sleeve (connecting terminals are installed in the circuit breaker)
- insulating barriers OD-BC-KS02 and OD-BC-KS42
- 2 sets of mounting bolts OD-BC-MS01 (4x M3x30)
- conductor holder OD-BC-DV01 (it is installed in the circuit breaker)

- the method of power circuit connection must observe recommendations, see page D18 as well as deionization space, see page D21

1) - for connecting in another way, it is necessary to use CS-BC-... connecting sets, see page D10, D11

Characteristic D - distribution

4P - for protected N conductor

■ protection lines and transformers

I_n [A]	Type	Product code	I_s setting [A]	I [A]	Weight [kg]	Package [pcs]
16	BC160NT406-16-D	33644	12.5 ÷ 16	160 ÷ 240	1.3	1
20	BC160NT406-20-D	33643	16 ÷ 20	200 ÷ 300	1.3	1
25	BC160NT406-25-D	33642	20 ÷ 25	250 ÷ 375	1.3	1
32	BC160NT406-32-D	33641	25 ÷ 32	160 ÷ 320	1.3	1
40	BC160NT406-40-D	33640	32 ÷ 40	200 ÷ 400	1.3	1
50	BC160NT406-50-D	33638	40 ÷ 50	250 ÷ 500	1.3	1
63	BC160NT406-63-D	33636	50 ÷ 63	315 ÷ 630	1.3	1
80	BC160NT406-80-D	33634	63 ÷ 80	400 ÷ 800	1.3	1
100	BC160NT406-100-D	33632	80 ÷ 100	500 ÷ 1 000	1.3	1
125	BC160NT406-125-D	33630	100 ÷ 125	625 ÷ 1 250	1.3	1
160	BC160NT406-160-D	33628	125 ÷ 160	800 ÷ 1 600	1.3	1

- TECHNICAL INFORMATION, see page D15, D37

Characteristic L - lines

4P - for protected N conductor

■ protection lines with low starting currents
■ without I_s setting

I_n [A]	Type	Product code	I_s setting [A]	I [A]	Weight [kg]	Package [pcs]
40	BC160NT406-40-L	33639	-	160	1.3	1
50	BC160NT406-50-L	33637	-	200	1.3	1
63	BC160NT406-63-L	33635	-	252	1.3	1
80	BC160NT406-80-L	33633	-	320	1.3	1
100	BC160NT406-100-L	33631	-	400	1.3	1
125	BC160NT406-125-L	33629	-	500	1.3	1
160	BC160NT406-160-L	33627	-	640	1.3	1

- TECHNICAL INFORMATION, see page D15, D37
- custom production

Characteristic N - only short-circuit release

4P - for protected N conductor

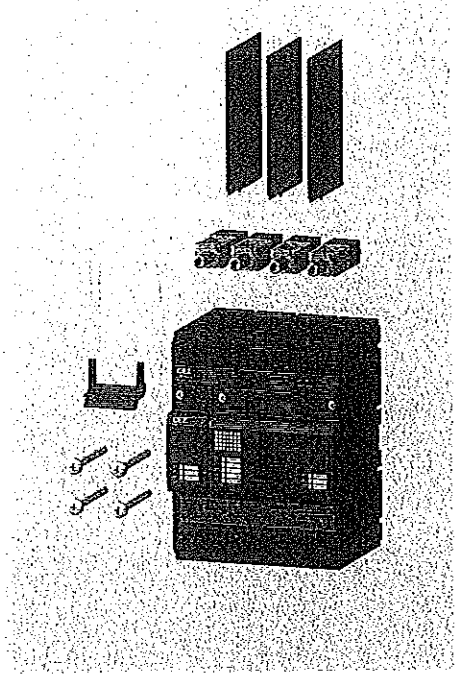
■ without I_s setting

I_n [A]	Type	Product code	I_s setting [A]	I [A]	Weight [kg]	Package [pcs]
32	BC160NT406-32-N	33652	-	160 ÷ 320	1.3	1
40	BC160NT406-40-N	33651	-	200 ÷ 400	1.3	1
50	BC160NT406-50-N	33650	-	250 ÷ 500	1.3	1
63	BC160NT406-63-N	33649	-	315 ÷ 630	1.3	1
80	BC160NT406-80-N	33648	-	400 ÷ 800	1.3	1
100	BC160NT406-100-N	33647	-	500 ÷ 1 000	1.3	1
125	BC160NT406-125-N	33646	-	625 ÷ 1 250	1.3	1
160	BC160NT406-160-N	33645	-	800 ÷ 1 600	1.3	1

- TECHNICAL INFORMATION, see page D15, D37
- custom production

SWITCH-DISCONNECTOR

4P



Switch-disconnector includes:
- 2 connecting sets for connecting Cu/Al cables with cross-sections 2.5 ÷ 95 mm² 1)
- in case of the connection of the fine stranged conductor, we recommend using of the end sleeve (connecting sets are installed in the switch-disconnector)
- insulating barriers OD-BC-KS02 and OD-BC-KS42
- 2 sets of mounting bolts OD-BC-MS01 (4x M3x30)
- conductor holder OD-BC-DV01 (it is installed in the switch-disconnector)

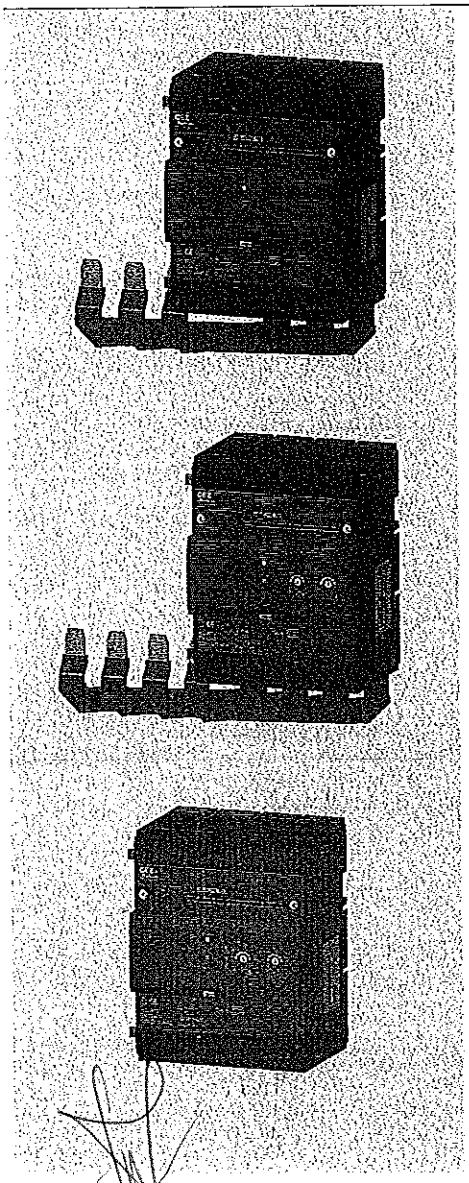
1) - for connecting in another way, one may use CS-BC-... connecting sets, see page D10, D11

I [A]	Type	Product code	Weight [kg]	Package [pc]
160	BC160NT405-160-V	33626	1.3	1

- TECHNICAL INFORMATION, see page D15

RESIDUAL CURRENT DEVICES

3P 4P



3-pole design, with interconnecting busbars

Type	Product code	Description	Weight [kg]	Package [pc]
RCD-BC3-EF06	37745	I_n 63 A, $I_{\Delta n}$ 0.3 A, without $t_{\Delta n}$ setting	1.44	1
RCD-BC3-EF16	37746	I_n 160 A, $I_{\Delta n}$ 0.3 A, without $t_{\Delta n}$ setting	1.65	1
RCD-BC3-EA06	37747	I_n 63 A, $I_{\Delta n}$ 0.03 ÷ 3 A, without $t_{\Delta n}$ setting	1.44	1
RCD-BC3-EA16	37748	I_n 160 A, $I_{\Delta n}$ 0.03 ÷ 3 A without $t_{\Delta n}$ setting	1.65	1

- CS-BC-L006 or CS-BC-L016 is part of residual current module
- TECHNICAL INFORMATION, see page D22

4-pole design, with interconnecting busbars

Type	Product code	Description	Weight [kg]	Package [pc]
RCD-BC4-EF06	37753	I_n 63 A, $I_{\Delta n}$ 0.3 A, without $t_{\Delta n}$ setting	1.75	1
RCD-BC4-EF16	37754	I_n 160 A, $I_{\Delta n}$ 0.3 A, without $t_{\Delta n}$ setting	2.03	1
RCD-BC4-EA06	37755	I_n 63 A, $I_{\Delta n}$ 0.03 ÷ 3 A, without $t_{\Delta n}$ setting	1.75	1
RCD-BC4-EA16	37756	I_n 160 A, $I_{\Delta n}$ 0.03 ÷ 3 A, without $t_{\Delta n}$ setting	2.03	1

- CS-BC-L406 or CS-BC-L416 is part of residual current module
- TECHNICAL INFORMATION, see page D22

4-pole design, without interconnecting busbars

Type	Product code	Description	Weight [kg]	Package [pc]
RCD-BC0-EF16	37761	I_n 160 A, $I_{\Delta n}$ 0,3 A, without $t_{\Delta n}$ setting	1.27	1
RCD-BC0-EA16	37762	I_n 160 A, $I_{\Delta n}$ 0,03 ÷ 3 A, without $t_{\Delta n}$ setting	1.27	1
RCD-BC0-EF06	38375	I_n 63 A, $I_{\Delta n}$ 0,3 A, without $t_{\Delta n}$ setting	1.27	1
RCD-BC0-EA06	38376	I_n 63 A, $I_{\Delta n}$ 0,03 ÷ 3 A, without $t_{\Delta n}$ setting	1.27	1

- TECHNICAL INFORMATION, see page D22

CONNECTING SETS FOR RESIDUAL CURRENT DEVICE

3P 4

Type	Product code	Description	Weight [kg]	Package [s
CS-BC-S006	38379	Interconnecting busbars, I_n = 63 A, for 3P design	0.17	1
CS-BC-S016	38380	Interconnecting busbars, I_n = 160 A, for 3P design	0.44	1

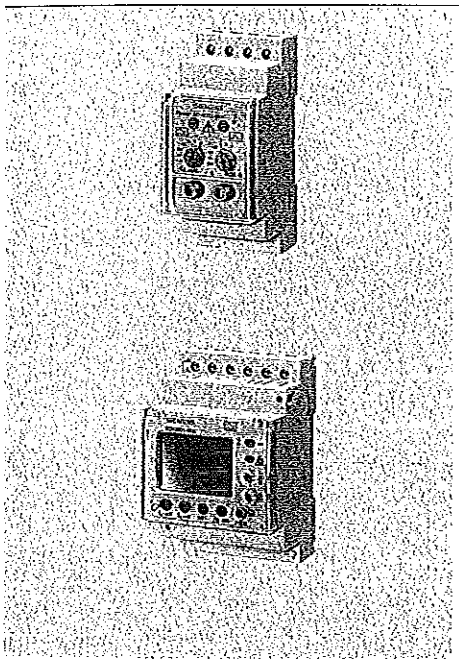
- TECHNICAL INFORMATION, see page D24

Type	Product code	Description	Weight [kg]	Package [s
CS-BC-S406	38383	Interconnecting busbars, I_n = 63 A, for 4P design	0.21	1
CS-BC-S416	38384	Interconnecting busbars, I_n = 160 A, for 4P design	0.64	1

- TECHNICAL INFORMATION, see page D24

RESIDUAL CURRENT MONITOR

3P 4



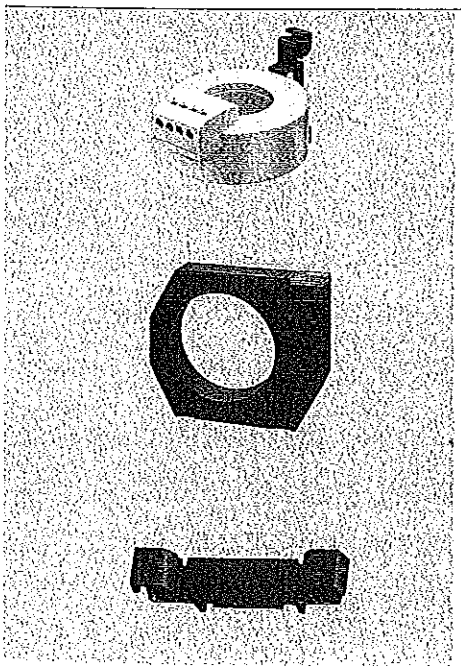
Type	Product code	Description	Weight [kg]	Pack... [s
5SV8000-6KK	42658	Analogue design, $I_{\Delta n}$ and $t_{\Delta n}$ setting	0.18	

- TECHNICAL INFORMATION, see page P4

Type	Product code	Description	Weight [kg]	Package [s
5SV8001-6KK	42659	Digital design, $I_{\Delta n}$ and $t_{\Delta n}$ setting	0.26	1
5SV8200-6KK	42660	Digital design, $I_{\Delta n}$ and $t_{\Delta n}$ setting, 4 channels	0.26	1

- TECHNICAL INFORMATION, see page P4

CURRENT TRANSFORMERS FOR RESIDUAL CURRENT MONITOR



Type	Product code	Description	Weight [kg]	Package [s
5SV8700-0KK	42661	Internal diameter 20 mm, including holder on „U" rail according to EN 60715 wide 35 mm	0.09	1
5SV8701-0KK	42662	Internal diameter 30 mm, including holder on „U" rail according to EN 60715 wide 35 mm	0.11	1

- TECHNICAL INFORMATION, see page P4

Type	Product code	Description	Weight [kg]	Package [s
5SV8702-0KK	42663	Internal diameter 35 mm, including holder on the panel	0.2	1
5SV8703-0KK	42664	Internal diameter 70 mm, including holder on the panel	0.31	1
5SV8704-0KK	42665	Internal diameter 105 mm, including holder on the panel	0.6	1
5SV8705-0KK	42666	Internal diameter 140 mm, including holder on the panel	1.35	1
5SV8706-0KK	42667	Internal diameter 210 mm, including holder on the panel	2.25	1

- TECHNICAL INFORMATION, see page P4

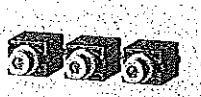
Type	Product code	Description	Weight [kg]	Package [s
5SV8 900-1KK	42668	Holder on „U" rail according to EN 60715 wide 35 mm for current transformers with internal diameter up to and including 105 mm	0.01	2

- TECHNICAL INFORMATION, see page P4

CONNECTING SETS

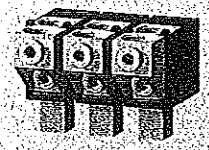
3P

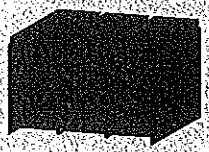
3 terminals



Type	Product code	Description	S (mm²)	Method of connection	Weight (kg)	Package (set)
CS-BC-A011	20223	Front connection		Cu/Al busbars, cable lugs	0.05	1

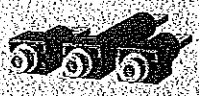
- TECHNICAL INFORMATION, see page D18





CS-BC-B021	20237	Double block terminal	2x (25 ÷ 120)	Cu/Al cables	0.18	1

- TECHNICAL INFORMATION, see page D18
- terminals cover included - degree of protection IP20

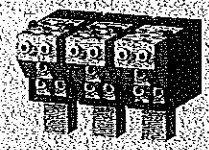


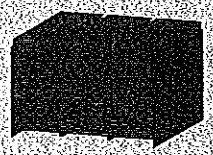
CS-BC-A021	20236	Rear connection		Cu/Al busbars, cable lugs	0.18	1

- TECHNICAL INFORMATION, see page D18

CS-BC-PS01	20239	Potential terminals	1.5 ÷ 2.5;4 ÷ 6	Cu flexible conductor	0.01	1

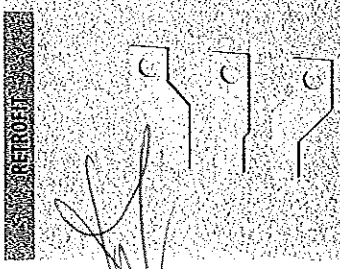
- TECHNICAL INFORMATION, see page D18





CS-BC-B014	34957	Block terminals - for 5 cables	5x (2.5 ÷ 25)	Cu/Al cables	0.18	1

- TECHNICAL INFORMATION, see page D18
- terminals cover included - degree of protection IP20



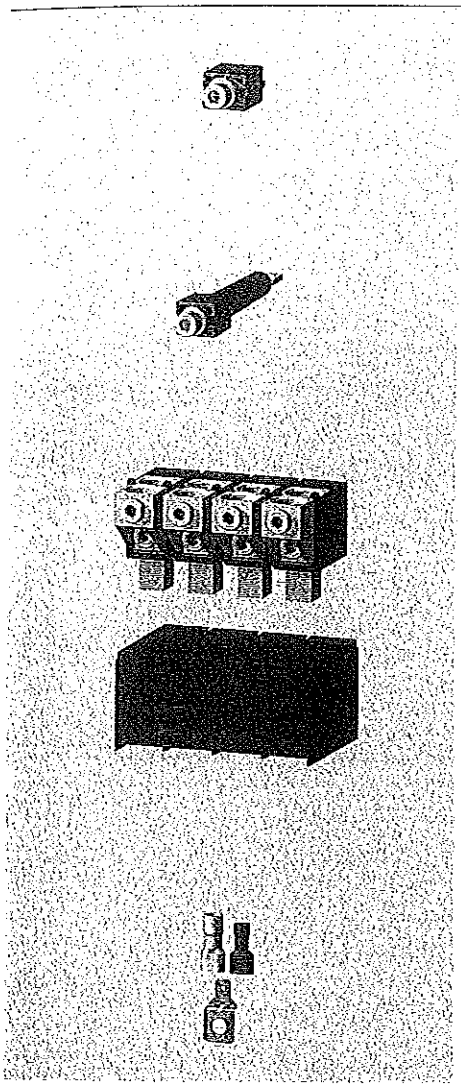
CS-BC-A033	20608	Reduction for BA...*33		Cu/Al busbars, cable lugs	0.11	1

TECHNICAL INFORMATION, see page D18
- for total replacement of BA...*33 circuit breaker also is necessary the OD-BC-MS33 mounting set

[1] - one set provides for connecting one side of the circuit breaker (set includes three terminals with necessary coupling elements)

CONNECTING SETS

3P 4P



1 terminal

Type	Product code	Description	S [mm²]	Method of connection	Weight [kg]	Package [set]
CS-BC-A411	33653	Front connection		Cu/Al busbars, cable lugs	0.02	1

- TECHNICAL INFORMATION, see page D18

CS-BC-A421	33654	Rear connection		Cu/Al busbars, cable lugs	0.08	1

- TECHNICAL INFORMATION, see page D18

CS-BC-B421	33658	Double block terminal	2x (25÷120)	Cu/Al cables	0.25	1

- TECHNICAL INFORMATION, see page D18
- terminals cover included - degree of protection IP20

CS-BC-B414	34958	Block terminal - for 5 cables	5x (2,5÷25)	Cu/Al cables	0.24	1

- TECHNICAL INFORMATION, see page D18
- terminals cover included - degree of protection IP20

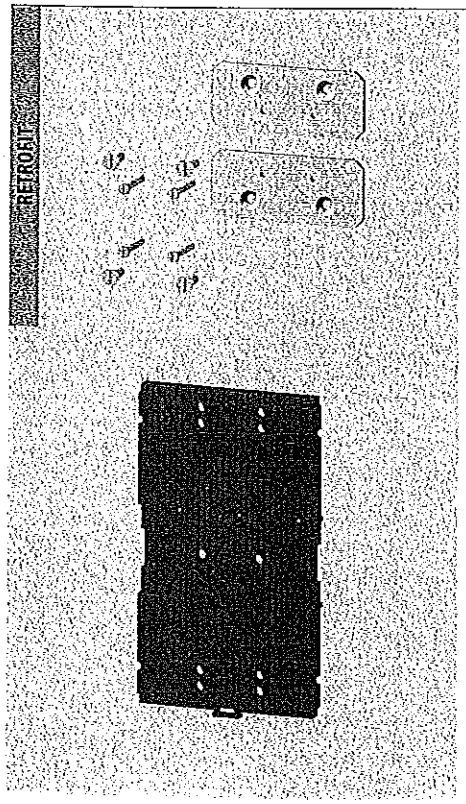
CS-BC-PS41	36030	Potential terminals	1,5÷2,5/4÷6	Cu flexible conductor	0.005	1

- TECHNICAL INFORMATION, see page D18

MOUNTING SETS

3P 4P

RETROFIT



Type	Product code	Description	Weight [kg]	Package [set]
OD-BC-MS33	20625	Reduction for BA...*33	0.13	1

- for total replacement of BA...*33 circuit breaker 2 connecting sets CS-BC-A033 are necessary

OD-BC-DIN1	20238	For mounting on „U" rail according to EN 60715 wide 35 mm	0.05	1

- DIMENSIONS, see page D29

[2] - one set provides for replacing one circuit breaker (set includes coupling elements necessary to assemble circuit breaker and mounting set)

RETROFIT - sets, which enable replacement of older circuit breakers by a new circuit breakers without switchboard reconstruction

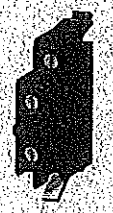
SWITCHES

3P

Auxiliary - signal state of the main contacts

Type	Product code	Operating voltage	Contacts	Weight [kg]	Package
PS-BC-0010	20227	60 ÷ 250 V a.c./d.c.		0.01	1
PS-BC-0010-Au	20228	5 ÷ 60 V a.c./d.c.		0.01	1

- TECHNICAL INFORMATION, see page D45



Signal - signal tripping of circuit breaker by overcurrent release

Type	Product code	Description	Contacts	Weight [kg]	Package
NS-BC-0010	20225	60 ÷ 250 V a.c./d.c.		0.01	1
NS-BC-0010-Au	20226	5 ÷ 60 V a.c./d.c.		0.01	1

- TECHNICAL INFORMATION, see page D45

SHUNT TRIPS

3P

Type	Product code	Operating voltage	Weight [kg]	Package
SV-BC-X024	20233	24, 48 V a.c./d.c.	0.05	1
SV-BC-X110	20234	110, 230 V a.c./110, 220 V d.c.	0.05	1
SV-BC-X230	20235	230, 400 V a.c./220 V d.c.	0.05	1

- TECHNICAL INFORMATION, see page D46

UNDERVOLTAGE RELEASES

3P

Type	Product code	Operating voltage	Description	Weight [kg]	Package
SP-BC-X024	20229	24, 48 V a.c./d.c.		0.05	1
SP-BC-X110	20231	110, 230 V a.c./110, 220 V d.c.		0.05	1
SP-BC-X230	20232	230, 400 V a.c./220 V d.c.		0.05	1

- TECHNICAL INFORMATION, see page D47

DELAY UNIT

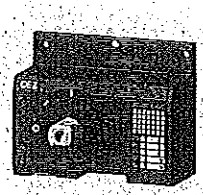
Type	Product code	Description	Weight [kg]	Package
BZ-BX-X230-A	36696	- enables to delay the undervoltage release tripping of circuit breakers Modeion	0.12	1

- the delay can be set up at three levels (according to wiring)

- TECHNICAL INFORMATION, see page P2

HAND DRIVES

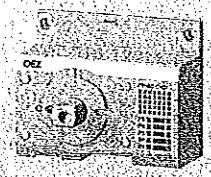
3P 4P



Type	Product code	Name - description		Weight [kg]	Package [pc]
RP-BC-CK10	20560	Hand drive unit	- without locking	0.08	1
RP-BC-CK20	20593	Hand drive unit	- with locking	0.08	1

- TECHNICAL INFORMATION, see page D48

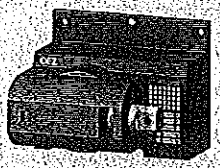
Hand drive unit must be fitted with:
- for control on the circuit breaker - hand drive lever RP-BC-CP..
- for control on the switchboard door - extension shaft RP-BC-CH..
- hand drive bearing RP-BC-CN..
- hand drive lever RP-BC-CP..



RP-BC-CK21	20594	Hand drive unit - yellow	- with locking	0.08	1

- TECHNICAL INFORMATION, see page D48

Hand drive unit must be fitted with:
- for control on the switching unit - hand drive lever RP-BC-CP..
- for control on the switchboard door - extension shaft RP-BC-CH..
- hand drive bearing RP-BC-CN..
- hand drive lever RP-BC-CP..



RP-BC-CK30	20595	Hand drive unit for right side control	- without locking	0.14	1
RP-BC-CK31	20596	Hand drive unit left side control	- without locking	0.14	1

- TECHNICAL INFORMATION, see page D48

Hand drive unit must be fitted with: with the extension shaft RP-BC-CH.., with the hand drive bearing RP-BC-CN.., with the hand drive lever RP-BC-CP..

RP-BC-CP10	20561	Hand drive lever - black	- without locking	0.02	1
RP-BC-CP20	20562	Hand drive lever - black	- with locking	0.02	1

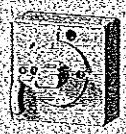
- TECHNICAL INFORMATION, see page D48

RP-BC-CP21	20597	Hand drive lever - red	- with locking	0.02	1

- TECHNICAL INFORMATION, see page D48

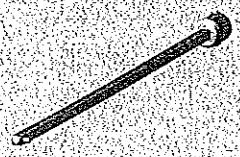
RP-BC-CN10	20564	Hand drive bearing	- degree of protection IP40	0.05	1
RP-BC-CN20	20565	Hand drive bearing	- degree of protection IP66	0.05	1

- TECHNICAL INFORMATION, see page D48
- is used in combination with the black lever of RP-BC-CP10 or RP-BC-CP20 hand drive



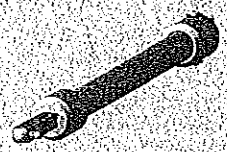
RP-BC-CN11	20598	Hand drive bearing - yellow	- degree of protection IP40	0.05	1
RP-BC-CN21	20599	Hand drive bearing - yellow	- degree of protection IP66	0.05	1

- TECHNICAL INFORMATION, see page D48
- is used in combination with the red lever of RP-BC-CP21 hand drive



RP-BC-CH10	20563	Extension shaft	- length 350 mm	0.12	1

- TECHNICAL INFORMATION, see page D48

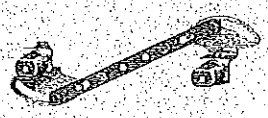


RP-BC-CH20	20600	Extension shaft	- telescopic, length 199 ÷ 352 mm	0.92	1

- TECHNICAL INFORMATION, see page D48

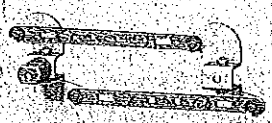
MECHANICAL INTERLOCKING AND PARALLEL SWITCHING

3P 4P



Type	Product code	Name	Weight [kg]	Package [pc]
RP-BC-CB10	20601	Mechanical interlocking	0.09	1

- TECHNICAL INFORMATION, see page D49
- Mechanical interlocking must be fitted with: 2 hand drive units RP-BC-CK.. (cannot be combined with hand drive unit for side control) 2 hand drive levers RP-BC-CP..

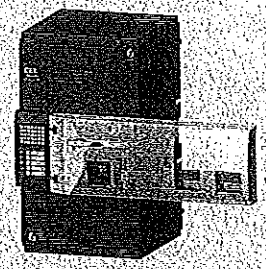


RP-BC-CD10	20602	Mechanical parallel switching	0.11	1

- TECHNICAL INFORMATION, see page D49
- Mechanical parallel switching must be fitted with: 2 hand drive units RP-BC-CK.. (cannot be combined with hand drive unit for side control) 1 hand drive lever RP-BC-CP..

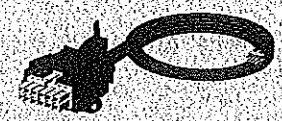
MOTOR DRIVES

3P 4P



Type	Product code	Name	Weight [kg]	Package [pc]
MP-BC-X024-B	34450	Motor drive side, 24 V a.c./d.c.	0.9	1
MP-BC-X048-B	34451	Motor drive side, 48 V a.c./d.c.	0.9	1
MP-BC-X110-B	34452	Motor drive side, 110 V a.c./d.c.	0.9	1
MP-BC-X230-B	34453	Motor drive side, 230 V a.c./d.c.	0.9	1

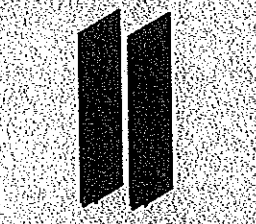
- TECHNICAL INFORMATION, see page D50



OD-BC-KA02-A	34454	Extension cable, length 0.6 m, for motor drive	0.1	1
OD-BC-KA02-B	37510	Extension cable, length 3 m, for motor drive	0.2	1

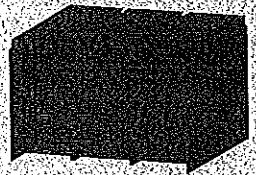
ACCESSORIES

3P 4P



Type	Product code	Name	Weight [kg]	Package [pc]
OD-BC-KS02	20224	Insulating barriers - set (two pieces), for 3P and 4P design	0.03	1
OD-BC-KS42	33660	Insulating barrier - one piece, for 4P design	0.02	1

- Included with each circuit breaker or switch-disconnector order
- In case connection is reversed (supply to terminals 2, 4, 6) it is necessary to install these barriers also on the lower side, for more detailed information see page D21



OD-BC-KS03	20240	Terminal cover - degree of protection IP20, for 3P	0.05	1
OD-BC-KS43	33661	Terminal cover - degree of protection IP20, for 4P	0.07	1

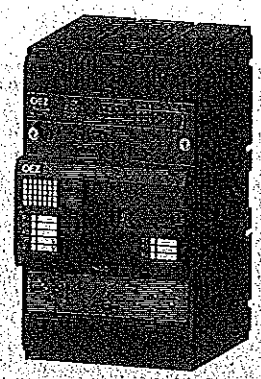
- increases degree of protection of connection point to IP20, e.g. when used with cable lugs

OD-BC-UP01	20241	Lever with locking	1

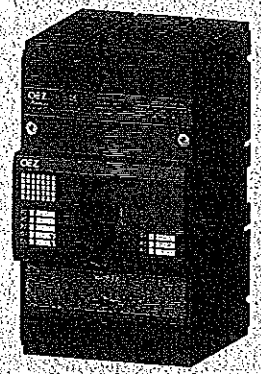
- enables to lock the circuit breaker/switch-disconnector in „switched off manually" position (loaded)
- locking is possible using padlock with shank diameter 3 ÷ 4 mm

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P 4P



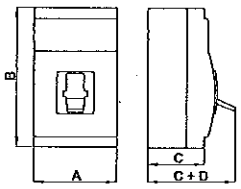
Circuit breaker



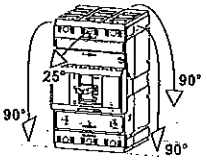
Switch-disconnector

Specifications

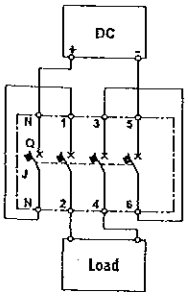
Type		CIRCUIT BREAKER BC160NT...	SWITCH-DISCONNECTOR BC160NT...V
Series		NORMAL	
Dimensions A x B x C + D (3P/4P design)		75/100x130x70+23mm	75/100x130x70+23mm
Weight (3P/4P design)		1/1.3 kg	1/1.3 kg
Standards		EN 60947-2, IEC 60947-2	EN 60947-3, IEC 60947-3
Approval marks		CE	CE
Number of poles		3, 4	3, 4
Rated current	I_n	16 ÷ 160 A [2]	-
Rated normal current	I_u	16 ÷ 160 A [2]	160 A
Rated operating current	I_e	-	160 A
Rated operating voltage	U_e	max. 690 V a.c. max. 250 V d.c. (3P) max. 440 V d.c. (4P)	max. 690 V a.c. max. 250 V d.c. (3P) max. 440 V d.c. (4P)
Rated frequency	f_n	50/60 Hz	50/60 Hz
Rated impulse withstand voltage	U_{imp}	8 kV	8 kV
Rated insulation voltage	U_i	690 V	690 V
Utilization category (selectivity)	690 V a.c.	A	
Utilization category (switching mode)		AC-3 (16 ÷ 100 A) AC-2 (125 ÷ 160 A) DC-22A	AC-23 A DC-22A
Rated short-time withstand current	I_{cw} / t	-	2 kA/ 1 s
Rated short-circuit ultimate breaking capacity (rms) [1]	I_{cu} / U_e	6 kA/690 V a.c. 12 kA/500 V a.c. 25 kA/415 V a.c. 40 kA/230 V a.c. 25 kA/250 V d.c. τ=max. 15 ms (3P) 20 kA/440 V d.c. τ=max. 15 ms (4P)	-
Off time at I_{cu}		7 ms	-
Rated short-circuit service breaking capacity (rms)	I_{cs} / U_e	3 kA/690 V a.c. 6 kA/500 V a.c. 13 kA/415 V a.c. 20 kA/230 V a.c. 13 kA/250 V d.c. τ=max. 10 ms (3P) 13 kA/440 V d.c. τ=max. 10 ms (4P)	-
Rated short-circuit making capacity (peak value)	I_{cm} / U_e	52 kA/415 V a.c.	2.8 kA/415 V a.c.
Losses per 1 pole at I_n = 160 A		15 W	15 W
Mechanical endurance		20 000 cycles	20 000 cycles
Electrical endurance (U_e = 415 V a.c.)		6 000 cycles	6 000 cycles
Switching frequency		120 cycles/hr	120 cycles/hr
Control force (3P/4P design)		55/65 N	55/65 N
Degree of protection from front side of the device		IP40	IP40
Degree of protection of terminals		IP20	IP20
Operating conditions			
Reference ambient temperature		40 °C	40 °C
Ambient temperature range		-40 °C ÷ +55 °C	-40 °C ÷ +55 °C
Working environment		dry and tropical climate	dry and tropical climate
Climatic resistance		EN 60068	EN 60068
Pollution degree		3	3
Max. sea level		2 000 m	2 000 m
Seismic resistance		3g (8 ÷ 50) Hz	3g (8 ÷ 50) Hz
Design modifications			
Front/rear connection		•/•	•/•
Plug-in design		–	–
Withdrawable design		–	–
Accessories			
Switches - auxiliary/relative/signal/early		•/–/•/–	•/–/•/–
Shunt trip/with signal switch		•/•	•/•
Undervoltage release/with early switch/with signal switch		•/–/•	•/–/•
Front hand drive/side drive right/left		•/•/•	•/•/•
Mechanical interlocking - with Bowden cable/for hand drive		–/•	–/•
Motor drive/with counter of cycles		•/–	•/–
Lever with locking		•	•



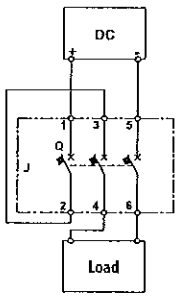
Dimensions



Installation positions



Connection of 3P circuit breaker in DC circuit up to 250 V d.c.



Connection of 4P circuit breaker in DC circuit up to 440 V d.c.

• available, – unavailable, + being prepared

[1] - in case circuit breaker connection is reversed (input terminals 2, 4, 6, output terminals 1, 3, 5) I_{cu} does not change

[2] - ranges of rated currents vary according to characteristics see page D37

- protection of Modeion switch-disconnectors, see page D

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

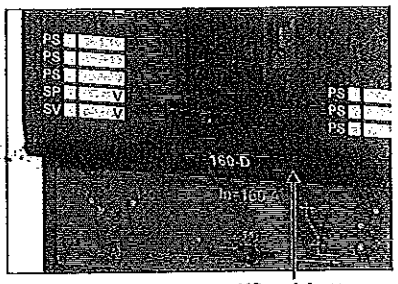
Specifications

Description of push button function and signalling

TEST push button - by pressing you will switch off the circuit breaker/switch-disconnector, including to actuate the auxiliary switches

Inspection push button - by pressing you will simulate tripping of the circuit breaker by the overcurrent release, including to actuate the auxiliary switches and signal switch. Pressing requires a suitable instrument, such as a wire with cross-section of about 1 mm.

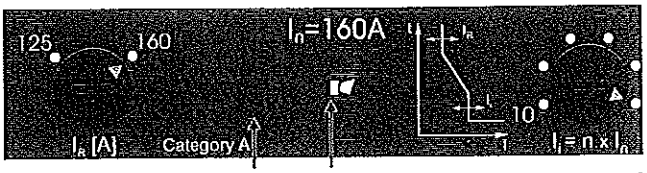
Signalling of tripping by the overcurrent release - after tripping of the circuit breaker by the overcurrent release, it will display the indicator „ "



TEST push button

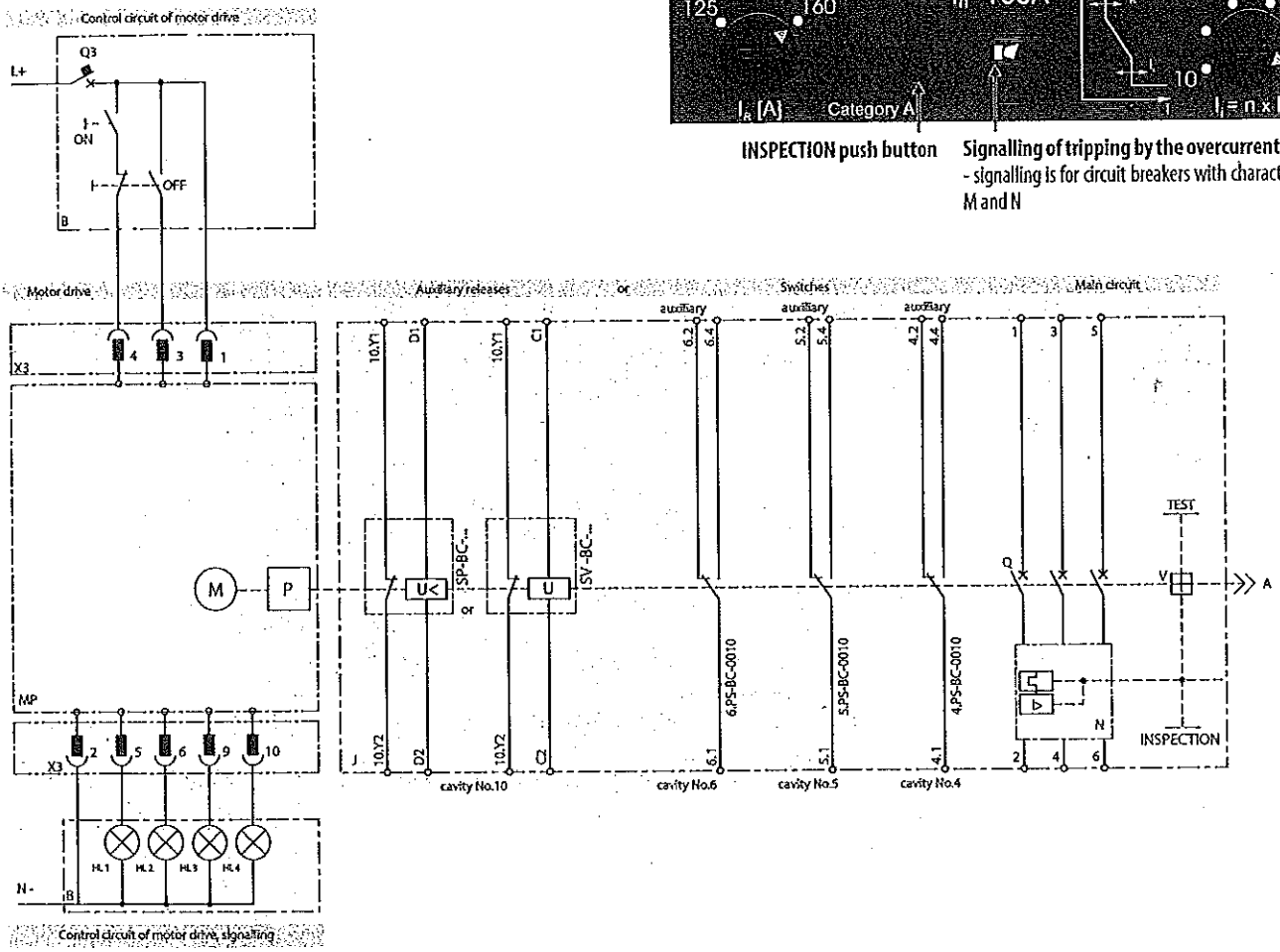
Diagram

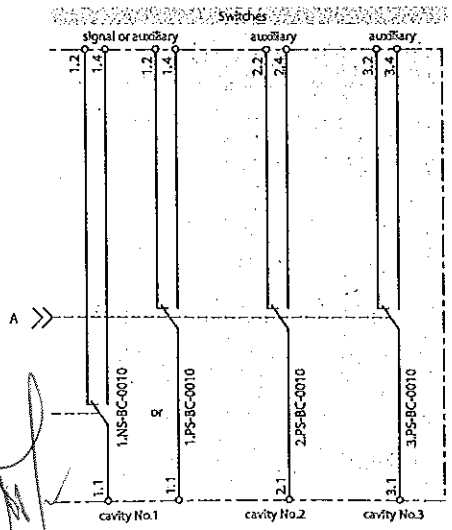
Circuit breaker with accessories (3-pole design)



INSPECTION push button

Signalling of tripping by the overcurrent rel
- signalling is for circuit breakers with characteris
M and N





Power losses (per 1 pole)

I [A]	P [W]
16	4
20	4
25	4
32	4
40	4
50	5
63	6
80	7
100	10
125	15
160	15

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

Diagram

Circuit breaker with accessories (4-pole design)

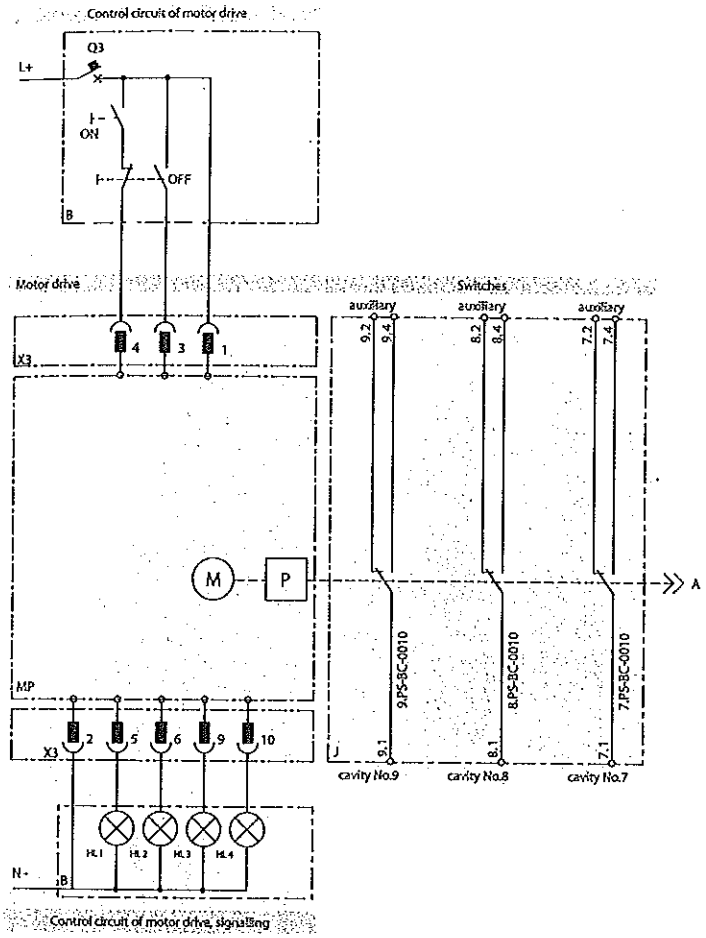
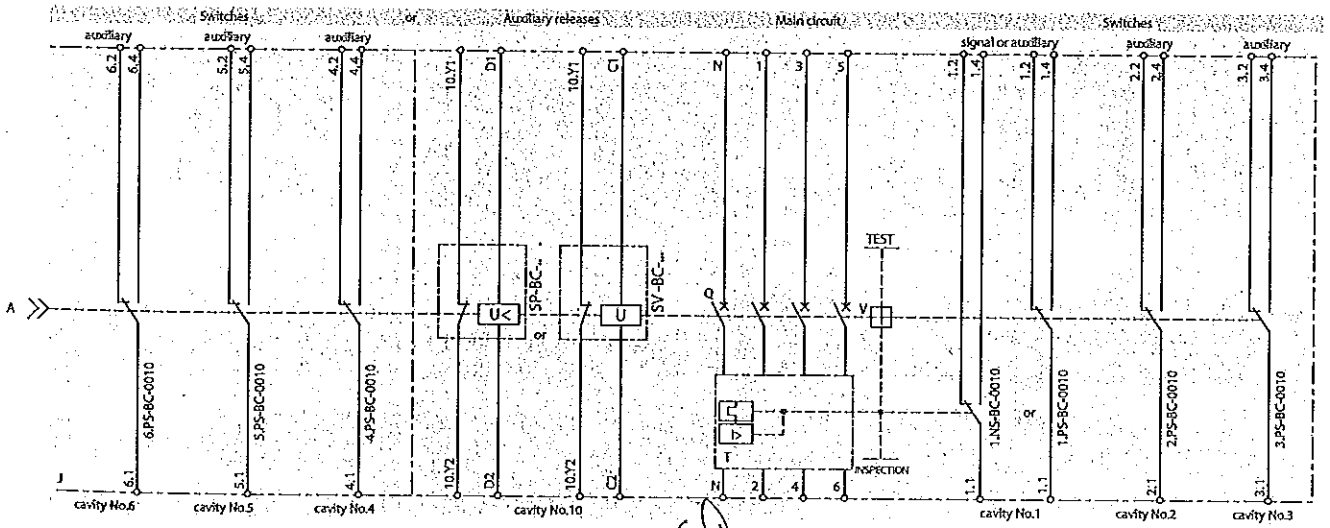


Diagram description

MP	motor drive - MP-BC...
M	motor
P	gear unit
X3	connector for connection of control and signalling circuits
B	recommended wiring of the control circuits - it is not a part of motor drive
ON	switch on button
OFF	switch off button
Q3	motor drive circuit breaker - see page D50
J	circuit breaker BC 160
Q	main contacts
T	thermomagnetic overcurrent release 3P+N (3 poles are protected, N pole is unprotected) 4P (all 4 poles are protected)
V	trip-free mechanism
TEST	push button to test release
REVIZE	inspection push button of release
SP-BC-X...	undervoltage release
SV-BC-X...	shunt trip
HL1	remote failure signalling (unreliable switching on or switching off), max. permissible load 10 W [1]
HL2	signalling of circuit breaker lever position „loaded", max. permissible load 10 W [1]
HL3	signalling of opening of the front safety cover of the drive, max. permissible load 10 W [1]
HL4	signalling of exsertion of the drive locking bar, max. permissible load 10 W [1]

[1] voltage on terminals 5, 6, 9, 10 is the same as U_s of the motor drive



CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

Specifications

Connecting and installation

Power circuit

- connected with Cu/Al busbars or cables and possibly cables with cable lugs
- connection sets are produced to provide greater connecting options, see page D10
- generally, conductors from the supply are connected to input terminals 1, 3, 5 and conductors from the load to terminals 2, 4, 6; however, it is possible to reverse the connection (exchanging input and output terminals without limiting rated short-circuit ultimate breaking capacity I_{cu})
- **in case of reversed connection, circuit breaker/switch-disconnector must be fitted with ODBL-KS02 insulating barriers also on the side of terminals 2, 4, 6, for more detailed information see page D21**
- we recommend painting the connecting busbars
- input and output conductors/busbars must be mechanically einforced in order to avoid transferring electrodynamic forces to the circuit breaker during short-circuiting
- the method of connecting the power circuit must observe the deionization space of the circuit breaker/switch-disconnector, see page D21

Auxiliary circuits

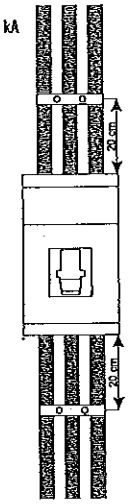
- switches, shunt trips or undervoltage releases are connected using flexible Cu conductors with cross-section 0.5 ÷ 1 mm² directly to terminals on these devices

Recommended minimum cross-sections of cables, busbars and flexibars

I_n (≤) [A]	Cables [mm²]		Busbars W x H [mm]	
	Cu	Al	Cu	Al
16	2,5	-	-	-
20	2,5	-	-	-
25	4	-	-	-
32	6	-	-	-
40	10	-	-	-
50	10	16	-	-
63	16	25	-	-
80	25	35	-	-
100	35	50	16 x 2; 12 x 3	16 x 4; 12 x 5
125	50	70	16 x 4; 12 x 5	16 x 5; 12 x 6
160	70	95	16 x 5; 12 x 6	16 x 6; 12 x 8

- it is necessary to follow the relevant valid standards when cables are designed

Mechanical reinforcement of conductors for BC



Connecting set specifications

Typ	In [A]	Cable values of connection cross-sections [mm²]				Busbars and cable lugs W x H	Technical information
		Type of cable: sector, stranded	sector, solid	round, stranded	round, solid		
CS-BC-B021	160	2x (25[1] ÷ 120)	2x (25 ÷ 120)	2x (25[1] ÷ 120)	2x (25 ÷ 120)		page D25
CS-BC-B421	160	2x (25[1] ÷ 120)	2x (25 ÷ 120)	2x (25[1] ÷ 120)	2x (25 ÷ 120)		page D31
CS-BC-A011	160					16 x ...	page D25
CS-BC-A411	160						page D31
CS-BC-A021	160					16 x ...	page D26
CS-BC-A421	160						page D32
CS-BC-PS01	10/16		1,5 ÷ 2,5 / 4 ÷ 6				
CS-BC-PS41	10/16		1,5 ÷ 2,5/4 ÷ 6				
CS-BC-A033	160	RETROFIT – reduction for circuit breaker BA...*33 with front connection				30 x ...	page D27
CS-BC-B014	160	5x (2,5 ÷ 25)	5x (2,5 ÷ 25)	5x (2,5 ÷ 25)	5x (2,5 ÷ 25)		page D26
CS-BC-B414	160	5x (2,5 ÷ 25)	5x (2,5 ÷ 25)	5x (2,5 ÷ 25)	5x (2,5 ÷ 25)		page D32

RETROFIT - sets, which enable replacement of older circuit breakers by a new circuit breakers without switchboard reconstruction

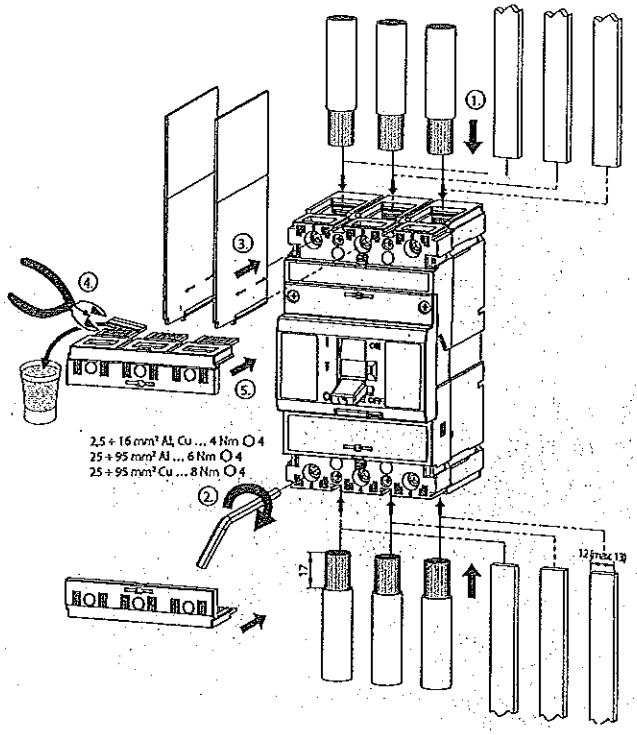
[1] stranded conductor with cross-sections 25 mm² ÷ 50 mm² only with end sleeve

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

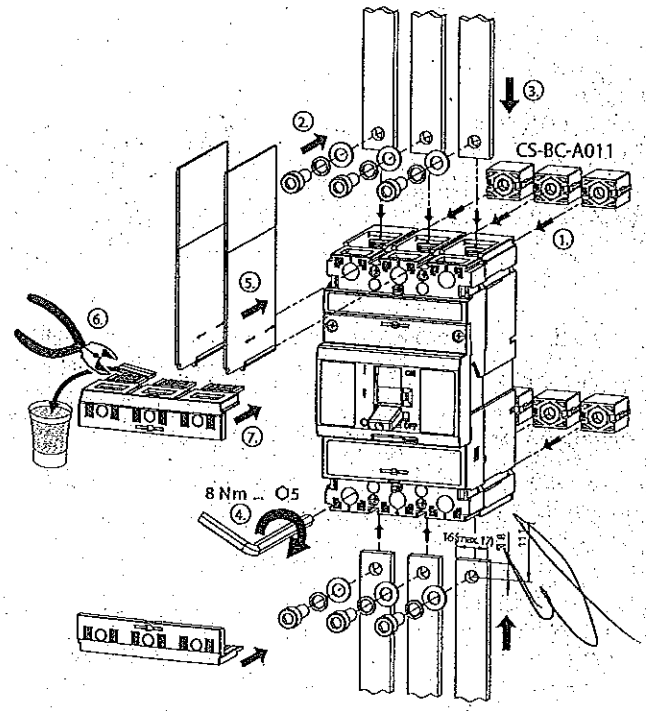
3P 4P

Connecting and installation

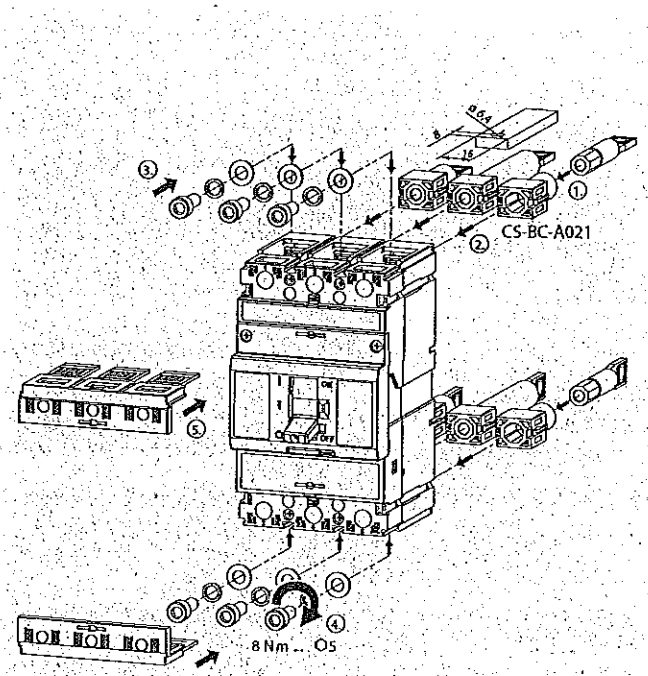
Front connection - Cu/Al cables, busbars (connecting set is a part of circuit breaker/switch-disconnector)



Front connection - Cu/Al busbars



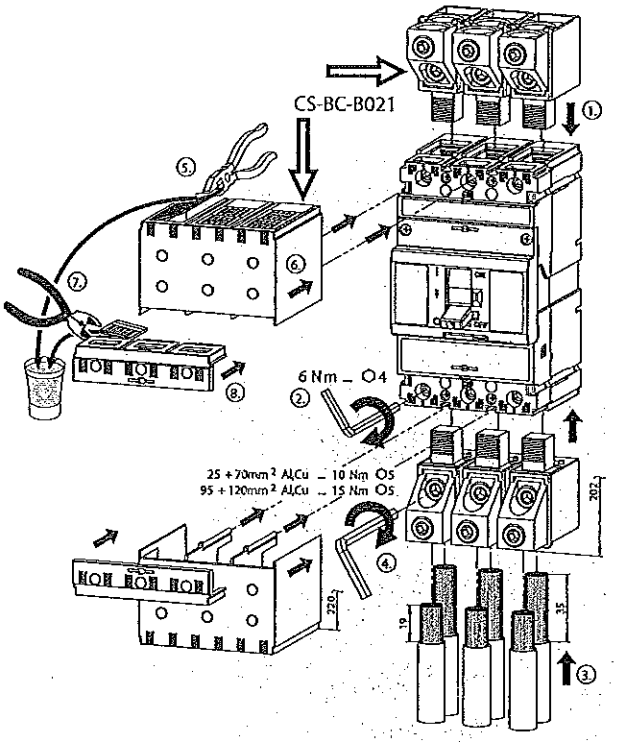
Rear connection - Cu/Al busbars



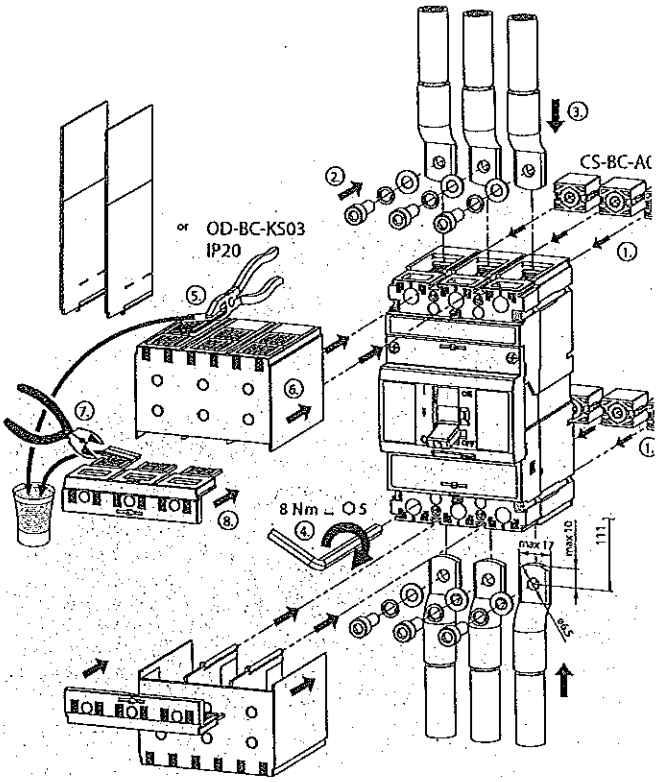
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Connecting and installation

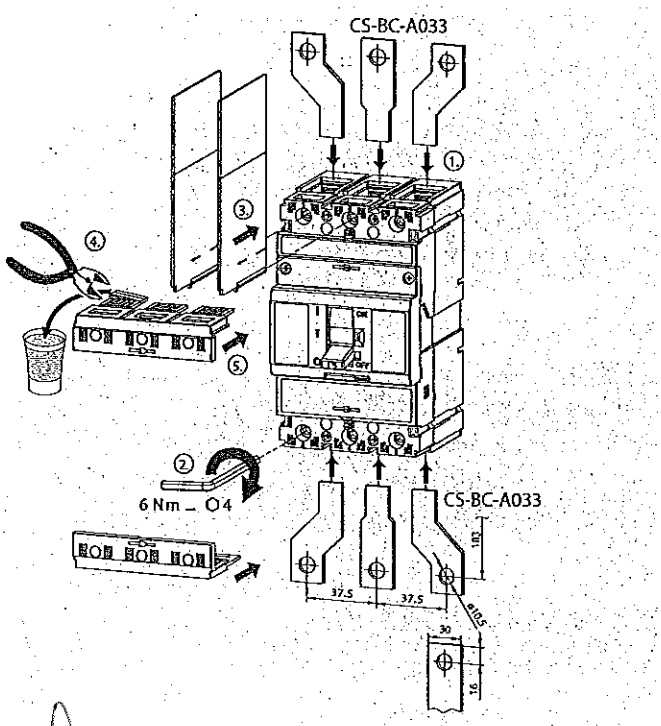
Front connection - 2x Cu/Al cables



Front connection - cable lugs



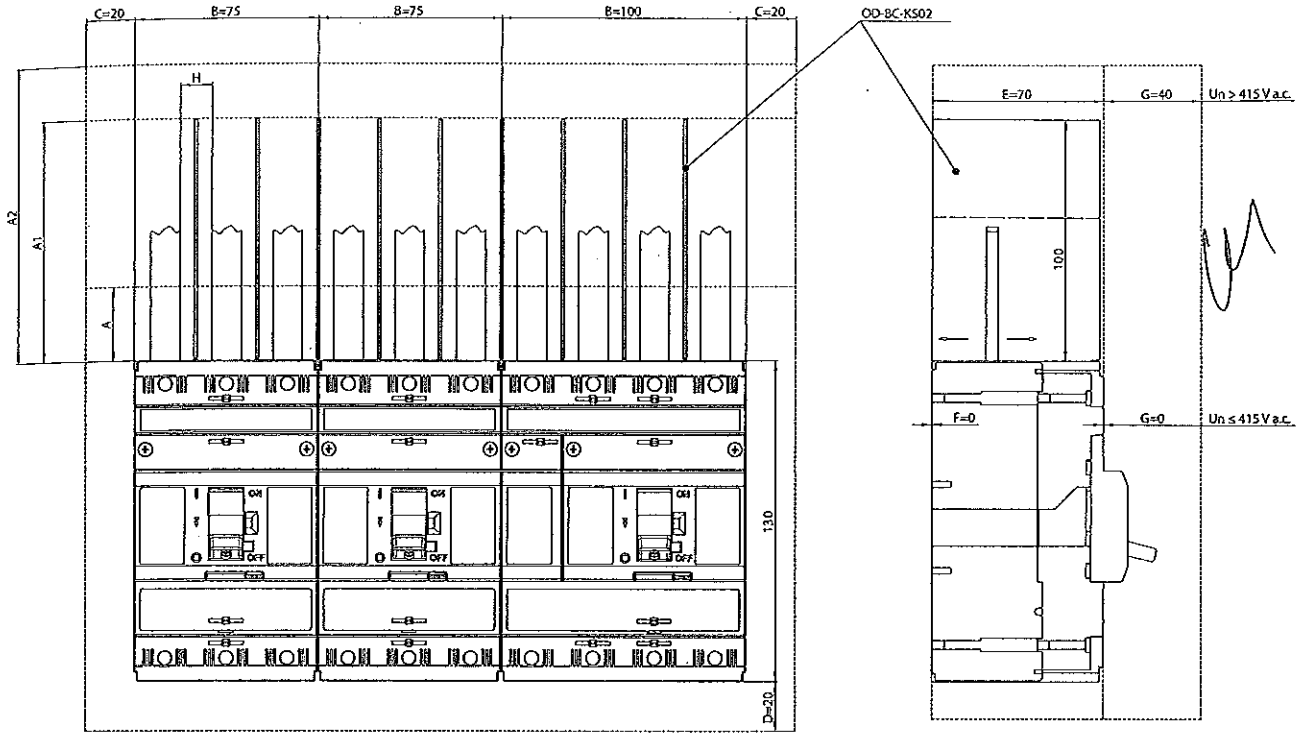
Front connection - reduction to BA...*33

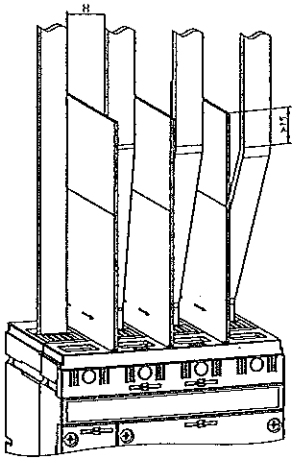


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P 4P

Deionization spaces





A...minimum distance between the circuit breaker/ /switch-disconnector and uninsulated earthed wall (applicable for connection using insulated conductors, cables, flexibars or with rear connection)

A1...minimum insulation length of bare conductors (using OD-BC-KS02 and OD-BC-KS42 insulating barriers from 50 mm to max. 100 mm, or by adding additional insulation for the conductors with barriers to obtain at least A1 value)

Reference	Dimension
A	50 mm
A1	100 mm
A2	150 mm
H	30 mm

A2...minimum distance:
- between the circuit breaker/switch-disconnector and uninsulated earthed wall (applicable for uninsulated conductors and busbars)
- between the circuit breaker/switch-disconnector and busbar
- between two circuit breakers/switch-disconnectors situated vertically above one another
- between uninsulated connections of two circuit breakers/switch-disconnectors above one another

C, D, E, F, G...minimum distance between the circuit breaker/switch-disconnector and uninsulated earthed wall

H...minimum distance between uninsulated conductors

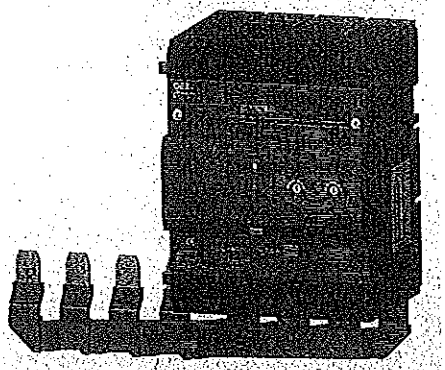
USE OF INSULATING BARRIERS AND TERMINAL COVERS WITH CIRCUIT BREAKERS AND SWITCH-DISCONNECTORS

FIXED DESIGN

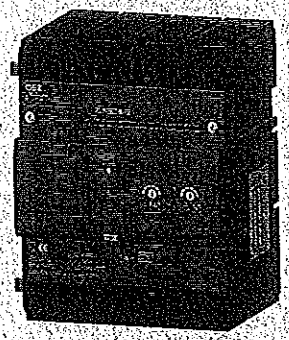
- front connection
  - terminals N, 1, 3, 5 - it is always necessary to use OD-BC-KS02 and OD-BC-KS42 insulating barriers or OD-BC-KS03 and OD-BC-KS43 terminal cover (when using CS-BC-B421 connections sets for connecting circuit breaker/switch-disconnector, the terminal cover is included in the connecting set)
  - terminals N, 2, 4, 6 - it is always necessary to use OD-BC-KS02 and OD-BC-KS42 insulating barriers or a OD-BC-KS43 terminal cover if circuit breaker/switch-disconnector is connected to the supply using terminals N, 2, 4, 6 (when using CS-BC-B421 connections sets for connecting circuit breaker/switch-disconnector, the terminal cover is included in the connecting set)
- rear connection - insulating barriers and covers need not be used

RESIDUAL CURRENT DEVICES

3P 4P



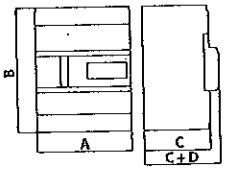
RCD-BC3-E...
RCD-BC4-E...



RCD-BC0-E...

Specifications

Type			RESIDUAL CURRENT DEVICE RCD-BC3-E... RCD-BC4-E...	RCD-BC0-E...
Dimensions A x B x C + D			100 x 130 x 70 + 10 mm	100 x 130 x 70 + 10 mm
Weight			1.7 kg	1.3 kg
Standards			EN 60947-2 IEC 60947-2	EN 60947-2 IEC 60947-2
Approval marks			CE	CE
Type			A	A
Number of poles			3; 4	3; 4
Rated current	I_n		63; 160 A	63; 160 A
Rated residual current	$I_{\Delta n}$	RCD-...-EF..	0,3 - fixed/	0,3 - fixed/
		RCD-...-EA..	/0,03; 0,1; 0,3; 0,5; 1,0; 3,0 A	/0,03; 0,1; 0,3; 0,5; 1,0; 3,0 A
Maximum inactivity time	$t_{\Delta n}$	RCD-...-EF..	0 - without delay/	0 - without delay/
		RCD-...-EA..	/0; 0,1; 0,2; 0,3; 0,5; 1,0 s	/0; 0,1; 0,2; 0,3; 0,5; 1,0 s
Rated voltage	U_n		440 V a.c.	440 V a.c.
Rated operating voltage	U_e		80 ÷ 253 V a.c./ /80 ÷ 440 V a.c.	80 ÷ 253 V a.c./ /80 ÷ 440 V a.c.
Rated impulse voltage	U_{imp}		6 kV	6 kV
Rated frequency	f_n		50/60 Hz	50/60 Hz
Losses per 1 pole			4 W	4 W
Mechanical/electrical endurance			8 000 cycles	8 000 cycles
Degree of protection from front side of the device			IP40	IP40
Degree of protection of terminals			IP20	IP20
Method of mounting			side	side
Installation on „U" rail			●	●
Use			circuit breaker BC160	circuit breaker BC160
Operating conditions				
Reference temperature			40 °C	40 °C
Ambient temperature range			-40 ÷ +55 °C	-40 ÷ +55 °C
Working environment			dry and tropical climate	dry and tropical climate
Pollution degree			3	3
Max. sea level			2 000 m	2 000 m
Seismic resistance			3g (8 ÷ 50) Hz	3g (8 ÷ 50) Hz
Accessories				
Connecting sets are part of delivery/have to be bought separately			●/–	–/●



Dimensions

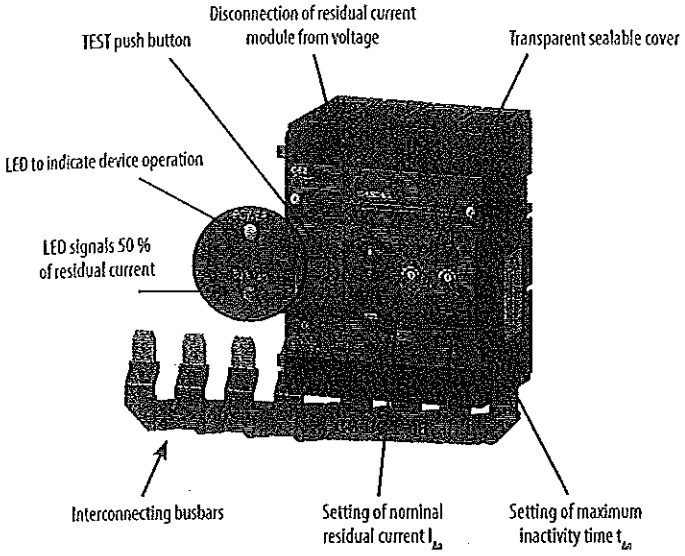
Description

- Designed to protect against leakage/residual current
- Accessories for BC160NT circuit breakers... - simple mounting on left side of the device
- Can be mounted on DIN rail by means of adapter
- Can be connected with the circuit breaker by interconnecting busbars (can be part of the device itself) or by standard cable
- Design according to the way of connection:
  - Version without interconnecting busbars (they are not a part of module)
    - Interconnecting busbars can be bought separately, see RCD connection
    - can be connected to the circuit breaker by a cable, see RCD connection (cable is not part of the module)
  - Version with interconnecting busbars
    - the interconnecting busbars for connection to the circuit breaker are part of the (module circuit breaker terminals N, 2, 4, 6 and module terminals N, 1, 3, 5 are connected)
- The circuit breaker is switched off by special shunt trip, that is part of the residual current module
- Design according to nominal current:
  - Version up to 63 A for BC160NT ...circuit breakers up to 63 A
  - Version up to 160 A for BC160NT ...circuit breakers from 80 up to 160 A
- Design according to the parameters setting:
  - Version with fixed residual current $I_{\Delta n}$ = 300 mA, without dela
  - Design with gradual setting of residual current $I_{\Delta n}$ and with setting of ultimate no action time of $t_{\Delta n}$ (see table)
  - When there is set $I_{\Delta n}$ = 0.03 A the delay is always 0 s !
- Setting can be sealed
- Module can be connected directly by means of CU/Al cable max. 95 mm²
- For other connection standard BC160 terminals with the exceptio of rear connection can be used
- LED to indicate device operation
- LED signals 50 % $I_{\Delta n}$
- Remote signalling of 50 % $I_{\Delta n}$ by means of make contact (or at RCD-BC-EA..)
- Remote signalling of circuit breaker switch off based on $I_{\Delta n}$ lev by means of break contact in shunt trip
- Mechanism for disconnection of electronic parts of module fro voltage - disconnection has to be done before the insulation resistan test is effected
- TEST push button - complete test of the device by means of simulati of real residual current
- Circuit breaker can not be assembled by another shunt trip undervoltage release
- Two circuit breakers with residual current module can be assembl neither by mechanical interlocking nor by parallel switching

RESIDUAL CURRENT DEVICES

3P 4P

Description

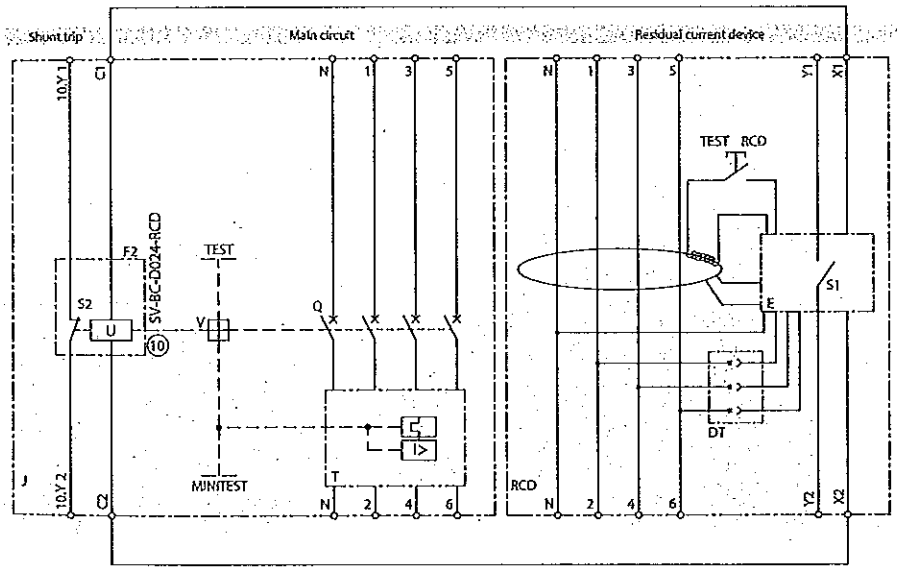


Signal contact specifications

		Signalling switch of switch off by a failure
Rated operating voltage	U_e	230 V a.c.
Rated insulation voltage	U_i	250 V
Rated impulse withstand voltage	U_{imp}	4 kV
Rated frequency	f_n	50/60 Hz
Rated operating current	I_e/U_e	2 A/ 230 V a.c.
Thermal current	I_{th}	6 A
Arrangement of contacts		01

		Signalling switch answering the value of 50 % $I_{\Delta n}$
Rated operating voltage	U_e	250 V a.c./ 30 V d.c.
Rated insulation voltage	U_i	250 V
Rated impulse withstand voltage	U_{imp}	6 kV
Rated frequency	f_n	50/60 Hz
Rated operating current	I_e/U_e	5 A/ 250 V a.c. 5 A/ 30 V d.c.
Thermal current	I_{th}	5 A
Arrangement of contacts		10

Wiring diagram



J	circuit breaker BC160
RCD	residual current device
Q	main contacts
V	trip-free mechanism
T	thermomagnetic overcurrent release
E	electronic of residual current device
TEST	push button to test release
MINITEST	inspection push button of release
TEST RCD	button of residual current module
S1	signalling of 50 % residual current value
S2	signalling switch of switch off by a failure
F2	shunt trip
DT	disconnection of residual current module from voltage

Total max. switching off time

	Maximum inactivity time, adjusted value					
	40 ms	100 ms	200 ms	300 ms	500 ms	1000 ms
$1x I_{\Delta n}$	< 70 ms	< 230 ms	< 350 ms	< 440 ms	< 630 ms	< 1 200 ms
$2x I_{\Delta n}$	< 40 ms	< 200 ms	< 320 ms	< 430 ms	< 620 ms	< 1 200 ms
$5x I_{\Delta n}$	< 40 ms	< 210 ms	< 310 ms	< 420 ms	< 630 ms	< 1 200 ms

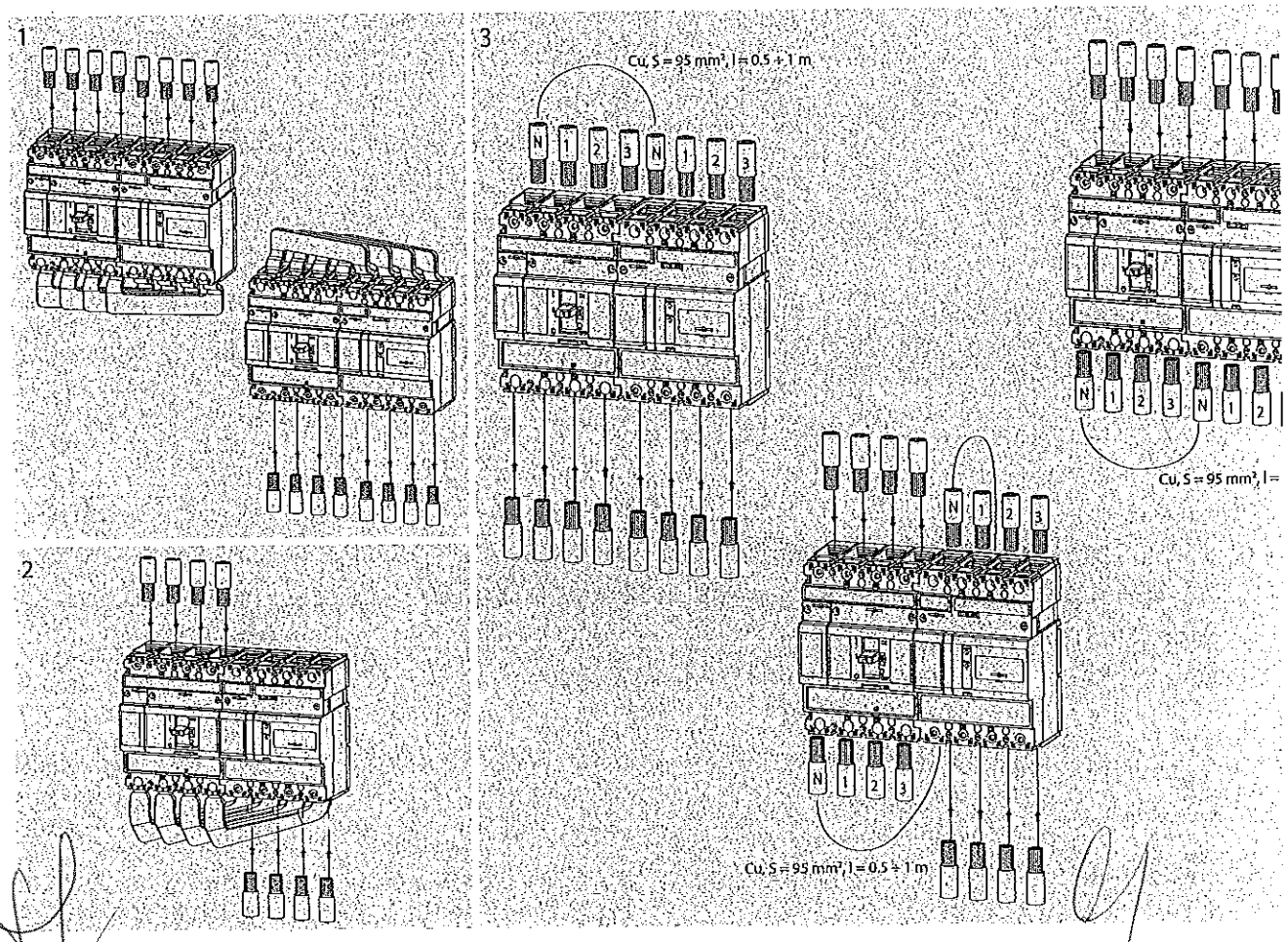
RESIDUAL CURRENT DEVICES

Connecting and installation

Reduction of rated current of circuit breaker according to connection type

Circuit breaker	Rated current of circuit breaker	Residual current device	Connection between circuit breaker and RCD	Inlet/outlet cables	Reduction coefficient (k*))	Adjusted current I_r	Real current I_r (t = 40 °C) [4] $I_n = I_r \times k$
BC160NT305-160-D BC160NT405-160-D BC160NT406-160-D BC160NT305-160-L BC160NT405-160-L BC160NT406-160-L	160 A	RCD-BC0-EF16 RCD-BC0-EA16	CS-BC-S016 [2] CS-BC-S416 [2]	Cu, 70 mm² [5]	0.9	160 A 125 A	144 A (160 x 0.90) 112.5 A (125 x 0.90)
		RCD-BC3-EF16 RCD-BC3-EA16	CS-BC-L016	Cu, 70 mm² [5]	0.95	160 A 125 A	152 A (160 x 0.95) 119 A (125 x 0.95)
		RCD-BC4-EF16 RCD-BC4-EA16	CS-BC-L416				
		RCD-BC0-EF16 RCD-BC0-EA16	CS-BC-S016 [2] CS-BC-S416 [2]	Cu, 95 mm² [5]	1	160 A 125 A	160 A 125 A
		RCD-BC3-EF16 RCD-BC3-EA16	CS-BC-L016	Cu, 95 mm² [5]	1	160 A 125 A	160 A 125 A
		RCD-BC4-EF16 RCD-BC4-EA16	CS-BC-L416				
			cable S = 95 mm² [6]	Cu, 70 mm² [5]	1	160 A 125 A	160 A 125 A

[1] - for others circuit breaker is reduction coefficient k = 1
[2] - connecting sets can be mounted on both upper/lower terminals
[3] - coefficients „k" are not dependent on ambient temperature
[4] - dependency of nominal current I_n on ambient temperature can be found in the catalogue, see page D37
[5] - length of cables 2 m is given by standard EN 60 947-1
[6] - cables length 0.5 up to 1 m
- In case of the connection of the fine stranged conductor, we recommend using of the end sleeve

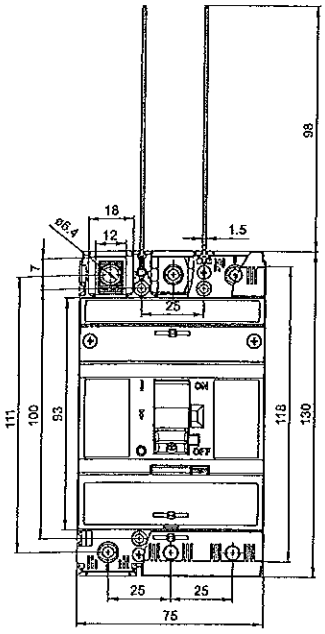


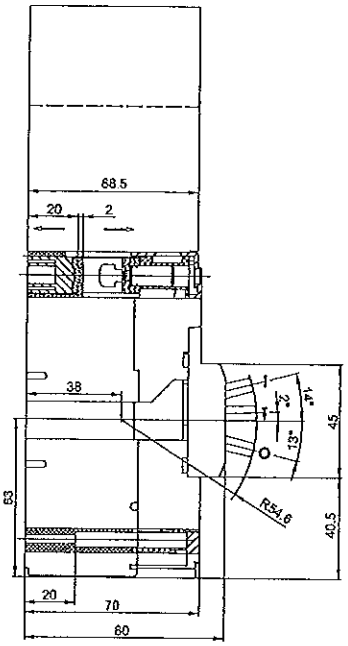
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

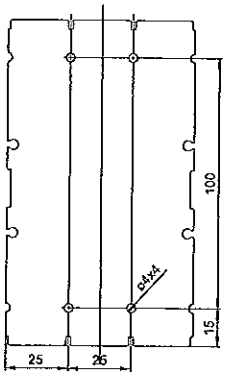
Dimensions

Fixed design, front connection

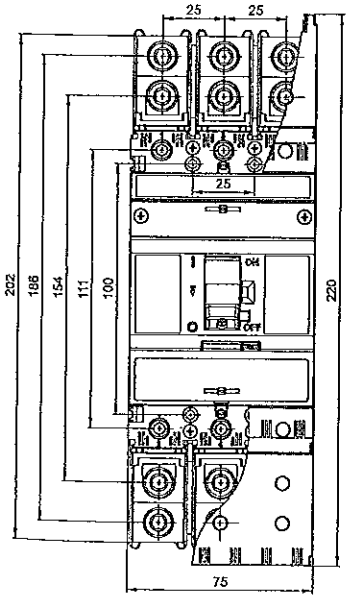


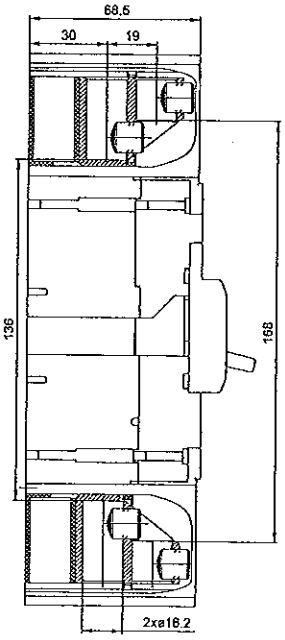


Drilling diagram



Fixed design, front connection (CS-BC-B021 connecting set)

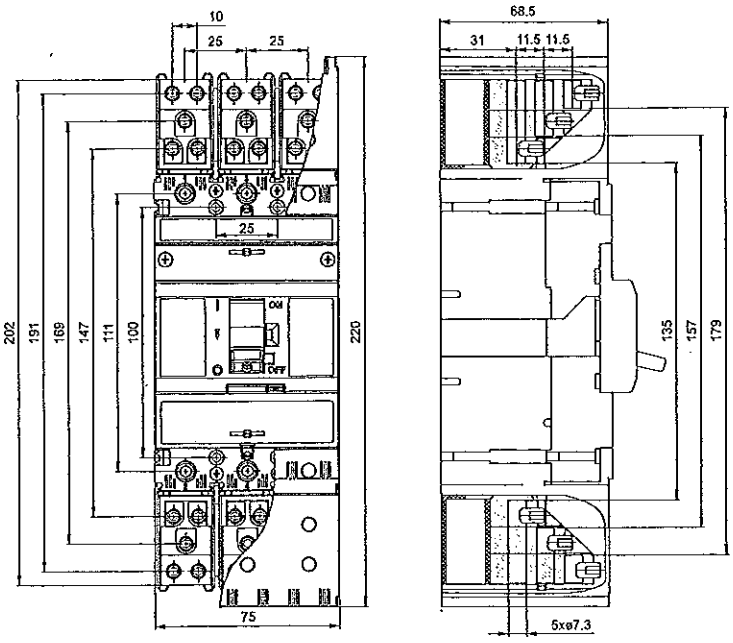




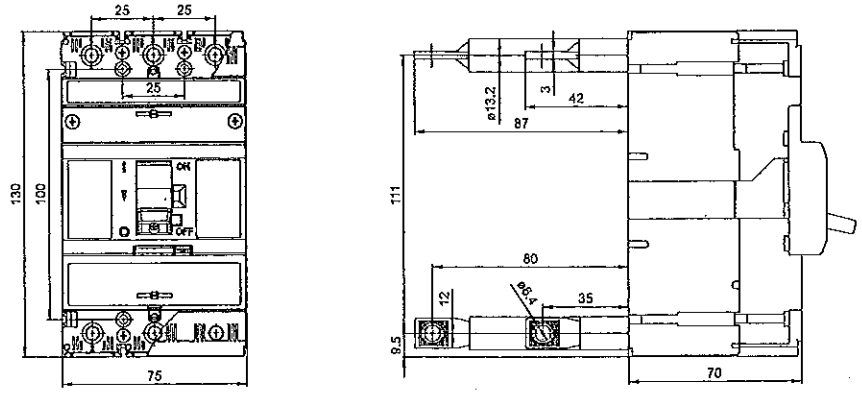
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

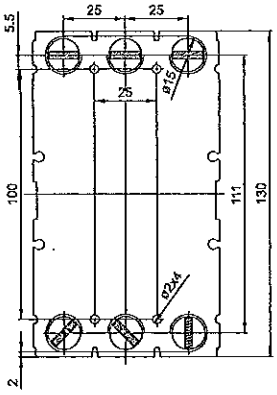
Fixed design, front connection (CS-BC-B014 connecting set)



Fixed design, rear connection (CS-BC-A021 connecting set)



Drilling diagram



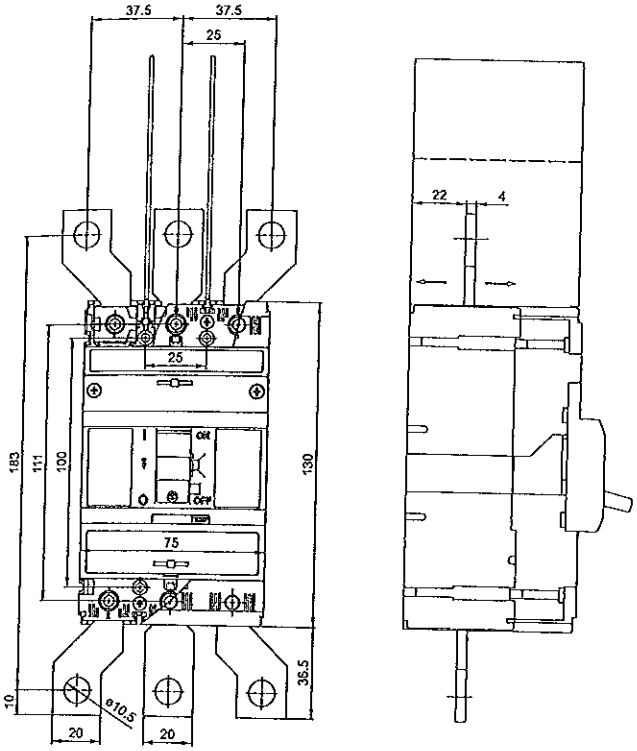
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

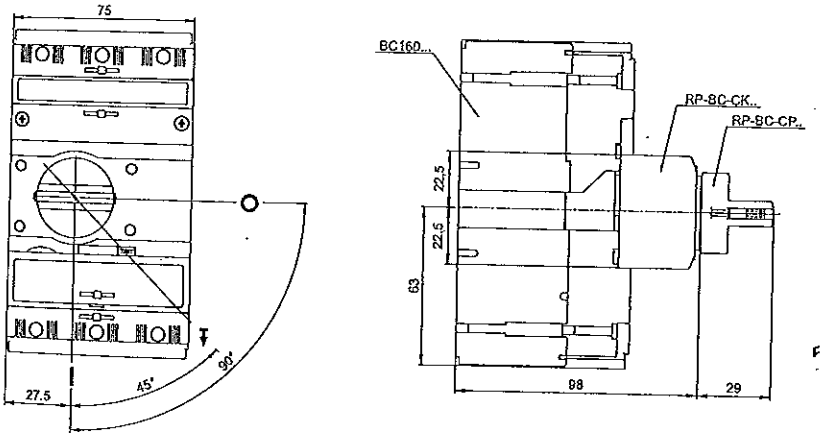
Dimensions

Fixed design, front connection (CS-BC-A033 connecting set)

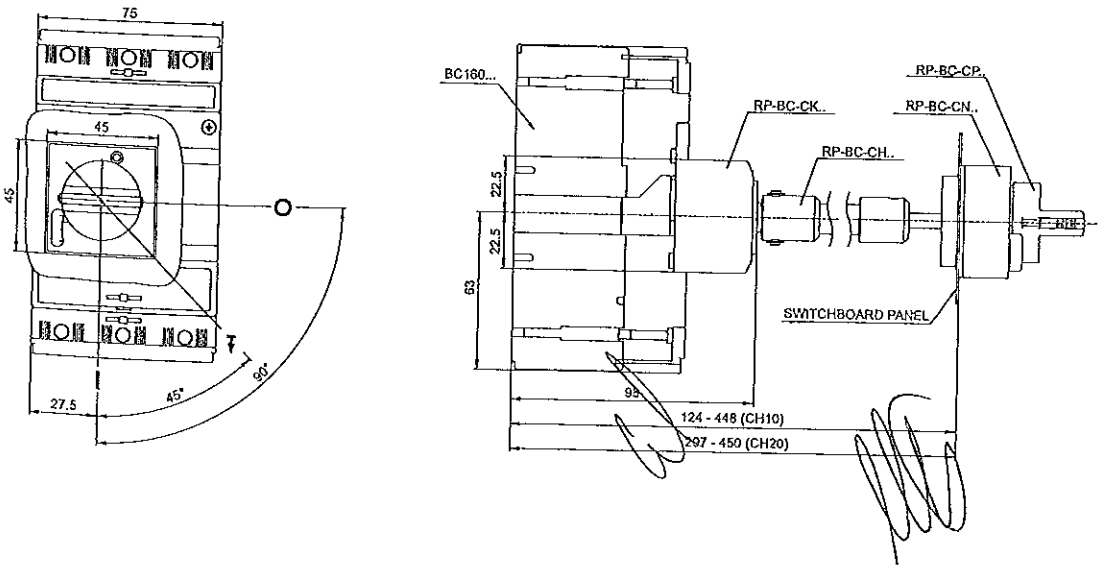
RETROFIT - reduction for BA...*33 circuit breaker



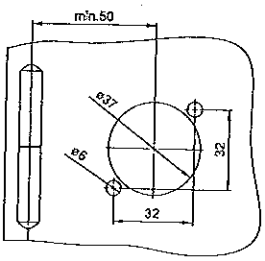
Fixed design, front hand drive



Fixed design, hand drive - front, with adjustable lever



Switchboard door modification

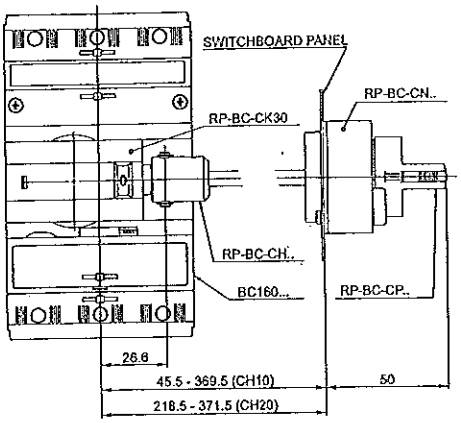


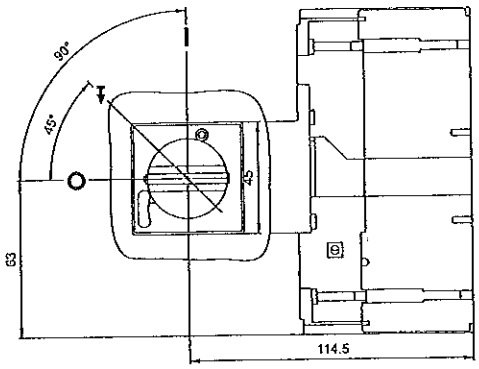
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

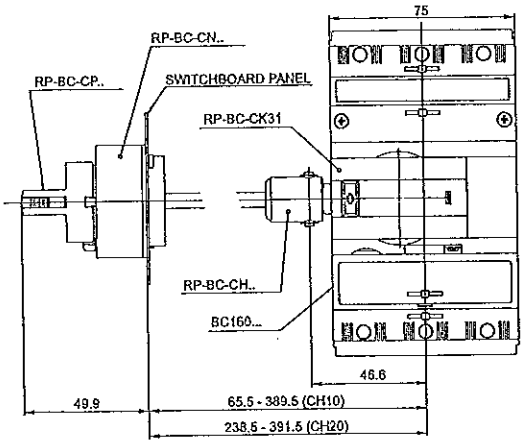
Dimensions

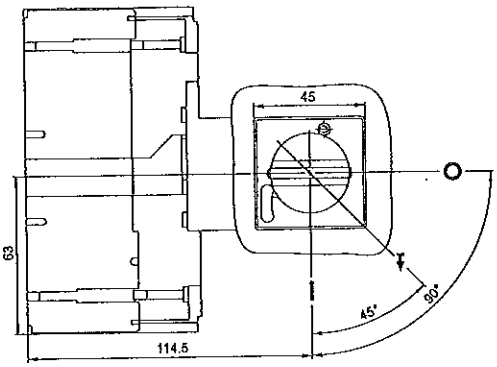
Fixed design, hand drive - control on right side, with adjustable lever



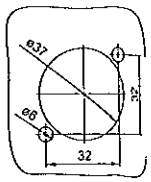


Fixed design, hand drive - control on left side, with adjustable lever

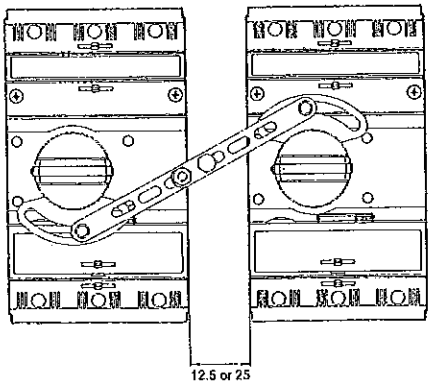


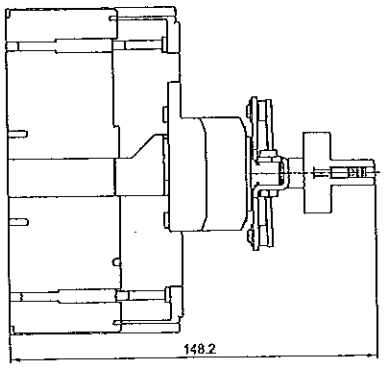


Switchboard modification



Fixed design, circuit breaker with RP-BC-CB10 mechanical interlocking



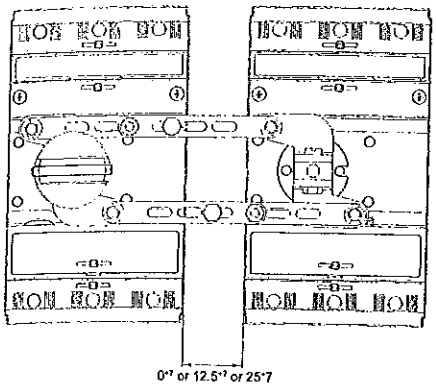


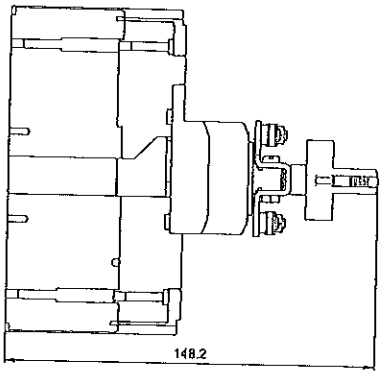
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

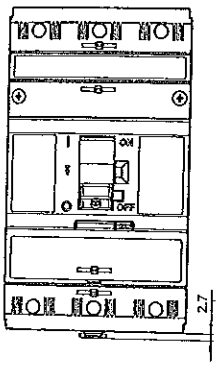
Dimensions

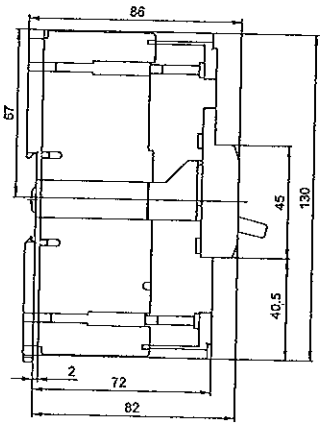
Fixed design, circuit breaker with RP-BC-CD10 mechanical parallel switching



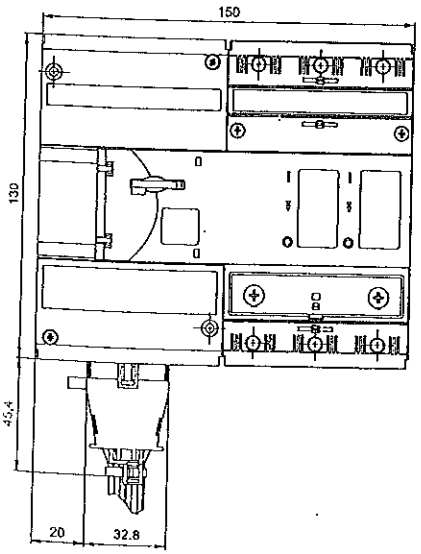


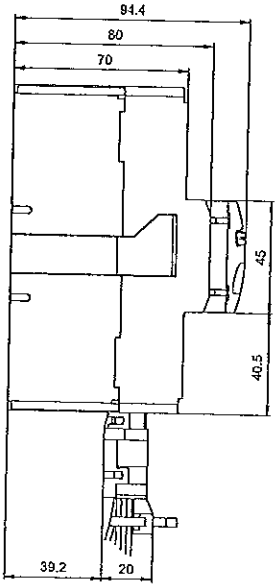
Fixed design, installation on 35 mm DIN rail



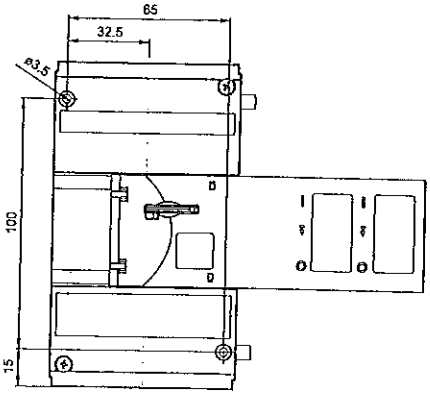


Fixed design, motor drive





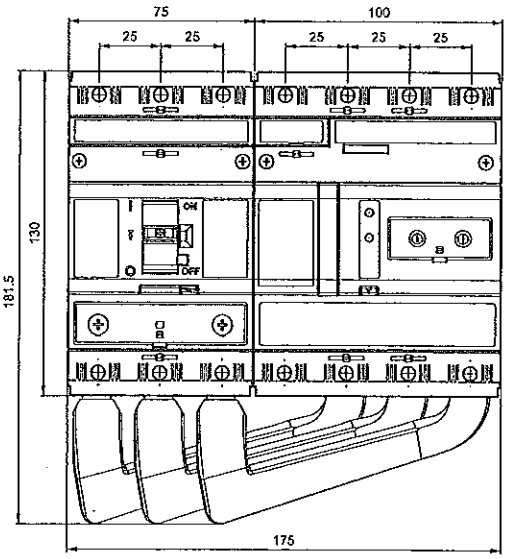
Drilling diagram

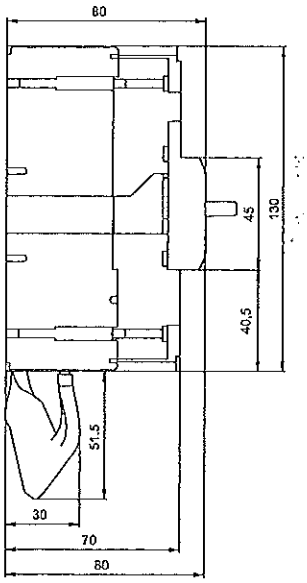


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

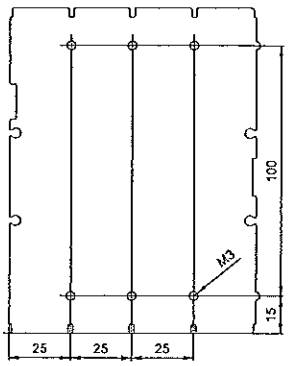
Dimensions

Fixed design, residual current device, rear connection

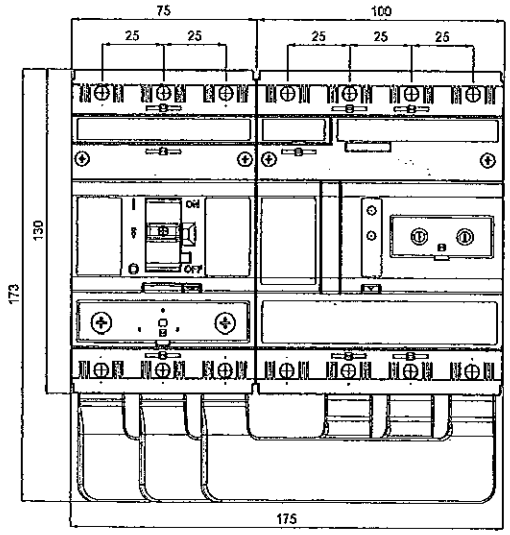


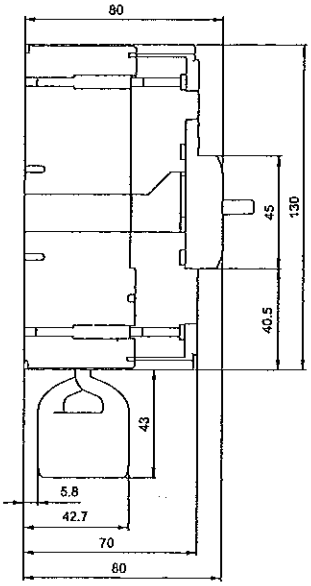


Drilling diagram



Fixed design, residual current device, bottom connection



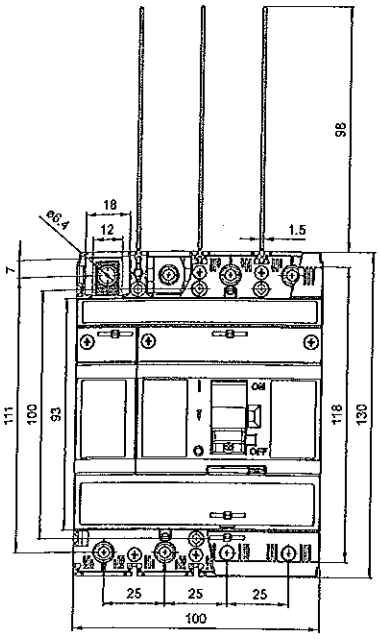


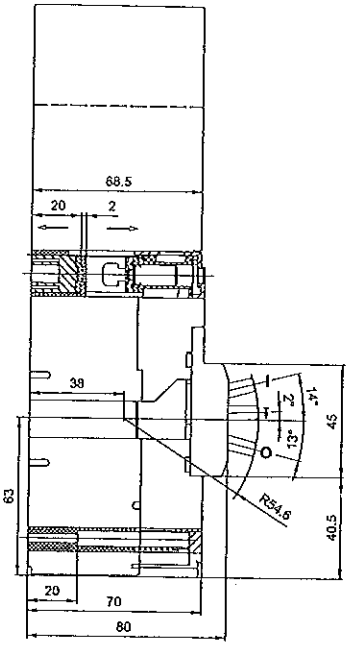
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

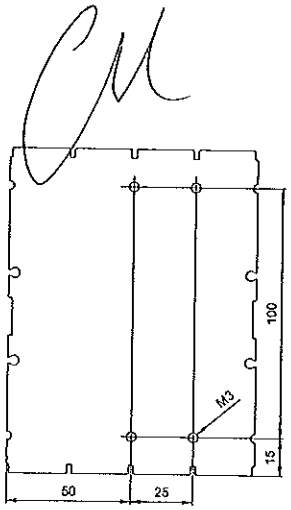
Dimensions

Fixed design, front connection

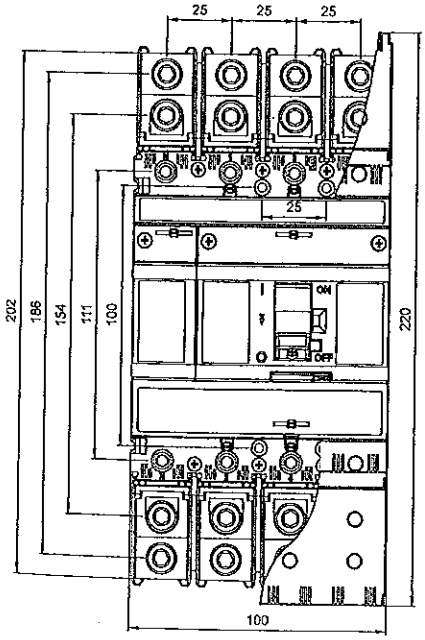


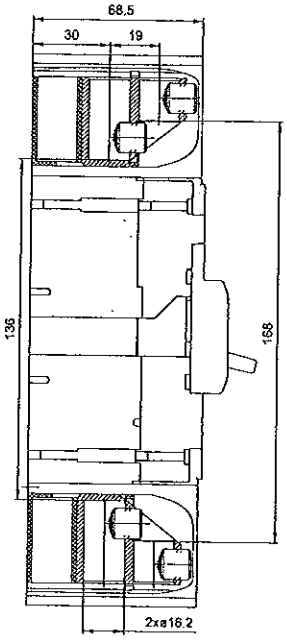


Drilling diagram



Fixed design, front connection (CS-BC-B421 connecting set)

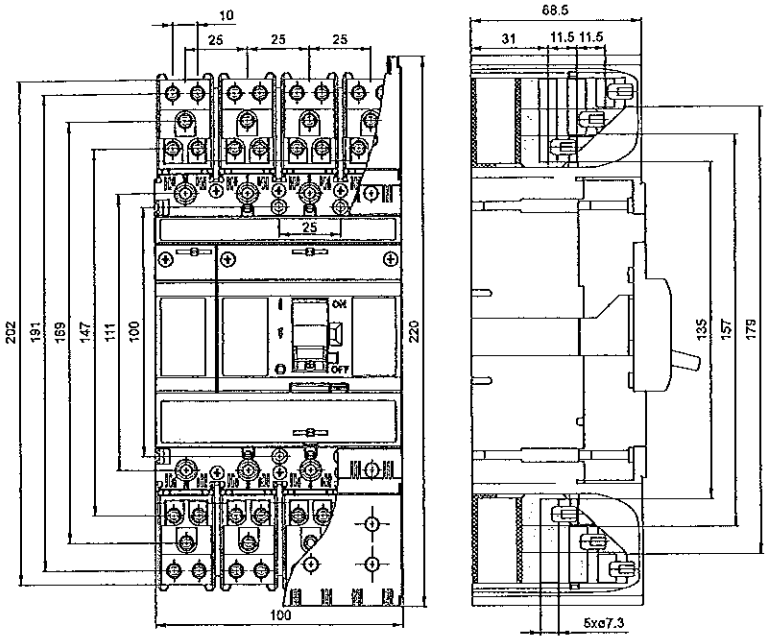




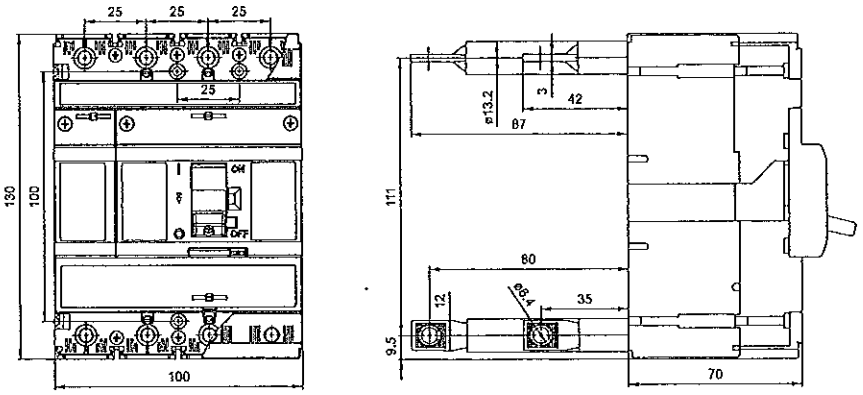
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

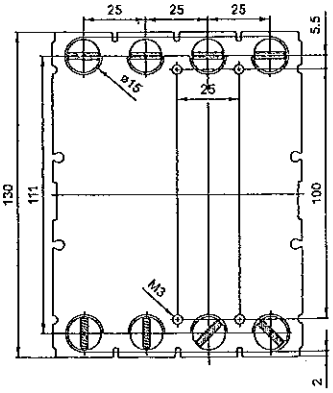
Fixed design, front connection (CS-BC-B414 connecting set)



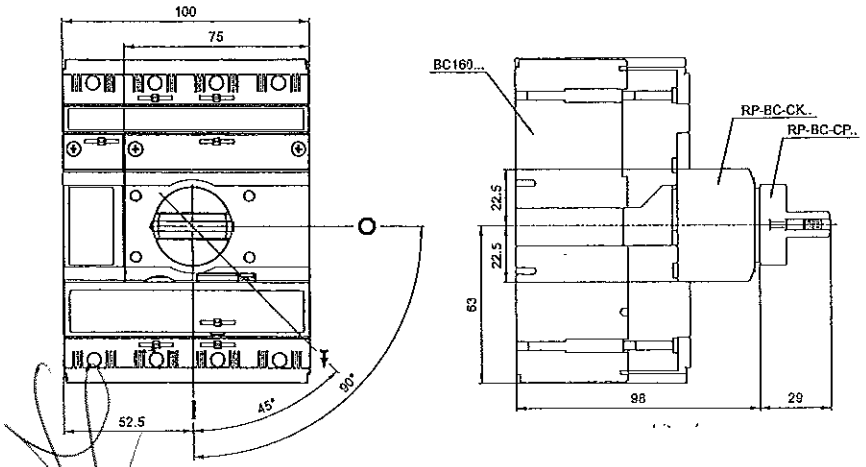
Fixed design, rear connection (CS-BC-A421 connecting set)



Drilling diagram



Fixed design, front hand drive

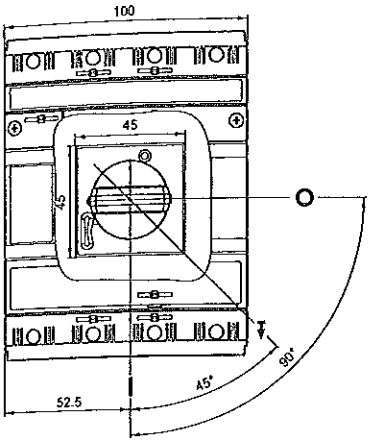


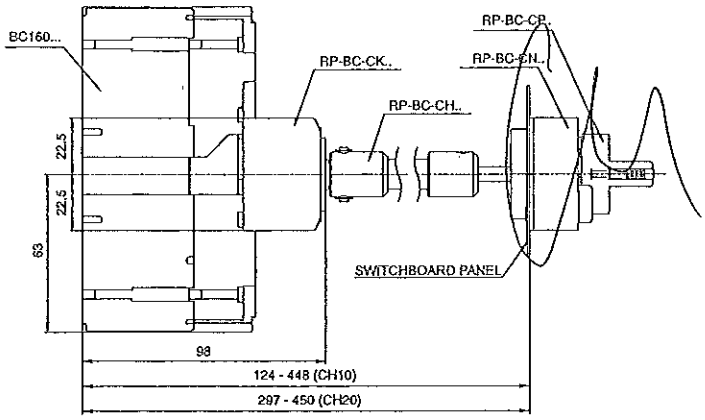
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

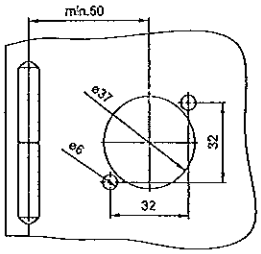
Dimensions

Fixed design, hand drive - front, with adjustable lever





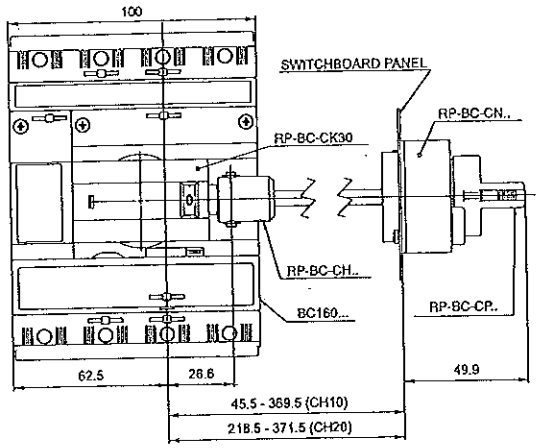
Switchboard door modification

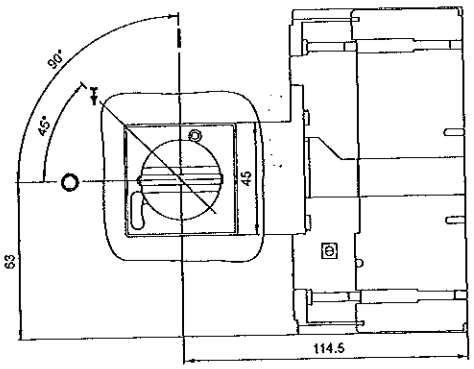


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

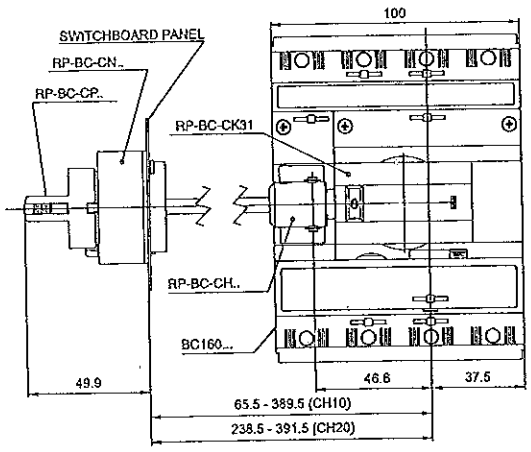
Dimensions

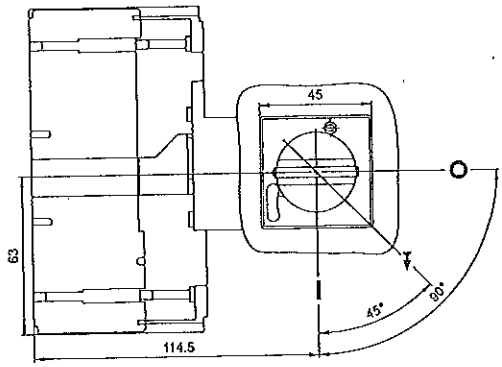
Fixed design, hand drive - control on right side, with adjustable lever



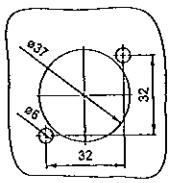


Fixed design, hand drive - control on left side, with adjustable lever





Switchboard modification

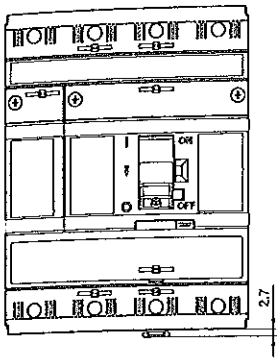


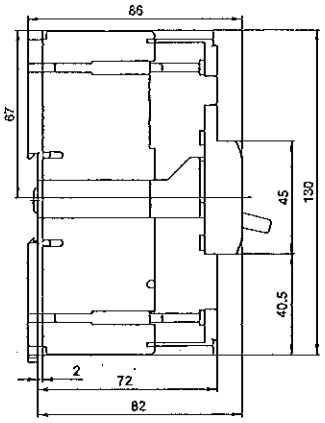
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

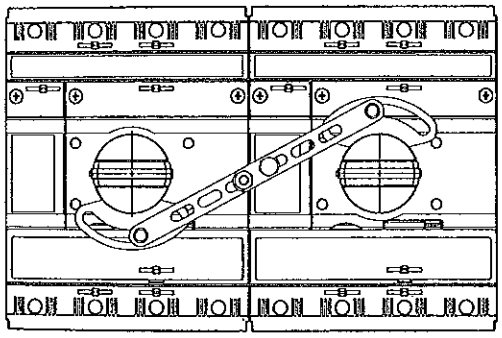
Dimensions

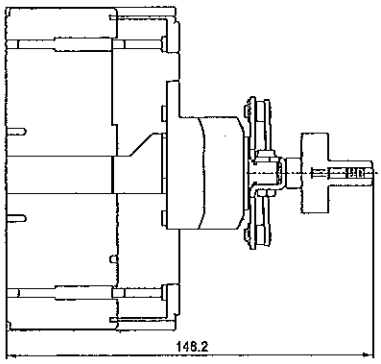
Fixed design, installation on 35 mm DIN rail



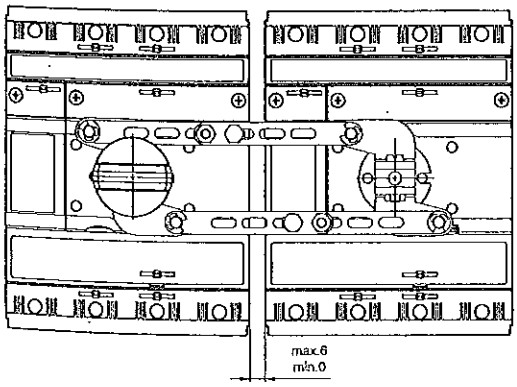


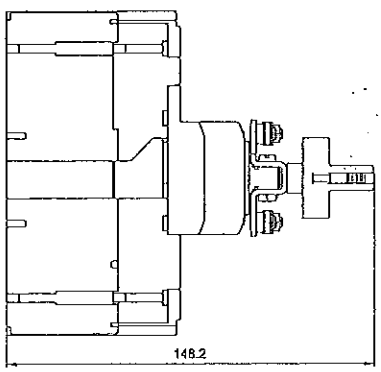
Fixed design, circuit breaker with RP-BC-CB10 mechanical interlocking





Fixed design, circuit breaker with RP-BC-CD10 mechanical parallel switching

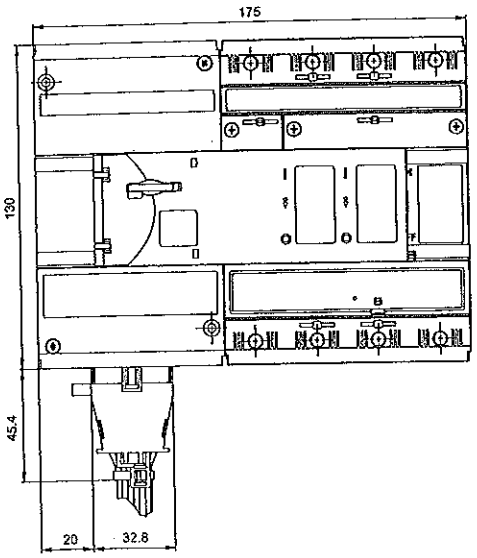


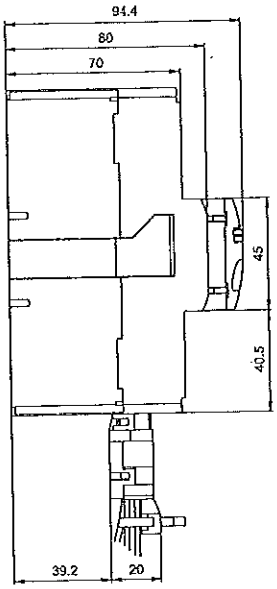


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

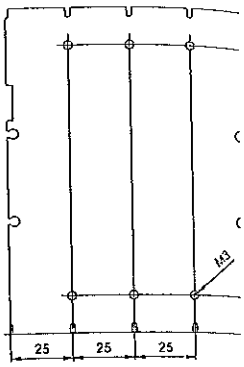
Dimensions

Fixed design, motor drive

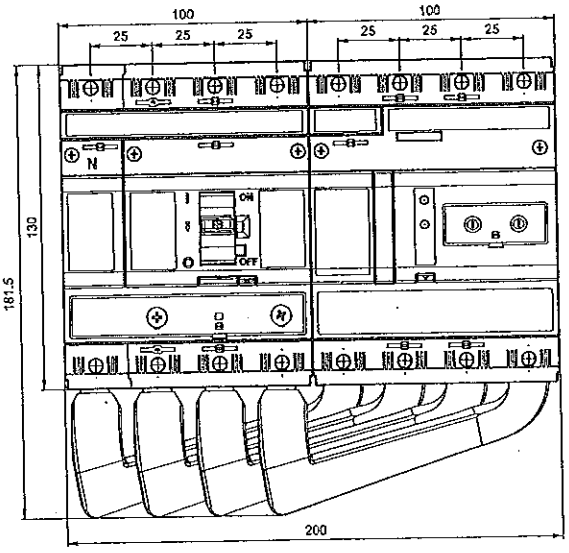


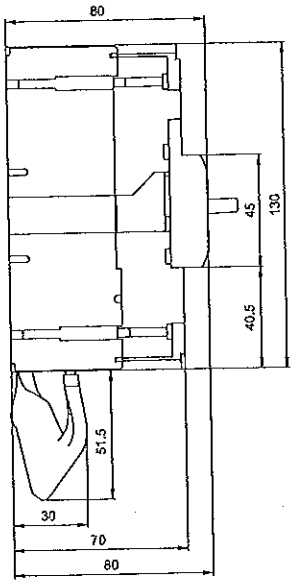


Drilling diagram

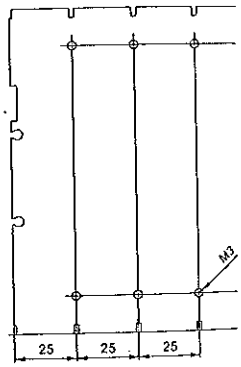


Fixed design, Residual current device, rear connection

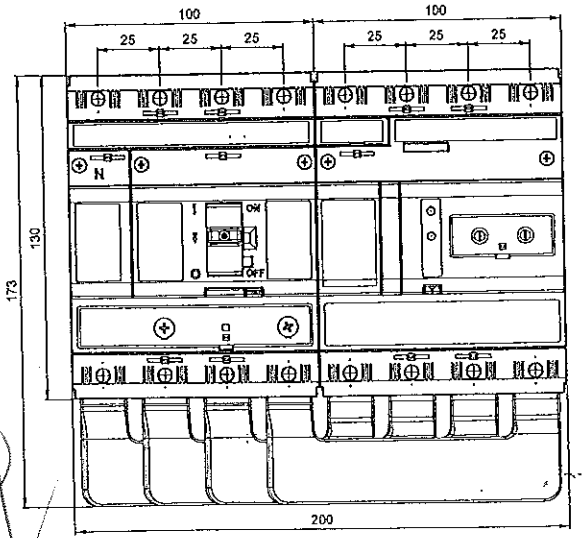


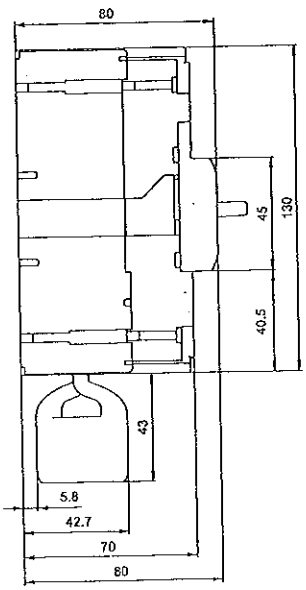


Drilling diagram



Fixed design, Residual current device, bottom connection





OVERCURRENT RELEASES

3P 4P

Overcurrent release is built into circuit breaker. Release cannot be demounted and exchanged.
4-pole circuit breakers are produced in variants:
3P+N (3 poles are protected, N pole is unprotected)
4P (all 4 poles are protected)
Permissible strength of N pole is 100 % I_n.

Tripping characteristics

Circuit breakers are supplied with four types of tripping characteristics.
They are designated with the letters:
„L" - lines (3P, 3P+N, 4P)
- protection lines with low starting currents
„D" - distribution (3P, 3P+N, 4P)
- protection lines and transformers
„M" - motor (3P, 3P+N, 4P)
- motors protection
„N" - only short-circuit release (3P, 4P)

■ BC160N circuit breakers with "L" characteristic have a given and fixed rated current value. The circuit breakers are produced with In values in a standardized series of currents 40 ÷ 160 A see table. Short-circuit release is fixed at the setting 4x In.
■ BC160 circuit breakers with "D" characteristic have the option of setting to a reduced current in a range of approximately 0.75÷1 I_n. The circuit breakers are produced with I_n values in a standardized series of currents 16 ÷ 160 A see table. Short-circuit release is adjustable. Adjustment values are given in the table.
■ BC160N circuit breakers with "M" characteristic have the option of setting to a reduced current in a range of approximately 0.75÷1 I_n. The circuit breakers are produced with I_n values in a standardized series of currents 16 ÷ 100 A see table. Short-circuit release is fixed at the setting 10x I_n. Circuit breakers are not produced in 4-pole design.
■ BC160N circuit breakers with "N" characteristic have only short-circuit release. They are produced with I_n values in a standardized series of currents from 32 A to 160 A. Short-circuit release is adjustable. Values are given in the table.

Circuit breaker designation is set according to the requested rated current and protection characteristics.
For example: Motors protection with $I_n = 32$ A.
Type designation will be BC160NT305-**32M**.

Tripping characteristic setting:

■ **dependent release (thermal) L** (for circuit breakers with characteristics „D" and „M"). Dependent release (reduced current value I_r) is being set in a continuous range using the I_r adjustment dial on the overcurrent release. The Ir adjustment range is 0.75 ÷ 1 I_n.
■ **Independent instantaneous release (short-circuit trip) I** (for circuit breakers with "D" and "N" characteristics). With an independent instantaneous release (short-circuit current value I_i), adjustment is possible in a continuous range. All values are given in the table.
■ **The value of short-circuit release in DC circuit**
In case that the circuit breaker is used in a DC circuit, it is necessary to set the value of the short-circuit release correctly. DC circuit the short-circuit release I_i (DC) = $I_i \times \sqrt{2}$

Rated currents in accordance with ambient temperature

I_n [A]	I_n			
55 °C	40 °C	20 °C	15 °C	
16	15	16	17	19
20	19	20	22	25
25	23	25	28	31
32	29	32	36	41
40	38	40	45	53
50	48	50	56	66
63	57	63	69	83
80	73	80	88	100
100	92	100	108	122
125	112	125	133	145
160	145	160	168	175

Ranges of overcurrent release and their possible setting at 40 °C

	BC160NT305-...-L			BC160NT305-...-D		BC160NT305-...-M		BC160NT305-...-N	
I_n [A]	I_r [A]	I_r [A]	I_r [A]	I_i [A]	I_i [A]	I_i [A]	I_i [A]	I_i [A]	I_i [A]
16	-	-	12.5 ÷ 16	160 ÷ 240	12.5 ÷ 16	160	-	-	
20	-	-	16 ÷ 20	200 ÷ 300	16 ÷ 20	200	-	-	
25	-	-	20 ÷ 25	250 ÷ 375	20 ÷ 25	250	-	-	
32	-	-	25 ÷ 32	160 ÷ 320	25 ÷ 32	320	-	160 ÷ 320	
40	40	160	32 ÷ 40	200 ÷ 400	32 ÷ 40	400	-	200 ÷ 400	
50	50	200	40 ÷ 50	250 ÷ 500	40 ÷ 50	500	-	250 ÷ 500	
63	63	252	50 ÷ 63	315 ÷ 630	50 ÷ 63	630	-	315 ÷ 630	
80	80	320	63 ÷ 80	400 ÷ 800	63 ÷ 80	800	-	400 ÷ 800	
100	100	400	80 ÷ 100	500 ÷ 1 000	80 ÷ 100	1 000	-	500 ÷ 1 000	
125	125	500	100 ÷ 125	625 ÷ 1 250	-	-	-	625 ÷ 1 250	
160	160	640	125 ÷ 160	800 ÷ 1 600	-	-	-	800 ÷ 1 600	

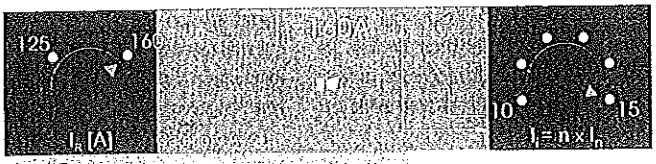
Tripping characteristic class

Tripping times of the overcurrent release of circuit breakers BC160 with characteristic M at 7.2 I_n corresponds to the release class 10 A, 10 and 20 according to EN 60947-4-1.

I_n	Type	Class
16	BC160NT305-16-M	10A
20	BC160NT305-20-M	10A
25	BC160NT305-25-M	10A
32	BC160NT305-32-M	10
40	BC160NT305-40-M	10
50	BC160NT305-50-M	20
63	BC160NT305-63-M	20
80	BC160NT305-80-M	20
100	BC160NT305-100-M	20

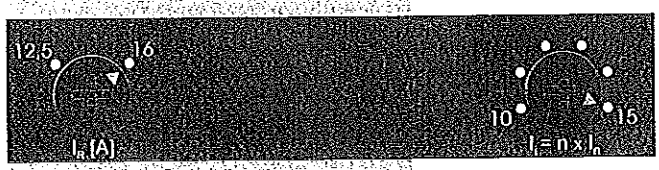
OVERCURRENT RELEASES - D

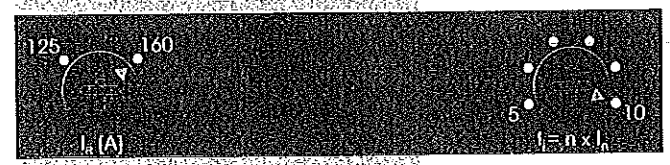
3P 4P

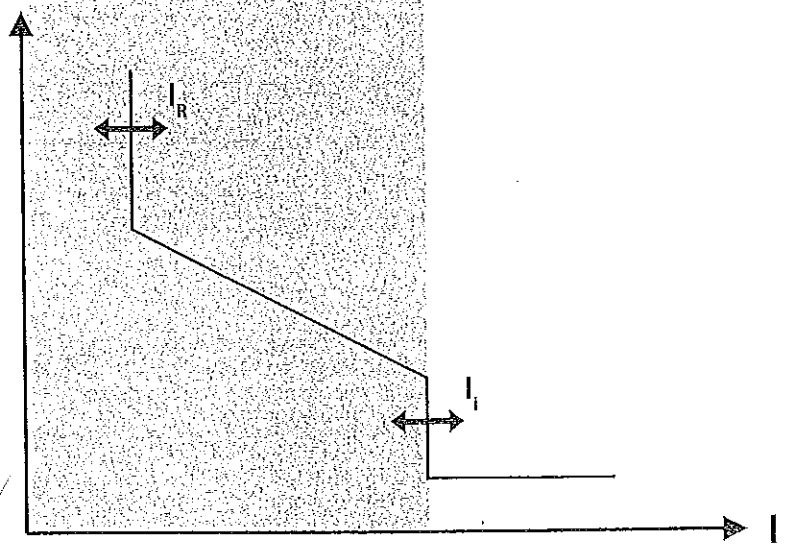


Reduced current | Short-circuit release

$I_n = 16$ A	BC160NT305-16-D
$I_n = 20$ A	BC160NT305-20-D
$I_n = 25$ A	BC160NT305-25-D
$I_n = 32$ A	BC160NT305-32-D
$I_n = 40$ A	BC160NT305-40-D
$I_n = 50$ A	BC160NT305-50-D
$I_n = 63$ A	BC160NT305-63-D
$I_n = 80$ A	BC160NT305-80-D
$I_n = 100$ A	BC160NT305-100-D
$I_n = 125$ A	BC160NT305-125-D
$I_n = 160$ A	BC160NT305-160-D







Properties

- suitable for protection of lines and distribution transformers
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.75 \div 1\ I_n$
- setting of short-circuit release:
  - circuit breakers with $I_n = 16$ A, 20 A, 25 A, 32 A in the range of $10 \div 15\ I_n$
  - circuit breakers with $I_n = 40$ A to 160 A in the range of $5 \div 10\ I_n$
- setting of I_R and I_i by means of knobs is smooth and linear in the marked range
- overcurrent release indicates circuit breaker switching off by overcurrent or short circuit by an optical symbol
- the values of parameters of the overcurrent release are set by the manufacturer to maximum

Data for the project

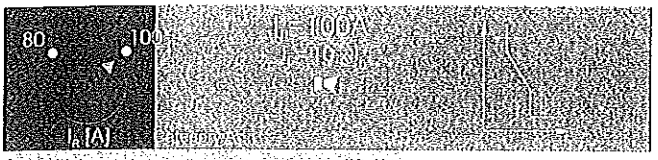
Circuit breaker	BC160NT305-...
Overcurrent release	D
Overcurrent release setting	
Reduced current	I_R ... A
Short-circuit release current	I_i ... A (... x I_n)

IMPORTANT

- the set value of current of the short-circuit release must correspond to the impedance loop - conditions must be fulfilled for automatic disconnection from power supply in case of failure

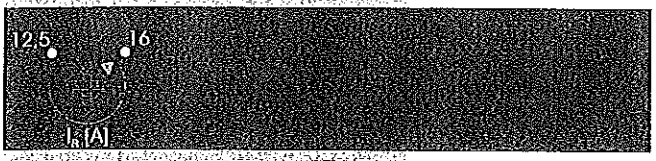
OVERCURRENT RELEASES - M

3P 4P



Reduced current

$I_n = 16$ A
BC160NT3O5-16-M



$I_n = 20$ A
BC160NT3O5-20-M

$I_n = 25$ A
BC160NT3O5-25-M

$I_n = 32$ A
BC160NT3O5-32-M

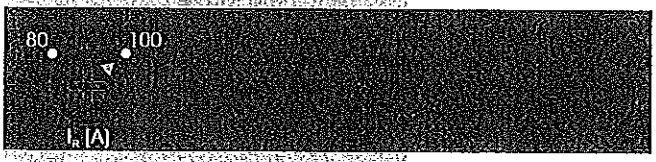
$I_n = 40$ A
BC160NT3O5-40-M

$I_n = 50$ A
BC160NT3O5-50-M

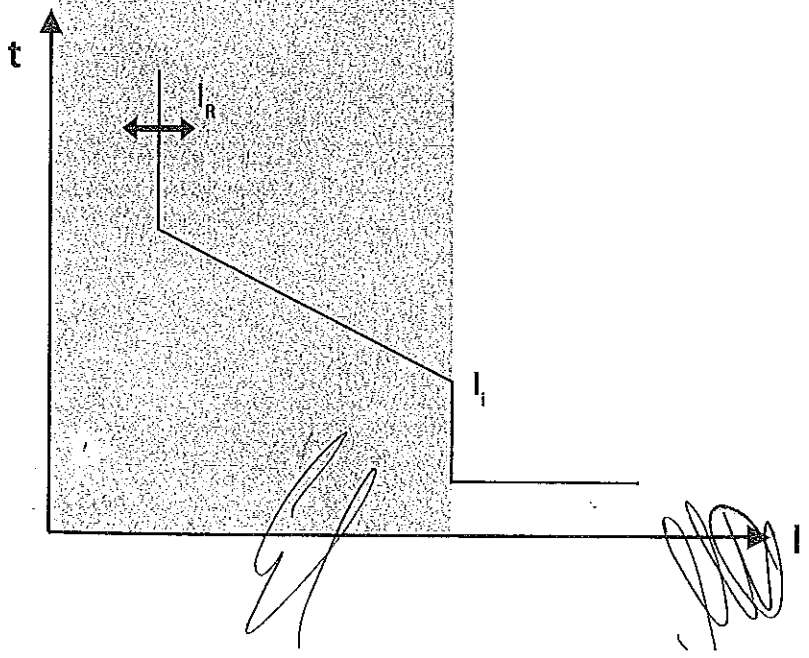
$I_n = 63$ A
BC160NT3O5-63-M

$I_n = 80$ A
BC160NT3O5-80-M

$I_n = 100$ A
BC160NT3O5-100-M



Short-circuit release



Properties

- appropriate for protection of motors
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.75 \div 1\ I_n$
- the value of the short-circuit release is fixed at $10\ I_n$
- setting of I_R by means of knob is smooth and linear in the marked range
- overcurrent release indicates circuit breaker switching off by overcurrent or short circuit by an optical symbol
- the values of parameters of the overcurrent release are set by the manufacturer to maximum

Data for the project

Circuit breaker		BC160NT3O5-...
Overcurrent release		M
Overcurrent release setting		
Reduced current	I_R	.... A
Short-circuit release current	I_i	.... A ($10 \times I_n$)

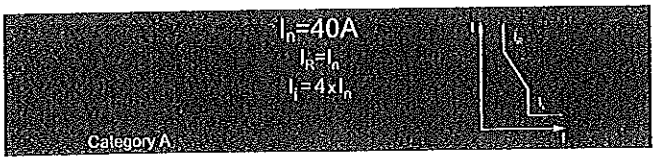
IMPORTANT

- reduced current I_R must not be higher than rated current of the motor

OVERCURRENT RELEASES - L

3P 4P

$I_n = 40$ A
BC160NT305-40-L



$I_n = 50$ A
BC160NT305-50-L

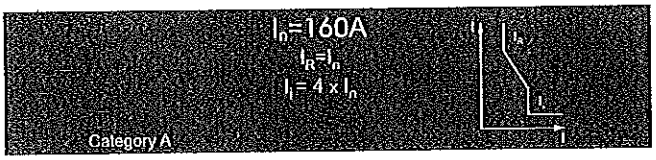
$I_n = 63$ A
BC160NT305-63-L

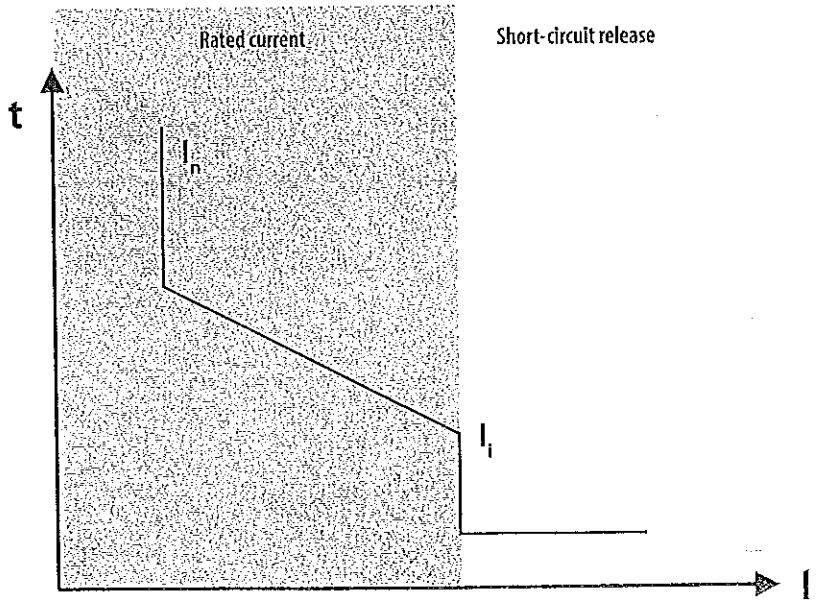
$I_n = 80$ A
BC160NT305-80-L

$I_n = 100$ A
BC160NT305-100-L

$I_n = 125$ A
BC160NT305-125-L

$I_n = 160$ A
BC160NT305-160-L





Properties

- the release is suitable for protection of lines with low impulse currents
- protects against both overcurrent and short circuit
- it is not possible to set a reduced current I_R
- the value of the short-circuit release I_i is fixed at 4 I_n

Data for the project

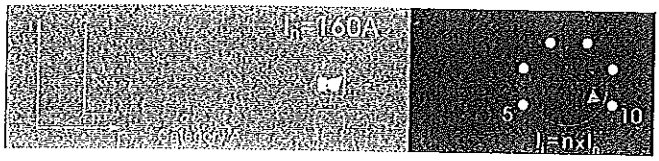
Circuit breaker		BC160NT305-...
Overcurrent release		L
Overcurrent release values		
Rated current	I_n	... A
Short-circuit release current	I_i	... A (4x I_n)

IMPORTANT

- high impulse current must not be in the circuit - undesirable breaking would take place, because the current of the short-circuit release is fixed at 4 I_n

OVERCURRENT RELEASES - N

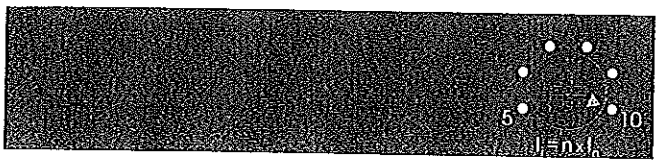
3P 4P



Short-circuit release

$I_n = 32$ A
BC160NT305-32-N

$I_n = 40$ A
BC160NT305-40-N



$I_n = 50$ A
BC160NT305-50-N

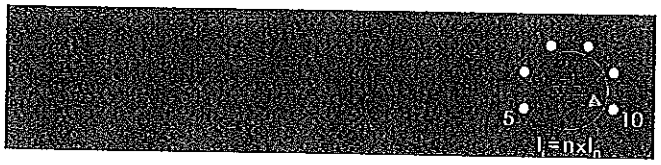
$I_n = 63$ A
BC160NT305-63-N

$I_n = 80$ A
BC160NT305-80-N

$I_n = 100$ A
BC160NT305-100-N

$I_n = 125$ A
BC160NT305-125-N

$I_n = 160$ A
BC160NT305-160-N

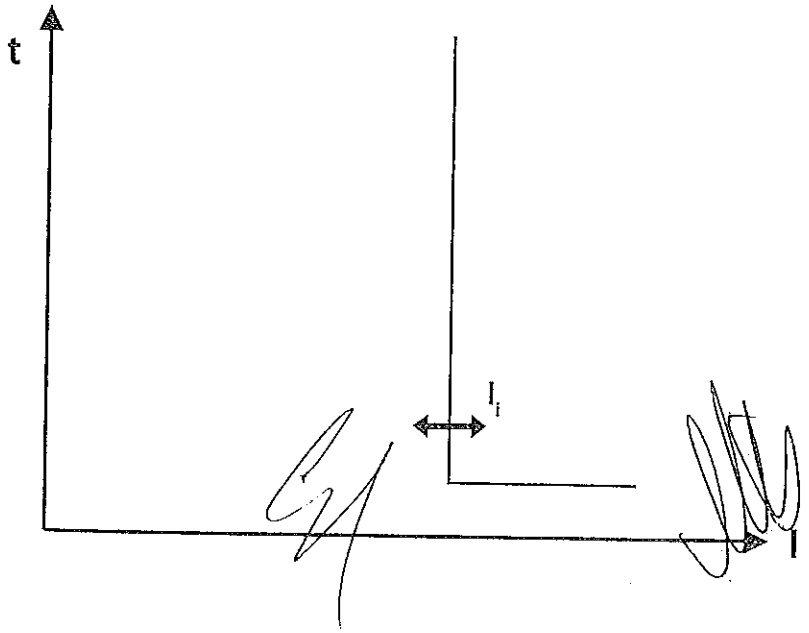


Properties

- for protection of e.g. motors with own overload protection
- it does not protect in the overload range – it does not react to low over-currents
- the set values of the short-circuit release within $5 \div 10\ I_n$
- setting of I_i by means of knobs is smooth and linear in the marked range
- the overcurrent release indicates circuit breaker switching off by short circuit by an optical symbol
- the values of parameters of the overcurrent release are set by the manufacturer to maximum

Data for the project

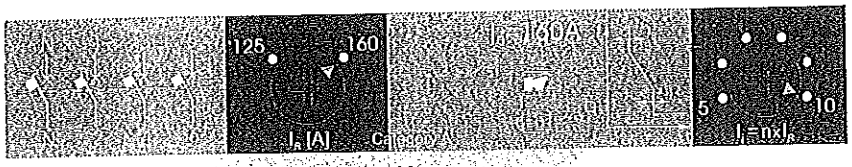
Circuit breaker	BC160NT305-...
Overcurrent release	N
Overcurrent release setting	
Rated current	I_n ... A
Short-circuit release current	I_i ... A (... x I_n)

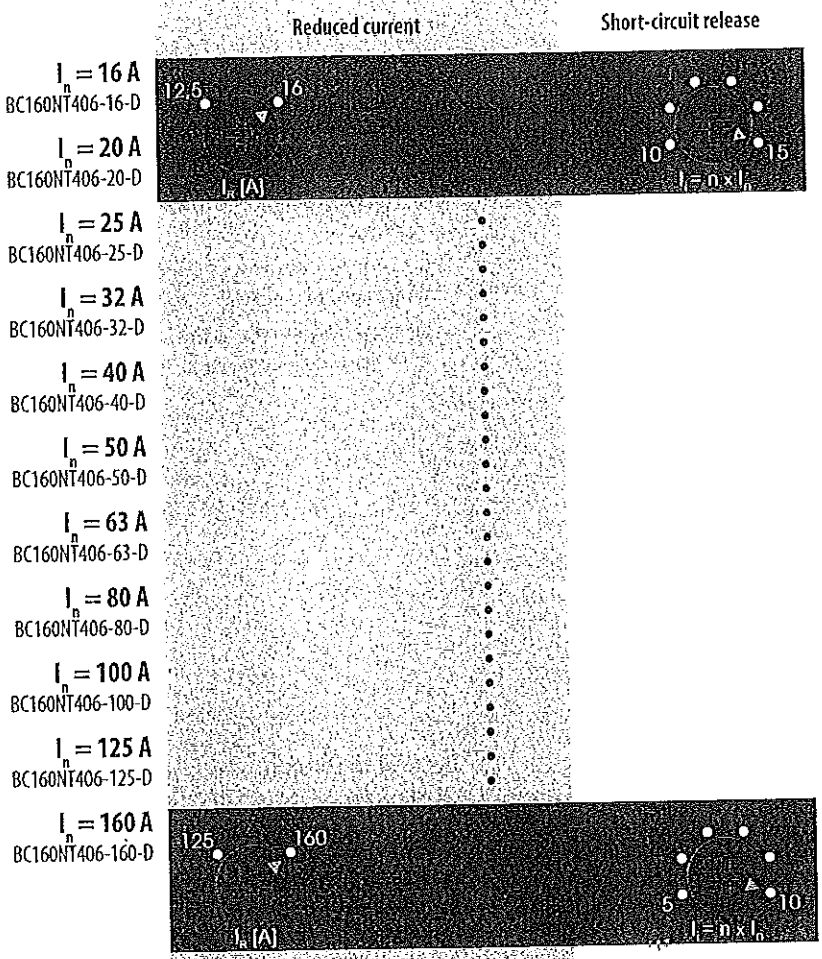


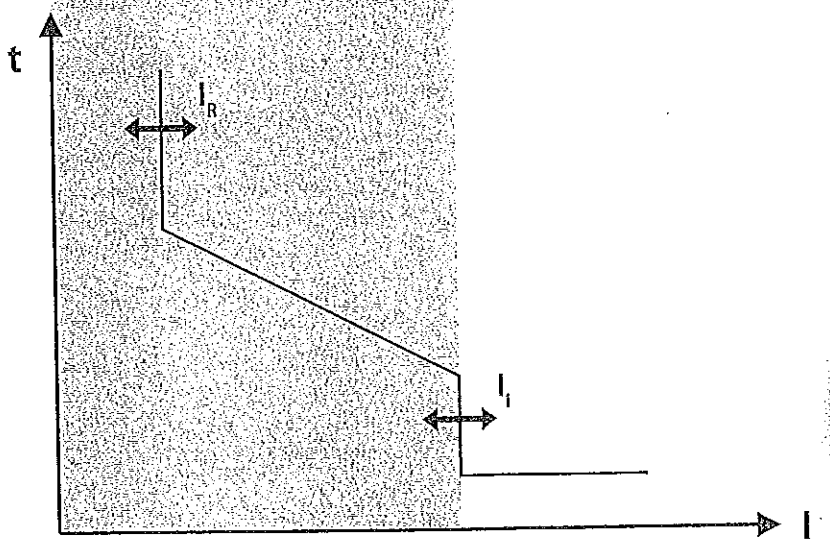
IMPORTANT

- the set value of current of the short-circuit release must correspond to the impedance loop - conditions must be fulfilled for automatic disconnection from power supply in case of failure

OVERCURRENT RELEASES - D







Properties

- it is appropriate for protection of lines and distributio transformers with protected „N" conductor in TN-C-S TN-S networks
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.75 \div 1\, I_n$
- setting of short-circuit release:
  - circuit breakers with I_n = 16 A, 20 A, 25 A, 32 A in th range of $10 \div 15\, I_n$
  - circuit breakers with I_n = 40 A to 160 A in the range of 5
- the value of reduced current I_R and of short-circuit rel for the fourth pole is the same as for the other three
- setting of I_R and I_i by means of knobs is smooth and i in the marked range
- the overcurrent release indicates circuit breaker swit off by short circuit by an optical symbol
- the values of parameters of the overcurrent release a by the manufacturer to maximum

Data for the project

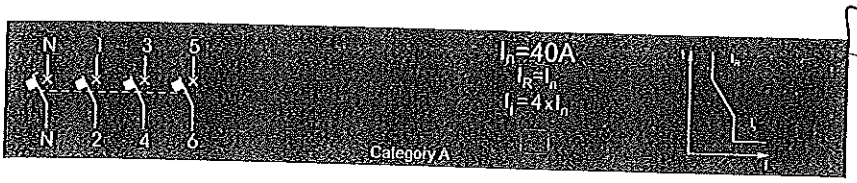
Circuit breaker	BC160NT405-.
Overcurrent release	D
Overcurrent release setting	
Reduced current	I_R ....A
Short-circuit release current	I_i ....A (....x I_n

IMPORTANT

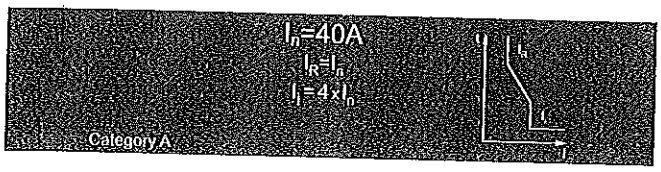
- the set value of current of the short-circuit release must correspond to the impedance loo - conditions must be fulfilled for automatic disconnection from power supply in case of failure

OVERCURRENT RELEASES - L

4P



I_n = 40 A
BC160NT406-40-L



I_n = 50 A
BC160NT406-50-L

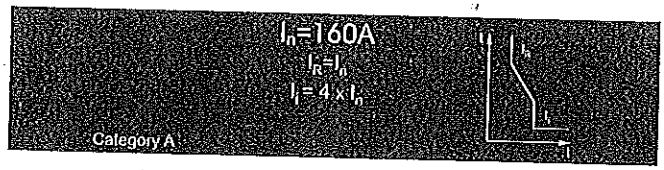
I_n = 63 A
BC160NT406-63-L

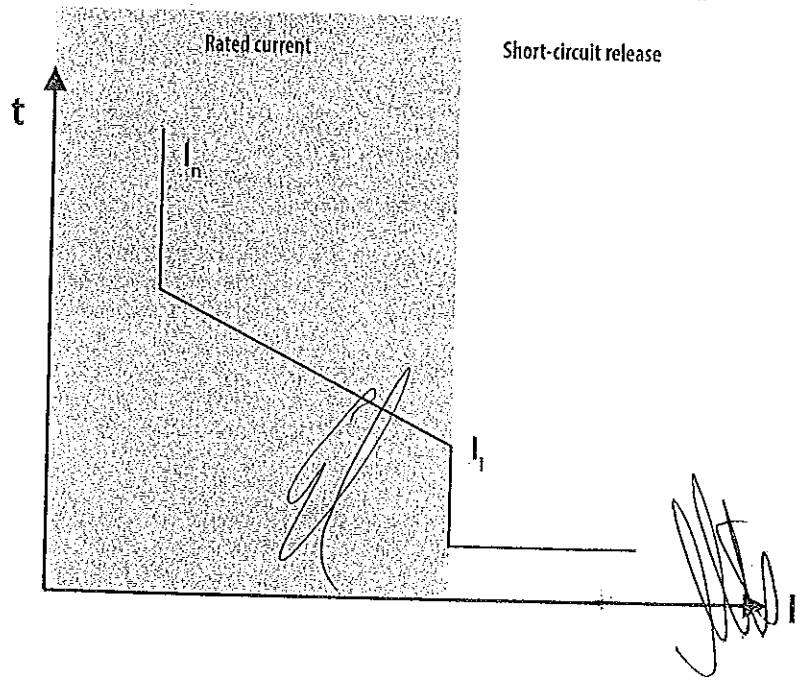
I_n = 80 A
BC160NT406-80-L

I_n = 100 A
BC160NT406-100-L

I_n = 125 A
BC160NT406-125-L

I_n = 160 A
BC160NT406-160-L





Properties

- it is appropriate for protection of lines with low starting currents including the protected „N" conductor in TN-C-S and TN-S networks
- it protects against overcurrent and short circuit
- it is not possible to set a reduced current I_R
- the value of the reduced release I_1 is fixed at 4 I_n
- the value of reduced current I_R and of short-circuit release I_1 for the fourth pole is the same as for the other three poles
- the values of parameters of the overcurrent release are set by the manufacturer to maximum

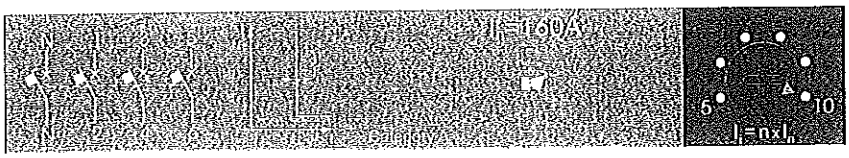
Data for the project

Circuit breaker	BC160NT406-....
Overcurrent release	L
Overcurrent release values	
Rated current	I_n ....A
Short-circuit release current	I_1 ....A (4x I_n)

IMPORTANT

- high impulse current must not be in the circuit - undesirable breaking would take place, because the current of the short-circuit release is fixed at 4 I_n

OVERCURRENT RELEASES - N



Short-circuit release

$I_n = 32$ A
BC160NT406-32-N

$I_n = 40$ A
BC160NT406-40-N

$I_n = 50$ A
BC160NT406-50-N

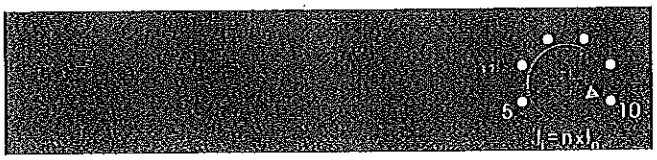
$I_n = 63$ A
BC160NT406-63-N

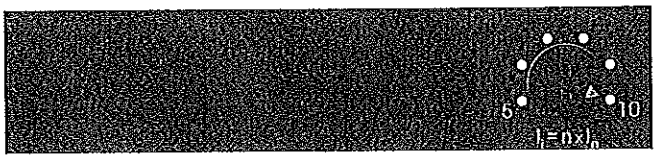
$I_n = 80$ A
BC160NT406-80-N

$I_n = 100$ A
BC160NT406-100-N

$I_n = 125$ A
BC160NT406-125-N

$I_n = 160$ A
BC160NT406-160-N



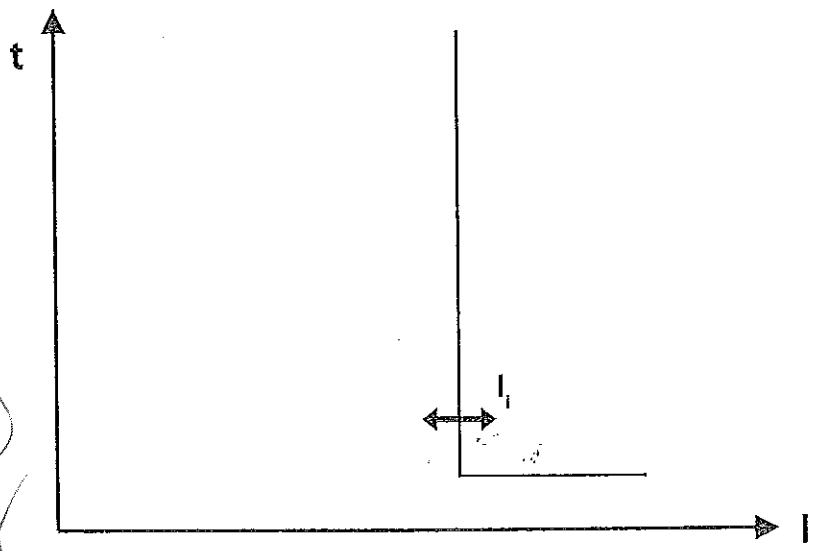


Properties

- the release is suitable for protection of e.g. motors own overload protection in TN-C-S a TN-S network
- it does not protect in the overload range – it does r to low over-currents
- the set values of the short-circuit release within 5 -
- the value of the short-circuit release I_i for the fourt the same as for the other three poles
- setting of I_i by means of knobs is smooth and linea marked range
- the overcurrent release indicates circuit breaker sw off by short circuit by an optical symbol
- the values of parameters of the overcurrent release by the manufacturer to maximum

Data for the project

Circuit breaker	BC160NT406-
Overcurrent release	N
Overcurrent release setting	
Rated current	I_n ....A
Rated current	I_i ....A (....x



IMPORTANT

- the set value of current of the short-circuit release must correspond to the impedance loc - conditions must be fulfilled for automatic dis- connection from power supply in case of failu

SWITCHES

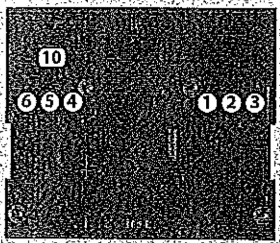
3P 4P

Auxiliary switch PS-BC-0010 / PS-BC-0010-Au
- make-and-break contact

Signal switch NS-BC-0010 / NS-BC-0010-Au
- make-and-break contact
- switch can be used only in cavity No. 1

Specifications

Type			PS-BC-0010, NS-BC-0010	PS-BC-0010-Au, NS-BC-0010-Au
Rated operating voltage	U_e		60 ÷ 250 V a.c. 60 ÷ 250 V d.c.	5 ÷ 60 V a.c. 5 ÷ 60 V d.c.
Rated insulation voltage	U_i		250 V	250 V
Rated impulse withstand voltage	U_{imp}		4 kV	4 kV
Rated frequency	f_n		50/60 Hz	50/60 Hz
Rated operating current	I_e / U_e	AC-12	6 A/250 V	0.004 ÷ 0.1 A/5 ÷ 60 V
		AC-15	5 A/60 V, 3 A/110 V, 1.5 A/230 V	0.004 ÷ 0.1 A/5 ÷ 60 V
		DC-12	0.25 A/250 V	0.1 A/60 V
		DC-13	0.5 A/60 V, 0.2 A/110 V, 0.1 A/250 V	0.004 ÷ 0.1 A/5 ÷ 60 V
Thermal current	I_{th}		6 A	0.5 A
Arrangement of contacts			001	001
Connection cross-section	S		0.5 ÷ 1 mm²	0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)			IP20	IP20

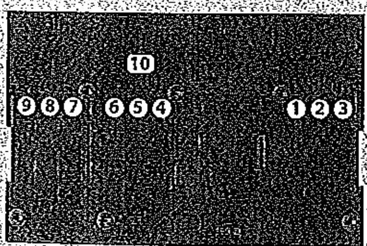


Position of cavities in BC160N.... circuit breaker/ /switch-disconnector. When one of cavities 4, 5 or 6 is in use, cannot be used with a shunt trip or undervoltage release.

Function, name and location of switches according to type designation

Type	Switch name	Position of switch	Switch function
PS-BC-0010 PS-BC-0010-Au	Auxiliary	Cavity 1[2], 2, 3, 4, 5, 6[1]	Signals state of circuit breaker/switch-disconnector's main contacts
NS-BC-0010 NS-BC-0010-Au	Signal	Cavity 1[2]	Signals tripping of circuit breaker by overcurrent release

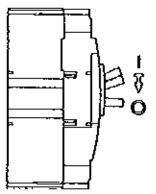
[1] - when one of cavities 4, 5 or 6 is in use for auxiliary switches, cannot be used a shunt trip or undervoltage release
[2] - in cavity 1, PS-BC-0010 auxiliary switch and NS-BC-0010 signal switch cannot be used simultaneously



Position of cavities in BC160NT4.. circuit breaker/ /switch-disconnector. When one of cavities 4, 5 or 6 is in use, cannot be used a shunt trip or undervoltage release.

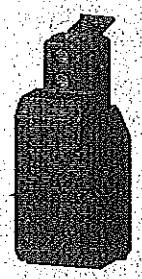
States of switches in circuit breaker/switch-disconnector

Cavity			1, 2, 3, 4, 5, 6, (7, 8, 9*)		1		10
State of circuit breaker	Circuit breaker lever position	State of the main contacts	PS-BC-0010		NS-BC-0010		SV-BC-X... SP-BC-X...
Switched on	I	1	1	0	0	1	1
Switched off manually (loaded state)	O	0	0	1	0	1	1
Switched off by the overcurrent release or INSPECTION push button	⇩	0	0	1	1	0	1
Switched off by auxiliary release	⇩	0	0	1	0	1	0
Switched off by TEST push button	⇩	0	0	1	0	1	1



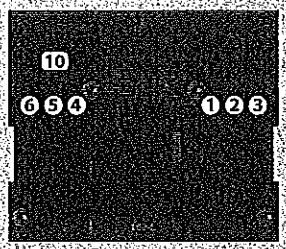
note: 0 - contact open, 1 - contact closed
* only 4P design

SHUNT TRIPS

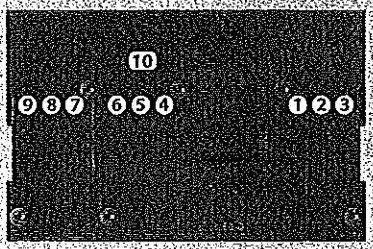


Specifications

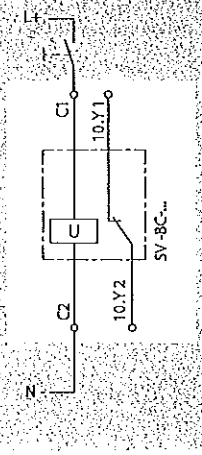
Type		SV-BC-X...
Rated operating voltage	U_e	24, 48, 110, 230, 400 V a.c. 24, 48, 110, 220 V d.c.
Rated frequency	f_n	50/60 Hz
Input power at 1.1 U_e AC		2 VA
DC		2 W
Characteristic		$U \geq 0.7\ U_e$ the circuit breaker must trip
Time to switching off		15 ms
Loading time		∞
Connection cross-section	S	0.5 ÷ 1 mm²
Degree of protection of terminals	(connected release)	IP20
Position in cavity No.		10
SIGNAL-SWITCH - signals tripping by shunt tri		
Rated operating voltage	U_e	230 V a.c.
Rated insulation voltage	U_i	250 V
Rated impulse withstand voltage	U_{imp}	4 kV
Rated frequency	f_n	50/60 Hz
Rated operating current	I_e/U_e	2 A/230 V a.c.
Thermal current	I_{th}	6 A
Arrangement of contacts		01



Position of cavities in BC160NT... circuit breaker/switch-disconnector. When shunt trip is used, cavities 4, 5, 6 cannot be used for auxiliary switches.



Position of cavities in BC160NT4... circuit breaker/switch-disconnector. When one of cavities 4, 5 or 6 is in use, cannot be used a shunt trip or undervoltage release.



Type designation according to rated operating voltage

U	Type
24, 48 V a.c./d.c.	SV-BC-X024
110, 230 V a.c./110, 220 V d.c.	SV-BC-X110
230, 400 V a.c./220 V d.c.	SV-BC-X230

The specific rated operating voltage of the release is set up by jumpers directly on the release. The setting from the manufacturer is always to the value corresponding to the type designation. (see fig. 1)

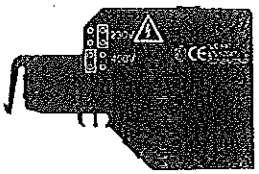
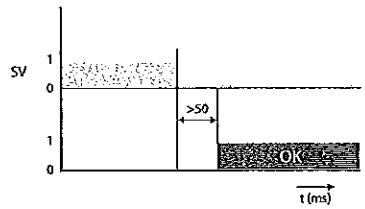


Fig. 1 - The rated operating voltage setting

Reaction time of the shunt trip

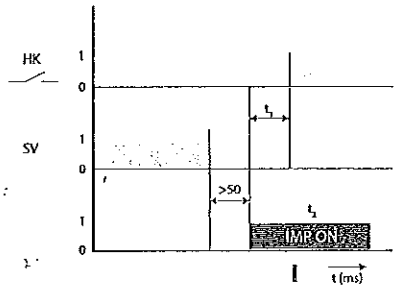


States and positions of circuit breaker/switch-disconnector lever

States of circuit breaker/switch-disconnector	Lever position o breaker/switch-dis
Switched on	
Switched off by releases or by TEST push button	
Switched off manually or by motor drive electrically (loaded state)	

Cooperation of motor drive and shunt trip

It is necessary to keep time delay when the control of the circuit breaker is done by motor drive and shunt trip at once. The following time delays have to be kept between the disconnection of voltage from the shunt trip and the control impulse for switch on of the motor drive:



Description of graphs

Symbol	Description
HK	Main contacts
OK	Circuit breaker is ready for further l
IMP ON	Make impulse for the motor drive
SV	Control voltage on the shunt trip

t_1 = 70 ms (mode 1, 2), 140 ms (mode 3)
t_2 = 60 ÷ 500 ms (mode 1, 3), 60 ÷ ∞ (mode 2)

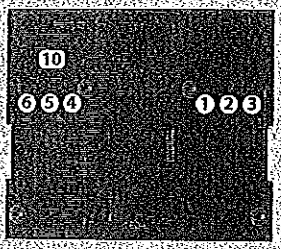
UNDERVOLTAGE RELEASES

3P 4P

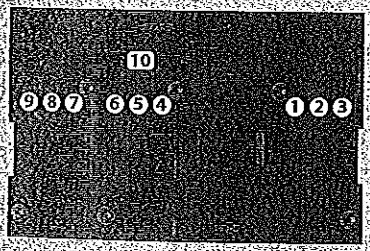
Specifications

Type		SP-BC-X...
Rated operating voltage	U_e	24, 48, 110, 230, 400 V a.c. 24, 48, 110, 220 V d.c.
Rated frequency	f_n	50/60 Hz
Input power at 1.1 U_e	AC	2 VA
	DC	2 W
Characteristic [1]		$U \le 0.35\ U_e$ the circuit breaker must trip $U \ge 0.85\ U_e$ it is possible to switch on the circuit breaker
Time to switching off		15 ms
Loading time		∞
Connection cross-section	S	0.5 ÷ 1 mm²
Degree of protection of terminals	(connected release)	IP20
Position in cavity No.		10
SIGNAL SWITCH - signals tripping by undervoltage release		
Rated operating voltage	U_e	230 V a.c.
Rated insulation voltage	U_i	250 V
Rated impulse withstand voltage	U_{imp}	4 kV
Rated frequency	f_n	50/60 Hz
Rated operating current	I_e/U_e	2 A/230 V a.c.
Thermal current	I_{th}	6 A
Arrangement of contacts		01

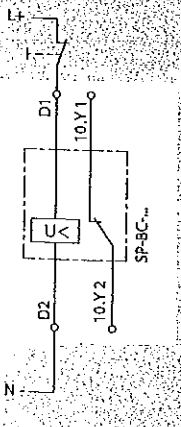
[1] - tripping of the undervoltage release can be delayed using the delay unit BZ-BX-X230-A, for more detailed information see page P2



Position of cavities in BC160NT... circuit breaker/switch-disconnector. When undervoltage release is used, cavities 4, 5, 6 cannot be used for auxiliary switches.



Position of cavities in BC160NT4... circuit breaker/switch-disconnector. When one of cavities 4, 5 or 6 is in use, cannot be used a shunt trip or undervoltage release.



Type designation according to rated operating voltage

U_e	Type
24, 48 V a.c./d.c.	SP-BC-X024
110, 230 V a.c./110, 220 V d.c.	SP-BC-X110
230, 400 V a.c./220 V d.c.	SP-BC-X230

The specific rated operating voltage of the release is set up by jumpers directly on the release. The setting from the manufacturer is always to the value corresponding to the type designation (see fig. 1).

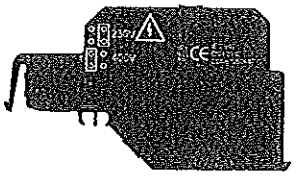
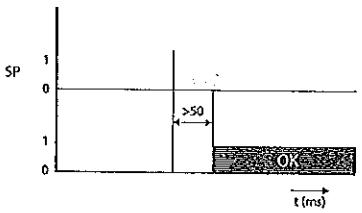


Fig. 1 - The rated operating voltage setting

Reaction time of the undervoltage release

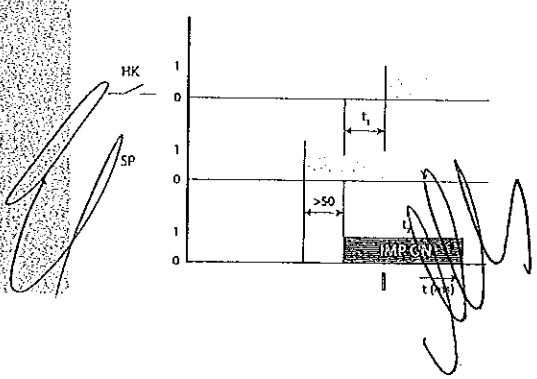


States and positions of circuit breaker/switch-disconnector lever

State of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases or by TEST push button	
Switched off manually or by motor drive electrically (loaded state)	

Cooperation of motor drive and undervoltage release

It is necessary to keep time delay when the control of the circuit breaker is done by motor drive and undervoltage release at once. The following time delays have to be kept between bringing the voltage to the undervoltage release and the control impulse for switch on of the motor drive:



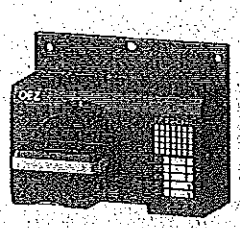
t_1 = 70 ms (mode 1, 2), 140 ms (mode 3)
t_2 = 60 ÷ 500 ms (mode 1, 3), 60 ÷ ∞ (mode 2)

Description of graphs

Symbol	Description
HK	Main contacts
OK	Circuit breaker is ready for further handling
IMP ON	Make impulse for the motor drive
SP	Control voltage on the undervoltage release

HAND DRIVES

3P 4p



Description

The hand drive permits controlling the circuit breaker/ /switch-disconnector by turning the lever, e.g. to switch machines on and off. Modular conception of the drives enables simple mounting on the circuit breaker (also additionally) after the cover of cavities is removed. The fixed drive can be sealed. The drive and its accessories are ordered separately according to your choice, see page D13.

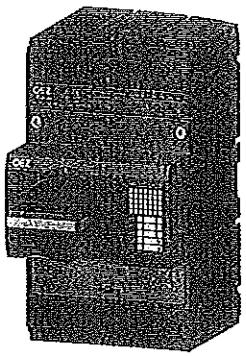


Fig. 1 - DIMENSIONS, see page D27, D33

- The hand drive makes possible to control the circuit breaker:
  - **a) from the front panel (fig. 1)**
    - Hand drive unit RP-BC-CK..
    - + Hand drive lever RP-BC-CP..
  - **b) through the switchboard door (fig. 2)**
    - Hand drive unit RP-BC-CK..
    - + Extension shaft RP-BC-CH..
    - + Hand drive bearing PR-BC-CN..
    - + Hand drive lever + RP-BC-CP..
  - **c) through the side wall of the switchboard (fig. 3)**
    - in left- or right-side designs
    - Hand drive unit for side control
    - right RP-BC-CK30
    - or left RP-BC-CK31
    - + Extension shaft RP-BC-CH..
    - + Hand drive bearing PR-BC-CN..
    - + Hand drive lever + RP-BC-CP..

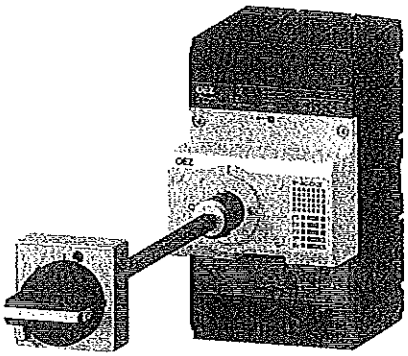


Fig. 2 - DIMENSIONS, see page D27, D33

- The hand drive unit is fixed directly to circuit breaker or switch-disconnector.
- The hand drive bearing is fixed to the switchboard door and it provides degree of protection IP40 or IP66.
- Hand drive lever is fixed on the hand drive unit or on the hand drive bearing.
- The extension shaft is supplied in two options, standard (length 350 mm - can be shortened) and telescopic (adjustable length 199 ÷ 352 mm).

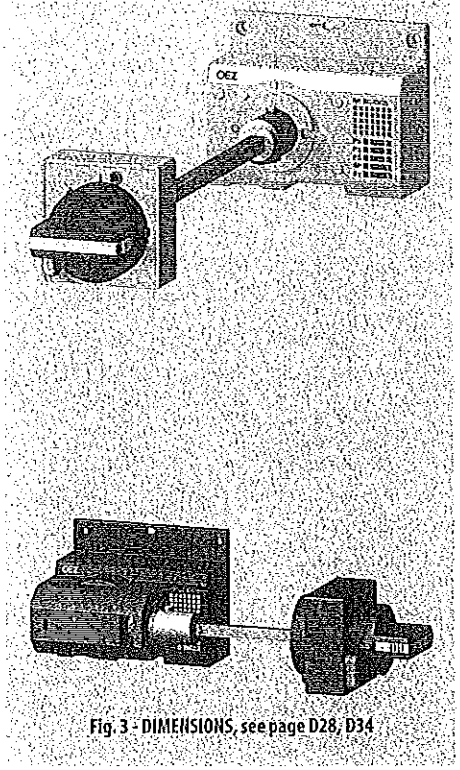


Fig. 3 - DIMENSIONS, see page D28, D34

Enhanced safety for operator:

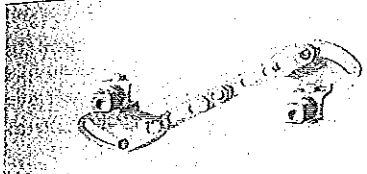
- The hand drive unit and hand drive lever are also supplied with the possibility to lock the circuit breaker in position „switched off manually". The unit and lever of the hand drive can be locked using three padlocks with shank diameter max. 4 mm.
- Each hand drive bearing prevents the switchboard door from opening when the circuit breaker is switched on or in a state of being switched off by releases. By means of the device, it is possible to turn off this locking and to open the door. Locking of the switchboard door opening also is possible in the circuit breaker's switched off manually state. It is necessary to activate the locking by means of the lever on the bearing and to lock the hand drive.
- Two circuit breakers with hand drives can be fitted also with reciprocal mechanical interlocking or mechanical parallel switching, see page D49.

Specifications

Type	Description	Colour	Locking while the circuit breaker is in OFF state	Degree of protection	Locking of the switchboard door opening in the circuit breaker's state: switched on	Locking of the switchboard door opening in the circuit breaker's state: switched off manually and locked	Switchboard door opening with the circuit breaker switched on	Length [mm]
RP-BC-CK10	Hand drive unit blue	blue	no	-	-	-	-	-
RP-BC-CK20	Hand drive unit blue	blue	yes	-	-	-	-	-
RP-BC-CK21	Hand drive unit blue	yellow	yes	-	-	-	-	-
RP-BC-CK30	Hand drive unit - right side	blue	no	-	-	-	-	-
RP-BC-CK31	Hand drive unit - left side	blue	no	-	-	-	-	-
RP-BC-CP10	Hand drive lever	black	no	-	-	-	-	-
RP-BC-CP20	Hand drive lever	black	yes	-	-	-	-	-
RP-BC-CP21	Hand drive lever	red	yes	-	-	-	-	-
RP-BC-CN10	Hand drive bearing	black	-	IP40	yes	yes	yes	-
RP-BC-CN11	Hand drive bearing	yellow	-	IP40	yes	yes	yes	-
RP-BC-CN20	Hand drive bearing	black	-	IP66	yes	yes	yes	-
RP-BC-CN21	Hand drive bearing	yellow	-	IP66	yes	yes	yes	-
RP-BC-CH10	Extension shaft	-	-	-	-	-	-	350 (can be shortened)
RP-BC-CH20	Extension shaft	-	-	-	-	-	-	199 ÷ 352 telescopic design

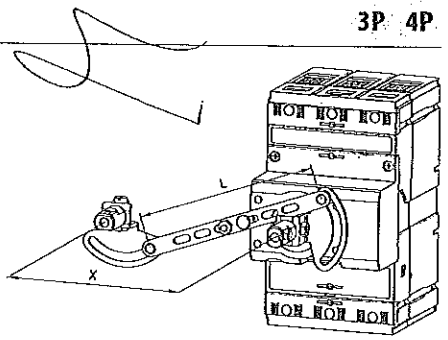
MECHANICAL INTERLOCKING AND PARALLEL SWITCHING

3P 4P

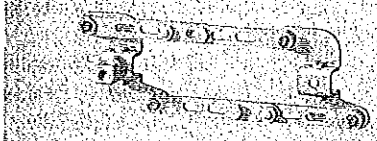


RP-BC-CB10 Mechanical interlocking

Provides mechanical interlocking of two circuit breakers/ /switch-disconnectors so that they cannot both be tripped simultaneously, but only one of them at a time. Both circuit breakers may be switched off simultaneously. Interlocking can be used between two BC160N circuit breakers. Both circuit breakers must be equipped with a hand drive (at least one with a hand drive unit and hand drive lever) see page D48. In order to use the interlocking, it is absolutely necessary to comply with the dimensions that are shown in the figure and given in the table. For correct function and signalling the state of the BC160 circuit breaker with RP-BC-CB10 mechanical interlocking, circuit breaker must be switched off, or switch-disconnector must be in loaded position.



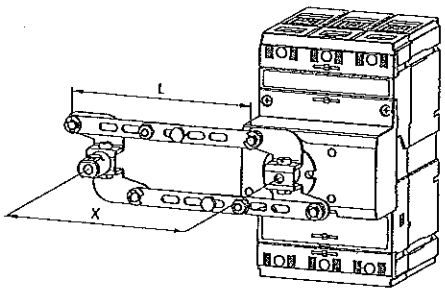
Dimension	[mm]
X	87.5 or 100
L	94.5 or 106



RP-BC-CD10 Mechanical parallel switching

Enables for simultaneous switching of two circuit breakers/switch-disconnectors. Parallel switching can be used between two BC160N circuit breakers. Both circuit breakers must be equipped witha hand drive unit and at least one with a hand drive lever, see page D48.

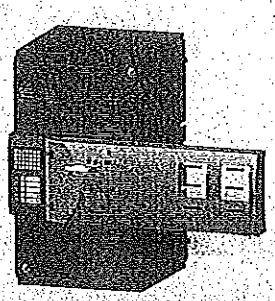
In order to use parallel switching, it is absolutely necessary to comply with the dimensions that are shown in the fi gure and given in the table.



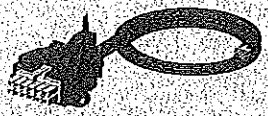
Dimension	[mm]
X	75^{+7} or 87.5^{+7} or 100^{+7}

MOTOR DRIVES

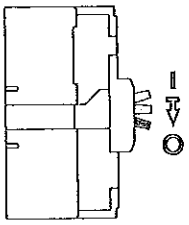
3P 4P



Motor drive side MP-BC-X...-B



Connecting cable OD-BC-KA02



Symbol	Description
I	Switched on manually or by motor drive electrically
U_V	Switched off by overcurrent releases, shunt trip or undervoltage release, TEST or INSPECTION push button
◎	Switched off manually or by motor drive electrically, loaded state

Description

- Motor drive is an accessory of the circuit breaker/switch-disconnector, by means of which it is possible to switch the circuit breaker or switch-disconnector on and off remotely. Modular conception of the drives enables simple mounting on the circuit breaker also additionally. The drive is used for both remote and local control of 3-pole and 4-pole circuit breakers BC160. It is manufactured in the design for side mounting next to the circuit breaker on the switchboard panel or on DIN rail. The mounting of motor drive to the circuit breaker is done by bayonet mechanism placed on the side of the circuit breaker. The mounted motor drive can be locked by means of terminal cover seal.
- Modeion BC160 circuit breakers with the motor drive are intended for industrial, power engineering and infrastructure applications. The motor drives have a system of direct control of the circuit breaker, without a spring storage unit.
- The motor drive can work in the local or remote control mode. The local control mode is used, for instance in loss of control voltage. Local control of the circuit breaker is accessible only after lifting the transparent safety cover of the drive off. This action locks the remote electrical control circuits automatically. The lifted off position of the cover can be indicated remotely.
- The circuit breaker is switched on and off by means of the control lever driver. After returning the safety cover to the original position, the drive is switched into the remote control mode automatically.
- After lifting the safety cover off it is possible to handle an automatic mode presetting change-over switch. Under the transparent cover there is also a red LED which lighting indicates a failure (unfinished switching on/off/loading operations).
- Electronics circuits of the motor drive block erroneous control processes, e.g. drive cycling after overcurrent or auxiliary release tripping.
- Side drive can be locked in off position of the circuit breaker by up to three padlocks with shaft diameter with shank diameter max. 4 mm. It is possible to signal the locking remotely. The protective cover of the drives can also be sealed.
- The position of the main contacts of the circuit breaker is indicated by the position of the circuit breaker driver lever under the transparent protective cover of the drive. The wound up position of the circuit breaker can also be signalled remotely.
- In the remote control mode the circuit breaker is switched on and off by ON and OFF push buttons respectively. The motor drive accessories include an extension cable OD-BC-KA02.

Motor drive automatic mode presettings

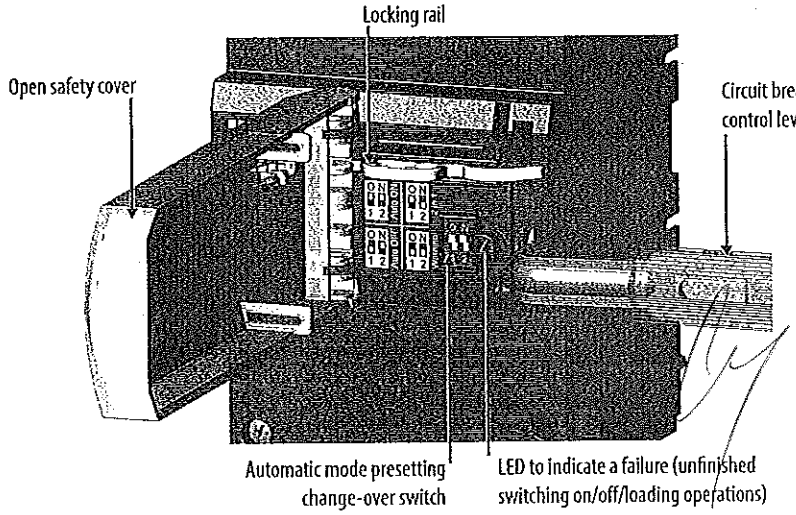
Switch position	Automatic mode presetting	Preset description	Circuit breaker switching off to position O	Circuit breaker loading to position ◎	Circuit breaker switching on to position I
	1 *)	Automatic loading is on	- By overcurrent release	Motor drive performs automatically	By pressing of ON push button
	2	Automatic loading is off	- By inspection push button - By auxiliary release	The operator must press the OFF push button	By pressing of ON push button
	3	Simultaneous loading and switching on	- By TEST push button	By pressing of ON push button the motor drive will loading and switch on the circuit breaker ***)	
	The motor drive is out of operation, the red LED is lighting				

*) *Standard factory setting of the switch.*

**) *When the circuit breaker is switched off by the motor drive electrically with the use of the OFF push button, the circuit breaker control lever gets into the wound up position automatically, independently of the automatic mode presetting.*

***) *By pressing the OFF push button, the motor drive only winds the circuit breaker up to the position.*

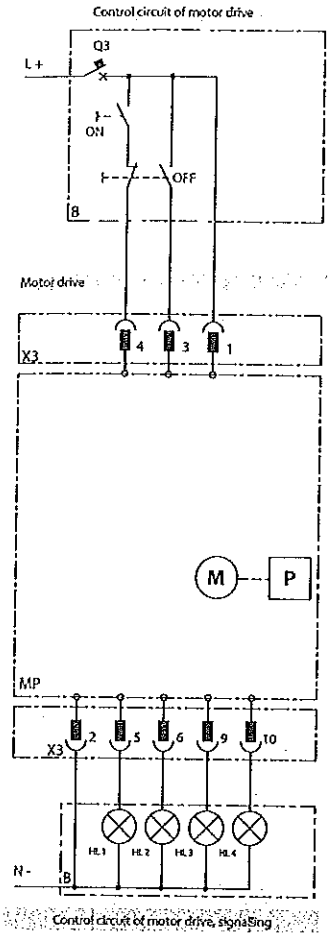
Side drive description



MOTOR DRIVES

3P 4P

Diagram



Control circuit of motor drive, signaling

Diagram description

MP	motor drive - MP-BC...
M	motor
P	gear unit
X3	connector for connection of control and signalling circuits
B	recommended wiring of the control circuits - it is not a part of MP-BC..
ON	switch on button
OFF	switch off button
Q3	motor drive circuit breaker
HL1	remote failure signalling (unreliable switching on or switching off), max. permissible load 10 W [1]
HL2	signalling of circuit breaker lever position „loaded", max. permissible load 10 W [1]
HL3	signalling of opening of the front safety cover of the drive, max. permissible load 10 W [1]
HL4	signalling of exsertion of the drive locking bar, max. permissible load 10 W [1]

[1] voltage on terminals 5, 6, 7, 8, 9,10 is the same as U_n of the motor drive

For complete wiring diagram of the circuit breaker BC160 with motor drive see page D16

Specifications

Type		MP-BC1...B
Rated operating voltage	U_e	24, 48, 110, 230 V a.c. 24, 48, 110, 220 V d.c.
Rated frequency	f_n	50/60 Hz
Control impulse length	for switching on	60 ms ÷ ∞ *)
	for switching off	60 ms ÷ ∞ *)
Time to switching on		< 70 ms *)
Time to switching off		< 50 ms *)
Frequency of cycles ON/OFF		5 cycles/min
Frequency of cycles - instant successive ON/OFF		10 cycles
Mechanical endurance		20 000 cycles
Input power	AC	100 VA
	DC	100 W
Starting current		12 A / 24 V a.c./d.c. 6 A / 48 V a.c./d.c. 4 A / 110 V a.c./d.c. 2 A / 230 V a.c. / 220 V d.c.
Protection 24, 48, 110 V a.c.; 230 V a.c. 24, 48, 110 V d.c.; 220 V d.c.		LPN-4C-1; LPN-2C-1 LPN-DC-4C-1; LPN-DC-2C-1

Type		OD-BC-KA02-A
Number of conductors		8
Conductor cross-section	S	0.35 mm²
Conductor lengths		0.6 m

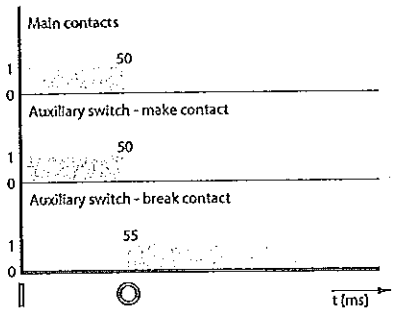
*) The values depends on the motor drive automatic mode presetting, see pages D50, D52, D53, D54

MOTOR DRIVES

Specifications

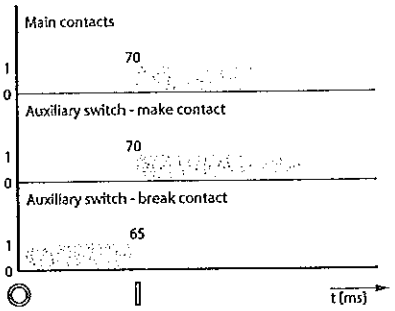
Circuit breaker switching off by motor drive electrically with OFF push button

Automatic operation No. 1, 2, 3



Circuit breaker switching on electrically by motor drive with ON push button

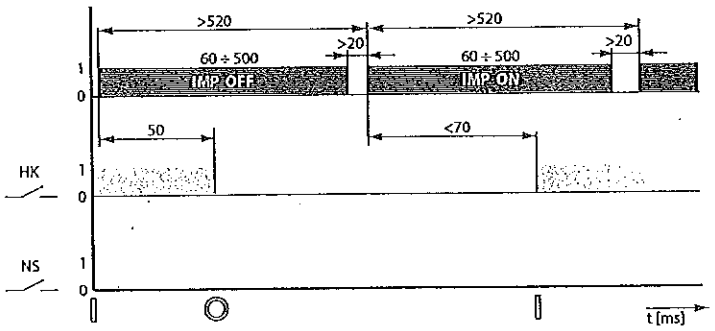
Automatic operation No. 1, 2, 3



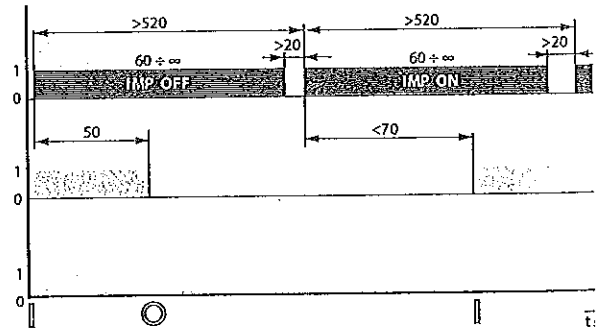
Recommended control impulses

Circuit breaker switching on and off by motor drive electrically using the ON and OFF push buttons

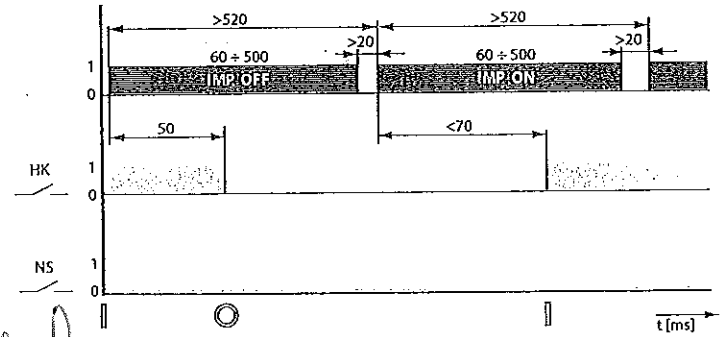
Automatic operation No. 1



Automatic operation No. 2



Automatic operation No. 3



Description of graphs

Symbol	Description
HK	Main contacts
NS	Signal switch
IMP ON	Make impulse for the motor drive
IMP OFF	Break impulse for the motor drive
‖	Switched on
◎	Switched off manually or by motor drive electrically (loaded state)

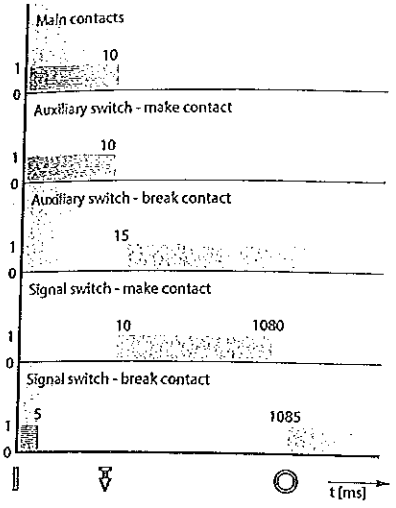
MOTOR DRIVES

3P 4P

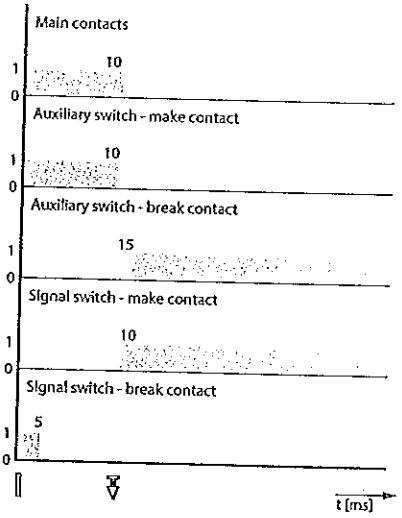
Specifications

Circuit breaker switching off by overcurrent release or inspection push button

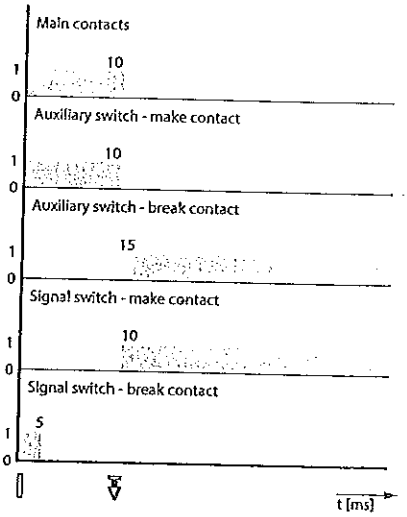
Automatic operation No. 1



Automatic operation No. 2



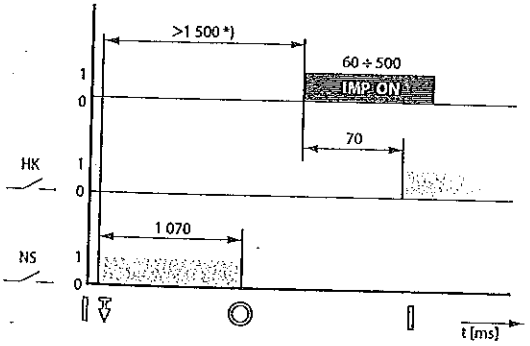
Automatic operation No. 3



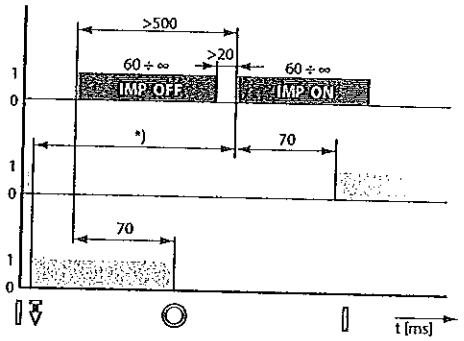
Recommended control impulses

Circuit breaker switching on with motor drive after its tripping by overcurrent release or inspection push button

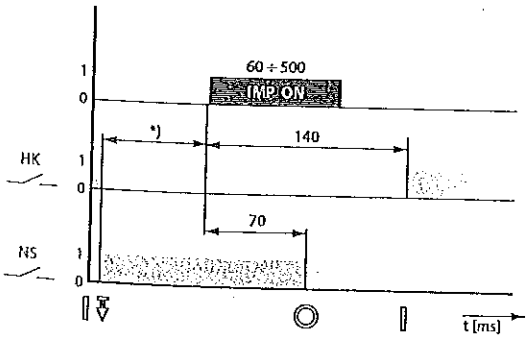
Automatic operation No. 1



Automatic operation No. 2



Automatic operation No. 3



Description of graphs

Symbol	Description
HK	Main contacts
NS	Signal switch
IMP ON	Make impulse for the motor drive
IMP OFF	Break impulse for the motor drive
▯	Switched on
⛛	Switched off by releases, TEST or INSPECTION push button
◎	Switched off manually or by motor drive electrically (loaded state)

*) *If the circuit breaker was switched off by an overcurrent release, it is necessary to remove the cause of the error before its switching on.*

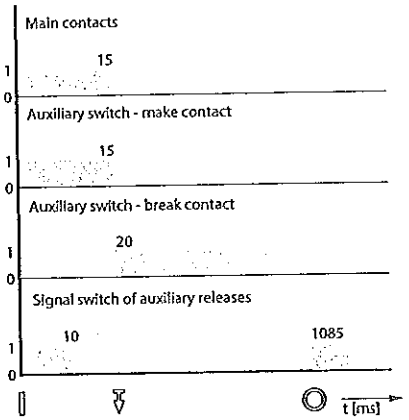
MOTOR DRIVES

3P 4P

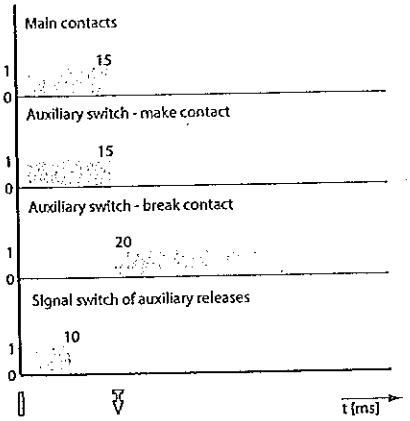
Specifications

Circuit breaker switching off by shunt trip, undervoltage release or TEST push button

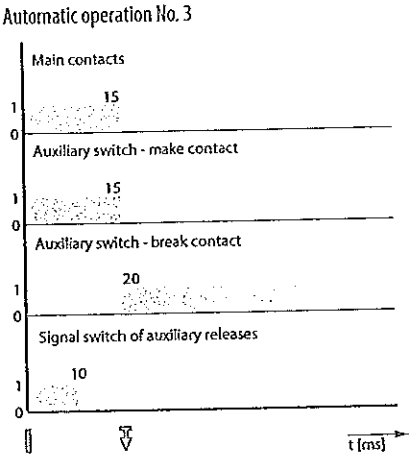
Automatic operation No. 1



Automatic operation No. 2



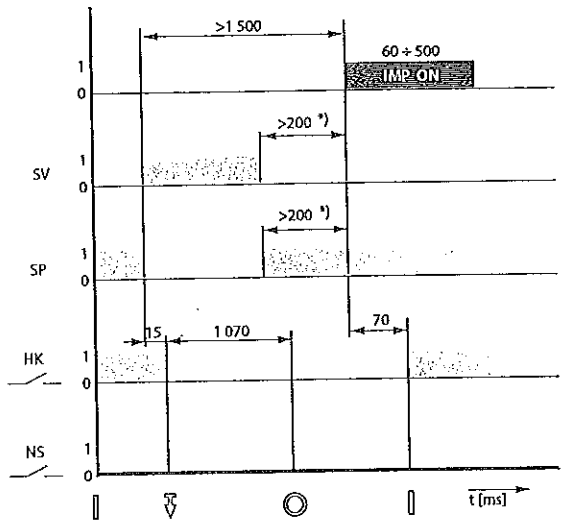
Automatic operation No. 3



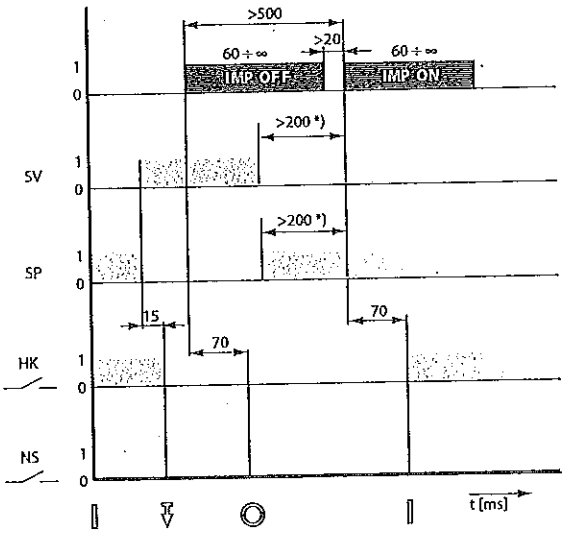
Recommended control impulses

Circuit breaker switching on by motor drive after tripping by shunt trip or undervoltage release

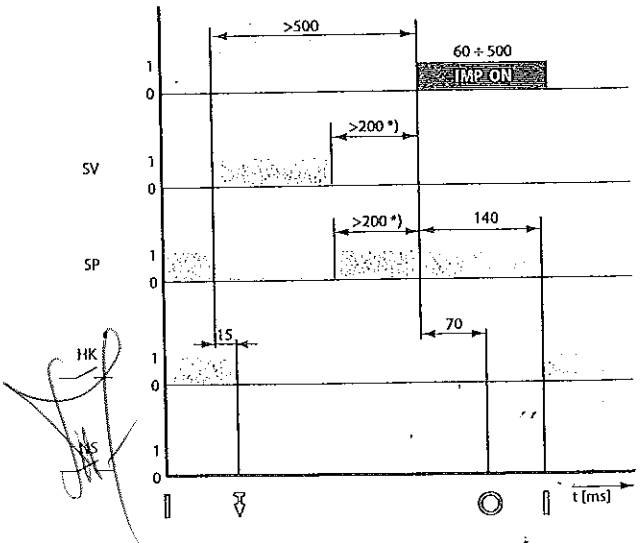
Automatic operation No. 1



Automatic operation No. 2



Automatic operation No. 3

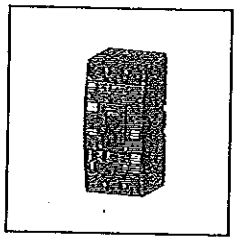


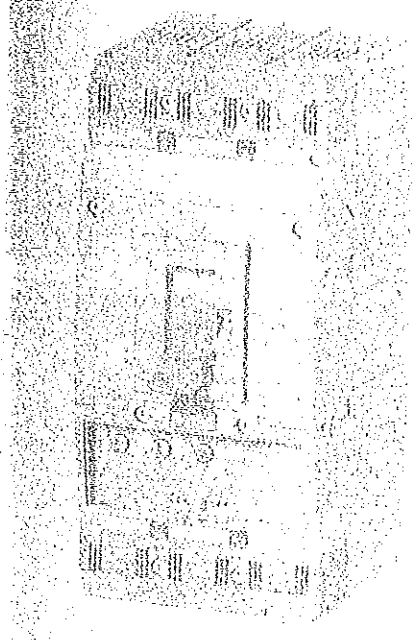
Description of graphs

Symbol	Description
HK	Main contacts
NS	Signal switch
SV	Impulse for shunt trip
SP	Impulse for undervoltage release
IMP ON	Make impulse for the motor drive
IMP OFF	Break impulse for the motor drive
‖	Switched on
⩛	Switched off by releases, TEST or INSPECTION push button
◎	Switched off manually or by motor drive electrically (loaded state)

*) *Restart is only possible after deactivation of shunt trip or undervoltage release.*

MOULDED CASE CIRCUIT BREAKERS BD250N, BD250S





COMMERCIAL INFORMATION

TECHNICAL INFORMATION

SUMMARY OF MODELS AND ACCESSORIES

3P 4P

CONNECTING SETS

Clamp terminals — CS-BD-T011

Block terminals — CS-BD-B011

Block terminals — CS-BD-B012

Double block terminals — CS-BD-B021, CS-BD-B022

Block terminals — CS-BD-B014

Rear connection — CS-BD-A021

Front connection — CS-BD-A011

Potential terminals — CS-BD-PS01

HAND DRIVES

RP-BD-CK..
RP-BHD-CP..
RP-BHD-CH..
RP-BHO-CH..

Mechanical parallel switching
RP-BHD-CD10

Mechanical interlocking
RP-BHD-CB10

Mechanical blocking with Bowden cable
MB-BD-PV05
MB-BHD-PV03

MOTOR DRIVES MP-BD-X..
OD-BHD-KA02
OD-BHD-PP01

SWITCHING UNIT
BD250SE305
BD250NE305

PLUG-IN DEVICE
ZO-BD-0250-300

WITHDRAWABLE DEVICE
ZV-BD-0250-300

SWITCHES PS-BHD-...
Simple — Double — Make-and-break — Early

SHUNT TRIP SV-BHD-X...

UNDERVOLTAGE RELEASE SP-BHD-X...

OVERCURRENT RELEASES
SE-BD-...-L001
SE-BD-...-DTV3
SE-BD-...-MTV8
SE-BD-...-MTV9

SWITCH-DISCONNECTOR UNIT
SE-BD-0250-V001
SE-BD-...-4D01

ACCESSORIES TO ZO... AND ZV...
Connecting cable
OD-BHD-KA01

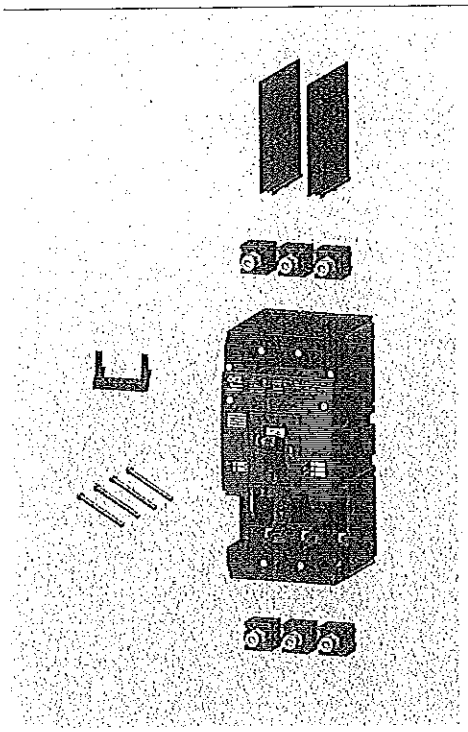
Signalling of position
SO-BHD-0010

Keying set
OD-BD-KK01

ACCESSORIES
Lever with locking — OD-BD-UP01
Sealing insert — OD-BD-VP01
Additional cover for overcurrent release — OD-BD-VP02
Terminal cover — OD-BD-KS03
Insulating barriers — OD-BHD-KS02

SWITCHING UNITS

3P



Type	Product code	I_n [A]	I_{cs} [kA]	Weight [kg]	Package [p
BD250NE305	14414	250	36	2.84	1
BD250SE305	14415	250	65	2.84	1

- TECHNICAL INFORMATION, see page E15
- the method of power circuit connection must observe recommendations, see page E18 as well as deionization space, see pag

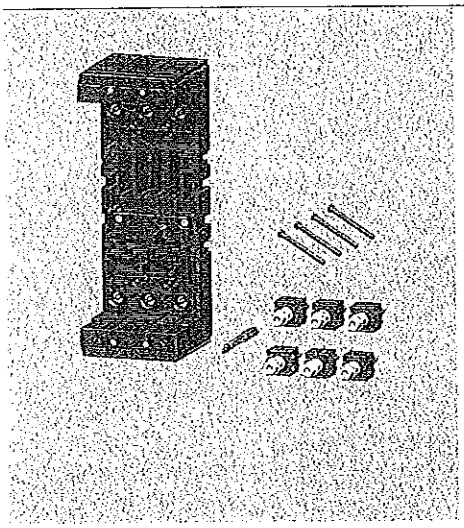
Switching unit: includes
- 2 CS-BD-A011 connecting sets - for connecting busbars or cable lug
- insulating barriers OD-BHD-KS02
- mounting bolts set OD-BD-MS01 (4x M4x35)
- conductor holder OD-BD-DV01

must be fitted with - by overcurrent release SE-BD-... (circuit breaker)
or switch-disconnector unit SE-BD-0250-V001 (switch-disconnecto

[1] - for connecting in another way, it is necessary to use CS-BD-... connecting sets, see page E8

PLUG-IN DEVICE

3P



Type	Product code	Name	Weight [kg]	Package [
ZO-BD-0250-300	14558	Plug-in device	1.593	1

- TECHNICAL INFORMATION, see page page ES0

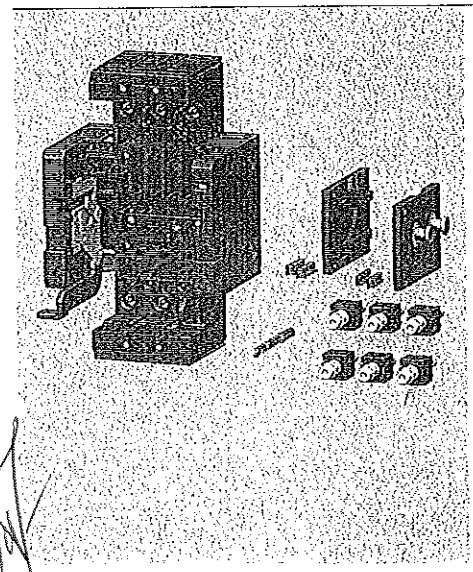
Plug-in device: includes
- complete accessories for assembly circuit breakers/switch-disconne in plug-in design
- mounting bolts set (4x M4x40) - for affixing switching unit to plug-in d

must be fitted with - switching unit BD250..305

- for connecting plug-in device with busbars or cable lugs, connecting sets CS-BD-A011 can be used, that are included in the p of the BD250..305 switching unit - for connecting in another way, it is necessary to use CS-BD-... connecting sets, see p

WITHDRAWABLE DEVICE

3P



Type	Product code	Name	Weight [kg]	Package [
ZV-BD-0250-300	14557	Withdrawable device	2.692	1

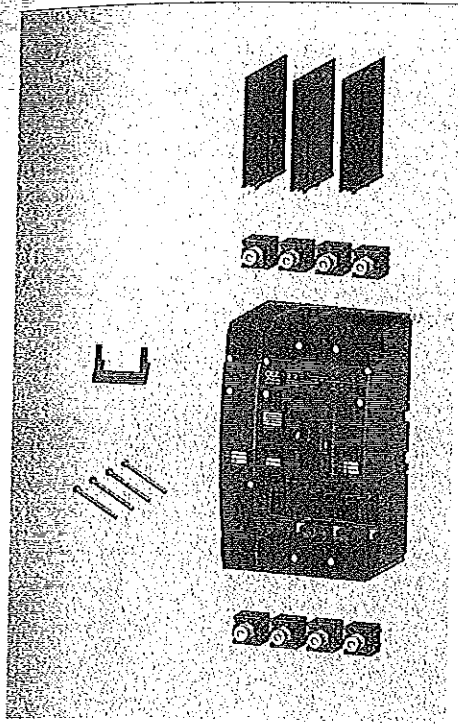
- TECHNICAL INFORMATION, see page ES2

- Withdrawable device: includes
- complete accessories for assembly circuit breakers/switch-disconn in withdrawable design

must be fitted with - switching unit BD250..305

- for connecting withdrawable device with busbars or cable lugs, connecting sets CS-BD-A011 can be used, that are ir with the BD250..305 switching unit - for connecting in another way, it is necessary to use CS-BD ... connecting sets, see

SWITCHING UNITS



4P

Type	Product code	I [A]	I_cs [kA]		Weight [kg]	Package [pc]
BD250NE405	19571	250	36	3P + N -conductor switching	3.7	1
BD250SE405	19573	250	65	3P + N -conductor switching	3.7	1
BD250NE406	19572	250	36	4P -conductor protection	3.9	1
BD250SE406	19574	250	65	4P -conductor protection	3.9	1

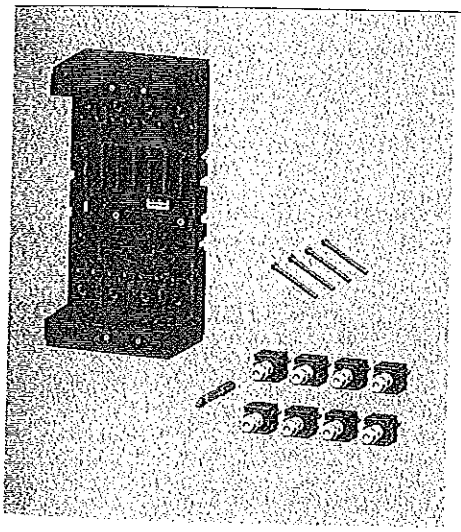
- TECHNICAL INFORMATION, see page E15
- the method of power circuit connection must observe recommendations, see page E18 as well as deionization space, see page E23

Switching unit: includes
- 2 connecting sets - for connecting busbars or cable lugs [1]
- insulating barriers
- mounting bolts set OD-BD-MS01 (4x M4x35)
- conductor holder OD-BD-DV01

must be fitted with - by overcurrent release SE-BD-... (circuit breaker) or switch-disconnector unit SE-BD-0250-V001 (switch-disconnector)

[1] - for connecting in another way, it is necessary to use CS-BD-... connecting sets, see page E8

PLUG-IN DEVICE



4P

Type	Product code	Name	Weight [kg]	Package [pc]
Z0-BD-0250-400	20651	Plug-in device	2.1	1

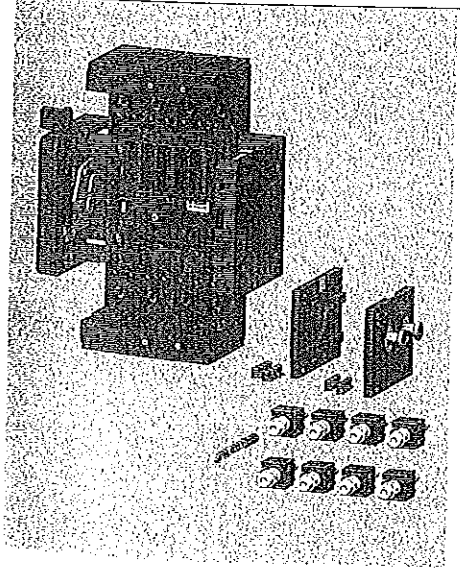
- TECHNICAL INFORMATION, see page E50

Plug-in device: includes
- complete accessories for assembly circuit breakers/switch-disconnectors in plug-in design
- mounting bolts set (4x M4x40) - for affixing switching unit to plug-in device

must be fitted with - switching unit BD250..405 or BD250..406

- for connecting plug-in device with busbars or cable lugs, connecting sets can be used, that are included in the package of the BD250..40.. switching unit - for connecting in another way, it is necessary to use CS-BD-... connecting sets, see page E8

WITHDRAWABLE DEVICE



4P

Type	Product code	Name	Weight [kg]	Package [pc]
ZV-BD-0250-400	20652	Withdrawable device	3.2	1

- TECHNICAL INFORMATION, see page E52

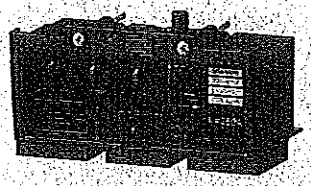
Withdrawable device: includes
- complete accessories for assembling breaker/switch-disconnector in withdrawable design

must be fitted with - switching unit BD250..405 or BD250..406

- for connecting withdrawable device with busbars or cable lugs, connecting sets can be used, that are included with the BD250..40.. switching unit - for connecting in another way it is necessary to use CS-BD-... connecting sets, see page E8

OVERCURRENT RELEASES

3P

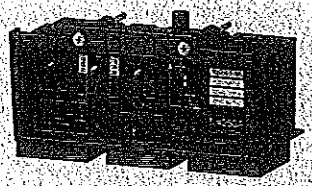


DTV3 - characteristic D - distribution

- protection lines and transformers

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc
100	SE-BD-0100-DTV3	24300	I_n setting = 40 ÷ 100 A	0.317	1
160	SE-BD-0160-DTV3	24200	I_n setting = 63 ÷ 160 A	0.317	1
250	SE-BD-0250-DTV3	24100	I_n setting = 100 ÷ 250 A	0.317	1

- TECHNICAL INFORMATION, see page ES4

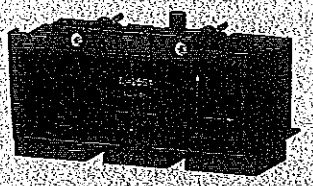


MTV8 - characteristic M - motor

- direct protection for motors and generators
- suitable also for protection lines and transformers

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc
100	SE-BD-0100-MTV8	24310	I_n setting = 40 ÷ 100 A	0.317	1
160	SE-BD-0160-MTV8	24210	I_n setting = 63 ÷ 160 A	0.317	1
250	SE-BD-0250-MTV8	24110	I_n setting = 100 ÷ 250 A	0.317	1

- TECHNICAL INFORMATION, see page ES5

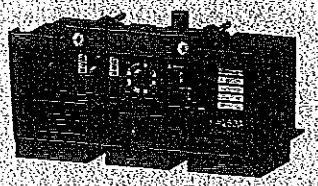


L001 - characteristic L - lines

- protection lines with low starting currents
- without I_n setting

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc
160	SE-BD-0160-L001	20612	Without I_n setting	0.317	1
200	SE-BD-0200-L001	20666	Without I_n setting	0.317	1
250	SE-BD-0250-L001	20613	Without I_n setting	0.317	1

- TECHNICAL INFORMATION, see page ES7



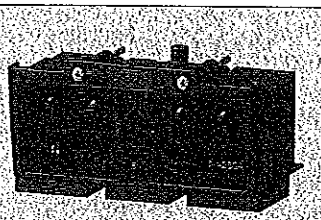
MTV9 - characteristic M - motor with adjustable timing selectivity

- direct protection for motors and generators
- suitable also for protection lines and transformers
- enables setting delay of independent release to 0, 100, 200 or 300 ms

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc
100	SE-BD-0100-MTV9	17304	I_n setting = 40 ÷ 100 A	0.317	1
160	SE-BD-0160-MTV9	19569	I_n setting = 63 ÷ 160 A	0.317	1
250	SE-BD-0250-MTV9	19570	I_n setting = 100 ÷ 250 A	0.317	1

- TECHNICAL INFORMATION, see page ES8

OVERCURRENT RELEASES



4D01 - characteristic D - distribution with N-pole protection

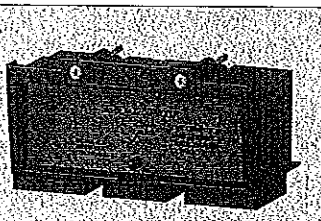
- protection lines and transformers in TN-C-S and TN-S networks

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc
100	SE-BD-0100-4D01	33423	I_n setting = 40 ÷ 100 A	0.327	1
160	SE-BD-0160-4D01	33424	I_n setting = 63 ÷ 160 A	0.327	1
250	SE-BD-0250-4D01	33425	I_n setting = 100 ÷ 250 A	0.327	1

- TECHNICAL INFORMATION, see page E60
- intended for BD250..406 switching unit

SWITCH-DISCONNECTOR UNIT

3P

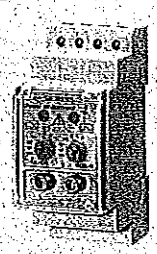


I_n [A]	Type	Product code	Name	Weight [kg]	Package [pc
250	SE-BD-0250-V001	24120	Switch-disconnector unit	0.267	1

- TECHNICAL INFORMATION, see page E15

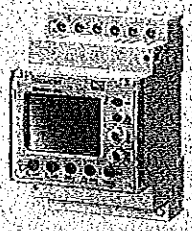
RESIDUAL CURRENT MONITOR

3P 4P



Type	Product code	Description	Weight [kg]	Package [set]
5SV8000-6KK	42658	Analogue design, $I_{\Delta n}$ and $t_{\Delta n}$ setting	0.18	1

- TECHNICAL INFORMATION, see page P4

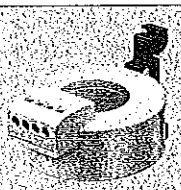


Type	Product code	Description	Weight [kg]	Package [set]
5SV8001-6KK	42659	Digital design, $I_{\Delta n}$ and $t_{\Delta n}$ setting	0.26	1
5SV8200-6KK	42660	Digital design, $I_{\Delta n}$ and $t_{\Delta n}$ setting, 4 channels	0.26	1

- TECHNICAL INFORMATION, see page P4

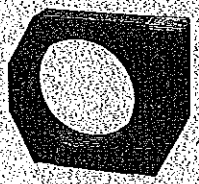
CURRENT TRANSFORMERS FOR RESIDUAL CURRENT MONITOR

3P 4P



Type	Product code	Description	Weight [kg]	Package [set]
5SV8700-0KK	42661	Internal diameter 20 mm, including holder on „U" rail according to EN 60715 wide 35 mm	0.09	1
5SV8701-0KK	42662	Internal diameter 30 mm, including holder on „U" rail according to EN 60715 wide 35 mm	0.11	1

- TECHNICAL INFORMATION, see page P4



Type	Product code	Description	Weight [kg]	Package [set]
5SV8702-0KK	42663	Internal diameter 35 mm, including holder on the panel	0.2	1
5SV8703-0KK	42664	Internal diameter 70 mm, including holder on the panel	0.31	1
5SV8704-0KK	42665	Internal diameter 105 mm, including holder on the panel	0.6	1
5SV8705-0KK	42666	Internal diameter 140 mm, including holder on the panel	1.35	1
5SV8706-0KK	42667	Internal diameter 210 mm, including holder on the panel	1.25	1

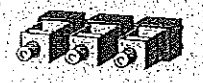
- TECHNICAL INFORMATION, see page P4

Type	Product code	Description	Weight [kg]	Package [set]
5SV8 900-1KK	42668	Holder on „U" rail according to EN 60715 wide 35 mm for current transformers with internal diameter up to and including 105 mm	0.01	2

- TECHNICAL INFORMATION, see page P4

CONNECTING SETS

3P 4P



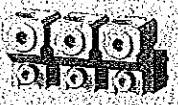
3 terminals

Type	Product code	Description	S [mm²]	Method of connection	Weight [kg]	Package [set]
CS-BD-T011	24810	Clamp terminals	16 ÷ 150	Cu cables, flexibars	0.24	1

- TECHNICAL INFORMATION, see page E19

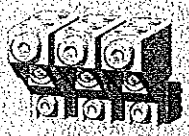
CS-BD-B011	24751	Block terminals	25 ÷ 150	Cu/Al cables	0.21	1

- TECHNICAL INFORMATION, see page E19



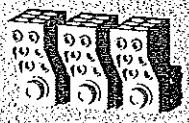
CS-BD-B012	17534	Block terminals	150 ÷ 240	Cu/Al cables	0.2	1

- TECHNICAL INFORMATION, see page E19
- using the OD-BD-KS03 cover the degree of protection IP20 is fulfilled



CS-BD-B021	24752	Double block terminals	2x (25 ÷ 150)	Cu/Al cables	0.51	1
CS-BD-B022	13808	Double block terminals	2x (150 ÷ 240)	Cu/Al cables	0.62	1

- TECHNICAL INFORMATION, see page E19
- using the OD-BD-KS03 cover the degree of protection IP20 is fulfilled

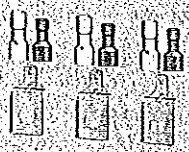


CS-BD-B014	20119	Block terminals - for 6 cables	6x (6 ÷ 35)	Cu/Al cables	0.3	1

- TECHNICAL INFORMATION, see page E19
- using the OD-BD-KS03 cover the degree of protection IP20 is fulfilled

CS-BD-A021	24770	Rear connection		Cu/Al busbars, cable lugs	0.237	1

- TECHNICAL INFORMATION, see page E19



CS-BD-PS01	13682	Potential terminals	1.5 ÷ 2.5; 4 ÷ 6	Cu flexible conductor	0.017	1

- TECHNICAL INFORMATION, see page E19

CS-BD-A011	24750	Front connection		Cu/Al busbars, cable lugs, flexibars	0.12	1

- TECHNICAL INFORMATION, see page E19
- Included in every supply of switching units

1 terminal

Type	Product code	Description	S [mm²]	Method of connection	Weight [kg]	Package [set]
CS-BD-T411	19578	Clamp terminal	16 ÷ 150	Cu cables, flexibars	0.08	1

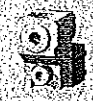
- TECHNICAL INFORMATION, see page E19

CS-BD-B411	19582	Block terminal	25 ÷ 150	Cu/Al cables	0.07	1

- TECHNICAL INFORMATION, see page E19

CS-BD-B412	19577	Block terminal	150 ÷ 240	Cu/Al cables	0.07	1

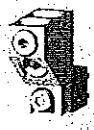
- TECHNICAL INFORMATION, see page E19

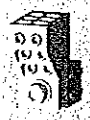


[1] - set includes three terminals

CONNECTING SETS

3P 4P





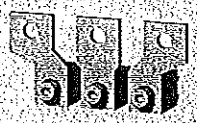
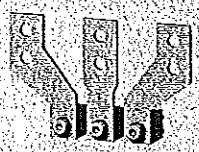
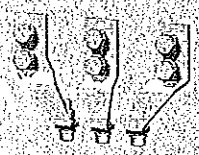
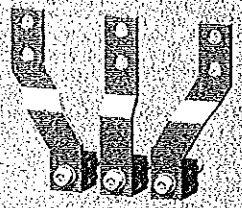
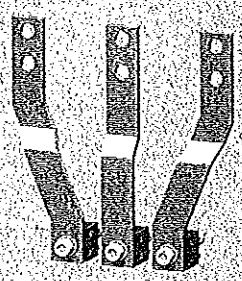
1 terminal

Type	Product code	Description	S [mm²]	Method of connection	Weight [kg]	Package [pc]
CS-BD-B421	19579	Double block terminal	2x (25 ÷ 150)	Cu/Al cables	0.17	1
- TECHNICAL INFORMATION, see page E19						
CS-BD-B422	19580	Double block terminal	2x (150 ÷ 240)	Cu/Al cables	0.21	1
- TECHNICAL INFORMATION, see page E19						
CS-BD-B414	21170	Block terminal - for 6 cables	6x (6 ÷ 35)	Cu/Al cables	0.1	1
- TECHNICAL INFORMATION, see page E19						
CS-BD-A421	19581	Rear connection		Cu/Al busbars, cable lugs	0.08	1
- TECHNICAL INFORMATION, see page E19						
CS-BD-PS41	36031	Potential terminal	1.5 ÷ 2.5/4 ÷ 6		0.005	1
- TECHNICAL INFORMATION, see page E19						

CONNECTING SETS

3P

RETROFIT RETROFIT RETROFIT RETROFIT RETROFIT

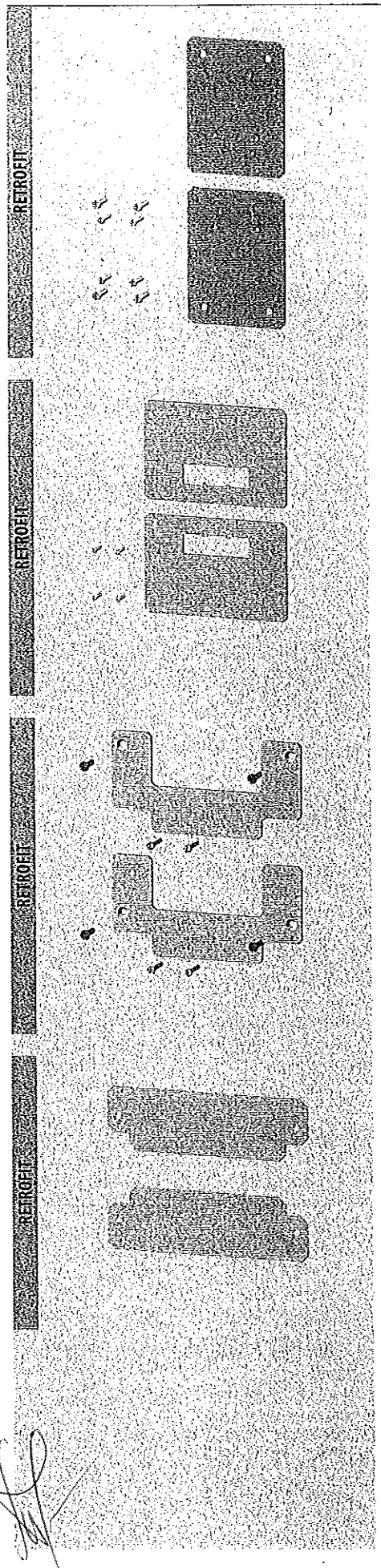
3 terminals

Type	Product code	Description	Method of connection	Weight [kg]	Package [pc]
CS-BD-A037	24772	Reduction for BA...*37-50 - front connection	Cu/Al busbars, cable lugs, flexibars	0.3	1
- TECHNICAL INFORMATION, see page E19					
CS-BD-A039	24771	Reduction for BA...*39-50 a J2UX50 - front connection	Cu/Al busbars, cable lugs, flexibars	0.447	1
- TECHNICAL INFORMATION, see page E19 - for total replacement of BA ...*39-50 or J2UX50 circuit breaker with front connection OD-BHD-MS39 connecting set is necessary					
CS-BD-Z039	18201	Reduction for BA...*39 a J2UX - rear connection	Cu/Al busbars, cable lugs, flexibars	0.739	1
- TECHNICAL INFORMATION, see page E19 - for total replacement of BA...*39 or J2UX circuit breaker with rear connection OD-BD-MZ39 and CS-BD-A021 connecting sets are necessary					
CS-BD-JX75	18023	Reduction for BA...*39-75 and J2UX75 - front connection, withdrawable design	Cu/Al busbars, cable lugs, flexibars	0.558	1
- TECHNICAL INFORMATION, see page E19 - for total replacement of BA...*39-75 or J2UX75T circuit breakers with front connection in withdrawable design OD-BHD-MS75 connecting set and ZO-BD-0250-300 plug-in device or ZV-BD-0250-300 withdrawable device are necessary					
CS-BD-JT75	18024	Reduction for J2UX75T - front connection, withdrawable design	Cu/Al busbars, cable lugs, flexibars	0.711	1
- TECHNICAL INFORMATION, see page E19 - for total replacement of J2UX75T circuit breaker with front connection in withdrawable design OD-BHD-MS75 connecting set and ZO-BD-0250-300 plug-in device or ZV-BD-0250-300 withdrawable device are necessary					

RETROFIT - sets, which enable replacement of older circuit breakers by a new circuit breakers without switchboard reconstruction

MOUNTING SETS

3P



Type	Product code	Description	Weight [kg]	Package [se
OD-BHD-MS39	24741	Reduction for BA...*39-50 and J2UX50 - front connection	0.7	1

- DIMENSIONS see page E28
- for total replacement of BA ...*39-50 or J2UX50 circuit breaker with front connection 2 connecting sets CS-BD-A039 are necessary

OD-BD-MZ39	18203	Reduction for BA...*39 and J2UX - rear connection	1.255	1

-DIMENSIONS see page E28
- for total replacement of BA...*39 or J2UX circuit breaker with rear connection 2 connecting sets CS-BD-Z039 and CS-BD-A021 are necess

OD-BD-MT75	33330	Reduction for J2UX75T - front connection, withdrawable design	1

- DIMENSIONS see page E34, E38
- for total replacement of J2UX75T circuit breaker with front connection in withdrawable design 2 connecting sets CS-BD-JT75 ar ZO-BD-0250-300 plug-in device or ZV-BD-0250-300 withdrawable device are necessary

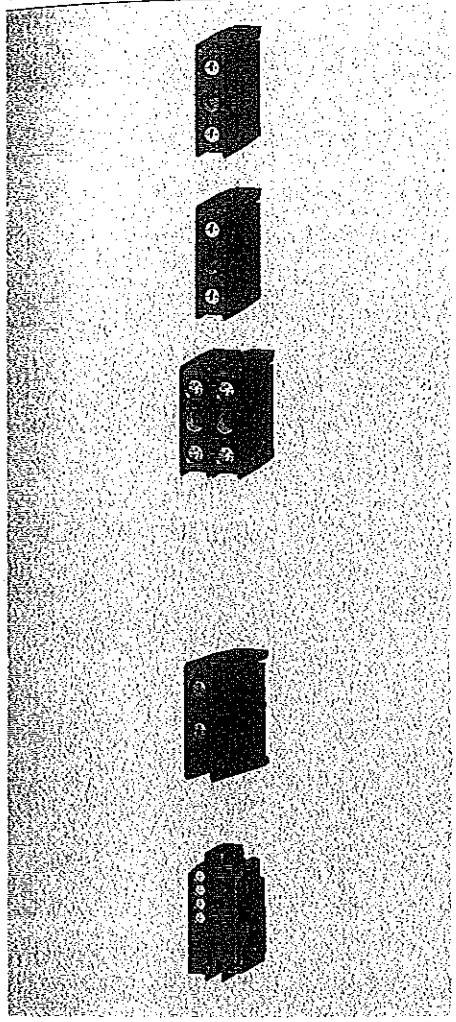
OD-BHD-MS75	14563	Reduction for BA...*39-75 and J2UX75 - front connection, withdrawable design	0.446	1

- DIMENSIONS see page E34, E37
- for total replacement of BA...*39-75 or J2UX75 circuit breaker with front connection in withdrawable design 2 connecting sets CS-BD-JX7! and ZO-BD-0250-300 plug-in device or ZV-BD-0250-300 withdrawable device are necessary

[1] - one set provides for replacing one circuit breaker (set includes coupling elements necessary to assemble circuit breaker and mounting set)

RETROFIT - sets, which enable replacement of older circuit breakers by a new circuit breakers without switchboard reconstructio

SWITCHES



Single make contacts

Type	Product code	Operating voltage	Contacts	Weight [kg]	Package [pc]
PS-BHD-1000	24700	60 ÷ 500 V a.c./d.c.		0.012	1
PS-BHD-1000-Au	24702	5 ÷ 60 V a.c./d.c.		0.012	1

Single break contacts

Type	Product code	Operating voltage	Contacts	Weight [kg]	Package [pc]
PS-BHD-0100	24701	60 ÷ 500 V a.c./d.c.		0.013	1
PS-BHD-0100-Au	24703	5 ÷ 60 V a.c./d.c.		0.013	1

Double

Type	Product code	Operating voltage	Contacts	Weight [kg]	Package [pc]
PS-BHD-0200	13690	60 ÷ 500 V a.c./d.c.		0.026	1
PS-BHD-0200-Au	13693	5 ÷ 60 V a.c./d.c.		0.026	1
PS-BHD-1100	13691	60 ÷ 500 V a.c./d.c.		0.025	1
PS-BHD-1100-Au	13694	5 ÷ 60 V a.c./d.c.		0.025	1
PS-BHD-2000	13689	60 ÷ 500 V a.c./d.c.		0.024	1
PS-BHD-2000-Au	13692	5 ÷ 60 V a.c./d.c.		0.024	1

Make-and-break

Type	Product code	Operating voltage	Contacts	Weight [kg]	Package [pc]
PS-BHD-0010	18021	60 ÷ 250 V a.c./d.c.		0.013	1
PS-BHD-0010-Au	18022	5 ÷ 60 V a.c./d.c.		0.013	1
PS-BHD-0020	35 893	60 ÷ 250 V a.c./d.c.		0.026	1
PS-BHD-0020-Au	37467	5 ÷ 60 V a.c./d.c.		0.026	1

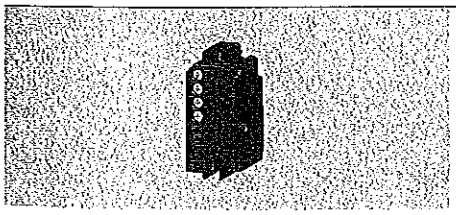
Early

Type	Product code	Description	Contacts	Weight [kg]	Package [pc]
SP-BHD-0002	16169	Early contact		0.045	1

- TECHNICAL INFORMATION for all switch, see page E61

SHUNT TRIPS

3P 4P

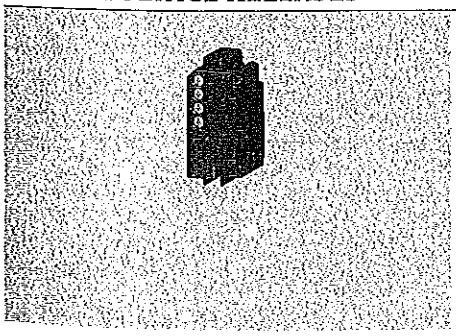


Type	Product code	Operating voltage	Weight [kg]	Package [pc]
SV-BHD-X024	24650	24, 40, 48 V a.c./d.c.	0.14	1
SV-BHD-X110	24630	110 V a.c./d.c.	0.14	1
SV-BHD-X230	24620	230, 400, 500 V a.c./ 220 V d.c.	0.14	1

- TECHNICAL INFORMATION, see page E62

UNDERVOLTAGE RELEASES

3P 4P

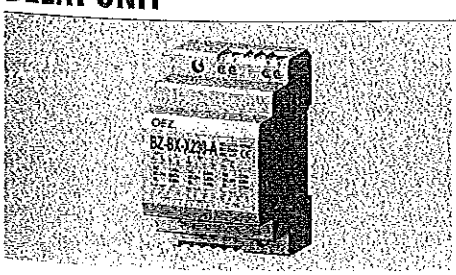


Type	Product code	Operating voltage	Description	Weight [kg]	Package [pc]
SP-BHD-X024	24450	24, 40, 48 V a.c./d.c.		0.11	1
SP-BHD-X110	24430	110 V a.c./d.c.		0.11	1
SP-BHD-X230	24420	230, 400, 500 V a.c./ 220 V d.c.		0.11	1
SP-BHD-X024-0001[1]	24550	24, 40, 48 V a.c./d.c.	early contact	0.12	1
SP-BHD-X110-0001[1]	24530	110 V a.c./d.c.	early contact	0.12	1
SP-BHD-X230-0001[1]	24520	230, 400, 500 V a.c./ 220 V d.c.	early contact	0.12	1

- TECHNICAL INFORMATION, see page E64

[1] - cannot be used in combination with motor drive MP-BD-X...

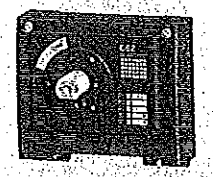
DELAY UNIT



Type	Product code	Description	Weight [kg]	Package [pc]
BZ-BX-X230A	36696	- enables to delay the undervoltage release tripping of circuit breakers Modeion	0.12	1

- TECHNICAL INFORMATION, see page P2

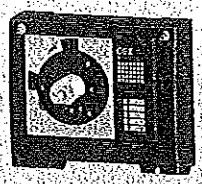
HAND DRIVES



Type	Product code	Name - description		Weight [kg]	Package [pcs]
RP-BD-CK10	13651	Hand drive unit	- without locking	0.223	1
RP-BD-CK20	13652	Hand drive unit	- with locking	0.223	1

- TECHNICAL INFORMATION, see page E66

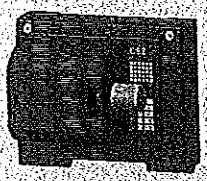
Hand drive unit must be fitted with: ■ for controlling on switch unit - with the black hand drive lever RP-BHD-CP10 or RP-BHD-CP20
■ for controlling through the switchboard door - with the extension shaft RP-BHD-CH..
- with the hand drive bearing RP-BHD-CN..
- with the hand drive lever RP-BHD-CP..



RP-BD-CK21	13684	Hand drive unit - yellow label	- with locking	0.223	1

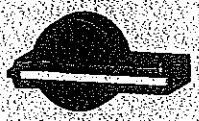
- TECHNICAL INFORMATION, see page E66

Hand drive unit must be fitted with: ■ for controlling on switch unit - with the red hand drive lever RP-BHD-CP21
■ for controlling through the switchboard door - with the extension shaft RP-BHD-CH..
- with the hand drive bearing RP-BHD-CN..
- with the hand drive lever RP-BHD-CP..



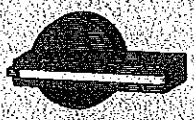
RP-BD-CK30	37250	Hand drive unit for right side control	0.484	1
RP-BD-CK31	37251	Hand drive unit left side control	0.484	1

- TECHNICAL INFORMATION, see page E66



RP-BHD-CP10	13655	Hand drive lever - black	- without locking	0.075	1
RP-BHD-CP20	13656	Hand drive lever - black	- with locking	0.075	1

- TECHNICAL INFORMATION, see page E66



RP-BHD-CP21	13657	Hand drive lever - red	- with locking	0.075	1

- TECHNICAL INFORMATION, see page E66

RP-BHD-CN40	37246	Hand drive bearing	- degree of protection IP40	0.14	1

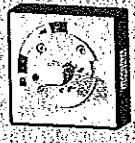
- TECHNICAL INFORMATION, see page E66
- Is used in combination with the black lever of RP-BHD-CP10, RP-BHD-CP20 hand drives

RP-BHD-CN41	37247	Hand drive bearing - yellow label	- degree of protection IP40	0.14	1

- TECHNICAL INFORMATION, see page E66
- is used in combination with the red lever of RP-BHD-CP21 hand drive

RP-BHD-CN60	37248	Hand drive bearing	- degree of protection IP66	0.14	1

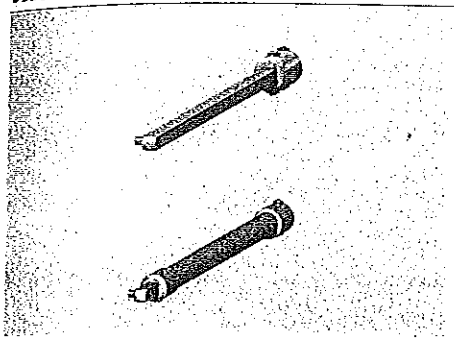
- TECHNICAL INFORMATION, see page E66
- Is used in combination with the black lever of RP-BHD-CP10, RP-BHD-CP20 hand drives



RP-BHD-CN61	37249	Hand drive bearing - yellow label - degree of protection IP66	- degree of protection IP66	0.14	1

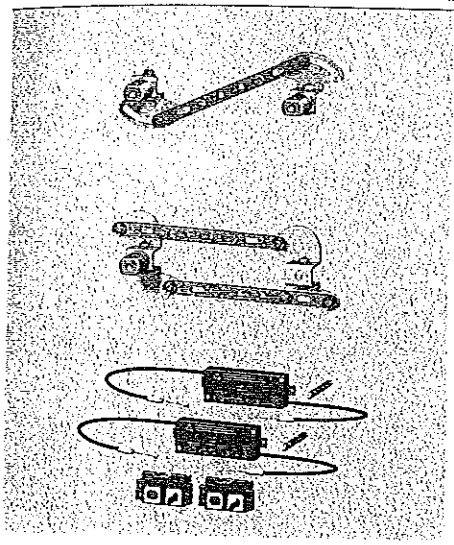
- TECHNICAL INFORMATION, see page E66
- Is used in combination with the red lever of RP-BHD-CP21 hand drive

HAND DRIVES



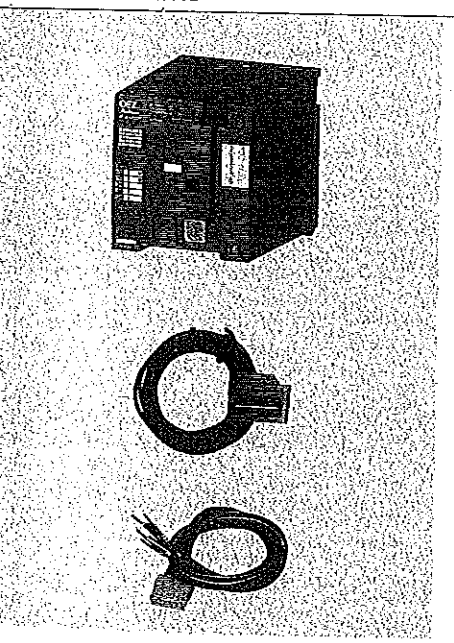
Type	Product code	Name - description	Weight [kg]	Package [pc]	3P	4P
RP-BHD-CH10	13658	Extension shaft - length 365 mm, can be shortened	0.205	1		
- TECHNICAL INFORMATION, see page E66						
RP-BHD-CH20	13659	Extension shaft - telescopic, length 245 ÷ 410 mm	0.255	1		
- TECHNICAL INFORMATION, see page E66						

MECHANICAL INTERLOCKING AND PARALLEL SWITCHING



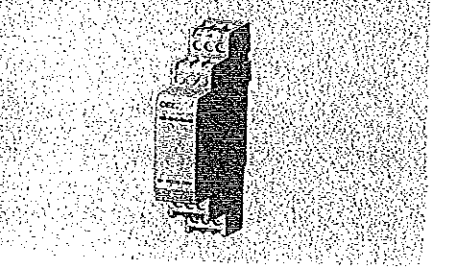
Type	Product code	Name - description	Weight [kg]	Package [pc]	3P	4P
RP-BHD-CB10	18290	Mechanical interlocking - for fixed design	0.16	1		
- TECHNICAL INFORMATION, see page E67						
- mechanical interlocking must be fitted with: 2 hand drive units RP-BD-CK.., 2 hand drive levers RP-BHD-CP..						
RP-BHD-CD10	18289	Mechanical parallel switching - for fixed design	0.23	1		
- TECHNICAL INFORMATION, see page E67						
- mechanical parallel switching must be fitted with: 2 hand drive units RP-BD-CK.., the hand drive lever RP-BHD-CP..						
MB-BD-PV05	19612	Mechanical interlocking - for two circuit breakers BD250	0.448	1		
MB-BHD-PV03	19613	Mechanical interlocking - for one BD250 and one BH630 circuit breaker	0.448	1		
- TECHNICAL INFORMATION, see page E67						
- mechanical blocking with Bowden cable is intended for fixed, plug-in and withdrawable design						

MOTOR DRIVES



Type	Product code	Name - description	Operating voltage	Weight [kg]	Package [pc]	3P	4P
MP-BD-X024[1]	21216	Motor drive	24 V a.c./d.c.	1.529	1		
MP-BD-X048[1]	19790	Motor drive	48 V a.c./d.c.	1.529	1		
MP-BD-X110	13537	Motor drive	110 V a.c./d.c.	1.529	1		
MP-BD-X230	13535	Motor drive	230 V a.c./220 V d.c.	1.529	1		
MP-BD-X024-P[1]	20592	Motor drive - with counter of cycles	24 V a.c./d.c.	1.546	1		
MP-BD-X048-P[1]	19791	Motor drive - with counter of cycles	48 V a.c./d.c.	1.546	1		
MP-BD-X110-P	13686	Motor drive - with counter of cycles	110 V a.c./d.c.	1.546	1		
MP-BD-X230-P	13538	Motor drive - with counter of cycles	230 V a.c./220 V d.c.	1.546	1		
- TECHNICAL INFORMATION, see page E69							
- motor drive cannot be used in combination with SP-BHD-X...-0001							
[1] - custom production							
OD-BHD-PP01	13688	Counter of cycles - cable length 1.1 m		0.08	1		
- DIMENSIONS see page E30							
- upon agreement with the manufacturer, different conductor lengths can be supplied							
OD-BHD-KA02	13809	Extension cable - to motor drive 12 wires, length 0.6 m		0.1	1		
- TECHNICAL INFORMATION, see page E69							
- upon agreement with the manufacturer, different conductor lengths can be supplied							

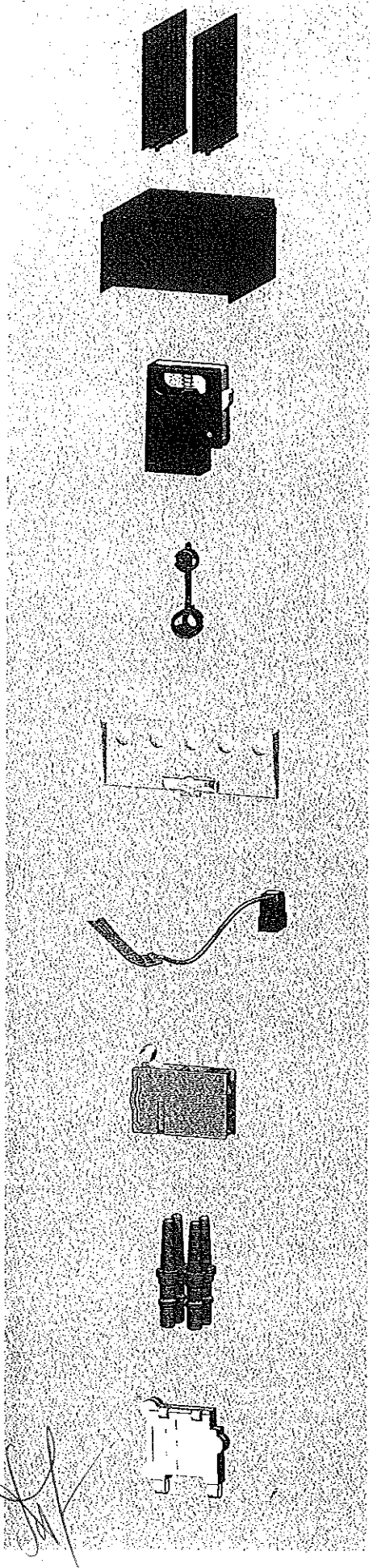
CONTROL RELAY



Type	Product code	Specifications	Weight [kg]	Package [pc]
OD-BHD-RX01	37425	24 V a.c./d.c.	0.06	1
OD-BHD-RX02	37426	48 V a.c./d.c.	0.06	1
OD-BHD-RA03	37427	110 ÷ 230 V a.c.	0.06	1
OD-BHD-RD04	37428	110 V d.c.	0.06	1
- TECHNICAL INFORMATION, see page P3				

ACCESSORIES

3P



Type	Product code	Name - description	Weight [kg]	Package
OD-BHD-KS02	24740	Insulating barriers - set (two pieces), for 3P and 4P design	0.077	1
OD-BHD-KS42	19575	Insulating barrier - one piece, for 4P design	0.039	1

- included with each switching unit order
- in case circuit breaker/switch-disconnector connection is reversed (supply to terminals 2, 4, 6) it is necessary in most cases to ins these barriers also on the lower side
- for more detailed information see page E22

OD-BD-KS03	13534	Terminal cover - degree of protection IP20, for 3P design	0.098	1
OD-BD-KS43	19576	Terminal cover - degree of protection IP20, for 4P design	0.141	1

- increases degree of protection of connection point to IP20 when using CS-BD-B012, B021, B022 and B014 block type terminals
- intended for fixed, plug-in and withdrawable design

OD-BD-UP01	13533	Lever with locking	0.009	1

- enables to lock the circuit breaker in „switched off manually" position (loaded)
- locking is possible using padlock with shank diameter 4 ÷ 6 mm

OD-BD-VP01	15328	Bolt sealing insert	0.001	2

- enables sealing for:
  - cover of cavities
  - terminal cover
  - overcurrent release
  - hand drive unit
  - motor drive

OD-BD-VP02	18215	Additional cover for overcurrent release	0.08	1

- enables sealing for overcurrent releases such as circuit breakers in the main meter switchboard

OD-BHD-KA01	14555	Connecting cable - to connect the circuit breaker/ /switch-disconnector accessories in the plug-in/ /withdrawable design - 15 wires (it is possible for plug-in design and fixed design)	0.12	1

SO-BHD-0010	14560	Signalling of position - signals circuit breaker position in the plug-in or withdrawable device	0.018	1

- TECHNICAL INFORMATION, see page E50, E52

OD-BD-KK01	14559	Keying set - prevents inserting in the plug-in or withdrawable devices beyond the switching unit	0.002	1

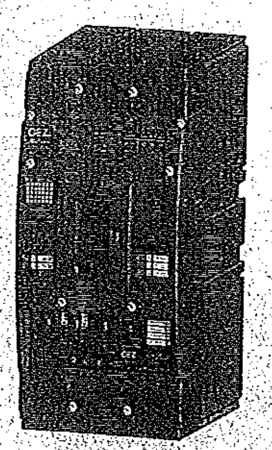
- TECHNICAL INFORMATION, see page E50, E52

OD-BHD-KT01	14642	Cover of switch on button - for motor drive, cover can be sealed	0.002	1

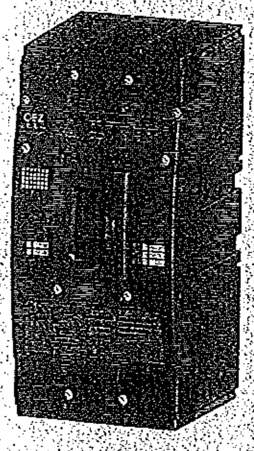
- TECHNICAL INFORMATION, see page E69

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

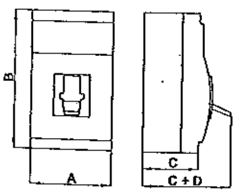
3P 4P



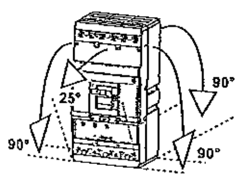
Circuit breaker



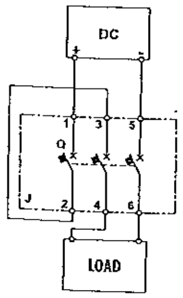
Switch-disconnector



Dimensions



Installation positions - fixed, plug-in and withdrawable design



Connection of switch-disconnector for DC circuits

Specifications

		CIRCUIT BREAKER	SWITCH-DISCONNECTOR
Type		BD250N, BD250S	
Dimensions A x B x C + D (3P/4P design)		105/140 x 225 x 105 + 43 mm	105/140 x 225 x 105 + 43 mm
Weight (3P/4P design)		3 kg/4 kg	3 kg/4 kg
Standards		EN 60947-2, IEC 60947-2	EN 60947-3, IEC 60947-3
Approval marks		CE	
Number of poles		3, 4	3, 4
Rated current	I_n	100, 160, 200, 250 A	-
Rated normal current	I_u	250 A	250 A
Rated operating current	I_e	-	250 A
Rated operating voltage	U_e	max. 690 V a.c.	max. 690 V a.c.
		-	max. 440 V d.c.
Rated frequency	f_n	50/60 Hz	50/60 Hz
Rated impulse withstand voltage	U_{imp}	8 kV	8 kV
Rated insulation voltage	U_i	690 V	690 V
Utilization category (selectivity)	690 V a.c.	A	-
Utilization category (switching mode)	690 V a.c.	-	AC-23B
	440 V d.c.	-	DC-23B
Rated short-time withstand current at U_e = 690 V a.c.	I_{cw}/t	2.5 kA/1 s	3 kA/5 s

Series		NORMAL BD250N	SUPERIOR BD250S	U_e	SWITCH-DISCONNECTOR
Rated short-circuit ultimate breaking capacity (rms) [1]	I_{cu}	60 kA	100 kA	230 V a.c.	
		36 kA	65 kA	415 V a.c.	-
		16 kA	25 kA	500 V a.c.	
		10 kA	13 kA	690 V a.c.	
Rated short-circuit service breaking capacity (rms)	I_{cs}	30 kA	50 kA	230 V a.c.	
		18 kA	36 kA	415 V a.c.	
		8 kA	13 kA	500 V a.c.	
		5 kA	8 kA	690 V a.c.	
Rated short-circuit making capacity (peak value)	I_{cm}/U_e	75 kA	140 kA	415 V a.c.	4 kA/415 V a.c.
		-	-	-	4 kA/440 V d.c.

	CIRCUIT BREAKER	SWITCH-DISCONNECTOR
Switching off time at I_{cu}	10 ms	
Losses per 1 pole fixed/withdrawable design	18 W/25 W	18 W/25 W
Mechanical endurance	30 000 cycles	30 000 cycles
Electrical endurance	3 000 cycles	3 000 cycles
Switching frequency	120 cycles/hr.	120 cycles/hr
Control force	80 N	80 N
Degree of protection from front side of the device	IP40	IP40
Degree of protection of terminals	IP20	IP20
Operating conditions		
Reference ambient temperature	40 °C	40 °C
Ambient temperature range	-40 °C ÷ +55 °C	-40 °C ÷ +55 °C
Working environment	dry and tropical climate	dry and tropical climate
Climatic resistance	EN 60068	EN 60068
Pollution degree	3	3
Max. sea level	2 000 m	2 000 m
Seismic resistance	3g (8 ÷ 50) Hz	3g (8 ÷ 50) Hz
Design modifications		
Front/rear connection	•/•	•/•
Plug-in design 3P/4P	•/•	•/•
Withdrawable design 3P/4P	•/•	•/•
Accessories		
Switches - auxiliary/relative/signal/early	•/•/•/•	•/•/•/•
Shunt trip	•	•
Undervoltage release/with early switch	•/•	•/•
Front hand drive/with adjustable lever	•/•	•/•
Mechanical interlocking-with Bowden cable/for hand drive	•/•	•/•
Motor drive/with counter of cycles	•/•	•/•
Lever with locking	•	•
Bolt sealing insert/additional cover for overcurrent release	•/•	•/•

• available, – unavailable, + being prepared

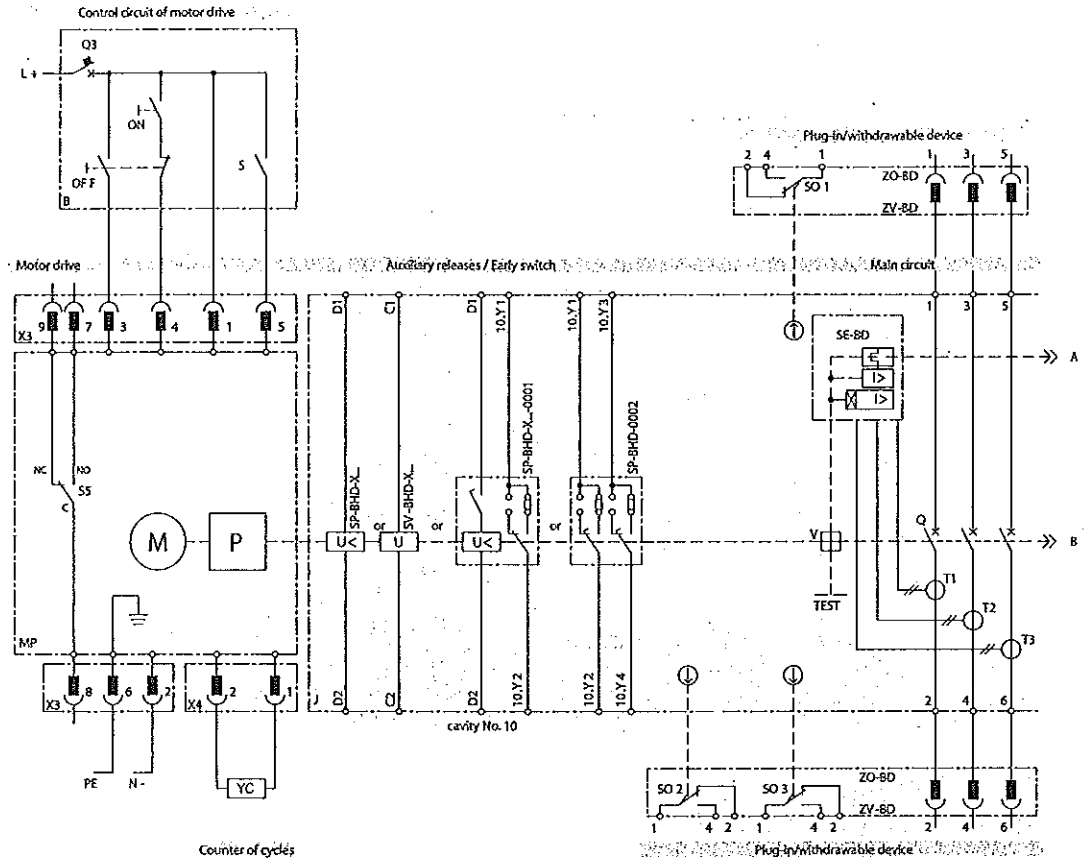
[1] - in case circuit breaker connection is reversed (input terminals 2, 4, 6, output terminals 1, 3, 5) I_{cu} does not change

- protection of Modeion switch-disconnectors, see page R

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Diagram

Circuit breaker with accessories (3-pole design)



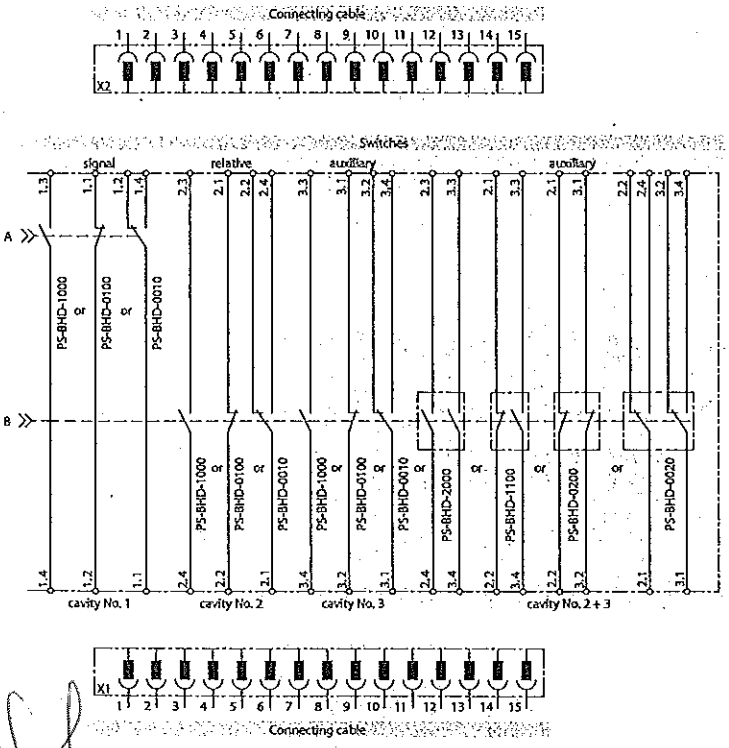


Diagram description (3P and 4P design)

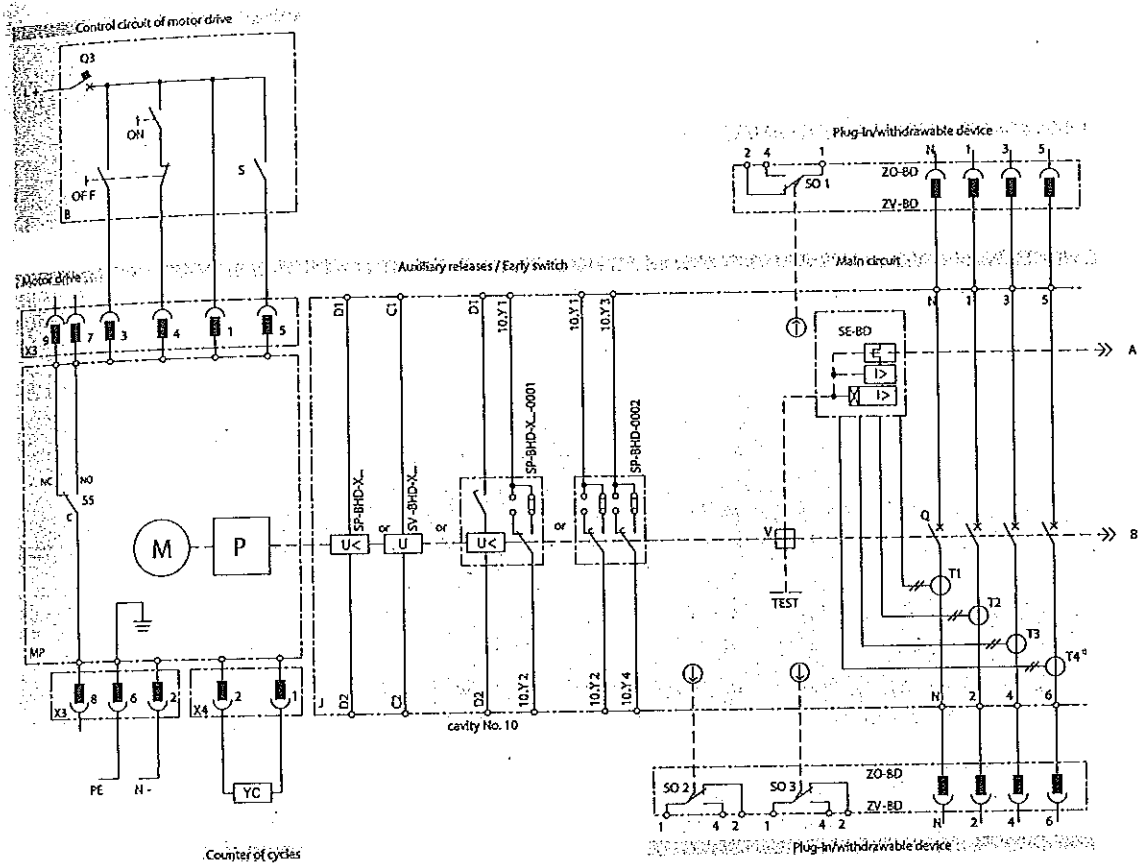
MP	motor drive - MP-BD-X...
M	motor
P	storage device
X3	connector for connection of control circuits
X4	connector for external counter of cycles
SS	switch to indicate AUTO (NO-C) / MANUAL (NC-C) modes
YC	external counter of cycles - OD-BHD-PP01
B	recommended wiring of the control circuits - it is not a part of motor dr
ON	switch on button
OFF	switch off button
S	switch for energy storage (switched on = automatic storage, switch may be continuously switched on)
Q3	motor drive circuit breaker - see page E69
J	switching unit - BD250..305
Q	main contacts
T1, T2, T3, T4[1]	current transformers
V	trip-free mechanism
SE-BD	circuit breaker - overcurrent release - SE-BD-... - ... switch-disconnect - switch-disconnector unit - SE-BD-0250-V001
TEST	push button to test release
ZO-BD	plug-in device - ZO-BD-0250-300
ZV-BD	withdrawable device - ZV-BD-0250-300
X1, X2	connecting cable - OD-BHD-KA01
S01, S02, S03	contacts signalling circuit breaker/switch-disconnector position in plug-in or withdrawable device S0-BHD-0010 - for more detailed information see page E59, E52
SP-BHD-X...	undervoltage release
SV-BHD-X...	shunt trip
SP-BHD-X...-0001	undervoltage release with early contact
SP-BHD-0002	early contact

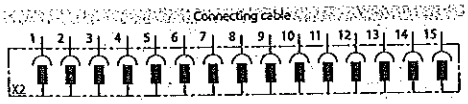
[1] - only for 4-pole design of BD250..406 switching unit

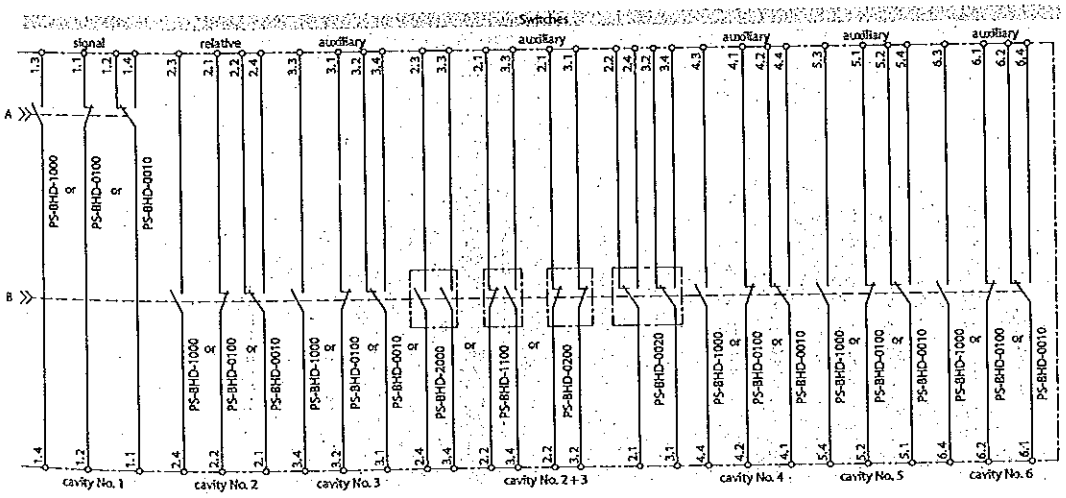
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

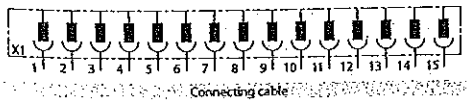
Diagram

Circuit breaker with accessories (4-pole design)









CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P 4P

Connecting and installation

Power circuit

- connected with Cu/Al busbars or cables and possibly cables with cable lugs
- connection sets are produced to provide greater connecting options, see page E8
- generally, conductors from the supply are connected to input terminals 1, 3, 5 and conductors from the load to terminals 2, 4, 6; however, it is possible to reverse the connection (exchanging input and output terminals without limiting rated short-circuit ultimate breaking capacity I_{cu})
- **in case of reversed connection, in the majority of cases, circuit breaker/switch-disconnector must be fitted with OD-BHD-KS02 insulating barriers also on the side of terminals 2, 4, 6, for more detailed information see page E22**
- we recommend painting the connecting busbars
- **input and output conductors/busbars must be mechanically reinforced in order to avoid transferring electrodynamic forces to the circuit breaker/ /switch-disconnector during short-circuiting**
- **the method of connecting the power circuit must observe the deionization space of the circuit breaker/ /switch-disconnector, see page E23**

Auxillary circuits

- switches, shunt trips or undervoltage releases are connected using flexible Cu conductors with cross-section 0.5 ÷ 1 mm² directly to terminals on these devices
- motor drive and auxiliary circuits of the plug-in or withdrawable design are connected using a connector

Recommended min. cross-sections of cables, busbars and flexibars for fixed, plug-in and withdrawable designs

I_n (A)	Cables S (mm²)		Busbars W x H (mm)	
	Cu	Al	Cu	Al
40	10	16	-	-
50	10	16	-	-
63	16	25	-	-
80	25	35	-	-
100	35	50	20 x 2	25 x 2
125	50	70	25 x 2	25 x 3
160	70	95	25 x 3	25 x 4
200	95	120	25 x 4	25 x 5
250	120	150	25 x 5	25 x 6

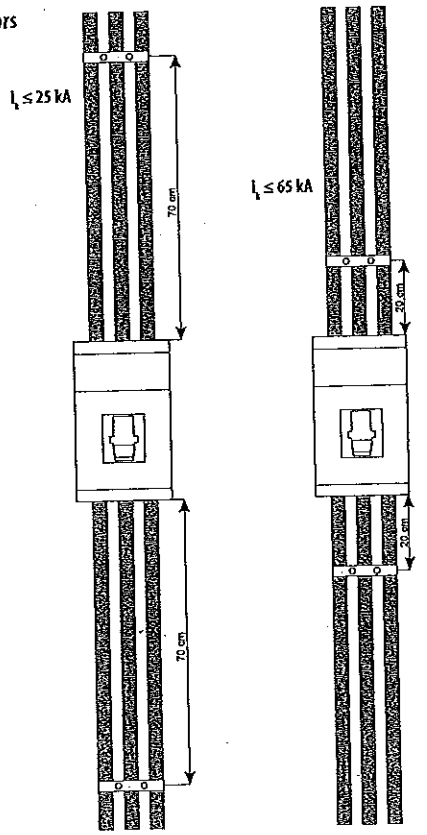
- it is necessary to follow the relevant valid standards when cables are designed

Maximum circuit breaker/switch-disconnector loads in accordance with ambient temperature

Circuit breaker/switch-disconnector BD250 - connection by Cu cable 1x 120 mm² per pole

50 °C	55 °C	60 °C	65 °C	70 °C
250 A	250 A	250 A	250 A	250 A

Mechanical reinforcement of conductors for BD250



CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P 4P

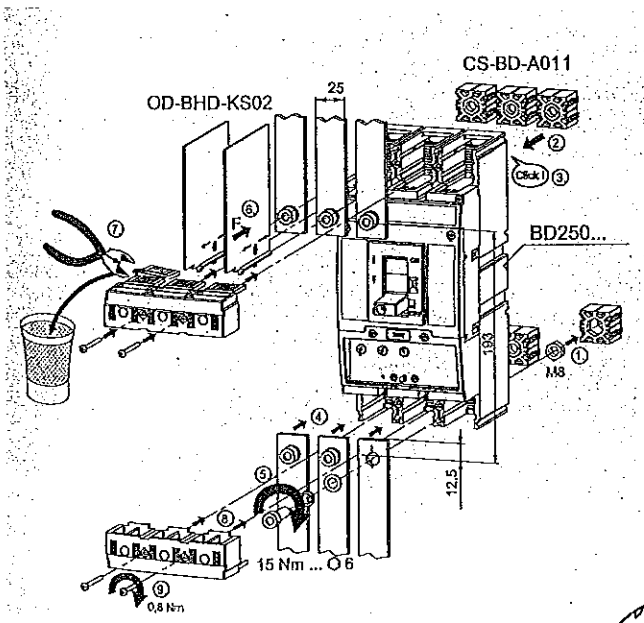
Connecting and installation

Connecting set specifications

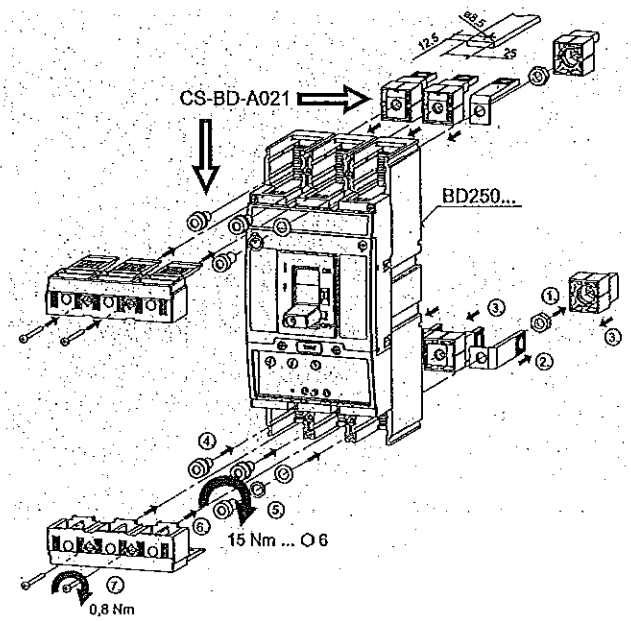
Type	I_n (A)	Cable - ranges of connection cross-sections s (mm²)				
	Type of cable	sector stranded	sector solid	round stranded	round solid	Busbars and cables - Dimensional drugs W x H (mm) - drawing 3/4P
CS-BD-A011	250					25 x ...
CS-BD-A021 CS-BD-B421	250					25 x ... page E27, E41
CS-BD-T011 CS-BD-T411	250	16 ÷ 150 Cu	10 ÷ 150 Cu	16 ÷ 150 Cu	10 ÷ 150 Cu	—
CS-BD-B011 CS-BD-B411	250	25 ÷ 150 Cu/Al	16 ÷ 150 Cu/Al	25 ÷ 150 Cu/Al	16 ÷ 150 Cu/Al	
CS-BD-B012 CS-BD-B412	250	150 ÷ 240 Cu/Al	120 ÷ 240 Cu/Al	150 ÷ 240 Cu/Al	120 ÷ 240 Cu/Al	page E24, E39
CS-BD-B021 CS-BD-B421	250	2x (25 ÷ 150) Cu/Al	2x (16 ÷ 150) Cu/Al	2x (25 ÷ 150) Cu/Al	2x (16 ÷ 150) Cu/Al	page E24, E39
CS-BD-B022 CS-BD-B422	250	2x (150 ÷ 240) Cu/Al	2x (120 ÷ 240) Cu/Al	2x (150 ÷ 240) Cu/Al	2x (120 ÷ 240) Cu/Al	page E25, E40
CS-BD-B014 CS-BD-B414	250	6x (6 ÷ 35) Cu/Al	6x (6 ÷ 35) Cu/Al	6x (6 ÷ 35) Cu/Al	6x (6 ÷ 35) Cu/Al	page E26, E40
CS-BD-A037	250	**RETROFIT** - reduction for circuit breaker BA...*37 with front connection				page E26, E41
CS-BD-A039	250	**RETROFIT** - reduction for circuit breaker BA...*39 and J2UX with front connection				page E27
CS-BD-Z039	250	**RETROFIT** - reduction for circuit breaker BA...*39 and J2UX with rear connection				page E28
CS-BD-JX75	250	**RETROFIT** - reduction for circuit breaker BA...39-75 and J2UX75 with front connection in plug-in or withdrawable device				page E28
CS-BD-JT75	250	**RETROFIT** - reduction for circuit breaker J2UX75T with front connection in plug-in or withdrawable device				page E34, E38
CS-BD-PS01	10/16	1.5÷2.5/4÷6 Cu flexible conductor				
CS-BD-PS41	10/16	1.5÷2.5/4÷6 Cu flexible conductor				

RETROFIT - sets, which enable replacement of older circuit breakers by a new circuit breakers without switchboard reconstruction

Front connection - Cu/Al busbars



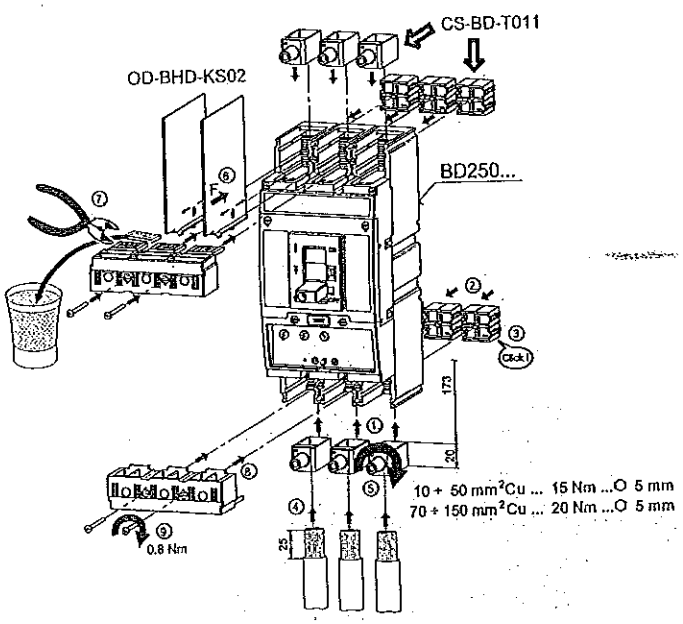
Rear connection - Cu/Al busbars



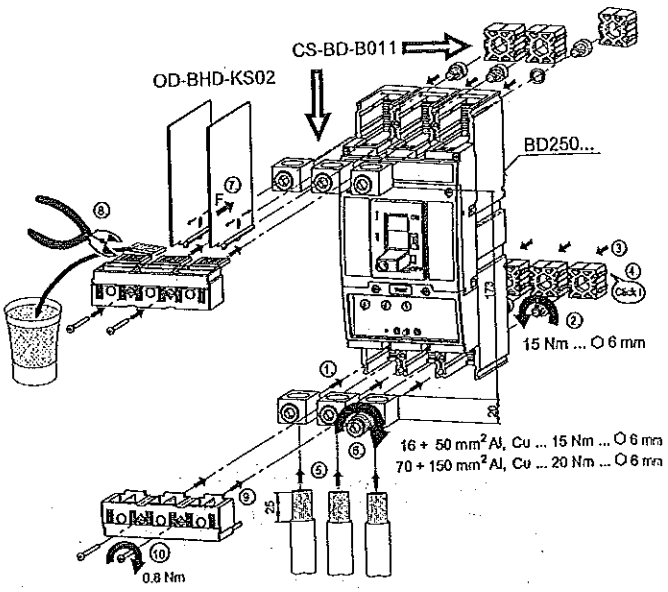
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Connecting and installation

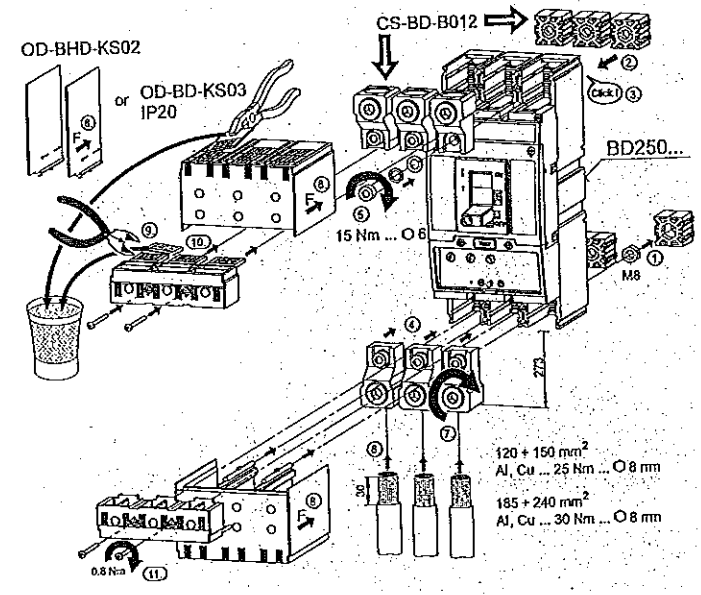
Front connection - Cu cables



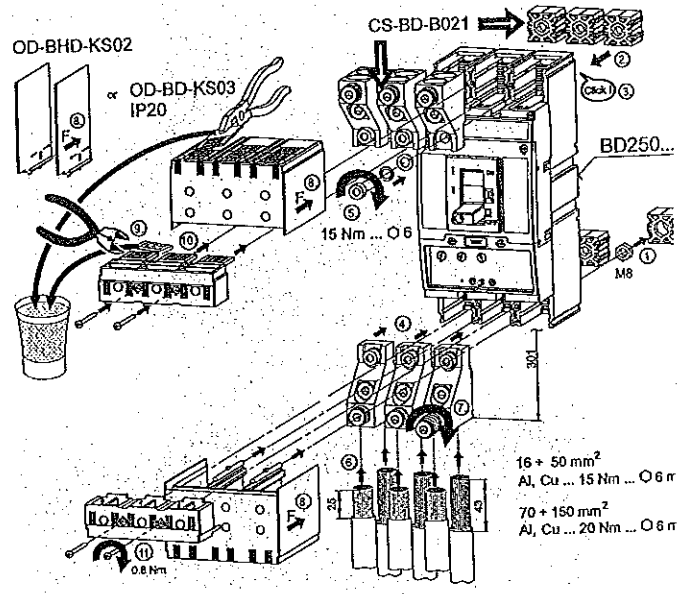
Front connection - Cu/Al cables cables - up to 150 mm²



Front connection - Cu/Al cables up to 240 mm²



Front connection - 2 Cu/Al cables

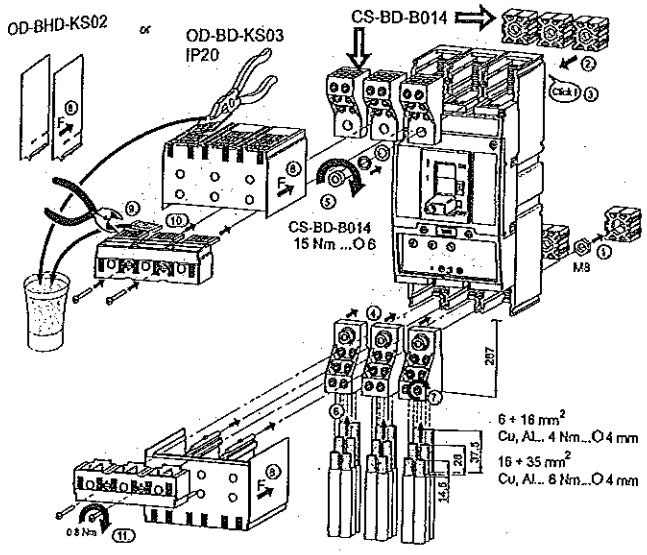


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

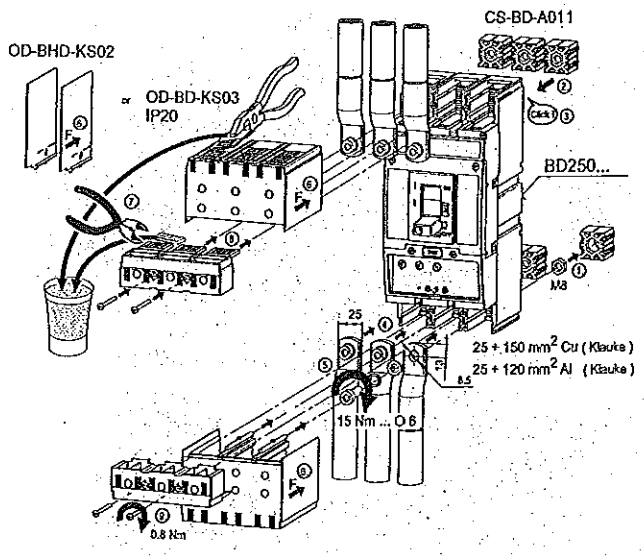
3P 4P

Connecting and installation

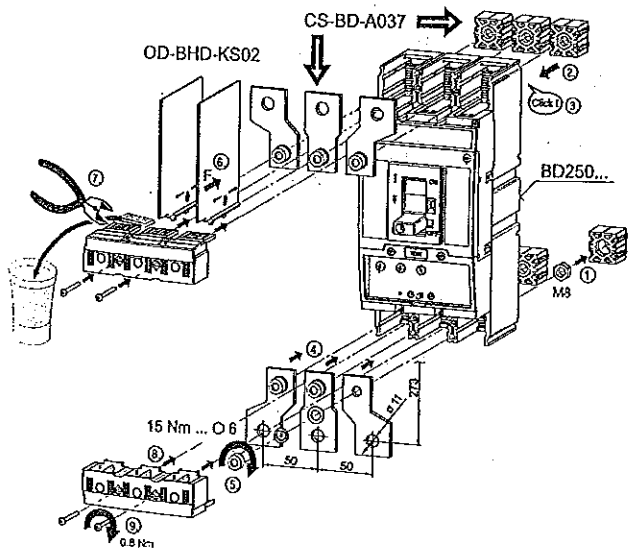
Front connection - 6 Cu/Al cables



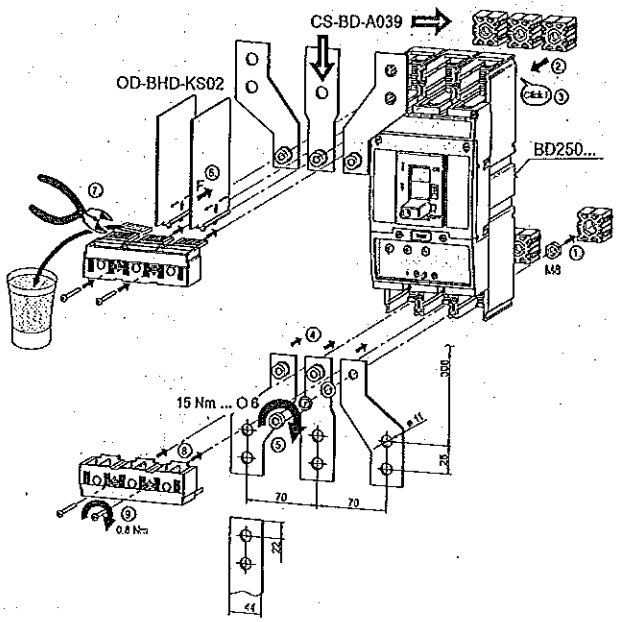
Front connection - cable lugs



Front connection - reduction BD to BA...*37

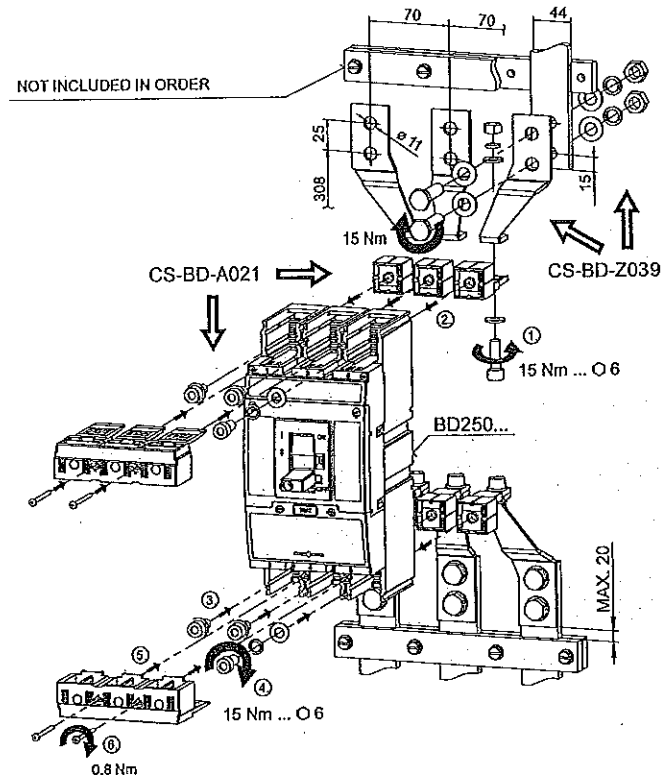


Front connection - reduction BD to BA...*39 and J2UX



Connecting and installation

Rear connection – reduction BD to BA ...*39 and J2UX with rear connection



Deionization spaces

USE OF INSULATING BARRIERS AND TERMINAL COVERS WITH CIRCUIT BREAKERS AND SWITCH-DISCONNECTORS

■ FIXED DESIGN

- front connection

- terminals 1, 3, 5 (upper side)

a) if $U_e \geq 415$ V a.c., it is necessary to use OD-BHD-KS02 insulating barriers or a OD-BHD-KS03 term

b) if insulated conductors are not used for connecting power circuit to terminals 1, 3, 5, flexibars c connection, it is necessary to use OD-BHD-KS02 insulating barriers or a OD-BHD-KS03 terminal cov

- terminals 2, 4, 6 (lower side)

only in case that circuit breaker/switch-disconnector is connected to the source using terminals 2, 4, 6 and furthermore:

a) if $U_e \geq 415$ V a.c., it is necessary to use OD-BHD-KS02 insulating barriers or a OD-BHD-KS03 terminal

b) if insulated conductors are not used for connecting power circuit to terminals 2, 4, 6, flexibars connection, it is necessary to use OD-BHD-KS02 insulating barriers or a OD-BHD-KS03 terminal co

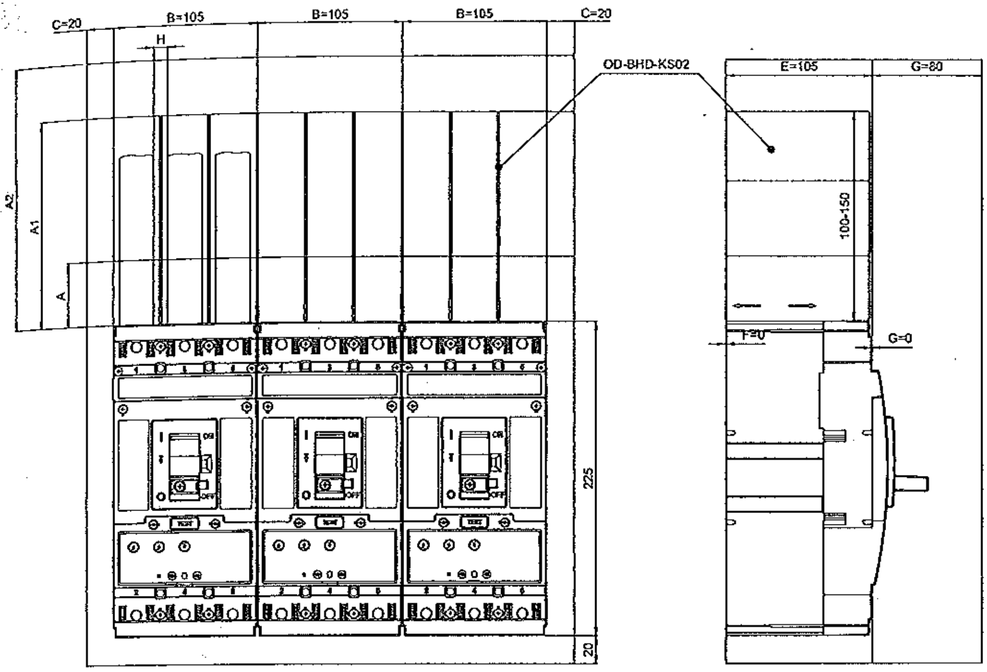
- rear connection - insulating barriers and terminal covers need not be used

■ PLUG-IN AND WITHDRAWABLE DEVICE - insulating barriers and terminal covers need not be used

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P 4P

Deionization spaces



A...minimum distance between the circuit breaker/ /switch-disconnector and uninsulated earthed wall (applicable for connection using insulated conductors, cables, flexibars or with rear connection)

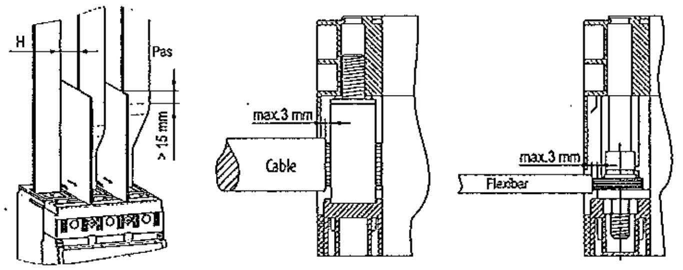
A1...minimum insulation length of bare conductors (using OD-BHD-KS02 insulating barriers from 100 mm to max. 150 mm, or by adding additional insulation for the conductors with barriers to obtain at least A1 value)

A2...minimum distance:
- between the circuit breaker/switch-disconnector and uninsulated earthed wall (applicable for uninsulated conductors and busbars)
- between the circuit breaker/switch-disconnector and busbar
- between two circuit breakers/switch-disconnectors situated vertically above one another
- between uninsulated connections of two circuit breakers/switch-disconnectors above one another

C, D, E, F, G...minimum distance between the circuit breaker/switch-disconnector and uninsulated earthed wall

H...minimum distance between uninsulated conductors

■ minimum distance of circuit breakers without using of uninsulated barriers is 50 mm



When insulating conductors, cables, flexibars or rear connection are used up to U <= 415 V a.c., it is not necessary to use OD-BHD-KS02 insulating barriers.

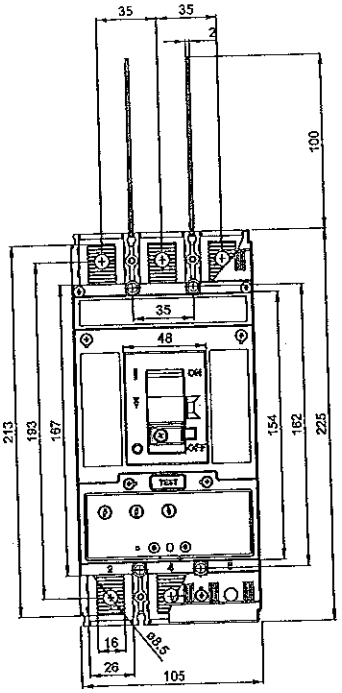
	U	[V]	230	415		500	690
BD250S wired with I_k''		[kA]	≤100	36–65	≤36	≤25	≤15
BD250N wired with I_k''		[kA]	≤60	[illegible]	≤36	≤16	≤10
I_s [mm]	H [mm]						
		A [mm]	50	50	50	50	50
	≥ 10	A1 [mm]	100	150	100	150	150
< 80		A2 [mm]	200	250	200	250	250
		A [mm]	50	50	50	50	50
	≥ 30	A1 [mm]	100	150	100	150	150
		A2 [mm]	150	200	150	200	200
		A [mm]	50	50	50	50	50
≥ 80	≥ 10	A1 [mm]	100	150	100	150	150
		A2 [mm]	150	200	150	200	200

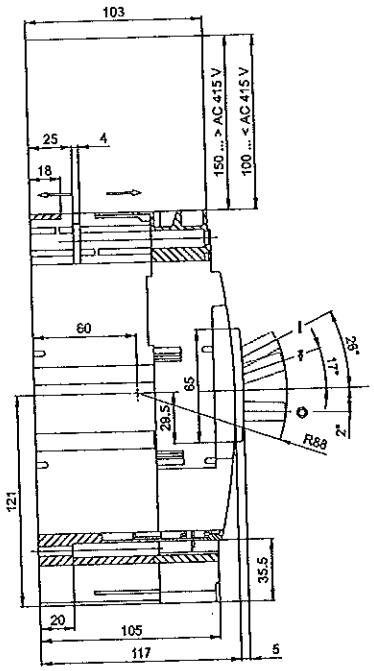
pozn.: I_k'' - max. short-circuit current in the protected circuit (rms)

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

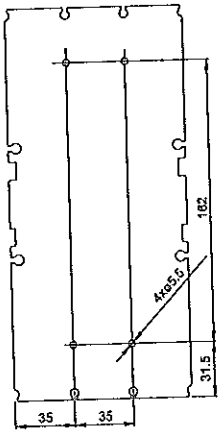
Dimensions

Fixed design, front connection

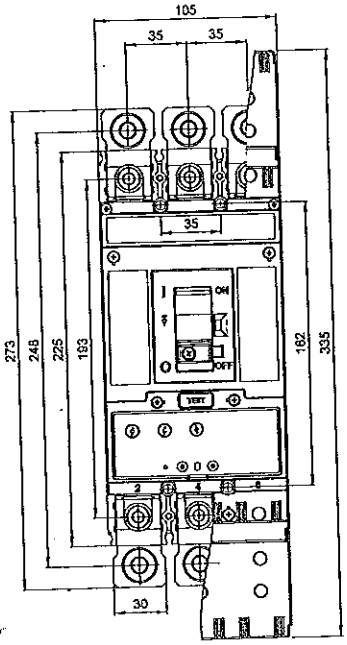


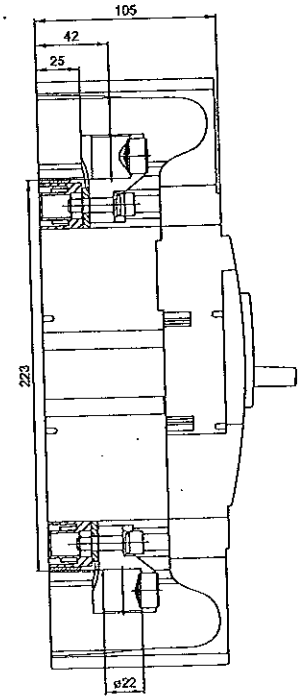


Drilling diagram



Fixed design, front connection (CS-BD-B012 connecting set)



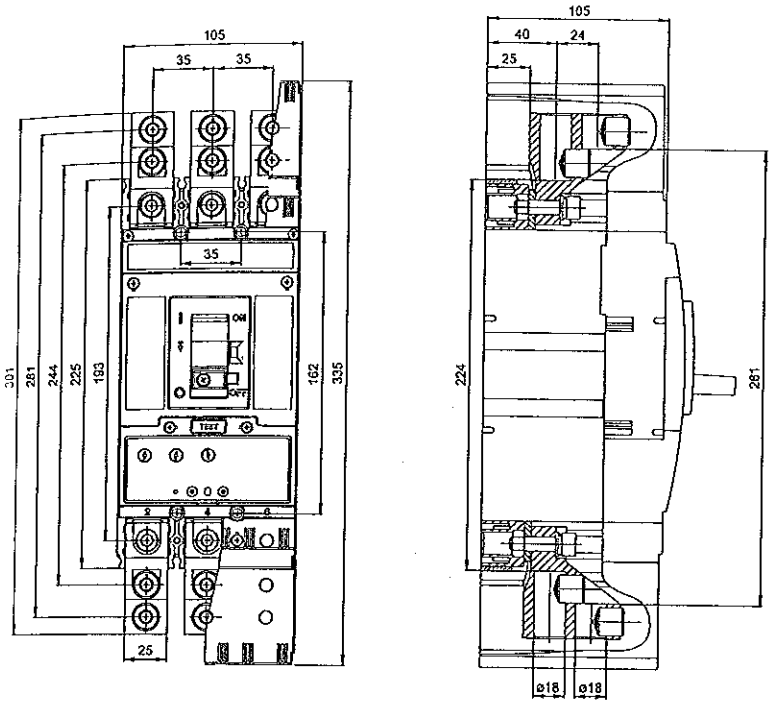


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

Dimensions

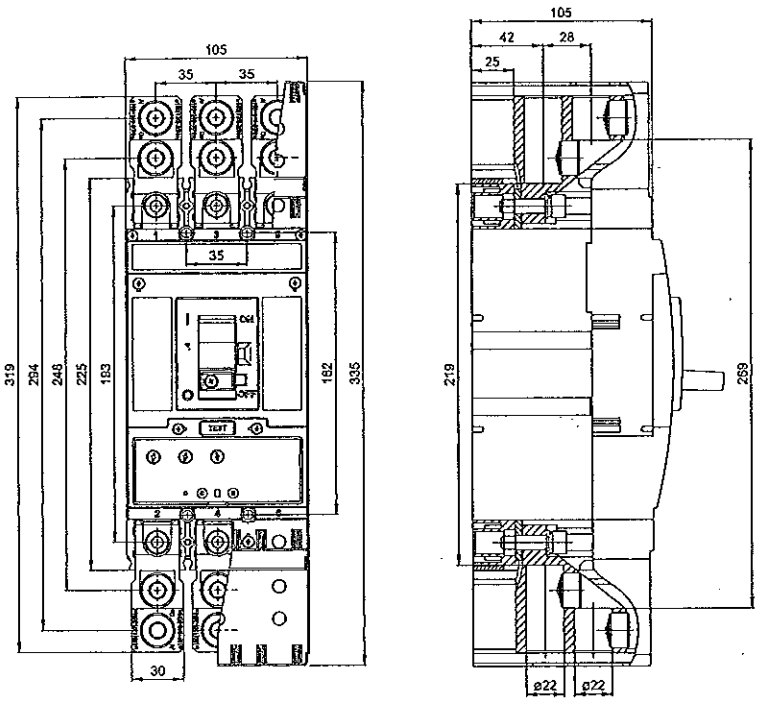
Fixed design, front connection (CS-BD-B021 connecting set)



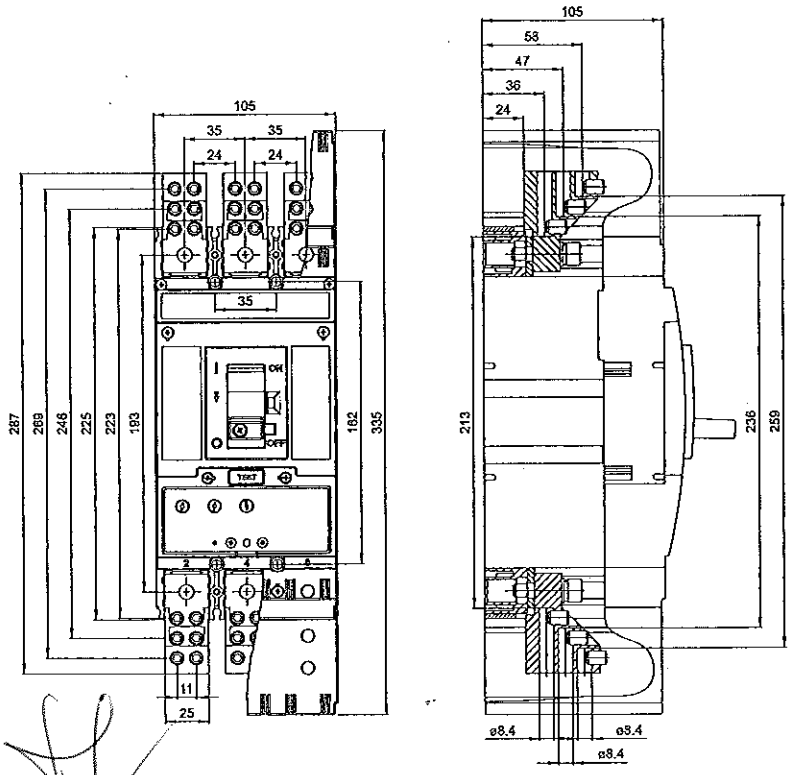
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

Fixed design, front connection (CS-BD-B022 connecting set)



Fixed design, front connection (CS-BD-B014 connecting set)

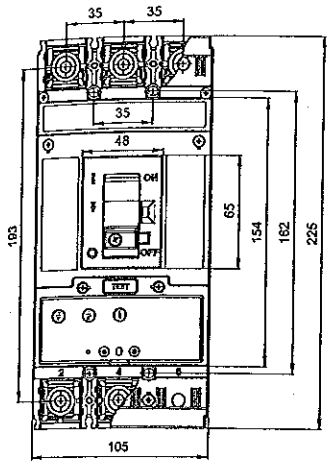


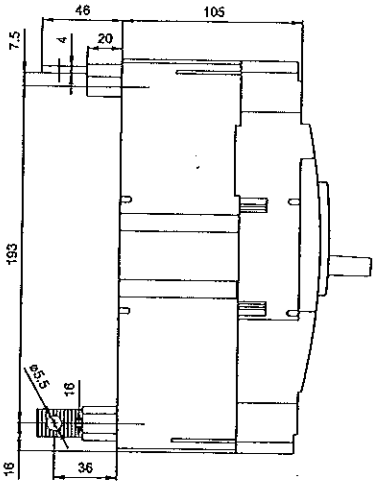
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

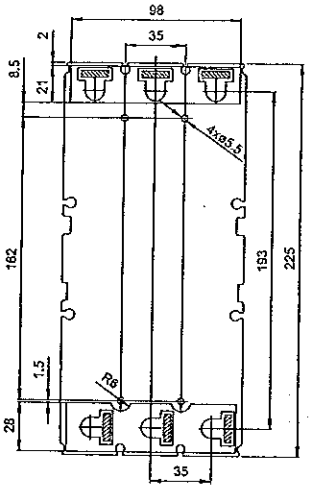
Dimensions

Fixed design, rear connection (CS-BD-A021 connecting set)



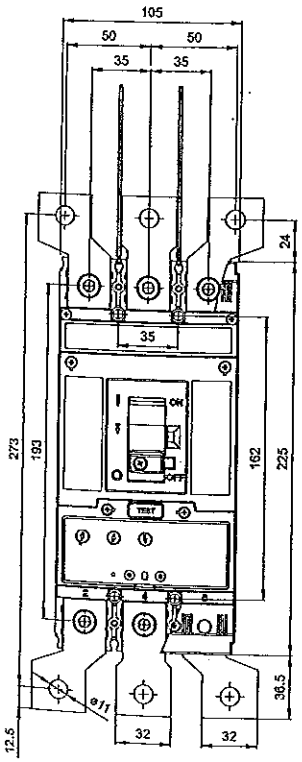


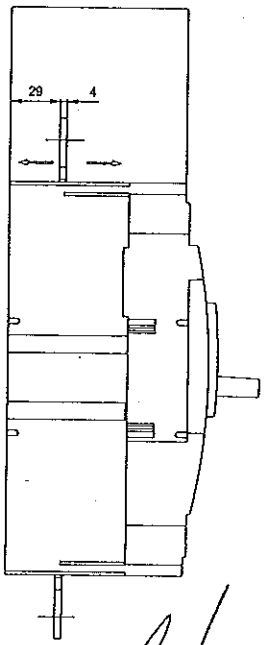
Drilling diagram



Fixed design, front connection (CS-BD-A037 connecting set)

RETROFIT



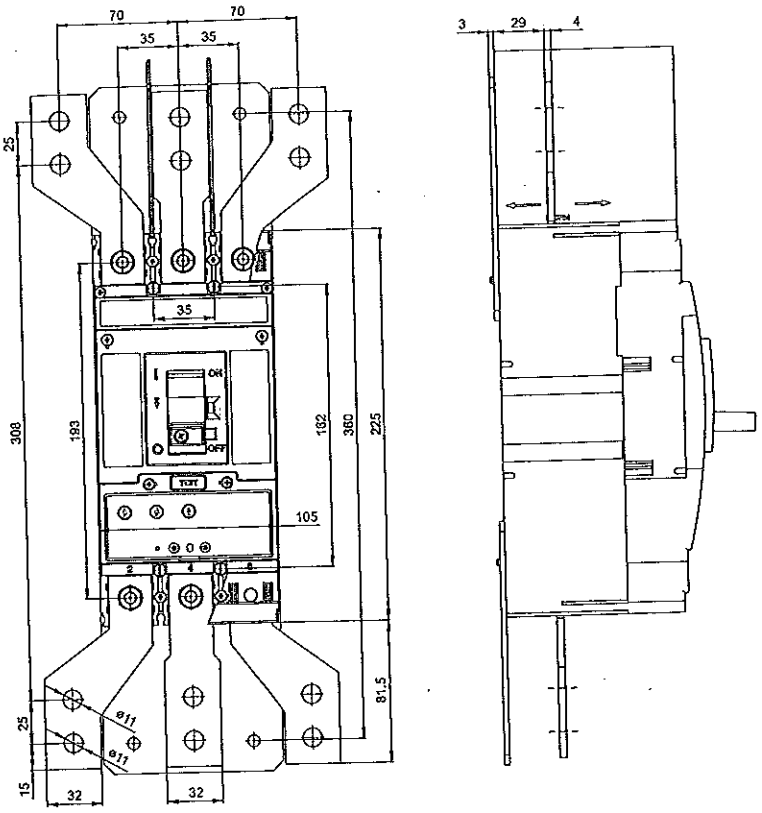


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

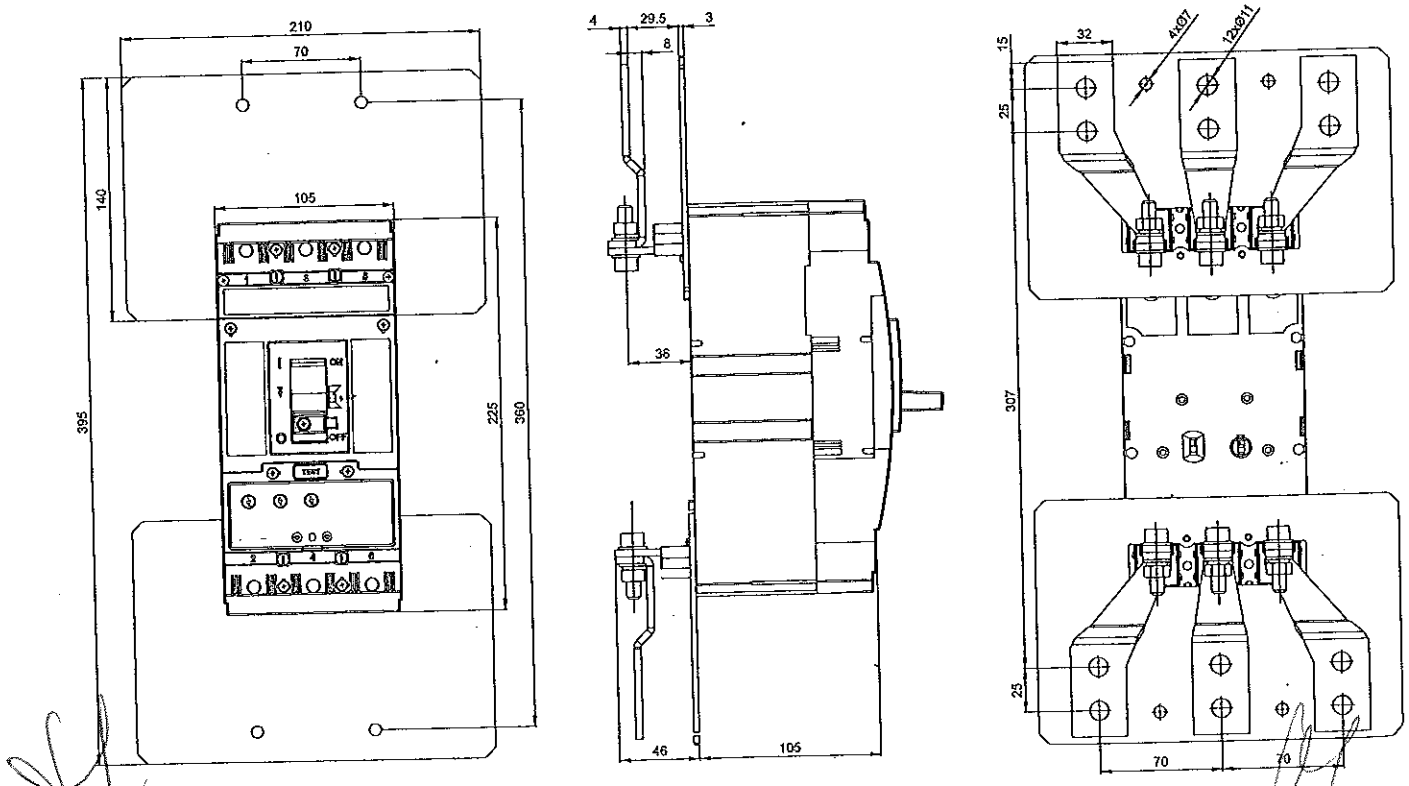
Fixed design, front connection (CS-BD-A039 connecting set, OD-BHD-MS39 mounting set)

RETROFIT



Fixed design, rear connection (CS-BD-Z039 connecting set, OD-BD-MZ39 mounting set)

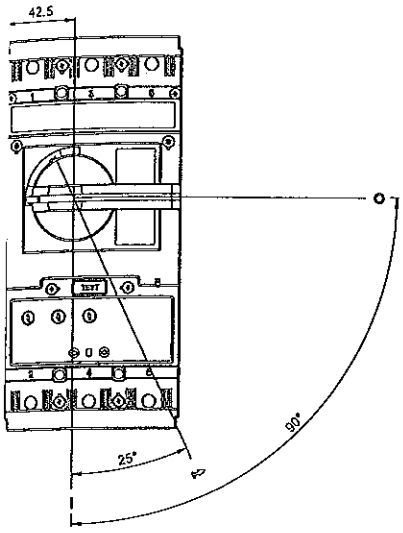
RETROFIT

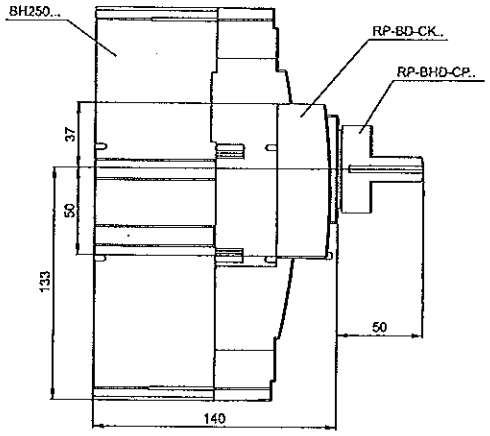


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS 3P

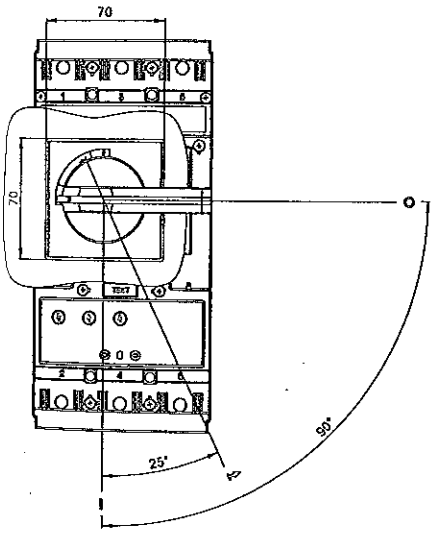
Dimensions

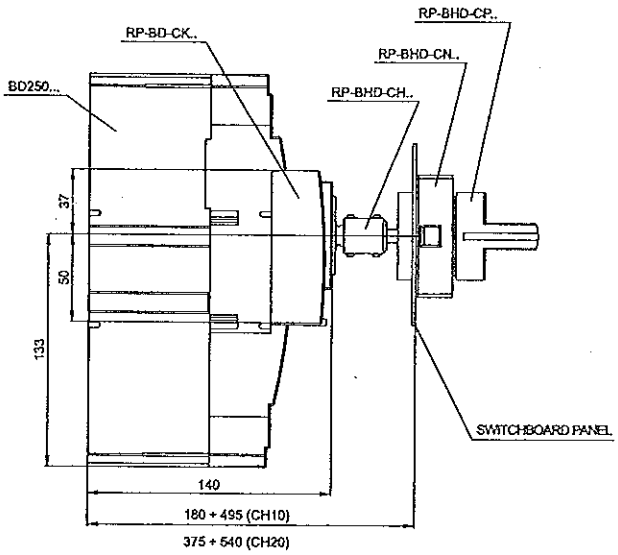
Fixed design, hand drive



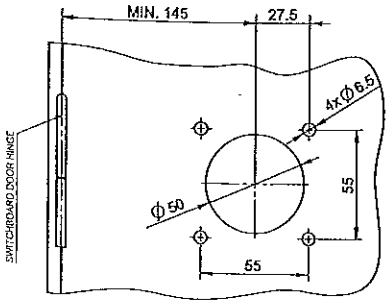


Fixed design, hand drive - front, with adjustable lever





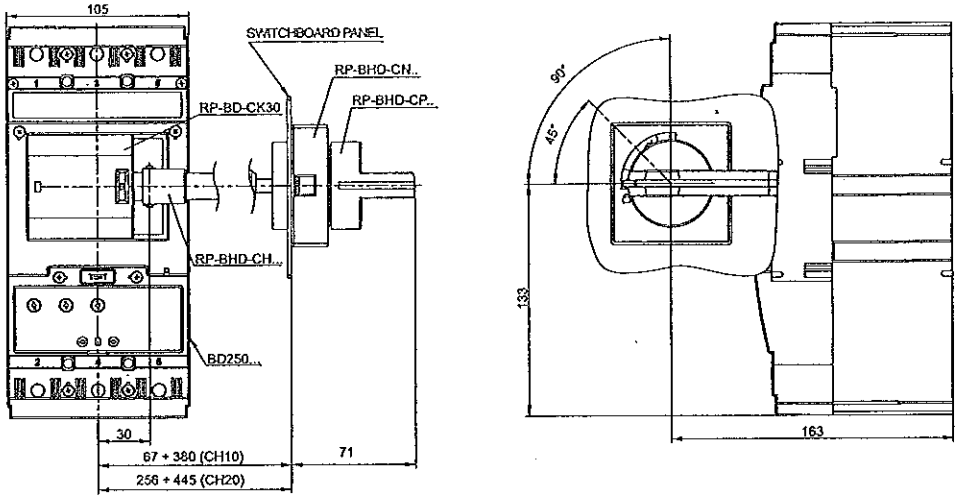
Switchboard door modification



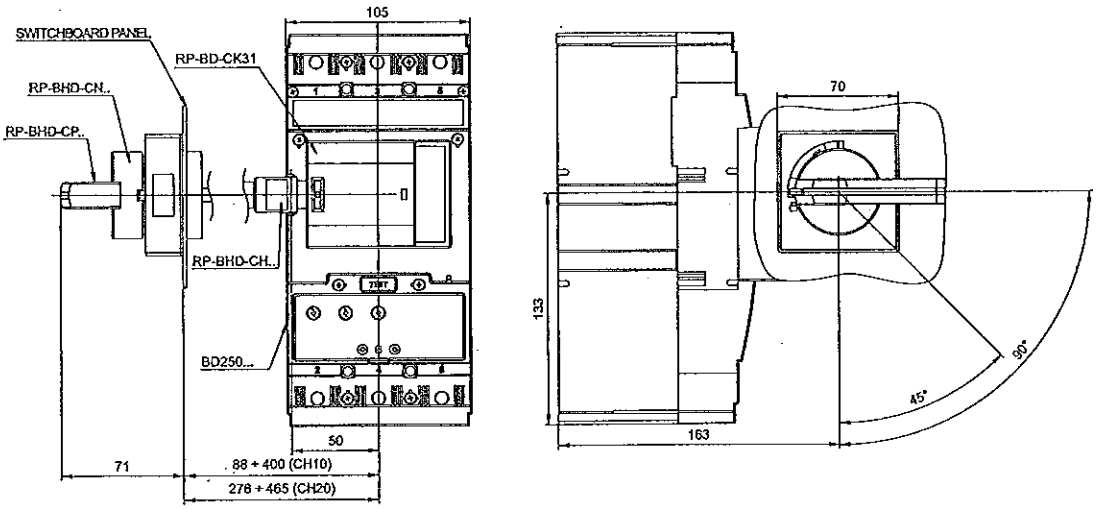
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

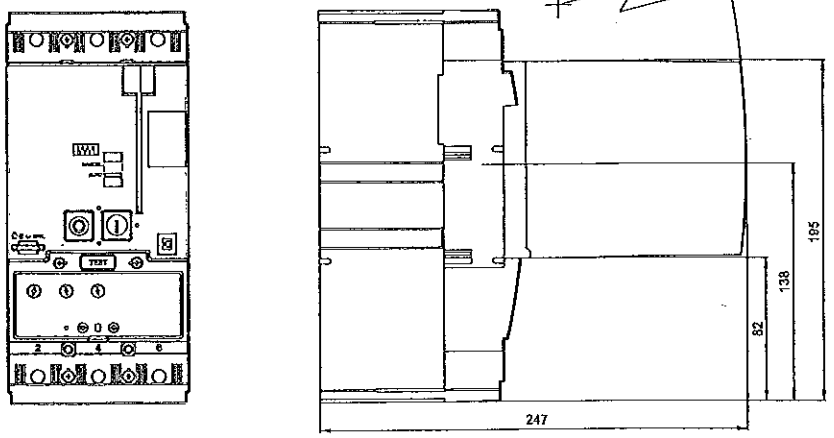
Fixed design, hand drive - control on right side, with adjustable lever



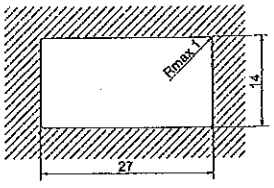
Fixed design, hand drive - control on left side, with adjustable lever



Fixed design, MP-BD-X... motor drive



Opening dimensions in switchboard door for external counter of cycles



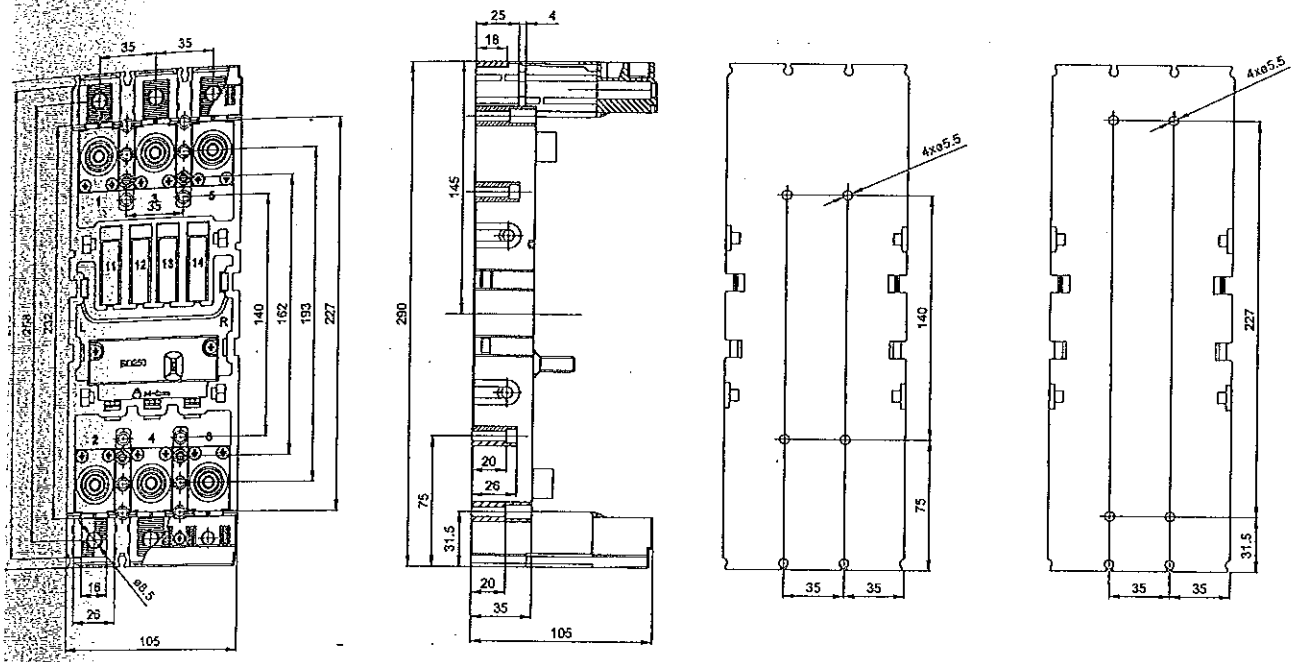
KUIT BREAKERS, SWITCH-DISCONNECTORS

3P

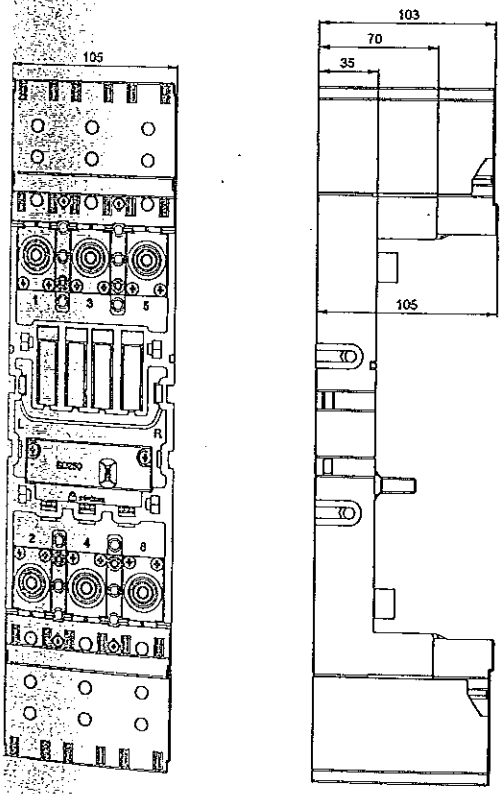
ensions

In device

Drilling diagram



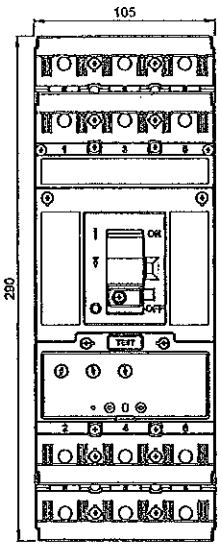
In device, OD-BD-KS03 terminal cover

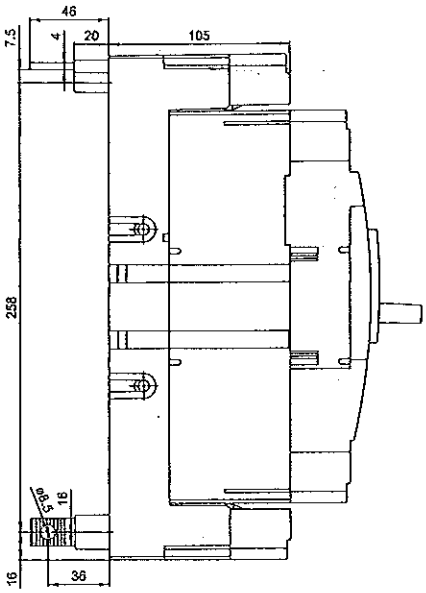


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

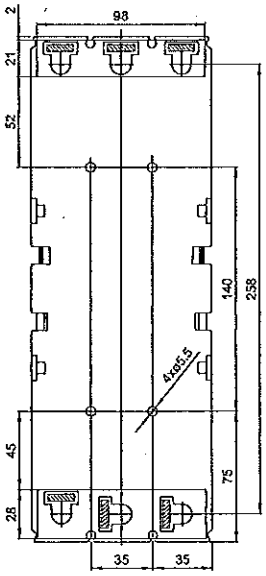
Dimensions

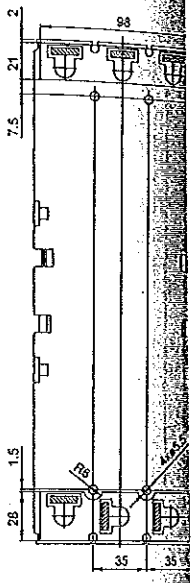
Plug-in design



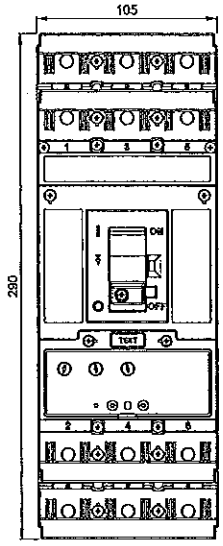


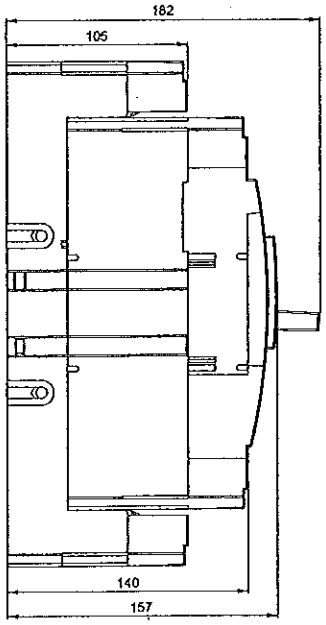
Drilling diagram





Plug-in design



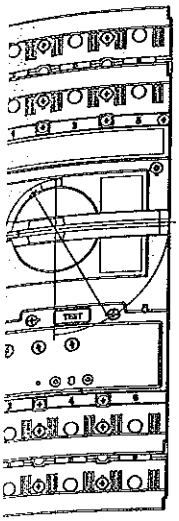


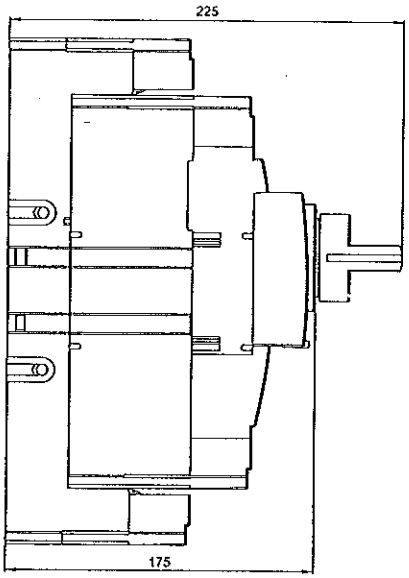
RCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

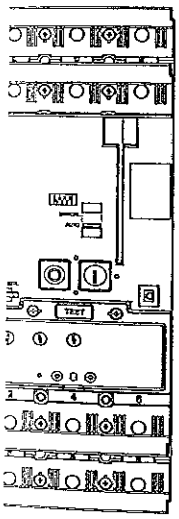
mensions

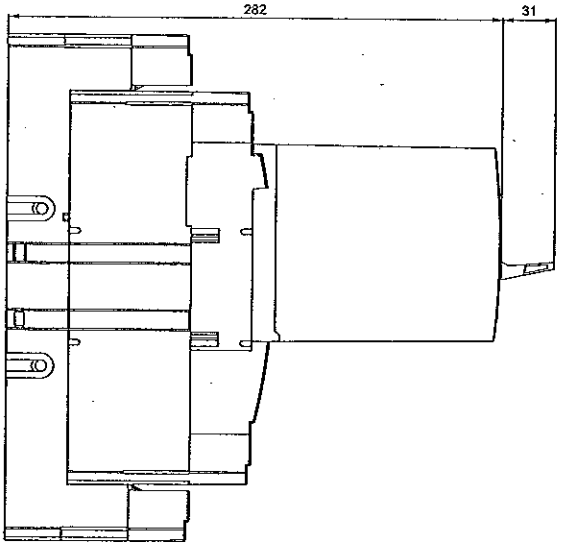
g-in design, hand drive





g-in design, motor drive



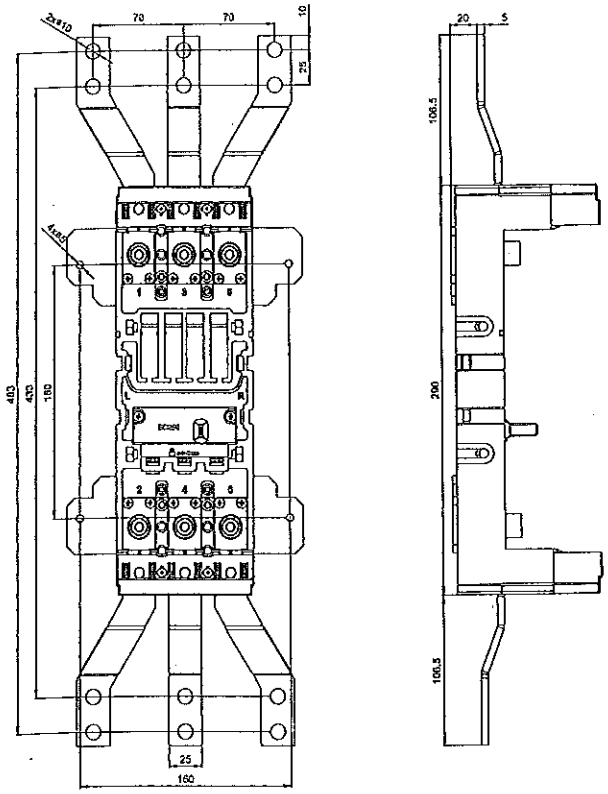


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

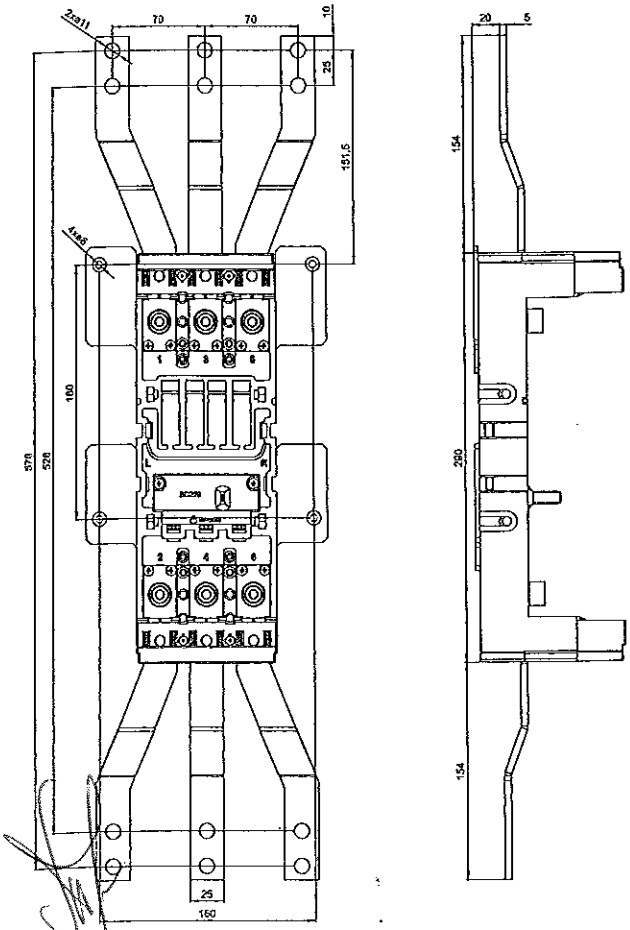
Plug-in device (CS-BD-JX75 connecting set, OD-BHD-MS75 mounting set)

RETROFIT



Plug-in device (CS-BD-JT75 connecting set, OD-BD-MT75 mounting set)

RETROFIT

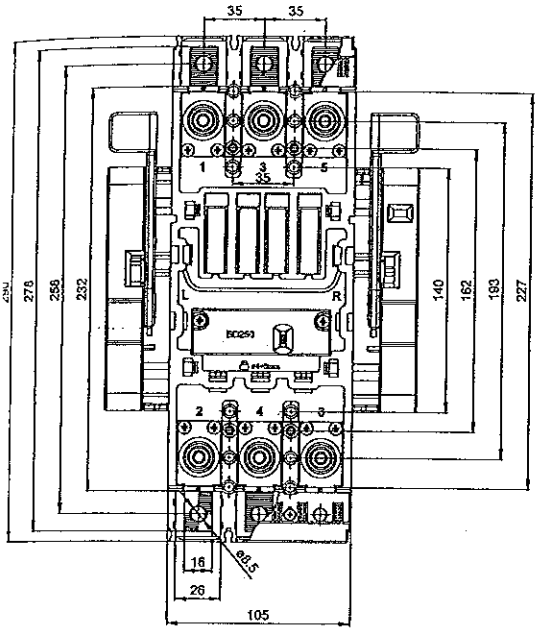


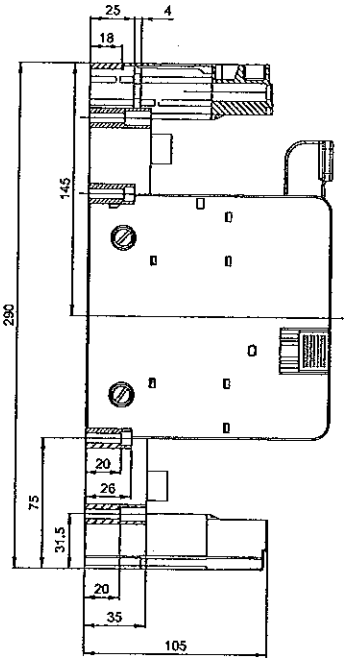
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

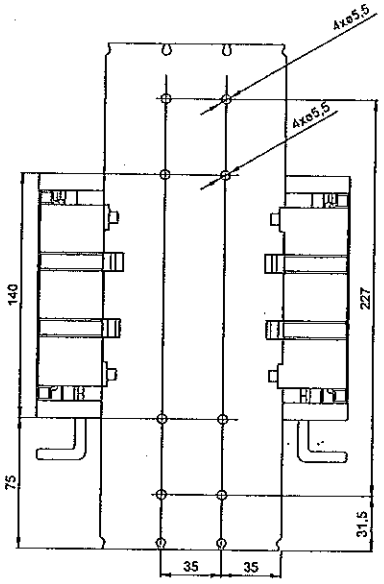
Dimensions

Withdrawable device

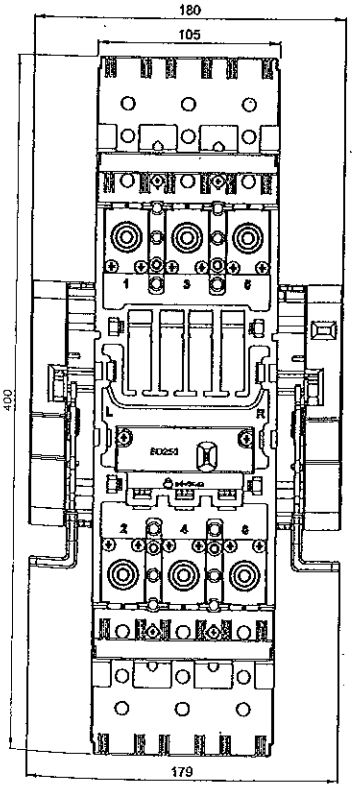


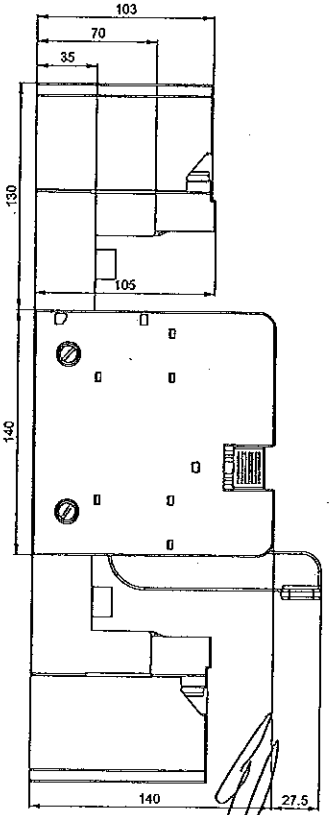


Drilling diagram



Withdrawable device, OD-BD-KS03 terminal cover





CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

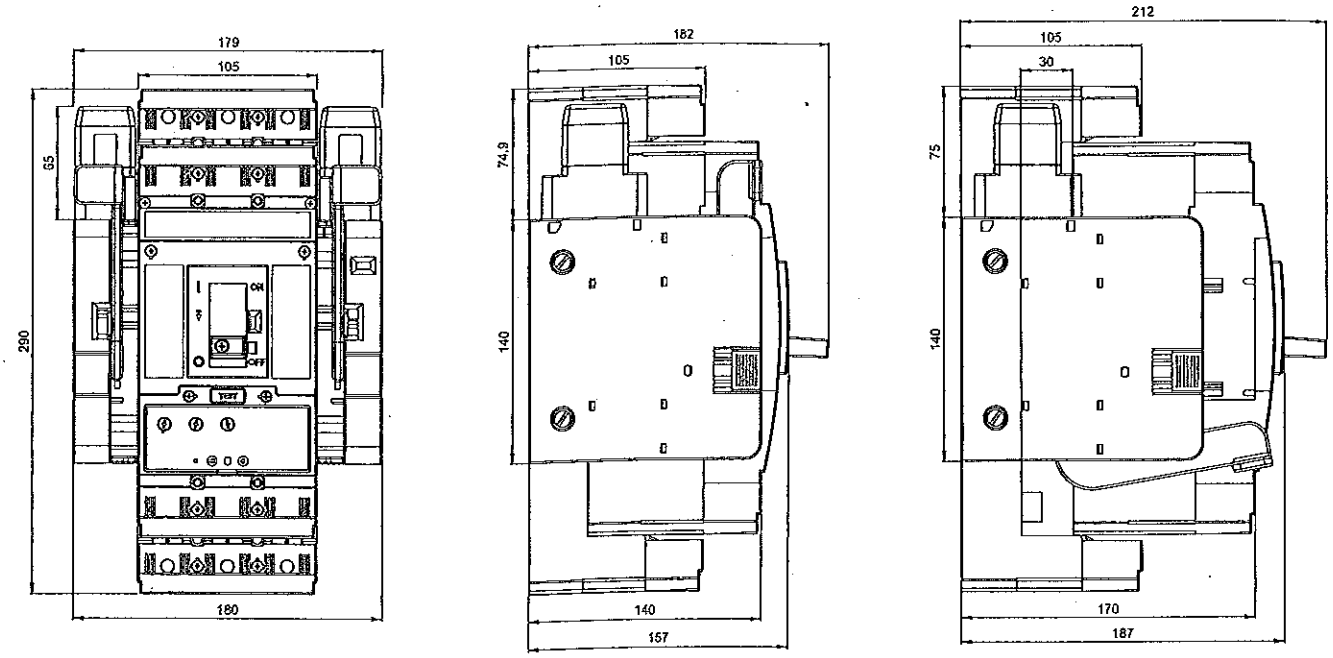
3P

Dimensions

Withdrawable design

Working position

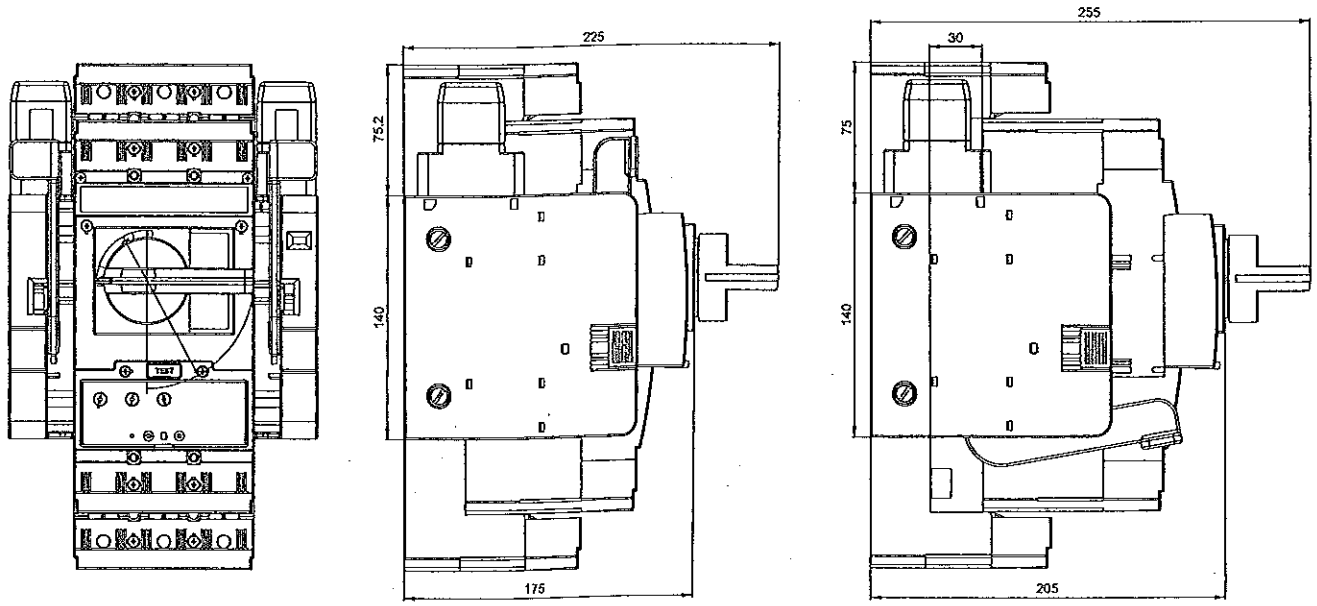
Inspection position



Withdrawable design, hand drive

Working position

Inspection position



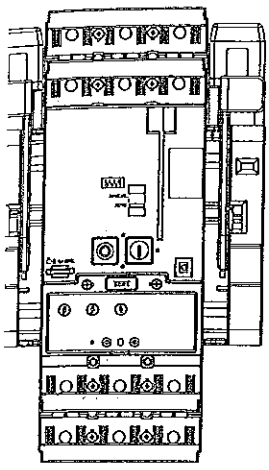
IRCUIT BREAKERS, SWITCH-DISCONNECTORS

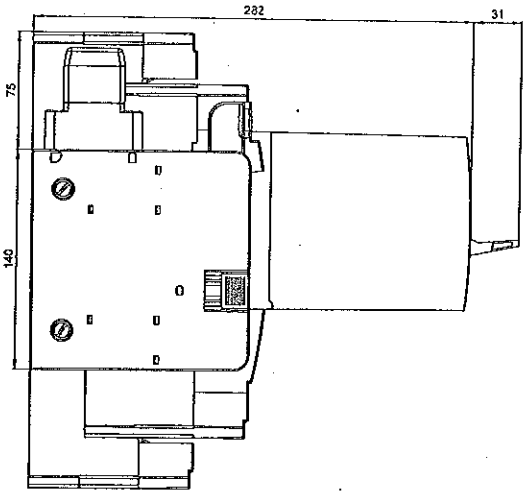
3P

imensions

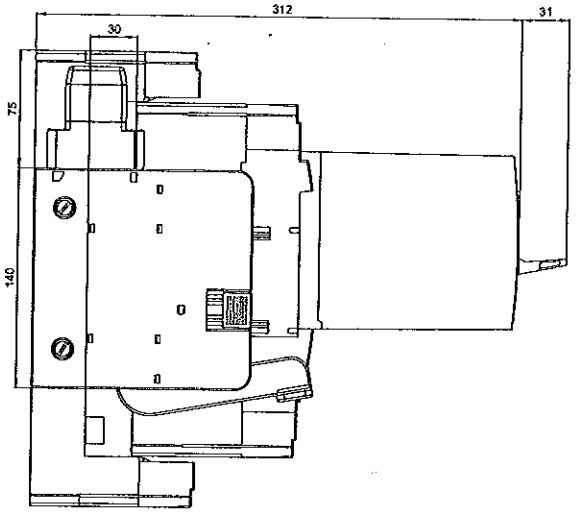
ithdrawable design, motor drive

Working position



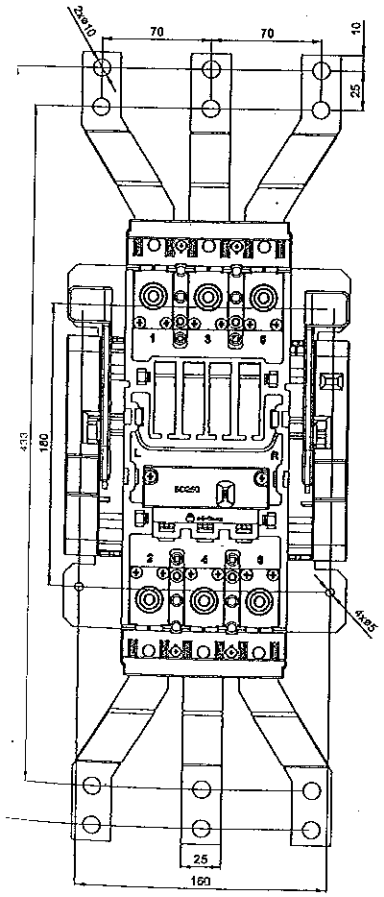


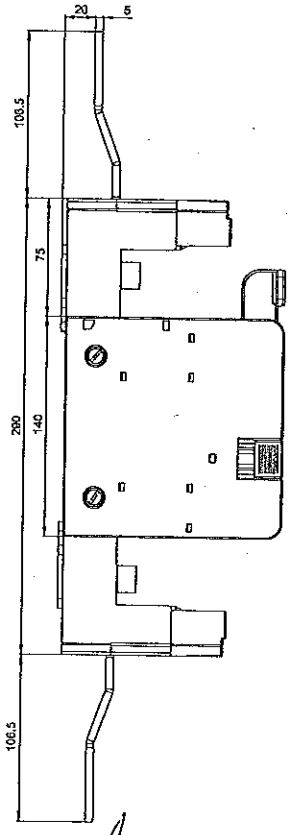
Inspection position



ithdrawable device (CS-BD-JX75 connecting set, OD-BHD-MS75 mounting set)

RETROFIT



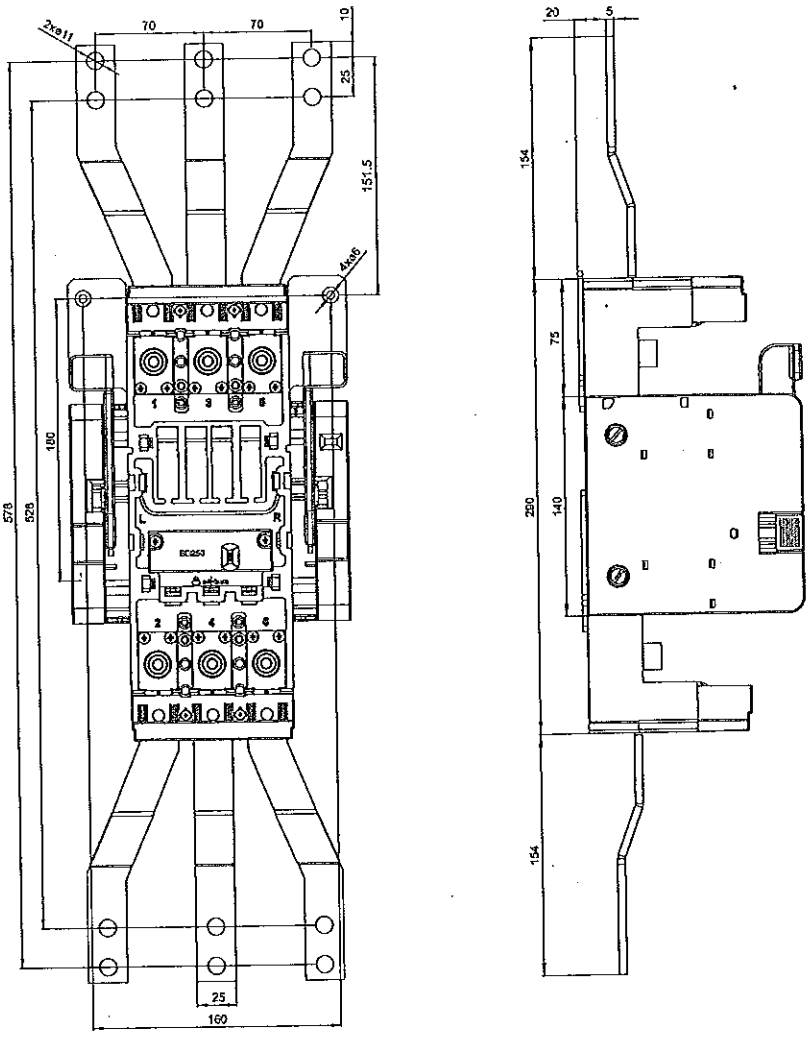


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

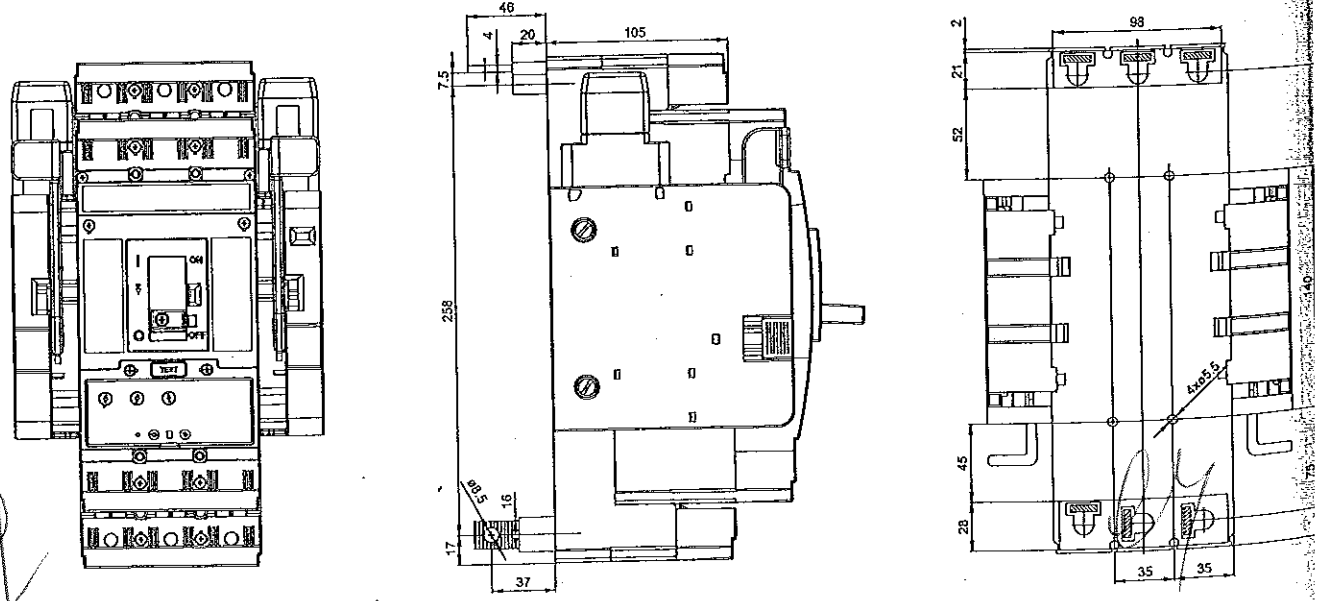
Dimensions

Withdrawable device (CS-BD-JT75 connecting set, OD-BD-MT75 mounting set)

RETROFIT



Withdrawable device, rear connection (CS-BD-A021 connecting set)

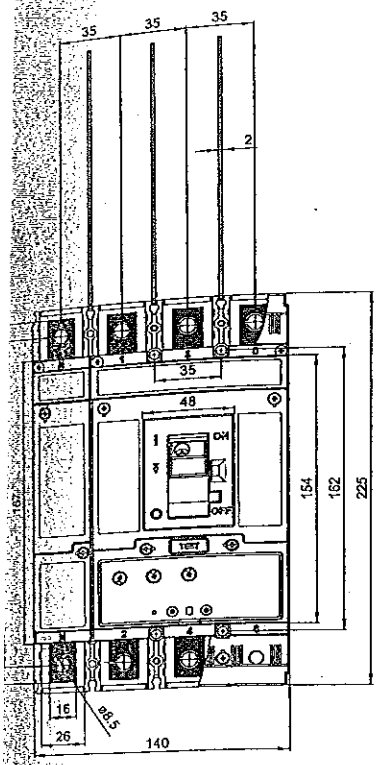


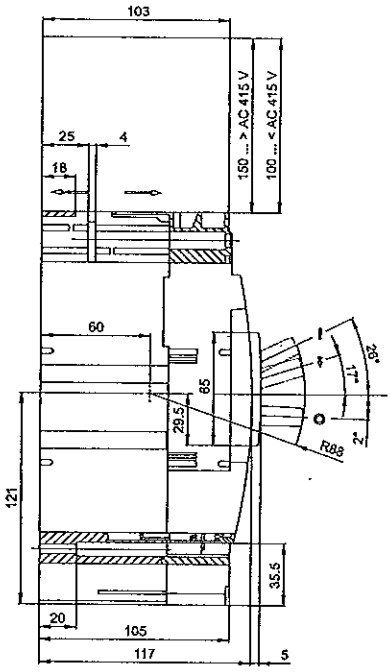
UIT BREAKERS, SWITCH-DISCONNECTORS

4P

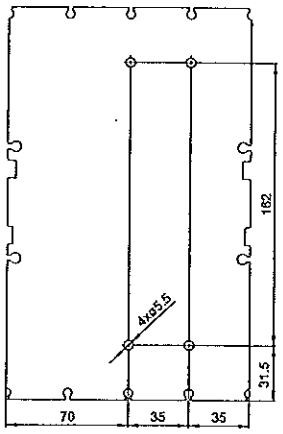
isions

esign, front connection

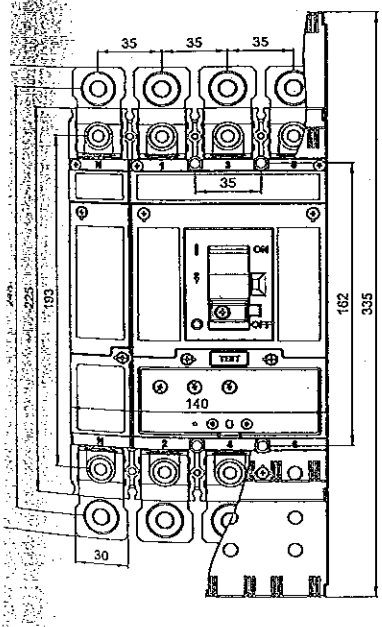


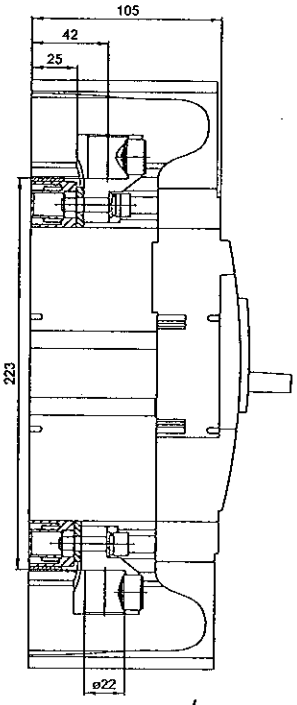


Drilling diagram



design, front connection (CS-BD-B012 + CS-BD-B412 connecting sets)

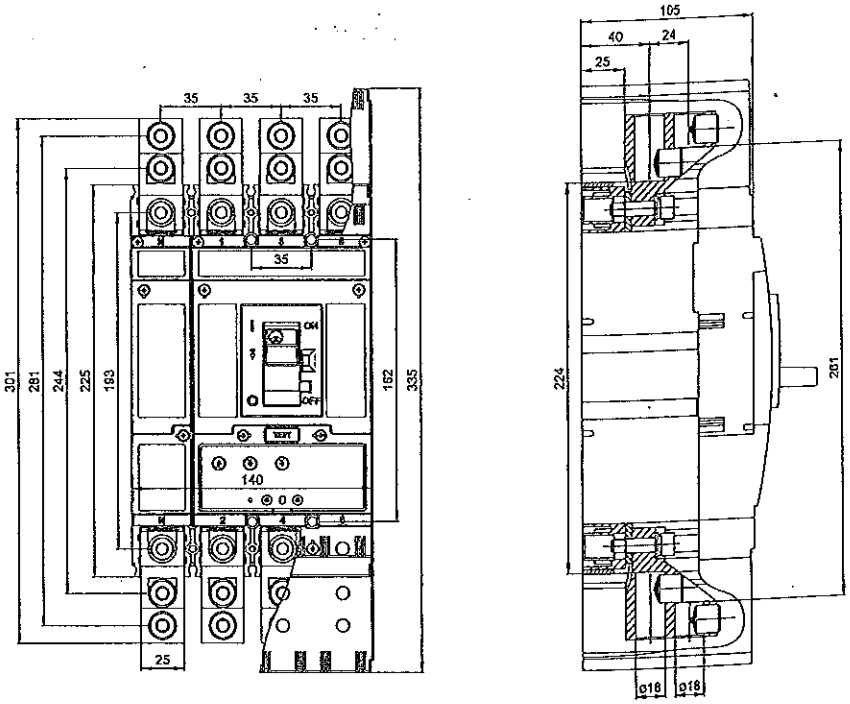




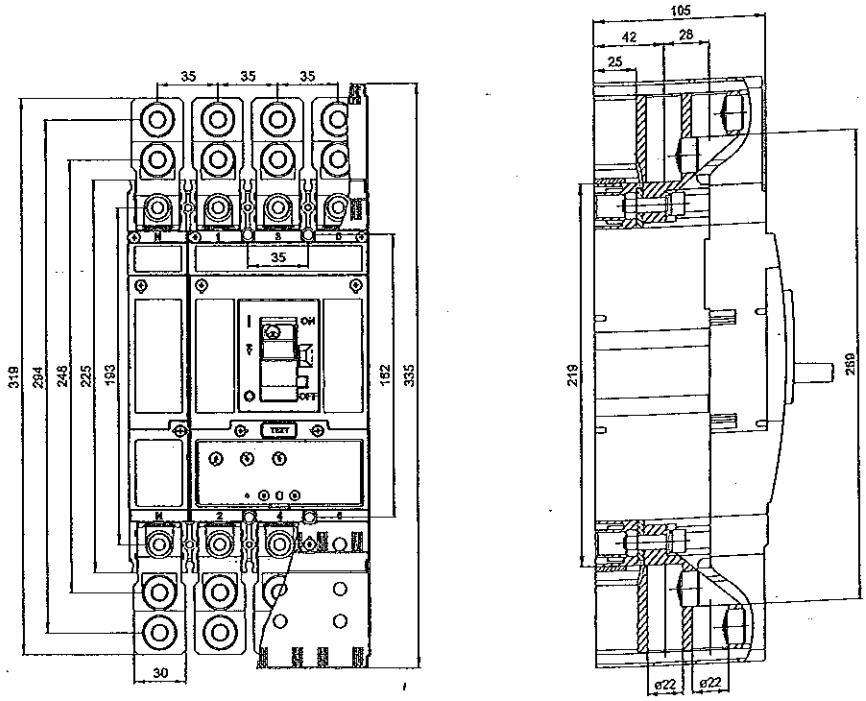
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

Fixed design, front connection (CS-BD-B021 + CS-BD-B421 connecting sets)



Fixed design, front connection (CS-BD-B022 + CS-BD-B422 connecting sets)

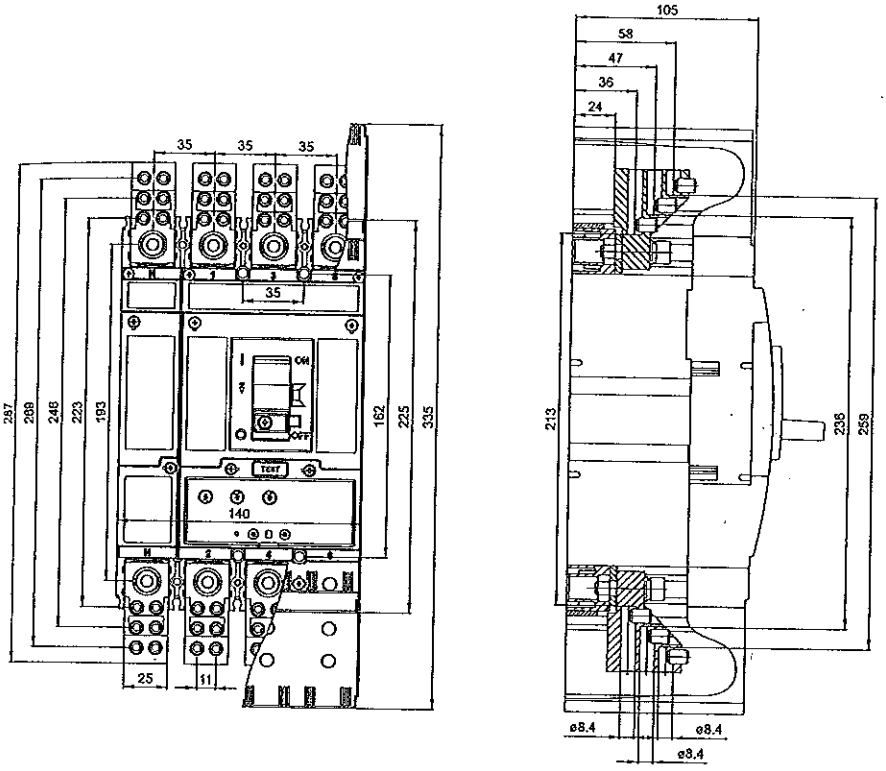


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

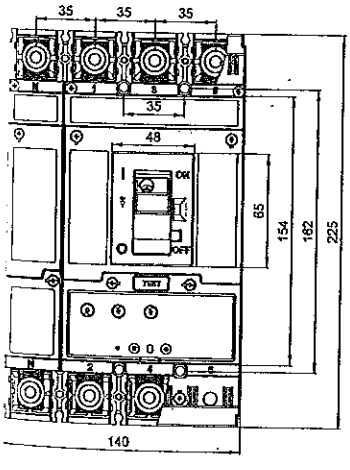
4P

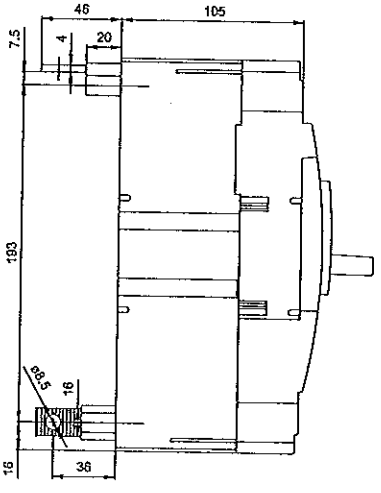
Dimensions

Fixed design, front connection (CS-BD-B014 + CS-BD-B414 connecting sets)

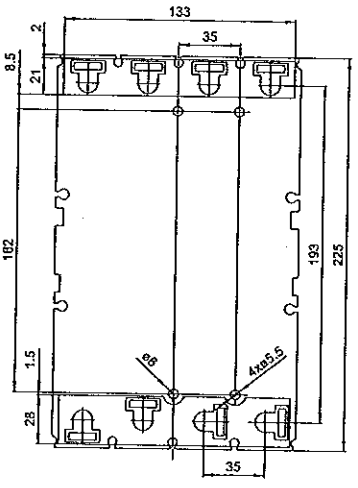


Fixed design, rear connection (CS-BD-A021 + CS-BD-A421 connecting sets)





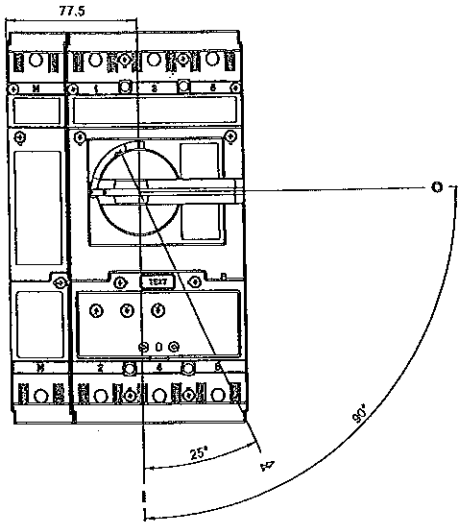
Drilling diagram

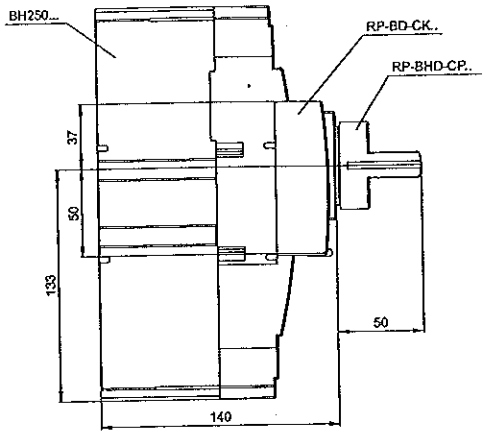


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

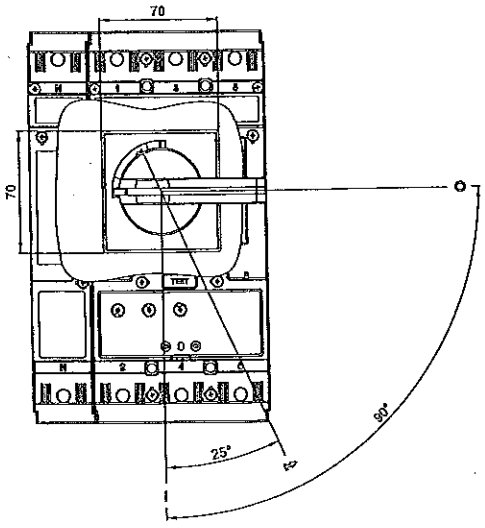
Dimensions

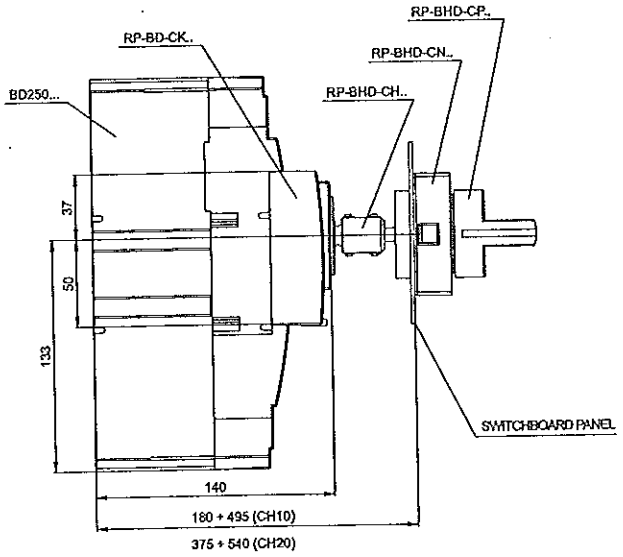
Fixed design, hand drive



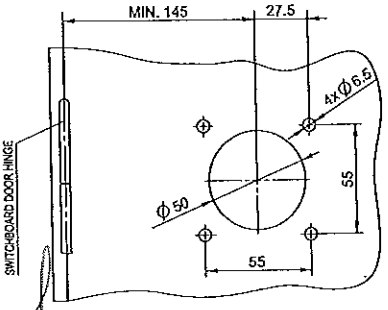


Fixed design, hand drive - front, with adjustable lever





Switchboard door modification

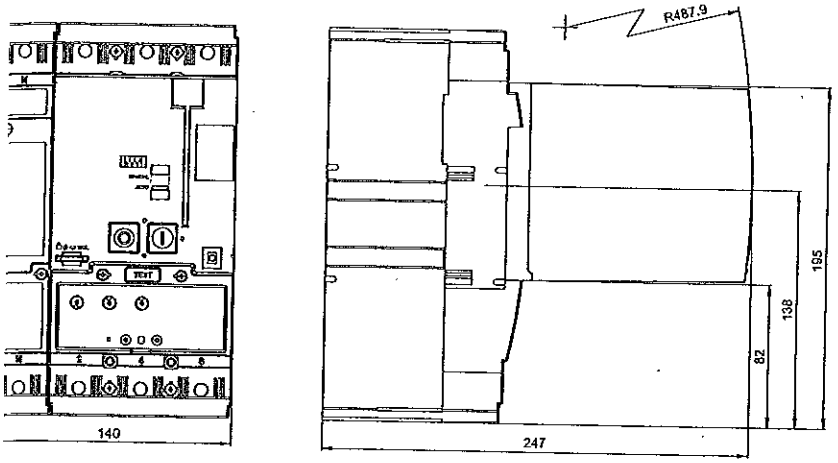


IRCUIT BREAKERS, SWITCH-DISCONNECTORS

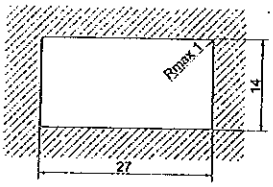
4P

imensions

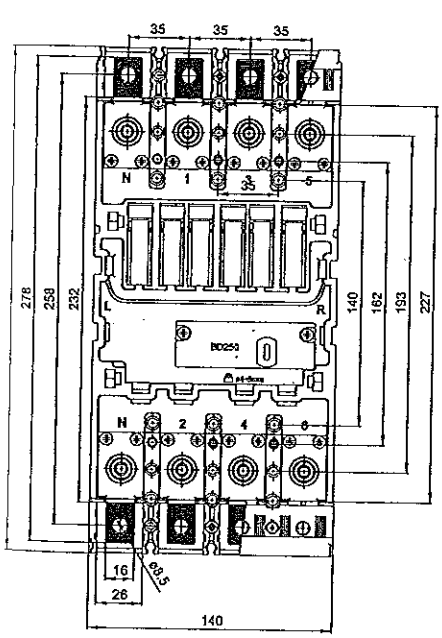
xed design, motor drive

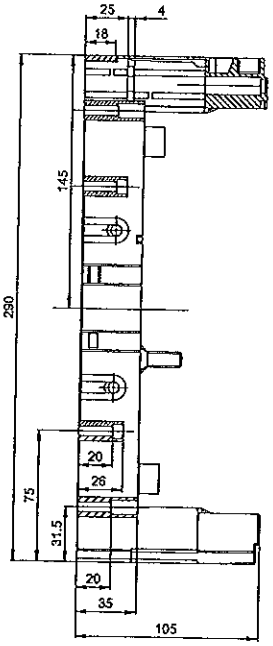


Opening dimensions in switchboard door for external counter of cycles

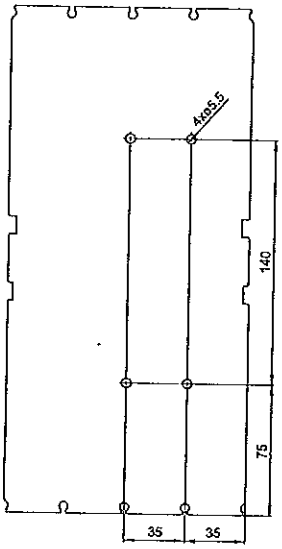


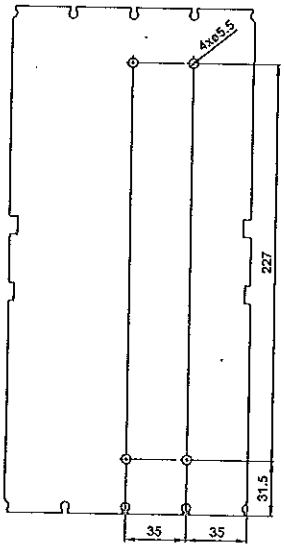
ug-in device





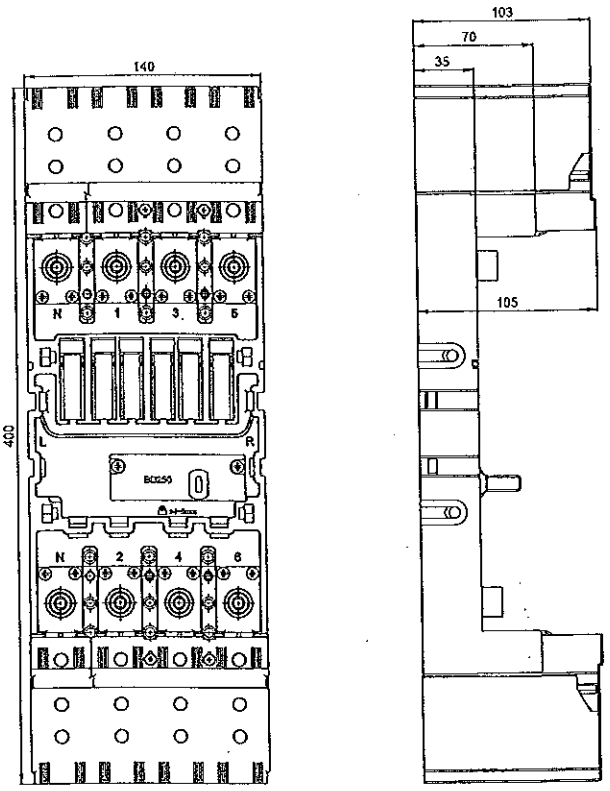
Drilling diagram



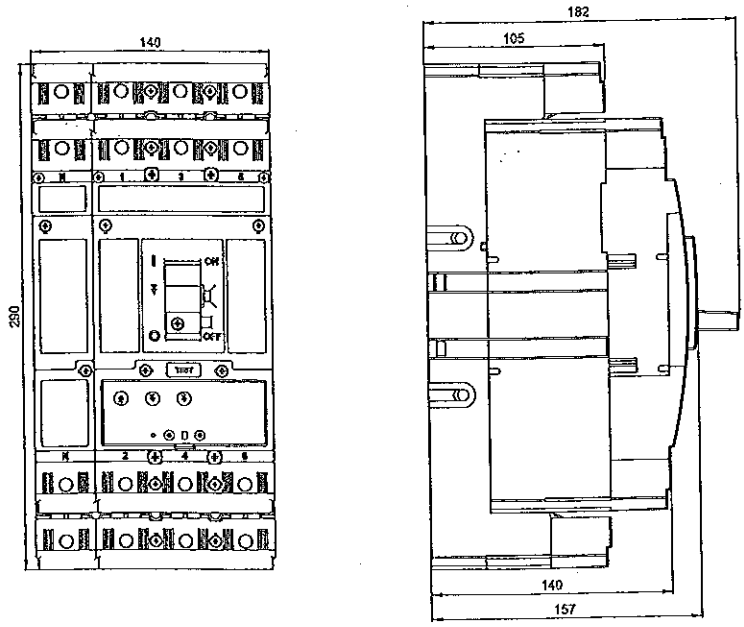


Dimensions

Plug-in device, OD-BD-KS43 terminal cover



Plug-in design

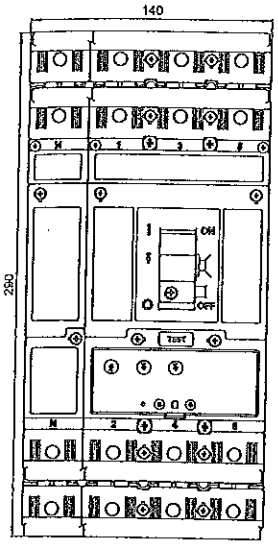


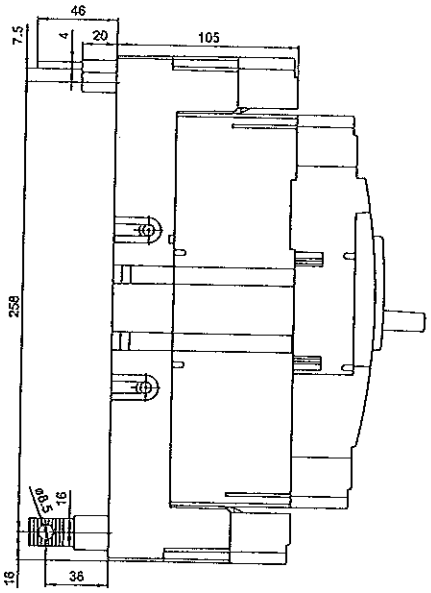
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

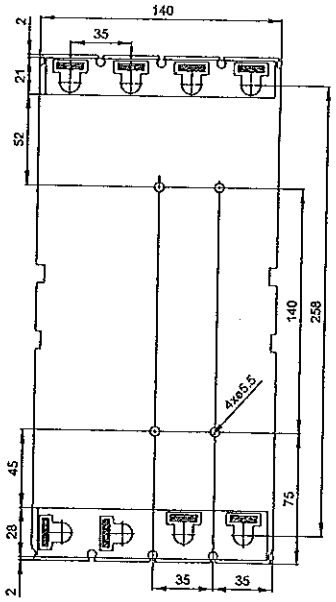
Dimensions

Plug-in design, rear connection (CS-BD-A021 + CS-BD-A421 connecting sets)





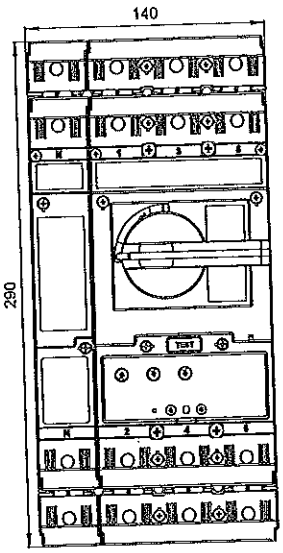
Drilling diagram

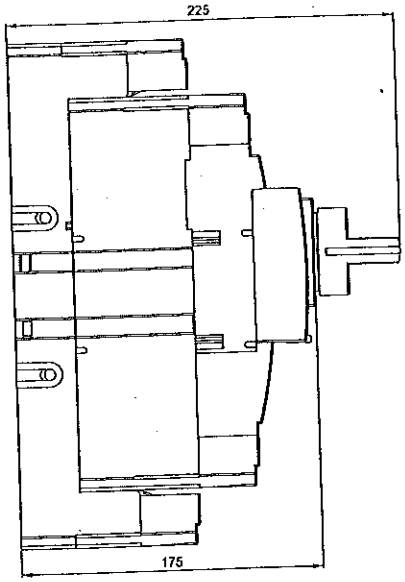


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

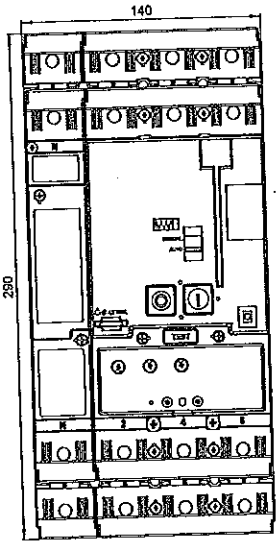
Dimensions

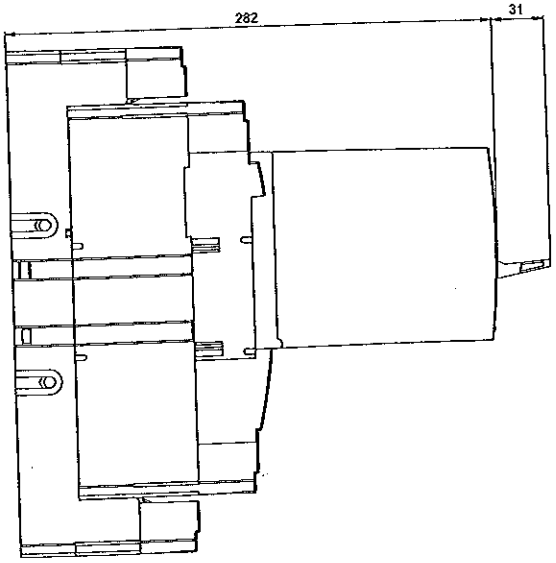
Plug-in design, hand drive





Plug-in design, motor drive



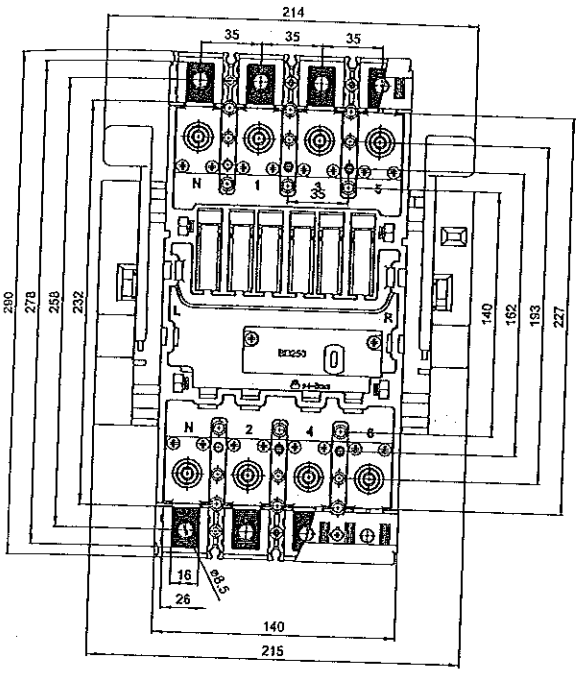


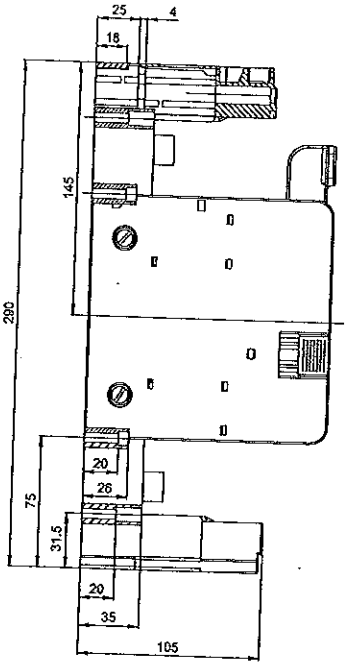
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

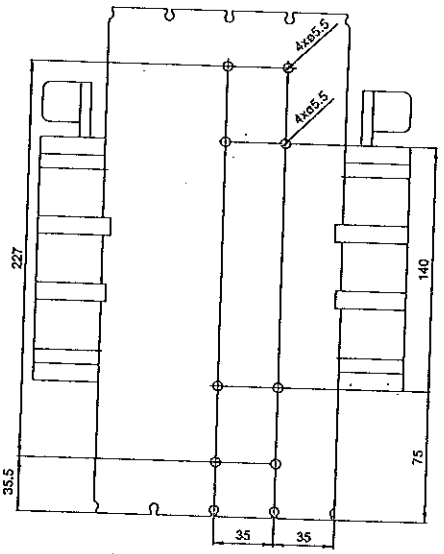
Dimensions

Withdrawable device

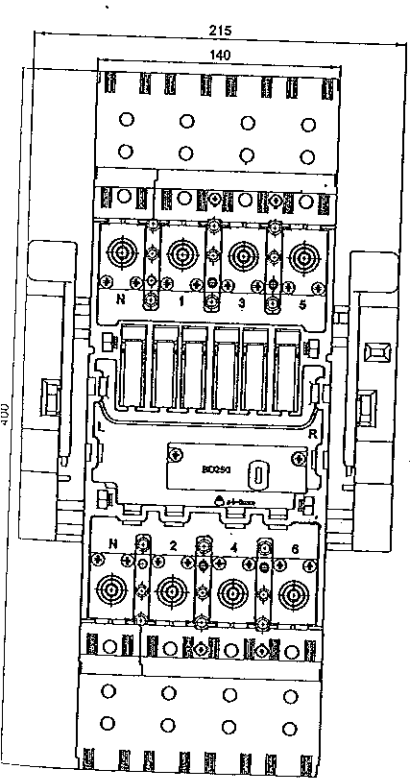


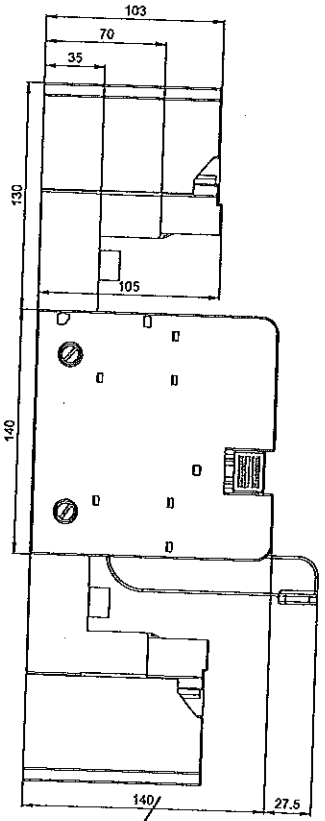


Drilling diagram



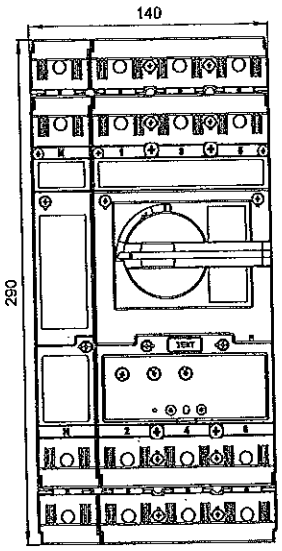
Withdrawable device, OD-BD-KS43 terminal cover

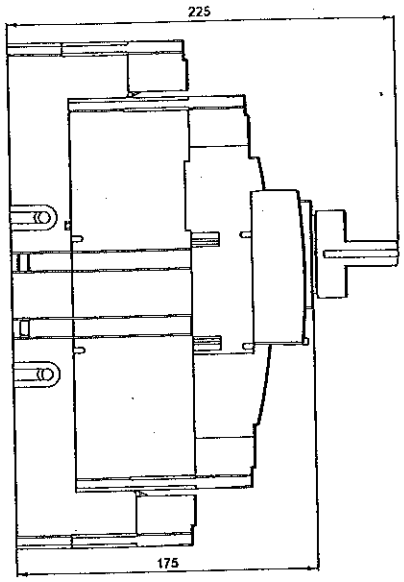




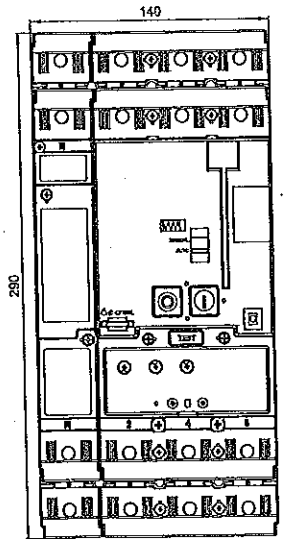
Dimensions

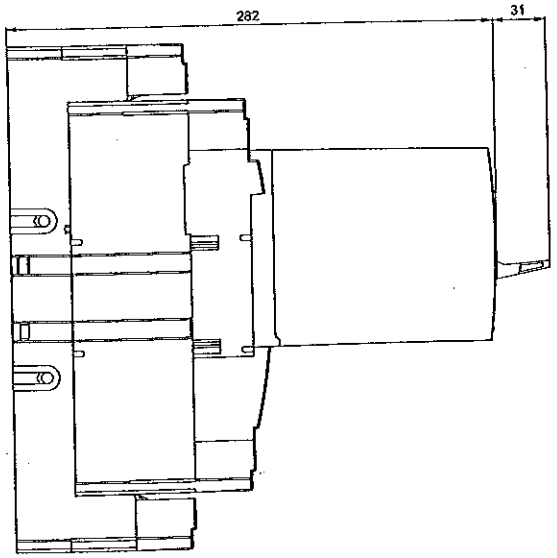
Plug-in design, hand drive





Plug-in design, motor drive



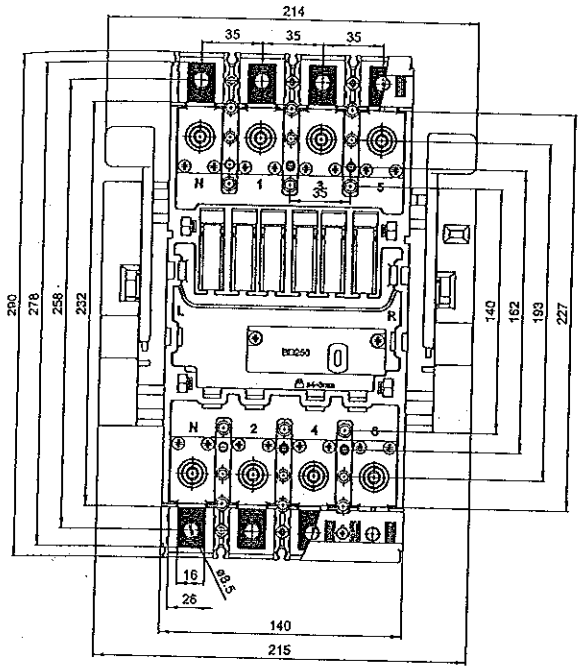


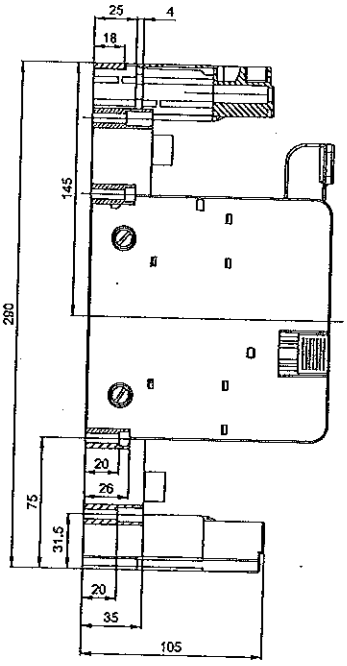
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

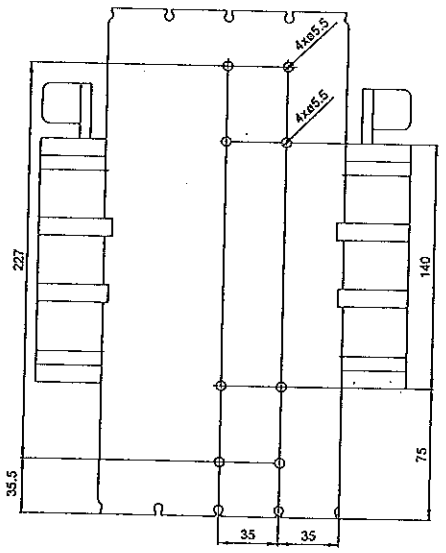
Dimensions

Withdrawable device

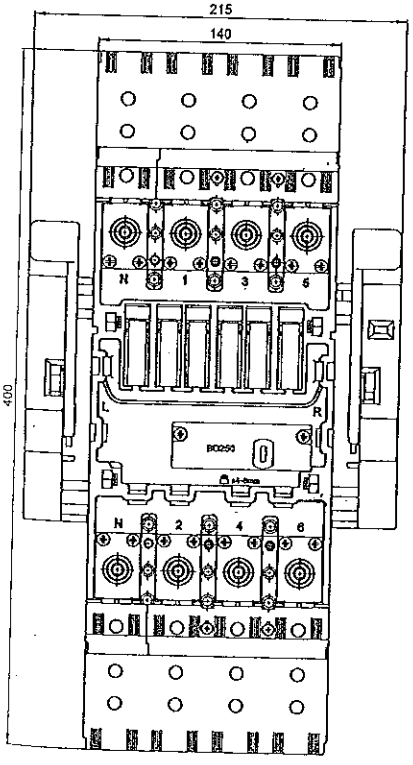


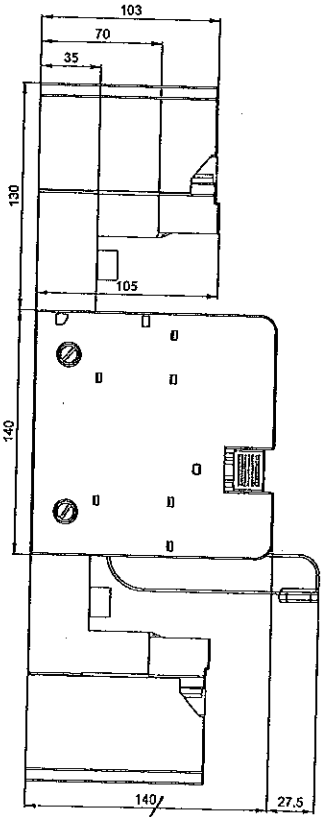


Drilling diagram



Withdrawable device, OD-BD-KS43 terminal cover



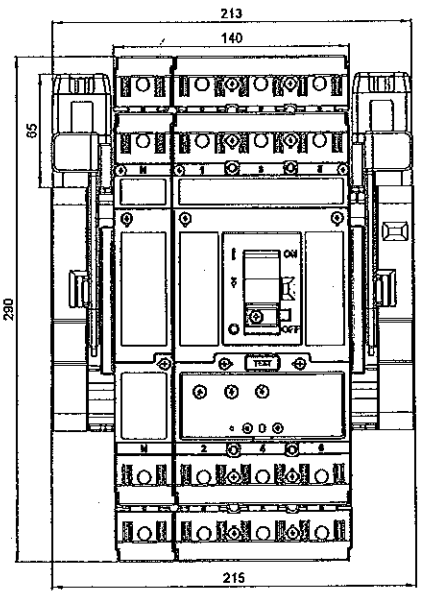


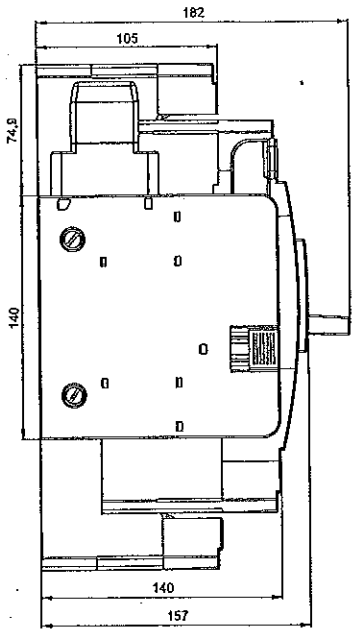
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

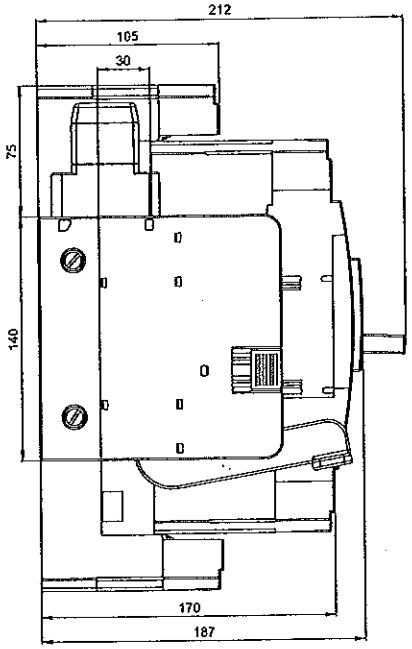
Withdrawable design

Working position

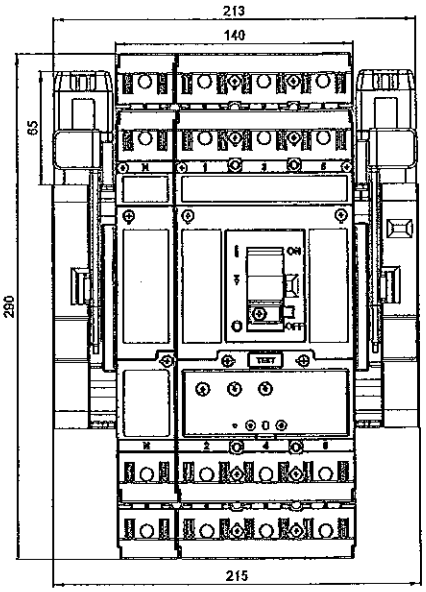


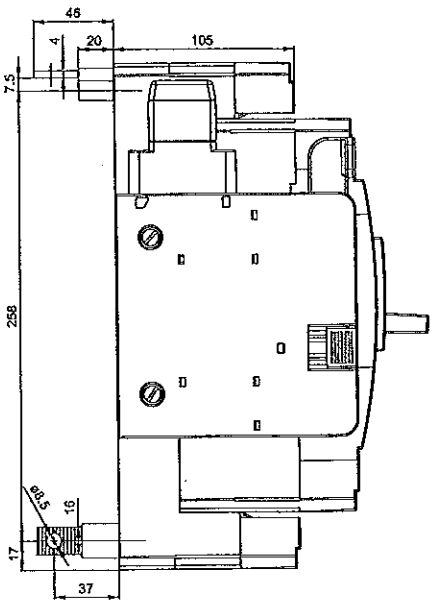


Inspection position

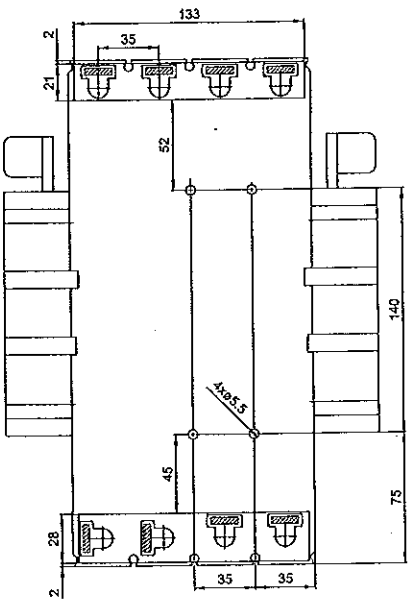


Withdrawable design, rear connection (CS-BD-A021 + CS-BD-A421 connecting sets)





Drilling diagram



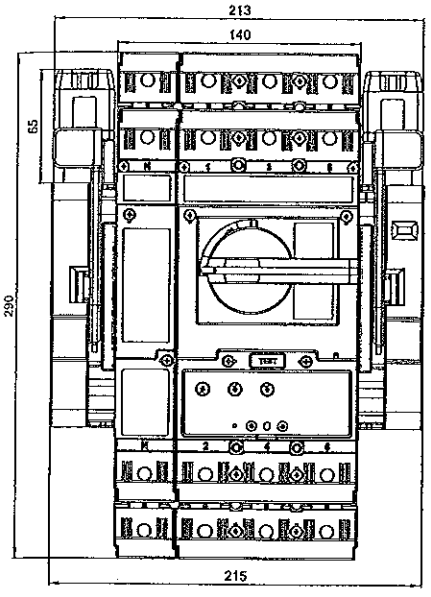
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

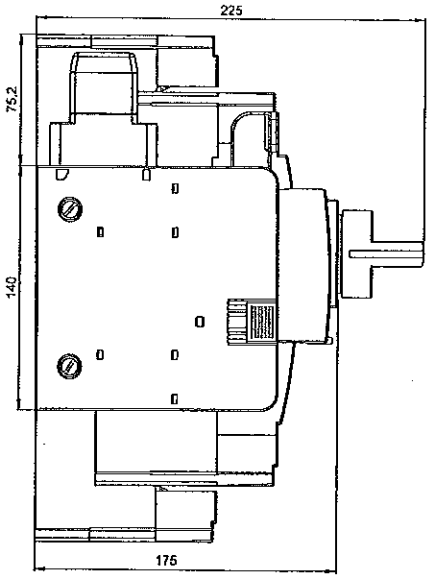
4P

Dimensions

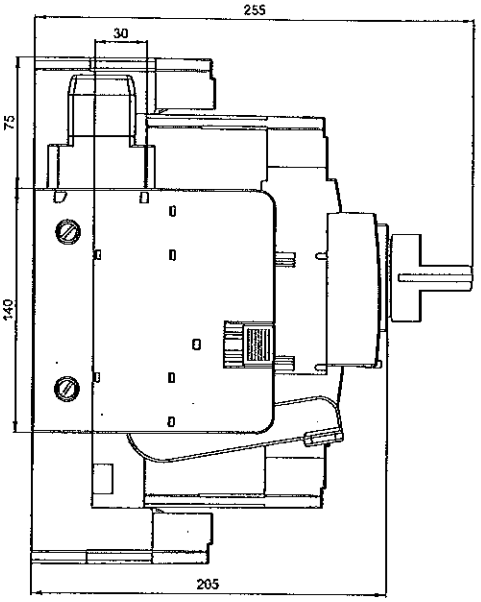
Withdrawable design, hand drive

Working position



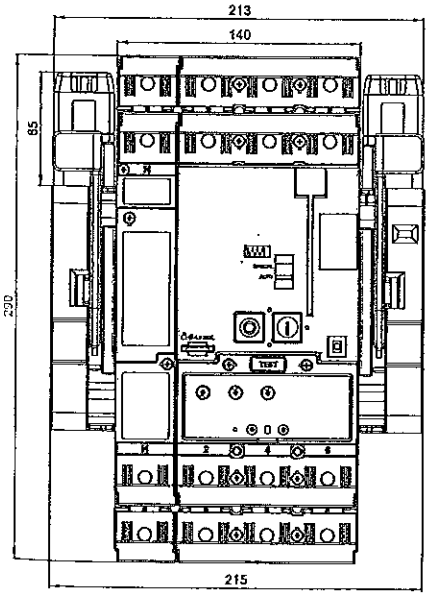


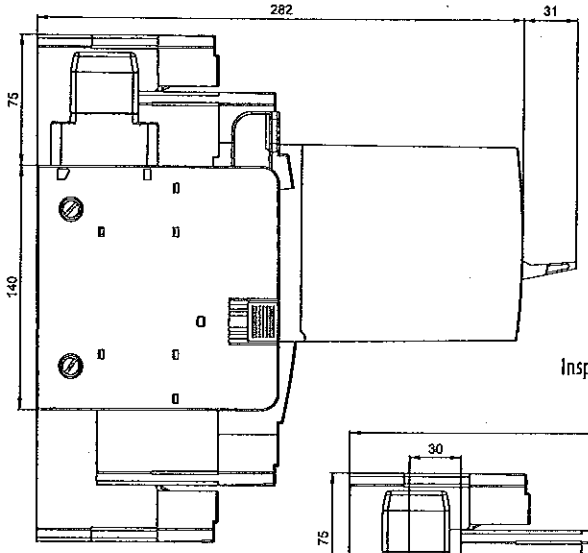
Inspection position



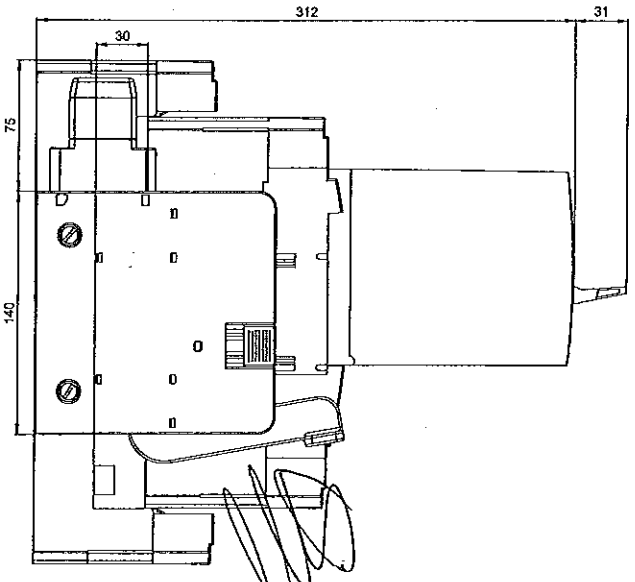
Withdrawable design, motor drive

Working position



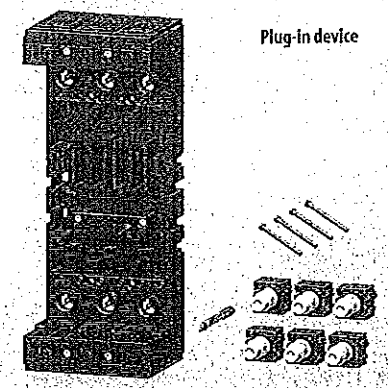


Inspection position

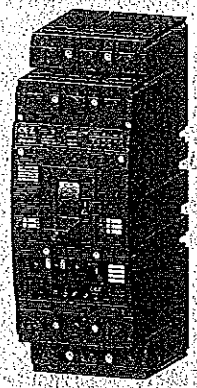


PLUG-IN DEVICE

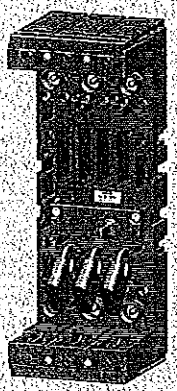
3P 4P



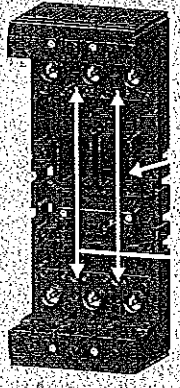
Plug-in device



Circuit breaker in plug-in design



Locking plug-in device against inserting circuit breaker



Position of cavities for switch SO-BHD-0010 in plug-in device

11, 12, 13, 14

Keying set OD-BD-KK01

Description

Plug-in design of the circuit breaker/switch-disconnector is intended for demanding industrial applications where rapid exchange of the circuit breaker along with both visual and conductive disconnection of the circuit are needed.

- plug-in device includes complete accessories for assembling circuit breaker/switch-disconnector in plug-in design from the originally fixed design
- components of the plug-in device are:
  - base of the plug-in device
  - 2 connecting sets (total of 6 terminals) - for fitting onto the switching unit
  - interlocking connecting rod (ensures automatic switching off of the circuit breaker for handling – inserting and removal)
  - set of mounting bolts - for affixing circuit breaker to plug-in device (set of mounting bolts is used to fasten the plug-in device into the switchboard, that is included in delivery of switching unit)

Circuit breaker positions

Circuit breaker in plug-in design has two positions:

1. inserted (working position)
2. removed

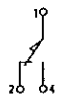
Power circuit

- connecting set CS-BD-A011 is used for connecting with busbars or cable lugs, that is included in delivery of BD250... switching unit
- for connecting in another way, it is necessary to use connecting sets, see page E8
- connection must comply with our recommendations, see page E18

Auxiliary circuits

These are connected using 15-wire cable **OD-BHD-KA01.**

States of switches SO-BHD-0010 in plug-in device according to circuit breaker position

Cavity	11, 12, 13, 14 (19, 20)
Circuit breaker position	
Inserted	0 1
Removed	1 0

note: 0 - contact open, 1 - contact closed

1) - cavities 19 and 20 are only for 4-pole design

Signalling of position SO-BHD-0010

Plug-in device may be fitted with a maximum of fou switches (for 4-pole design, max. 6 switches) for signallin the inserted/removed position.

Keying set OD-BD-KK01

Plug-in device and circuit breaker can be fitted with keying se which prevents inserting any other circuit breaker into the plug in device.

Circuit breaker accessories in plug-in design

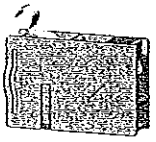
Circuit breaker in plug-in design has the same accessories a the fixed circuit breaker.

Advantages and enhanced safety for operator:

- unambiguous remote signalling of the circuit breake position
- option to lock plug-in device with padlocks to prevent inseri ing of circuit breaker
- visible and conductive disconnection of the power circui
- easy exchange of circuit breakers in case of failure
- IP20 degree of protection of all termination points
- plug-in device does not need earthing

Keying set OD-BD-KK01

Connecting cable OD-BHD-KA01



Signalling of position SO-BHD-0010

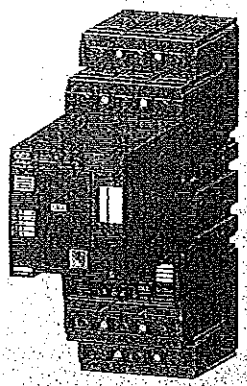
Specifications SO-BHD-0010

Type		SO-BHD-0010
Rated operating voltage	U_e	400 V a.c. 220 V d.c.
Rated insulation voltage	U_i	500 V a.c.
Rated frequency	f_e	50/60 Hz
Rated operating current	I_e / U_e AC-13	3 A/400 V a.c.
	I_e / U_e DC-15	3.5 A/24 V d.c., 1 A/48 V d.c., 0.3 A/110 V d.c., 0.15 A/220 V d.c.
Thermal current	I_{th}	6 A
Arrangement of contacts		001
Connection cross-section	S	0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)		IP20

For wiring diagram of circuit breaker in plug-in device with accessories see page E16.

PLUG-IN DEVICE

3P 4P



Circuit breaker in plug-in design with motor drive

Recommended circuit breaker manipulation

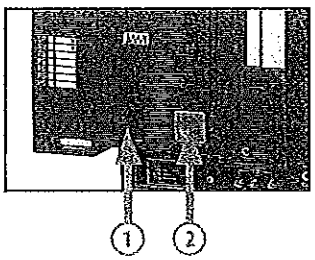
During the manipulation with circuit breaker in plug-in design with motor drive, the circuit breaker may reach the state, in which the first attempt at switching on by motor drive is unsuccessful. Switching on is executed after repeated make impulse. To avoid this effect, some of the following steps may be done:

1) To keep the process of manipulation with the circuit breaker, see „Recommended circuit breaker manipulation" below
2) To connect OD-BHD-R... control relay into the motor drive circuit according to wiring diagram, see page E73

Recommended process of manipulation

After every manipulation with circuit breaker in plug-in design is necessary to accomplish the operations in following sequence, after repeated insertion into the plug-in device:

1) press the switch off button (red) on the motor drive, see fig.
2) press the switch on button (green) on the motor drive, see fig.



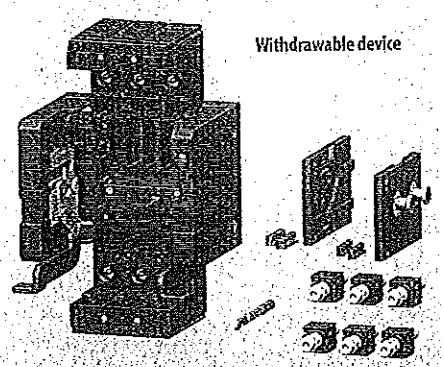
Changes in states of switches in cavities of switching unit when removing circuit breaker

State of circuit breaker before removing			State of switches before removing - inserted position →						State of switches after removing - withdrawn position					
			Cavity 1		2		3 (4, 5, 6)[1]		1		2		3 (4, 5, 6)[1]	
	Circuit breaker lever position	State of the main contacts	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100
			40 20 30 10											
Switched on		1	1	0	0	1	1	0	1	0	1	0	0	1
Switched off manually or by motor drive electrically (loaded state)		0	1	0	0	1	0	1	1	0	1	0	0	1
Switched off by overcurrent release		0	0	1	1	0	0	1	0	1	1	0	0	1
Switched off from switched on state: by auxiliary release, or by TEST push button or by the switch off button on the motor drive		0	0	1	1	0	0	1	1	0	1	0	0	1

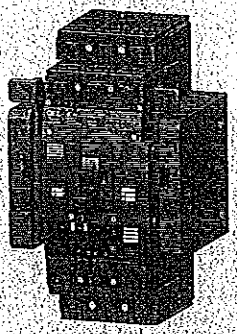
note: 0 - contact open, 1 - contact closed
[1] - cavities 4, 5, 6 are only for 4-pole design

WITHDRAWABLE DEVICE

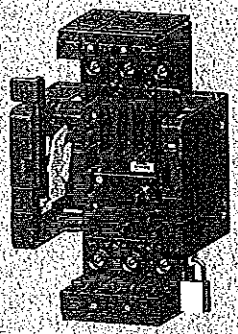
3P 4P



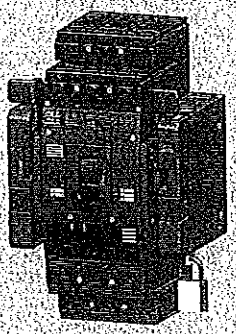
Withdrawable device



Circuit breaker in withdrawable design

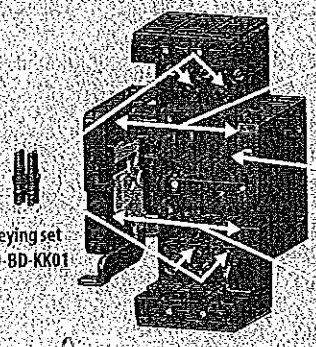


Locking withdrawable device against inserting circuit breaker



Locking withdrawable circuit breaker against tampering

Position of cavities for switch SO-BHD-0010 in withdrawable device



Description

Withdrawable design of the circuit breaker/switch-disconnector is intended for demanding industrial applications where rapid exchange of the circuit breaker, frequent checking and both visual and conductive disconnection of the circuit are needed.

- withdrawable device includes complete accessories for assembling circuit breaker/switch-disconnector in withdrawable design from the originally fixed design
- components of the withdrawable device are:
  - base of the withdrawable device
  - 2 movable side plates
  - 2 connecting sets (total of 6 terminals) - for fitting onto the switching unit
  - interlocking connecting rod (ensures automatic switching off of the circuit breaker for handling – inserting and withdrawing)
  - set of mounting bolts is used to fasten the withdrawable device into the switchboard, that is included in delivery of switching unit

Circuit breaker positions

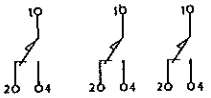
Circuit breaker in withdrawable design has three positions:

1. inserted (working position)
2. withdrawn (inspection position)
3. removed

Keying set OD-BD-KK01

Withdrawable device and circuit breaker can be fitted with keying set, which prevents inserting any other circuit breaker into the withdrawable device.

States of switches SO-BHD-0010 in withdrawable device according to circuit breaker and arrestment positions

Cavity	11 12 13 14	15 17	16 18
	19 20 [1]	19 20 [1]	19 20 [1]
Circuit breaker and arrestment position			
Inserted and not arrested	0 1	1 0	0 1
Inserted and arrested	0 1	1 0	1 0
Withdrawn and not arrested	1 0	0 1	0 1
Withdrawn and arrested	1 0	0 1	1 0
Removed and not arrested	1 0	1 0	0 1
Removed and arrested	1 0	1 0	1 0

note: 0 - contact open, 1 - contact closed
- operating state is always in arrested position
- in arrested position it is possible to lock the withdrawable device (for more information see „Advantages and enhanced safety for operator")

[1] - cavities 19 and 20 are only for 4-pole design

Signalling of position SO-BHD-0010

Withdrawable device can be fitted with the switches for signalling the position of the circuit breaker inserted/withdrawn/removed.

Power circuit

- connecting set CS-BD-A011 is used for connecting with busbars or cable lugs, that is included in delivery of BD250.. switching unit
- for connecting in another way, it is necessary to use connecting sets, see page E8
- connection must comply with our recommendations, see page E18

Auxiliary circuits

These are connected using 15-wire cable **OD-BHD-KA01.**

Circuit breaker accessories in withdrawable design

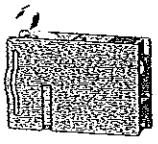
Circuit breaker in withdrawable design has the same accessories as fixed circuit breaker.

Advantages and enhanced safety for operator:

- unambiguous remote and local signalling of the circuit breaker and arrestment positions
- checking of circuit breaker and accessories function in the inspection position
- locking withdrawable device against inserting circuit breaker, locking of circuit breaker in inserted (operating position, locking of circuit breaker in withdrawn (checking) position - locking by means of padlocks
- visible and conductive disconnection of the power circuit
- easy exchange of circuit breakers in case of failure
- IP20 degree of protection of all termination points
- withdrawable device does not need earthing

Keying set OD-BD-KK01

Connecting cable OD-BHD-KA01



Signalling of position SO-BHD-0010

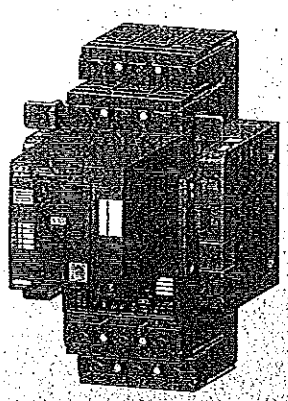
Specifications SO-BHD-0010

Type		SO-BHD-0010
Rated operating voltage	U_e	400 V a.c. 220 V d.c.
Rated insulation voltage	U_i	500 V a.c.
Rated frequency	f_n	50/60 Hz
Rated operating current	I_e/U_e AC-13	3 A/400 V a.c.
	I_e/U_e DC-15	3.5 A/24 V d.c., 1 A/48 V d.c., 0.3 A/110 V d.c., 0.15 A/220 V d.c.
Thermal current	I_{th}	6 A
Arrangement of contacts		001
Connection cross-section	S	0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)		IP20

For wiring diagram of circuit breaker in withdrawable device with accessories see page E16.

WITHDRAWABLE DEVICE

3P 4P



Circuit breaker in withdrawable design with motor drive

Recommended circuit breaker manipulation

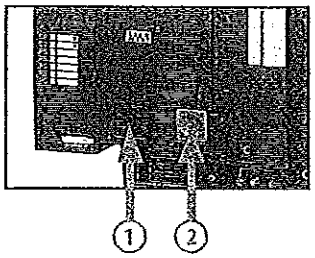
During the manipulation with circuit breaker in withdrawable design with motor drive, the circuit breaker may reach the state, in which the first attempt at switching on by motor drive is unsuccessful. Switching on is executed after repeated make impulse. To avoid this effect, some of the following steps may be done:

1) To keep the process of manipulation with the circuit breaker, see „Recommended circuit breaker manipulation" below
2) To connect OD-BHD-R... control relay into the motor drive circuit according to wiring diagram, see page E73

Recommended process of manipulation

After every manipulation with circuit breaker in withdrawable design is necessary to accomplish the operations in following sequence, after repeated insertion into the plug-in device:

1) press the switch off button (red) on the motor drive, see fig.
2) press the switch on button (green) on the motor drive, see fig.

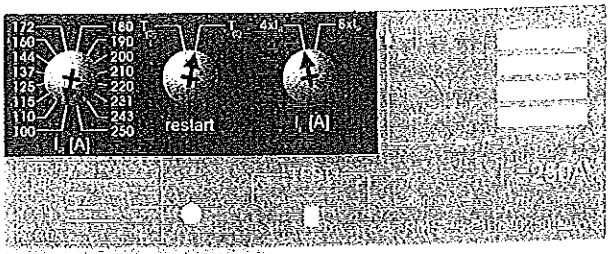


Changes in states of switches in cavities of switching unit when inserting and withdrawing circuit breaker

State before insertion/withdrawal			State after insertion/withdrawal											
State of circuit breaker before insertion			State of switches before insertion - withdrawn position →						State of switches after insertion - inserted position →					
State of circuit breaker before withdrawal			State of switches before withdrawal - inserted position →						State of switches after withdrawal - withdrawn position →					
			Cavity	1		2		3 (4, 5, 6)[1]		1		2		3 (4, 5, 6)[1]	
	Circuit breaker lever position	State of the main contacts	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100
Switched on		1	1	0	0	1	1	0	1	0	1	0	0	1
Switched off manually or by motor drive electrically (loaded state)		0	1	0	0	1	0	1	1	0	1	0	0	1
Switched off by overcurrent release		0	0	1	1	0	0	1	0	1	1	0	0	1
Switched off from switched on state: by auxiliary release, or by TEST push button or by the switch off button on the motor drive		0	1	0	1	0	0	1	1	0	1	0	0	1

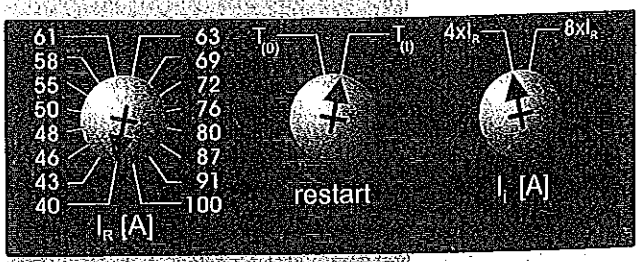
note: 0 - contact open, 1 - contact closed
[1] - cavities 4, 5, 6 are only for 4-pole design

OVERCURRENT RELEASES - DTV3

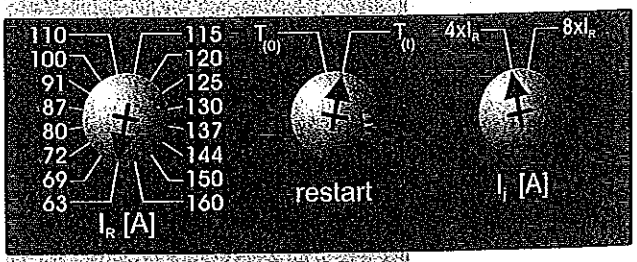


Reduced current Thermal memory Short-circuit release

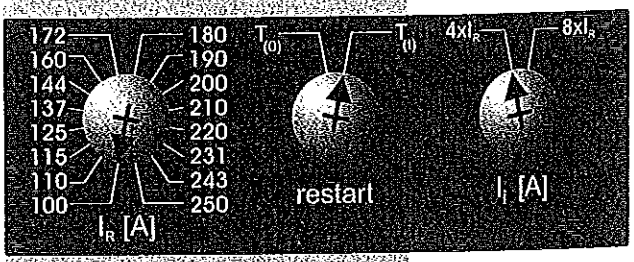
$I_n = 100$ A
SE-BD-0100-DTV3

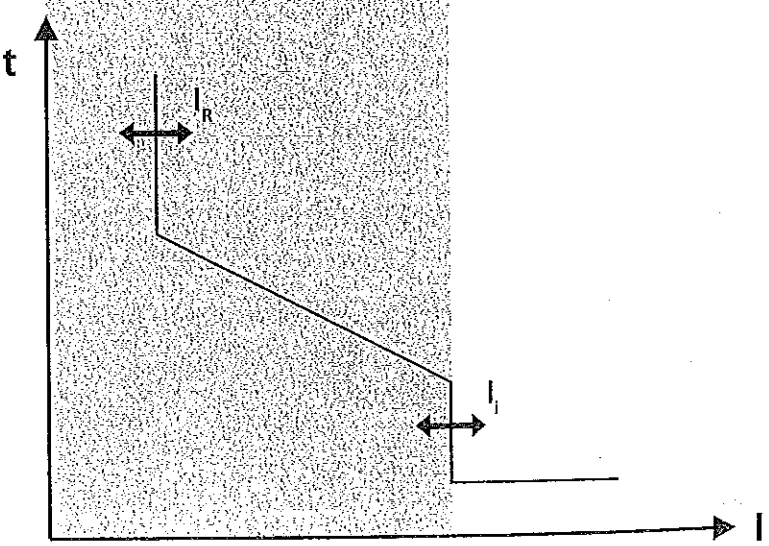


$I_n = 160$ A
SE-BD-0160-DTV3



$I_n = 250$ A
SE-BD-0250-DTV3





Properties

- suitable for protection of lines and distribution transfor
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF =
- setting of the value of the short-circuit release I_i in tw steps, $4\ I_R$ or $8\ I_R$
- setting of I_R and I_i by means of the rotary switches is ste
- the overcurrent release indicates operating state and t value of the passing current by means of LED
- the values of parameters of the overcurrent release ar by the manufacturer to minimum

Data for the project

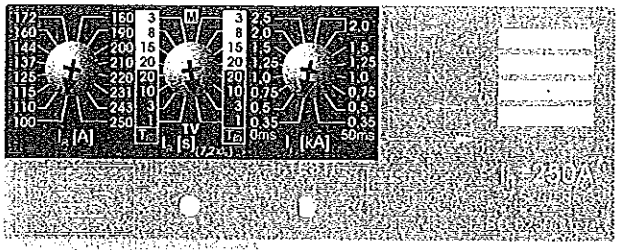
Switching unit		BD250...
Overcurrent release		SE-BD-...
Overcurrent release setting		
Reduced current	I_R	... A
Thermal memory	T	...
Short-circuit release current	I_i	... A (... x I_R)

IMPORTANT

- thermal memory must be switched on in protection of transformers and lines - thus the transformer or the line will be protected against repeated overload

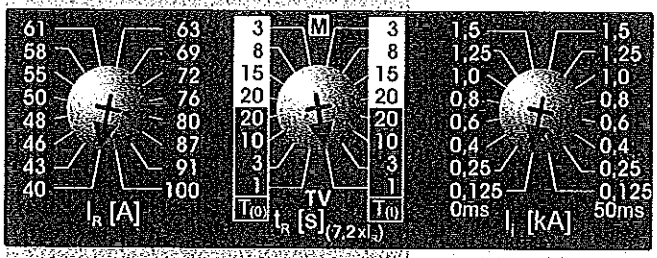
OVERCURRENT RELEASES - MTV8, TV mode

3P 4P

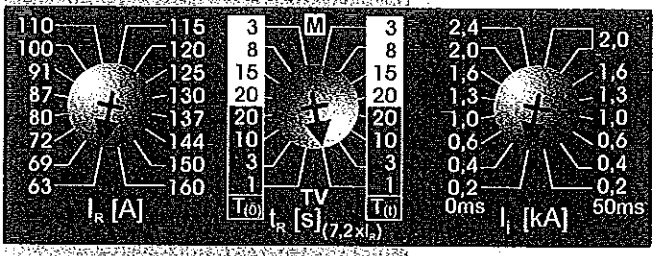


Reduced current | Thermal release delay | Short-circuit release

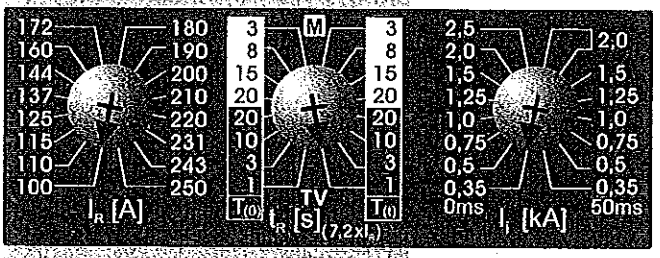
I_n = 100 A
SE-BD-0100-MTV8

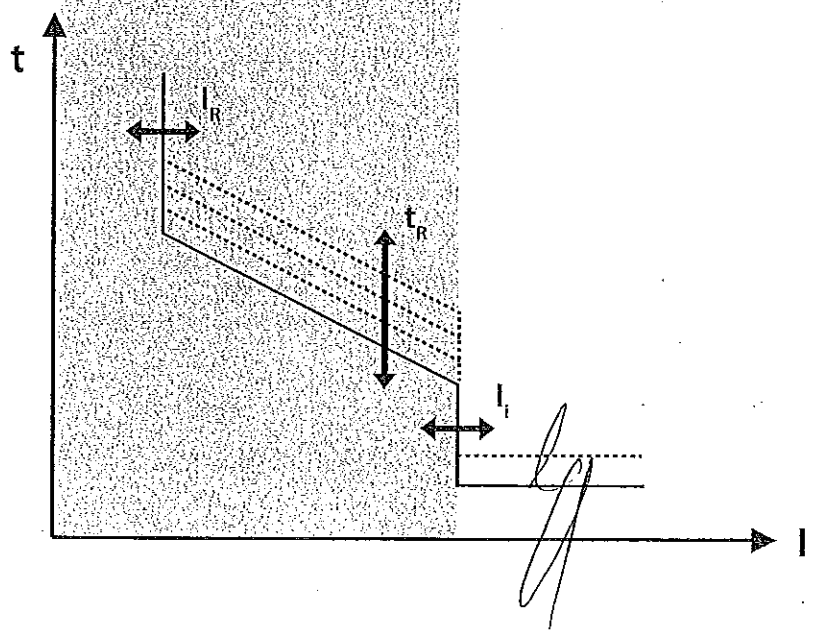


I_n = 160 A
SE-BD-0160-MTV8



I_n = 250 A
SE-BD-0250-MTV8





Properties

- TV mode - suitable for protection of lines, distribution transformers and generators
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(0)}$, OFF = $T_{(0)}$)
- in TV mode the undercurrent release is inactive
- setting of delay of the thermal release t_R 1 s, 3 s, 10 s and 20 s
- setting of the value of short-circuit release I_i in 8 steps and possibility of switching the short-circuit release off with a delay of 50 ms
- setting of I_R, t_R and I_i by means of the rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

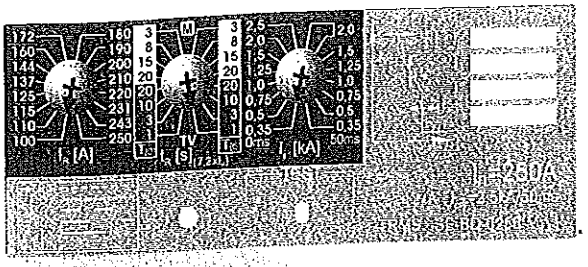
Data for the project

Switching unit		BD250...
Overcurrent release		SE-BD-...
Overcurrent release setting		
Reduced current	I_R	....A
Mode		TV
Thermal memory	T	....
Thermal release delay	t_R	....s
Short-circuit release current	I_i	....A
Setting of short-circuit release		.... ms

IMPORTANT

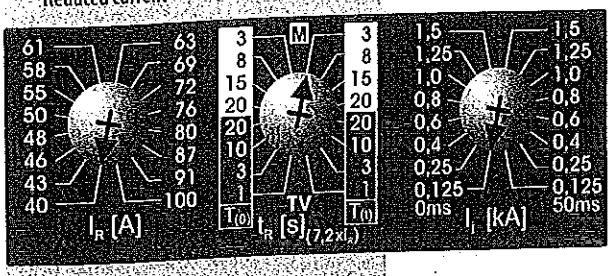
- the set value of current of the short-circuit release must correspond to the impedance loop - conditions must be fulfilled for automatic disconnection from power supply in case of failure

OVERCURRENT RELEASES - MTV8, M mode

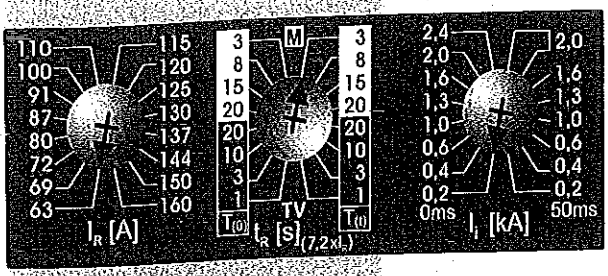


Reduced current | Motor starting | Short-circuit release

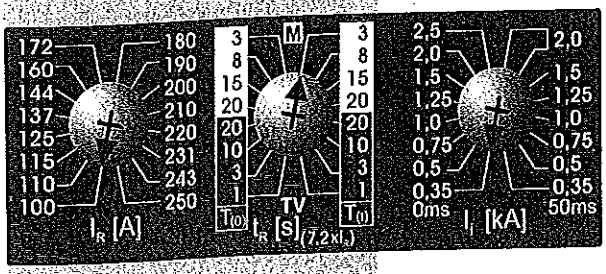
$I_n = 100$ A
SE-BD-0100-MTV8

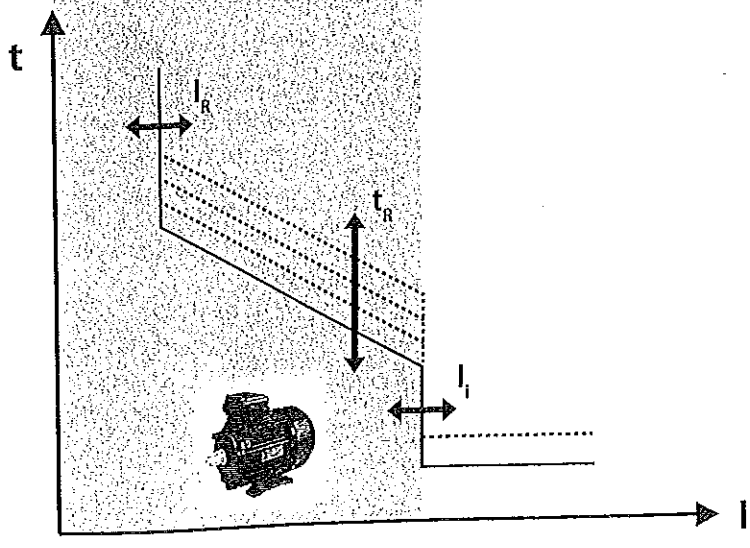


$I_n = 160$ A
SE-BD-0160-MTV8



$I_n = 250$ A
SE-BD-0250-MTV8





Properties

- M mode - suitable for protection of motors
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(0)}$, OFF =
- in M mode the undercurrent release is active
- setting of delay of the thermal release t_R 3 s, 8 s, 15 s an 20 s according to the motor starting class
- setting of the value of short-circuit release I_i in 8 steps a possibility of switching the short-circuit release off with a delay of 50 ms
- setting of I_R, t_R and I_i by means of the rotary switches is stepv
- the overcurrent release indicates operating state and th value of the passing current by means of LED
- the values of parameters of the overcurrent release are s by the manufacturer to minimum

Data for the project

Switching unit		BD250...
Overcurrent release		SE-BD-...
Overcurrent release setting		
Reduced current	I_R	... A
Mode		M
Thermal memory	T	...
Thermal release delay	t_R	... s
Short-circuit release current	I_i	... A
Setting of short-circuit release		... ms

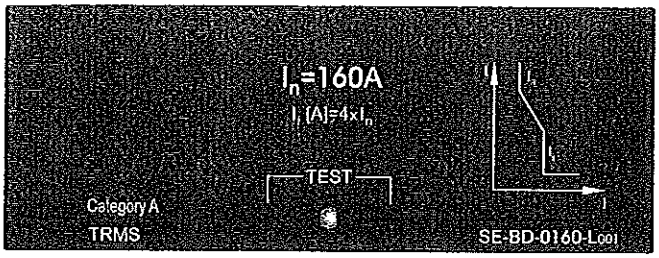
IMPORTANT

- M mode must be selected in protection of motors - the motor will be protected in phase failure
- thermal release delay t_R must correspond to the motor starting class
- in protection of motors it is suitable to set the delay of the short-circuit release at 50 ms

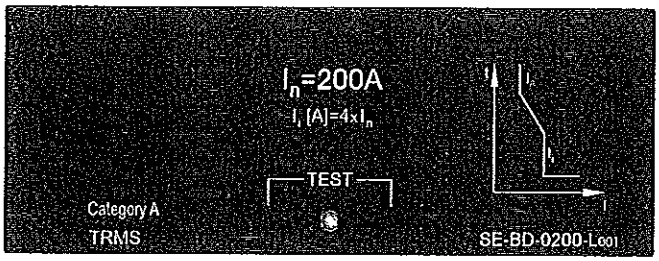
OVERCURRENT RELEASES - L001

3P 4P

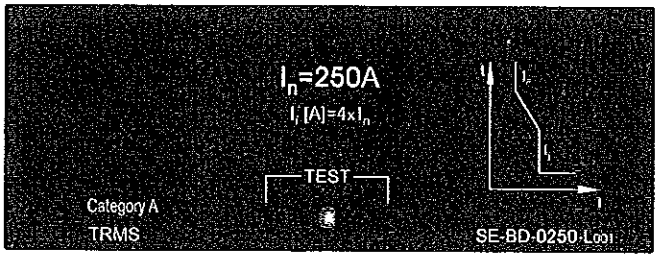
I_n = 160 A
SE-BD-0160-L001

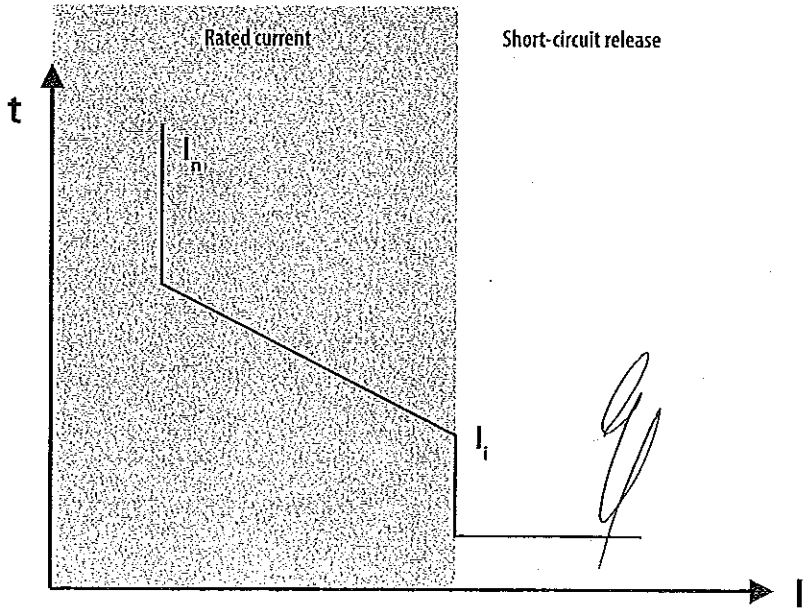


I_n = 200 A
SE-BD-0200-L001



I_n = 250 A
SE-BD-0250-L001





Properties

- suitable for protection of lines with low impulse currents
- protects against both overcurrent and short circuit
- reduced current cannot be set
- thermal release cannot be switched off
- short-circuit release is fixed at 4 I_n

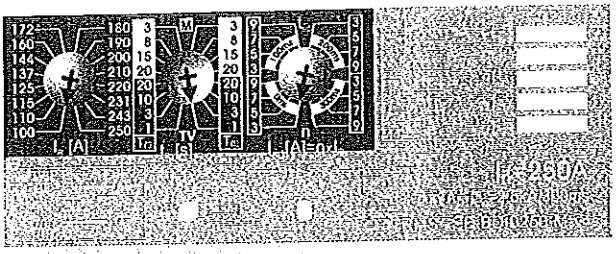
Data for the project

Switching unit		BD250...
Overcurrent release		SE-BD-...
Overcurrent release values		
Rated current	I_n	....A
Short-circuit release current	I_i	....A (4 x I_n)

IMPORTANT

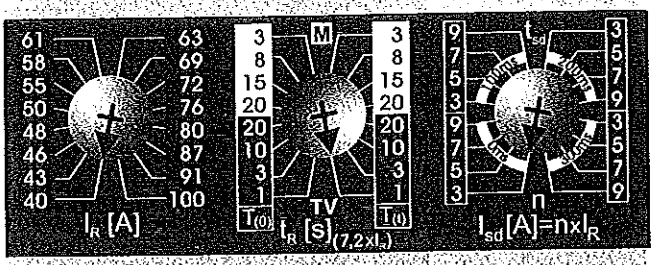
- high impulse current must not be in the circuit - undesirable breaking would take place, because the current of the short-circuit release is fixed at 4 I_n

OVERCURRENT RELEASES - MTV9, TV mode

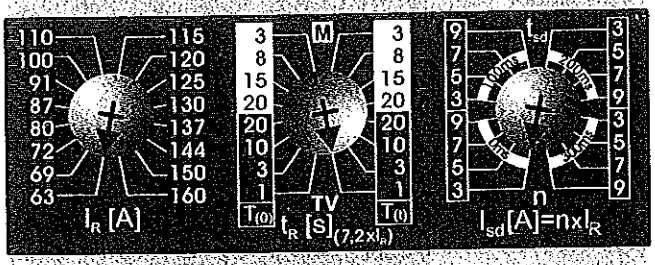


Rated current | Motor starting | Selective release

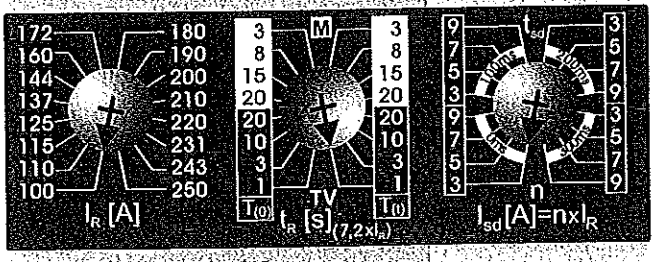
$I_n = 100$ A
SE-BD-0100-MTV9



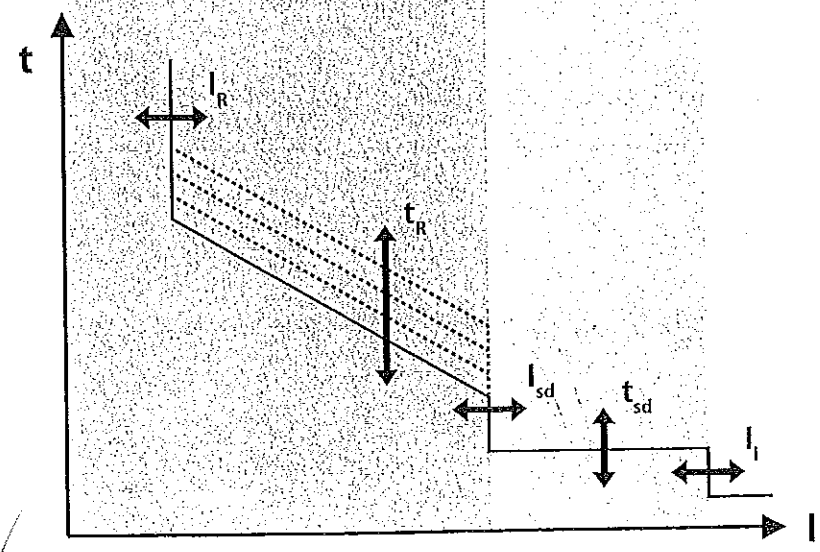
$I_n = 160$ A
SE-BD-0160-MTV9



$I_n = 250$ A
SE-BD-0250-MTV9



Short-circuit release



Properties

- TV mode suitable for protection of lines, distribution transformers and generators – enables setting of time selectivity
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(s)}$, OFF =
- in TV mode the undercurrent release is inactive
- setting of delay of the thermal release t_R 1 s, 3 s, 10 s and
- setting of the value of selective release I_{sd} in 4 steps (independent time-delayed release)
- setting of delay of the selective release t_{sd} 0 ms, 100 ms 200 ms or 300 ms
- setting of I_R, t_R, I_{sd} and t_{sd} by means of rotary switches is step
- the overcurrent release indicates operating state and th value of the passing current by means of LED
- the values of parameters of the overcurrent release are by the manufacturer to minimum

Data for the project

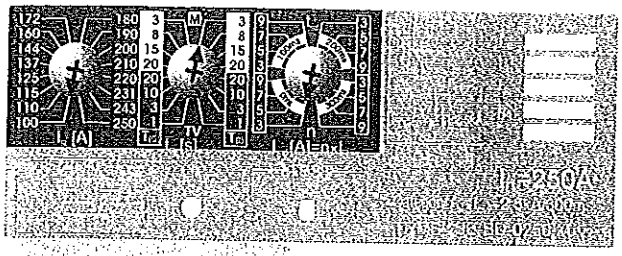
Switching unit		BD250...
Overcurrent release		SE-BD-...
Overcurrent release setting		
Reduced current	I_R	....A
Mode		TV
Thermal memory	T	....
Thermal release delay	t_R	....s
Selective release value	I_{sd}	....A (...xI_R)
Selective release delay	t_{sd}	.... ms

IMPORTANT

- the set value of current of the short-circuit release must correspond to the impedance loop - conditions must be fulfilled for automatic disconnection from power supply in case of failure

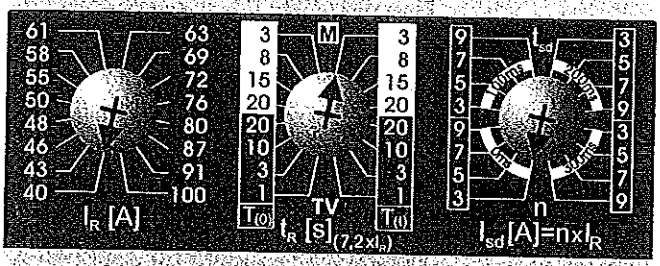
OVERCURRENT RELEASES - MTV9, M mode

3P 4P

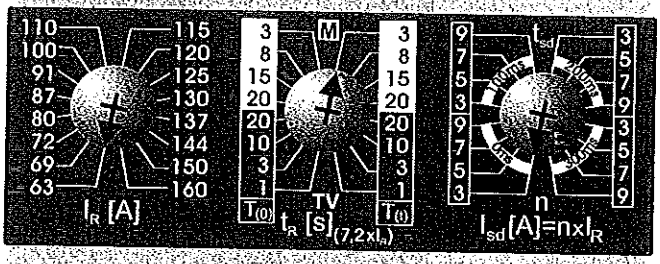


Rated current Motor starting Selective release

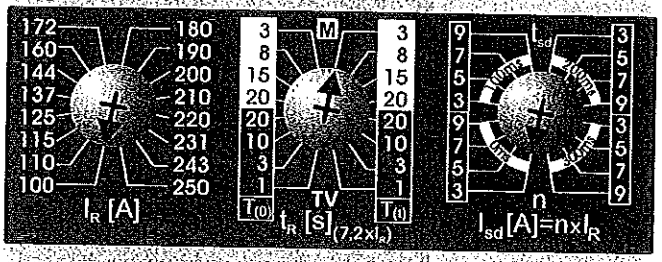
$I_n = 100$ A
SE-BD-0100-MTV9

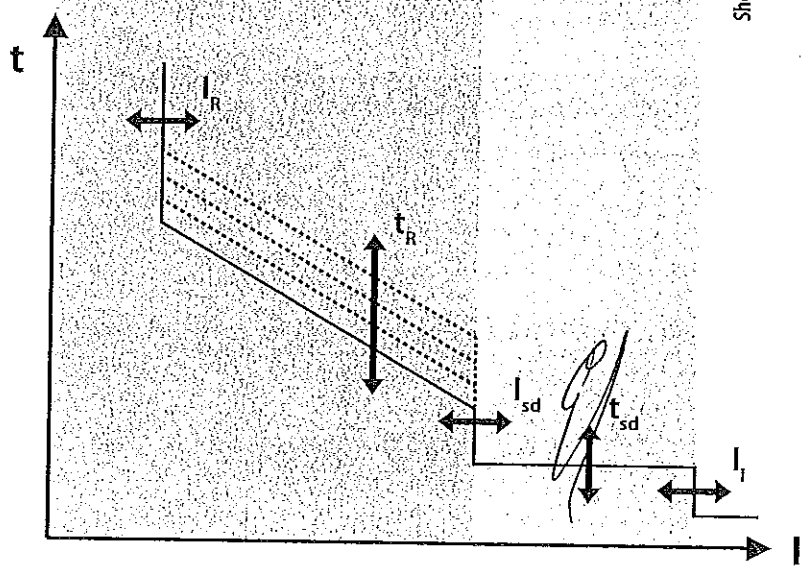


$I_n = 160$ A
SE-BD-0160-MTV9



$I_n = 250$ A
SE-BD-0250-MTV9





Properties

- M mode suitable for protection of motors – enables setting of time selectivity
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(0)}$)
- in M mode the undercurrent release is active
- setting of delay of the thermal release t_R 3 s, 8 s, 15 s and 20 s according to the motor starting class
- setting of the value of selective release I_{sd} in 4 steps (independent time-delayed release)
- setting of delay of the selective release t_{sd} 0 ms, 100 ms, 200 ms or 300 ms
- setting of I_R, t_R, I_{sd} and t_{sd} by means of rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

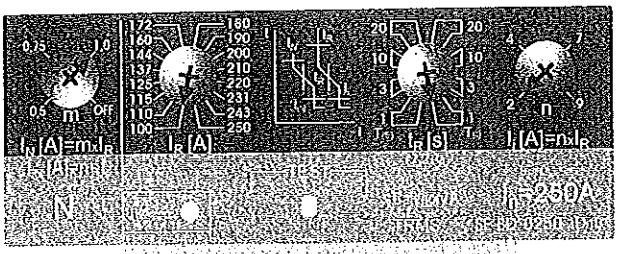
Switching unit		BD250...
Overcurrent release		SE-BD-...
Overcurrent release setting		
Reduced current	I_R	....A
Mode		M
Thermal memory	T	....
Thermal release delay	t_R	....s
Selective release value	I_{sd}	....A (...x I_R)
Selective release delay	t_{sd}	....ms

IMPORTANT

- M mode must be selected in protection of motors – the motor will be protected in phase
- failure thermal release delay t_R must correspond to the motor starting class

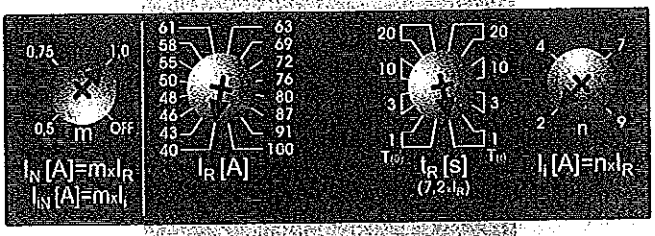
OVERCURRENT RELEASES - 4D01

3P

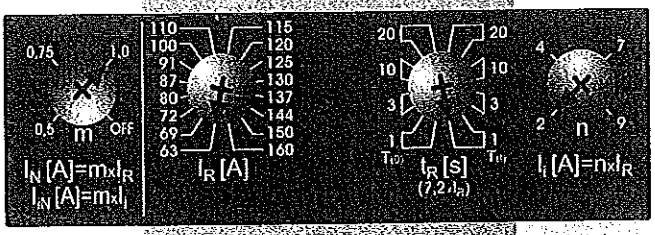


Rated current | Motor starting | Short-circuit release

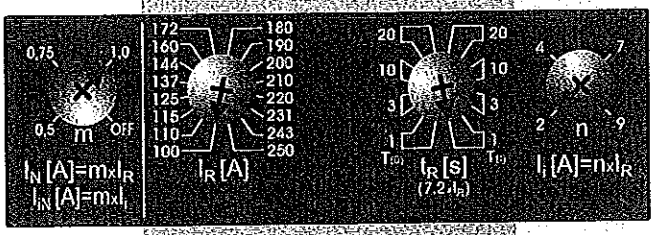
$I_n = 100$ A
SE-BD-0100-4D01

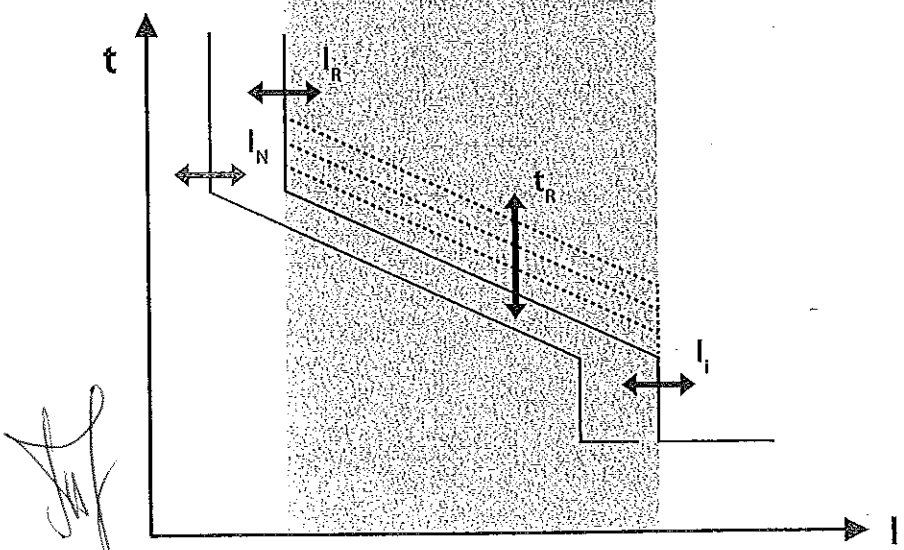


$I_n = 160$ A
SE-BD-0160-4D01



$I_n = 250$ A
SE-BD-0250-4D01





Properties

- it is appropriate for protection of lines and distribution transformers with protected „N" conductor in TN-C-S a TN-S networks
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF =
- setting of delay of the thermal release t_R 1 s, 3 s, 10 s and
- setting of the value of the short-circuit release I_i in 4 st $(2 \div 9)\ I_R$
- setting of the value of reduced current I_N and short-circ current I_{iN} in the 4th pole
- setting of I_R, t_R, I_N and I_{iN} by means of rotary switches is step
- the overcurrent release indicates operating state and tl value of the passing current by means of LED
- the values of parameters of the overcurrent release are by the manufacturer to minimum

Data for the project

Switching unit		BD250...
Overcurrent release -		SE-BD-...
Overcurrent release setting		
Reduced current	I_R	... A
Thermal memory	T	...
Thermal release delay	t_R	... s
Level of reduced current in the 4th pole	I_N	... A (...
Level of reduced current in the 4th pole	I_{iN}	... A (...

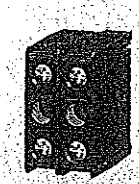
IMPORTANT

- the set value of current of the short-circuit release must correspond to the impedance loop - conditions must be fulfilled for automatic disconnection from power supply in case of failure

WITCHES

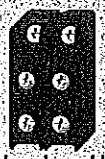
3P -4P

Simple

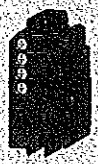


Double

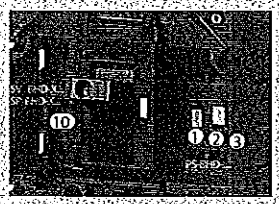
Make-and-break



Double make-and-break



Early



Cavities in BD250... switching unit

Specification

Type		PS-BHD-00	PS-BHD-00-Au[1]
Rated operating voltage	U_e	60 ÷ 500 V a.c. 60 ÷ 500 V d.c.	5 ÷ 60 V a.c. 5 ÷ 60 V d.c.
Rated insulation voltage	U_i	500 V	500 V
Rated frequency	f_n	50/60 Hz	50/60 Hz
Rated operating current	I_e/U_e AC-15 I_e/U_e DC-13	6 A/240 V, 4 A/400 V, 2 A/500 V 0.4 A/240 V, 0.3 A/400 V, 0.2 A/500 V	AC-12, DC-12 0.004 ÷ 0.5 A/5 V, 0.004 ÷ 0.01/60 V
Thermal current	I_{th}	10 A	0,5 A
Arrangement of contacts		01, 10, 02, 11, 20	01, 10, 02, 11, 20
Connection cross-section	S	0.5 ÷ 1 mm²	0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)		IP20	IP20

Type		SP-BHD-0002	PS-BHD-0010/0020	PS-BHD-0010-Au/0020-Au
Rated operating voltage	U_e	250 V a.c. -	60 ÷ 250 V a.c. 60 ÷ 250 V d.c.	5 ÷ 60 V a.c. 5 ÷ 60 V d.c.
Rated insulation voltage	U_i	250 V	250 V	250 V
Rated frequency	f_n	50/60 Hz	50/60 Hz	50/60 Hz
Rated operating current	I_e/U_e I_e/U_e	1 A/250 V a.c. -	AC-15 1.5 A/250 V a.c. DC-13 0.2 A/250 V d.c.	AC-12, DC-12 0.004 ÷ 0.5 A/5 V, 0.004 ÷ 0.01/60 V
Thermal current	I_{th}	-	6 A	0,5 A
Arrangement of contacts		02, 11, 20	001/002	001/002
Connection cross-section	S	0.5 ÷ 1 mm²	0.5 ÷ 1 mm²	0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)		IP20	IP20	IP20

[1] - PS-BHD-....- Au is not suitable to control electromagnetic loads

Type designation, number and type of contacts according to contact arrangement

Arrangement of contacts	Type	Number of contacts	Contact types
01	PS-BHD-1000 (-Au)	1	make
20	PS-BHD-2000 (-Au)	2	make
01	PS-BHD-0100 (-Au)	1	break
02	PS-BHD-0200 (-Au)	2	break
11	PS-BHD-1100 (-Au)	1+1	break+make
001	PS-BHD-0010 (-Au)	1	make-and-break
002	PS-BHD-0020(-Au)	2	make-and-break

Function and names of switches according to their location in cavities

Position of switch	Switch name	Switch function
Cavity 1	Signal	signals tripping of circuit breaker by overcurrent release
Cavity 2	Relative	signals tripping of circuit breaker/switch-disconnector by releases, TEST push button or by the switch off button on the motor drive
Cavity 3 (4, 5, 6)[2]	Auxiliary	switch signals position of circuit breaker/switch-disconnector's main contacts
Cavity 10	Early	makes/breaks in advance before making the main contact of circuit breaker/switch-disconnector

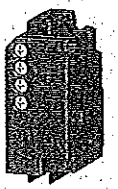
[2] - cavities 4, 5, 6 are only for 4-pole design

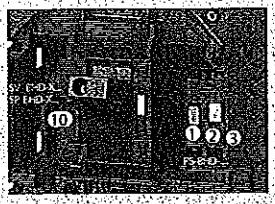
tates of switches in the circuit breaker cavities

Cavity			1	2	3 (4, 5, 6)[1]	10	2 and 3	2 and 3	2 and 3	1	2	3
State of circuit breaker		Circuit breaker lever position	State of the main contacts	PS-BHD-1000 PS-BHD-0100	PS-BHD-1000 PS-BHD-0100	PS-BHD-1000 PS-BHD-0100	SP-BHD-0002 SP-BHD-....-0001	PS-BHD-2000	PS-BHD-1100	PS-BHD-0200	PS-BHD-0010	PS-BHD-0010	PS-BHD-0010
Switched on		I	1	1 0	0 1	1 0	1 0	1 1	0 1	0 0	1 0	0 1	1 0
Switched off manually or by motor drive electrically (loaded state)		◎	0	1 0	0 1	0 1	0 1	0 0	1 0	1 1	1 0	0 1	0 1
Switched off by overcurrent release		▽	0	0 1	1 0	0 1	0 1	0 0	1 0	1 1	0 1	1 0	0 1
Switched off from switched on state: by auxiliary release, or by TEST push button or by the switch off button on the motor drive		▽	0	1 0	1 0	0 1	0 1	0 0	1 0	1 1	1 0	0 1	0 1

ote: 0 - contact open, 1 - contact closed [1] - cavities 4, 5, 6 are only for 4-pole design

SHUNT TRIPS





Cavities in BD250..., switching unit

Specifications

Type		SV-BHD-X...
Rated operating voltage	U_e	24, 40, 48, 110, 230, 400, 500 V a.c. 24, 40, 48, 110, 220 V d.c.
Rated frequency	f_o	50/60 Hz
Input power at 1.1 U_e	AC	< 3 VA
	DC	< 3 W
Characteristic		$U \geq 0.7\ U_e$ the circuit breaker must trip
Time to switching off		20 ms
Loading time		∞
Connection cross-section	S	0.5 ÷ 1 mm²
Degree of protection of terminals	(connected release)	IP20
Position in cavity No.		10

Type designation according to rated operating voltage

U_e	Type
24, 40, 48 V a.c./d.c.	SV-BHD-X024
110 V a.c./d.c.	SV-BHD-X110
230, 400, 500 V a.c. /220 V d.c.	SV-BHD-X230

The specific rated operating voltage of the release is set up by jumpers directly on the release. It is always set to the maximum value by default (see fig. 1).

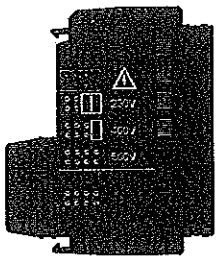
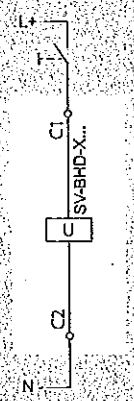
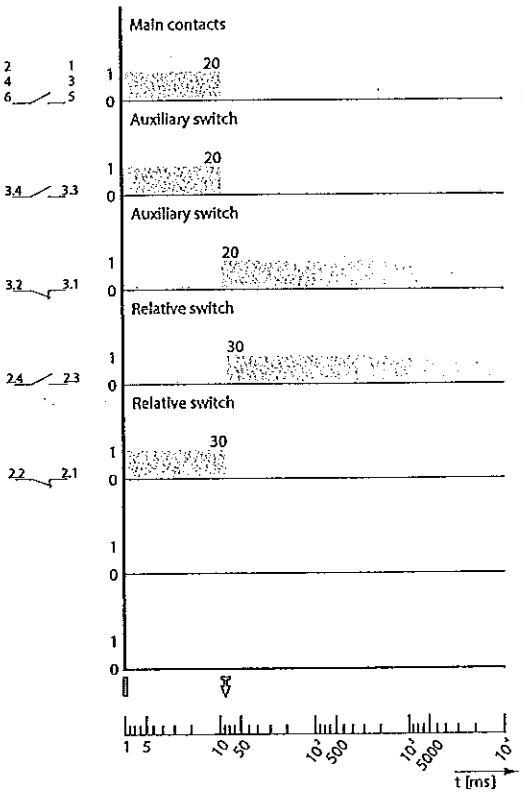


Fig. 1 - The rated operating voltage setting



Circuit breaker/switch-disconnector switching off by shunt trip



States and positions of circuit breaker/switch-disconnector lever

States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases, TEST or by switch off button on the motor drive	
Switched off manually or by motor drive electrically (loaded state)	

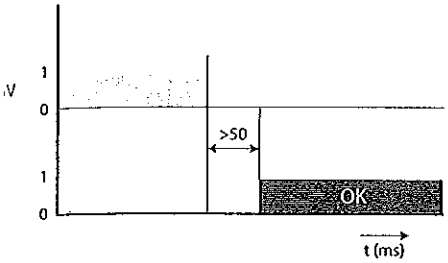
SHUNT TRIPS

3P 4P

Specifications

Reaction time of the auxiliary releases

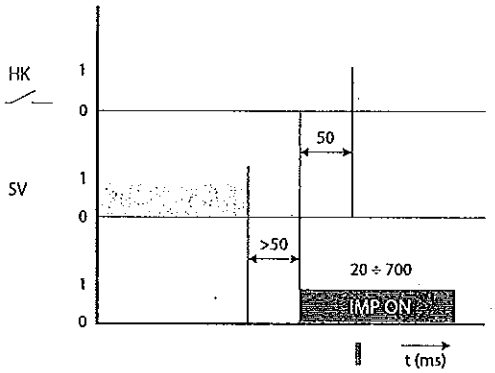
Shunt trip



Cooperation of motor drive and shunt trip

It is necessary to keep time delay when the control of the circuit breaker is done by motor drive and shunt trip or undervoltage release. The following time delays have to be kept between the disconnection of voltage from the shunt trip or bringing the voltage to the undervoltage release and the control impulse for switch on of the motor drive:

Shunt trip

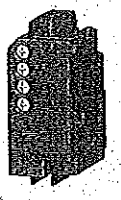


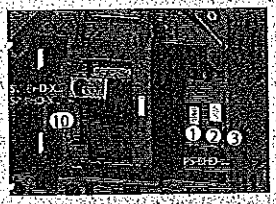
States and positions of circuit breaker/switch-disconnector lever

States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases, TEST or by switch off button on the motor drive	
Switched off manually or by motor drive electrically (loaded state)	

Description of graphs

Symbol	Description
HK	Main contacts
OK	Circuit breaker is ready for further handling
IMP ON	Make impulse for the motor drive
SV	Control voltage on the shunt trip
SP	Control voltage on the undervoltage release





Cavities in BD250... switching unit

Specifications

Type		SP-BHD-X...	SP-BHD-X...-0001[2]
Rated operating voltage	U_e	24, 40, 48, 110, 230, 400, 500 V a.c. 24, 40, 48, 110, 220 V d.c.	24, 40, 48, 110, 230, 400, 500 V a.c. 24, 40, 48, 110, 220 V d.c.
Rated frequency	f_n	50/60 Hz	50/60 Hz
Input power at 1.1 U_e	AC	< 3 VA	< 3 VA
	DC	< 3 W	< 3 W
Characteristic[1]		$U \geq 0.85\ U_e$ - it is possible to switch on the circuit breaker $U \leq 0.35\ U_e$ - the circuit breaker must trip	
Time to switching off		20 ms	20 ms
Loading time		∞	∞
Connection cross-section	S	0.5 ÷ 1 mm²	0.5 ÷ 1 mm²
Degree of protection of terminals	(connected release)	IP20	IP20
Position in cavity No.		10	10
Early switch			
Rated operating voltage	U_e	-	250 V a.c.
Rated frequency	f_n	-	50/60 Hz
Rated operating current	I_e/U_e	-	1 A/250 V a.c.
Arrangement of contacts		-	10, 01
Connection cross-section	S	-	0.5 ÷ 1 mm²
Degree of protection of terminals	(connected release)	-	IP20

[1] - tripping of the undervoltage release can be delayed using the delay unit BZ-BX-X230-A, for more detailed information see page P2

[2] - cannot be used in combination with motor drive MP-BD-X....

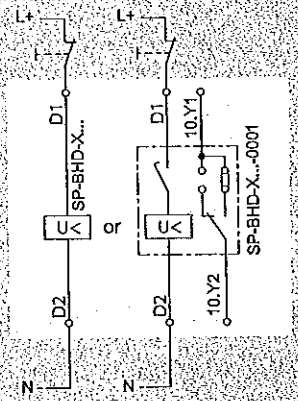
Number and type of contacts according to contact arrangement

Arrangement of contacts	Number of contacts	Contact type
01	1	break
10	1	make

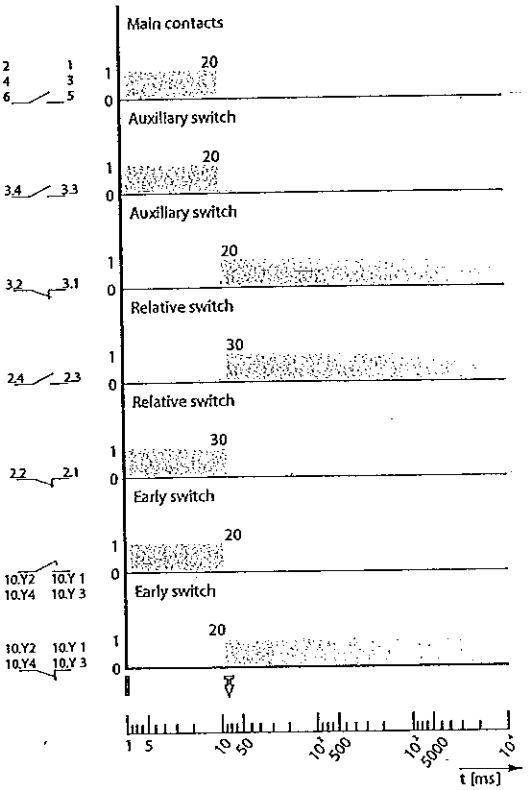
Type designation according to rated operating voltage

U_e	Type
24, 40, 48 V a.c.	SP-BHD-X02
110 V a.c./d.c.	SP-BHD-X11
230, 400, 500 a.c./220 V d.c.	SP-BHD-X23

The specific rated operating voltage of the
lease is set up by jumpers directly on the relea
It is always set to the maximum value by defa
(see fig. 1).



Circuit breaker/switch-disconnector switching off by undervoltage release



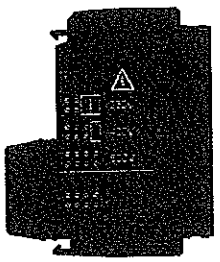


Fig. 1 - The rated operating voltage setting

States and positions of circuit breaker/ switch-disconnector lever

States of circuits breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases, TEST or by switch off button on the motor drive	
Switched off manually or by motor drive electrically (loaded state)	

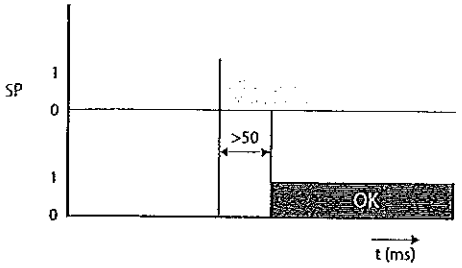
UNDERVOLTAGE RELEASES

3P 4P

Specifications

Reaction time of the auxiliary releases

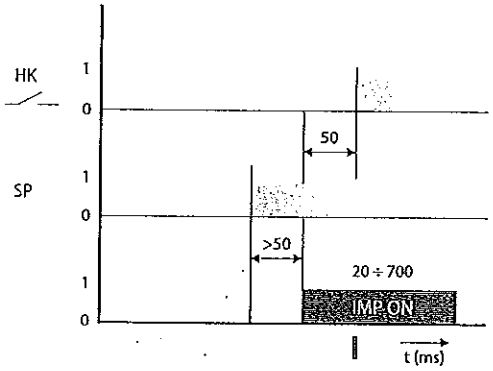
Undervoltage release



Cooperation of motor drive and undervoltage release

It is necessary to keep time delay when the control of the circuit breaker is done by motor drive and shunt trip or undervoltage release. The following time delays have to be kept between the disconnection of voltage from the shunt trip or bringing the voltage to the undervoltage release and the control impulse for switch on of the motor drive:

Undervoltage release



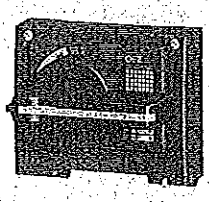
States and positions of circuit breaker/switch-disconnector lever

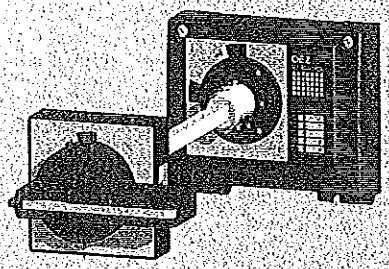
States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases, TEST or by switch off button on the motor drive	
Switched off manually or by motor drive electrically (loaded state)	

Description of graphs

Symbol	Description
HK	Main contacts
OK	Circuit breaker is ready for further handling
IMP ON	Make impulse for the motor drive
SV	Control voltage on the shunt trip
SP	Control voltage on the undervoltage release

HAND DRIVES





Description

The hand drive permits controlling the circuit breaker/ /switch-disconnector by turning the lever, e.g. to switch machines on and off. Modular conception of the drives enables simple mounting on the switching unit (also additionally) after the cover of cavities is removed. The fixed drive can be sealed. The drive and its accessories are ordered separately according to your choice, see page E12.

- The hand drive makes possible to control the circuit breaker:
  - **a) from the front panel (fig. 1)**
    Hand drive unit RP-BD-CK..
    + Hand drive lever RP-BHD-CP..
  - **b) through the switchboard door (fig. 2)**
    Hand drive unit RP-BD-CK..
    + Extension shaft RP-BHD-CH..
    + Hand drive bearing PR-BHD-CN..
    + Hand drive lever + RP-BHD-CP..
- The hand drive unit is fixed directly to switching unit of the circuit breaker
- The hand drive bearing is fixed to the switchboard door and it provides degree of protection IP40 or IP66.
- Hand drive lever is fixed on the hand drive unit or on the hand drive bearing.
- The extension shaft is supplied in two options, standard (length 365 mm - can be shortened) and telescopic (adjustable length 245 ÷ 410 mm).

Enhanced safety for operator:

- The hand drive unit and hand drive lever are also supplied with the possibility to lock the circuit breaker in position „switched off manually". The unit and lever of the hand drive can be locked using three padlocks with shank diameter max. 6 mm.
- Each hand drive bearing prevents the door from opening when the circuit breaker is switched on or in a state of being switched off by releases and in the circuit breaker state „switched off manually" and hand drive lever is locked up.
- Two circuit breakers with hand drives can be fitted also with reciprocal mechanical interlocking or mechanical parallel switching, see page E67.

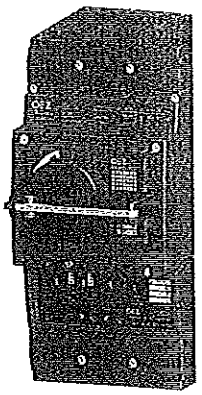


Fig. 1 - DIMENSIONS, see pa

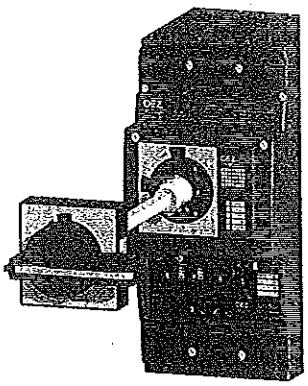
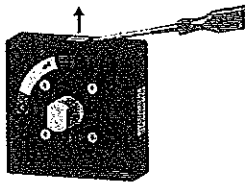


Fig. 2 - DIMENSIONS, see pa

By a screwdriver it is possible to unlock the mechanism ing the switchboard door opening with the circuit b switched on (for bearing RP-BHD-CN40 and RP-BHD-C

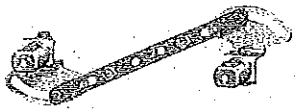


Specification

Type	Description	Colour	Locking with the circuit breaker in OFF state	Degree of protection	Locking of the switchboard door opening in the circuit breaker state: switched on	switched off manually and locked	Switchboard door opening with the circuit breaker switched on	length
RP-BD-CK10	Hand drive unit	blue	no	-	-	-	-	-
RP-BD-CK20	Hand drive unit	blue	yes	-	-	-	-	-
RP-BD-CK21	Hand drive unit	yellow	yes	-	-	-	-	-
RP-BD-CK30	Hand drive unit - right side	blue	-	-	-	-	-	-
RP-BD-CK31	Hand drive unit - left side	blue	-	-	-	-	-	-
RP-BHD-CP10	Hand drive lever	black	no	-	-	-	-	-
RP-BHD-CP20	Hand drive lever	black	yes	-	-	-	-	-
RP-BHD-CP21	Hand drive lever	red	yes	-	-	-	-	-
RP-BHD-CN40	Hand drive bearing	black	-	IP40	yes	yes	yes	-
RP-BHD-CN41	Hand drive bearing	yellow	-	IP40	yes	yes	yes	-
RP-BHD-CN60	Hand drive bearing	black	-	IP66	yes	yes	no	-
RP-BHD-CN61	Hand drive bearing	yellow	-	IP66	yes	yes	no	-
RP-BHD-CH10	Extension shaft	-	-	-	-	-	-	365 (ca shorter
RP-BHD-CH20	Extension shaft - telescopic	-	-	-	-	-	-	245 ÷

MECHANICAL INTERLOCKING AND PARALLEL SWITCHING

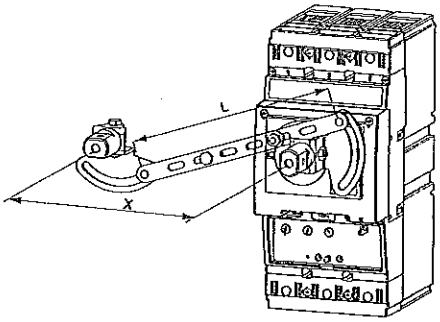
3P 4P



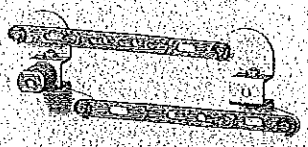
RP-BHD-CB10 Mechanical interlocking

Provides mechanical interlocking of two circuit breakers/ /switch-disconnectors so that they cannot both be tripped simultaneously, but only one of them at a time. Both circuit breakers may be switched off simultaneously. Interlocking can be used between two BD250 circuit breakers or between BD250 and BH630 circuit breakers. Both circuit breakers must be equipped with a hand drive (at least one with a hand drive unit and hand drive lever), see page E66.

In order to use the interlocking, it is absolutely necessary to comply with the dimensions that are shown in the figure and given in the table.



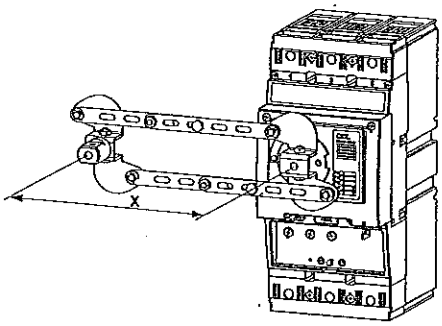
		Right switching unit							
	Dimension [mm]	BD250..3..		BD250..4..		BH630..3..		BH630..4..	
		X	L	X	L	X	L	X	L
Left switching unit	BD250..3..	105	112	140	145.5	122.5	128.5	181	185.5
	BD250..4..	105	112	140	145.5	122.5	128.5	181	185.5
	BH630..3..	122.5	128.5	157.5	162.5	140	145.5	185	189
	BH630..4..	122.5	128.5	157.5	162.5	140	145.5	185	189



RP-BHD-CD10 Mechanical parallel switching

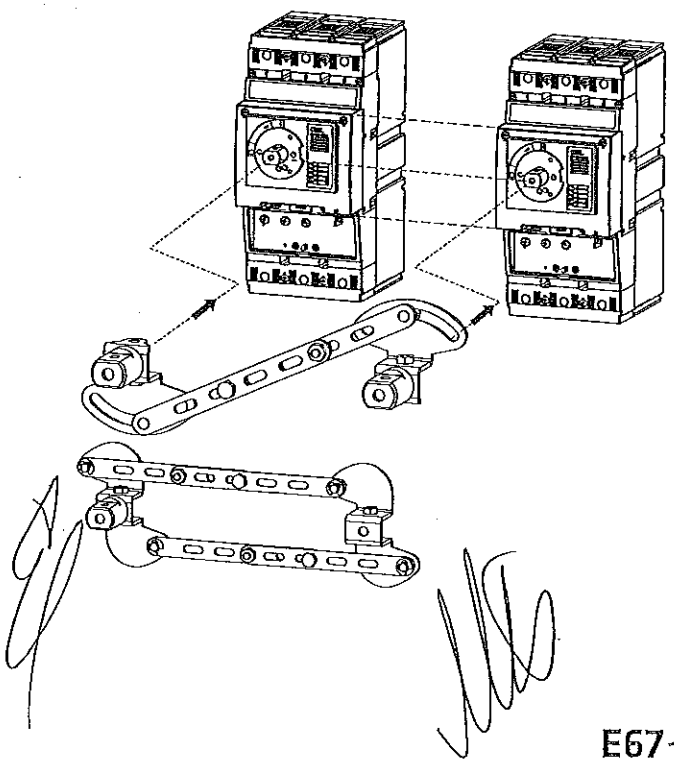
Enables for simultaneous switching of two circuit breakers/switch-disconnectors. Parallel switching can be used between two BD250 circuit breakers or between BD250 and BH630 circuit breakers. Both circuit breakers must be equipped with a hand drive unit and at least one with a hand drive lever, see page E66.

In order to use parallel switching, it is absolutely necessary to comply with the dimensions that are shown in the figure and given in the table.

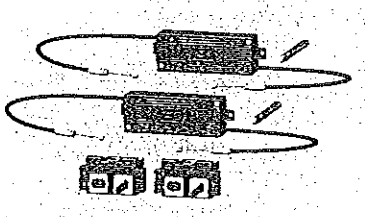


		Right switching unit							
	Dimension [mm]	BD250..3..		BD250..4..		BH630..3..		BH630..4..	
		X	Y	X	Y	X	Y	X	Y
Left switching unit	BD250..3..	105^{+7}	164.5^{-7}	122.5^{+7}	164.5^{-7}	122.5^{+7}	164.5^{-7}	x	x
	BD250..4..	105^{+7}	164.5^{-7}	122.5^{+7}	164.5^{-7}	122.5^{+7}	164.5^{-7}	x	x
	BH630..3..	122.5^{+7}	164.5^{-7}	140^{+7}	164.5^{-7}	140^{+7}	164.5^{-7}	x	x
	BH630..4..	122.5^{+7}	164.5^{-7}	140^{+7}	164.5^{-7}	140^{+7}	164.5^{-7}	x	x

1) - Switching unit BH630..4.. (4-pole design) can only be on the left side



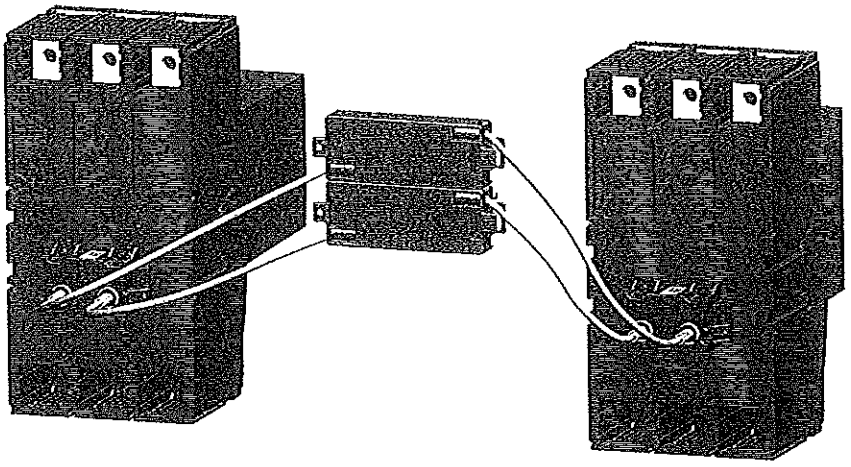
MECHANICAL INTERLOCKING



Mechanical interlocking
MB-BD-PV05
MB-BHD-PV03

- Provides mechanical interlocking of two circuit breakers/ /switch-disconnectors so that they cannot both be tripped simultaneously, but only one of them at a time. Both circuit breakers may be switched off simultaneously.
- Mechanical interlocking MB-BD-PV05 is intended for two BD250 circuit breakers. Interlocking MB-BHD-PV03 is intended for one BD250 circuit breaker and one BH630.
- Circuit breakers may be in fixed, plug-in and withdrawable designs.

Type of circuit breakers	BD250 ... BD250	BD2 ... BH6
Type of mechanical interlocking	MB-BD-PV05	MB-BHD



Circuit breaker placement in switchboard
Detailed information can be found in the instructions for use, which you may download from our website www.oez.com.

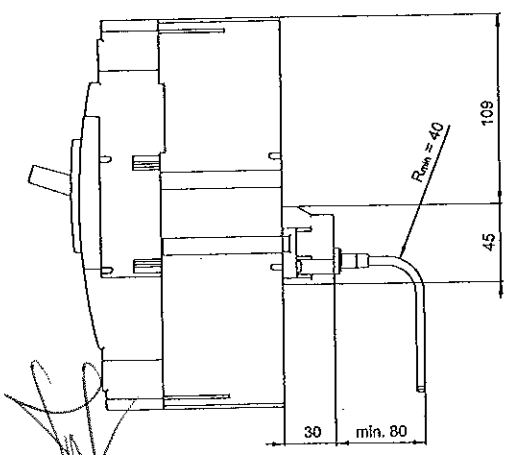
Recommended circuit breaker manipulation

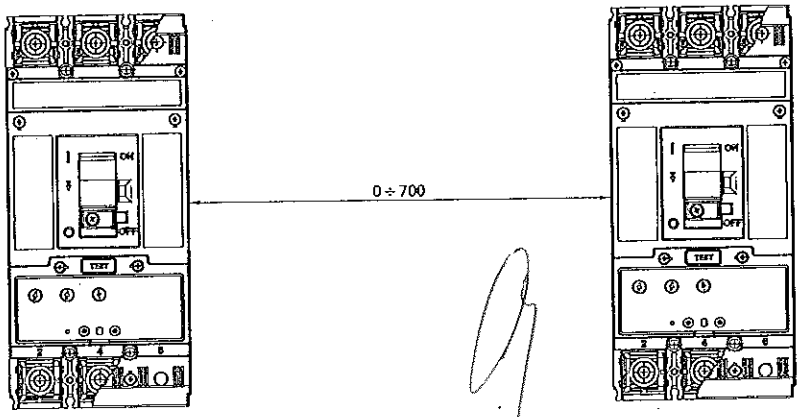
During the manipulation with circuit breaker with mechanical interlocking and motor drive, the circuit breaker may reach the state, in which the first attempt at switching on by motor drive is unsuccessful. Switching on is executed after repeated make impulse. To avoid this effect, some of the following steps may be done:

1) To keep the process of manipulation with the circuit breaker, see „Recommended circuit breaker manipulation" below
2) To connect OD-BHD-R... control relay into the motor drive circuit according to wiring diagram, see page E74

Recommended process of manipulation

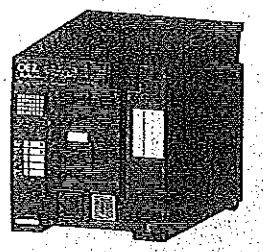
1) Shunt trip/undervoltage release must be used to off the circuit breaker. Circuit breaker switching o not be made by motor drive
2) Circuit breaker can be stored and switched on the second circuit breaker is in switch-off mode. breaker status indicator on motor drive is in „0" po Between storing and switching on the circuit b it is necessary to keep the time interval min. 1 Switch „S" must be disconnected.
3) In case of infringement of these principles, th switching on of circuit breaker is unsuccessful.



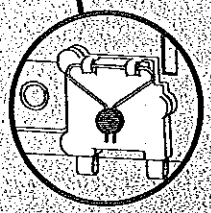


OTOR DRIVES

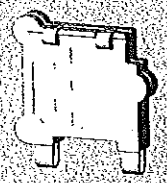
3P 4P



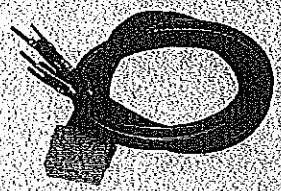
DIMENSIONS, see page E30



Cover of switch on button OD-BHD-KT01



Connecting cable OD-BHD-KA02



Description

- It is used for remote control of the circuit breaker (switch OFF/ON).
- Simple mounting on the circuit breaker after the circuit breaker cover of cavities is removed.
- Usage in industrial applications e.g. switching of stand by units etc. or wherever the automatic operation of electric devices is needed.
- In order to speed up the circuit breaker's switch off (e.g. safety STOP button) the undervoltage release or shunt trip can be used.
- On the motor drive front panel there is a change-over switch to select the drive modes AUTO/MANUAL:
  - AUTO mode – remote control. The circuit breaker is controlled by buttons for remote switch off/on, furthermore in this position mechanical control can be used on the front panel of the motor drive
  - MANUAL mode – manual control. Control voltage is not needed. The circuit breaker can be switched on using the green switch on button and switched off using the red switch off button on the front part of the drive cover. Electric switch on is blocked. Electric switch off is functional. The accumulation of energy can be done by means of hinged lever.
- Possibility to indicate remotely the state of the AUTO/MANUAL switch.
- Switch S (external switch – has to be bought separately) enables the choice of automatic accumulation of energy (circuit breaker loading).
  - automatic accumulation of energy is on (S switch switched on): after tripping of the circuit breaker by the overcurrent release, by auxiliary release, or by TEST push button or by the switch off button on the motor drive motor drive immediately accumulates energy (circuit breaker loading), motor drive is then ready to switch on the circuit breaker
  - automatic accumulation of energy is switched off (S switch open): after tripping of the circuit breaker by the overcurrent release, by auxiliary release, or by TEST push button or by the switch off button on the motor drive both motor drive and circuit breaker stay in position „ switched off by releases". In this position motor drive waits for the impulse from switch S. When the impulse is brought in the motor drive accumulates energy (turn on the circuit breaker) and after this loading the motor drive is ready to switch on the circuit breaker. It is not possible to switch on the circuit breaker when motor drive is not loaded.
- Front panel state indicating device of the stored energy signals the state of motor drive storage devices. The state can be signalled from a distance.
- The drive may be furnished with an electromechanical counter of cycles.
  - internal design on the motor drive cover
  - external design OD-BHD-PP01 for mounting on the switchboard's door or inside the switchboard by means of metal holder, that is part of the delivery
- Motor drive can be sealed by means of bolt sealing insert (OD-BD-VP01).
- Drive can be locked in off position by up to three padlocks (shank diameter max. 4.3 mm).
- Switch on button can be covered and sealed (OD-BHD-KT01).
- Drive is connected by multi-pole connector with cavities (in order to connect cables special tongs have to be used).
- Drive can be furnished with cable (OD-BHD-KA02), that has on one side connector to the motor drive and on the other side free terminals for connection to etc. switchboard's terminal block.

Specifications

Type		MP/BD-X...MP/BD-X...P
Operating voltage	U_e	24, 48, 110, 230 V a.c. 24, 48, 110, 220 V d.c.
Rated frequency	f_n	50 / 60 Hz
Control impulse length for storage		400 ms ÷ ∞ [1]
Control impulse length for switching on		20 ms ÷ 700 ms [1]
for switching off		400 ms ÷ ∞ [1]
Time to switching on		< 50 ms
Time to switching off		800 ms
Frequency of cycles ON/OFF		3 cycles/min
Frequency of cycles - instant successive ON/OFF		10 cycles
Mechanical endurance		30 000 cycles
Input power	AC	100 VA
	DC	100 W
Protection	24, 48, 110 V a.c.; 230 V a.c.	LPN-4C-1; LPN-2C-1
	24, 48, 110 V d.c.; 220 V d.c.	LPN-DC-4C-1; LPN-DC-2C-1
Rated operating current of the change-over switch AUTO/MANUAL	I_n / U_e	5 A/250 V a.c. 0.5 A/250 V d.c.
Type		**OD-BHD-KA02**
Number of conductors		12
Conductor cross-section	S	0.35 mm²
Conductor lengths		0.6 m

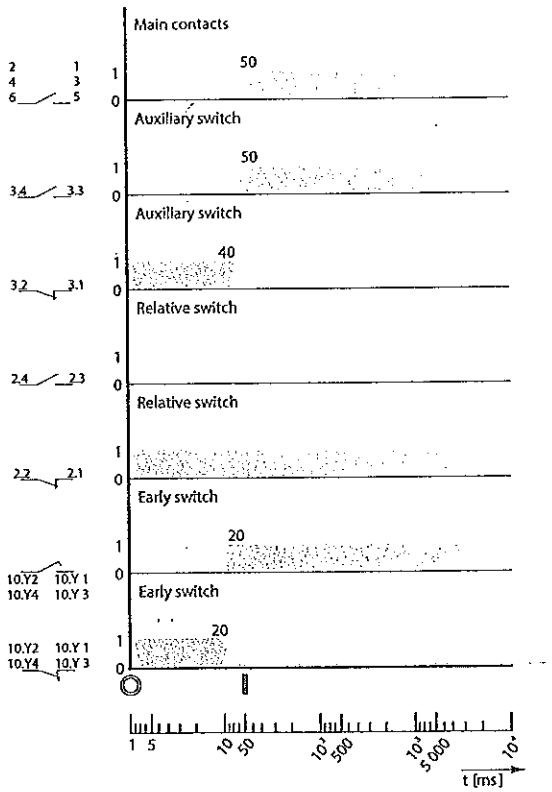
[1] - for sequence of control impulses, see page E72

MOTOR DRIVES

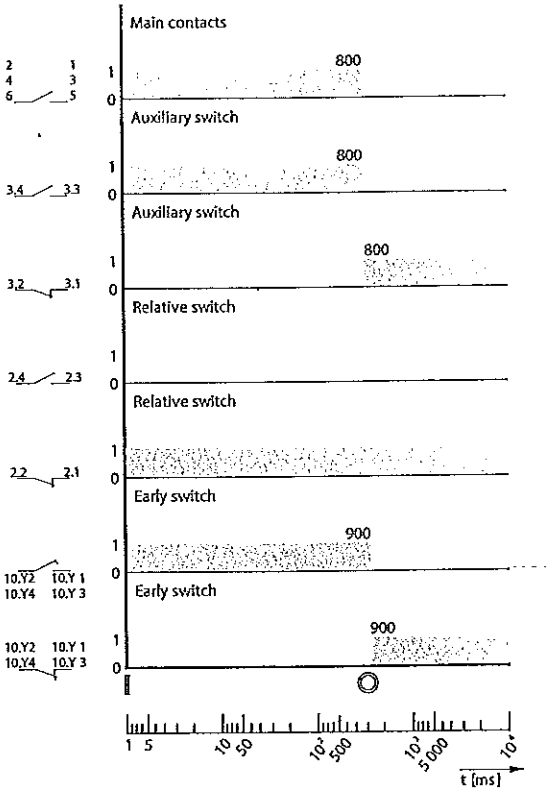
3P 4P

Specifications

Circuit breaker switching on by motor drive - electrically by ON push button

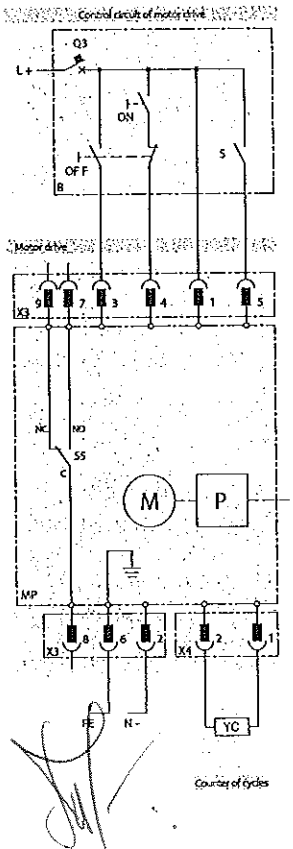


Circuit breaker switching off by motor drive - electrically by OFF push button



Diagram

Circuit breaker switching on and off by motor drive - electrically by ON and OFF push button



States and positions of circuit breaker/switch-disconnector lever

States of circuit breaker/switch-disconnector	Lever position in circuit breaker/switch-disconnector
Switched on	
Switched off by releases, TEST or by switch off button on the motor drive	
Switched off manually or by motor drive electrically (loaded state)	

Wiring diagram description

Symbol	Description
MP	motor drive MP-BD-X...
M	motor
P	storage device
X3	connector for connection of control circuits
X4	connector for external counter of cycles
S5*)	switch to indicate AUTO (NO-C)/MANUAL (NC-C) modes
YC	external counter of cycles 0D-BHD-PP01
B	recommended wiring of the control circuits (not included in motor drive order)
ON	switch off button
OFF	switch off button
S	switch for energy storage (switched on = automatic storage, may be continuously switched on)
Q3	motor drive circuit breaker - see page C68

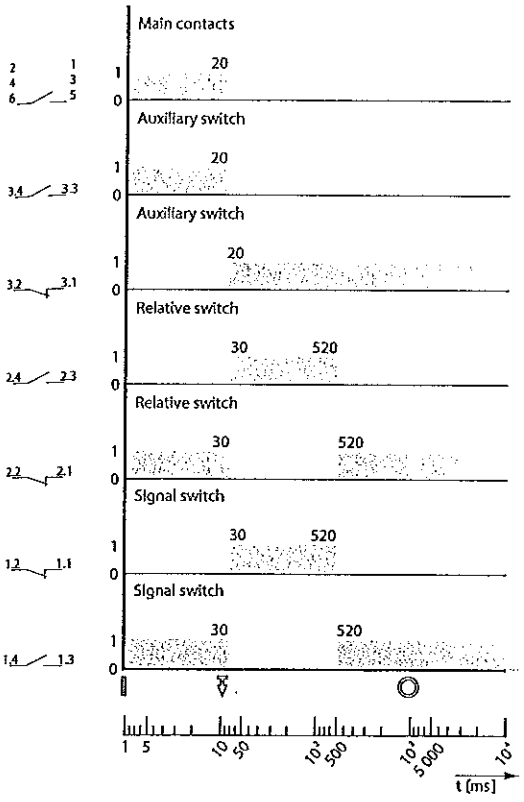
*) for custom production it is possible to make the design with signalling of storage device state

MOTOR DRIVES

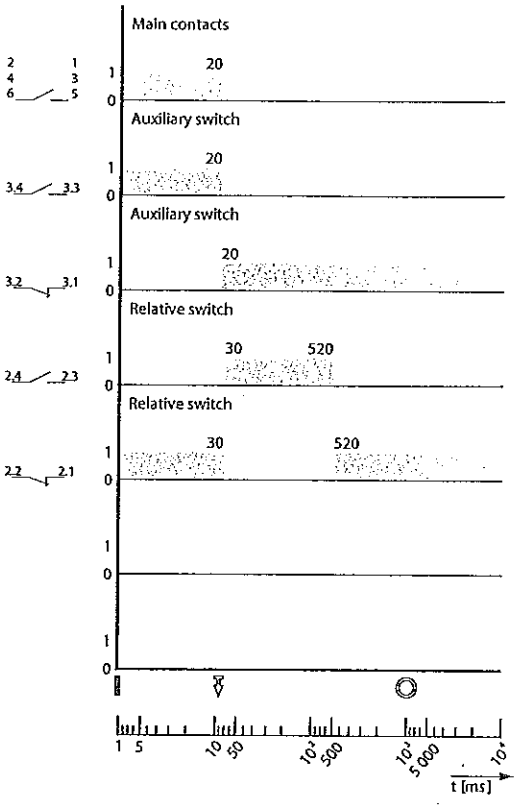
3P 4P

Specifications

Switching off of the circuit breaker with motor drive by overcurrent release (S switch in switched on state-automatic storage)

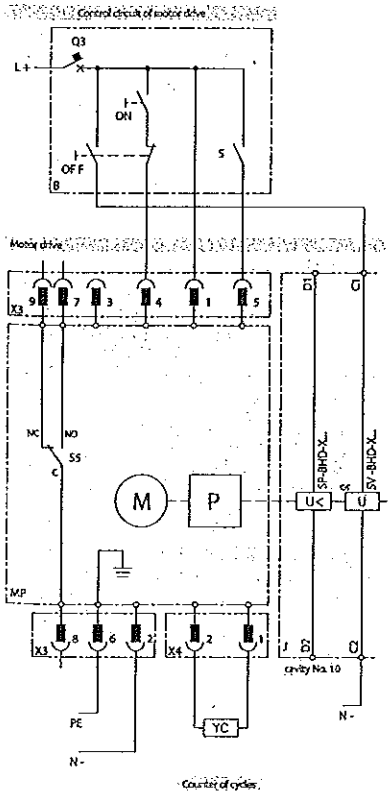


Switching off of the circuit breaker with motor drive by shunt trip or undervoltage release (switch s in switched on state-automatic storage)

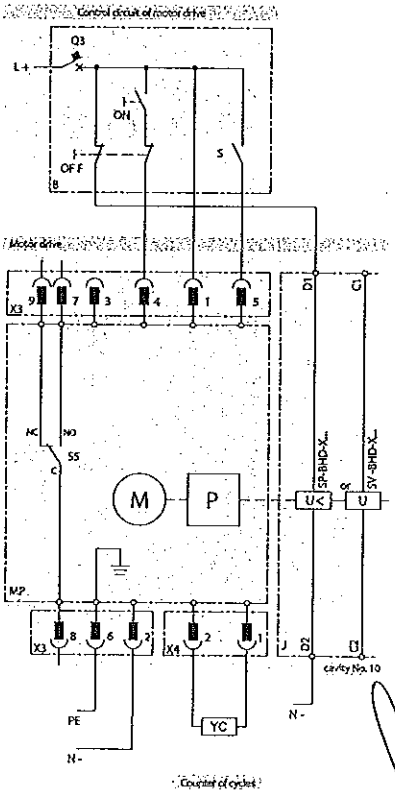


Diagram

Circuit breaker switching on by motor drive (electrically by ON push button) and tripping by shunt trip



Circuit breaker switching on by motor drive (electrically by ON push button) and tripping by undervoltage release

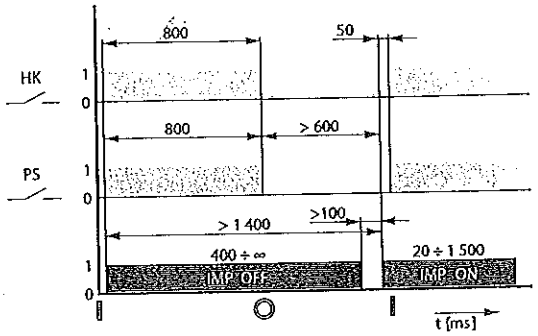


MOTOR DRIVES

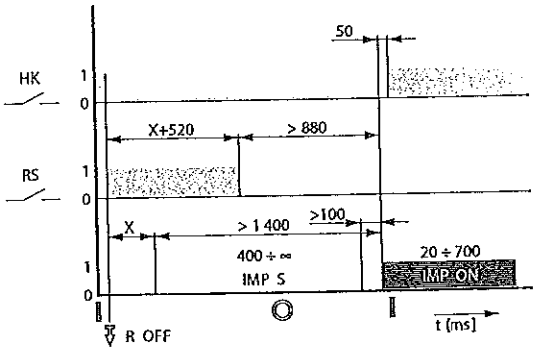
Specifications

Recommended control impulses

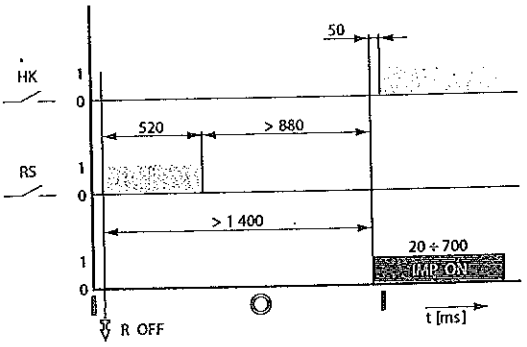
Circuit breaker switching on and off by motor drive
- S switch permanently switched on (automatic storage) or open



Circuit breaker switching off by overcurrent or auxiliary release and switching on by motor drive - S switch switched on only for storing up



Circuit breaker switching off by overcurrent or auxiliary release and switching on by motor drive - S switch permanently switched on (automatic storage)



Description of graphs

Symbol, etc.	Description
HK	main contacts
PS	auxiliary switch
RS	relative switch
R OFF	circuit breaker closing instant by release of circuit breaker
IMP S	impulse to store up motor drive energy (generated by S switch)
IMP ON	make impulse for the motor drive
IMP OFF	break impulse for the motor drive
X	random segment of time

States and positions of circuit breaker/switch-disconnector lever

States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	▮
Switched off by releases, TEST or by switch off button on the motor drive	⊽
Switched off manually or by motor drive electrically (loaded state)	◎

MOTOR DRIVES

3P 4P

Diagram

Recommended wiring diagram of connecting the circuit breaker control circuits in withdrawable/plug-in design with motor drive

connecting with control relays
operating voltage U_e 24 V a.c./d.c., 48 V a.c./d.c., 110 ÷ 230 V a.c., 110 V d.c.
switching off by motor drive

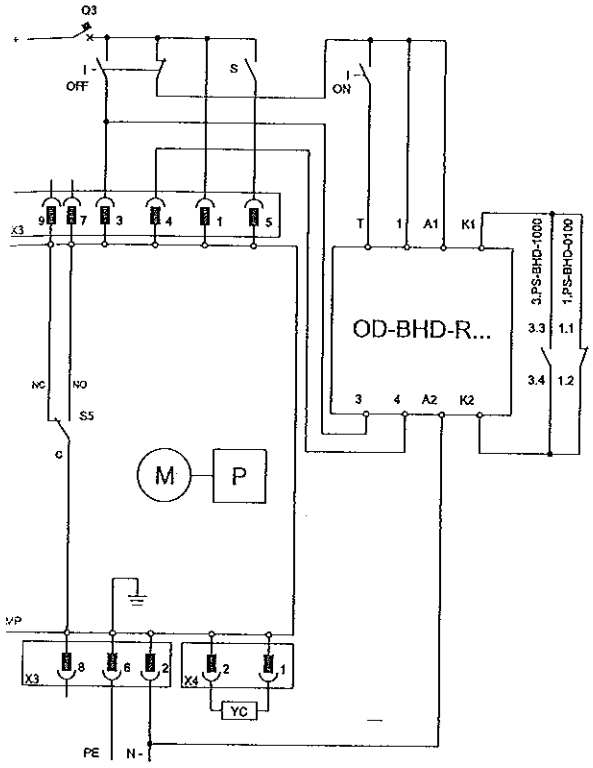
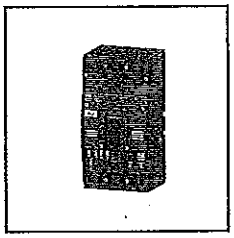


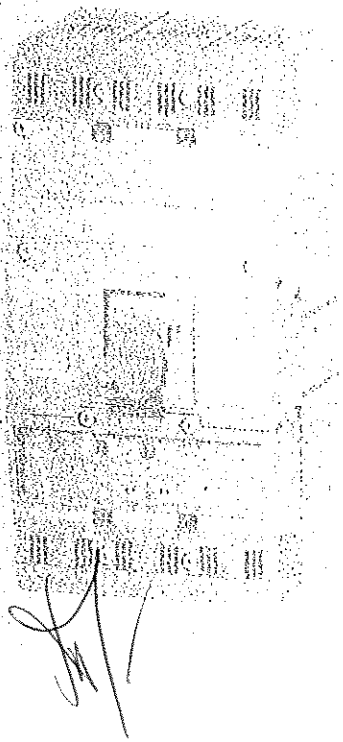
Diagram description

Symbol	Description
MP	motor drive - U_e of drive must be the same as Ue of control relay
M	motor
P	storage device
X3	connector for connection of control circuits
X4	connector for external counter of cycles
S5	switch to indicate AUTO (NO-C) / MANUAL (NC-C) modes
YC	external counter of cycles OD-BHD-PP01 (not included in motor drive order)
OFF	switch off button
S	switch for energy storage
Q3	motor drive circuit breaker for 24 V a.c. LPN-4C-1 for 48 V a.c. LPN-4C-1 for 110 V a.c. LPN-4C-1 for 230 V a.c. LPN-2C-1 for 24 V d.c. LPN-DC-4C-1 for 48 V d.c. LPN-DC-4C-1 for 110 V d.c. LPN-DC-4C-1 for 220 V d.c. LPN-DC-2C-1
OD-BHD-R...	control relay for 24 V a.c./d.c. OD-BHD-RX01 for 48 V a.c./d.c. OD-BHD-RX02 for 110 ÷ 230 V a.c. OD-BHD-RA03 for 110 V d.c. OD-BHD-RD04
3.PS-BHD-1000	auxiliary switch
1.PS-BHD-0100	signal switch

- impulse on T terminal reacts to trailing edge

MOULDED CASE CIRCUIT BREAKERS BH630N, BH630S





MOTOR DRIVES

3P 4P

Diagram

Recommended wiring diagram of connecting the circuit breakers control circuits with mechanical interlocking and motor drive (applicable for any circuit breaker)

- connecting with control relays
- operating voltage U_e 24 V a.c./d.c., 48 V a.c./d.c., 110 ÷ 230 V a.c., 110 V d.c.

Switching off is possible only by undervoltage release or shunt trip

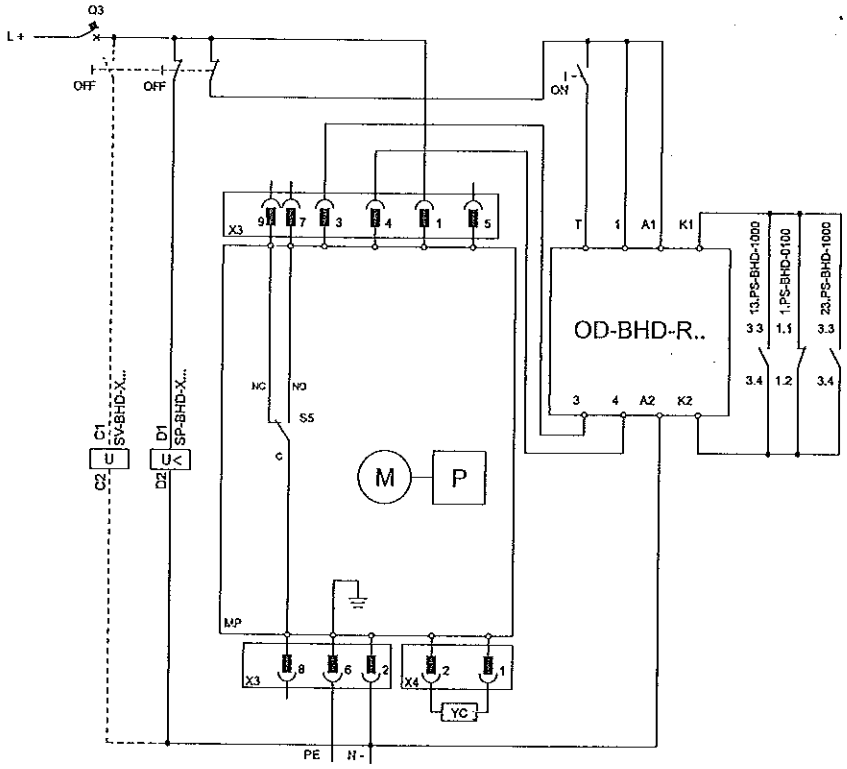


Diagram description

Symbol	Description
MP	motor drive - U_e of drive must be the same as Ue of control relay
M	motor
P	storage device
X3	connector for connection of control circuits
X4	connector for external counter of cycles
S5	switch to indicate AUTO (NO-C) / MANUAL (NC-C) modes
YC	external counter of cycles OD-BHD-PP01
OFF	switch off button
Q3	motor drive circuit breaker for 24 V a.c. LPN-4C-1 for 48 V a.c. LPN-4C-1 for 110 V a.c. LPN-4C-11 for 230 V a.c. LPN-2C-1 for 24 V d.c. LPN-DC-4C-1 for 48 V d.c. LPN-DC-4C-1 for 110 V d.c. LPN-DC-4C-1 for 220 V d.c. LPN-DC-2C-1
OD-BHD-R...	control relay for 24 V a.c./d.c. OD-BHD-RX01 for 48 V a.c./d.c. OD-BHD-RX02 for 110 ÷ 230 V a.c. OD-BHD-RA03 for 110 V d.c. OD-BHD-RD04
1.PS-BHD-0100	signal switch
13.PS-BHD-1000	switch inserted in cavity 3 (first circuit breaker) - auxiliary switch
23.PS-BHD-1000	switch inserted in cavity 3 (second circuit breaker) - auxiliary switch
SP-BHD-X...	undervoltage release - U_e of release must be the same as U_e of control relay
SV-BHD-X...	shunt trip - U_e of release must be the same as U_e of control relay

- impulse on T terminal reacts to trailing edge

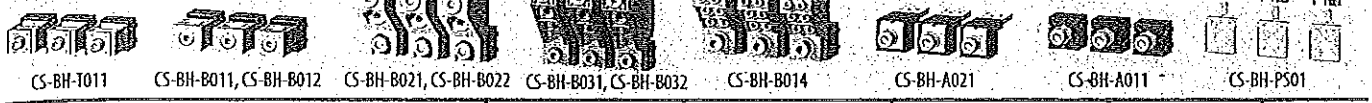
COMMERCIAL INFORMATION

TECHNICAL INFORMATION

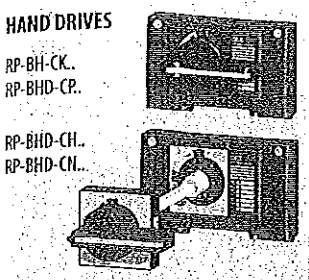
SUMMARY OF MODELS AND ACCESSORIES

3P 4P

CONNECTING SETS



HAND DRIVES



Mechanical parallel switching

RP-BHD-CD10

Mechanical interlocking

RP-BHD-CB10

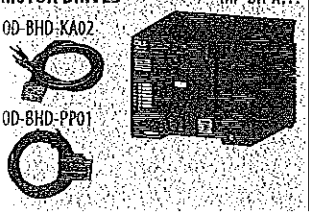
Mechanical blocking with Bowden cable

MB-BH-PV04

MB-BHD-PV03

MOTOR DRIVES

MP-BH-X..



SHUNT TRIP

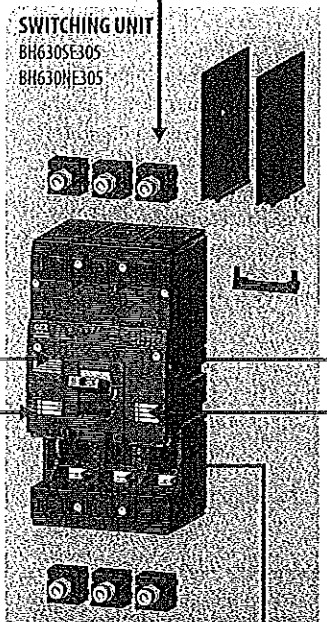
SV-BHD-X..

UNDERVOLTAGE RELEASE

SP-BHD-X..

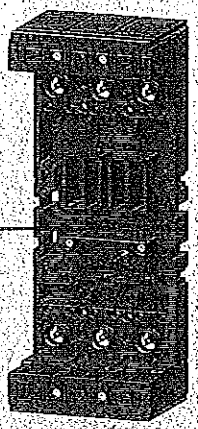
SWITCHING UNIT

BH630SE305
BH630HE305



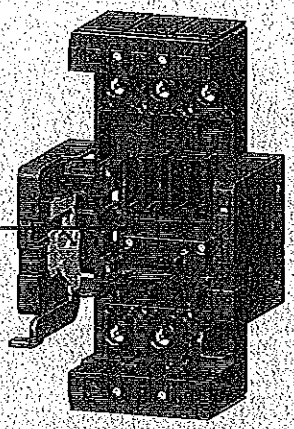
PLUG-IN DEVICE

ZO-BH-0630-300



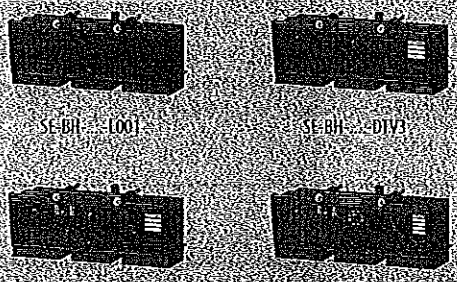
WITHDRAWABLE DEVICE

ZV-BH-0630-300

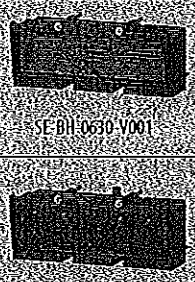


SWITCHES PS-BHD-...

OVERCURRENT RELEASES



SWITCH-DISCONNECTOR UNIT



ACCESSORIES TO ZO... AND ZV...

Connecting cable

OD-BHD-KA01

Signalling of position

SO-BHD-0010

Keying set

OD-BH-KK01

ACCESSORIES

Lever with locking

OD-BH-UP01

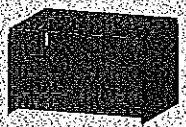
Sealing insert

OD-BH-VP01

Additional cover for overcurrent release

OD-BH-VP02

Terminal cover



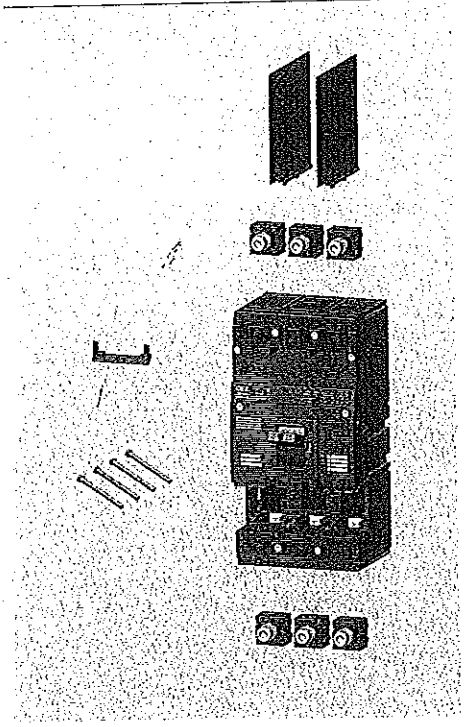
OD-BH-KS03

Insulating barriers

OD-BHD-KS02

SWITCHING UNITS

3P



Type	Product code	I (A)	I (kA)	Weight [kg]	Package [pc]
BH630NE305	14412	630	36	5.3	1
BH630SE305	14413	630	65	5.3	1

- TECHNICAL INFORMATION, see page F15
- the method of power circuit connection must observe recommendations, see page F18 as well as deionization space, see page F2

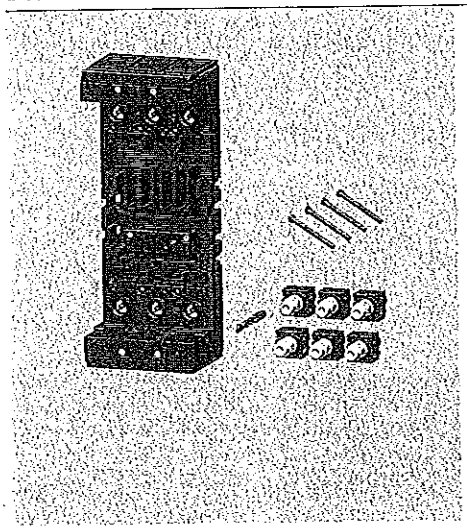
- Switching unit: includes - 2 CS-BH-A011 connecting sets - for connecting busbars or cable lugs [1)]
  - insulating barriers OD-BHD-KS02
  - mounting bolts set OD-BH-MS01 (4x M5x35)
  - conductor holder OD-BH-DV01

must be fitted with - by overcurrent release SE-BH-....-.... (circuit breaker)
or switch-disconnector unit SE-BH-0630-V001 (switch-disconnector)

[1)] - for connecting in another way, it is necessary to use CS-BH-... connecting sets, see page F8

PLUG-IN DEVICE

3P



Type	Product code	Name	Weight [kg]	Package [pc]
ZO-BH-0630-300	14556	Plug-in device	2.61	1

- TECHNICAL INFORMATION, see page F48

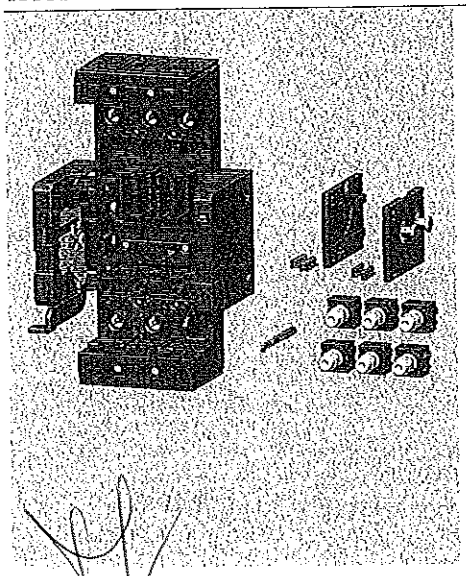
- Plug-in device: includes - complete accessories for assembly circuit breakers/switch-disconnectors in plug-in design
  - mounting bolts set (4x M5x45) for affixing switching unit to plug-in device

must be fitted with - switching unit BH630..305

- for connecting plug-in device with busbars or cable lugs, connecting sets CS-BH-A011 can be used, that are included the package of the BH630..305 switching unit - for connecting in another way, it is necessary to use CS-BH-... connectir sets, see page F8

WITHDRAWABLE DEVICE

3P



Type	Product code	Name	Weight [kg]	Package [pc]
ZV-BH-0630-300	14553	Withdrawable device	3.664	1

- TECHNICAL INFORMATION, see page F50

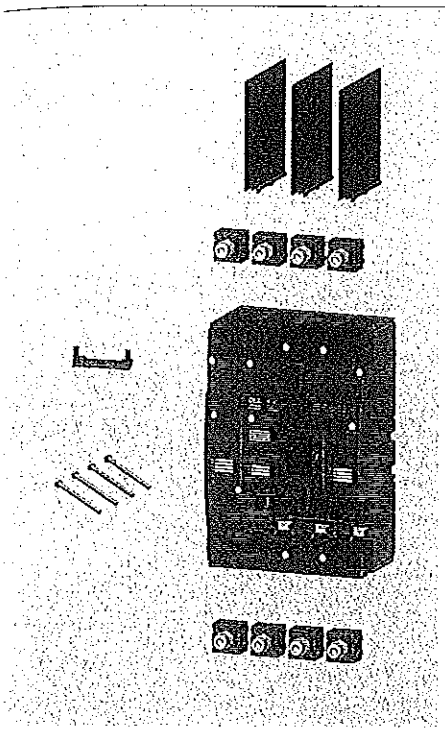
- Withdrawable device: includes - complete accessories for assembly circuit breakers/switch-disconnectors in withdrawable design

must be fitted with - switching unit BH630..305

- for connecting withdrawable device with busbars or cable lugs, connecting sets CS-BH-A011 can be used, that are includ in the package of the BH630..305 switching unit - for connecting in another way, it is necessary to use CS-BH ... connectir sets, see page F8

SWITCHING UNITS

4P



Type	Product code	I [A]	I [kA]		Weight [kg]	Package [pcs]
BH630NE405	19583	630	36	3P + N - conductor switching	6.65	1
BH630SE405	19585	630	65	3P + N - conductor switching	6.65	1
BH630NE406	19584	630	36	4P - conductor protection	7	1
BH630SE406	19586	630	65	4P - conductor protection	7	1

- TECHNICAL INFORMATION, see page F15
- the method of power circuit connection must observe recommendations, see page F18 as well as deionization space, see page F22

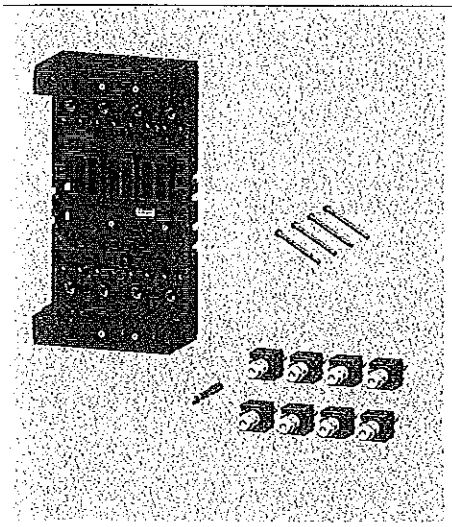
- Switching unit: includes - 2 connecting sets - for connecting busbars or cable lugs [1]
- insulating barriers
- mounting bolts set OD-BH-MS01 (4x M4x35)
- conductor holder OD-BH-DV01

must be fitted with - by overcurrent release SE-BH-....-.... (circuit breaker)
or switch-disconnector unit SE-BH-0630-V001 (switch-disconnector)

[1] - for connecting in another way, it is necessary to use CS-BH-... connecting sets, see page F8

PLUG-IN DEVICE

4P



Type	Product code	Name	Weight [kg]	Package [pcs]
ZO-BH-0630-400	20649	Plug-in device	3.4	1

- TECHNICAL INFORMATION, see page F48

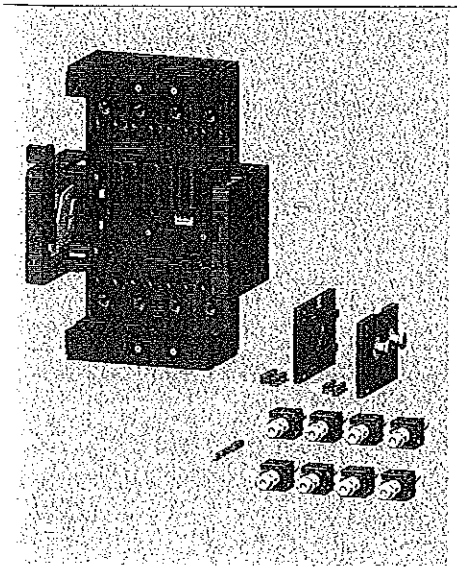
- Plug-in device: includes - complete accessories for assembly circuit breakers/switch-disconnectors in plug-in design
- mounting bolts set (4x M4x45) - for affixing switching unit to plug-in device

must be fitted with - switching unit BH630..405 or BH630..406

- for connecting plug-in device with busbars or cable lugs, connecting sets can be used, that are included in the package of the BH630..40... switching unit - for connecting in another way, it is necessary to use CS-BH-... connecting sets, see page F8

WITHDRAWABLE DEVICE

4P



Type	Product code	Name	Weight [kg]	Package [pcs]
ZV-BH-0630-400	20650	Withdrawable device	4.5	1

- TECHNICAL INFORMATION, see page F50

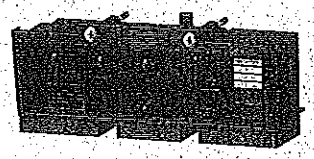
- Withdrawable device: includes - complete accessories for assembly circuit breakers/switch-disconnectors in withdrawable design

must be fitted with - switching unit BH630..405 or BH630..406

- for connecting withdrawable device with busbars or cable lugs, connecting sets can be used that are included with the BH630..40... switching unit - for connecting in another way, it is necessary to use CS-BH-... connecting sets, see page F8

OVERCURRENT RELEASES

3P 4P

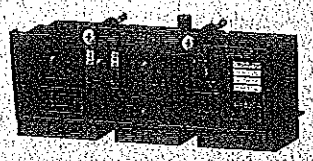


DTV3 - characteristic D - distribution

- protection lines and transformers

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc]
250	SE-BH-0250-DTV3	25300	I_R setting = 100 ÷ 250 A	0.345	1
400	SE-BH-0400-DTV3	25200	I_R setting = 160 ÷ 400 A	0.345	1
630	SE-BH-0630-DTV3	25100	I_R setting = 250 ÷ 630 A	0.345	1

- TECHNICAL INFORMATION, see page FS2

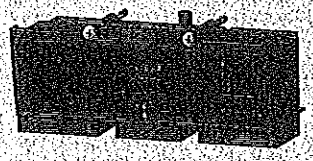


MTV8 - characteristic M - motor

- direct protection for motors and generators
- possibility of protection lines and transformers

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc]
250	SE-BH-0250-MTV8	25310	I_R setting = 100 ÷ 250 A	0.345	1
400	SE-BH-0400-MTV8	25210	I_R setting = 160 ÷ 400 A	0.345	1
630	SE-BH-0630-MTV8	25110	I_R setting = 250 ÷ 630 A	0.345	1

- TECHNICAL INFORMATION, see page FS3

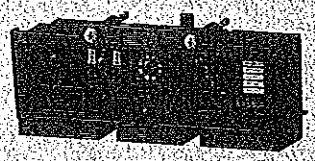


L001 - characteristic L - lines

- protection lines with low starting currents
- without I_R setting

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc]
250	SE-BH-0250-L001	20614	Without I_R setting	0.345	1
315	SE-BH-0315-L001	20615	Without I_R setting	0.345	1
400	SE-BH-0400-L001	20616	Without I_R setting	0.345	1
500	SE-BH-0500-L001	20617	Without I_R setting	0.345	1
630	SE-BH-0630-L001	20618	Without I_R setting	0.345	1

- TECHNICAL INFORMATION, see page FS5



MTV9 - characteristic M - motor with adjustable timing selectivity

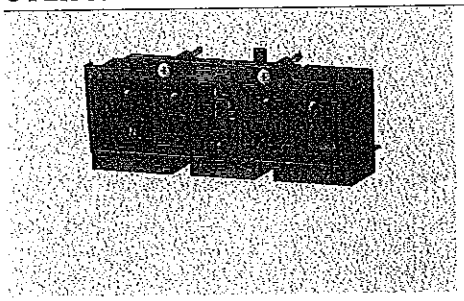
- direct protection for motors and generators
- possibility of protection lines and transformers
- enables setting delay of independent release to 0, 100, 200 or 300 ms

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc]
250	SE-BH-0250-MTV9	19566	I_R setting = 100 ÷ 250 A	0.345	1
400	SE-BH-0400-MTV9	19567	I_R setting = 160 ÷ 400 A	0.345	1
630	SE-BH-0630-MTV9	19568	I_R setting = 250 ÷ 630 A	0.345	1

- TECHNICAL INFORMATION, see page FS6

OVERCURRENT RELEASES

4P



4D01 - characteristic D - distribution with N-pole protection

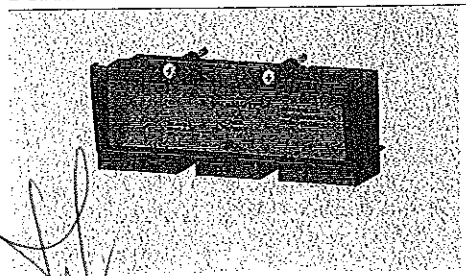
- protection lines and transformers in TN-C-S and TN-S networks

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc]
250	SE-BH-0250-4D01	33426	I_R setting = 100 ÷ 250 A	0.355	1
400	SE-BH-0400-4D01	33427	I_R setting = 160 ÷ 400 A	0.355	1
630	SE-BH-0630-4D01	33428	I_R setting = 250 ÷ 630 A	0.355	1

- TECHNICAL INFORMATION, see page FS8
- intended for BH630..406 switching unit

SWITCH-DISCONNECTOR UNIT

3P 4P

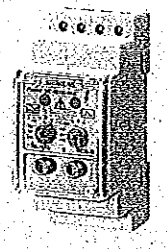


I_n [A]	Type	Product code	Name	Weight [kg]	Package [pc]
630	SE-BH-0630-V001	25120	Switch-disconnector unit	0.295	1

- TECHNICAL INFORMATION, see page F15

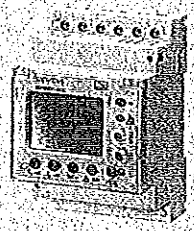
RESIDUAL CURRENT MONITOR

3P 4P



Type	Product code	Description	Weight [kg]	Package [set]
5SV8000-6KK	42658	Analogue design, $I_{\Delta n}$ and $t_{\Delta n}$ setting	0.18	1

- TECHNICAL INFORMATION, see page P4

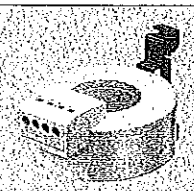


Type	Product code	Description	Weight [kg]	Package [set]
5SV8001-6KK	42659	Digital design, $I_{\Delta n}$ and $t_{\Delta n}$ setting	0.26	1
5SV8200-6KK	42660	Digital design, $I_{\Delta n}$ and $t_{\Delta n}$ setting, 4 channels	0.26	1

- TECHNICAL INFORMATION, see page P4

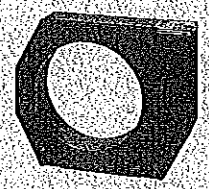
CURRENT TRANSFORMERS FOR RESIDUAL CURRENT MONITOR

3P 4P



Type	Product code	Description	Weight [kg]	Package [set]
5SV8700-0KK	42661	Internal diameter 20 mm, including holder on „U" rail according to EN 60715 wide 35 mm	0.09	1
5SV8701-0KK	42662	Internal diameter 30 mm, including holder on „U" rail according to EN 60715 wide 35 mm	0.11	1

- TECHNICAL INFORMATION, see page P4



Type	Product code	Description	Weight [kg]	Package [set]
5SV8702-0KK	42663	Internal diameter 35 mm, including holder on the panel	0.2	1
5SV8703-0KK	42664	Internal diameter 70 mm, including holder on the panel	0.31	1
5SV8704-0KK	42665	Internal diameter 105 mm, including holder on the panel	0.6	1
5SV8705-0KK	42666	Internal diameter 140 mm, including holder on the panel	1.35	1
5SV8706-0KK	42667	Internal diameter 210 mm, including holder on the panel	1.25	1

- TECHNICAL INFORMATION, see page P4

Type	Product code	Description	Weight [kg]	Package [set]
5SV8 900-1KK	42668	Holder on „U" rail according to EN 60715 wide 35 mm, for current transformers with internal diameter up to and including 105 mm	0.01	2

- TECHNICAL INFORMATION, see page P4

CONNECTING SETS

3P 4I

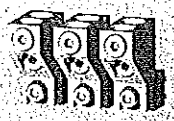
3 terminals

Type	Product code	Description	S [mm²]	Method of connection	Weight [kg]	Package [set]
CS-BH-T011	24820	Clamp terminals	35 ÷ 240	Cu cables, flexibars	0.433	1

- TECHNICAL INFORMATION, see page F19

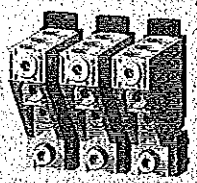
CS-BH-B011	24761	Block terminals	150 ÷ 240	Cu/Al cables	0.279	1
CS-BH-B012	24762	Block terminals	25 ÷ 150	Cu/Al cables	0.302	1

- TECHNICAL INFORMATION, see page F19



CS-BH-B021	24781	Double block terminals	2x (150 ÷ 240)	Cu/Al cables	0.721	1
CS-BH-B022	15816	Double block terminals	2x (25 ÷ 150)	Cu/Al cables	0.750	1

- TECHNICAL INFORMATION, see page F19
- using the OD-BH-KS03 cover the degree of protection IP20 is fulfilled

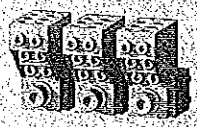


CS-BH-B031	36604	Block terminals	3x (150 ÷ 240)	Cu/Al cables	0.9	1
CS-BH-B032	42691	Block terminals	3x (25 ÷ 150)	Cu/Al cables	0.9	1

- TECHNICAL INFORMATION, see page F19
- using the OD-BH-KS03 cover the degree of protection IP20 is fulfilled
- conductor cross-section for potential terminal is 1.5 ÷ 6 mm²

CS-BH-A021	24780	Rear connection		Cu/Al busbars, cable lugs	0.567	1

- TECHNICAL INFORMATION, see page F19

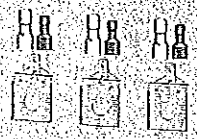


CS-BH-B014	20121	Block terminals - for 6 cables	6x (6 ÷ 35)	Cu/Al cables	0.3	1

- TECHNICAL INFORMATION, see page F19
- using the OD-BH-KS03 cover the degree of protection IP20 is fulfilled

CS-BH-A011	24760	Front connection		Cu/Al busbars, cable lugs, flexibars	0.186	1

- TECHNICAL INFORMATION, see page F19
- included in every supply of switching units



CS-BH-PS01	13683	Potential terminals	15 ÷ 25,4 ÷ 6	Cu flexible conductor	0.021	1

- TECHNICAL INFORMATION, see page F19

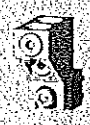
1 terminal

Type	Product code	Description	S [mm²]	Method of connection	Weight [kg]	Package [set]
CS-BH-T411	19589	Clamp terminal	35 ÷ 240	Cu cables, flexibars	0.148	1

- TECHNICAL INFORMATION, see page F19

CS-BH-B411	19593	Block terminal	150 ÷ 240	Cu/Al cables	0.093	1
CS-BH-B412	19588	Block terminal	25 ÷ 150	Cu/Al cables	0.101	1

- TECHNICAL INFORMATION, see page F19



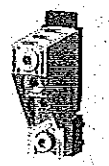
CS-BH-B421	19590	Double block terminal	2x (150÷240)	Cu/Al cables	0.24	1
CS-BH-B422	19591	Double block terminal	2x (25÷150)	Cu/Al cables	0.25	1

- TECHNICAL INFORMATION, see page F19

1) - set includes three terminals

CONNECTING SETS

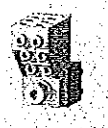
3P



1 terminal

Type	Product code	Description		Method of connection	Weight [kg]	Package [pc]
CS-BH-B431	36605	Block terminals	3x(150÷240)	Cu/Al cables	0.3	1
CS-BH-B432	42692	Block terminals	3x(25÷150)	Cu/Al cables	0.3	1

- TECHNICAL INFORMATION, see page F19
- conductor cross-section for potential terminal is 1.5 ÷ 6 mm²



CS-BH-B414	21169	Block terminal - for 6 cables	6x (6÷35)	Cu/Al cables	0.1	1

- TECHNICAL INFORMATION, see page F19

CS-BH-A421	19592	Rear connection		Cu/Al busbars, cable lugs	0.189	1

- TECHNICAL INFORMATION, see page F19

CS-BH-PS41	36032	Potential terminal	1.5÷2.5/4÷6		0.005	1

- TECHNICAL INFORMATION, see page F19

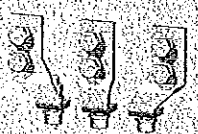
3 terminals

Type	Product code	Description	Method of connection	Weight [kg]	Package [pc]
CS-BH-A037	24783	Reduction for BA...*37-50 - front connection	Cu/Al busbars, cable lugs, flexibars	0.47	1

- TECHNICAL INFORMATION, see page F19

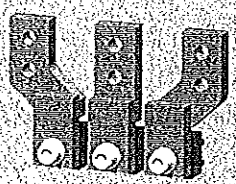
CS-BH-A039	24782	Reduction for BA...*39-50 and J2UX50 - front connection	Cu/Al busbars, cable lugs, flexibars	0.628	1

- TECHNICAL INFORMATION, see page F19
- for total replacement of BA ...*39-50 or J2UX50 circuit breaker with front connection OD-BHD-MS39 connecting set is necessary



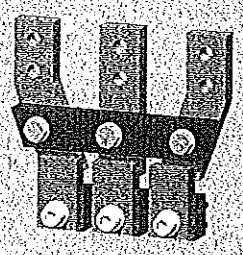
CS-BH-Z039	18202	Reduction for BA...*39 a J2UX - rear connection	Cu/Al busbars, cable lugs	0.954	1

- TECHNICAL INFORMATION, see page F19
- for total replacement of BA...*39 or J2UX circuit breaker with rear connection OD-BH-MZ39 and CS-BH-A021 connecting sets are necessary



CS-BH-JX75	14562	Reduction for BA...*39-75 and J2UX75 - front connection, withdrawable design	Cu/Al busbars, flexibars, cable lugs	1.924	1

- TECHNICAL INFORMATION, see page F19
- for total replacement of BA...*39-75 or J2UX75T circuit breakers with front connection in withdrawable design OD-BHD-MS75 connecting set and ZO-BH-0630-300 plug-in device or ZV-BH-0630-300 withdrawable device are necessary



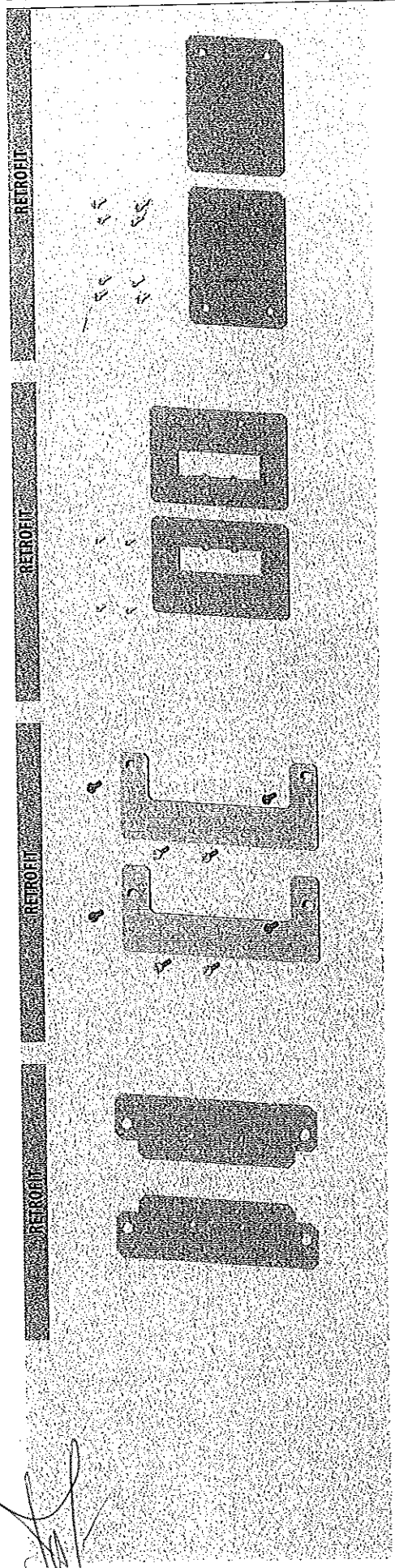
CS-BH-JT75	14561	Reduction for J2UX75T - front connection, withdrawable design	Cu/Al busbars, flexibars, cable lugs	2.64	1

- TECHNICAL INFORMATION, see page F19
- for total replacement of J2UX75T circuit breaker with front connection in withdrawable design OD-BHD-MS75 connecting set and ZO-BH-0630-300 plug-in device or ZV-BH-0630-300 withdrawable device are necessary

RETROFIT - sets, which enable replacement of older circuit breakers by a new circuit breakers without switchboard reconstruction

MOUNTING SETS

3P



Type	Product code	Description	Weight [kg]	Package [set]
OD-BHD-MS39	24741	Reduction for BA...*39-50 and J2UX50 - front connection	0.7	1

- DIMENSIONS see page F27
- for total replacement of BA ...*39-50 or J2UX50 circuit breaker with front connection 2 connecting sets CS-BH-A039 are necessary

OD-BH-MZ39	18204	Reduction for BA...*39 and J2UX - rear connection	1.195	1

- DIMENSIONS see page F27
- for total replacement of BA...*39 or J2UX circuit breaker with rear connection also 2 connecting sets CS-BH-Z039 and CS-BH A021 are necessary

OD-BH-MT75	33331	Reduction for J2UX75T - front connection, withdrawable design		1

- DIMENSIONS see page F33, F37
- for total replacement of J2UX75T circuit breaker with front connection in withdrawable design 2 connecting sets CS-BH-JT7 and ZO-BH-0630-300 plug-in device or ZV-BH-0630-300 withdrawable device are necessary

OD-BHD-MS75	14563	Reduction for BA...*39-75 a J2UX75 - front connection, withdrawable design	0.446	1

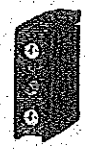
- DIMENSIONS see page F33, F37
- for total replacement of BA...*39-75 or J2UX75 circuit breaker with front connection in withdrawable design 2 connecting sets CS-BH-JT7 and ZO-BH-0630-300 plug-in device or ZV-BH-0630-300 withdrawable device are necessary

[1] - one set provides for replacing one circuit breaker (set includes coupling elements necessary to assemble circuit breaker and mounting se

RETROFIT - sets, which enable replacement of older circuit breakers by a new circuit breakers without switchboard reconstruc

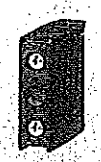
AUXILIARY SWITCHES

3P 4P



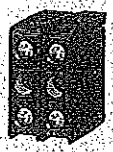
Single make contacts

Type	Product code	Operating voltage	Contacts	Weight [kg]	Package [pc]
PS-BHD-1000	24700	60 ÷ 500 V a.c./d.c.		0.012	1
PS-BHD-1000-Au	24702	5 ÷ 60 V a.c./d.c.		0.012	1



Single break contacts

Type	Product code	Operating voltage	Contacts	Weight [kg]	Package [pc]
PS-BHD-0100	24701	60 ÷ 500 V a.c./d.c.		0.013	1
PS-BHD-0100-Au	24703	5 ÷ 60 V a.c./d.c.		0.013	1

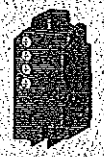


Double

Type	Product code	Operating voltage	Contacts	Weight [kg]	Package [pc]
PS-BHD-0200	13690	60 ÷ 500 V a.c./d.c.		0.026	1
PS-BHD-0200-Au	13693	5 ÷ 60 V a.c./d.c.		0.026	1
PS-BHD-1100	13691	60 ÷ 500 V a.c./d.c.		0.025	1
PS-BHD-1100-Au	13694	5 ÷ 60 V a.c./d.c.		0.025	1
PS-BHD-2000	13689	60 ÷ 500 V a.c./d.c.		0.024	1
PS-BHD-2000-Au	13692	5 ÷ 60 V a.c./d.c.		0.024	1

Make-and-break

Type	Product code	Operating voltage	Contacts	Weight [kg]	Package [pc]
PS-BHD-0010	18021	60 ÷ 250 V a.c./d.c.		0.013	1
PS-BHD-0010-Au	18022	5 ÷ 60 V a.c./d.c.		0.013	1
PS-BHD-0020	35 893	60 ÷ 250 V a.c./d.c.		0.026	1
PS-BHD-0020-Au	37467	5 ÷ 60 V a.c./d.c.		0.026	1



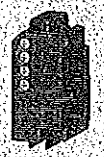
Early

Type	Product code	Description	Contacts	Weight [kg]	Package [pc]
SP-BHD-0002	16169	Early switch		0.045	1

- TECHNICAL INFORMATION for all switch, see page F59

SHUNT TRIPS

3P 4P

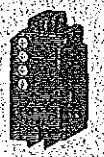


Type	Product code	Operating voltage	Weight [kg]	Package [pc]
SV-BHD-X024	24650	24, 40, 48 V a.c./d.c.	0.14	1
SV-BHD-X110	24630	110 V a.c./d.c.	0.14	1
SV-BHD-X230	24620	230, 400, 500 V a.c./220 V d.c.	0.14	1

- TECHNICAL INFORMATION, see page F60

UNDERVOLTAGE RELEASES

3P 4P

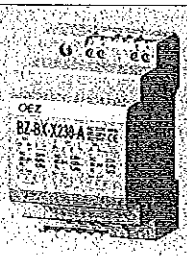


Type	Product code	Operating voltage	Description	Weight [kg]	Package [pc]
SP-BHD-X024	24450	24, 40, 48 V a.c./d.c.		0.11	1
SP-BHD-X110	24430	110 V a.c./d.c.		0.11	1
SP-BHD-X230	24420	230, 400, 500 V a.c./220 V d.c.		0.11	1
SP-BHD-X024-0001[1]	24550	24, 40, 48 V a.c./d.c.	- with early contact	0.12	1
SP-BHD-X110-0001[1]	24530	110 V a.c./d.c.	- with early contact	0.12	1
SP-BHD-X230-0001[1]	24520	230, 400, 500 V a.c./220 V d.c.	- with early contact	0.12	1

- TECHNICAL INFORMATION, see page F62

[1] - cannot be used in combination with motor drive MP-BH-X...

DELAY UNIT

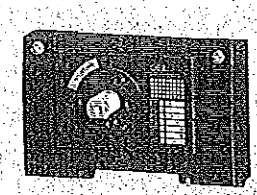


Type	Product code	Description	Weight [kg]	Package [pc]
BZ-BX-X230-A	36696	- enables to delay the undervoltage release tripping of circuit breaker Modeion	0.12	1

- TECHNICAL INFORMATION, see page P2

3P 4P

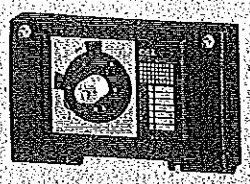
HAND DRIVES



Type	Product code	Name - description		Weight (kg)	Package (pc)
RP-BH-CK10	13653	Hand drive unit	- without locking	0.223	1
RP-BH-CK20	13654	Hand drive unit	- with locking	0.223	1

- TECHNICAL INFORMATION, see page F64

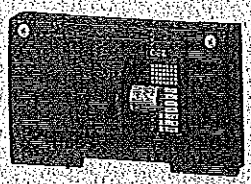
Hand drive unit must be fitted with: ■ for controlling on switch unit - with the black hand drive lever RP-BHD-CP10 or RP-BHD-CP20
■ for controlling through the switchboard door - with the extension shaft RP-BHD-CH..
- with the hand drive bearing RP-BHD-CN..
- with the hand drive lever RP-BHD-CP..



RP-BH-CK21	13685	Hand drive unit - yellow label	- with locking	0.223	1

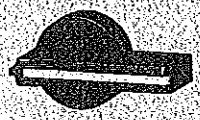
- TECHNICAL INFORMATION, see page F64

Hand drive unit must be fitted with: ■ for controlling on switch unit - with the red hand drive lever RP-BHD-CP21
■ for controlling through the switchboard door - with the extension shaft RP-BHD-CH..
- with the hand drive bearing RP-BHD-CN..
- with the hand drive lever RP-BHD-CP..



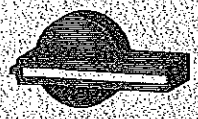
RP-BH-CK30	37252	Hand drive unit for right side control	0.512	1
RP-BH-CK31	37253	Hand drive unit for left side control	0.512	1

- TECHNICAL INFORMATION, see page F64



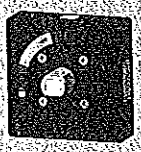
RP-BHD-CP10	13655	Hand drive lever - black	- without locking	0.075	1
RP-BHD-CP20	13656	Hand drive lever - black	- with locking	0.075	1

- TECHNICAL INFORMATION, see page F64



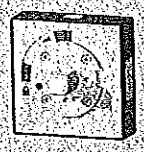
RP-BHD-CP21	13657	Hand drive lever - red	- with locking	0.075	1

- TECHNICAL INFORMATION, see page F64



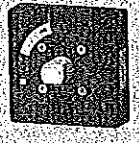
RP-BHD-CN40	37246	Hand drive bearing - degree of protection IP40	0.14	1

- TECHNICAL INFORMATION, see page F64
- is used in combination with the black lever of RP-BHD-CP10, RP-BHD-CP20 hand drives



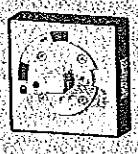
RP-BHD-CN41	37247	Hand drive bearing - yellow label - degree of protection IP40	0.14	1

- TECHNICAL INFORMATION, see page F64
- is used in combination with the red lever of RP-BHD-CP21 hand drive



RP-BHD-CN60	37248	Hand drive bearing - degree of protection IP66	0.14	1

- TECHNICAL INFORMATION, see page F64
- is used in combination with the black lever of RP-BHD-CP10, RP-BHD-CP20 hand drives

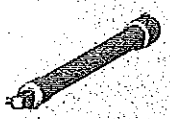


RP-BHD-CN61	37249	Hand drive bearing - yellow label - degree of protection IP66	0.14	1

- TECHNICAL INFORMATION, see page F64
- is used in combination with the red lever of RP-BHD-CP21 hand drive

HAND DRIVES

3P 4P



Type	Product code	Name - description	Weight [kg]	Package [pc]
RP-BHD-CH10	13658	Extension shaft - length 365 mm, can be shortened	0.205	1

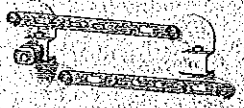
- TECHNICAL INFORMATION, see page F64

Type	Product code	Name - description	Weight [kg]	Package [pc]
RP-BHD-CH20	13659	Extension shaft - telescopic, length 245 ÷ 410 mm	0.255	1

- TECHNICAL INFORMATION, see page F64

MECHANICAL INTERLOCKING AND PARALLEL SWITCHING

3P 4P



Type	Product code	Name	Weight [kg]	Package [pc]
RP-BHD-CB10	18290	Mechanical interlocking - for fixed design	0.16	1

- TECHNICAL INFORMATION, see page F65
- mechanical interlocking must be fitted with: 2 hand drive units RP-BH-CK..
  2 hand drive levers RP-BHD-CP..

Type	Product code	Name	Weight [kg]	Package [pc]
RP-BHD-CD10	18289	Mechanical parallel switching - for fixed design	0.23	1

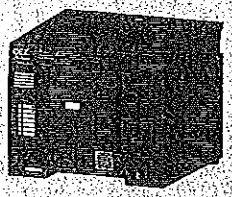
- TECHNICAL INFORMATION, see page F65
- mechanical parallel switching must be fitted with: 2 hand drive units RP-BH-CK..
  with the hand drive lever RP-BHD-CP..

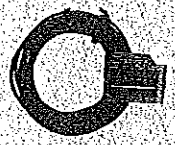
Type	Product code	Name	Weight [kg]	Package [pc]
MB-BH-PV04	19611	Mechanical blocking with Bowden cable - for two circuit breakers BH630	0.448	1
MB-BHD-PV03	19613	Mechanical blocking with Bowden cable - for one BD250 and one BH630 circuit breaker	0.448	1

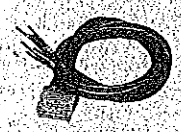
- TECHNICAL INFORMATION, see page F66
- mechanical blocking with Bowden cable is intended for fixed, plug-in and withdrawable design

MOTOR DRIVES

3P 4P







Type	Product code	Name - description	Operating voltage	Weight [kg]	Package [pc]
MP-BH-X024[1]	20590	Motor drive	24V a.c/d.c.	1.691	1
MP-BH-X048[1]	19792	Motor drive	48V a.c/d.c.	1.691	1
MP-BH-X110	13539	Motor drive	110V a.c/d.c.	1.691	1
MP-BH-X230	13536	Motor drive	230V a.c/220V d.c.	1.691	1
MP-BH-X024-P[1]	20591	Motor drive	24V a.c/d.c.	1.708	1
MP-BH-X048-P[1]	19793	Motor drive - with counter of cycles	48V a.c/d.c.	1.708	1
MP-BH-X110-P	13687	Motor drive - with counter of cycles	110V a.c/d.c.	1.708	1
MP-BH-X230-P	13540	Motor drive - with counter of cycles	230V a.c/220V d.c.	1.708	1

- TECHNICAL INFORMATION, see page F67
- motor drive cannot be used in combination with SP-BHD-X...-0001

[1] - custom production

Type	Product code	Name - description	Weight [kg]	Package [pc]
OD-BHD-PP01	13688	Counter of cycles - cable length 1.1 m	0.08	1

- DIMENSIONS see page F67
- upon agreement with the manufacturer, different conductor lengths can be supplied

Type	Product code	Name - description	Weight [kg]	Package [pc]
OD-BHD-KA02	13809	Extension cable - to motor drive, 12 wires, length 0.6 m	0.1	1

- TECHNICAL INFORMATION, see page F67
- upon agreement with the manufacturer, different conductor lengths can be supplied

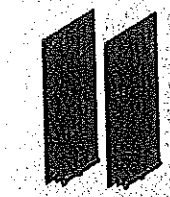
CONTROL RELAY

Type	Product code	Specifications	Weight [kg]	Package [pc]
OD-BHD-RX01	37425	24V a.c/d.c.	0.06	1
OD-BHD-RX02	37426	48V a.c/d.c.	0.06	1
OD-BHD-RA03	37427	110 ÷ 230V a.c.	0.06	1
OD-BHD-RD04	37428	110V d.c.	0.06	1

- TECHNICAL INFORMATION, see page P3

3P 4P

ACCESSORIES

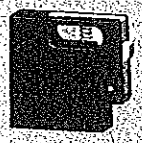


Type	Product code	Name - description	Weight [kg]	Package [pc]
OD-BHD-KS02	24740	Insulating barriers - set (two pieces), for 3P and 4P design	0.077	1
OD-BHD-KS42	19575	Insulating barrier - one piece, for 4P design	0.039	1

- included with each switching unit order
- in case circuit breaker/switch-disconnector connection is reversed (supply to terminals 2, 4, 6) it is necessary in most cases to install these barriers also on the lower side
- for more detailed information see page F22

OD-BH-KS03	13531	Terminal cover - degree of protection IP20, for 3P design	0.144	1
OD-BH-KS43	19587	Terminal cover - degree of protection IP20, for 4P design	0.209	1

- increases degree of protection of connection point to IP20 when using B021, B022, B031, B032 a B014 block type terminals
- intended for fixed, plug-in and withdrawable design

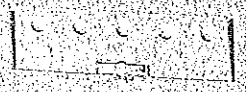


OD-BH-UP01	13532	Lever with locking	0.013	1

- enables to lock the circuit breaker in „switched off manually" position (loaded)
- locking is possible using padlock with shank diameter 4 ÷ 6 mm

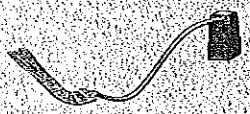
OD-BH-VP01	15330	Bolt sealing insert	0.001	2

- enables sealing for:
  - cover of cavities
  - terminal cover
  - overcurrent release
  - hand drive unit
  - motor drive

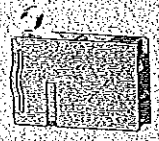


OD-BH-VP02	18216	Additional cover for overcurrent release	0.1	1

- enables sealing for overcurrent releases such as circuit breakers in the main meter switchboard



OD-BHD-KA01	14555	Connecting cable - to connect the circuit breaker/ /switch-disconnector accessories in the plug-in/ /withdrawable design - 15 wires (it is possible for plug-in design and fixed design)	0.12	1

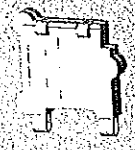


SO-BHD-0010	14560	Signalling of position - signals circuit breaker position in the plug-in or withdrawable device	0.018	1

- TECHNICAL INFORMATION, see page F48, F50

OD-BH-KK01	14554	Keying set - prevents inserting in the plug-in or withdrawable devices beyond the switching unit	0.005	1

- TECHNICAL INFORMATION, see page F48, F50

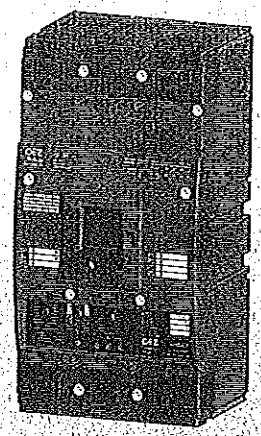


OD-BHD-KT01	14642	Cover of switch on button - for motor drive, cover can be sealed	0.002	1

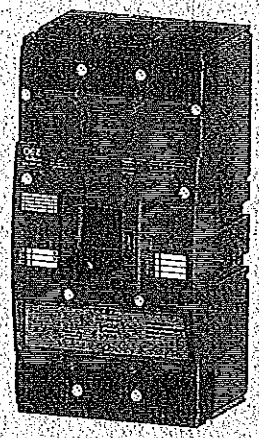
- TECHNICAL INFORMATION, see page F67

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

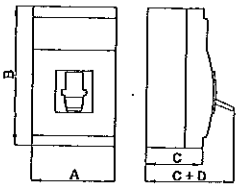
3P 4P



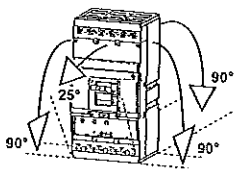
Circuit breaker



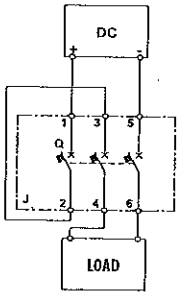
Switch-disconnector



Dimensions



nstallation positions - fixed, plug-in and withdrawable design



Connection of switch-disconnector for DC circuits

Specifications

		CIRCUIT BREAKER	SWITCH-DISCONNECTOR
Type		**BH630N; BH630S**	
Dimensions A x B x C + D (3P/4P design)		140/185 x 275 x 105 + 49 mm	140/185 x 275 x 105 + 49 mm
Weight (3P/4P design)		5.4/7.4 kg	5.4 kg
Standards		EN 60947-2 IEC 60947-2	EN 60947-3 IEC 60947-3
Approval marks		CE GS PCT	
Number of poles		3, 4	3, 4
Rated current	I_n	250, 315, 400, 500, 630 A	-
Rated normal current	I_u	630 A	630 A
Rated operating current	I_e	-	630 A
Rated operating voltage	U_e	max. 690 V a.c. -	max. 690 V a.c. max. 440 V d.c.
Rated frequency	f_n	50/60 Hz	50/60 Hz
Rated impulse withstand voltage	U_{imp}	8 kV	8 kV
Rated insulation voltage	U_i	690 V	690 V
Utilization category (selectivity)	690 V a.c.	A	-
Utilization category (switching mode)	690 V a.c. 440 V d.c.	- -	AC-23B DC-23B
Rated short-time withstand current at U_e = 690 V a.c.	I_{cw} / t	8 kA/50 ms, 7 kA/300 ms, 6.5 kA/1 s	7.5 kA/5 s
Series		NORMAL BH630N / SUPERIOR BH630S	U_e
Rated short-circuit ultimate breaking capacity (rms) [1]	I_{cu}	60 kA / 100 kA	230 V a.c.
		36 kA / 65 kA	415 V a.c.
		20 kA / 35 kA	500 V a.c.
		15 kA / 20 kA	690 V a.c.
Rated short-circuit service breaking capacity (rms)	I_{cs}	40 kA / 75 kA	230 V a.c.
		18 kA / 36 kA	415 V a.c.
		10 kA / 20 kA	500 V a.c.
		8 kA / 15 kA	690 V a.c.
Rated short-circuit making capacity (peak value)	I_{cm} / U_e	75 kA -	140 kA 415 V a.c. -	14 kA/415 V a.c. 14 kA/440 V d.c.
Switching off time at I_{cu}		20 ms	-
Losses per 1 pole fixed/withdrawable design		75 W/85 W	75 W/85 W
Mechanical endurance		20 000 cycles	20 000 cycles
Electrical endurance		5 000 cycles	5 000 cycles
Switching frequency		120 cycles/hr	120 cycles/hr
Control force		110 N	110 N
Degree of protection from front side of the device		IP40	IP40
Degree of protection of terminals		IP20	IP20
Operating conditions:			
Reference ambient temperature		40 °C	40 °C
Ambient temperature range		-40 ÷ +55 °C	-40 ÷ +55 °C
Working environment		dry and tropical climate	dry and tropical climate
Climatic resistance		EN 60068	EN 60068
Pollution degree		3	3
Max. sea level		2 000 m	2 000 m
Seismic resistance		3g (8 ÷ 50) Hz	3g (8 ÷ 50) Hz
Design modifications			
Front/rear connection		•/•	•/•
Plug-in design 3P/4P		•/•	•/•
Withdrawable design 3P/4P		•/•	•/•
Accessories			
Switches - auxiliary/relative/signal/early		•/•/•/•	•/•/•/•
Shunt trip		•	•
Undervoltage release/with early switch		•/•	•/•
Front hand drive/with adjustable lever		•/•	•/•
Mechanical interlocking -with Bowden cable/for hand drive		•/•	•/•
Motor drive/with counter of cycles		•/•	•/•
Lever with locking		•	•
Bolt sealing insert/additional cover for overcurrent release		•/•	•/•

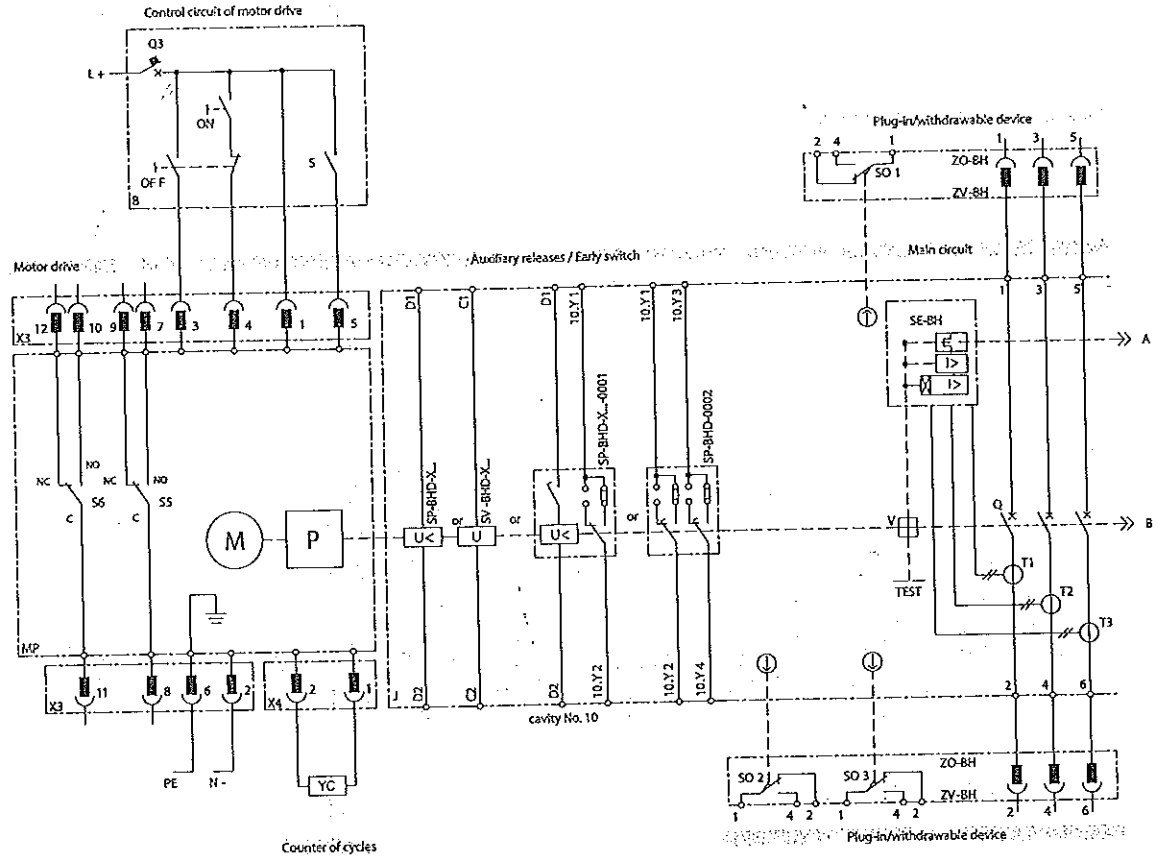
• available, – unavailable, + being prepared

[1] - in case circuit breaker connection is reversed (input terminals 2, 4, 6, output terminals 1, 3, 5) I_{cu} does not change

- protection of Modeion switch-disconnectors, see page R

Diagram

Circuit breaker with accessories (3-pole design)



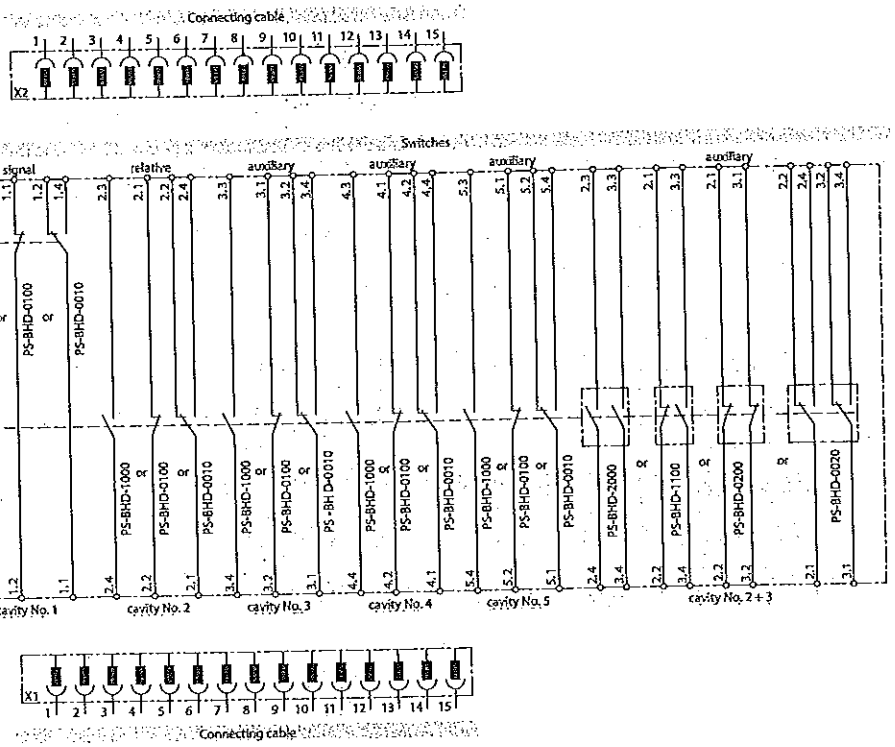


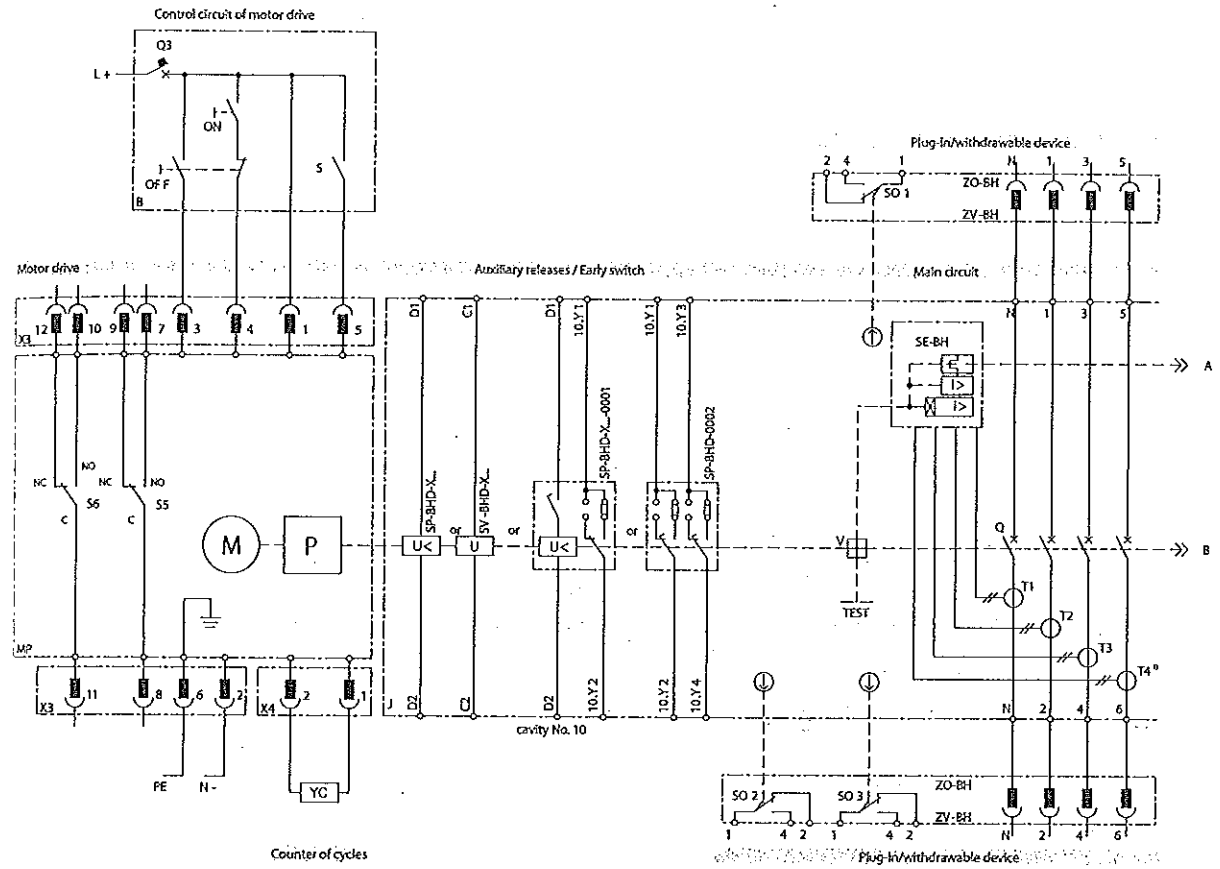
Diagram description (3P and 4P design)

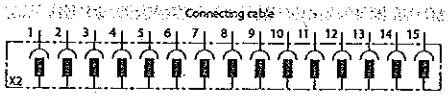
MP	motor drive - MP-BH-X...
M	motor
P	storage device
X3	connector for connection of control circu
X4	connector for external counter of cycle
S5	switch to indicate AUTO AUTO (NO-C)/ /MANUAL (NC-C)
S6	switch to indicate full storage (ready to switch on: NO-C)
YC	external counter of cycles - OD-BHD-PI
B	recommended wiring of the control circu - it is not a part of motor drive
ON	switch on button
OFF	switch off button
S	switch for energy storage (switched on = automatic storage, switch may be continuously switched on)
Q3	motor drive circuit breaker - see page
J	switching unit - BH630...
Q	main contacts
T1, T2, T3, T4[1]	current transformers
V	trip-free mechanism
SE-BH	circuit breaker - overcurrent release - SE-BH-...-... switch-disconnector - switch-disconnec unit - SE-BH-0630-V001
TEST	push button to test release
ZO-BH	plug-in device - ZO-BH-0630-...
ZV-BH	withdrawable device - ZV-BH-0630-...
X1, X2	connecting cable - OD-BHD-KA01
S01, S02, S03	contacts signalling circuit breaker/ /switch-disconnector position in plug or withdrawable device SO-BHD-001(for more detailed information see pa F48, F50
SP-BHD-X...	undervoltage release
SV-BHD-X...	shunt trip
SP-BHD-X...-0001	undervoltage release with early cont
SP-BHD-0002	early contact

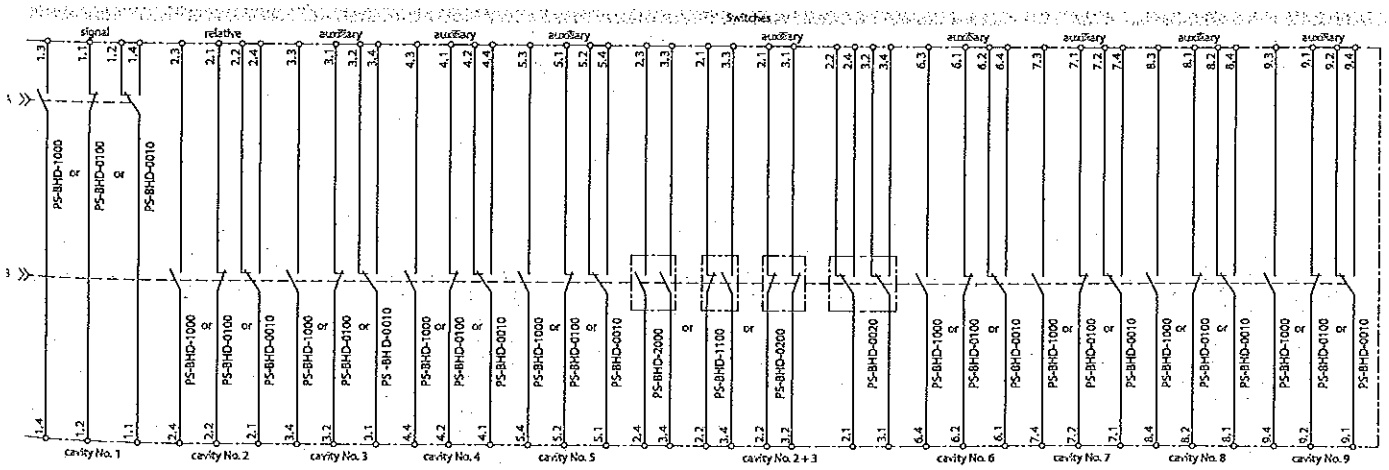
[1] - only for 4-pole design of BH630...406 switching unit

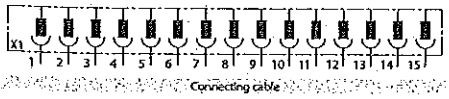
Diagram

Circuit breaker with accessories (4-pole design)









CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P 4P

Connecting and installation

Power circuit

- connected with Cu/Al busbars or cables, and possibly cables with cable lugs
- connection sets are produced to provide greater connecting options, see page F7
- generally, conductors from the supply are connected to input terminals 1, 3, 5, (N) and conductors from the load to terminals 2, 4, 6, (N); however, it is possible to reverse the connection (exchanging input and output terminals without limiting rated short-circuit ultimate breaking capacity I_{cu})
- **in case of reversed connection, in the majority of cases, circuit breaker/switch-disconnector must be fitted with OD-BHD-KS02 insulating barriers also on the side of terminals 2, 4, 6, for more detailed information see page F22**
- we recommend painting the connecting busbars
- **input and output conductors/busbars must be mechanically reinforced in order to avoid transferring electrodynamic forces to the circuit breaker/switch-disconnector during short-circuiting**
- **the method of connecting the power circuit must observe the deionization space of the circuit breaker see page F23**

Auxiliary circuits

- switches, shunt trips or undervoltage releases are connected using flexible Cu conductors with cross-section 0.5 ÷ 1 mm² directly to terminals on these devices
- motor drive and auxiliary circuits of the plug-in or withdrawable design are connected using a connector

Recommended min. cross-sections of cables, busbars and flexibars for fixed, plug-in and withdrawable designs

I_r (I) [A]	Cables S [mm²]		Busbars W x H [mm]	
	Cu	Al	Cu	Al
100	35	50	20 x 2	25 x 2
125	50	70	25 x 2	25 x 3
160	70	95	25 x 3	32 x 3
200	95	120	25 x 4	25 x 5
250	120	150	25 x 5	32 x 5
315	150	185	32 x 5	32 x 6
400	185	240	32 x 6	32 x 8
500	2x 120	2x 185	32 x 8	32 x 12
630	2x 185 [1]	2x 240 [2]	32 x 12 [3]	32 x 16 [3]

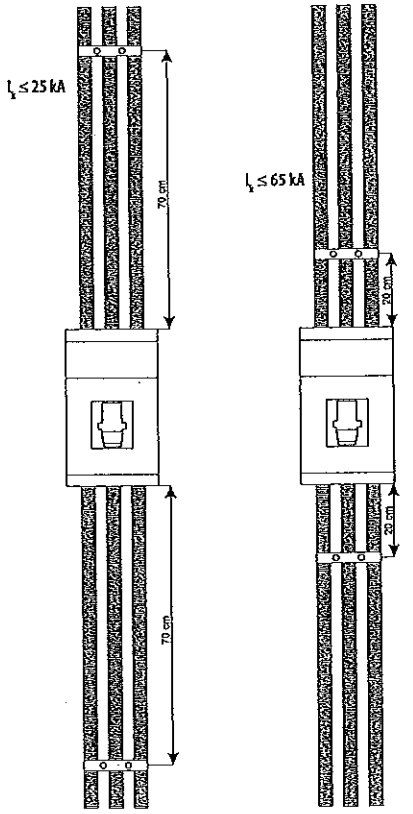
- It is necessary to follow the relevant valid standards when cables are designed
[1] connection of withdrawable and plug-in design by 2x 240 mm² Cu
[2] withdrawable and plug-in design can not be connected by Al
[3] connection of withdrawable and plug-in design by min. 32 x 16 Cu

Maximum circuit breaker/switch-disconnector loads in accordance with ambient temperature

Circuit breaker/switch-disconnector BH630 - connection by cu cable 2x 185 mm² per pole

50 °C	55 °C	60 °C	65 °C	70 °C
630 A	620 A	580 A	540 A	500 A

Mechanical reinforcement of conductors for BH630



IRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P 4P

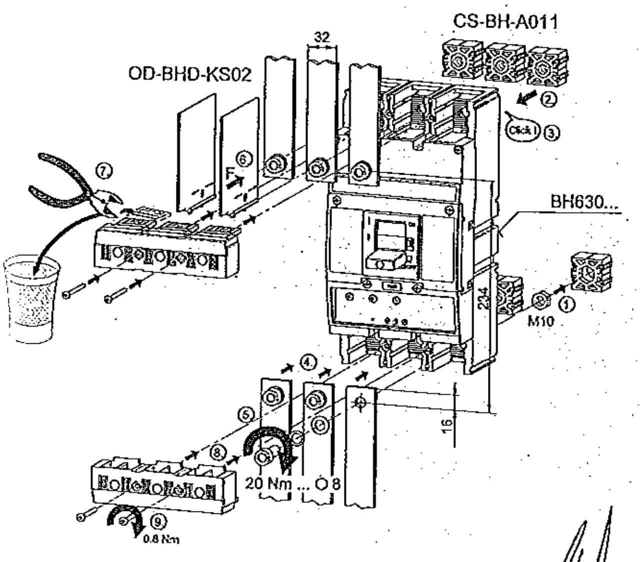
nnecting and installation

nnecting set specifications

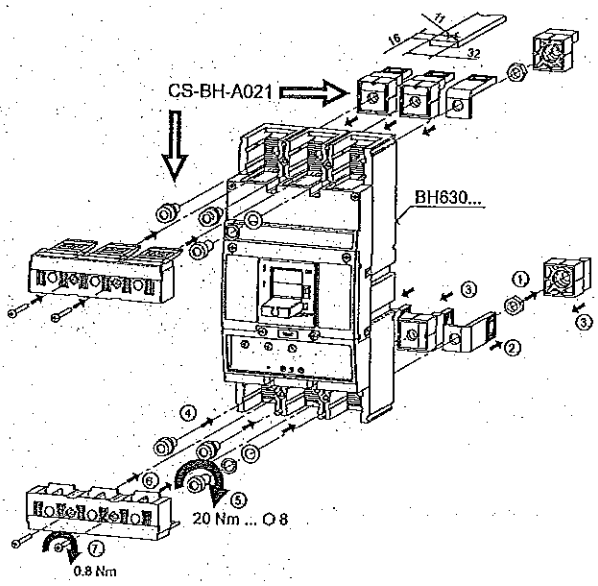
Type	I_n [A]	Cable - ranges of connection cross-sections S [mm²] – Type of cable: sector stranded	sector solid	round stranded	round solid	Busbars and cable lugs W x H [mm]	Dimensional drawing 3P/4P
CS-BH-A011 CS-BH-A411	630					32 x ...	
CS-BH-A021 CS-BH-A421	630					32 x ...	page F26/F40
CS-BH-T011 CS-BH-T411	400	35 ÷ 240 Cu	35 ÷ 240 Cu	35 ÷ 240 Cu	35 ÷ 240 Cu		
CS-BH-B011 CS-BH-B411	400	150 ÷ 240 Cu/Al	120 ÷ 240 Cu/Al	150 ÷ 240 Cu/Al	120 ÷ 240 Cu/Al		
CS-BH-B012 CS-BH-B412	315	25 ÷ 150 Cu/Al	16 ÷ 150 Cu/Al	25 ÷ 150 Cu/Al	16 ÷ 150 Cu/Al		
CS-BH-B021 CS-BH-B421	630	2x (150 ÷ 240) Cu/Al	2x (120 ÷ 240) Cu/Al	2x (150 ÷ 240) Cu/Al	2x (120 ÷ 240) Cu/Al		page F24/F38
CS-BH-B022 CS-BH-B422	500	2x (25 ÷ 150) Cu/Al	2x (16 ÷ 150) Cu/Al	2x (25 ÷ 150) Cu/Al	2x (16 ÷ 150) Cu/Al		page F24/F38
CS-BH-B014 CS-BH-B414	250	6x (6 ÷ 35) Cu/Al	6x (6 ÷ 35) Cu/Al	6x (6 ÷ 35) Cu/Al	6x (6 ÷ 35) Cu/Al		page F25/F39
CS-BH-B031 CS-BH-B431	630	3x (150 ÷ 240) Cu/Al	3x (120 ÷ 240) Cu/Al	3x (150 ÷ 240) Cu/Al	3x (120 ÷ 240) Cu/Al		page F25/F39
CS-BH-B032 CS-BH-B432	630	3x (25 ÷ 150) Cu/Al	3x (16 ÷ 150) Cu/Al	3x (25 ÷ 150) Cu/Al	3x (16 ÷ 150) Cu/Al		page F26/F40
CS-BH-A037	400	**RETROFIT** - reduction for circuit breaker BA...*37 with front connection page F27					page F27
CS-BH-A039	630	**RETROFIT** - reduction for circuit breaker BA...*39 with front connection page F27					page F27
CS-BH-Z039	630	**RETROFIT** - reduction for circuit breaker BA...*39 with rear connection page F27					page F27
CS-BH-JX75	630	**RETROFIT** - reduction for circuit breaker BA...39-75 a J2UX75 with front connection in withdrawable design page F33, F37					page F33, F37
CS-BH-JT75	630	**RETROFIT** - reduction for circuit breaker J2UX75T with front connection in withdrawable design page F33, F37					page F33, F37
CS-BH-PS01	10/16	1,5 ÷ 2,5/4 ÷ 6 Cu flexible conductor					
CS-BH-PS41	10/16	1,5 ÷ 2,5/4 ÷ 6 Cu flexible conductor					

TROFIT - sets, which enable replacement of older circuit breakers by a new circuit breakers without switchboard reconstruction

nt connection - Cu/Al busbars



Rear connection - Cu/Al busbars

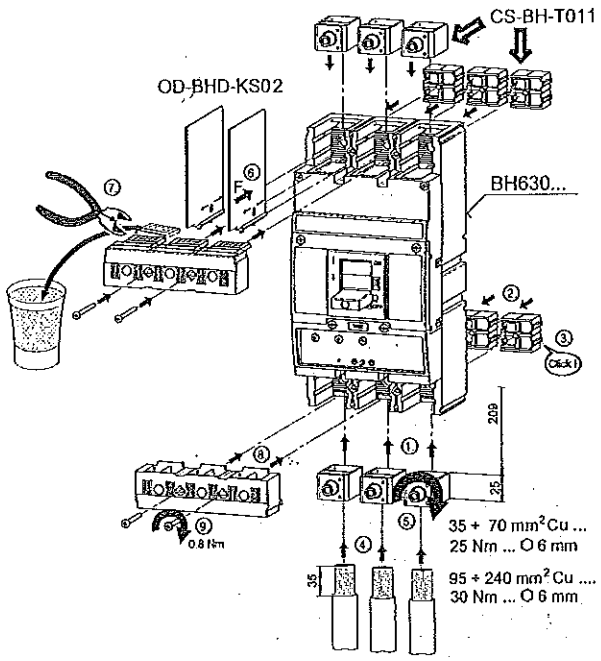


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

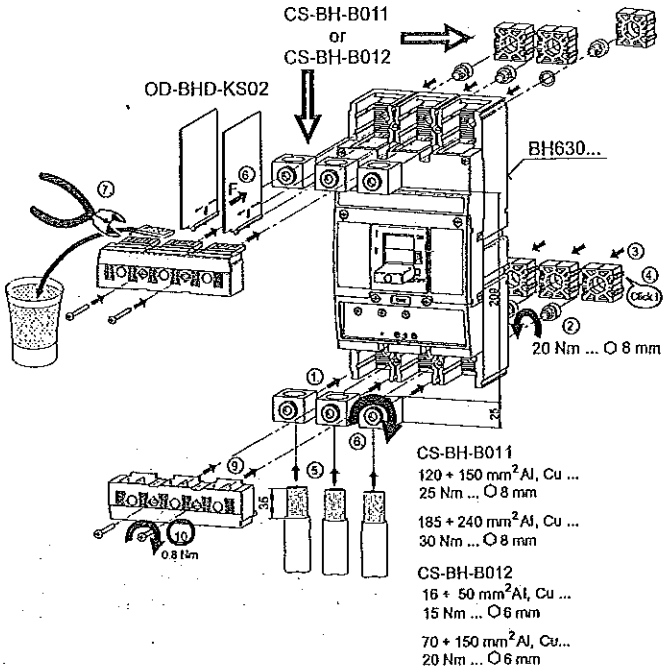
3P 4P

Connecting and installation

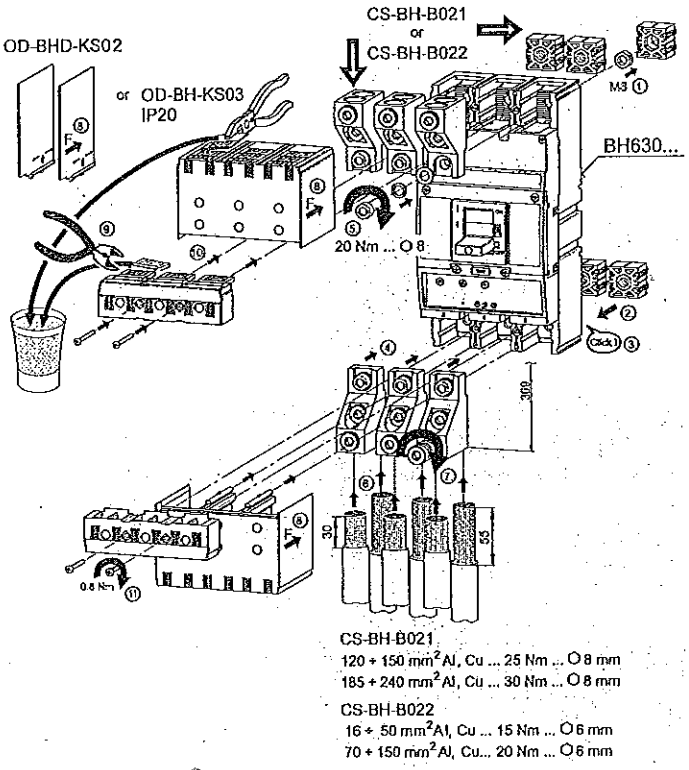
Front connection - Cu cables



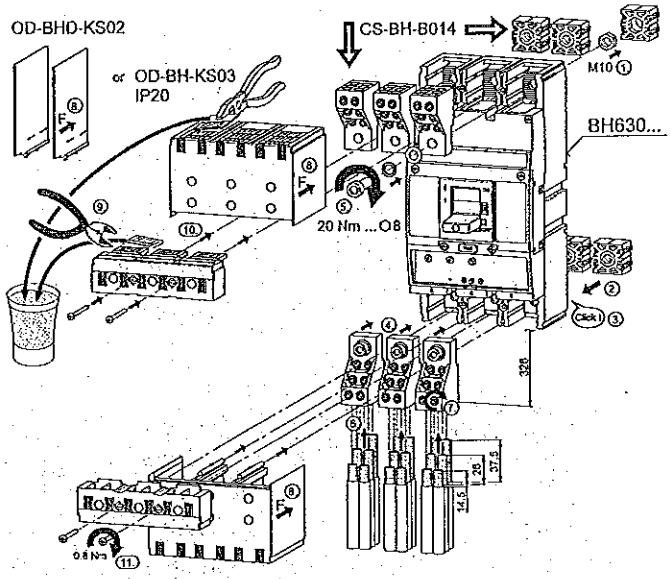
Front connection - Cu/Al cables



Front connection - 2 Cu/Al cables

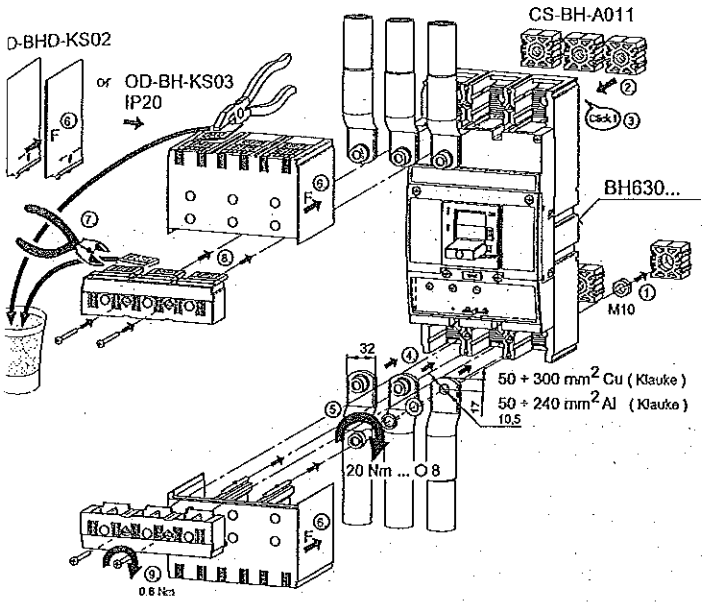


Front connection - 6 Cu/Al cables

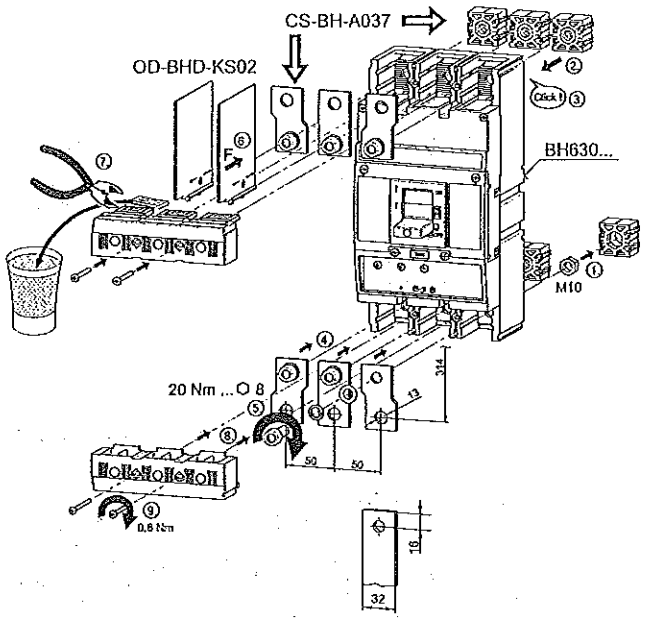


onnecting and installation

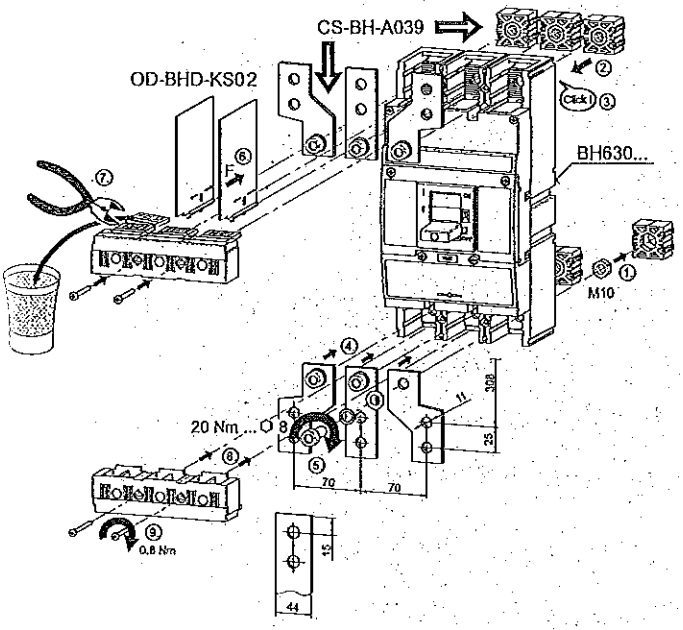
ront connection - cable lugs



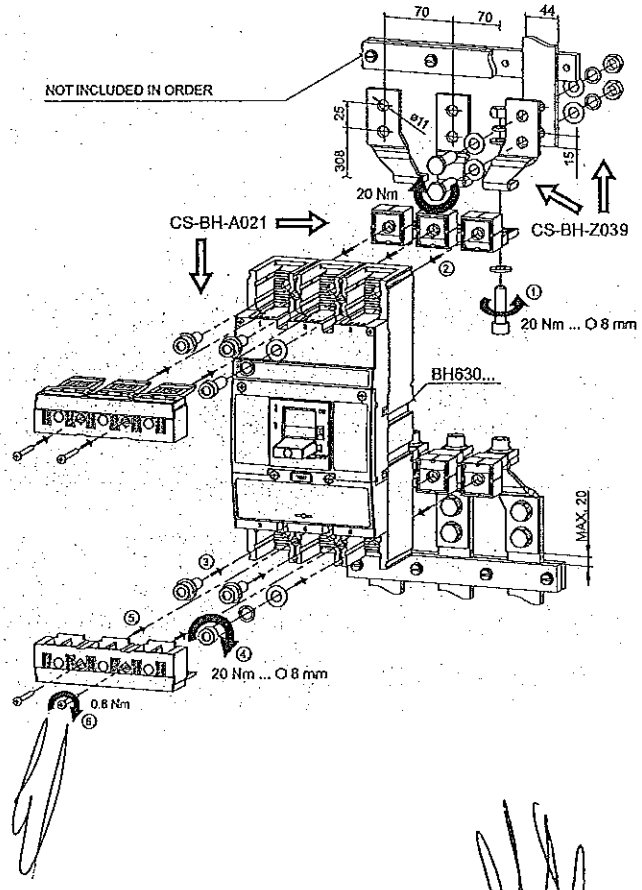
Front connection - reduction BH to BA...37



ront connection - reduction BH to J2UX and BA...39



Rear connection - reduction BH to J2UX and BA...39 with rear connection



CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Deionization spaces

USE OF INSULATING BARRIERS AND TERMINAL COVERS WITH CIRCUIT BREAKERS AND SWITCH-DISCONNECTORS

FIXED DESIGN

- front connection

  - terminals 1, 3, 5 (upper side)
    - a) if Ue ≥ 415 V a.c., it is necessary to use OD-BHD-KS02 insulating barriers or a OD-BHD-KS03 terminal cover
    - b) if insulated conductors are not used for connecting power circuit to terminals 1, 3, 5, flexibars or rear connection, it is necessary to use OD-BHD-KS02 insulating barriers or a OD-BHD-KS03 terminal cover
  - terminals 2, 4, 6 (lower side) only in case that circuit breaker/switch-disconnector is connected to the source using terminals 2, 4, 6 and furthermore:
    - a) if $U_e \geq 415$ V a.c., it is necessary to use OD-BHD-KS02 insulating barriers or a OD-BHD-KS03 terminal cove
    - b) if insulated conductors are not used for connecting power circuit to terminals 2, 4, 6, flexibars or rear connection, it is necessary to use OD-BHD-KS02 insulating barriers or a OD-BHD-KS03 terminal cover

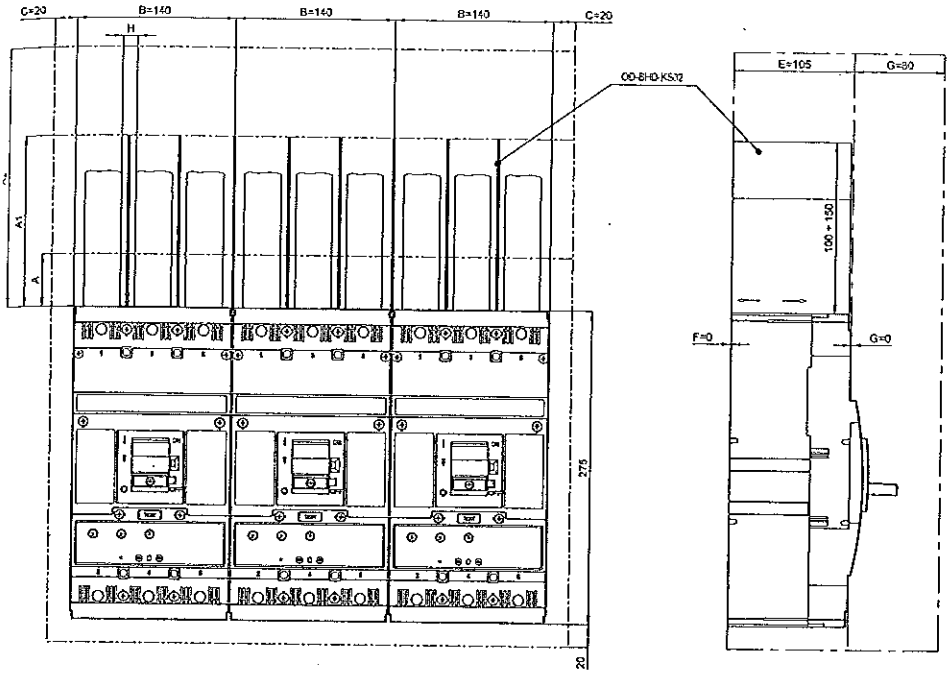
- rear connection - insulating barriers and terminal covers need not be used

PLUG-IN AND WITHDRAWABLE DEVICE - insulating barriers and terminal covers need not be used

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P 4P

Deionization spaces



A...minimum distance between the circuit breaker/ /switch-disconnector and uninsulated earthed wall (applicable for connection using insulated conductors, cables, flexibars or with rear connection)

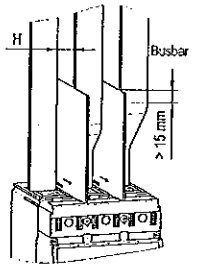
A1...minimum insulation length of bare conductors (using OD-BHD-KS02 insulating barriers from 100 mm to max. 150 mm, or by adding additional insulation for the conductors with barriers to obtain at least A1 value)

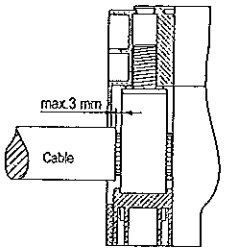
A2...minimum distance:
- between the circuit breaker/switch-disconnector and uninsulated earthed wall (applicable for uninsulated conductors and busbars)
- between the circuit breaker/switch-disconnector and busbar
- between two circuit breakers/switch-disconnectors situated vertically above one another
- between uninsulated connections of two circuit breakers/switch-disconnectors above one another

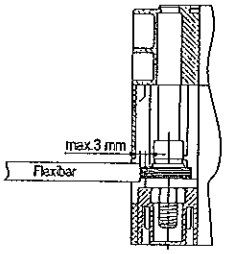
C, D, E, F, G...minimum distance between the circuit breaker/switch-disconnector and uninsulated earthed wall

H...minimum distance between uninsulated conductors

■ minimum distance of circuit breakers without using of uninsulated barriers is 50 mm







		AC U	[V]	230		415		500		690
BH630S wired with L			[kA]	100		36	65	36	70	35
BH630N wired with L			[kA]	50		36		20		15
C [mm]	H [mm]									
< 80	≥ 13	A	[mm]	50	50	50	50	50	50	50
		A1	[mm]	150	200	100	200	150	250	150
		A2	[mm]	250	300	200	300	250	350	250
	≥ 30	A	[mm]	50	50	50	50	50	50	50
		A1	[mm]	100	150	100	150	150	150	150
		A2	[mm]	150	200	150	200	200	200	200
≥ 80	≥ 13	A	[mm]	50	50	50	50	50	50	50
		A1	[mm]	100	150	100	150	150	150	150
		A2	[mm]	150	200	150	200	200	200	200

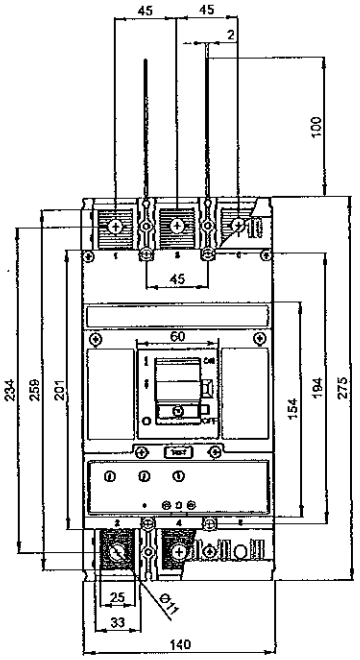
Note: I_k'' - max. short-circuit current in the protected circuit (rms)

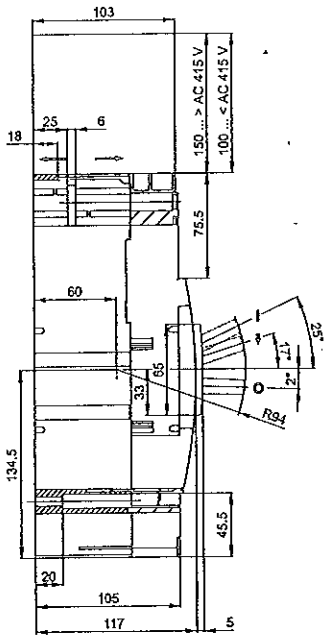
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

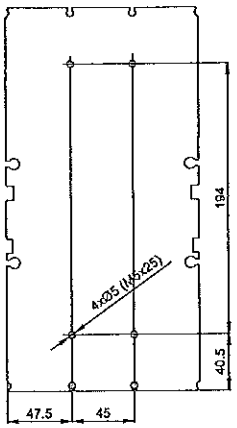
Dimensions

Fixed design, front connection

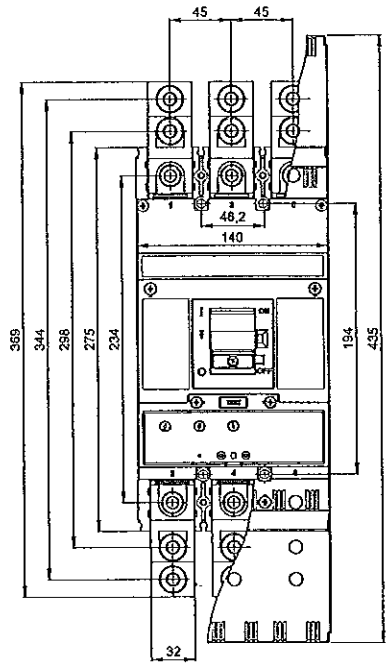
Drilling diagram

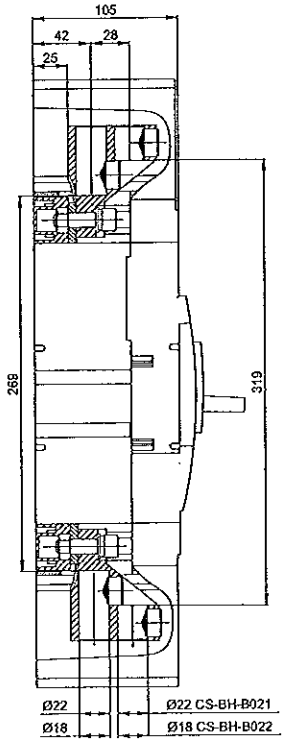






Fixed design, front connection (CS-BH-B021, CS-BH-B022 connecting sets)

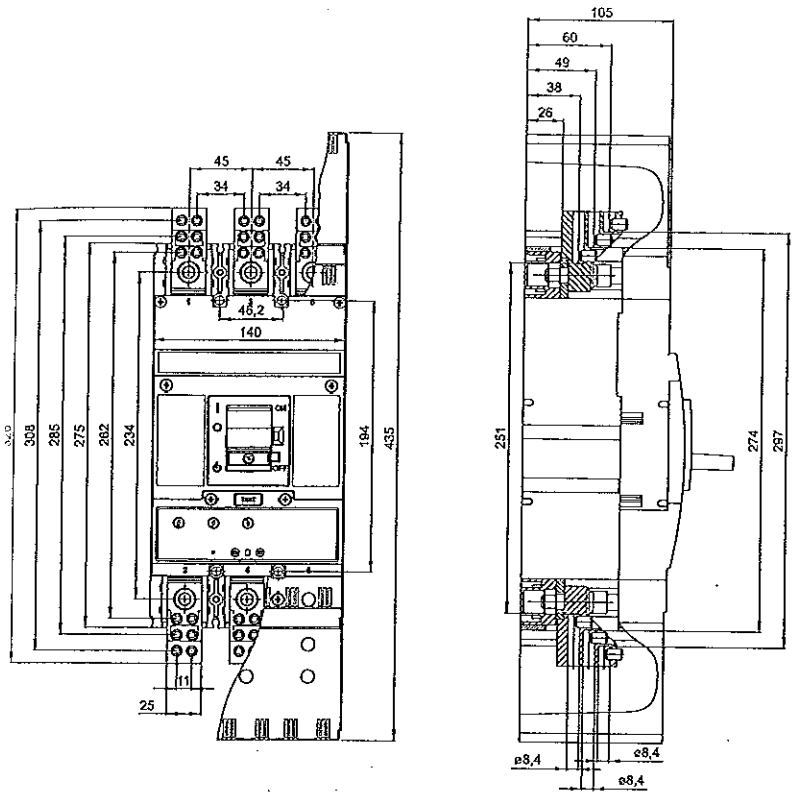




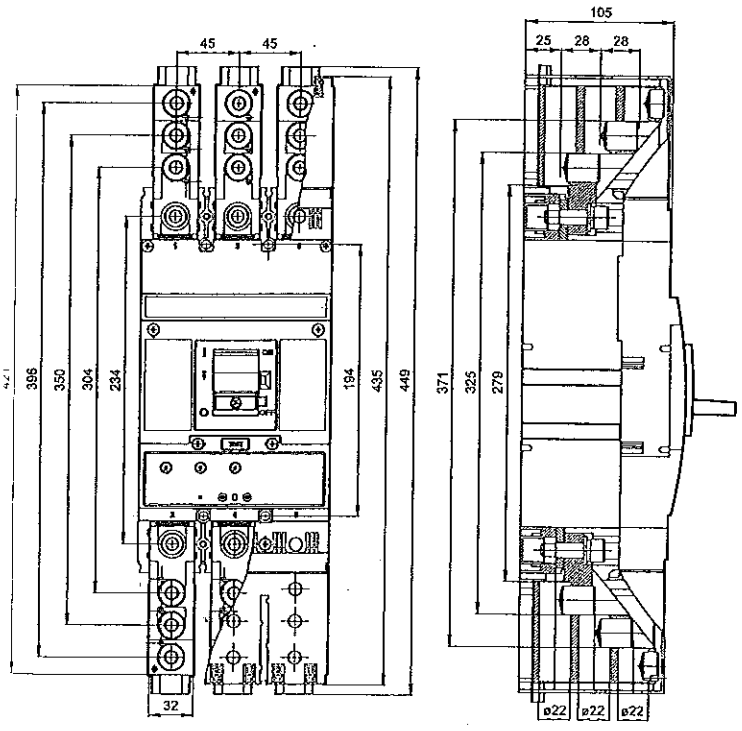
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS 3P

Dimensions

Fixed design, front connection (CS-BH-B014 connecting set)

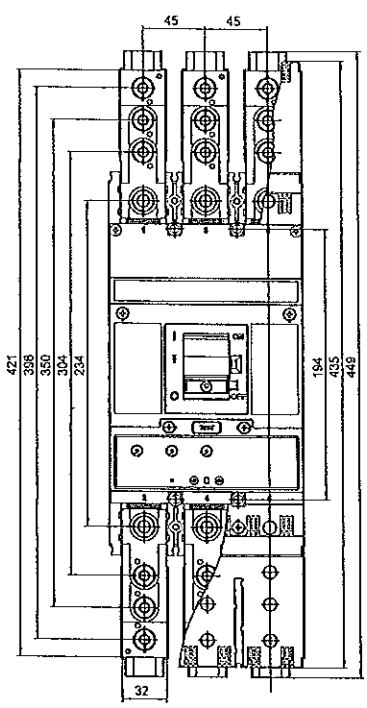


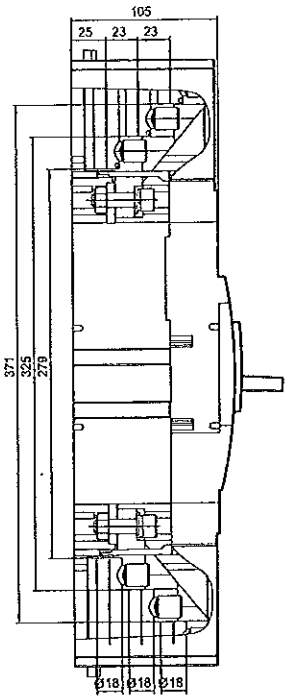
Fixed design, front connection (CS-BH-B031 connecting set)



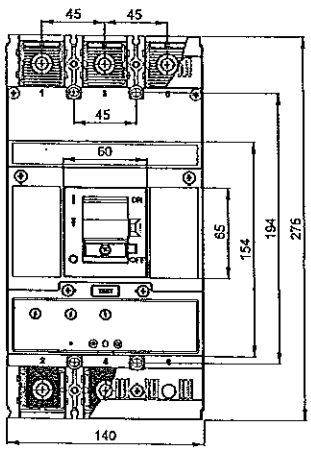
Dimensions

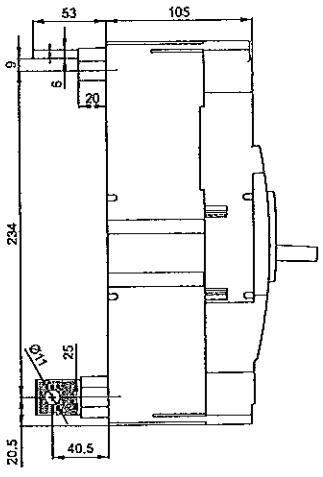
Fixed design, front connection (CS-BH-B032 connecting set)



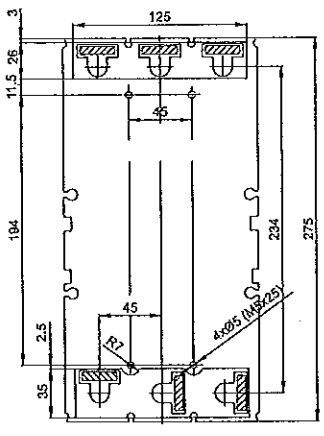


Fixed design, rear connection (CS-BH-A021 connecting set)





Drilling diagram



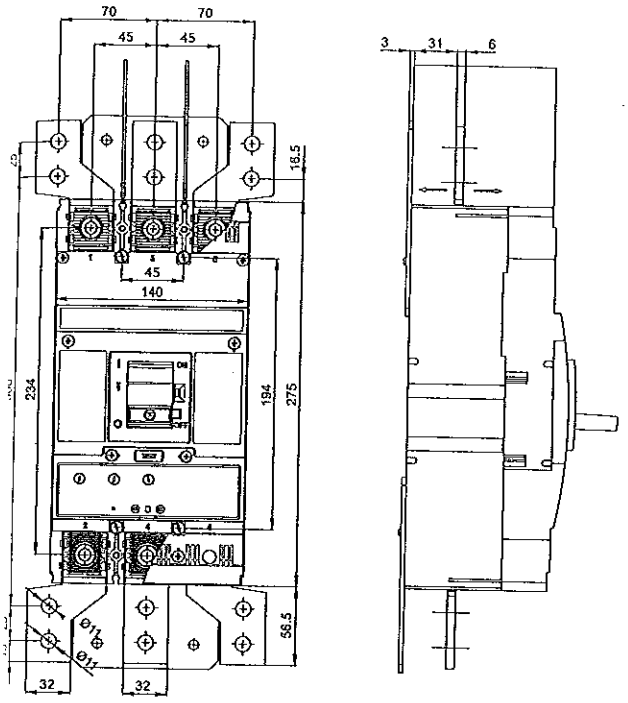
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

Dimensions

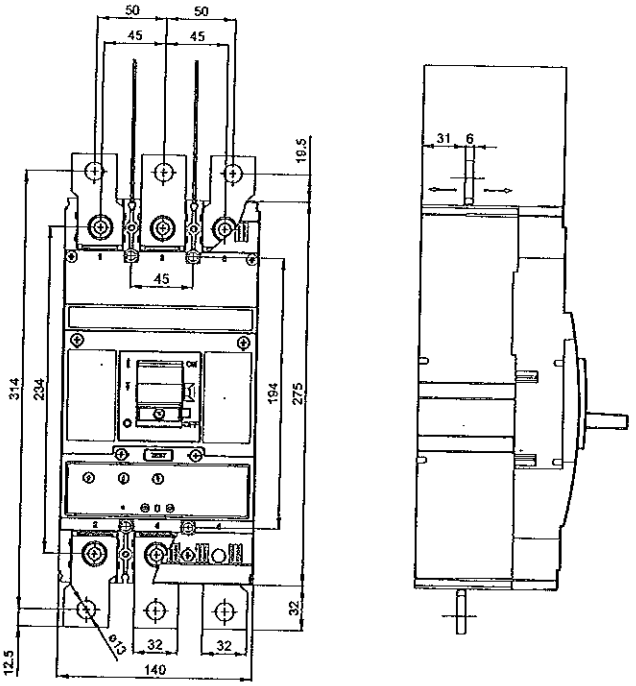
Fixed design, front connection (CS-BH-A039 connecting set, OD-BHD-MS39 mounting set)

RETROFIT



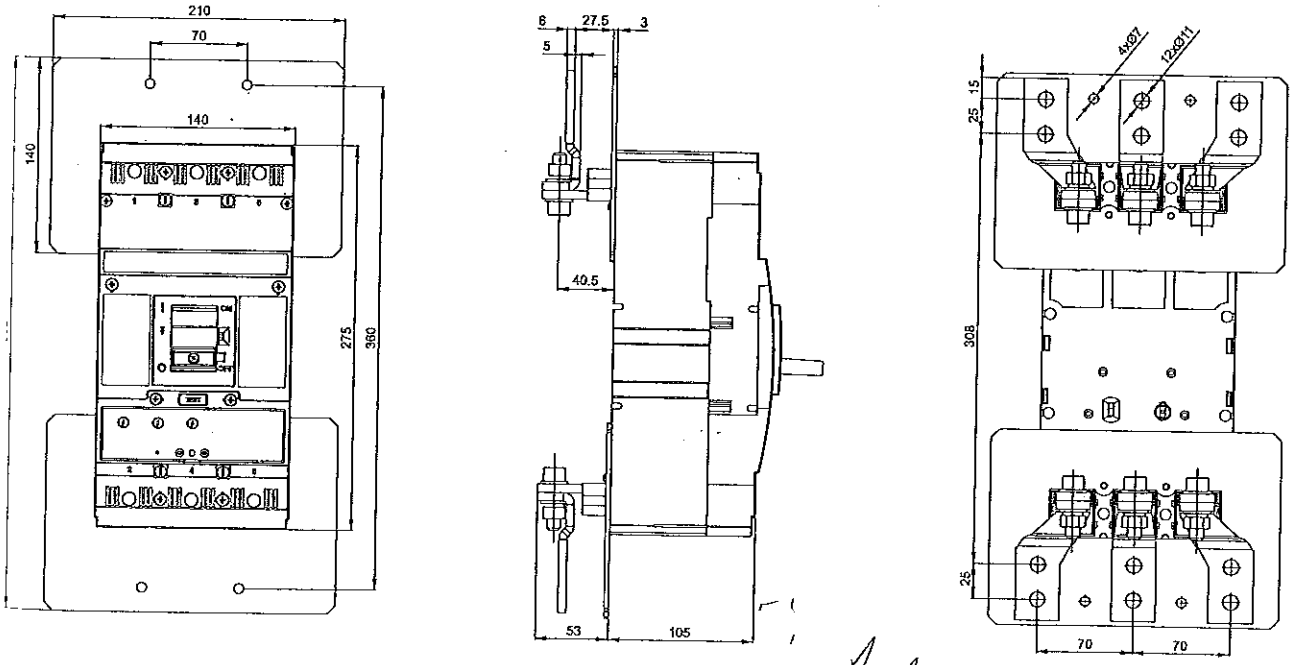
Fixed design, front connection (CS-BH-A037 connecting set)

RETROFIT



Fixed design, rear connection (CS-BH-Z039 connecting set, OD-BH-MZ39 mounting set)

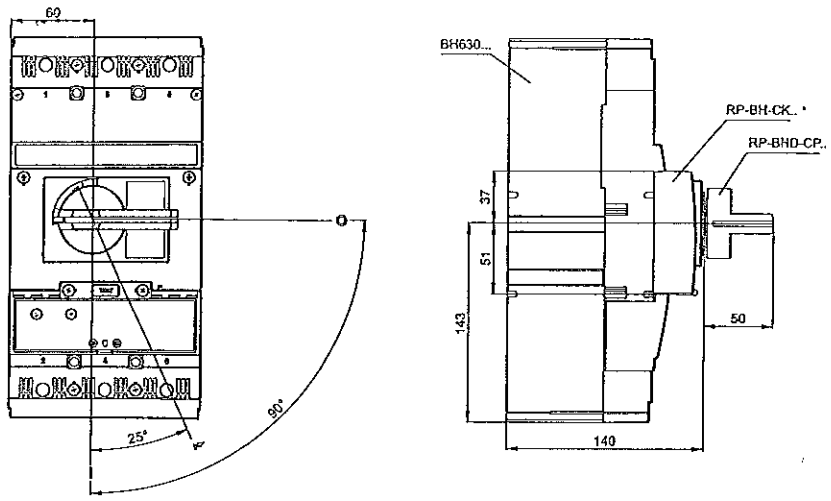
RETROFIT



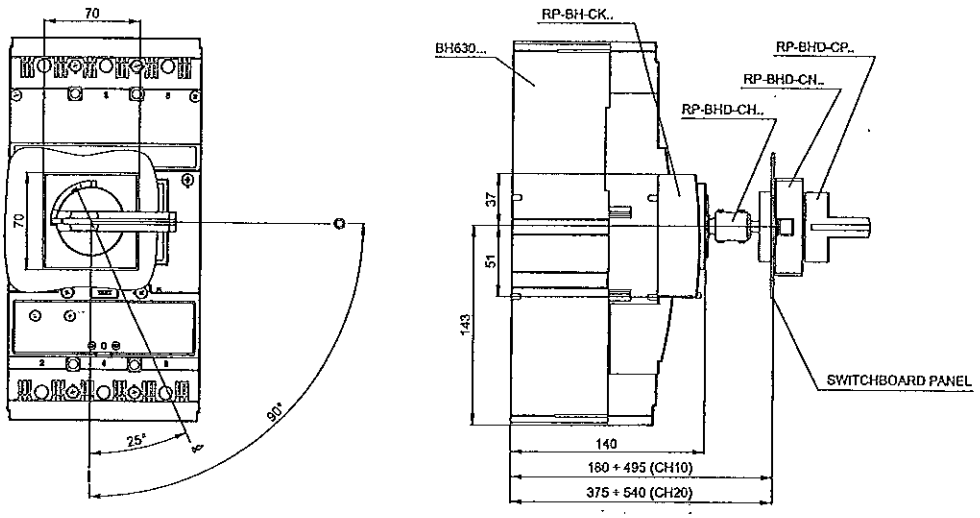
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

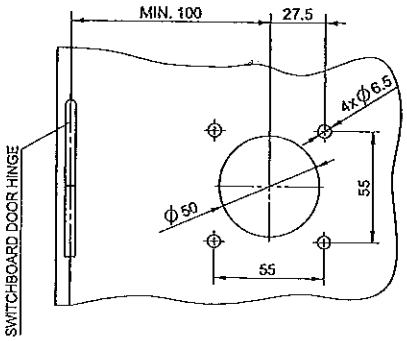
Fixed design, hand drive



Fixed design, hand drive - front, with adjustable lever



Switchboard door modification

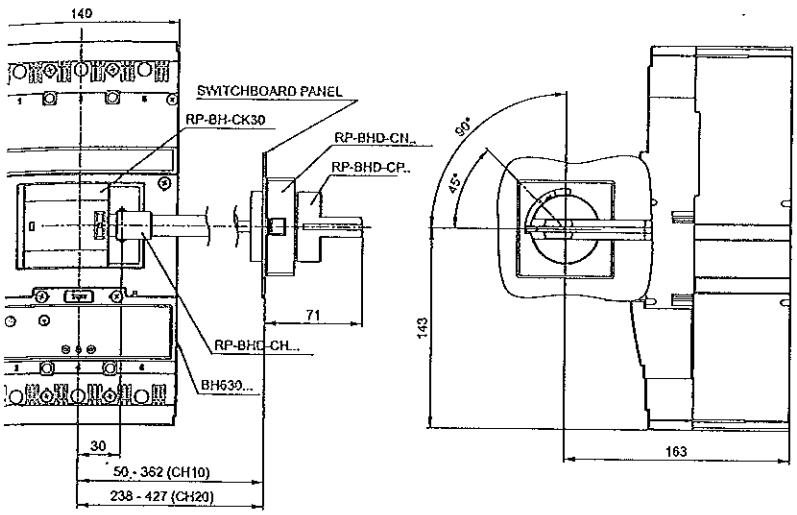


RCUIT BREAKERS, SWITCH-DISCONNECTORS

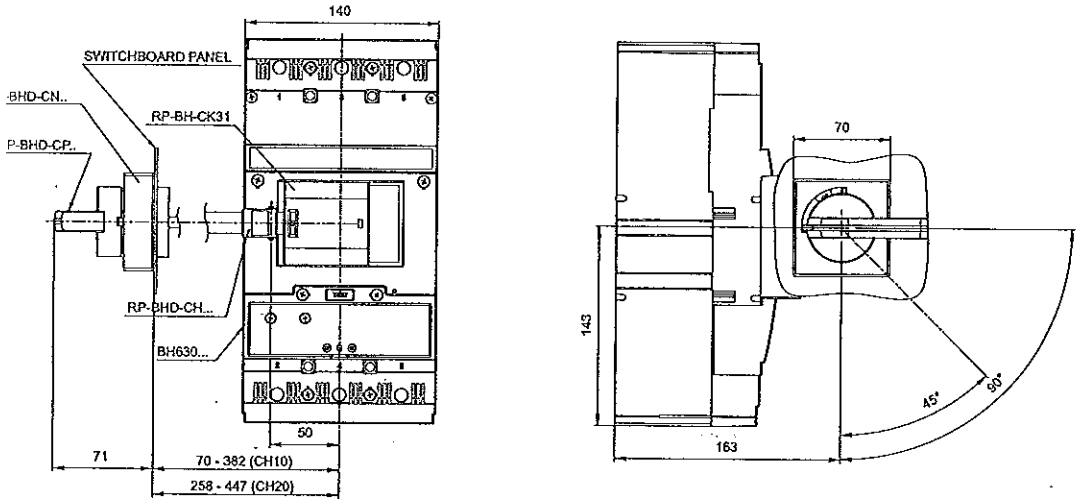
3P

mensions

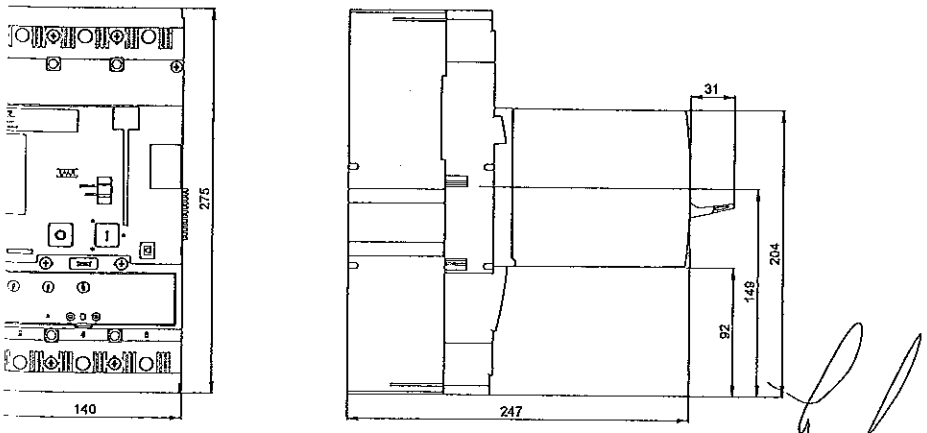
ed design, hand drive - control on right side, with adjustable lever



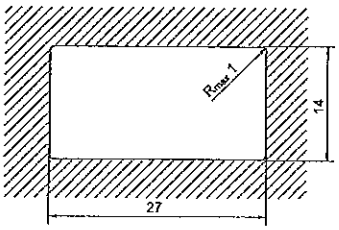
ed design, hand drive - control on left side, with adjustable lever



ed design, MP-BH-X... motor drive

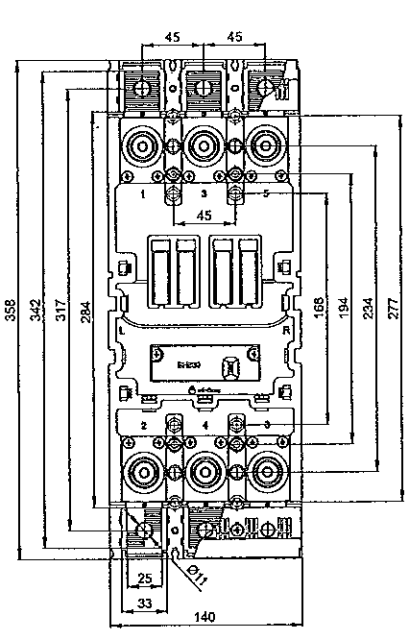


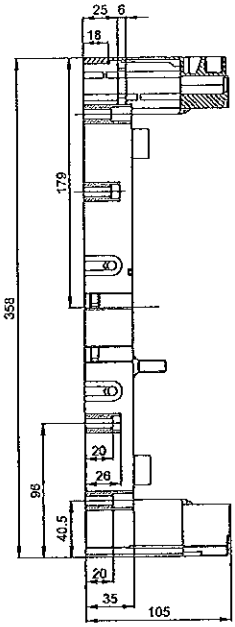
Opening dimensions in switchboard door for external counter of cycles



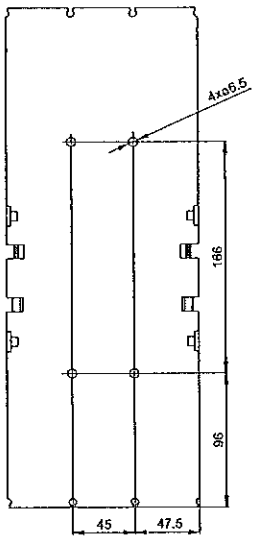
Dimensions

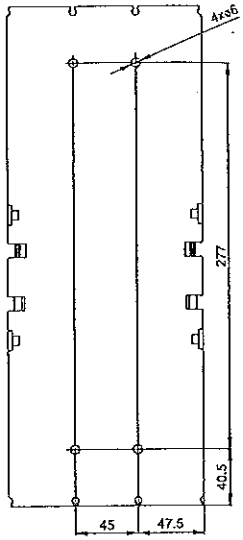
Plug-in device



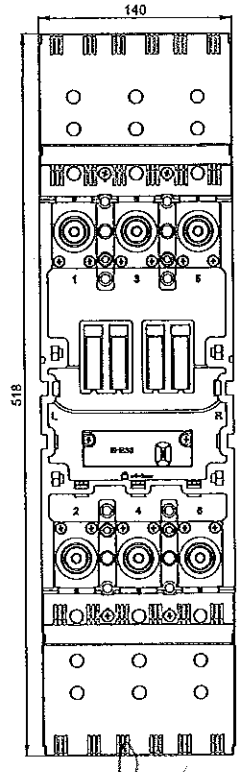


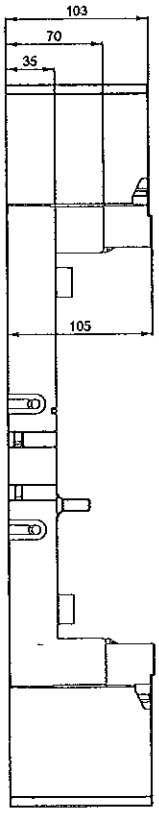
Drilling diagram





Plug-in device, OD-BH-KS03 terminal cover



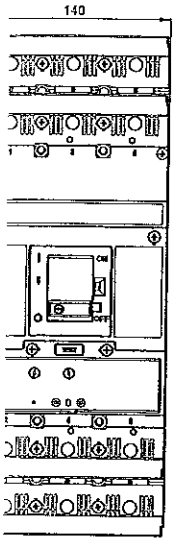


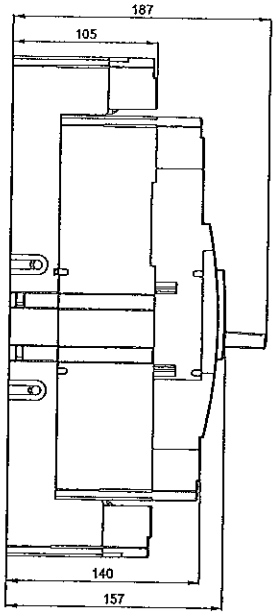
UIT BREAKERS, SWITCH-DISCONNECTORS

3P

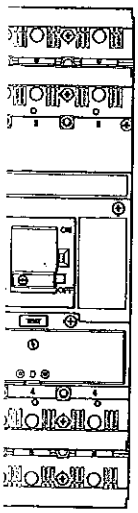
sions

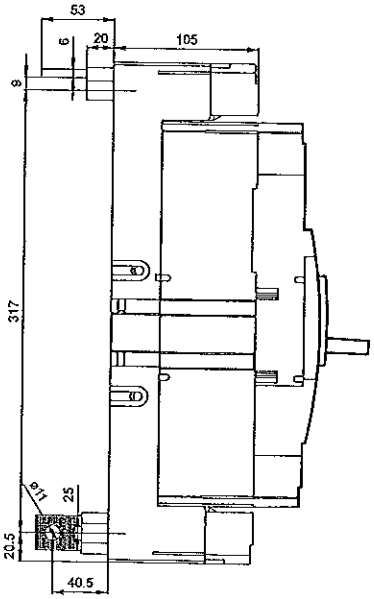
design



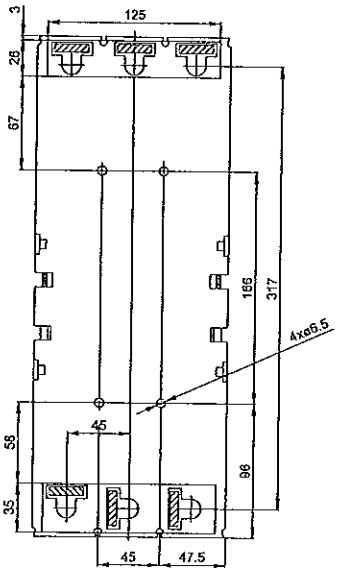


lesign, rear connection (CS-BH-A021 connecting set)





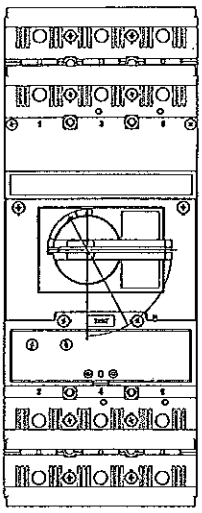
Drilling diagram

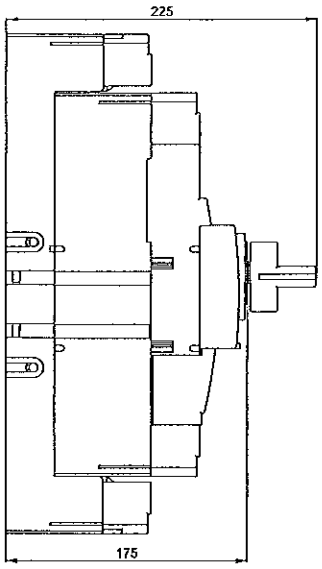


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

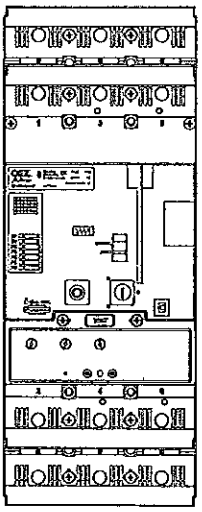
Dimensions

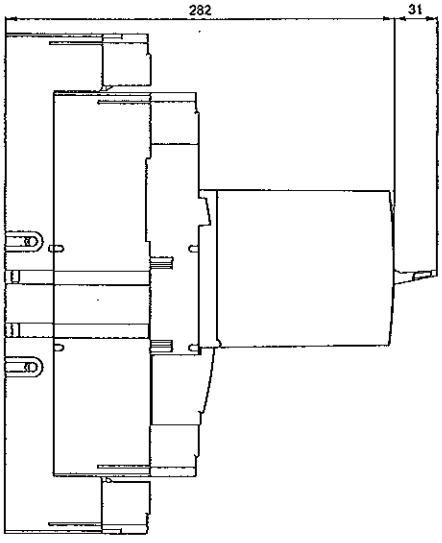
Plug-in design, hand drive





Plug-in design, motor drive





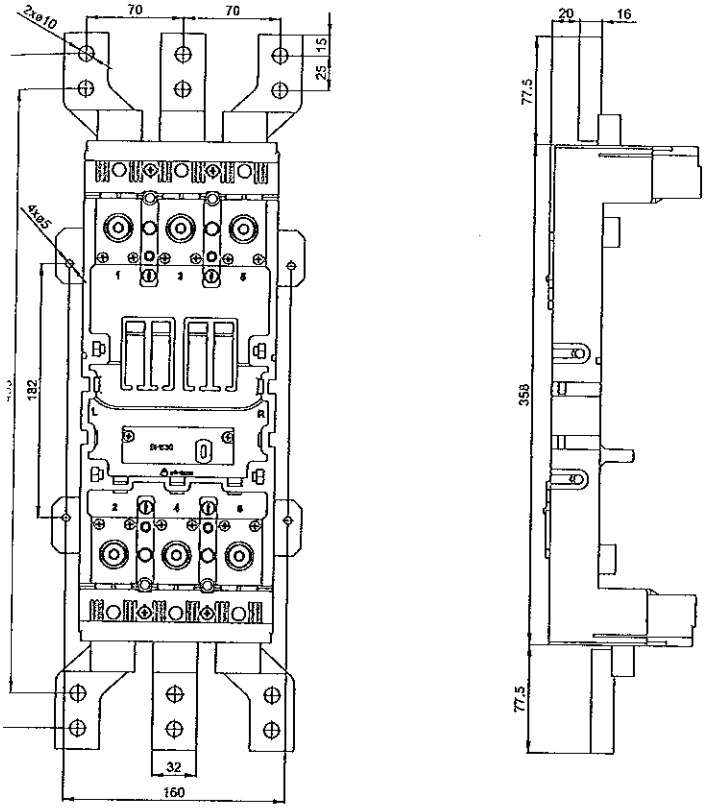
RCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

ıensions

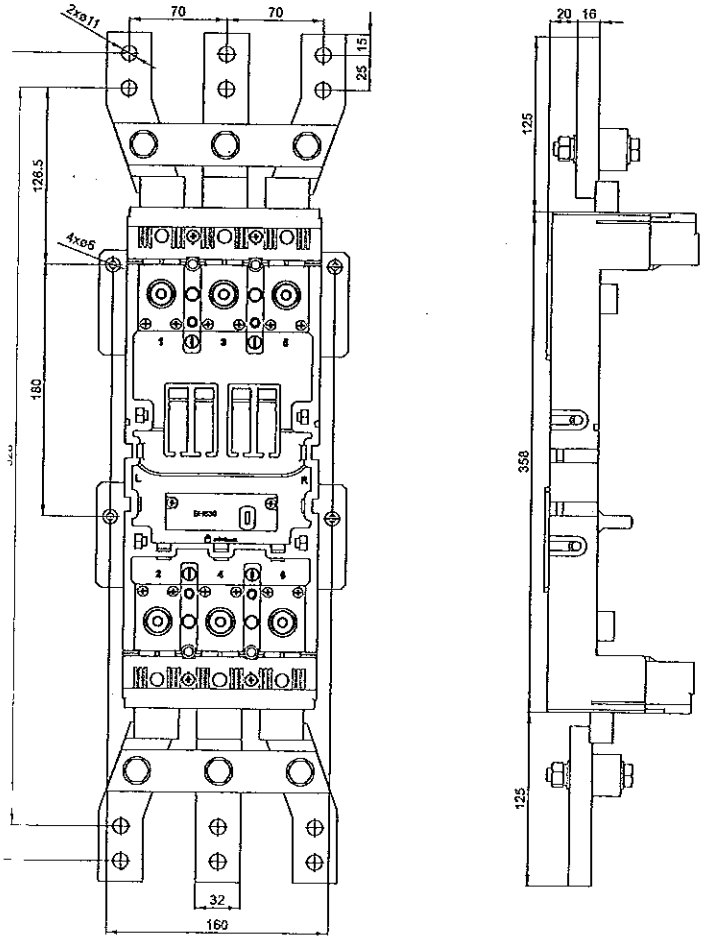
ı-in device (CS-BH-JX75 connecting set, OD-BHD-MS75 connecting set)

RETROFIT



-in device (CS-BH-JT75 connecting set, OD-BH-MT75 mounting set)

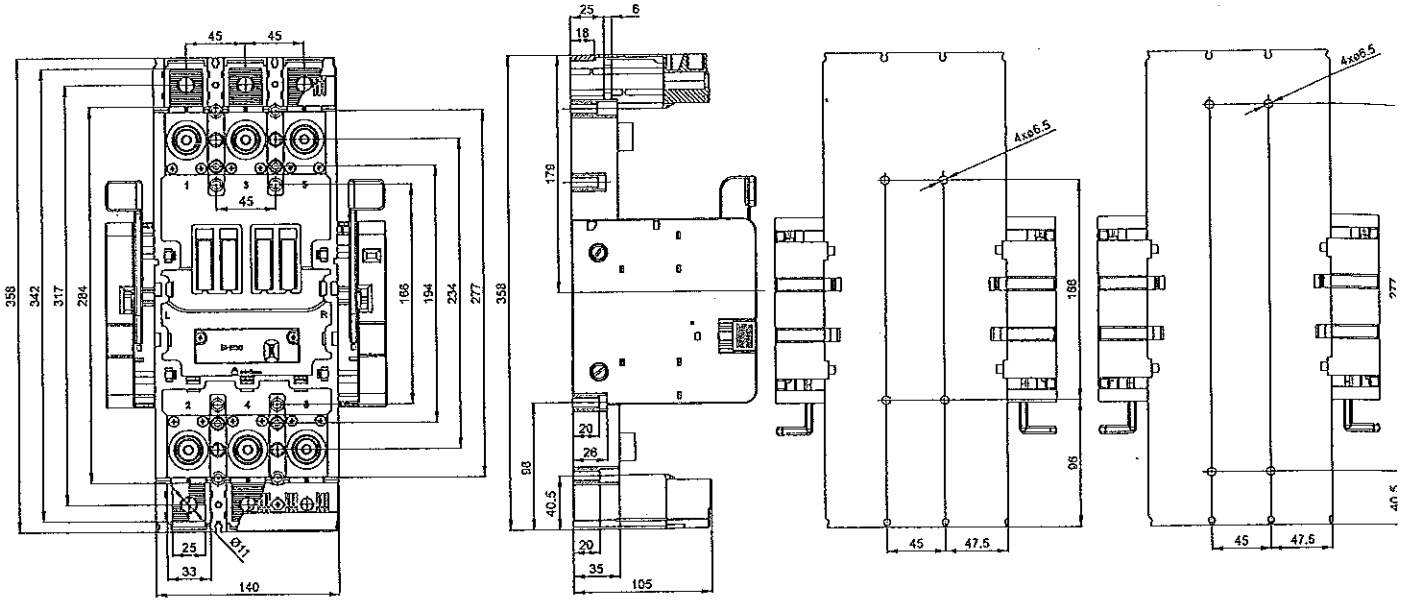
RETROFIT



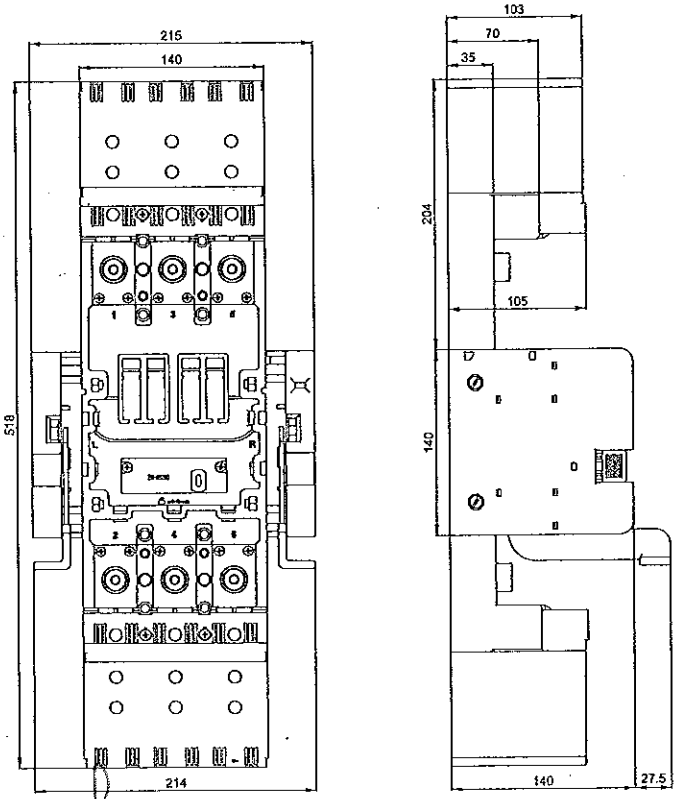
Dimensions

Withdrawable device

Drilling diagram



Withdrawable device, OD-BH-KS03 terminal cover

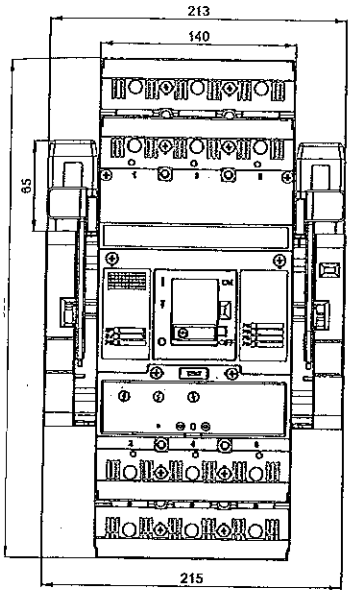


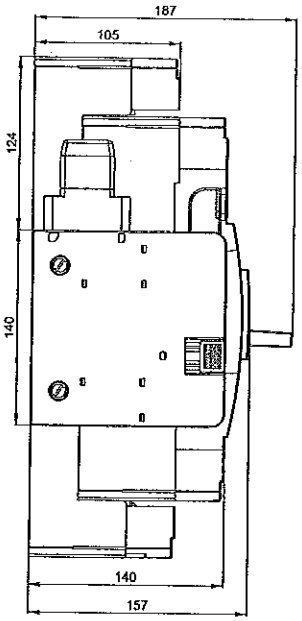
IRCUIT BREAKERS, SWITCH-DISCONNECTORS 3P

imensions

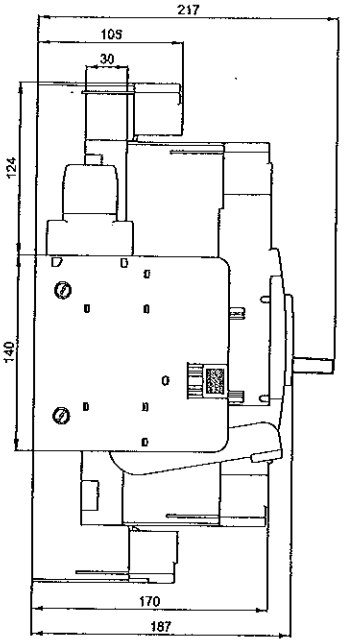
ithdrawable design

Working position



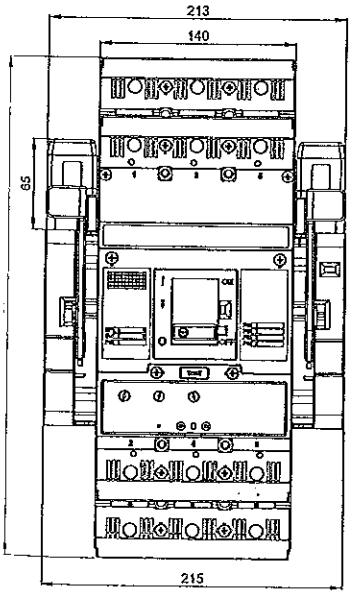


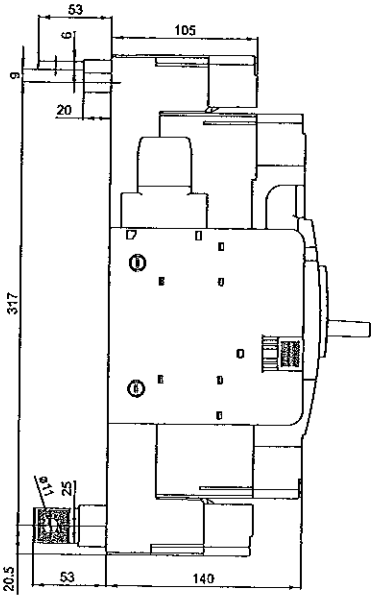
Inspection position



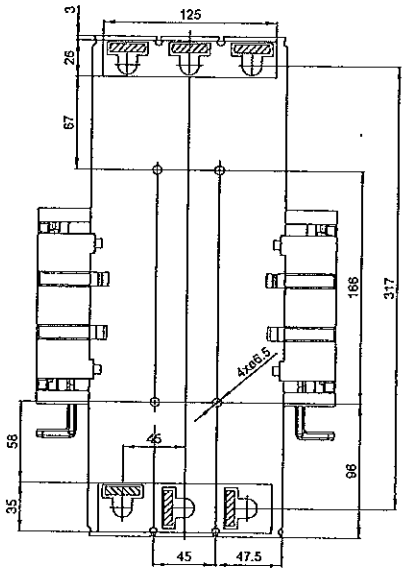
ithdrawable design, rear connection (CS-BH-A021 connecting set)

Working position





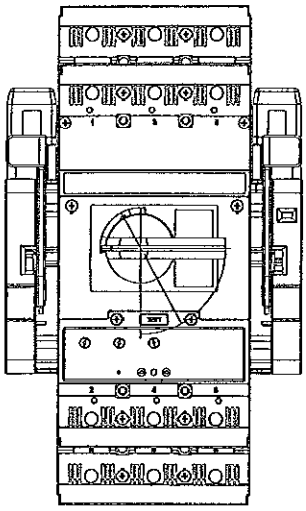
Inspection position



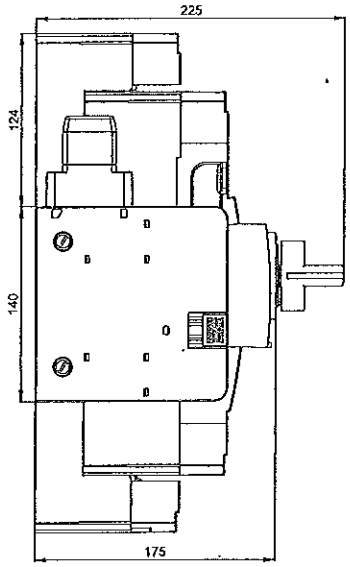
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

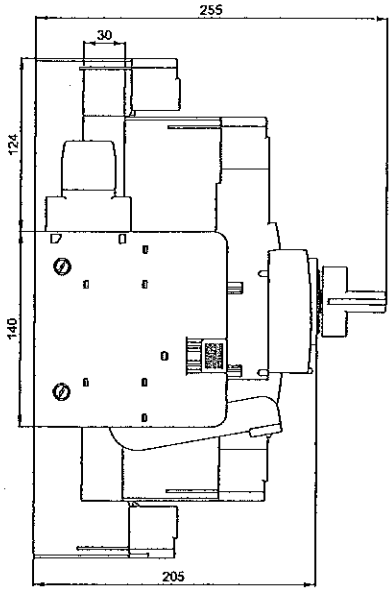
Withdrawable design, hand drive



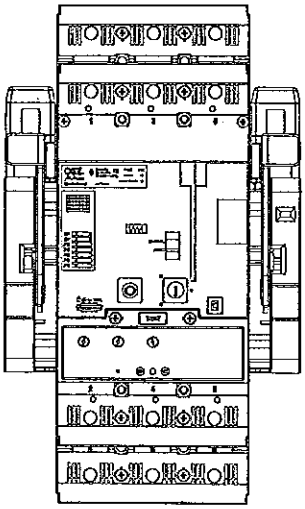
Working position



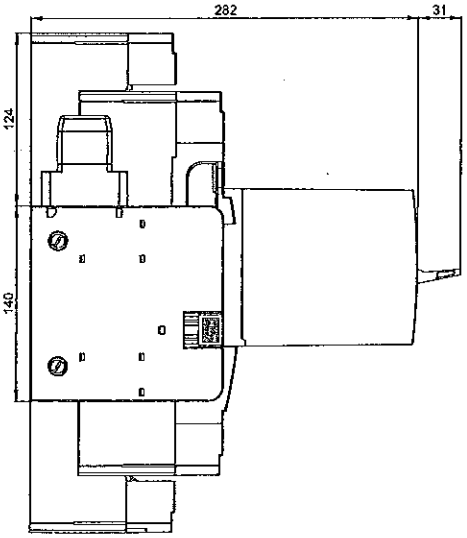
Inspection position



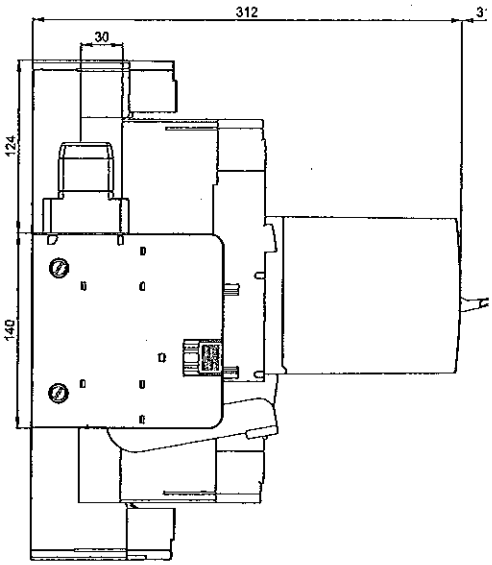
Withdrawable design, motor drive



Working position



Inspection position



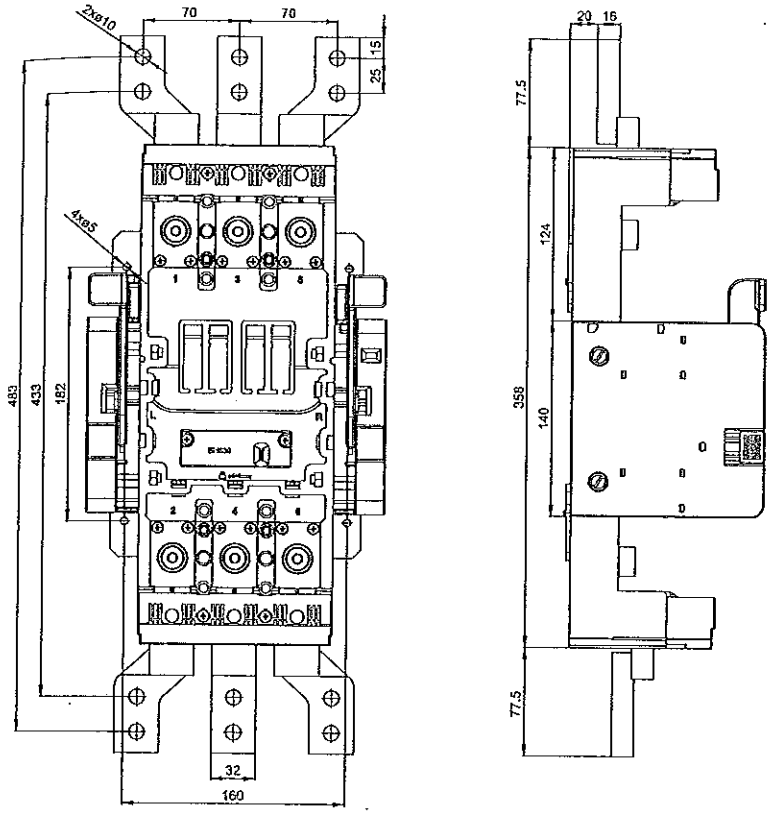
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

Dimensions

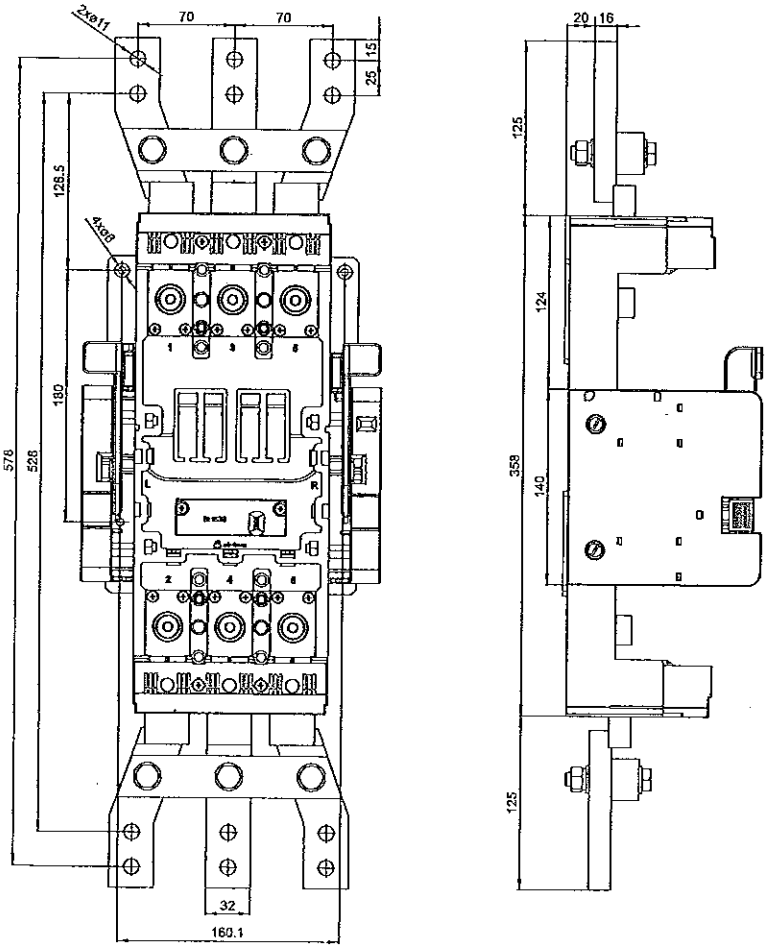
Withdrawable device (CS-BH-JT75 connecting set, OD-BH-MT75 mounting set)

RETROFIT



Withdrawable device (CS-BH-JX75 connecting set, OD-BHD-MS75 connecting set)

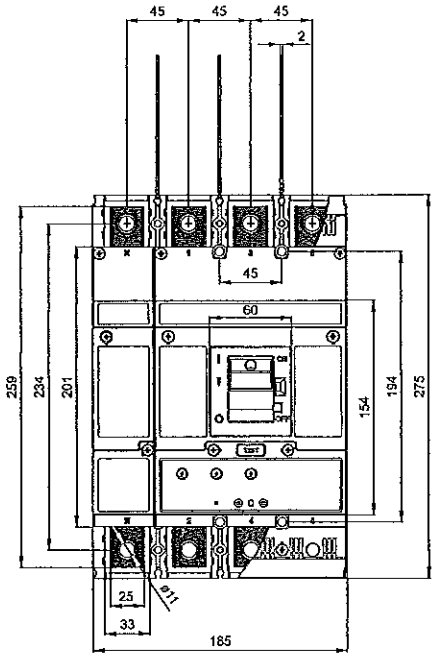
RETROFIT

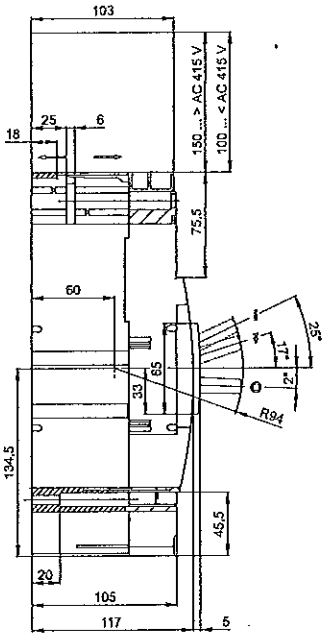


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

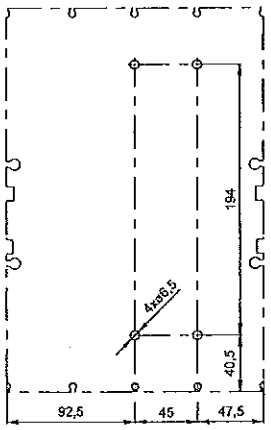
Dimensions

Fixed design, front connection

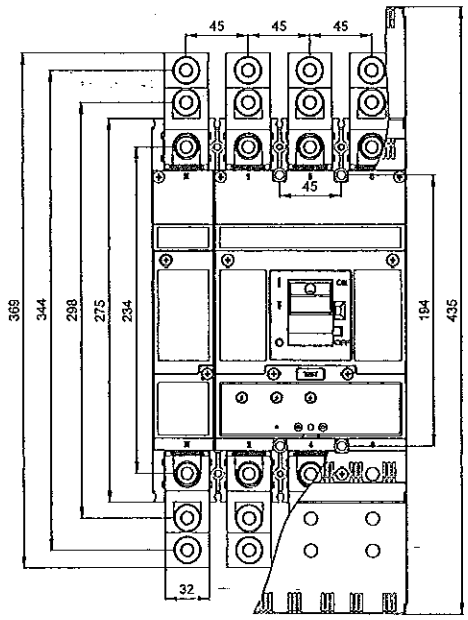


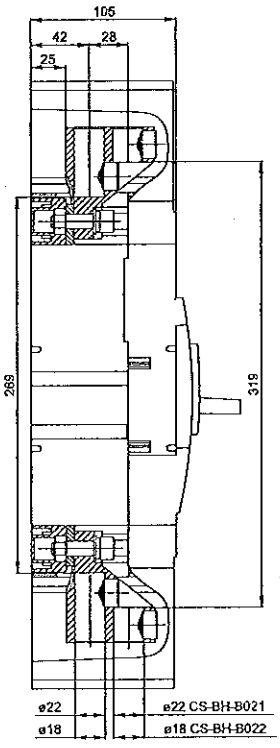


Drilling diagram



Fixed design, front connection (CS-BH-B021 + CS-BH-B421, CS-BH-B022 + CS-BH-B422 connecting sets)

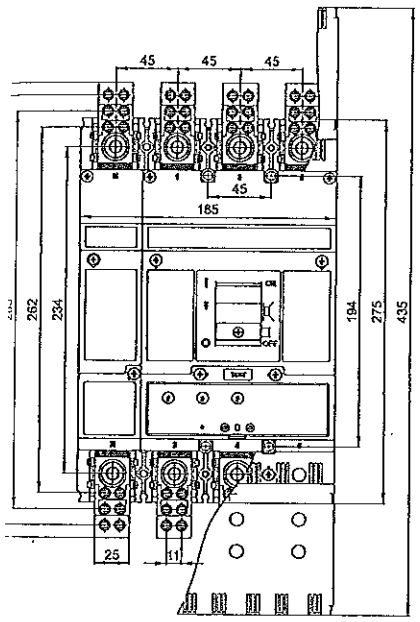


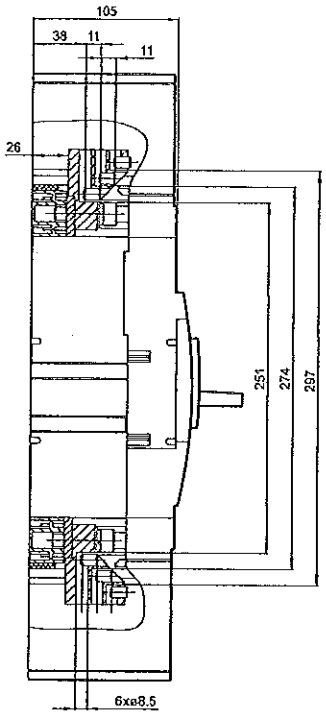


UIT BREAKERS, SWITCH-DISCONNECTORS 4P

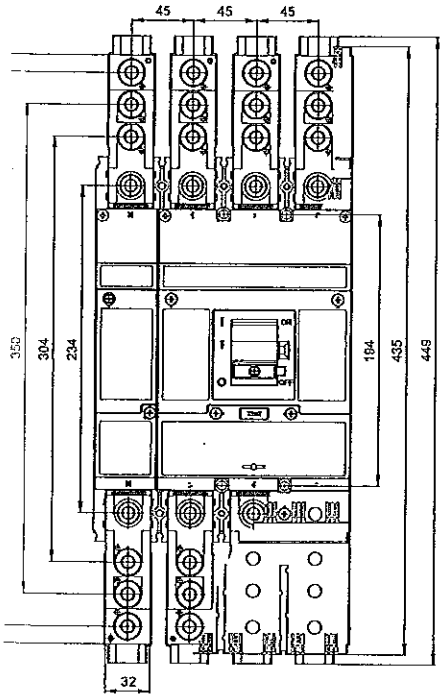
ısions

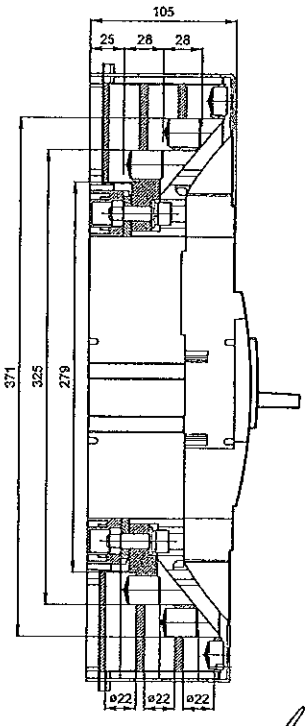
esign, front connection (CS-BH-B014 + CS-BH-B414 connecting sets)





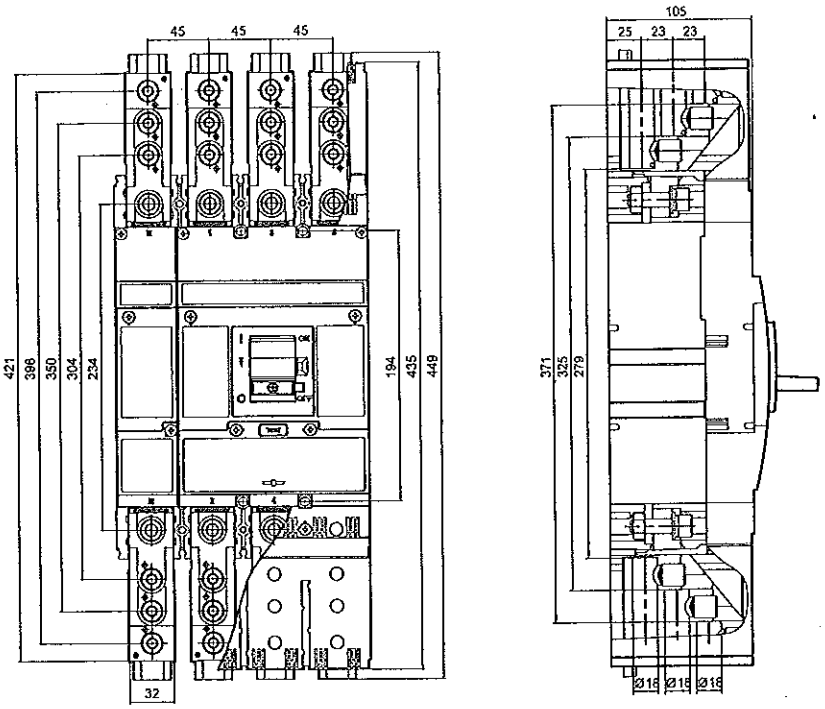
esign, front connection (CS-BH-B031 + CS-BH-B431 connecting sets)



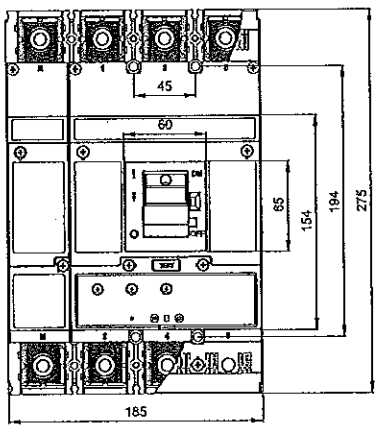


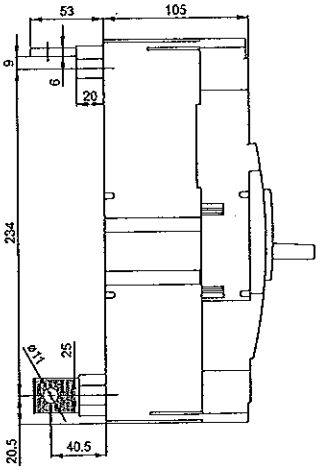
Dimensions

Fixed design, front connection (CS-BH-B032 + CS-BH-B432 connecting sets)

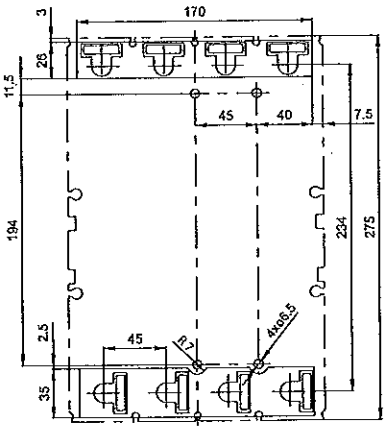


Fixed design, rear connection (CS-BH-A021 + CS-BH-A421 connecting sets)





Drilling diagram

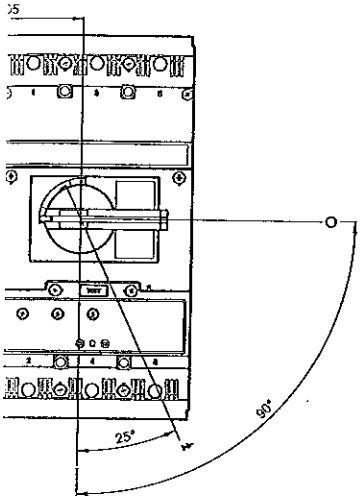


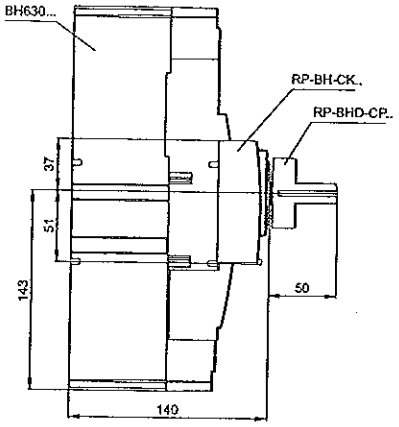
UIT BREAKERS, SWITCH-DISCONNECTORS

4P

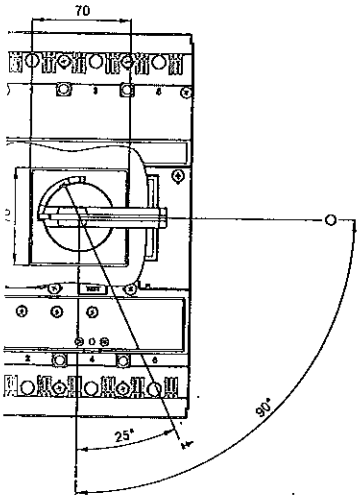
sions

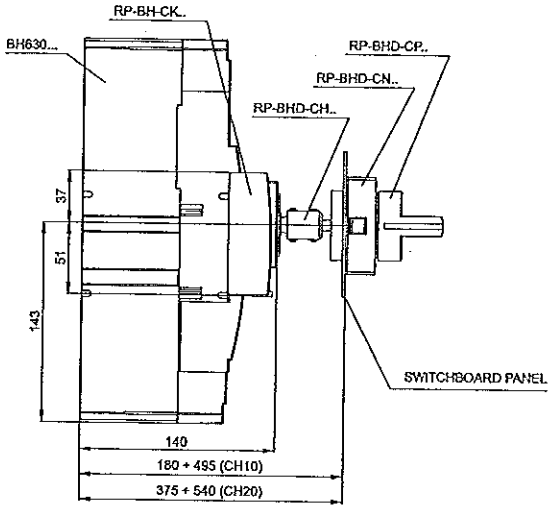
sign, hand drive



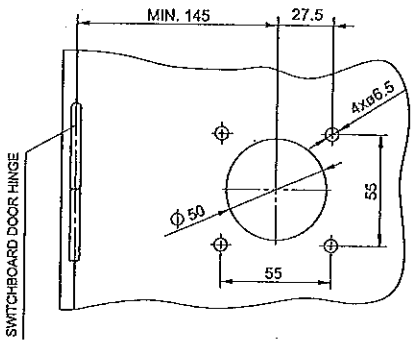


sign, hand drive - front, with adjustable lever

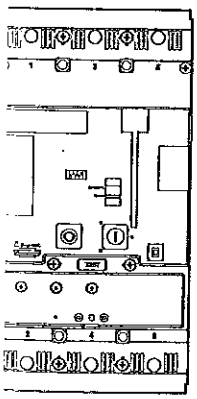


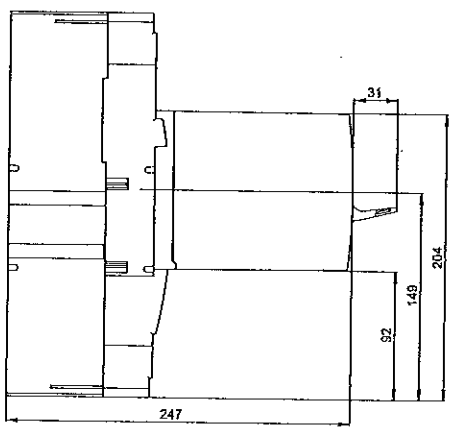


Switchboard door modification

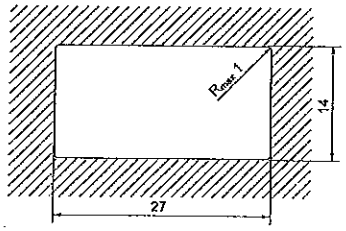


ign, motor drive



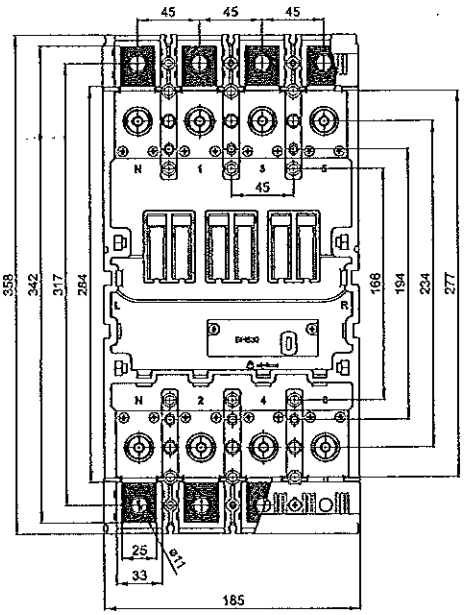


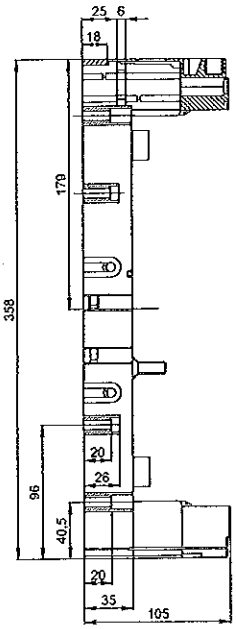
Opening dimensions in switchboard door for external counter of cycles



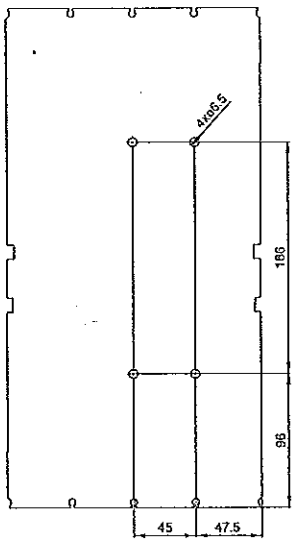
Dimensions

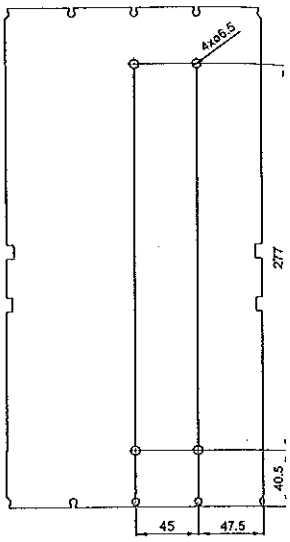
Plug-in device



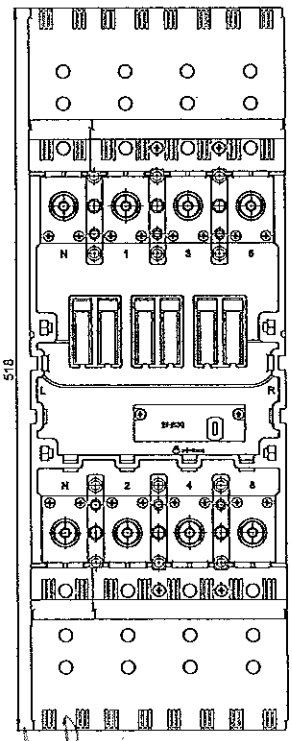


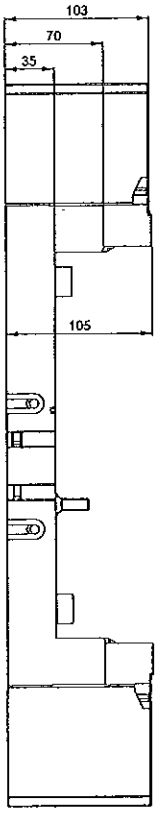
Drilling diagram





Plug-in device, OD-BH-KS43 terminal cover



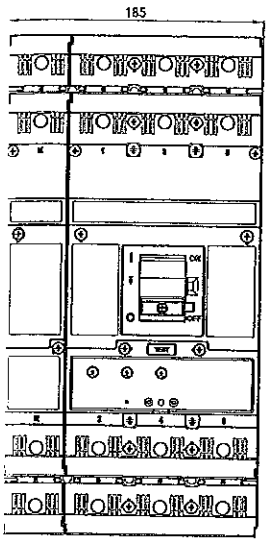


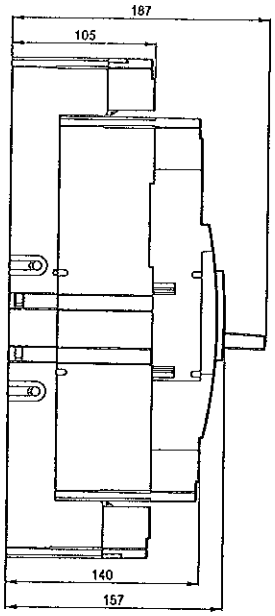
RCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

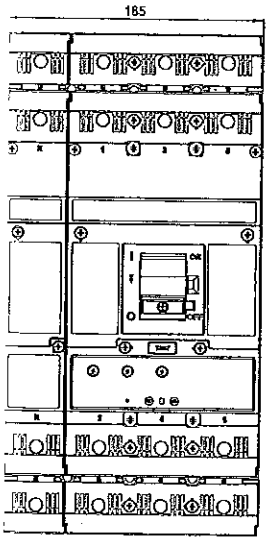
ıensions

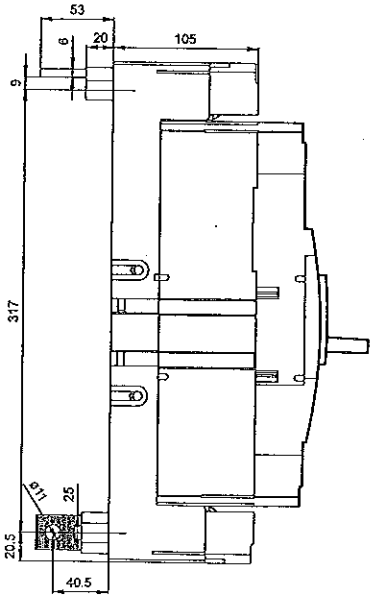
ı-in design



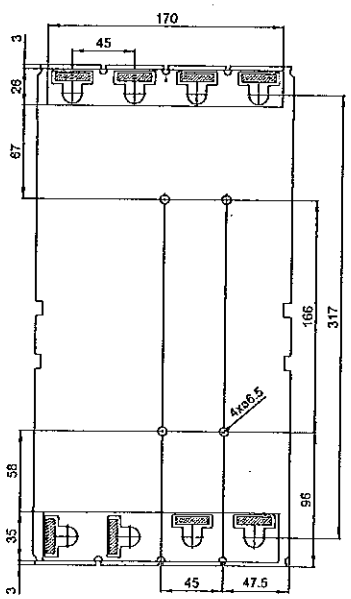


ı-in design, rear connection (CS-BH-A021 + CS-BH-A421 connecting sets)





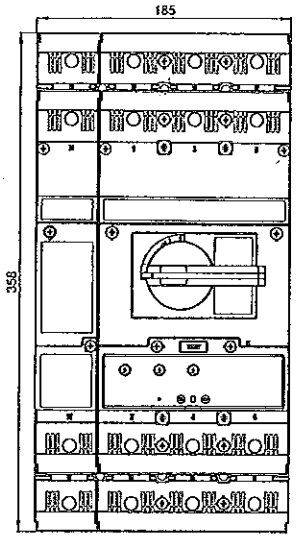
Drilling diagram

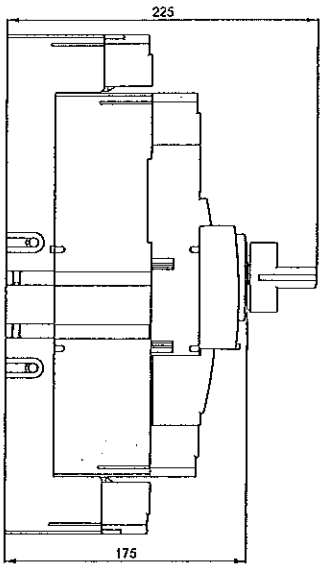


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

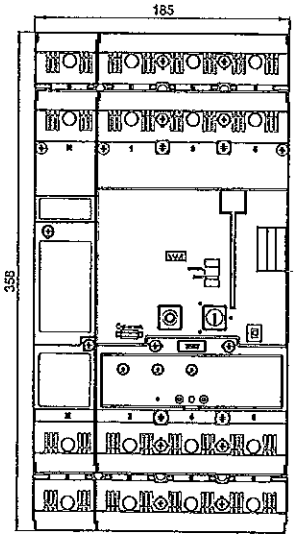
Dimensions

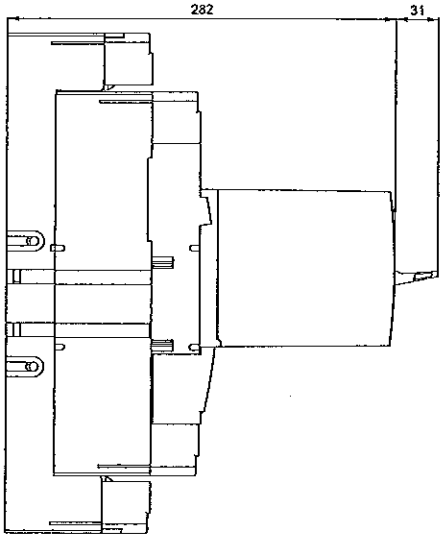
Plug-in design, hand drive





Plug-in design, motor drive





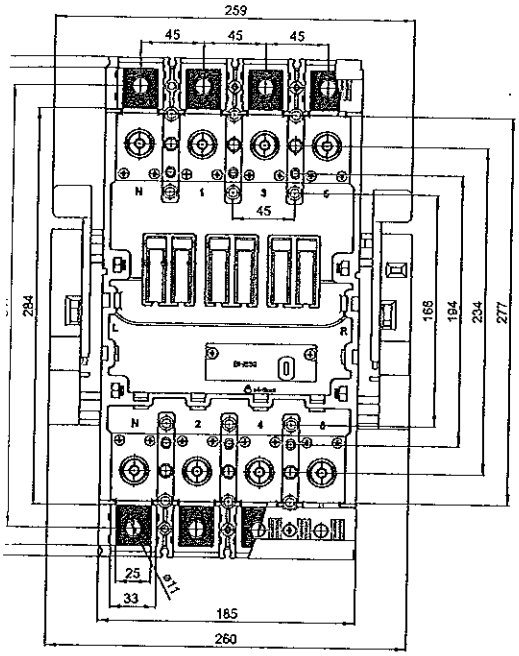
UIT BREAKERS, SWITCH-DISCONNECTORS

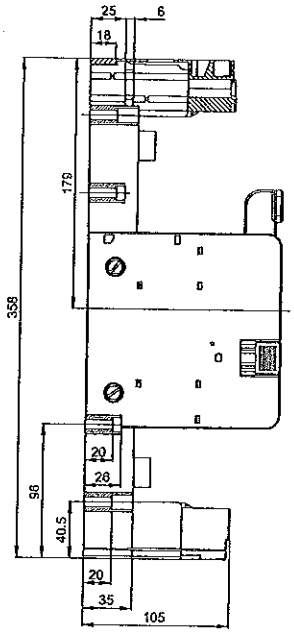
4P

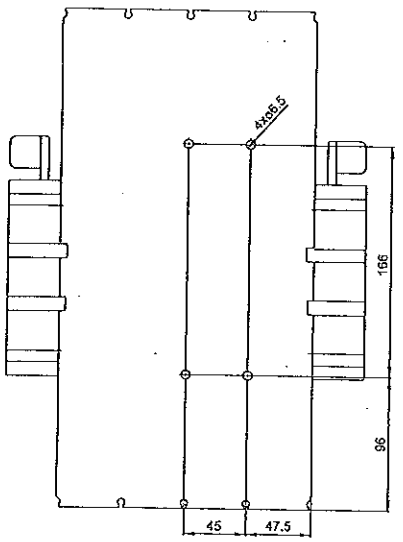
ısions

ıwable device

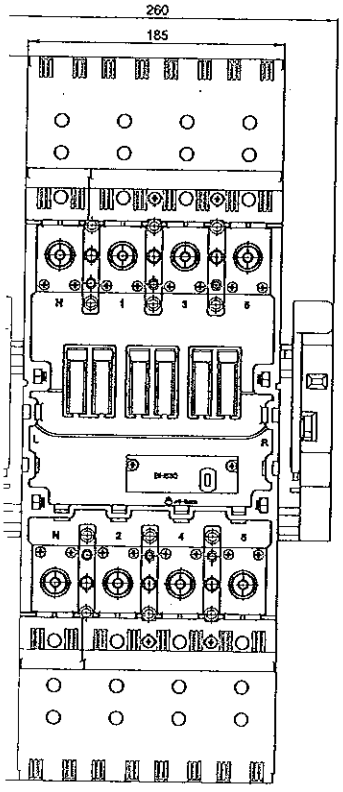
Drilling diagram

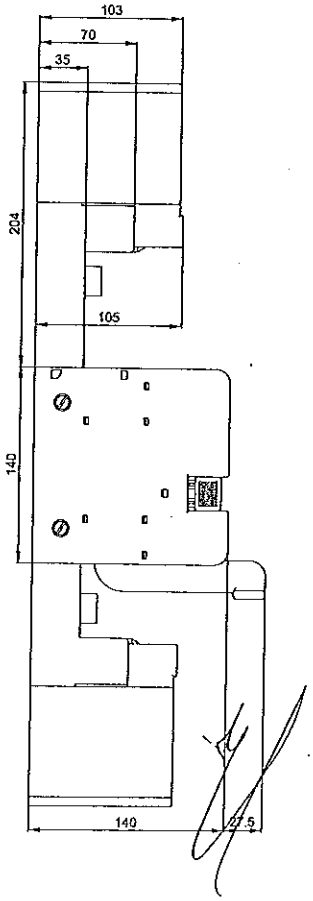






wable device, OD-BH-K543 terminal cover

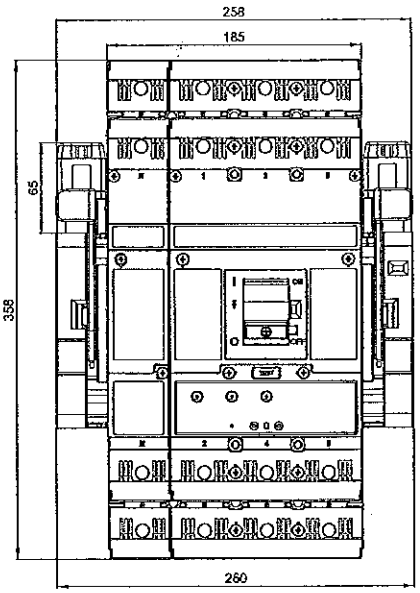




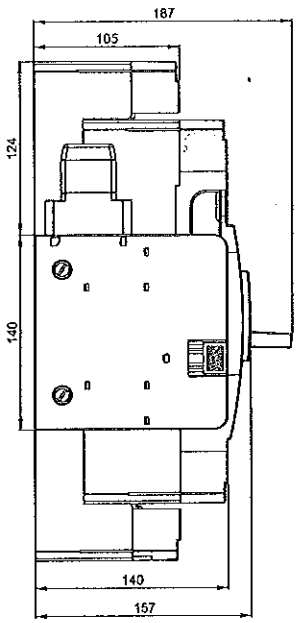
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

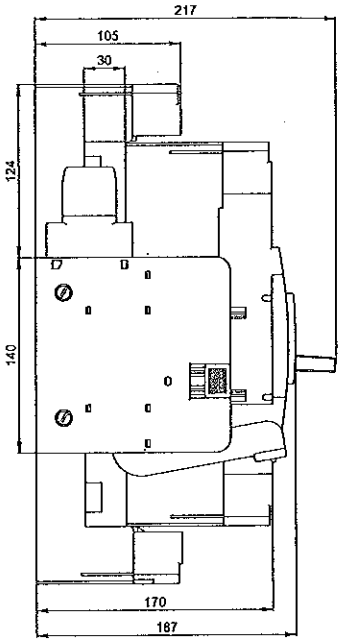
Withdrawable design



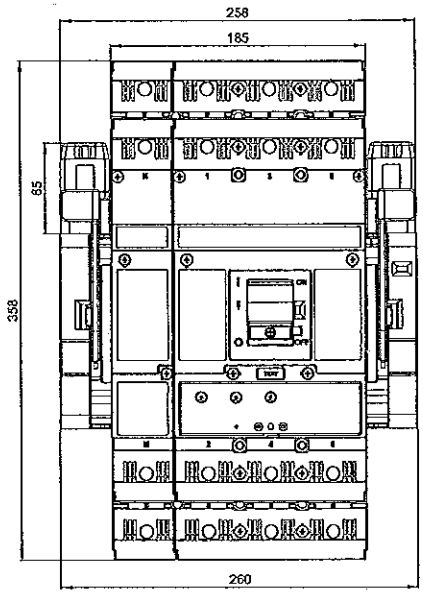
Working position

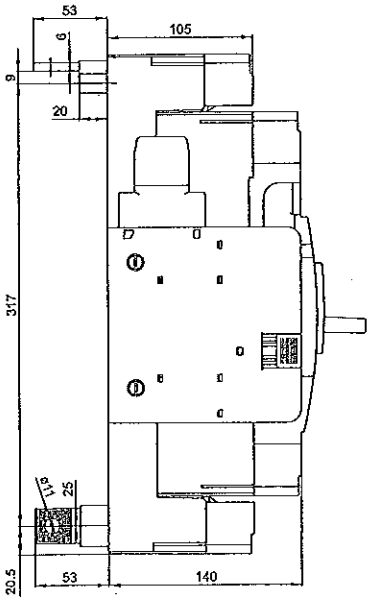


Inspection position

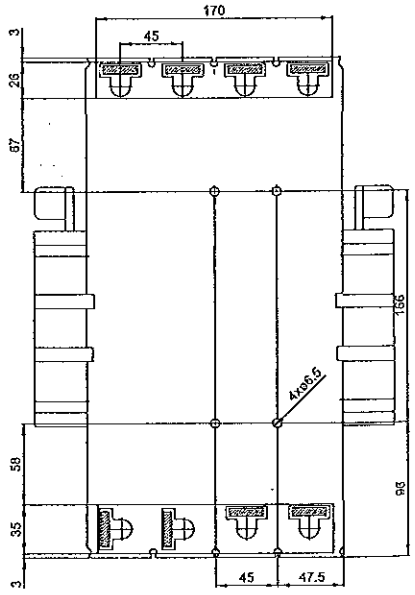


Withdrawable design, rear connection (CS-BH-A021 + CS-BH-A421 connecting sets)





Drilling diagram



CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

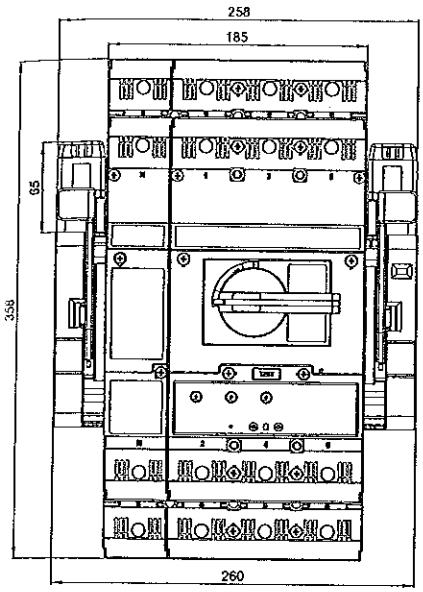
4P

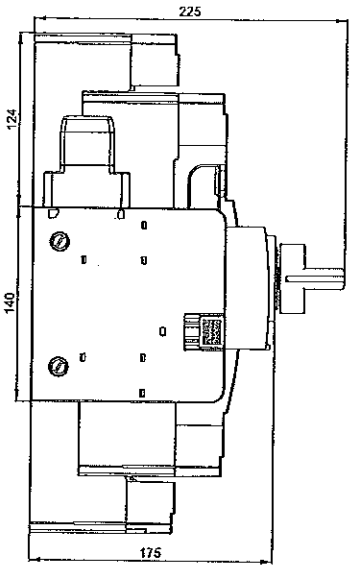
Dimensions

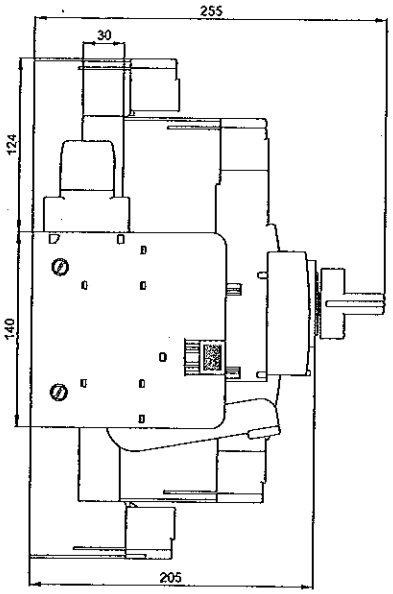
Withdrawable design, hand drive

Working position

Inspection position



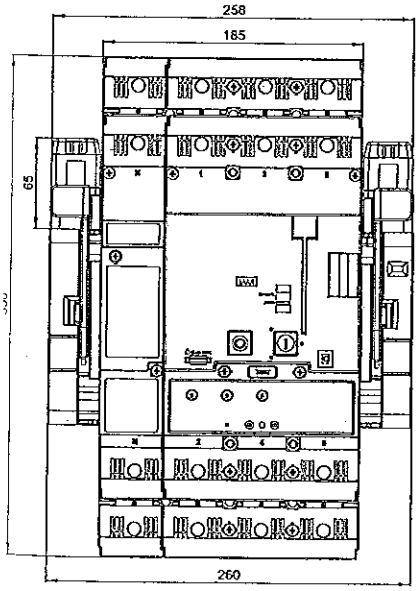


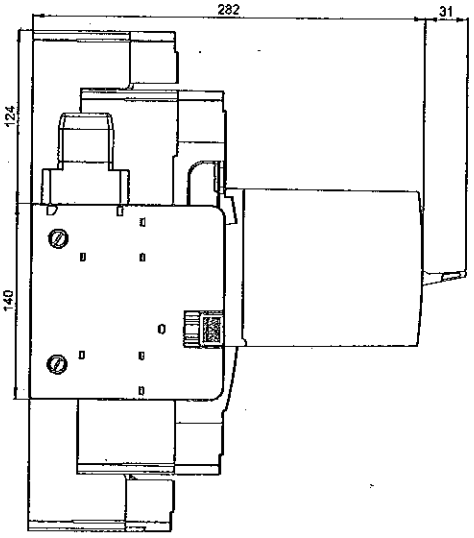


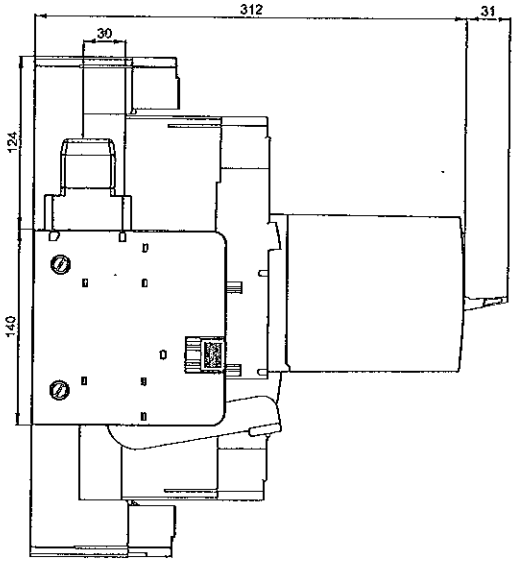
Withdrawable design, motor drive

Working position

Inspection position

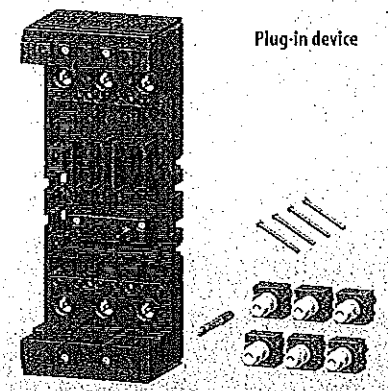






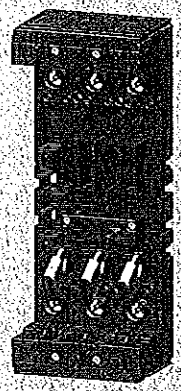
PLUG-IN DEVICE

3P 4P

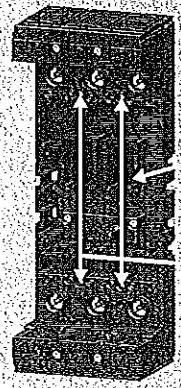


Plug-in device

Circuit breaker in plug-in design



Locking plug-in device against inserting circuit breaker



Position of cavities for switch SO-BHD-0010 in plug-in device

11, 12, 13, 14

Keying set OD-BH-KK01

Description

Plug-in design of the circuit breaker/switch-disconnector is intended for demanding industrial applications where rapid exchange of the circuit breaker along with both visual and conductive disconnection of the circuit are needed.

- plug-in device includes complete accessories for assembling circuit breaker/switch-disconnector in plug-in design from the originally fixed design
- components of the plug-in device are:
  - base of the plug-in device
  - 2 connecting sets - for fitting onto the switching unit
  - interlocking connecting rod (ensures automatic switching off of the circuit breaker for handling – inserting and removal)
  - set of mounting bolts - for affixing circuit breaker to plug-in device (set of mounting bolts is used to fasten the plug-in device into the switchboard, that is included in delivery of switching unit)

Circuit breaker positions

Circuit breaker in plug-in design has two positions:
1. inserted (working position)
2. removed

Power circuit

- connecting set CS-BH-A011 is used for connecting with busbars or cable lugs, that is included in delivery of switching unit
- for connecting in another way, it is necessary to use connecting sets, see page F8
- connection must comply with our recommendations, see page F18

Auxiliary circuits

These are connected using 15-wire connecting cable **OD-BHD-KA01.**

States of switches SO-BHD-0010 in plug-in device according to circuit breaker position

Cavity	11, 12, 13, 14 (19, 20)
Circuit breaker position	
Inserted	0 1
Removed	1 0

note: 0 - contact open, 1 - contact closed
1) - cavities 19 and 20 are only for 4-pole design

Signalling of position SO-BHD-0010

Plug-in device may be fitted with a maximum of four switches (for 4-pole design, max. 6 switches) for signalling the inserted/removed position.

Keying set OD-BH-KK01

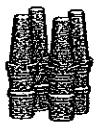
Plug-in device and circuit breaker can be fitted with keying set, which prevents inserting any other circuit breaker into the plug-in device.

Circuit breaker accessories in plug-in design

Circuit breaker in plug-in design has the same accessories as the fixed circuit breaker.

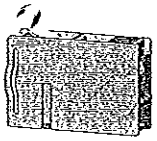
Advantages and enhanced safety for operator:

- unambiguous remote signalling of the circuit breaker position
- option to lock plug-in device with padlocks to prevent inserting of circuit breaker
- visible and conductive disconnection of the power circuit
- easy exchange of circuit breakers in case of failure
- IP20 degree of protection of all termination points
- plug-in device does not need earthing



Keying set OD-BH-KK01

Connecting cable OD-BHD-KA01



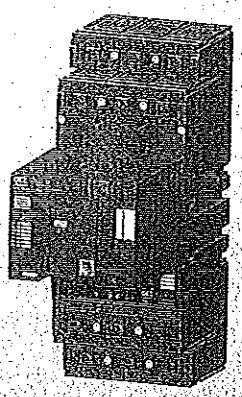
Signalling of position SO-BHD-0010

Specifications SO-BHD-0010

Type		SO-BHD-0010
Rated operating voltage	U_e	400 V a.c. 220 V d.c.
Rated insulation voltage	U_i	500 V a.c.
Rated frequency	f_n	50/60 Hz
Rated operating current	I_e/U_e AC-13	3 A/400 V a.c.
	I_e/U_e DC-15	3.5 A/24 V d.c., 1 A/48 V d.c., 0.3 A/110 V d.c., 0.15 A/220 V d.c.
Thermal current	I_{th}	6 A
Arrangement of contacts		001
Connection cross-section	S	0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)		IP20

For wiring diagram of circuit breaker in plug-in device with accessories see page F16.

PLUG-IN DEVICE



Circuit breaker in plug-in design with motor drive

Recommended circuit breaker manipulation

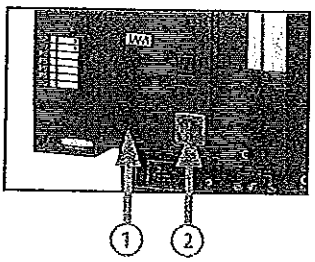
During the manipulation with circuit breaker in plug-in design with motor drive, the circuit breaker may reach the state, in which the first attempt at switching on by motor drive is unsuccessful. Switching on is executed after repeated make impulse. To avoid this effect, some of the following steps may be done:

1) To keep the process of manipulation with the circuit breaker, see „Recommended circuit breaker manipulation" below
2) To connect OD-BHD-R... control relay into the motor drive circuit according to wiring diagram, see page F71

Recommended process of manipulation

After every manipulation with circuit breaker in plug-in design is necessary to accomplish the operations in following sequence, after repeated insertion into the plug-in device:

1) press the switch off button (red) on the motor drive, see fig.
2) press the switch on button (green) on the motor drive, see fig.



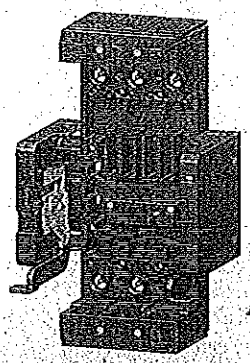
anges in states of switches in cavities of switching unit when removing circuit breaker

te of circuit breaker before removing →			State of switches before removing - inserted position						→ State of switches after removing - removed position					
			Cavity 1		2		3,4,5,(6,7,8,9)[1]		1		2		3,4,5,(6,7,8,9)[1]	
	Circuit breaker lever position	State of the main contacts	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100
itched on		1	1	0	0	1	1	0	1	0	1	0	0	1
itched off manually or by motor drive electrically ided state)		0	1	0	0	1	0	1	1	0	1	0	0	1
itched off by overcurrent release		0	0	1	1	0	0	1	0	1	1	0	0	1
itched off from switched on state: by auxiliary release, y TEST push button or by the switch off button on motor drive		0	1	0	1	0	0	1	1	0	1	0	0	1

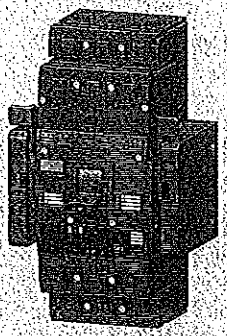
: 0 - contact open, 1 - contact closed
avities 6, 7, 8, 9 are only for 4-pole design

WITHDRAWABLE DEVICE

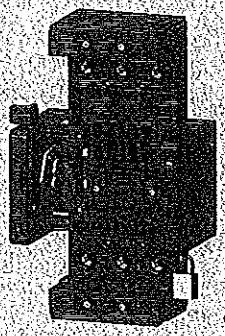
3P 4P



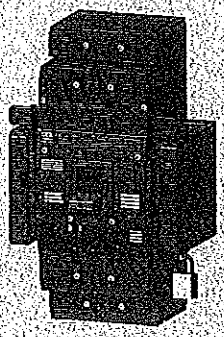
Withdrawable device



Circuit breaker in withdrawable design

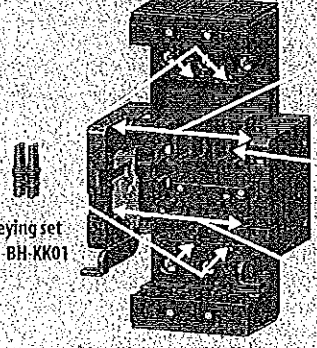


Locking withdrawable device against inserting circuit breaker



Locking withdrawable circuit breaker against tampering

Position of cavities for switch SO-BHD-0010 in withdrawable device



Description

Withdrawable design of the circuit breaker/switch-disconnector is intended for demanding industrial applications where rapid exchange of the circuit breaker, frequent checking and both visual and conductive disconnection of the circuit are needed.

- withdrawable device includes complete accessories for assembling circuit breaker/switch-disconnector in withdrawable design from the originally fixed design
- components of the withdrawable device are:
  - base of the withdrawable device
  - 2 movable side plates
  - 2 connecting sets - for fitting onto the switching unit
  - interlocking connecting rod (ensures automatic switching off of the circuit breaker for handling – inserting and withdrawing)
  - set of mounting bolts is used to fasten the withdrawable device into the switchboard, that is included in delivery of switching unit

Circuit breaker positions

Circuit breaker in withdrawable design has three positions:
1. inserted (working position)
2. withdrawn (inspection position)
3. removed

Keying set OD-BH-KK01

Withdrawable device and circuit breaker can be fitted with keying set, which prevents inserting any other circuit breaker into the withdrawable device.

States of switches SO-BHD-0010 in withdrawable device according to circuit breaker and arrestment positions

Cavity	11, 12, 13, 14 (19, 20)[1]				15, 17		16, 18	
Circuit breaker and arrestment position	19		19		19			
	20	04	20	04	20	04		
Inserted and not arrested	0	1	1	0	0	1		
Inserted and arrested	0	1	1	0	1	0		
Withdrawn and not arrested	1	0	0	1	0	1		
Withdrawn and arrested	1	0	0	1	1	0		
Removed and not arrested	1	0	1	0	0	1		
Removed and arrested	1	0	1	0	1	0		

note: 0 - contact open, 1 - contact closed
- operating state is always in arrested position
- in arrested position it is possible to lock the withdrawable device (for more information see „Advantages and enhanced safety for operator")

[1] - cavities 19 and 20 are only for 4-pole design

Signalling of position SO-BHD-0010

Withdrawable device can be fitted with the switches for signalling the position of the circuit breaker inserted/withdrawn/removed.

Power circuit

- connecting set CS-BH-A011 is used for connecting with busbars or cable lugs, that is included in delivery of switching unit
- for connecting in another way, it is necessary to use connecting sets, see page F8
- connection must comply with our recommendations, see page F18

Auxiliary circuits

These are connected using 15-wire cable **OD-BHD-KA01.**

Circuit breaker accessories in withdrawable design

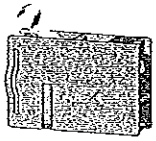
Circuit breaker in withdrawable design has the same accessories as fixed circuit breaker.

Advantages and enhanced safety for operator:

- unambiguous remote and local signalling of the circuit breaker and arrestment positions
- checking of circuit breaker and accessories function in the inspection position
- locking withdrawable device against inserting circuit breaker, locking of circuit breaker in inserted (operating) position, locking of circuit breaker in withdrawn (checking) position - locking by means of padlocks
- visible and conductive disconnection of the power circuit
- easy exchange of circuit breakers in case of failure
- IP20 degree of protection of all termination points
- withdrawable device does not need earthing

Keying set OD-BH-KK01

Connecting cable OD-BHD-KA01



Signalling of position SO-BHD-0010

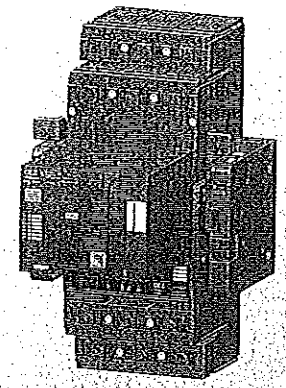
Specifications SO-BHD-0010

Type			SO-BHD-0010
Rated operating voltage	U_e		400 V a.c. 220 V d.c.
Rated insulation voltage	U_i		500 V a.c.
Rated frequency	f_n		50/60 Hz
Rated operating current	I_e/U_e	AC-13	3 A/400 V a.c.
	I_e/U_e	DC-15	3.5 A/24 V d.c.; 1 A/48 V d.c.; 0.3 A/110 V d.c.; 0.15 A/220 V d.c.
Thermal current	I_{th}		6 A
Arrangement of contacts			001
Connection cross-section	S		0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)			IP20

For wiring diagram of circuit breaker in withdrawable device with accessories see page F16.

ITHDRAWABLE DEVICE

3P 4P



ircuit breaker in withdrawable design with motor drive

Recommended circuit breaker manipulation

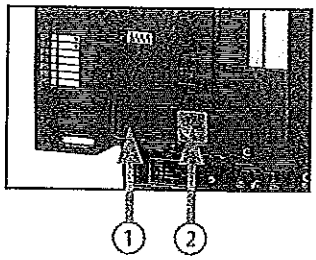
During the manipulation with circuit breaker in withdrawable design with motor drive, the circuit breaker may reach the state, in which the first attempt at switching on by motor drive is unsuccessful. Switching on is executed after repeated make impulse. To avoid this effect, some of the following steps may be done:

1) To keep the process of manipulation with the circuit breaker, see „Recommended circuit breaker manipulation" below
2) To connect OD-BHD-R... control relay into the motor drive circuit according to wiring diagram, see page F71

Recommended process of manipulation

After every manipulation with circuit breaker in withdrawable design is necessary to accomplish the operations in following sequence, after repeated insertion into the plug-in device:

1) press the switch off button (red) on the motor drive, see fig.
2) press the switch on button (green) on the motor drive, see fig.



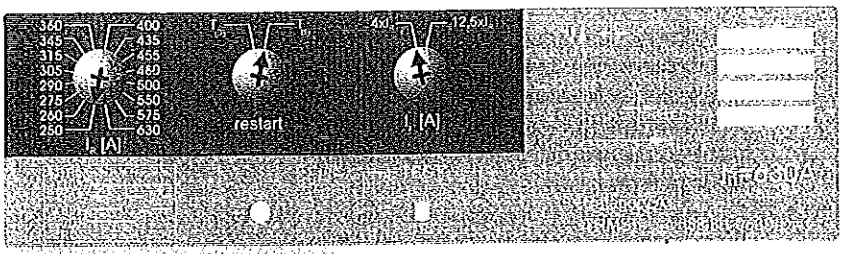
nges in states of switches in cavities of switching unit when inserting and withdrawing circuit breaker

State before insertion/withdrawal			State after insertion/withdrawal											
e of circuit breaker before insertion			State of switches before insertion - withdrawn position →						State of switches after insertion - inserted position					
e of circuit breaker before withdrawal			State of switches before withdrawal - inserted position →						State of switches after withdrawal - withdrawn position					
			Cavity 1		2		3,4,5,(6,7,8,9)[1]		1		2		3,4,5,(6,7,8,9)[1]	
	Circuit breaker lever position	State of the main contacts	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100
ched on		1	1	0	0	1	1	0	1	0	1	0	0	1
ched off manually or by motor drive electrically ded state)		0	1	0	0	1	0	1	1	0	1	0	0	1
ched off by overcurrent release		0	0	1	1	0	0	1	0	1	1	0	0	1
ched off from switched on state: by auxiliary release, TEST push button or by the switch off button on notor drive		0	1	0	1	0	0	1	1	0	1	0	0	1

0 - contact open, 1 - contact closed
vities 6, 7, 8, 9 are only for 4-pole design

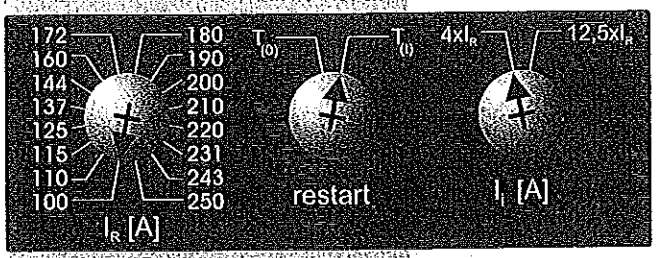
OVERCURRENT RELEASES - DTV3

3P 4P

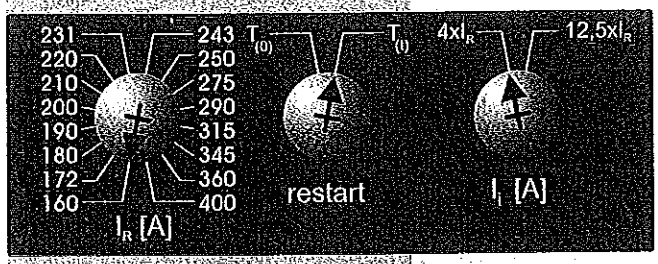


Short-circuit release Reduced current Thermal memory

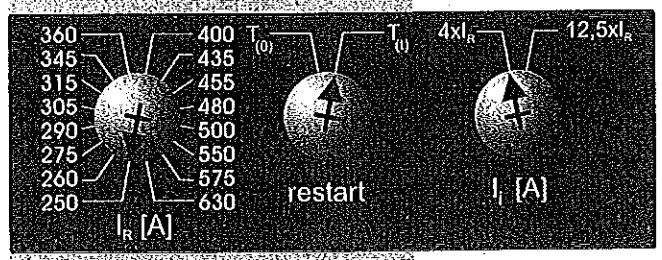
$I_n = 250$ A
SE-BH-0250-DTV3

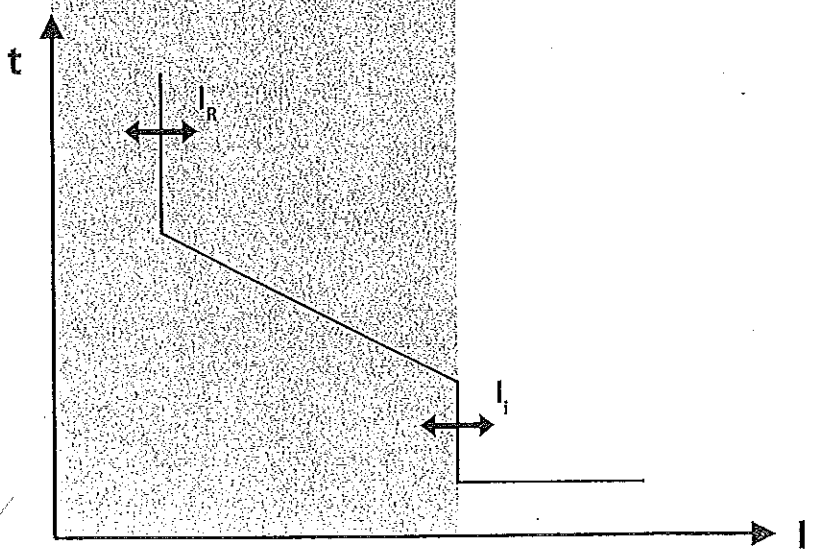


$I_n = 400$ A
SE-BH-0400-DTV3



$I_n = 630$ A
SE-BH-0630-DTV3





Properties

- suitable for protection of lines and distribution transformers
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(i)}$, OFF = $T_{(0)}$)
- setting of short-circuit release I_i in two steps, 4 I_R or 12.5 I_R
- setting of I_R and I_i by means of the rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

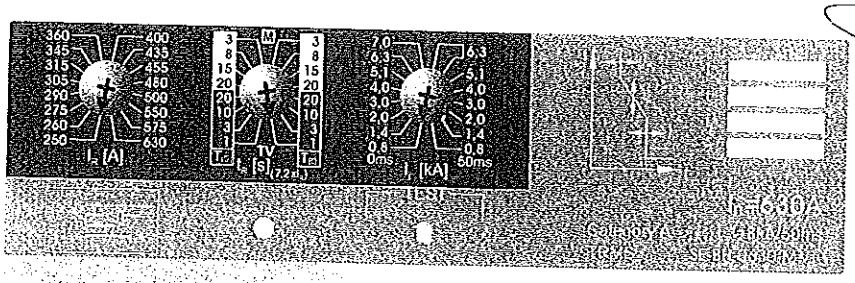
Switching unit		BH630...
Overcurrent release		SE-BH-...
Overcurrent release setting		
Reduced current	I_R	... A
Thermal memory	T	...
Short-circuit release current	I_i	... A (... x I_R)

IMPORTANT

- thermal memory must be switched on in protection of transformers and lines – thus the transformer or the line will be protected against repeated overload

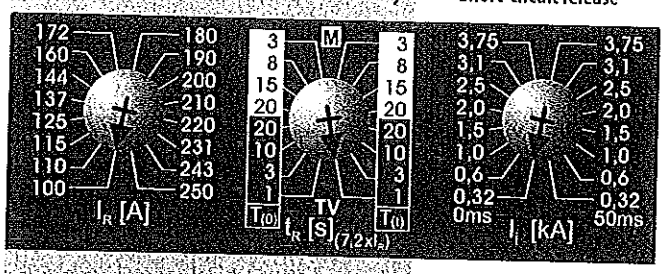
VERCURRENT RELEASES - MTV8, TV mode

3P 4P

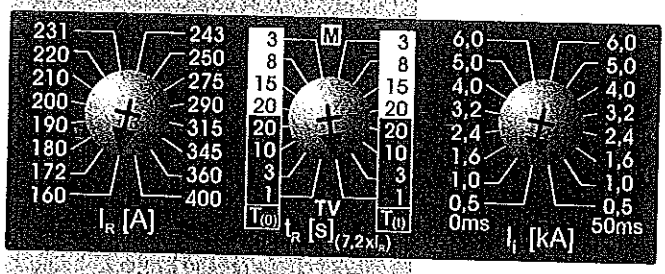


Reduced current | Thermal release delay | Short-circuit release

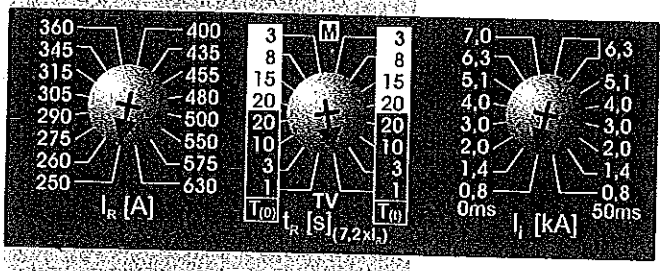
$I_n = 250$ A
-BH-0250-MTV8



$I_n = 400$ A
BH-0400-MTV8



$I_n = 630$ A
3H-0630-MTV8

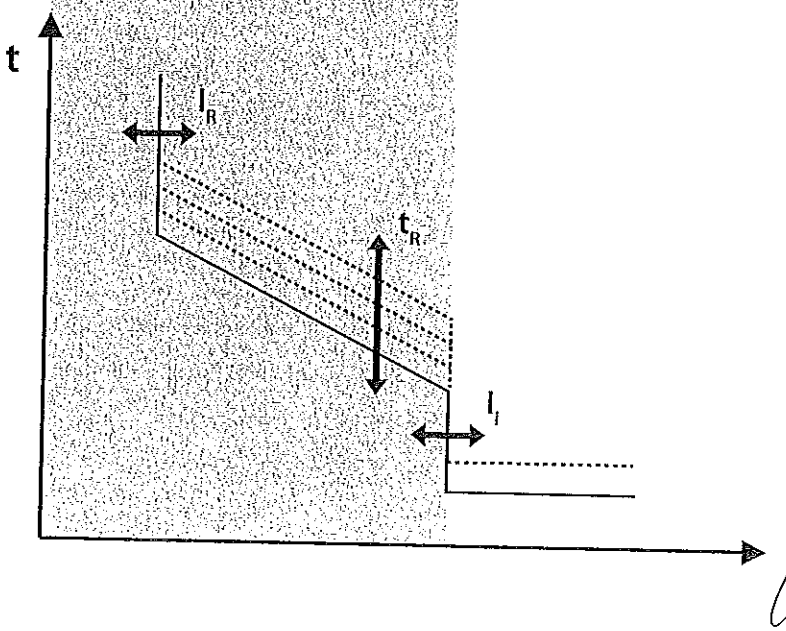


Properties

- TV mode - suitable for protection of lines, distribution transformers and generators
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(s)}$)
- in TV mode the undercurrent release is inactive
- setting of delay of the thermal release t_R 1 s, 3 s, 10 s and 20 s
- setting of the value of short-circuit release I_I in 8 steps and possibility of switching the short-circuit release off with a delay of 50 ms
- setting of I_R, t_R and I_I by means of the rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

Switching unit		BH630...
Overcurrent release		SE-BH-..
Overcurrent release setting		
Reduced current	I_R	....A
Mode		TV
Thermal memory	T	....
Thermal release delay	t_R	....s
Short-circuit release current	I_I	....A
Setting of short-circuit release		....ms

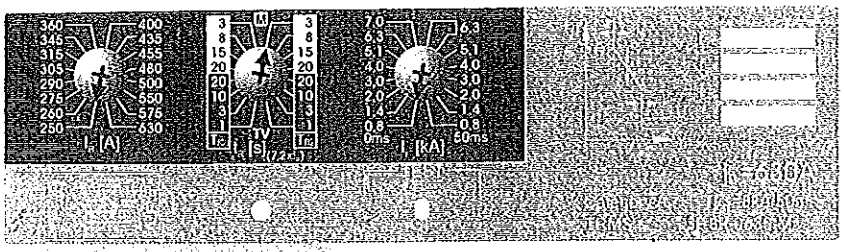


IMPORTANT

- the set value of current of the short-circuit release must correspond to the impedance loop - conditions must be fulfilled for automatic disconnection from power supply in case of failure

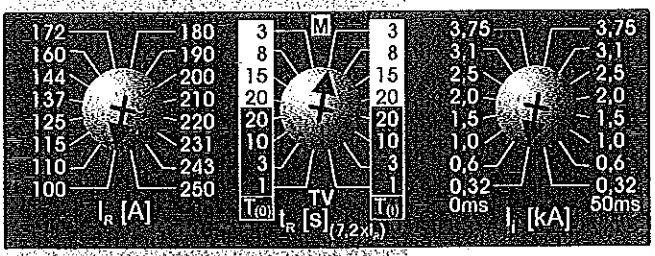
OVERCURRENT RELEASES - MTV8, M mode

3P 4P

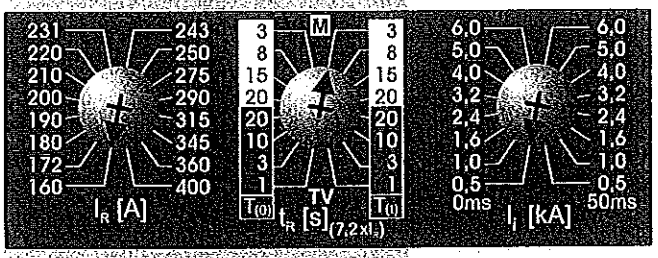


Reduced current | Motor starting | Short-circuit release

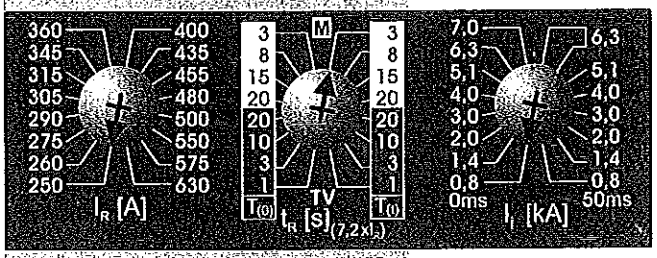
$I_n = 250$ A
SE-BH-0250-MTV8

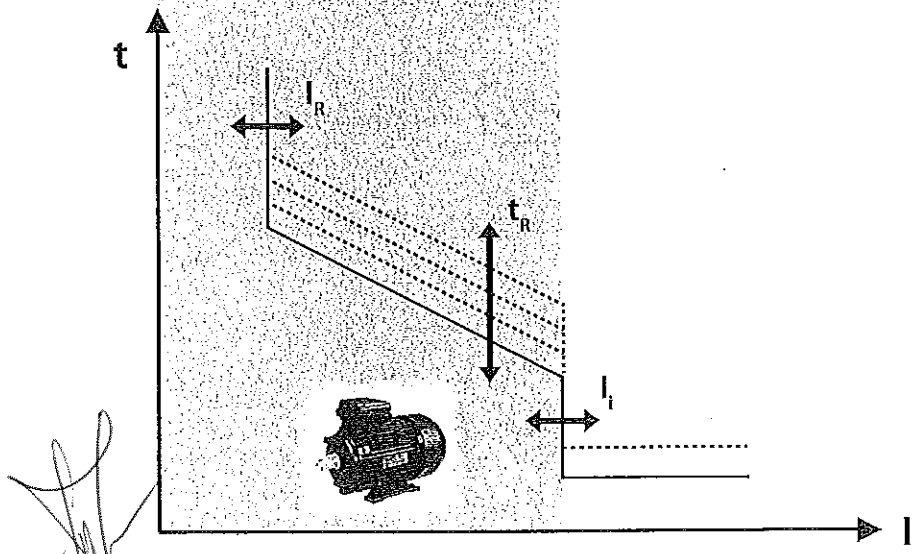


$I_n = 400$ A
SE-BH-0400-MTV8



$I_n = 630$ A
SE-BH-0630-MTV8





Properties

- M mode - suitable for protection of motors
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(0)}$)
- in M mode the undercurrent release is active
- setting of delay of the thermal release t_R 3 s, 8 s, 15 s and 20 s according to the motor starting class
- setting of the value of short-circuit release I_i in 8 steps and possibility of switching the short-circuit release off with a delay of 50 ms
- setting of I_R, t_R and I_i by means of the rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

Switching unit		BH630...
Overcurrent release		SE-BH-...
Overcurrent release setting		
Reduced current	I_R	... A
Mode		M
Thermal memory	T	....
Thermal release delay	t_R	... s
Short-circuit release current	I_i	... A
Setting of short-circuit release		... ms

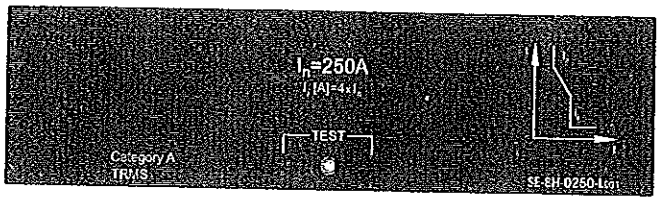
IMPORTANT

- M mode must be selected in protection of motors - the motor will be protected in phase failure
- thermal release delay t_R must correspond to the motor starting class
- in protection of motors it is suitable to set the delay of the short-circuit release at 50 ms

OVERCURRENT RELEASES - L001

3P 4P

$I_n = 250$ A
E-BH-0250-L001

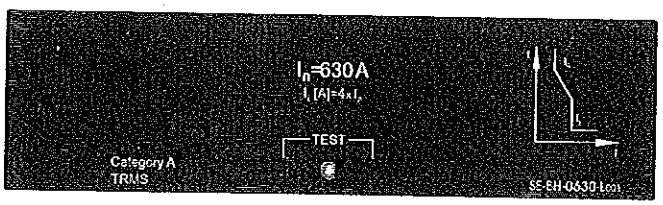


$I_n = 315$ A
E-BH-0315-L001

$I_n = 400$ A
E-BH-0400-L001

$I_n = 500$ A
E-BH-0500-L001

$I_n = 630$ A
E-BH-0630-L001

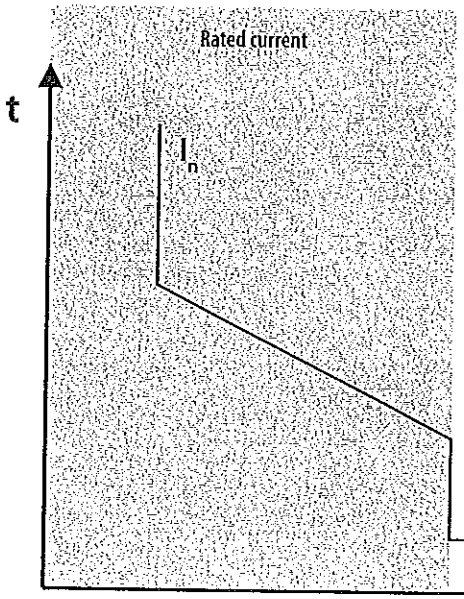


Properties

- suitable for protection of lines with low impulse currents
- protects against both overcurrent and short circuit
- reduced current cannot be set
- thermal release cannot be switched off
- short-circuit release is fixed at 4 I_n

Data for the project

Switching unit	BH630...
Overcurrent release	SE-BH-...
Overcurrent release values	
Rated current	I_n ... A
Short-circuit release current	I_i ... A (4x I_n)

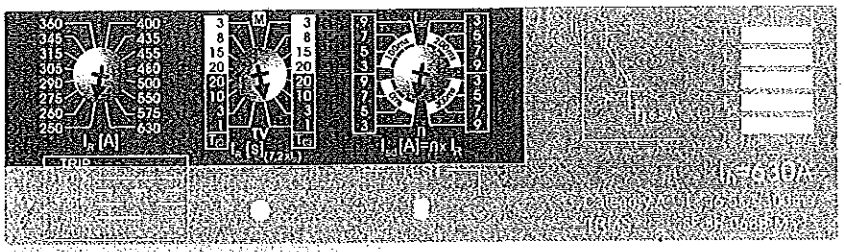


IMPORTANT

- high impulse current must not be in the circuit - undesirable breaking would take place, because the current of the short-circuit release is fixed at 4 I_n

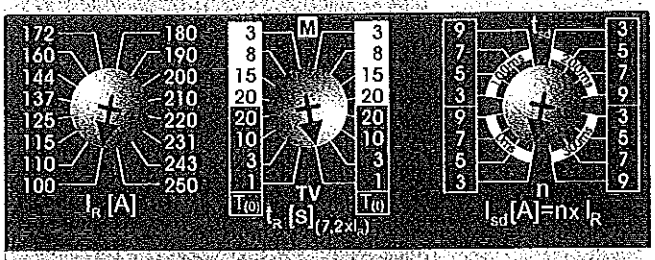
OVERCURRENT RELEASES - MTV9, TV mode

3P 4P

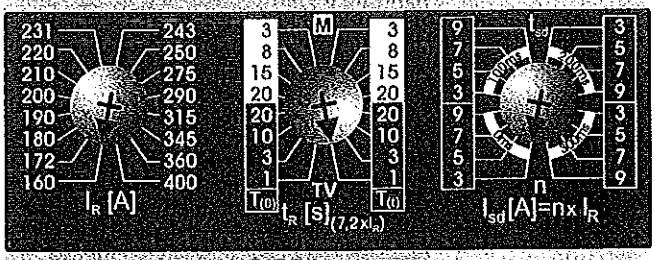


Rated current Motor starting Selective release

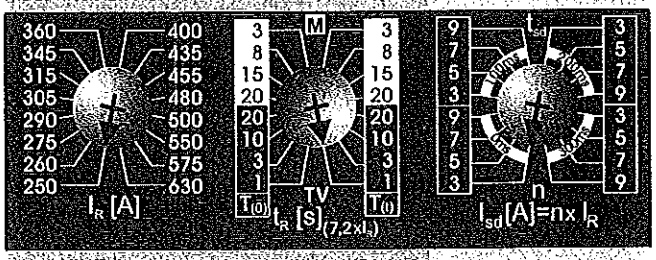
$I_n = 250$ A
SE-BH-0250-MTV9

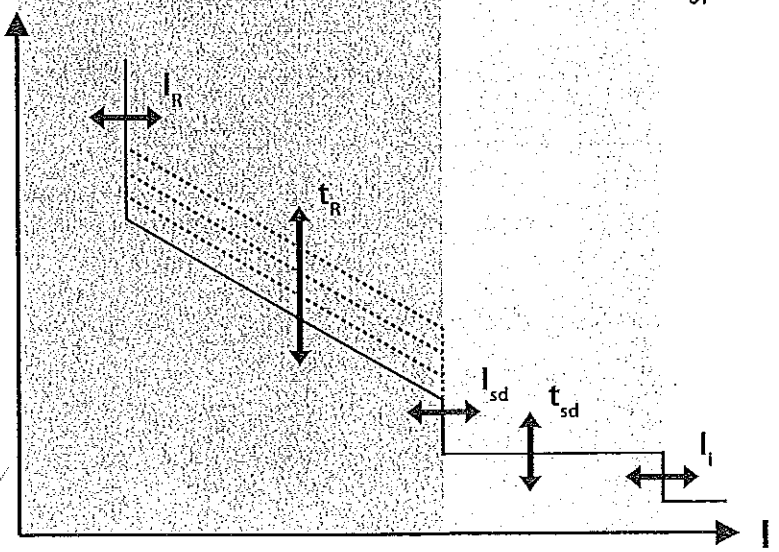


$I_n = 400$ A
SE-BH-0400-MTV9



$I_n = 630$ A
SE-BH-0630-MTV9





Properties

- TV mode suitable for protection of lines, distribution transformers and generators – enables setting of time selectivity
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(0)}$)
- in TV mode the undercurrent release is inactive
- setting of delay of the thermal release t_R 1 s, 3 s, 10 s and 20
- setting of the value of selective release I_{sd} in 4 steps (independent time-delayed release)
- setting of delay of the selective release t_{sd} 0 ms, 100 ms, 200 ms or 300 ms
- setting of I_R, t_R, I_{sd} and t_{sd} by means of rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

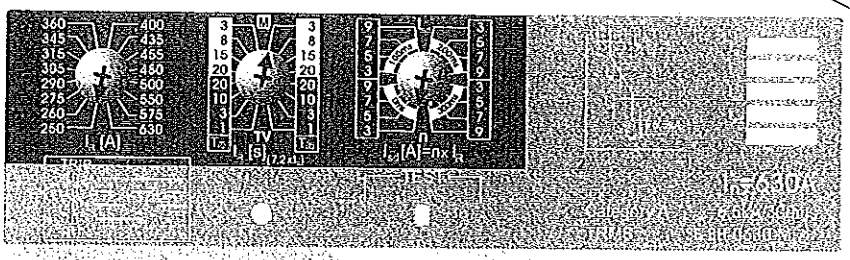
Switching unit		BH630...
Overcurrent release		SE-BH-...
Overcurrent release setting		
Reduced current	I_R	....A
Mode		TV
Thermal memory	T	....
Thermal release delay	t_R	....s
Selective release value	I_{sd}	....A (...x I_R)
Selective release delay	t_{sd}	.... ms

IMPORTANT

- the set value of current of the short-circuit release must correspond to the impedance loop - conditions must be fulfilled for automatic disconnection from power supply in case of failure

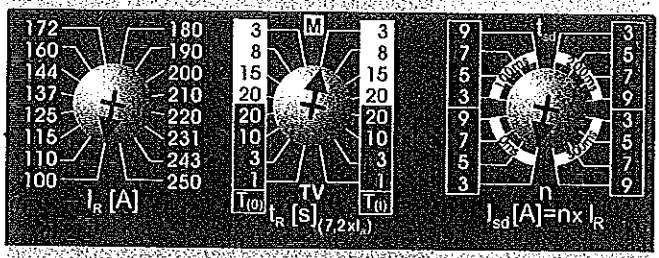
OVERCURRENT RELEASES - MTV9, M mode

3P 4P

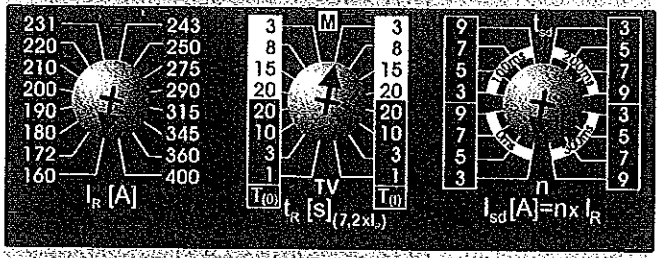


Rated current Motor starting Selective release

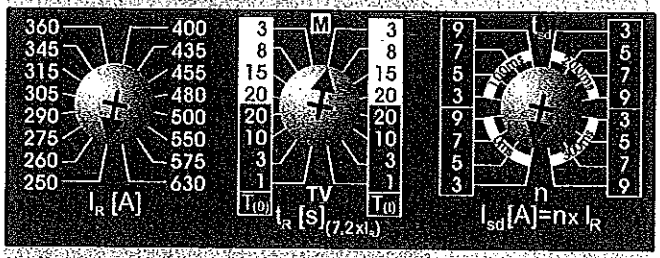
$I_n = 250$ A
SE-BH-0250-MTV9



$I_n = 400$ A
SE-BH-0400-MTV9



$I_n = 630$ A
SE-BH-0630-MTV9



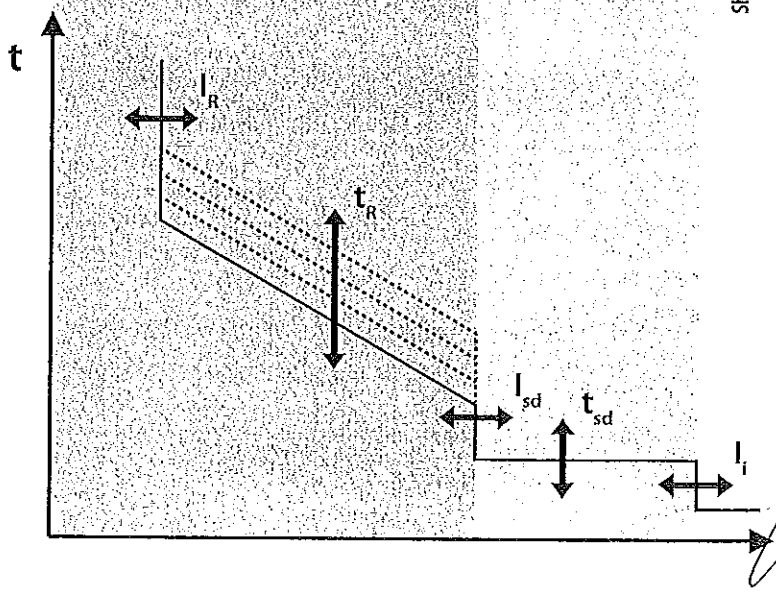
Properties

- M mode suitable for protection of motors – enables setting of time selectivity
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(0)}$, OFF = $T_{(\infty)}$)
- in M mode the undercurrent release is active
- setting of delay of the thermal release t_R 3 s, 8 s, 15 s and 20 s according to the motor starting class
- setting of the value of selective release I_{sd} in 4 steps (independent time-delayed release)
- setting of delay of the selective release t_{sd} 0 ms, 100 ms, 200 ms or 300 ms
- setting of I_R, t_R, I_{sd} and t_{sd} by means of rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

Switching unit		BH630...
Overcurrent release		SE-BH-...
Overcurrent release setting		
Reduced current	I_R	....A
Mode		M
Thermal memory	T	....
Thermal release delay	t_R	...s
Selective release value	I_{sd}	....A (...x I_R)
Selective release delay	t_{sd}	.... ms

Short-circuit release

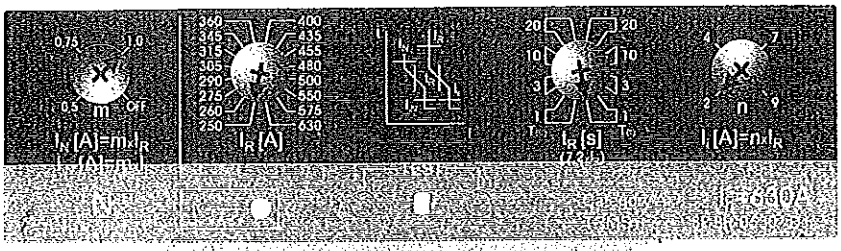


IMPORTANT

- M mode must be selected in protection of motors - the motor will be protected in phase failure
- thermal release delay t_R must correspond to the motor starting class

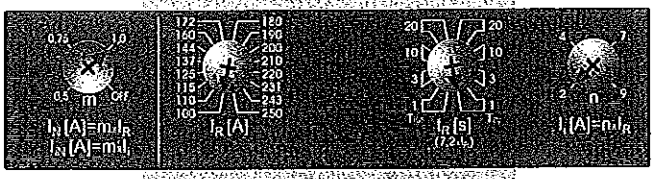
OVERCURRENT RELEASES - 4D01

4P

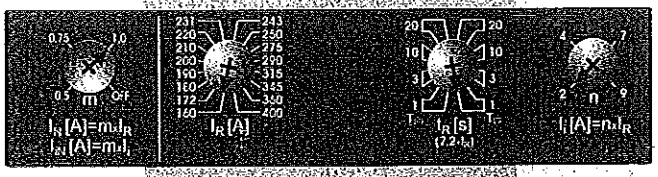


Rated current | Motor starting | Short-circuit release

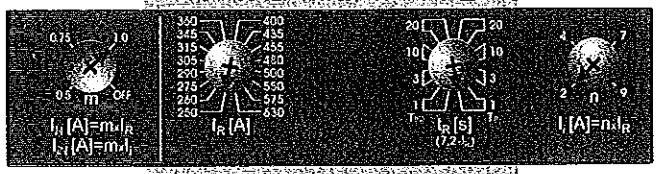
$I_n = 250$ A
SE-BH-0250-4D01



$I_n = 400$ A
SE-BH-0400-4D01



$I_n = 630$ A
SE-BH-0630-4D01

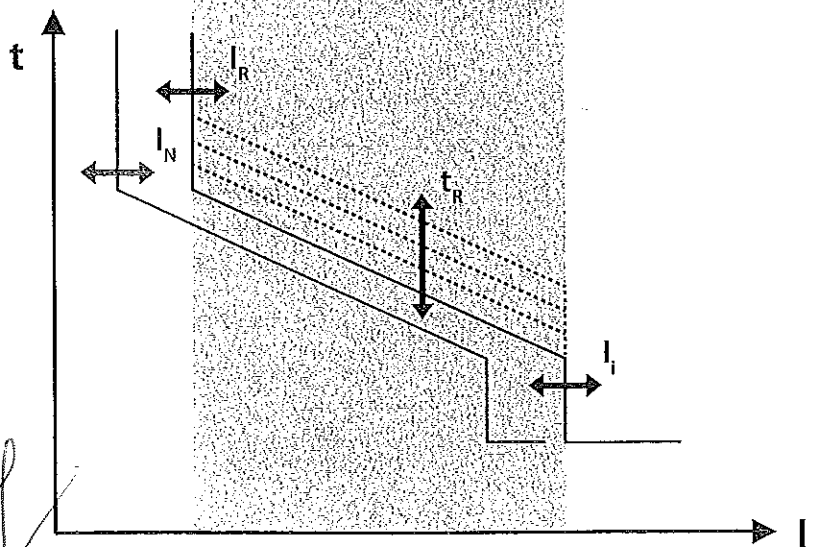


Properties

- it is appropriate for protection of lines and distribution transformers with protected „N" conductor in TN-C-S and TN-S networks
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(s)}$
- setting of delay of the thermal release t_R 1 s, 3 s, 10 s and 20
- setting of the value of the short-circuit release I_i in 4 steps $(2 \div 9)\ I_R$
- setting of the value of reduced current I_N and short-circuit current I_{iN} in the 4th pole
- setting of I_R, t_R, I_N and I_{iN} by means of rotary switches is stepwis
- the overcurrent release indicates operating state and the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set b the manufacturer to minimum

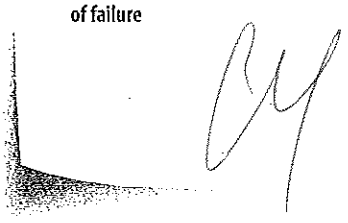
Data for the project

Switching unit		BH630...
Overcurrent release		SE-BH-...
Overcurrent release setting		
Reduced current	I_R	....A
Thermal memory	T	....
Thermal release delay	t_R	....s
Level of reduced current in the 4th pole	I_N	....A (...x I_R)
Level of reduced current in the 4th pole	I_{iN}	....A (...x I_i)



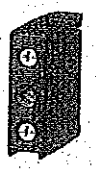
IMPORTANT

- the set value of current of the short-circuit release must correspond to the impedance loop - conditions must be fulfilled for automatic disconnection from power supply in case of failure

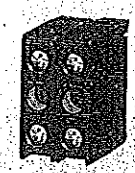


WITCHES

3P 4P

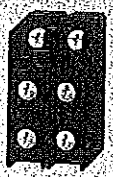


Simple



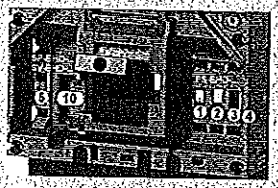
Double

Make-and-break



Double make-and-break

Early



Cavities in BH630... switching unit

Specifications

Type		PS-BHD-..00	PS-BHD-..00-Au[1]
Rated operating voltage	U_e	60 ÷ 500 V a.c.	5 ÷ 60 V a.c.
	U_e	60 ÷ 500 V d.c.	5 ÷ 60 V d.c.
Rated insulation voltage	U_i	500 V	500 V
Rated frequency	f_n	50/60 Hz	50/60 Hz
Rated operating current	I_e/U_e AC-15	6 A/240 V, 4 A/400 V, 2 A/500 V	AC-12, DC-12 0.004 ÷ 0.5 A/5 V,
	I_e/U_e DC-13	0.4 A/240 V, 0.3 A/400 V, 0.2 A/500 V	0.004 ÷ 0.01/60 V
Thermal current	I_{th}	10 A	0.5 A
Arrangement of contacts		01, 10, 02, 11, 20	01, 10, 02, 11, 20
Connection cross-section	S	0.5 ÷ 1 mm²	0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)		IP20	IP20

Type		SP-BHD-0002	PS-BHD-0010/0020	PS-BHD-0010-Au/0020-Au[1]
Rated operating voltage	U_e	250 V a.c.	60 ÷ 250 V a.c.	5 ÷ 60 V a.c.
	U_e	-	60 ÷ 250 V d.c.	5 ÷ 60 V d.c.
Rated insulation voltage	U_i	250 V	250 V	250 V
Rated frequency	f_n	50/60 Hz	50/60 Hz	50/60 Hz
Rated operating current	I_e/U_e	1 A/250 V a.c.	AC-15 1.5 A/250 V a.c.	AC-12, DC-12 0.004 ÷ 0.5 A/5 V,
	I_e/U_e		DC-13 0.2 A/250 V d.c.	0.004 ÷ 0.01/60 V
Thermal current	I_{th}	-	6 A	0.5 A
Arrangement of contacts		02, 11, 20	001/002	001/002
Connection cross-section	S	0.5 ÷ 1 mm²	0.5 ÷ 1 mm²	0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)		IP20	IP20	IP20

[1] - PS-BHD-.....- Au is not suitable to control electromagnetic loads

Type designation, number and type of contacts according to contact arrangement

Arrangement of contacts	Type	Number of contacts	Contact types
01	PS-BHD-1000 (-Au)	1	make
20	PS-BHD-2000 (-Au)	2	make
01	PS-BHD-0100 (-Au)	1	break
02	PS-BHD-0200 (-Au)	2	break
11	PS-BHD-1100 (-Au)	1+1	break+make
001	PS-BHD-0010 (-Au)	1	make-and-break
002	PS-BHD-0020(-Au)	2	make-and-break

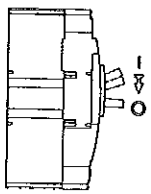
Function and names of switches according to their location in cavities

Position of switch	Switch name	Switch function
Cavity 1	Signal	signals tripping of circuit breaker by overcurrent release
Cavity 2	Relative	signals tripping of circuit breaker/switch-disconnector by releases, TEST push button or by switch off button on the motor drive
Cavity 3, 4, 5 (6, 7, 8, 9)[2]	Auxiliary	signals position of circuit breaker/switch-disconnector's main contacts
Cavity 10	Early	makes/breaks in advance before making the main contact of circuit breaker/switch-disconnector

[2] - cavities 6, 7, 8, 9 are only for 4-pole design

es of switches in the circuit breaker cavities

y	4	3 and 5 (6, 7, 8, 9)	10	2 and 3	2 and 3	2 and 3	1	2	3 and 5 (6, 7, 8, 9)



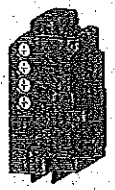
cuit breaker	Circuit breaker lever position	State of the main contacts	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	SP-BHD-0002	SP-BHD-X...-0001	PS-BHD-2000	PS-BHD-1100	PS-BHD-0200	PS-BHD-0010	PS-BHD-0010	PS-BHD-0010
ched on	I	1	1	0	0	1	1	0	1	0	1	1	0	1	0	0	1	0	0	1	1	0
ched off manually or by motor drive rically (loaded state)	◎	0	1	0	0	1	0	1	0	1	0	0	1	0	1	1	1	0	0	1	0	1
ched off by overcurrent release	↯	0	0	1	1	0	0	1	0	1	0	0	1	0	1	1	0	1	1	0	0	1
ched off from switched on state: by auxiliary se, or by TEST push button or by the switch off n on the motor drive	↯	0	1	0	1	0	0	1	0	1	0	0	1	0	1	1	1	0	1	0	0	1

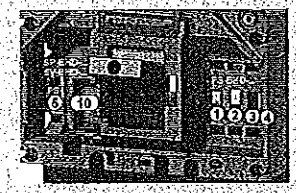
) - contact open, 1 - contact closed

[1] - cavities 6, 7, 8, 9 are only for 4-pole design

SHUNT TRIPS

3P 4P





Cavities in BH630... switching unit

Specifications

Type		SV-BHD-X...
Rated operating voltage	U_e	24, 40, 48, 110, 230, 400, 500 V a.c. 24, 40, 48, 110, 220 V d.c.
Rated frequency	f_n	50/60 Hz
Input power at 1.1 U_e	AC	< 3 VA
	DC	< 3 W
Characteristic		$U \geq 0.7\ U_e$ the circuit breaker must trip
Time to switching off		20 ms
Loading time		∞
Connection cross-section	S	0.5 ÷ 1 mm²
Degree of protection of terminals (connected release)		IP20
Position in cavity No.		10

Type designation according to rated operating voltage

U_e	Type
24, 40, 48 V a.c./d.c.	SV-BHD-X024
110 V a.c./d.c.	SV-BHD-X110
230, 400, 500 V a.c. /220 V d.c.	SV-BHD-X230

The specific rated operating voltage of the release is set up by jumpers directly on the release. It is always set to the maximum value by default (see fig. 1).

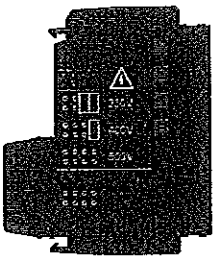
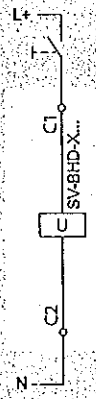
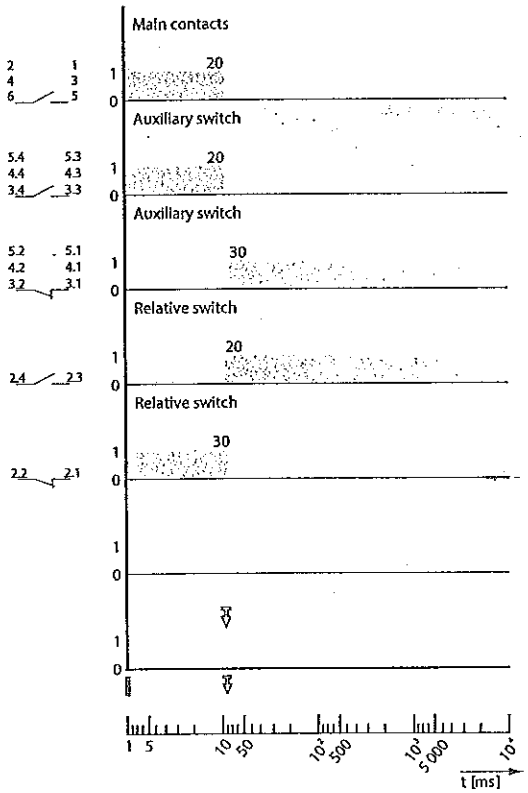


Fig. 1 - The rated operating voltage setting



Circuit breaker/switch-disconnector switching off by shunt trip



States and positions of circuit breaker/ /switch-disconnector lever

States of circuit breaker/ switch-disconnector	Lever position of circuit breaker/ switch-disconnector
Switched on	I
Switched off by releases, TEST or by switch off button on the motor drive	O
Switched off manually or by motor drive electrically (loaded state)	◎

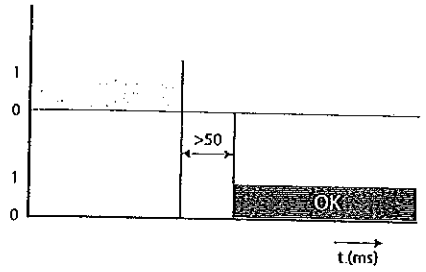
IUNT TRIPS

3P 4P

ecifications

ıction time of the auxiliary releases

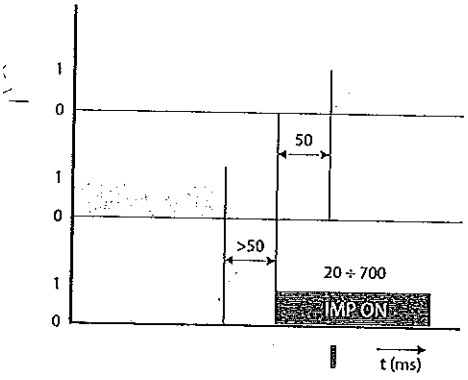
ınt trip



peration of motor drive and shunt trip

necessary to keep time delay when the control of the circuit breaker is
: by motor drive and shunt trip or undervoltage release. The following
delays have to be kept between the disconnection of voltage from the
t trip or bringing the voltage to the undervoltage release and the control
ılse for switch on of the motor drive:

ıt trip



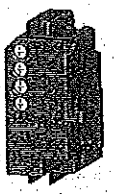
ıs and positions of circuit breaker/switch-disconnector lever

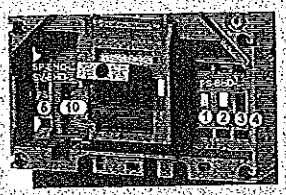
s of circuit-breaker/switch-disconnector	Lever position of circuit-breaker/switch-disconnector
hed on	‖
hed off by releases, TEST or by switch off on the motor drive	⊽
hed off manually or by motor drive ically (loaded state)	◎

Description of graphs

Symbol	Description
HK	Main contacts
OK	Circuit breaker is ready for further handling
IMP ON	Make impulse for the motor drive
SV	Control voltage on the shunt trip
SP	Control voltage on the undervoltage release

UNDERVOLTAGE RELEASES





Cavities in BH630... switching unit

Specifications

Type		SP-BHD-X...	SP-BHD-X...-0001[2]
Rated operating voltage	U_e	24, 40, 48, 110, 230, 400, 500 V a.c. 24, 40, 48, 110, 220 V d.c.	24, 40, 48, 110, 230, 400, 500 24, 40, 48, 110, 220 V d.c.
Rated frequency	f_n	50/60 Hz	50/60 Hz
Input power at 1.1 U_e	AC	< 3 VA	< 3 VA
	DC	< 3 W	< 3 W
Characteristic[1]		$U \geq 0.85\ U_e$ - it is possible to switch on the circuit breaker $U \leq 0.35\ U_e$ - the circuit breaker must trip	
Time to switching off		20 ms	20 ms
Loading time		∞	∞
Connection cross-section	S	0.5 ÷ 1 mm²	0.5 ÷ 1 mm²
Degree of protection of terminals (connected release)		IP20	IP20
Position in cavity No.		10	10
Early switch			
Rated operating voltage	U_e	-	250 V a.c.
Rated frequency	f_n		50/60 Hz
Rated operating current	I_e/U_e	-	1 A/250 V a.c.
Arrangement of contacts			10, 01
Connection cross-section	S	-	0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)			IP20

[1] - tripping of the undervoltage release can be delayed using the delay unit BZ-BX-X230-A, for more detailed information see pag

[2] - cannot be used in combination with motor drive MP-BH-X....

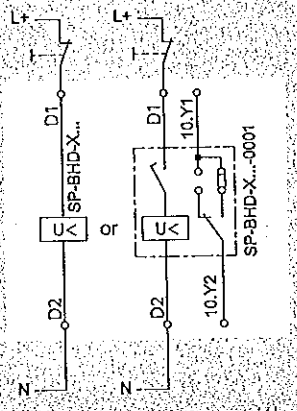
Number and type of contacts according to contact arrangement

Arrangement of contacts	Number of contacts	Contact type
01	1	break
10	1	make

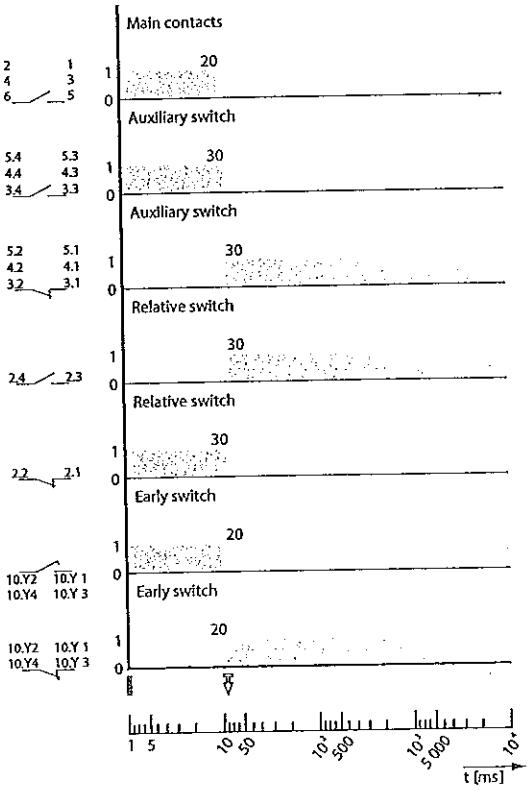
Type designation according to rat operating voltage

U_e	Type
24, 40, 48 V a.c.	SP-BH
110 V a.c./d.c.	SP-BH
230, 400, 500 a.c./220 V d.c.	SP-BH

The specific rated operating voltage lease is set up by jumpers directly on th It is always set to the maximum value (see fig. 1).



Circuit breaker/switch-disconnector switching off by shunt trip



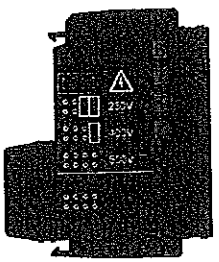


Fig. 1 - The rated operating voltage s

States and positions of circuit br switch-disconnector lever

State of circuit breaker/ switch-disconnector	Lev of cir switch
Switched on	
Switched off by releases, TEST or by switch off button on the motor drive	
Switched off manually or by motor drive electrically (loaded state)	

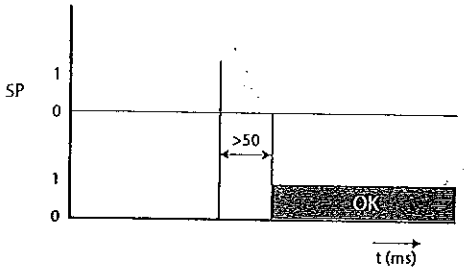
UNDERVOLTAGE RELEASES

3P 4P

Specifications

Reaction time of the auxiliary releases

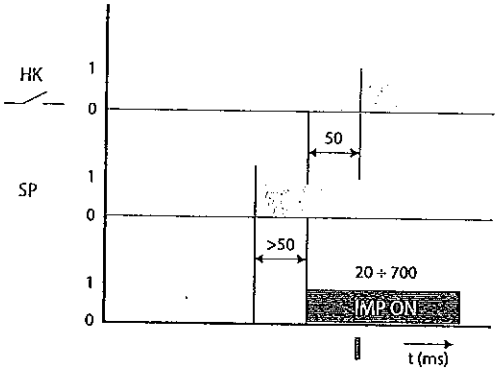
Undervoltage release



Cooperation of motor drive and undervoltage release

It is necessary to keep time delay when the control of the circuit breaker is done by motor drive and shunt trip or undervoltage release. The following time delays have to be kept between the disconnection of voltage from the shunt trip or bringing the voltage to the undervoltage release and the control impulse for switch on of the motor drive:

Undervoltage release



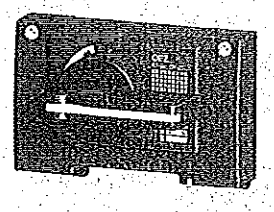
States and positions of circuit breaker/switch-disconnector lever

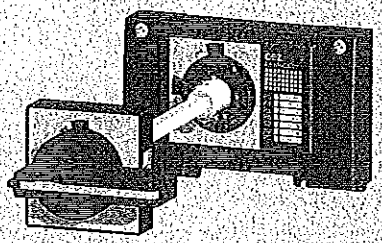
States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases, TEST or by switch off button on the motor drive	
Switched off manually or by motor drive electrically (loaded state)	

Description of graphs

Symbol	Description
HK	Main contacts
OK	Circuit breaker is ready for further handling
IMP ON	Make impulse for the motor drive
SV	Control voltage on the shunt trip
SP	Control voltage on the undervoltage release

HAND DRIVES





Description

The hand drive permits controlling the circuit breaker/ /switch-disconnector by turning the lever, e.g. to switch machines on and off. Modular conception of the drives enables simple mounting on the switching unit (also additionally) after the cover of cavities is removed. The fixed drive can be sealed. The drive and its accessories are ordered separately according to your choice, see page F12.

- The hand drive makes possible to control the circuit breaker:
  - **a) from the front panel (fig. 1)**
    Hand drive unit RP-BH-CK..
    + Hand drive lever RP-BHD-CP..
  - **b) through the switchboard door (fig. 2)**
    Hand drive unit RP-BH-CK..
    + Extension shaft RP-BHD-CH..
    + Hand drive bearing PR-BHD-CN..
    + Hand drive lever + RP-BHD-CP..

- The hand drive unit is fixed directly to switching unit of the circuit breaker.
- The hand drive bearing is fixed to the switchboard door and it provides degree of protection IP40 or IP66.
- Hand drive lever is fixed on the hand drive unit or on the hand drive bearing.
- The extension shaft is supplied in two options, standard (length 365 mm - can be shortened) and telescopic (adjustable length 245 ÷ 410 mm).

Enhanced safety for operator:

- The hand drive unit and hand drive lever are also supplied with the possibility to lock the circuit breaker in position „switched off manually". The unit and lever of the hand drive can be locked using three padlocks with shank diameter max. 6 mm.
- Each hand drive bearing prevents the door from opening when the circuit breaker is switched on or in a state of being switched off by releases and in the circuit breaker state „switched off manually" and hand drive lever is locked up.
- Two circuit breakers with hand drives can be fitted also with reciprocal mechanical interlocking or mechanical parallel switching, see page F65.

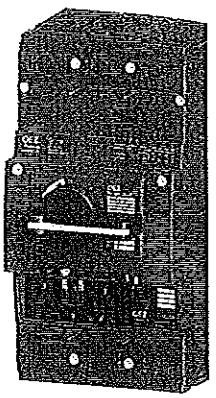


Fig. 1 - DIMENSIONS see page I

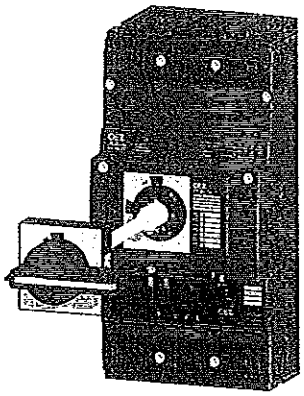
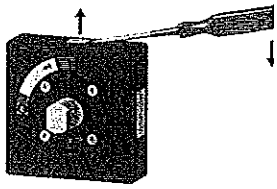


Fig. 2 - DIMENSIONS see page F

By a screwdriver it is possible to unlock the mechanism blo ing the switchboard door opening with the circuit breal switched on (for bearing RP-BHD-CN40 and RP-BHD-CN41)

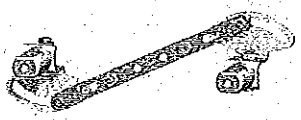


Specifications

Type	Description	Colour	Locking while the circuit breaker is in Off state	Degree of protection	Locking of the switchboard door preventing the circuit breaker state: switched on	switched off manually and locked	switchboard door opening with the circuit breaker switched on	Length [mm]
RP-BH-CK10	Hand drive unit	blue	no	-	-	-	-	-
RP-BH-CK20	Hand drive unit	blue	yes	-	-	-	-	-
RP-BH-CK21	Hand drive unit	yellow	yes	-	-	-	-	-
RP-BH-CK30	Hand drive unit - right side	blue	-	-	-	-	-	-
RP-BH-CK31	Hand drive unit - left side	blue	-	-	-	-	-	-
RP-BHD-CP10	Hand drive lever	black	no	-	-	-	-	-
RP-BHD-CP20	Hand drive lever	black	yes	-	-	-	-	-
RP-BHD-CP21	Hand drive lever	red	yes	-	-	-	-	-
RP-BHD-CN40	Hand drive bearing	black	-	IP40	yes	yes	yes	-
RP-BHD-CN41	Hand drive bearing	yellow	-	IP40	yes	yes	yes	-
RP-BHD-CN60	Hand drive bearing	black	-	IP66	yes	yes	no	-
RP-BHD-CN61	Hand drive bearing	yellow	-	IP66	yes	yes	no	-
RP-BHD-CH10	Extension shaft	-	-	-	-	-	-	365 (can be shortened
RP-BHD-CH20	Extension shaft - telescopic	-	-	-	-	-	-	245 ÷ 410

MECHANICAL INTERLOCKING AND PARALLEL SWITCHING

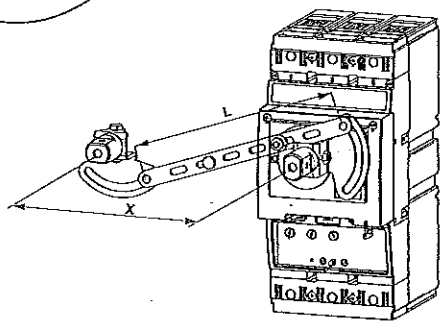
3P 4P



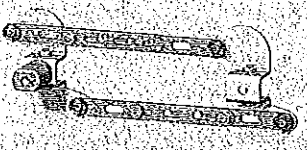
RP-BHD-CB10 Mechanical interlocking

Provides mechanical interlocking of two circuit breakers/ /switch-disconnectors so that they cannot both be tripped simultaneously, but only one of them at a time. Both circuit breakers may be switched off simultaneously. Interlocking can be used between two BH630 circuit breakers or between BH630 and BD250 circuit breakers. Both circuit breakers must be equipped with a hand drive (at least one with a hand drive unit and hand drive lever), see page F63.

In order to use the interlocking, it is absolutely necessary to comply with the dimensions that are shown in the figure and given in the table.

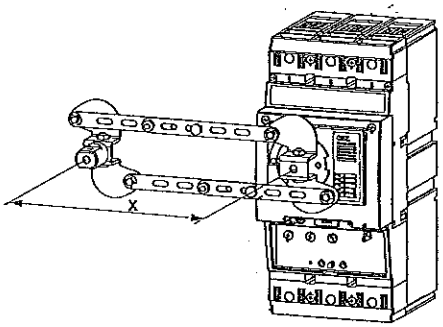


		Right switching unit							
		BD250..3..		BD250..4..		BH630..3..		BH630..4..	
	Dimension [mm]	X	L	X	L	X	L	X	L
Left switching unit	BD250..3..	105	112	140	145.5	122.5	128.5	181	185.5
	BD250..4..	105	112	140	145.5	122.5	128.5	181	185.5
	BH630..3..	122.5	128.5	157.5	162.5	140	145.5	185	189
	BH630..4..	122.5	128.5	157.5	162.5	140	145.5	185	189



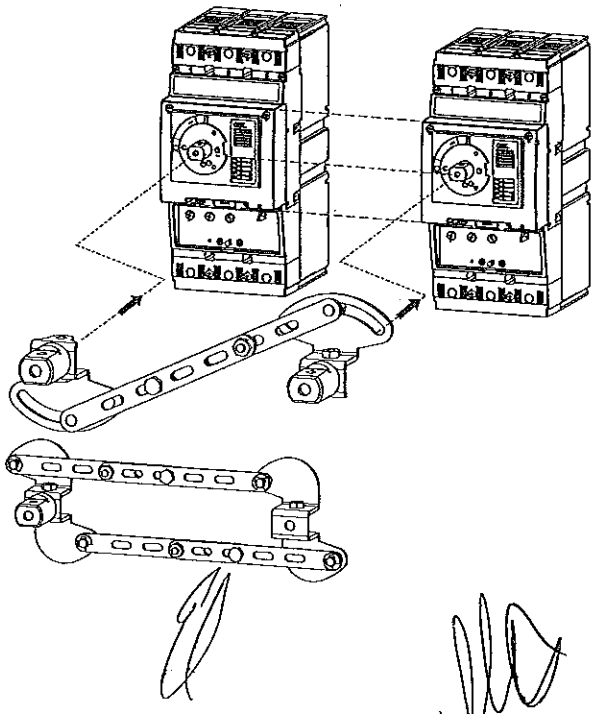
RP-BHD-CD10 Mechanical parallel switching

Enables for simultaneous switching of two circuit breakers/switch-disconnectors. Parallel switching can be used between two BH6301) circuit breakers or between BH630 and BD250 circuit breakers. Both circuit breakers must be equipped with a hand drive unit and at least one with a hand drive lever, see page F63. In order to use parallel switching, it is absolutely necessary to comply with the dimensions that are shown in the figure and given in the table.



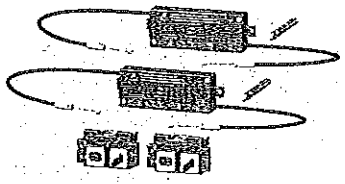
		Right switching unit							
		BD250..3..		BD250..4..		BH630..3..		BH630..4..	
	Dimension [mm]	X	Y	X	Y	X	Y	X	Y
Left switching unit	BD250..3..	105^{+7}	164.5^{7}	122.5^{+7}	164.5^{7}	122.5^{+7}	164.5^{7}	x	x
	BD250..4..	105^{+7}	164.5^{7}	122.5^{+7}	164.5^{7}	122.5^{+7}	164.5^{7}	x	x
	BH630..3..	122.5^{+7}	164.5^{7}	140^{+7}	164.5^{7}	140^{+7}	164.5^{7}	x	x
	BH630..4..	122.5^{+7}	164.5^{7}	140^{+7}	164.5^{7}	140^{+7}	164.5^{7}	x	x

1) - Switching unit BH630..4.. (4-pole design) can only be on the left side



MECHANICAL INTERLOCKING

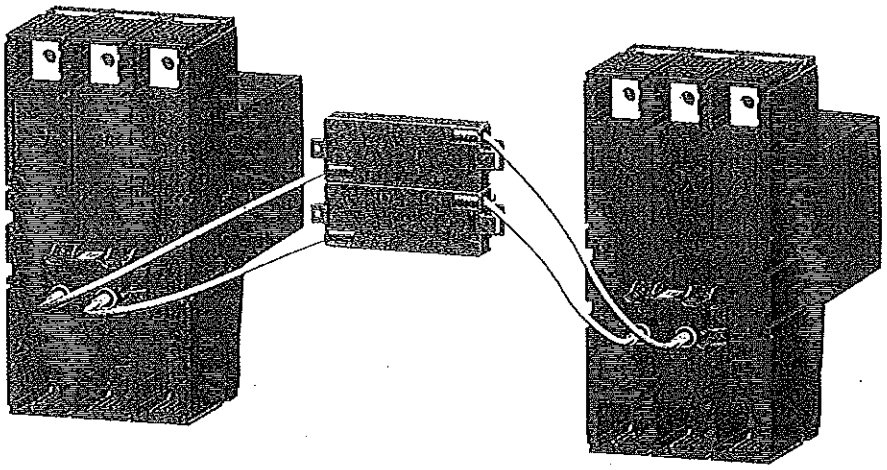
3P 4P



Mechanical interlocking
MB-BH-PV04
MB-BHD-PV03

- Provides mechanical interlocking of two circuit breakers/ /switch-disconnectors so that they cannot both be tripped simultaneously, but only one of them at a time. Both circuit breakers may be switched off simultaneously.
- Mechanical interlocking MB-BH-PV04 is intended for two BH630 circuit breakers. Interlocking MB-BHD-PV03 is intended for one BH630 circuit breaker and one BD250.
- Circuit breakers may be in fixed, plug-in and withdrawable designs.

Type of circuit breakers	BH630 BH630	BD250 BH630
Type of mechanical interlocking	MB-BH-PV04	MB-BHD-PV03



Circuit breaker placement in switchboard
Detailed information can be found in the instructions for use, which you may download from our website www.oez.com.

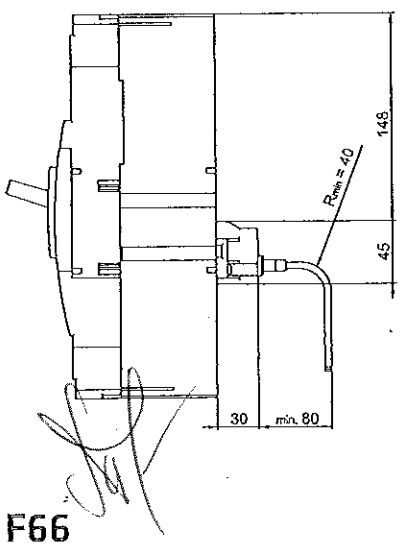
Recommended circuit breaker manipulation

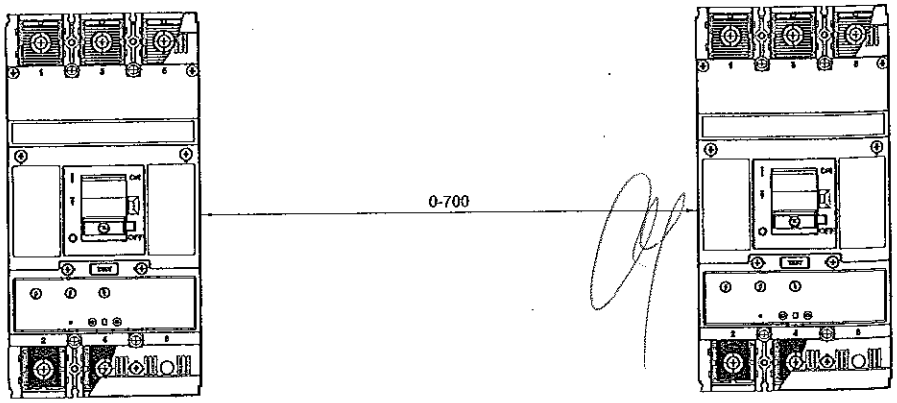
During the manipulation with circuit breaker with mechanical interlocking and motor drive, the circuit breaker may reach the state, in which the first attempt at switching on by motor drive is unsuccessful. Switching on is executed after repeated make impulse. To avoid this effect, some of the following steps may be done:

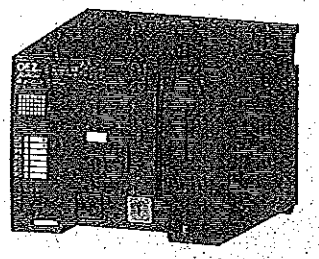
1) To keep the process of manipulation with the circuit breaker, see „Recommended circuit breaker manipulation" below
2) To connect OD-BHD-R... control relay into the motor drive circuit according to wiring diagram, see page F72

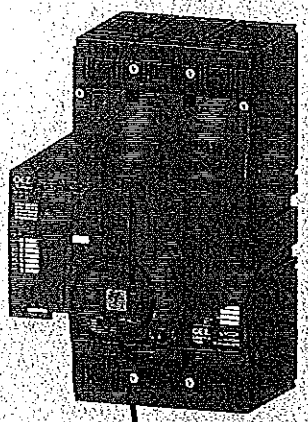
Recommended process of manipulation

1) Shunt trip/undervoltage release must be used to switch off the circuit breaker. Circuit breaker switching off cannot be made by motor drive
2) Circuit breaker can be stored and switched on only if the second circuit breaker is in switch-off mode. Circuit breaker status indicator on motor drive is in „0" position. Between storing and switching on the circuit breaker, it is necessary to keep the time interval min. 100 ms. Switch „S" must be disconnected.
3) In case of infringement of these principles, the first switching on of circuit breaker is unsuccessful.

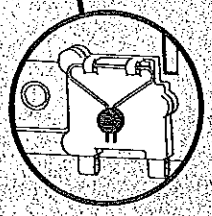




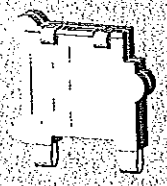




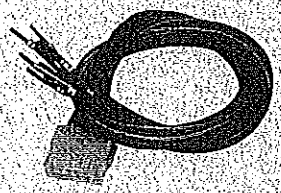
DIMENSIONS, see page F29



Cover of switch on button OD-BHD-KT01



Connecting cable OD-BHD-KA02



Description

- It is used for remote control of the circuit breaker (switch OFF/ON).
- Simple mounting on the circuit breaker after the circuit breaker cover of cavities is removed.
- Usage in industrial applications e.g. switching of stand by units etc. or wherever the automatic operation of electric devices is needed.
- In order to speed up the circuit breaker's switch off (e.g. safety STOP button) the undervoltage release or shunt trip can be used.
- On the motor drive front panel there is a change-over switch to select the drive modes AUTO/MANUAL:
  - AUTO mode – remote control. The circuit breaker is controlled by buttons for remote switch off/on, furthermore in this position mechanical control can be used on the front panel of the motor drive
  - MANUAL mode – manual control. Control voltage is not needed. The circuit breaker can be switched on using the green switch on button and switched off using the red switch off button on the front part of the drive cover. Electric switch on is blocked. Electric switch off is functional. The accumulation of energy can be done by means of hinged lever.
- Possibility to indicate remotely the state of the AUTO/MANUAL switch.
- Switch S (external switch – has to be bought separately) enables the choice of automatic accumulation of energy (circuit breaker loading).
  - automatic accumulation of energy is on (S switch switched on): after tripping of the circuit breaker by the overcurrent release, by auxiliary release, or by TEST push button or by the switch off button on the motor drive motor drive immediately accumulates energy (circuit breaker loading), motor drive is then ready to switch on the circuit breaker
  - automatic accumulation of energy is switched off (S switch open): after tripping of the circuit breaker by the overcurrent release, by auxiliary release, or by TEST push button or by the switch off button on the motor drive both motor drive and circuit breaker stay in position „ switched off by releases". In this position motor drive waits for the impulse from switch S. When the impulse is brought in the motor drive accumulates energy (turn on the circuit breaker) and after this loading the motor drive is ready to switch on the circuit breaker. It is not possible to switch on the circuit breaker when motor drive is not loaded
- Front panel state indicating device of the stored energy signals the state of motor drive storage devices. The state can be signalled from a distance.
- The drive may be furnished with an electromechanical counter of cycles:
  - internal design on the motor drive cover
  - external design OD-BHD-PP01 for mounting on the switchboard's door or inside the switchboard by means of metal holder, that is part of the delivery
- Motor drive can be sealed by means of bolt sealing insert (OD-BH-VP01).
- Drive can be locked in off position by up to three padlocks (shank diameter max. 4.3 mm).
- Switch on button can be covered and sealed (OD-BHD-KT01).
- Drive is connected by multi-pole connector with cavities (in order to connect cables special tongs have to be used).
- Drive can be furnished with cable (OD-BHD-KA02) that has on one side connector to the motor drive and on the other side free terminals for connection to etc. switchboard's terminal block.

Specifications

Type		MP-BH-X, MP-BH-XL, P
Operating voltage	U_e	24, 48, 110, 230 V a.c. 24, 48, 110, 220 V d.c.
Rated frequency	f_e	50/60 Hz
Control impulse length for storage		400 ms ÷ ∞ [1]
Control impulse length for switching on		20 ÷ 700 ms [1]
for switching off		400 ms ÷ ∞ [1]
Time to switching on		< 60 ms
Time to switching off		900 ms
Frequency of cycles ON/OFF		3 cycles/min
Frequency of cycles - instant successive ON/OFF		10 cycles
Mechanical endurance		20 000 cycles
Input power	AC	100 VA
	DC	100 W
Protection	24, 48, 110 V a.c.; 230 V a.c.	LPN-4C-1; LPN-2C-1
	24, 48, 110 V d.c.; 220 V d.c.	LPN-DC-4C-1; LPN-DC-2C-1
Rated operating current of the change-over switch AUTO/MANUAL	I_e/U_e	5 A/250 V a.c. 0.5 A/250 V d.c.
Type		**OD-BHD-KA02**
Number of conductors		12
Conductor cross-section	S	0.35 mm²
Conductor lengths		0.6 m

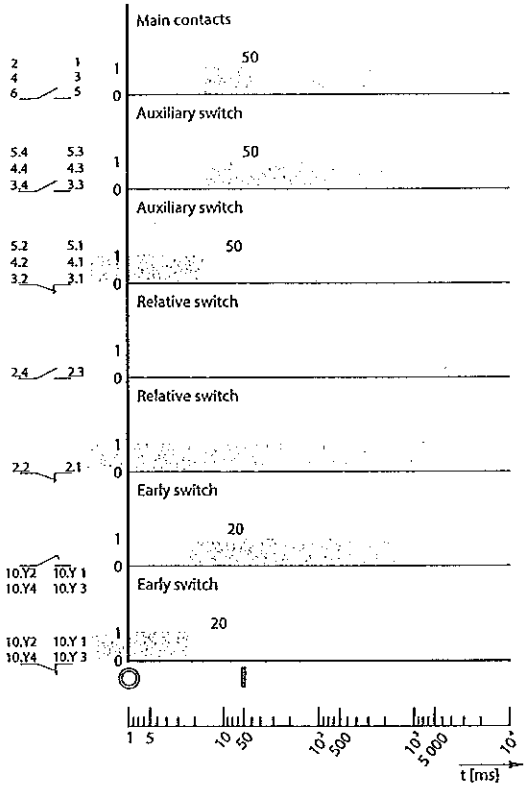
[1] - for sequence of control impulses, see page F70

MOTOR DRIVES

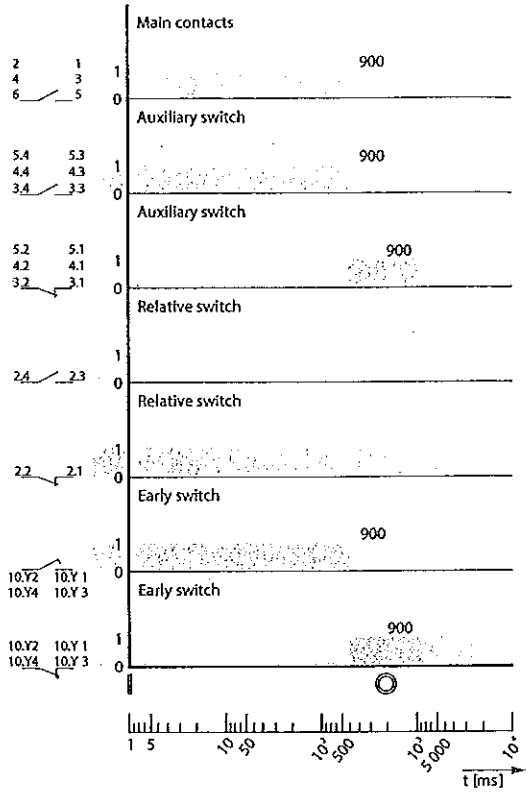
3P 4P

Specifications

Circuit breaker switching on by motor drive - electrically by ON push button

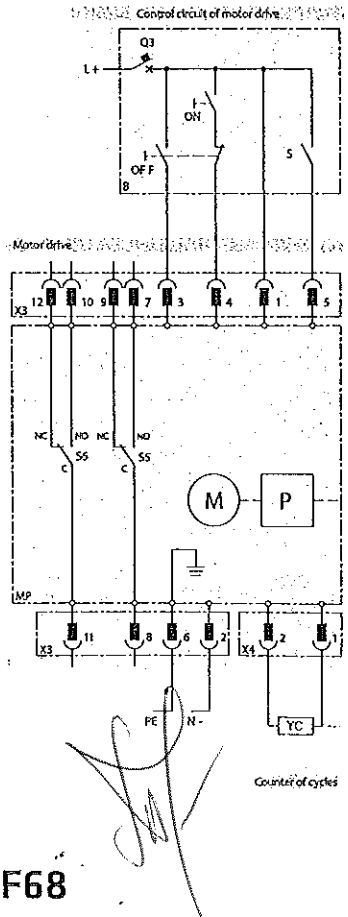


Circuit breaker switching off by motor drive - electrically by OFF push buttor



Diagram

Circuit breaker switching on and off by motor drive - electrically by ON and OFF push button



States and positions of circuit breaker/switch-disconnector lever

States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	‖
Switched off by releases, TEST or by switch off button on the motor drive	⊽
Switched off manually or by motor drive electrically (loaded state)	◎

Wiring diagram description

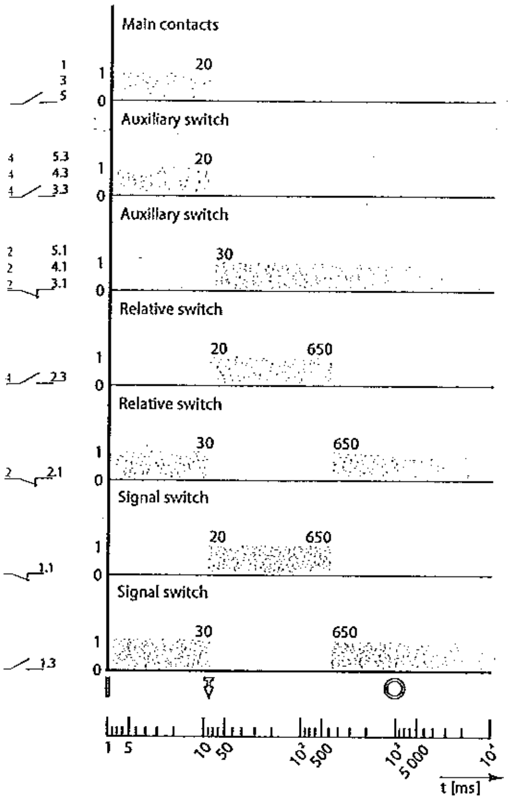
Symbol	Description
MP	motor drive MP-BH-X...
M	motor
P	storage device
X3	connector for connection of control circuits
X4	connector for external counter of cycles
S5	switch to indicate AUTO (NO-C)/MANUAL modes (NC-C)
S6	switch to indicate full storage (ready to switch on: NO-C)
YC	external counter of cycles OD-BHD-PP01
B	recommended wiring of the control circuits (not included in motor drive order)
ON	switch off button
OFF	switch off button
S	switch for energy storage (switched on = automatic storage, may be continuously switched on)
Q3	motor drive circuit breaker - see page F66

ıOTOR DRIVES

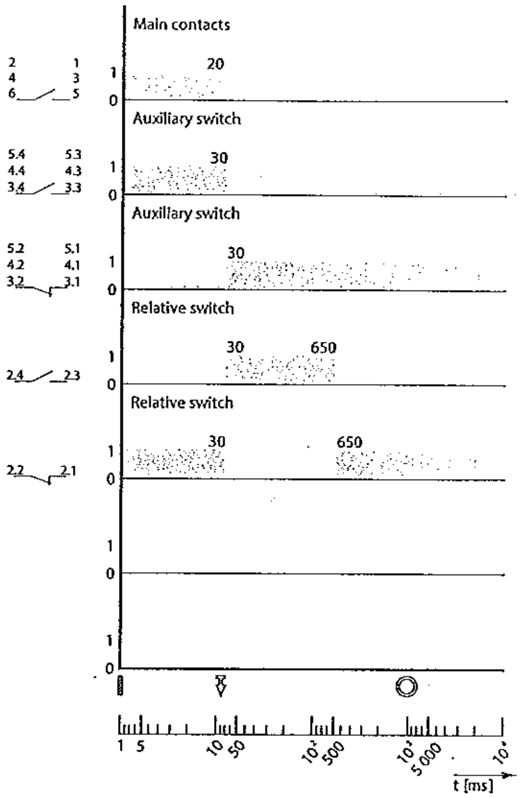
3P 4P

ɔecifications

ɿitching off of the circuit breaker with motor drive by overcurrent release
switch in switched on state-automatic storage)

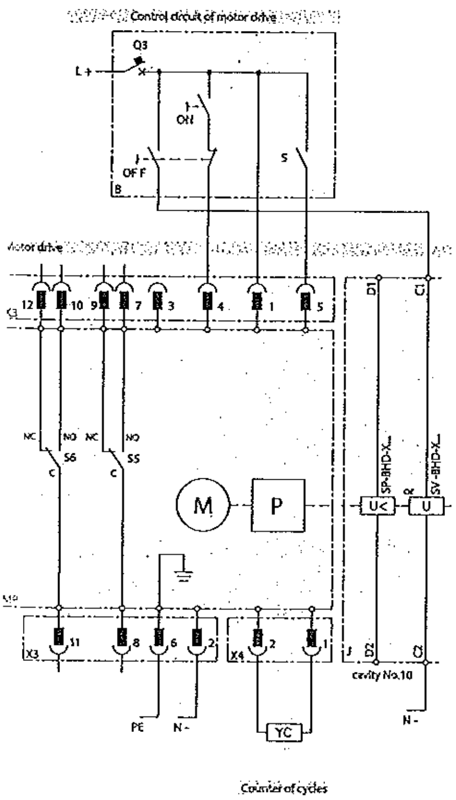


Switching off of the circuit breaker with motor drive by shunt trip or undervoltage release (switch S in switched on state-automatic storage)

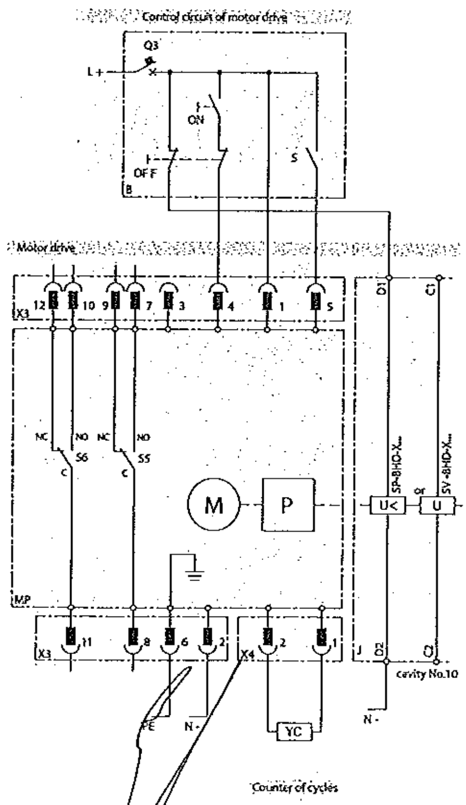


ıagram

rcuit breaker switching on by motor drive (electrically by ON push button) ıd tripping by shunt trip



Circuit breaker switching on by motor drive (electrically by ON push button) a tripping by undervoltage release

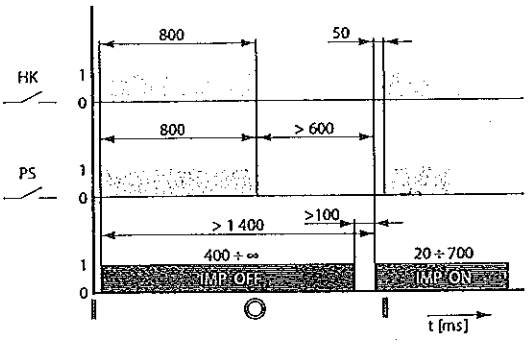


MOTOR DRIVE

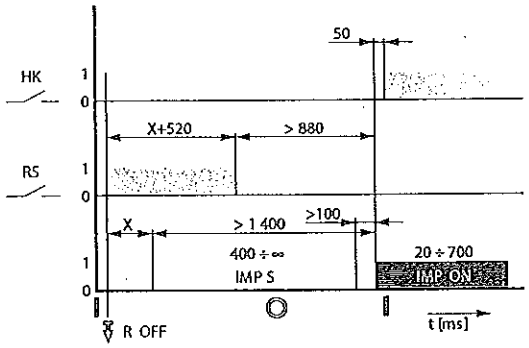
Specifications

Recommended control impulses

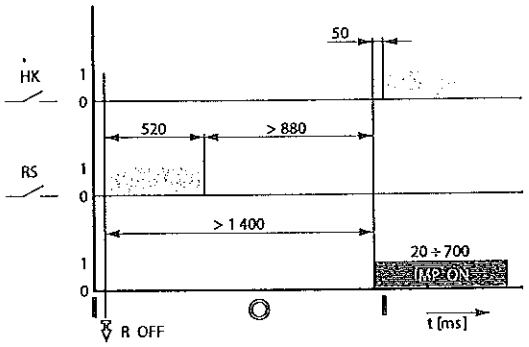
Circuit breaker switching on and off by motor drive
- S switch permanently switched on (automatic storage) or open



Circuit breaker switching off by overcurrent or auxiliary release and switching on by motor drive - S switch switched on only for storing up



Circuit breaker switching off by overcurrent or auxiliary release and switching on by motor drive - S switch permanently switched on (automatic storage)



Description of graphs

Symbol	Description
HK	main contacts
PS	auxiliary switch
RS	relative switch
R OFF	circuit breaker closing instant by release of circuit breaker
IMP S	impulse to store up motor drive energy (generated by S switch)
IMP ON	make impulse for the motor drive
IMP OFF	break impulse for the motor drive
X	random segment of time

States and positions of circuit breaker/switch-disconnector lever

States of circuit breaker/switch-disconnector	Lever positions of circuit breaker/switch-disconnector
Switched on	
Switched off by releases, TEST or by switch off button on the motor drive	
Switched off manually or by motor drive electrically (loaded state)	

OTOR DRIVES

3P 4P

igram

ommended wiring diagram of connecting the circuit breaker trol circuits in withdrawable/plug-in design with motor drive

nnecting with control relays
erating voltage U_e 24 V a.c./d.c., 48 V a.c./d.c., 110 ÷ 230 V a.c., 110 V d.c.

tching off by motor drive

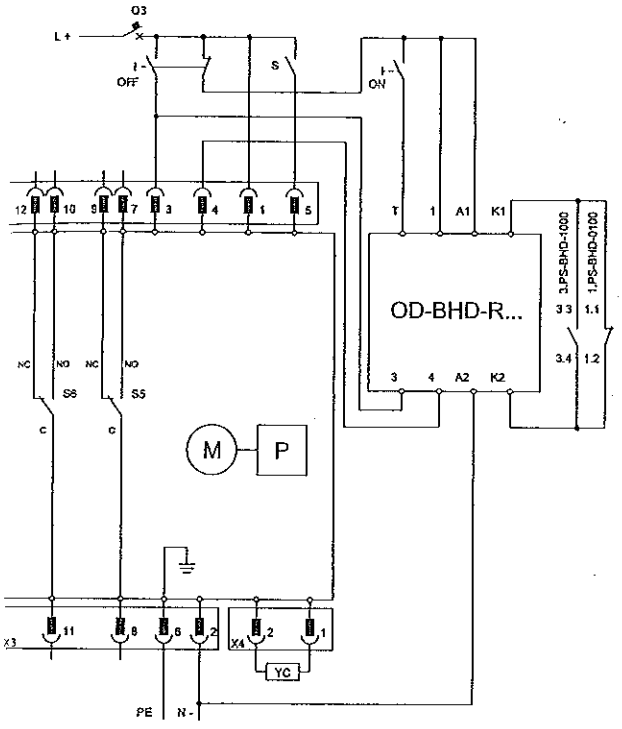


Diagram description

Symbol	Description
MP	motor drive - U_e of drive must be the same as U_e of control relay
M	motor
P	storage device
X3	connector for connection of control circuits
X4	connector for external counter of cycles
S5	switch to indicate AUTO (NO-C) / MANUAL modes
YC	external counter of cycles OD-BHD-PP01 (not included in motor drive order)
OFF	switch off button
S	switch for energy storage
Q3	motor drive circuit breaker for 24 V a.c. LPN-4C-1 for 48 V a.c. LPN-4C-1 for 110 V a.c. LPN-4C-1 for 230 V a.c. LPN-2C-1 for 24 V d.c. LPN-DC-4C-1 for 48 V d.c. LPN-DC-4C-1 for 110 V d.c. LPN-DC-4C-1
OD-BHD-R...	control relay for 24 V a.c./d.c. OD-BHD-RX01 for 48 V a.c./d.c. OD-BHD-RX02 for 110 ÷ 230 V a.c. OD-BHD-RA03 for 110 V d.c. OD-BHD-RD04
3.PS-BHD-1000	auxiliary switch
1.PS-BHD-0100	signal switch

- impulse on T terminal reacts to trailing edge

MOTOR DRIVES

Diagram

Recommended wiring diagram of connecting the circuit breakers control circuits with mechanical interlocking and motor drive (applicable for any circuit breaker)

- connecting with control relays
- operating voltage U_e 24 V a.c./d.c., 48 V a.c./d.c., 110 ÷ 230 V a.c., 110 V d.c.

Switching off is possible only by undervoltage release or shunt trip

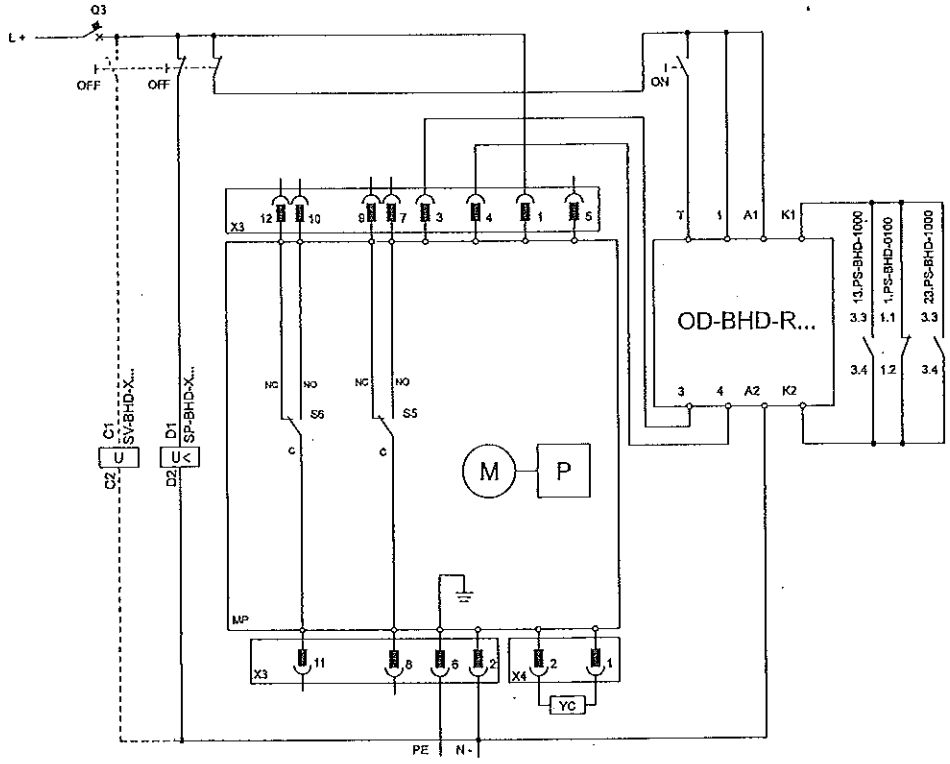
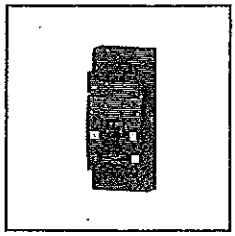


Diagram description

Symbols	Description
MP	motor drive - U_e of drive must be the same as U_e of control relay
M	motor
P	storage device
X3	connector for connection of control circuits
X4	connector for external counter of cycles
S5	switch to indicate AUTO (NO-C) / MANUAL modes
YC	external counter of cycles OD-BHD-PP01
S6	switch to indicate full storage (ready to switch on: NO-C)
OFF	switch off button
Q3	motor drive circuit breaker for 24 V a.c. LPN-4C-1 for 48 V a.c. LPN-4C-1 for 110 V a.c. LPN-4C-1 for 230 V a.c. LPN-2C-1 for 24 V d.c. LPN-DC-4C-1 for 48 V d.c. LPN-DC-4C-1 for 110 V d.c. LPN-DC-4C-1
OD-BHD-R...	control relay for 24 V a.c./d.c. OD-BHD-RX01 for 48 V a.c./d.c. OD-BHD-RX02 for 110 ÷ 230 V a.c. OD-BHD-RA03 for 110 V d.c. OD-BHD-RD04
1.PS-BHD-0100	signal switch
13.PS-BHD-1000	switch inserted in cavity 3 (first circuit breaker) - auxiliary switch
23.PS-BHD-1000	switch inserted in cavity 3 (second circuit breaker) - auxiliary switch
SP-BHD-X...	undervoltage release - U_e of release must be the same as U_e of control relay
SV-BHD-X...	shunt trip - U_e of release must be the same as U_e of control relay

- impulse on 1 terminal reacts to trailing edge

MOULDED CASE CIRCUIT BREAKERS BL1000S



COMMERCIAL INFORMATION

3P

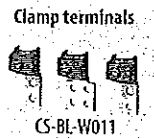
TECHNICAL INFORMATION

MMARY OF MODELS AND ACCESSORIES

3P

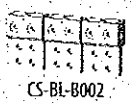
INECTING SETS

Clamp terminals — CS-BL-W010

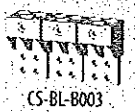


Clamp terminals — CS-BL-W011

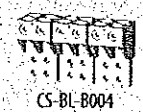
Block terminals — CS-BL-B002



Block terminals — CS-BL-B003



Block terminals — CS-BL-B004



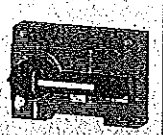
Rear connection — CS-BL-A022

Front connection — CS-BL-A010

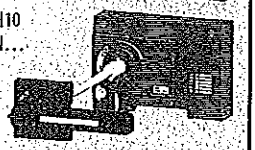
Rear connection — CS-BL-A020

ND DRIVES

3L-CK10
3L-CP...



3L-CH10
3L-CN...



hanical interlocking

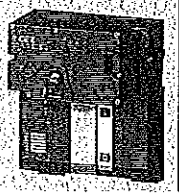
3L-CB10

hanical
king with
den cable

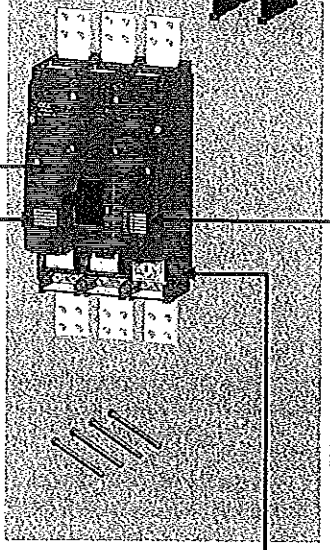
BL-...

TOR DRIVES

BL-X...

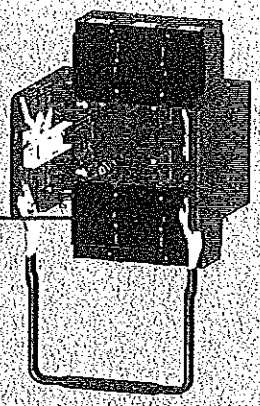


SWITCHING UNIT
BL1000SE305



SWITCHING UNIT
- WITHDRAWABLE DESIGN
BL1000SE320

WITHDRAWABLE DEVICE
ZV-BL-1600-300



SWITCHES PS-BL-...

Signalling of position
SO-BL-0010

UNT TRIP

SV-BL-X...

DERVOLTAGE RELEASE

SP-BL-X...

OVERCURRENT RELEASES

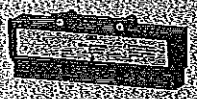
SE-BL-J... DTV3

SE-BL-J... MTV8

SE-BL-J... U001

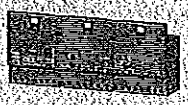
SWITCH-DISCONNECTOR UNIT

SE-BL-J1000-V001



SIGNALLING UNITS

SB-BL-0007



CESSORIES

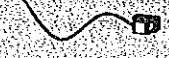
Lever with locking

OD-BL-UP01

Sealing insert

OD-BL-VP01

Extension cable



OD-BL-KA01

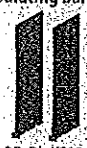
Terminal cover

OD-BL-KS09

Terminal cover

OD-BL-KS04

Insulating barriers



OD-BL-KS02

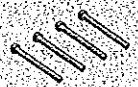
Insulating barriers

OD-BL-KS08

Insulating grommets

OD-BL-KS03

Mounting bolts



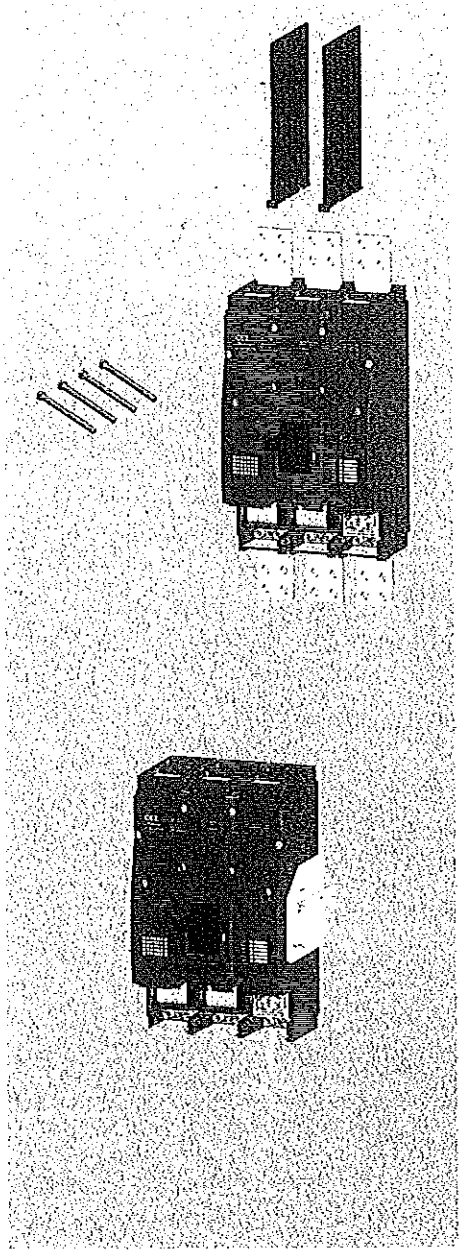
OD-BL-MS02

Terminal cover

OD-BL-KS01

SWITCHING UNITS

3P



Fixed design

Type	Product code	I [A]	I [KA]	Weight [kg]	Package [pc]
BL1000SE305	19381	1 000	65	20	1

- TECHNICAL INFORMATION, see page G6
- the method of power circuit connection must observe recommendations, see page H13 as well as deionization space, see page H16

- Switching unit: includes
  - insulating barriers OD-BL-KS02
  - mounting bolts set OD-BL-MS01 (4x M8x80)
  - connecting sets for front connection - busbars connection

must be fitted with - by overcurrent release SE-BL-J....-.... (circuit breaker)
or switch-disconnector unit SE-BL-J1000-V001 (switch-disconnector)

Withdrawable design

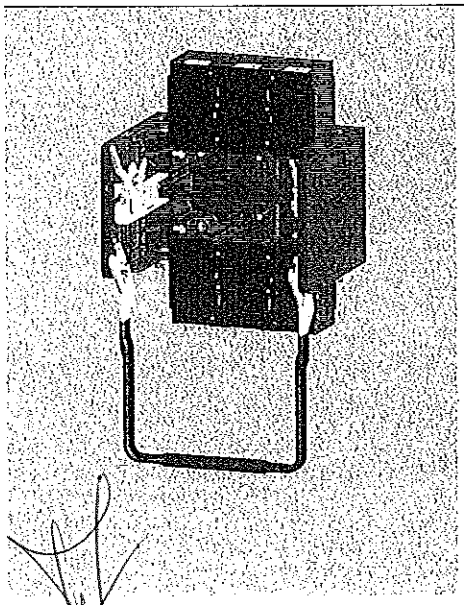
Type	Product code	I [A]	I [KA]	Weight [kg]	Package [pc]
BL1000SE320	19382	1 000	65	23	1

- TECHNICAL INFORMATION, see page G6

- Switching unit must be fitted with: - by overcurrent release SE-BL-J....-.... (circuit breaker)
or switch-disconnector unit SE-BL-J1000-V001 (switch-disconnector)

- withdrawable device ZV-BL-1600-300

WITHDRAWABLE DEVICE



Type	Product code	Name	Weight [kg]	Package [pc]
ZV-BL-1600-300	21010	Withdrawable device	14	1

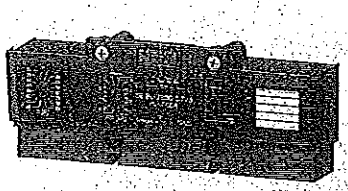
- TECHNICAL INFORMATION, see page H30
- the method of power circuit connection must observe recommendations, see page H30 as well as deionization space, see page H16

- Withdrawable device: must be fitted with - 2 connection sets CS-BL-A010 (front connection)
or CS-BL-A020 (rear connection)

we recommend fitting with - mounting bolts set OD-BL-MS02 (4x M8x60)

OVERCURRENT RELEASES

3P

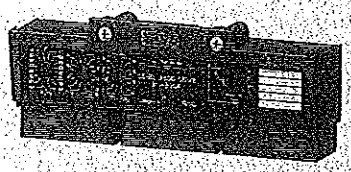


DTV3 - characteristic D - distribution

- protection lines and transformers

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc]
315	SE-BL-J315-DTV3	22111	I_n setting = 125 ÷ 315 A	0.5	1
630	SE-BL-J630-DTV3	22211	I_n setting = 250 ÷ 630 A	0.5	1
800	SE-BL-J800-DTV3	22311	I_n setting = 315 ÷ 800 A	0.5	1
1000	SE-BL-J1000-DTV3	19383	I_n setting = 400 ÷ 1 000 A	0.5	1

- TECHNICAL INFORMATION, see page G7

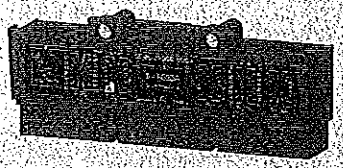


MTV8 - characteristic M - motor

- direct protection for motors and generators
- possibility of protection lines and transformers

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc]
315	SE-BL-J315-MTV8	22101	I_n setting = 125 ÷ 315 A	0.5	1
630	SE-BL-J630-MTV8	22201	I_n setting = 250 ÷ 630 A	0.5	1
800	SE-BL-J800-MTV8	22301	I_n setting = 315 ÷ 800 A	0.5	1
1000	SE-BL-J1000-MTV8	19384	I_n setting = 400 ÷ 1 000 A	0.5	1

- TECHNICAL INFORMATION, see page G8



U001 - characteristic U - universal

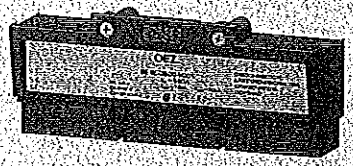
- protection complicated loads or those not specified in advance

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc]
315	SE-BL-J315-U001	20527	I_n setting = 125 ÷ 315 A	0.5	1
630	SE-BL-J630-U001	20526	I_n setting = 250 ÷ 630 A	0.5	1
800	SE-BL-J800-U001	20525	I_n setting = 315 ÷ 800 A	0.5	1
1000	SE-BL-J1000-U001	20524	I_n setting = 400 ÷ 1 000 A	0.5	1

- TECHNICAL INFORMATION, see page G10

SWITCH-DISCONNECTOR UNIT

3P

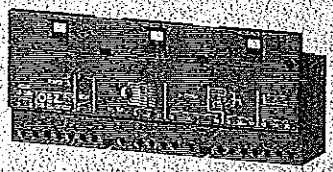


I_n [A]	Type	Product code	Name	Weight [kg]	Package [pc]
1000	SE-BL-J1000-V001	19385	Switch-disconnector unit	0.4	1

- TECHNICAL INFORMATION, see page G6

SIGNALLING UNIT

3P



Type	Product code	Description	Weight [kg]	Package [pc]
SB-BL-0002	13765	for overcurrent releases DTV3, MTV8 and U001	0,67	1

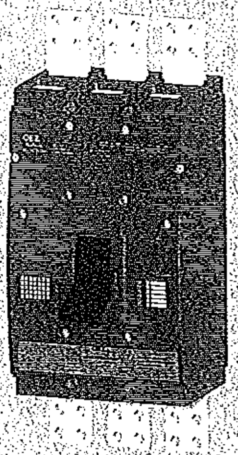
- TECHNICAL INFORMATION, see page H36

- for connecting of circuit breaker with signalling unit CS-BL-B*** block terminals cannot be used

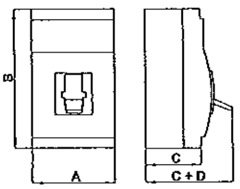
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

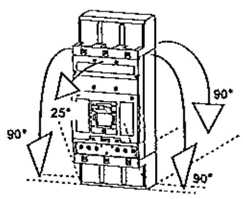
Circuit breaker



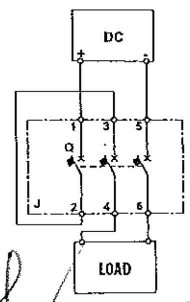
Switch-disconnector



Dimensions



Mounting



Connection of switch-disconnector for DC circuits

Specification

Specification		CIRCUIT BREAKERS	SWITCH-DISCONNECTORS
Type		BL1000S	
Series		SUPERIOR	
Dimensions A x B x C + D		210x350x135+63 mm	210x350x135+63 mm
Weight		20 kg	20 kg
Standards		EN 60947-2 IEC 60947-2	EN 60947-3 IEC 60947-3
Approval marks		CE	
Number of poles		3	3
Rated current	I_n	315, 630, 800, 1 000 A	-
Rated normal current	I_u	1 000 A	1 000 A
Rated operating current	I_e	-	1 000 A
Rated operating voltage	U_e	max. 690 V a.c. -	max. 690 V a.c. max. 440 V d.c.
Rated frequency	f_n	50/60 Hz	50/60 Hz
Rated impulse withstand voltage	U_{imp}	8 kV	8 kV
Rated insulation voltage	U_i	690 V	690 V
Utilization category (selectivity)	690 V a.c.	A, B	AC-23B
Utilization category (switching mode) at I_e = 1 000 A	690 V a.c. 440 V d.c.	- -	AC-23B DC-23B
Rated short-time withstand current at U_e = 690 V a.c.	I_{cw} / t	15 kA/1 s	15 kA/1 s
Rated short-circuit ultimate breaking capacity (rms) [1]	I_{cu} / U_e	85 kA/230 V a.c. 65 kA/415 V a.c. 45 kA/500 V a.c. 20 kA/690 V a.c.	-
Switching off time at I_{cu}		30 ms	
Rated short-circuit service breaking capacity (rms)	I_{cs} / U_e	45 kA/230 V a.c. 36 kA/415 V a.c. 30 kA/500 V a.c. 20 kA/690 V a.c.	-
Rated short-circuit making capacity	I_{cm} / U_e	140 kA/415 V a.c.	30 kA/415 V a.c. 30 kA/440 V d.c.
Losses per 1 pole fixed/withdrawable design		100 W/139 W	100 W/139 W
Mechanical endurance		10 000 cycles	10 000 cycles
Electrical endurance		4 000 cycles	4 000 cycles
Switching frequency		120 cycles/hr	120 cycles/hr
Control force		230 N	230 N
Degree of protection from front side of the device		IP40	IP40
Degree of protection of terminals		IP20	IP20
Operating conditions			
Reference ambient temperature		40 °C	40 °C
Ambient temperature range		-40 ÷ +55 °C	-40 ÷ +55 °C
Working environment		dry and tropical climate	dry and tropical climate
Climatic resistance		EN 60068	EN 60068
Pollution degree		3	3
Max. sea level		2 000 m	2 000 m
Seismic resistance		3g (8 ÷ 50) Hz	3g (8 ÷ 50) Hz
Design modifications			
Front/rear connection		•/•	•/•
Plug-in design		–	–
Withdrawable design		•	•
Accessories			
Switches - auxiliary/relative/signal/early		•/•/–/–	•/•/–/–
Shunt trip		•	•
Undervoltage release/with early switch		•/–	•/–
Front hand drive/with adjustable lever		•/•	•/•
Mechanical interlocking-with Bowden cable/for hand drive		•/•	•/•
Motor drive/with counter of cycles		•/•	•/•
Lever with locking		•	•
Bolt sealing insert/additional cover for overcurrent release		•/–	•/–

• available, – unavailable

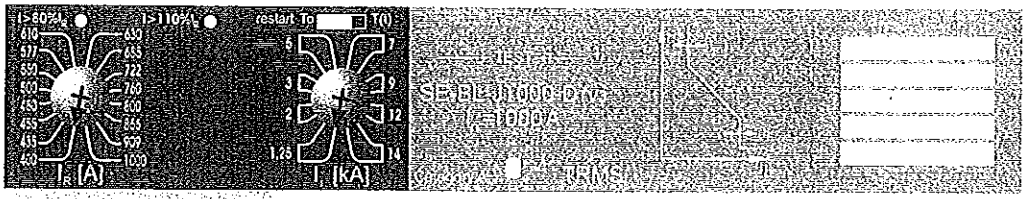
[1] - in case circuit breaker connection is reversed (input terminals 2, 4, 6, output terminals 1, 3, 5) I_{cu} does not change

- protection of Modeion switch-disconnectors, see page R

You can find some more technical information in chapter „BL1000S, BL1600S – Technical information" (Circuit breakers, switch-disconnectors - diagram, connecting, mounting, deionization spaces, dimensions.

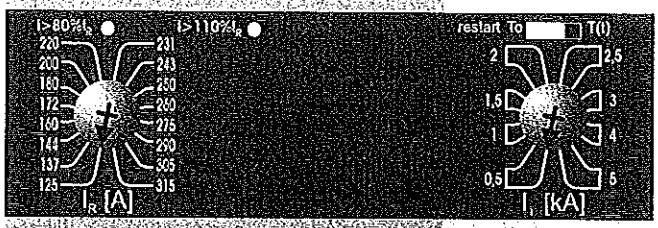
/ERCURRENT RELEASES - DTV3

3P

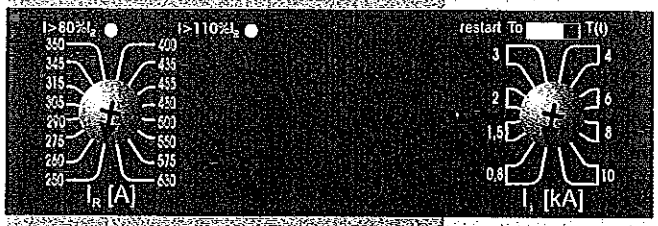


Reduced current Short-circuit release

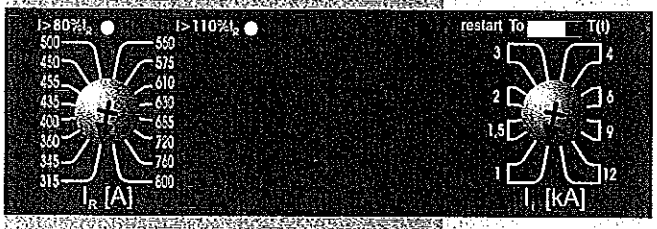
$I_n = 315$ A
E-BL-J315-DTV3



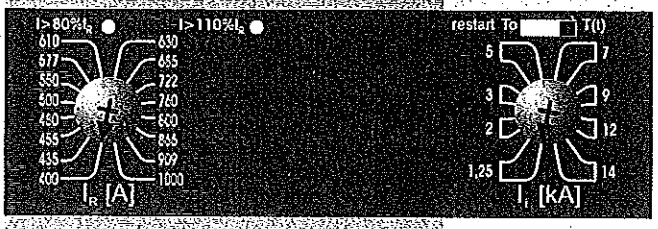
$I_n = 630$ A
E-BL-J630-DTV3



$I_n = 800$ A
E-BL-J800-DTV3



$I_n = 1\,000$ A
-BL-J1000-DTV3

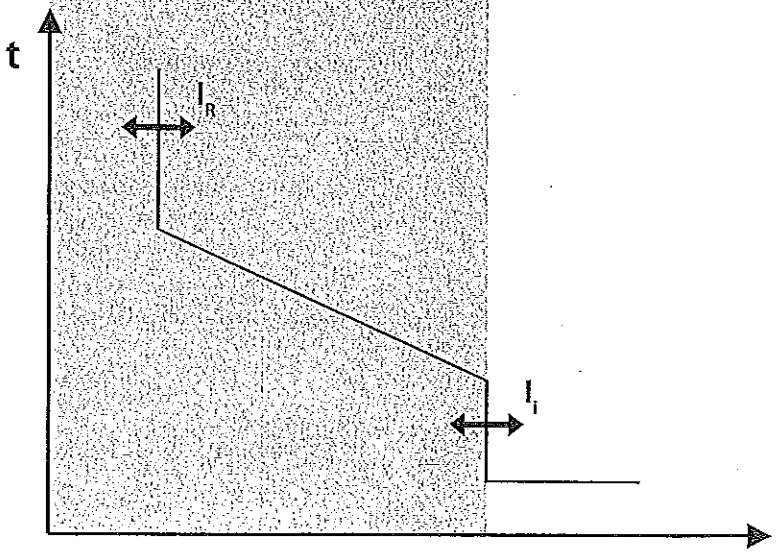


Properties

- suitable for protection of lines and distribution transformers
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(t)}$)
- setting of the value of the short-circuit release I_i in 8 steps
- setting of I_R and I_i by means of the rotary switches is stepwise
- the overcurrent release indicates the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

Switching unit		BL1000...
Overcurrent release		SE-BL-J...
Overcurrent release setting		
Reduced current	I_R	....A
Thermal memory	T	....
Short-circuit release current	I_i	....A

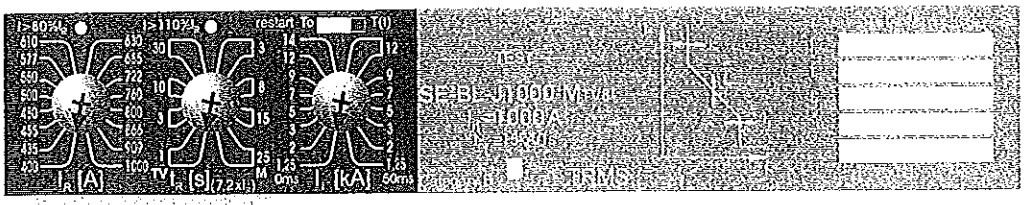


IMPORTANT

- thermal memory must be switched on in protection of transformers and lines - thus the transformer or the line will be protected against repeated overload

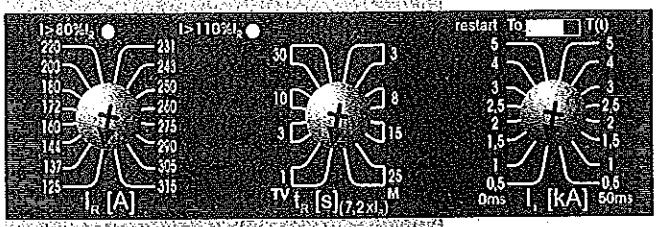
OVERCURRENT RELEASES- MTV8, TV mode

3P

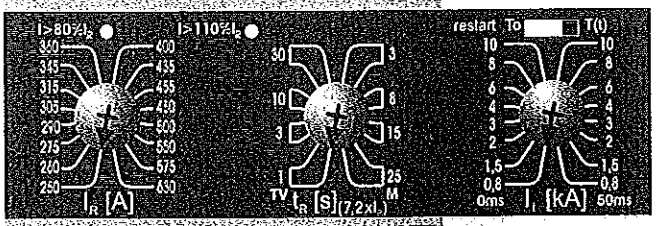


Reduced current | Thermal release delay | Short-circuit release

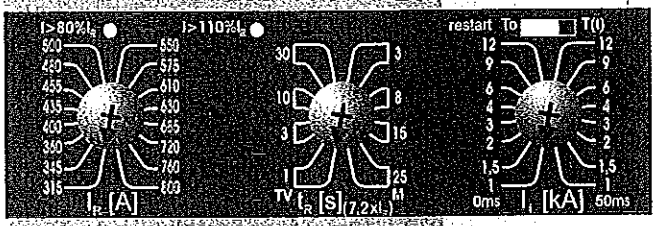
$I_n = 315$ A
SE-BL-J315-MTV8



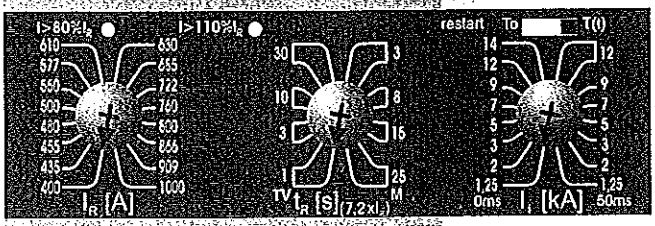
$I_n = 630$ A
SE-BL-J630-MTV8

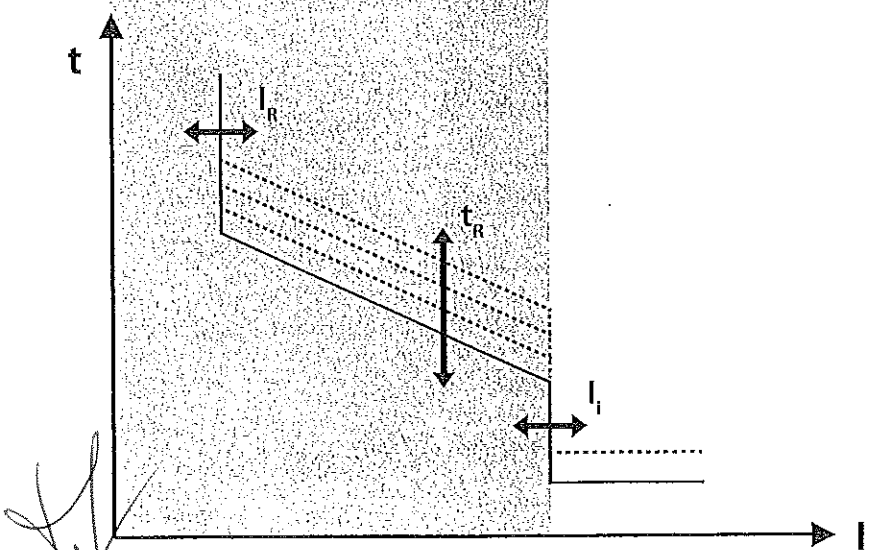


$I_n = 800$ A
SE-BL-J800-MTV8



$I_n = 1\,000$ A
SE-BL-J1000-MTV8





Properties

- TV mode - suitable for protection of lines, distribution transformers and generators
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\,I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(t)}$
- in TV mode the undercurrent release is inactive
- setting of delay of the thermal release t_R 1 s, 3 s, 10 s and 30
- setting of the value of short-circuit release I_i in 8 steps and possibility of switching the short-circuit release off with a delay of 50 ms
- setting of I_R, t_R and I_i by means of the rotary switches is stepwis
- the overcurrent release indicates the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

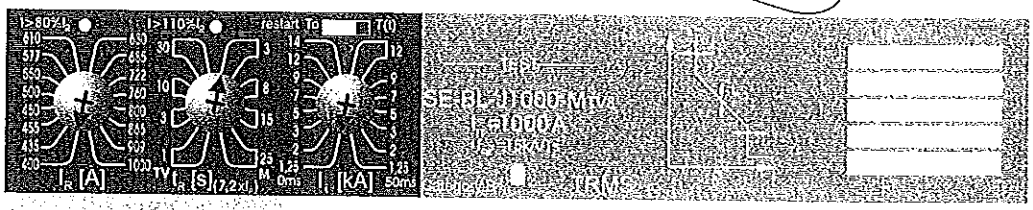
Switching unit		BL1000...
Overcurrent release		SE-BL-J...
Overcurrent release setting		
Reduced current	I_R	....A
Mode		TV
Thermal memory	T	....
Thermal release delay	t_R	....s
Short-circuit release current	I_i	....A
Setting of short-circuit release		....ms

IMPORTANT

- the set value of current of the short-circuit release must correspond to the impedance loop - conditions must be fulfilled for automatic disconnection from power supply in case of failure

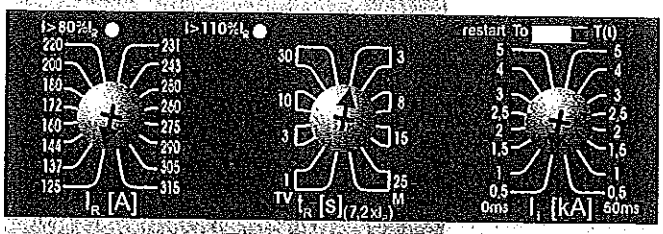
OVERCURRENT RELEASES - MTV8, M mode

3P

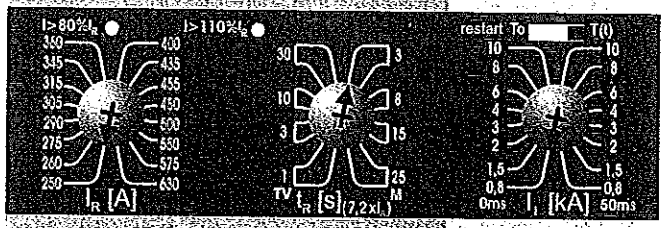


Reduced current | Motor starting | Short-circuit release

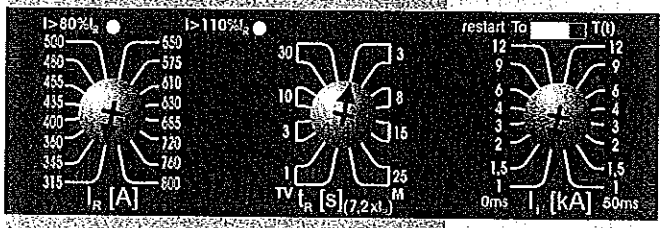
$I_n = 315$ A
SE-BL-J315-MTV8



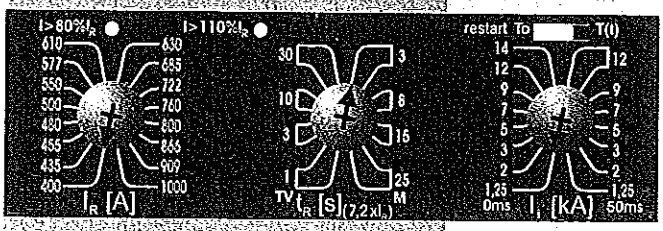
$I_n = 630$ A
SE-BL-J630-MTV8

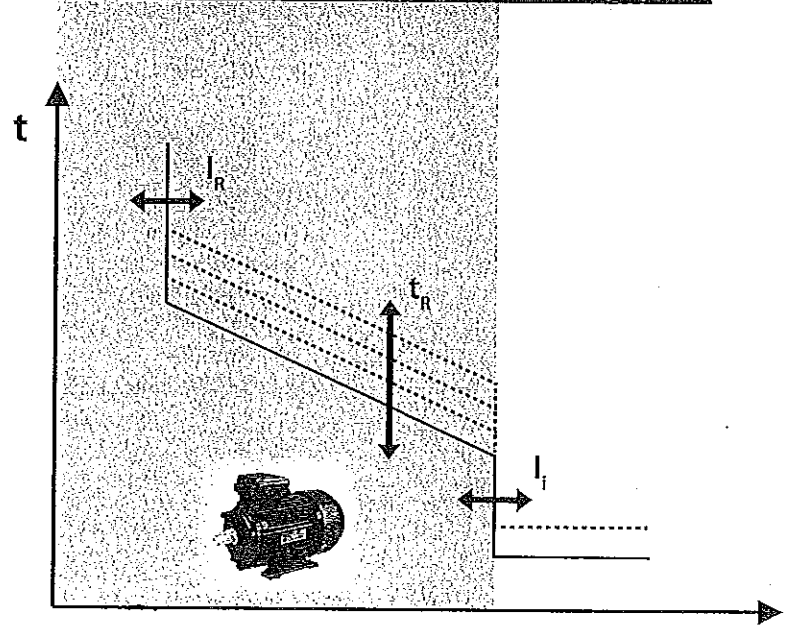


$I_n = 800$ A
SE-BL-J800-MTV8



$I_n = 1\,000$ A
E-BL-J1000-MTV8





Properties

- M mode - suitable for protection of motors
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(s)}$)
- in M mode the undercurrent release is active
- setting of delay of the thermal release t_R 3 s, 8 s, 15 s and 25 s according to the motor starting class
- setting of the value of short-circuit release I_i in 8 steps and possibility of switching the short-circuit release off with a delay of 50 ms
- setting of I_R, t_R and I_i by means of the rotary switches is stepwise
- the overcurrent release indicates the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

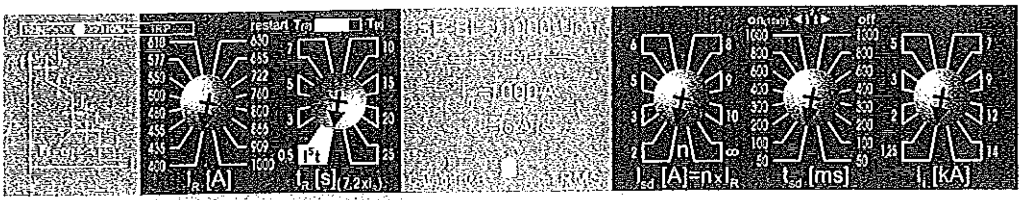
Switching unit		BL1000...
Overcurrent release		SE-BL-J...
Overcurrent release setting		
Reduced current	I_R	... A
Mode		M
Thermal memory	T	...
Thermal release delay	t_R	... s
Short-circuit release current	I_i	... A
Setting of short-circuit release		... ms

IMPORTANT

- M mode must be selected in protection of motors - the motor will be protected in phase failure
- thermal release delay t_R must correspond to the motor starting class
- in protection of motors it is suitable to set the delay of the short-circuit release at 50 ms

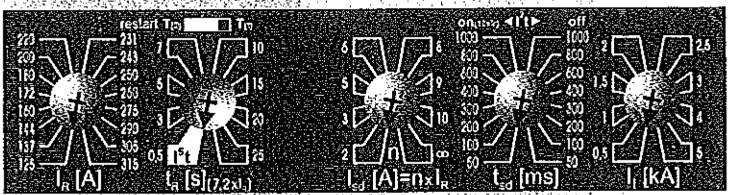
OVERCURRENT RELEASES - U001

3P

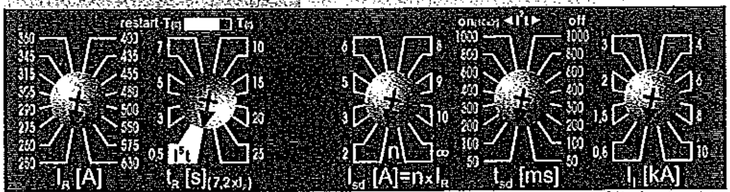


Rated current	Motor starting	Selective release	Short-circuit release

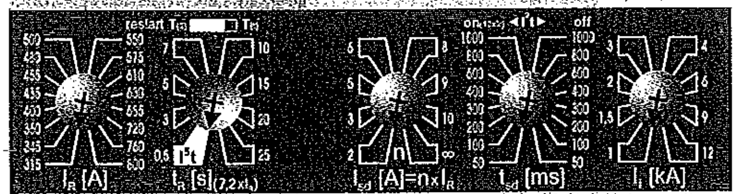
$I_n = 315$ A
SE-BL-J315-U001



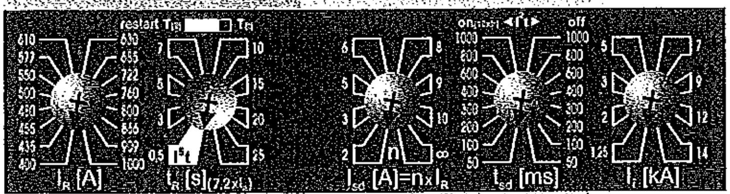
$I_n = 630$ A
SE-BL-J630-U001

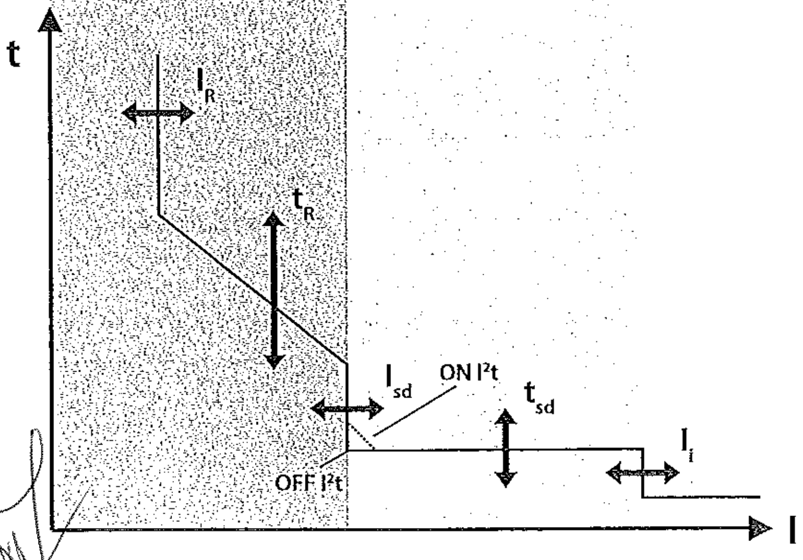


$I_n = 800$ A
SE-BL-J800-U001



$I_n = 1\,000$ A
SE-BL-J1000-U001





Properties

- it is designed for demanding applications with a complicated load and required high selectivity with fuses or circuit breake
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\,I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(}$
- setting of the value of selective release t_R in 8 steps, possibili of setting of gradient of characteristic of the thermal release I²t (adaptation of time-current characteristic of the fuse)
- setting of the value of selective release I_{sd} in 8 steps (independent time-delayed release)
- setting of delay of the selective release t_{sd} 50 to 1000 ms including possibility of setting of a gradient of characteristi of the short-circuit release (adaptation of the time-current characteristic of the fuse)
- setting of the value of the short-circuit release I_i in 8 steps
- setting of I_R, t_R, I_{sd}, t_{sd} and I_i by means of rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED
- the values of parameters of the overcurrent release are se by the manufacturer to minimum

Data for the project

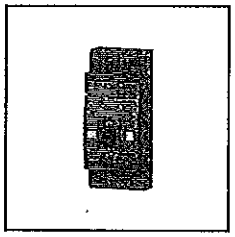
Switching unit		BL1000...
Overcurrent release		SE-BL-J...
Overcurrent release setting		
Reduced current	I_R	... A
Thermal memory	T	...
Setting of the gradient of characteristic of the thermal release	I²t	...
Thermal release delay	t_R	... s
Selective release value	I_{sd}	... A (... x I_R)
Selective release delay	t_{sd}	... ms
Setting of the gradient of characteristic of the short-circuit release	I²t	...
Short-circuit release value	I_i	... A

IMPORTANT

- to achieve as high selectivity as possible, use the possibility of setting of the current and delay including gradient of the time-current characteristic of the independent (short-circuit) time-delayed release.

For selectivity solution, use the calculation program Sichr.

MOULDED CASE CIRCUIT BREAKERS BL1600S



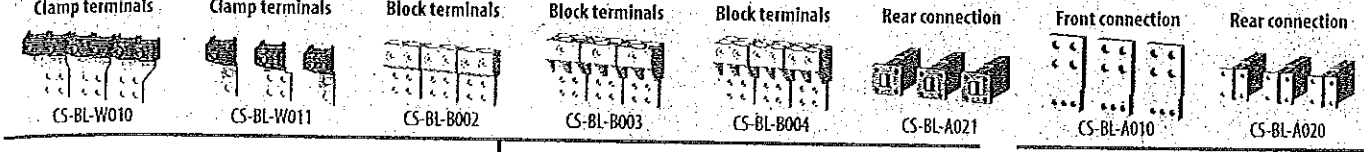
COMMERCIAL INFORMATION

TECHNICAL INFORMATION

SUMMARY OF MODELS AND ACCESSORIES

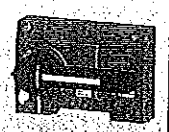
3P

CONNECTING SETS

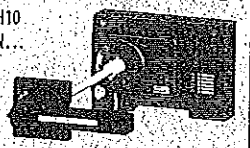


HAND DRIVES

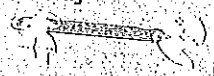
RP-BL-CK10
RP-BL-CP...



RP-BL-CH10
RP-BL-CN...



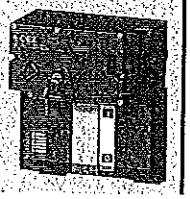
Mechanical interlocking
RL-BL-CB10



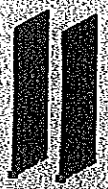
Mechanical blocking with Bowden cable
MB-BL-...

MOTOR DRIVES

MP-BL-X...

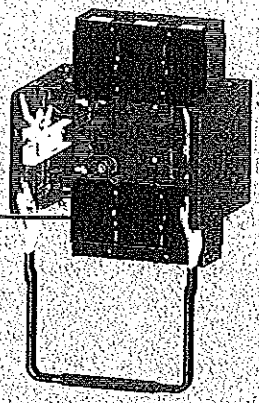


SWITCHING UNIT
BL1600SE30S



SWITCHING UNIT - WITHDRAWABLE DESIGN
BL1600SE320

WITHDRAWABLE DEVICE
ZV-BL-1600-300



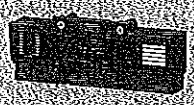
SWITCHES PS-BL-...

Signalling of position
SO-BL-0010

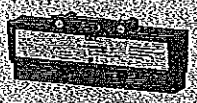
SHUNT TRIP
SV-BL-X...

UNDERVOLTAGE RELEASE
SP-BL-X...

OVERCURRENT RELEASES



SWITCH-DISCONNECTOR UNIT



SIGNALLING UNITS

ACCESSORIES

Lever with locking

OD-BL-UP01

Sealing insert

OD-BL-VP01

Extension cable

OD-BL-KA01

Terminal cover

OD-BL-KS09

Terminal cover

OD-BL-KS04

Insulating barriers

OD-BL-KS02

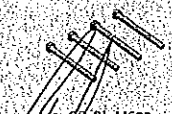
Insulating barriers

OD-BL-KS08

Insulating grommets

OD-BL-KS03

Mounting bolts



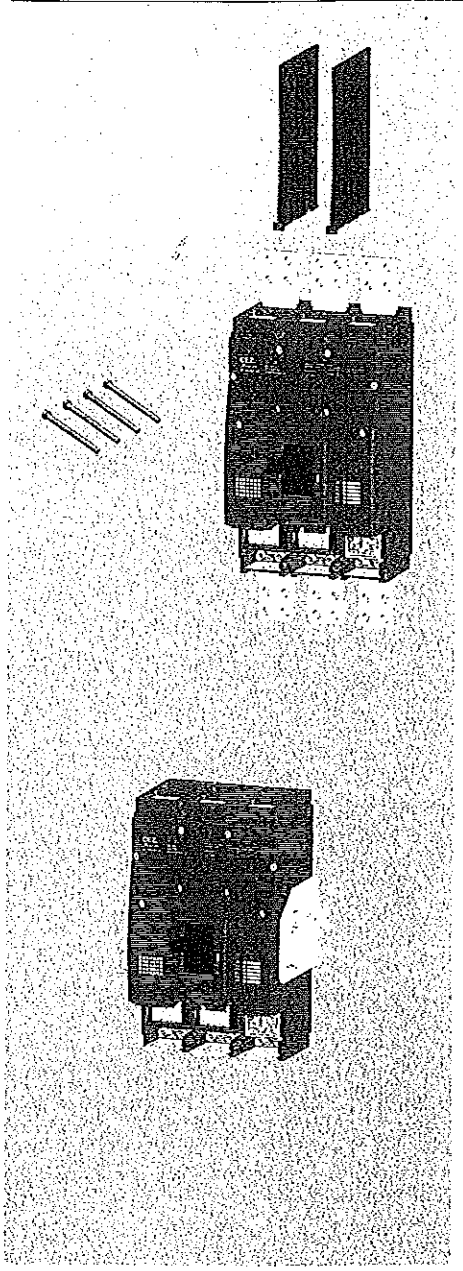
OD-BL-MS02

Terminal cover

OD-BL-KS01

SWITCHING UNITS

3P



Fixed design

Type	Product code	I [A]	I_cs [kA]	Weight [kg]	Package [pcs]
BL1600SE305	14410	1 600	65	22	1

- TECHNICAL INFORMATION, see page H10
- the method of power circuit connection must observe recommendations, see page H13 as well as deionization space see page H16

- Switching unit: includes
  - insulating barriers OD-BL-KS02
  - mounting bolts set OD-BL-MS01 (4x M8x80)
  - connecting sets for front connection - busbars connection

must be fitted with - by overcurrent release SE-BL-....-.... (circuit breaker)
or switch-disconnector unit SE-BL-1600-V001 (switch-disconnector)

Withdrawable design

Type	Product code	I [A]	I_cs [kA]	Weight [kg]	Package [pcs]
BL1600SE320	21000	1 600	65	23	1

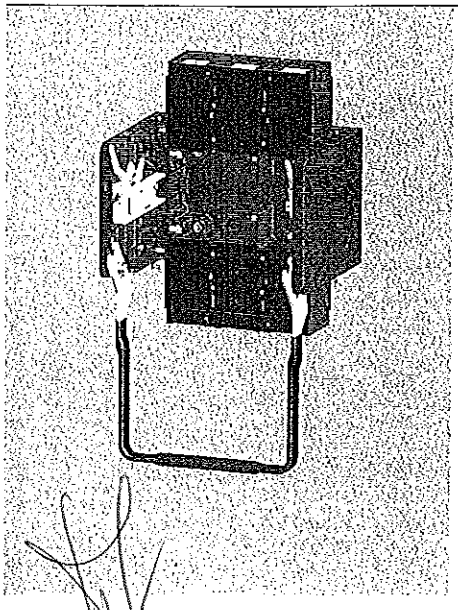
- TECHNICAL INFORMATION, see page H11

- Switching unit must be fitted with: - by overcurrent release SE-BL-....-.... (circuit breaker)
or switch-disconnector unit SE-BL-1600-V001 (switch-disconnector)

- withdrawable device ZV-BL-1600-300

WITHDRAWABLE DEVICE

3P



Type	Product code	Name	Weight [kg]	Package [pcs]
ZV-BL-1600-300	21010	Withdrawable device	14.3	1

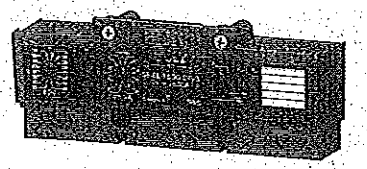
- TECHNICAL INFORMATION, see page H28
- the method of power circuit connection must observe recommendations, see page H30 as well as deionization space, see page H16

- Withdrawable device must be fitted with - 2 connection sets CS-BL-A010 (front connection)
or CS-BL-A020 (rear connection)

we recommend fitting with - mounting bolts set OD-BL-MS02 (4x M8x60)

)VERCURRENT RELEASES

3P

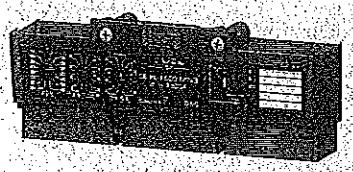


DTV3 - characteristic D - distribution

- protection lines and transformers

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc]
630	SE-BL-0630-DTV3	20070	I_R setting = 250 ÷ 630 A	0.5	1
1 000	SE-BL-1000-DTV3	20080	I_R setting = 400 ÷ 1 000 A	0.5	1
1 250	SE-BL-1250-DTV3	19388	I_R setting = 500 ÷ 1 250 A	0.5	1
1 600	SE-BL-1600-DTV3	20090	I_R setting = 630 ÷ 1 600 A	0.5	1

- TECHNICAL INFORMATION, see page H32

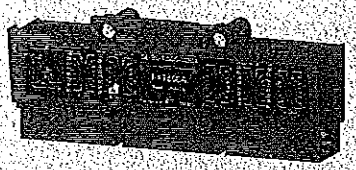


MTV8 - characteristic M - motor

- direct protection for motors and generators
- possibility of protection lines and transformers

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc]
630	SE-BL-0630-MTV8	20071	I_R setting = 250 ÷ 630 A	0.5	1
1 000	SE-BL-1000-MTV8	20081	I_R setting = 400 ÷ 1 000 A	0.5	1
1 250	SE-BL-1250-MTV8	19389	I_R setting = 500 ÷ 1 250 A	0.5	1
1 600	SE-BL-1600-MTV8	20091	I_R setting = 630 ÷ 1 600 A	0.5	1

- TECHNICAL INFORMATION, see page H33



U001 - characteristic U - universal

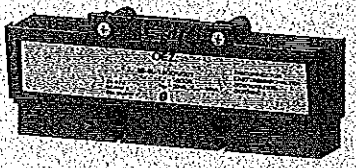
- protection complicated loads or those not specified in advance

I_n [A]	Type	Product code	Description	Weight [kg]	Package [pc]
630	SE-BL-0630-U001	20523	I_R setting = 250 ÷ 630 A	0.59	1
1 000	SE-BL-1000-U001	20364	I_R setting = 400 ÷ 1 000 A	0.59	1
1 250	SE-BL-1250-U001	20521	I_R setting = 500 ÷ 1 250 A	0.59	1
1 600	SE-BL-1600-U001	20363	I_R setting = 630 ÷ 1 600 A	0.59	1

- TECHNICAL INFORMATION, see page H35

SWITCH-DISCONNECTOR UNIT

3P

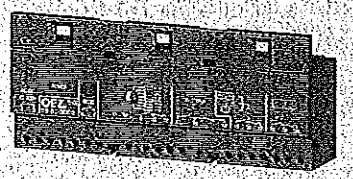


I_n [A]	Type	Product code	Name	Weight [kg]	Package [pc]
1 600	SE-BL-1600-V001	20400	Switch-disconnector unit	0.4	1

- TECHNICAL INFORMATION, see page H11

SIGNALLING UNITS

3P



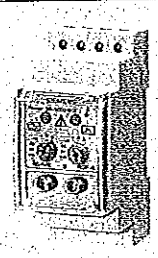
Type	Product code	Description	Weight [kg]	Package [pc]
SB-BL-0002	13765	- for overcurrent releases DTV3, MTV8 and U001	0.67	1

- TECHNICAL INFORMATION, see page H36

- for connecting of circuit breaker with signalling unit CS-BL-B*** block terminals cannot be used

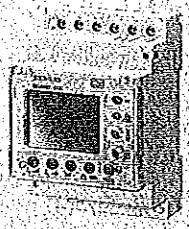
RESIDUAL CURRENT MONITOR

3P 4P



Type	Product code	Description	Weight [kg]	Package [set]
5SV8000-6KK	42658	Analogue design, $I_{\Delta n}$ and $t_{\Delta n}$ setting	0.18	1

- TECHNICAL INFORMATION, see page P4

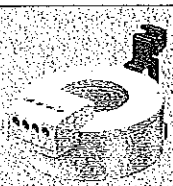


Type	Product code	Description	Weight [kg]	Package [set]
5SV8001-6KK	42659	Digital design, $I_{\Delta n}$ and $t_{\Delta n}$ setting	0.26	1
5SV8200-6KK	42660	Digital design, $I_{\Delta n}$ and $t_{\Delta n}$ setting, 4 channels	0.26	1

- TECHNICAL INFORMATION, see page P4

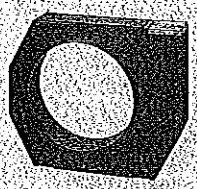
CURRENT TRANSFORMERS FOR RESIDUAL CURRENT MONITOR

3P 4P



Type	Product code	Description	Weight [kg]	Package [set]
5SV8700-0KK	42661	Internal diameter 20 mm, including holder on „U" rail according to EN 60715 wide 35 mm	0.09	1
5SV8701-0KK	42662	Internal diameter 30 mm, including holder on „U" rail according to EN 60715 wide 35 mm	0.11	1

- TECHNICAL INFORMATION, see page P4



Type	Product code	Description	Weight [kg]	Package [set]
5SV8702-0KK	42663	Internal diameter 35 mm, including holder on the panel	0.2	1
5SV8703-0KK	42664	Internal diameter 70 mm, including holder on the panel	0.31	1
5SV8704-0KK	42665	Internal diameter 105 mm, including holder on the panel	0.6	1
5SV8705-0KK	42666	Internal diameter 140 mm, including holder on the panel	1.35	1
5SV8706-0KK	42667	Internal diameter 210 mm, including holder on the panel	1.25	1

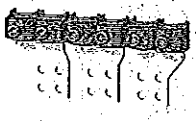
- TECHNICAL INFORMATION, see page P4

Type	Product code	Description	Weight [kg]	Package [set]
5SV8 900-1KK	42668	Holder on „U" rail according to EN 60715 wide 35 mm for current transformers with internal diameter up to and including 105 mm	0.01	2

- TECHNICAL INFORMATION, see page P4

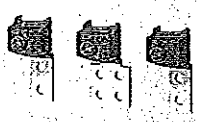
CONNECTING SETS

3P



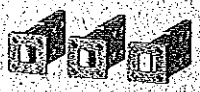
Type	Product code	Description	S [mm²]	Method of connection	Weight [kg]	Package [set][1]
CS-BL-W010	20710	Clamp terminals - double	2x(70÷240)	Cu/Al cables	1.47	1

- TECHNICAL INFORMATION, see page H13
- for connection four 70 ÷ 240 mm² cables per pole, it is possible to use two CS-BL-W010 connecting sets, see page H19 (not for BL1000SE305 switching unit)
- conductor cross-section for potential terminal is 2.5 mm²



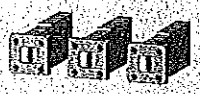
CS-BL-W011	20930	Clamp terminals	70÷240	Cu/Al cables	0.663	1

- TECHNICAL INFORMATION, see page H13
- for connection three 70 ÷ 240 mm² cables per pole, it is possible to combine CS-BL-W011 connecting set with CS-BL-W010 connecting set, see page H16, H19 (not for BL1000SE305 switching unit)



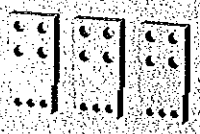
CS-BL-A022	20611	Rear connection - up to 1 000 A - for fixed design		Cu/Al busbars	1.43	1

- TECHNICAL INFORMATION, see page H13



CS-BL-A021	20610	Rear connection - up to 1 600 A - for fixed design		Cu/Al busbars	2.76	1

- TECHNICAL INFORMATION, see page H13

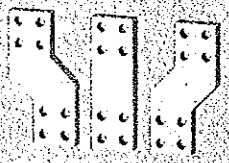


CS-BL-A010	21050	Front connection - for withdrawable design		Cu/Al busbars	2.73	1

- TECHNICAL INFORMATION, see page H13

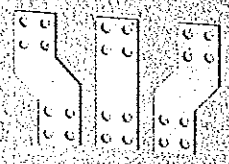
CS-BL-A020	21070	Rear connection - for withdrawable design		Cu/Al busbars	3.42	1

- TECHNICAL INFORMATION, see page H13



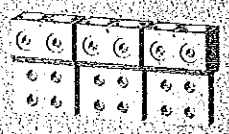
CS-BL-A015	41469	Front connection - for fixed design, for BL1600		Cu/Al busbars	4.5	1

- TECHNICAL INFORMATION, see page H13



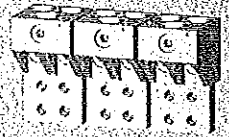
CS-BL-A016	41470	Front connection - for fixed design, for BL1000		Cu/Al busbars	3.00	1

- TECHNICAL INFORMATION, see page H13



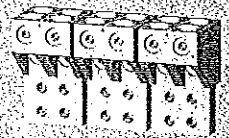
CS-BL-B002	20116	Block terminal - for 2 cables	150÷300	Cu/Al cables	1.00	1

- TECHNICAL INFORMATION, see page H13
- conductor cross-section for potential terminal is 1.5 ÷ 6 mm²
- it is necessary to use insulating barriers
- using the OD-BD-KS09 cover the degree of protection IP20 is fulfilled without the need to apply insulating barriers



CS-BL-B003	20117	Block terminal - for 3 cables	150÷300	Cu/Al cables	2.00	1

- TECHNICAL INFORMATION, see page H13
- conductor cross-section for potential terminal is 1.5 ÷ 6 mm²
- it is necessary to use insulating barriers
- using the OD-BD-KS09 cover the degree of protection IP20 is fulfilled without the need to apply insulating barriers



CS-BL-B004	20118	Block terminal - for 4 cables	150÷300	Cu/Al cables	1.80	1

- TECHNICAL INFORMATION, see page H13
- conductor cross-section for potential terminal is 1.5 ÷ 6 mm²
- it is necessary to use insulating barriers
- using the OD-BD-KS09 cover the degree of protection IP20 is fulfilled without the need to apply insulating barriers

[1] - one set provides for connecting one side of the circuit breaker (set includes three terminals with necessary coupling elements)

AUXILIARY SWITCHES

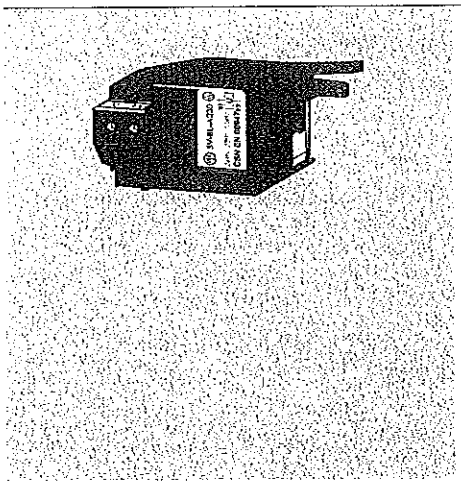
3P

Type	Product code	Operating voltage	Contacts	Weight [kg]	Package [pc]
PS-BL-2200	20510	60÷500V a.c./60÷240V d.c.		0.041	1
PS-BL-2200-Au	12808	5÷60V a.c./d.c.		0.041	1

- TECHNICAL INFORMATION, see page H37

SHUNT TRIPS

3P

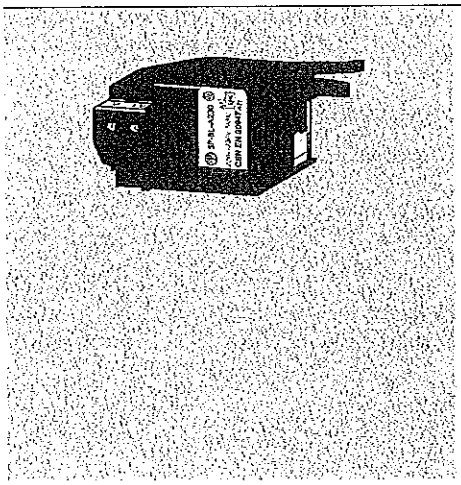


Type	Product code	Operating voltage	Weight [kg]	Package [pc]
SV-BL-X024	16162	24V a.c/d.c.	0.22	1
SV-BL-X048	16161	48V a.c/d.c.	0.22	1
SV-BL-X110	16160	110V a.c/d.c.	0.22	1
SV-BL-X230	16159	230V a.c./220V d.c.	0.22	1
SV-BL-X400	16158	400V a.c.	0.22	1
SV-BL-X500	16157	500V a.c.	0.22	1

- TECHNICAL INFORMATION, see page H38

UNDERVOLTAGE RELEASES

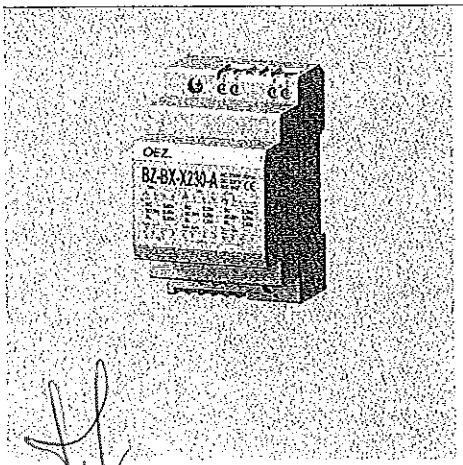
3P



Type	Product code	Operating voltage	Weight [kg]	Package [pc]
SP-BL-X024	16168	24V a.c/d.c.	0.22	1
SP-BL-X048	16167	48V a.c/d.c.	0.22	1
SP-BL-X110	16166	110V a.c/d.c.	0.22	1
SP-BL-X230	16165	230V a.c./220V d.c.	0.22	1
SP-BL-X400	16164	400V a.c.	0.22	1
SP-BL-X500	16163	500V a.c.	0.22	1

- TECHNICAL INFORMATION, see page H39

DELAY UNIT



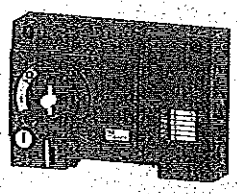
Type	Product code	Description	Weight [kg]	Package [pc]
BZ-BX-X230-A	36696	- Enables to delay the undervoltage release tripping of circuit breakers Modelon	0.12	1

- the delay can be set up at three levels (according to wiring)

- TECHNICAL INFORMATION, see page P2

HAND DRIVES

3P



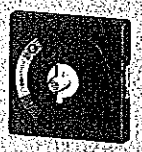
Type	Product code	Name - description	Weight [kg]	Package [pc]
RP-BL-CK10	20850	Hand drive unit - with locking	0.23	1
RP-BL-CK52	20678	Hand drive unit, 2 pcs, with the same lock and key	0.46	1
RP-BL-CK53	20679	Hand drive unit, 3 pcs, with the same lock and key	0.69	1
RP-BL-CK54	20680	Hand drive unit, 4 pcs, with the same lock and key	0.92	1
RP-BL-CK55	20681	Hand drive unit, 5 pcs, with the same lock and key	1.15	1

- TECHNICAL INFORMATION, see page H40

Hand drive unit must be fitted with: ■ for controlling on switch unit - with the black hand drive lever RP-BL-CP
■ for controlling through the switchboard door - with the extension shaft RP-BL-CH10
- with the hand drive bearing RP-BL-CN..
- with the hand drive lever RP-BL-CP..

RP-BL-CP10	20865	Hand drive lever - black - with locking	0.261	1
RP-BL-CP11	20867	Hand drive lever - red - with locking	0.261	1

- TECHNICAL INFORMATION, see page H40

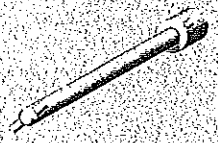


RP-BL-CN10	20870	Hand drive bearing - degree of protection IP44	1.1	1

- TECHNICAL INFORMATION, see page H40

RP-BL-CN20	19103	Hand drive bearing - degree of protection IP66	1.1	1

- TECHNICAL INFORMATION, see page H40

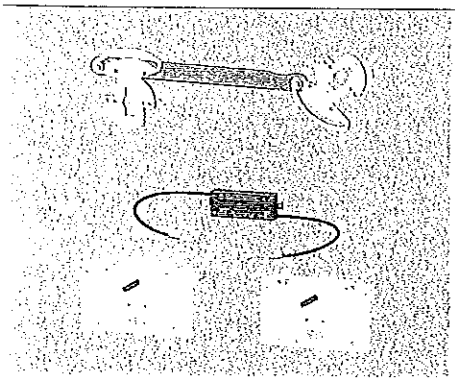


RP-BL-CH10	20875	Extension shaft - length 365 mm	0.352	1

- TECHNICAL INFORMATION, see page H40

MECHANICAL INTERLOCKING

3P



For hand drive

Type	Product code	Description	Weight [kg]	Package [pc]
RP-BL-CB10	20880	For circuit breakers/switch-disconnectors in fixed design	0.12	1

- TECHNICAL INFORMATION, see page H41
- Both circuit breakers must be equipped with a hand drive (at least one with a hand drive unit and hand drive lever)

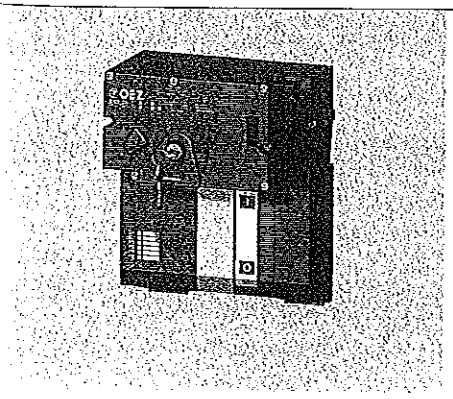
With Bowden cable

Type	Product code	Description	Weight [kg]	Package [pc]
MB-BL-PP07	19807	For circuit breakers/switch-disconnectors in fixed design	0.4	1
MB-BL-PV08	20529	For one fixed and one withdrawable circuit breaker/switch-disconnector	0.4	1
MB-BL-VV06	20528	For circuit breakers/switch-disconnectors in withdrawable design	0.4	1

- TECHNICAL INFORMATION, see page H43

MOTOR DRIVES

3P

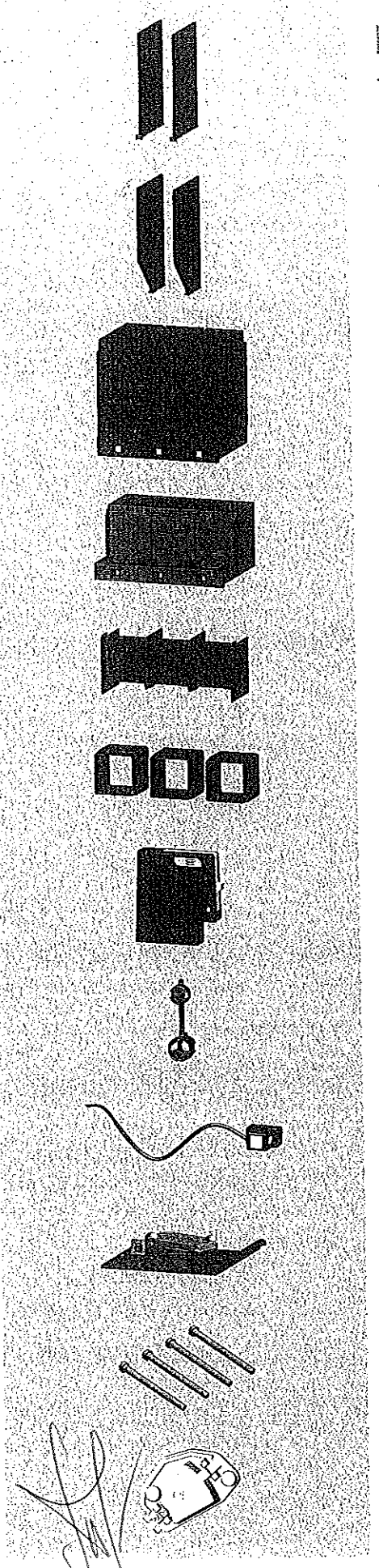


Type	Product code	Name - description	Operating voltage	Weight [kg]	Package [pc]
MP-BL-X110	11601	Motor drive	110 V a.c./d.c.	4.35	1
MP-BL-X230	11600	Motor drive	230 V a.c./220 V d.c.	4.35	1
MP-BL-X110-P	11604	Motor drive - with counter of cycles	110 V a.c./d.c.	4.4	1
MP-BL-X230-P	11605	Motor drive - with counter of cycles	230 V a.c./220 V d.c.	4.4	1

- TECHNICAL INFORMATION, see page H43

ACCESSORIES

3P



Type	Product code	Name - description	Weight [kg]	Package [pc]
OD-BL-KS02	20910	Insulating barriers - for switching unit in fixed design	0.264	1

- in case of reversed connection (supply to terminals 2, 4, 6), must be installed also on lower side
- included with each switching unit order in fixed design

OD-BL-KS08	20569	Insulating barriers - for withdrawable device	0.142	1

- must always be installed on withdrawable device when clamp or block type terminals are used for its connection

OD-BL-KS09	39893	Terminal cover – degree of protection IP20	0.7	1

- increases degree of protection of connection point to IP20 when using CS-BL-B002, CS-BL-B003, CS-BL-B004 block type terminals
- it is intended for fixed design

OD-BL-KS01	20810	Terminal cover - for circuit breaker/switch-disconnector in fixed design with rear connection	0.287	1

- increases degree of protection of connection point to IP20

OD-BL-KS04	20940	Terminal cover - for withdrawable device with front connection	0.168	1

- intended for withdrawable device with front connection
- we recommend its installation on both sides of withdrawable device for increasing safety in servicing electrical device

OD-BL-KS03	20920	Insulating grommets - for rear connection	0.1	1

- are intended for fixed design of switching unit and withdrawable device with rear connection
- insulate connecting sets of rear connection from switchboard structure
- we recommend installing on all connecting sets with rear connection
- set (3 pieces)

OD-BL-UP01	13621	Lever with locking	0.041	1

- enables to lock the lever of circuit breaker in „switched off manually" position (loaded)
- locking is possible using up to three padlocks with max. shank diameter 4 ÷ 6 mm

OD-BL-VP01	13924	Bolt sealing insert	0.003	2

enables sealing for:
- overcurrent release
- cover of cavities

OD-BL-KA01	21030	Connecting cable - for connecting circuit breaker accessories in withdrawable design - 15 wires	0.12	1

SO-BL-0010	21020	Signalling of position - signals circuit breaker/switch-disconnector position in withdrawable design	0.02	1

- TECHNICAL INFORMATION, see page H28

OD-BL-MS02	14855	Mounting bolts set - for withdrawable device	0.144	1

- bolts M8x60

OD-BL-KT01	14643	Cover of switch on button - for motor drive, cover can be sealed	0.019	1

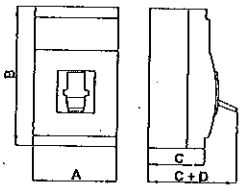
- TECHNICAL INFORMATION, see page H43

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

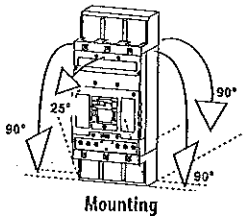
3P

Circuit breaker

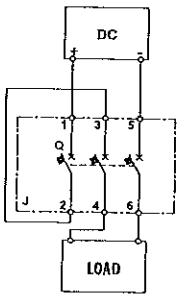
Switch-disconnector



Dimensions



Mounting



Connection of switch-disconnector for DC circuits

Specifications

		CIRCUIT BREAKERS	SWITCH-DISCONNECTORS
Type		BL1600S	
Series		SUPERIOR	
Dimensions A x B x C + D		210 x 350 x 135 + 63 mm	210 x 350 x 135 + 63 mm
Weight		22 kg	22 kg
Standards		EN 60947-2 IEC 60947-2	EN 60947-3 IEC 60947-3
Approval marks		CE	
Number of poles		3	3
Rated current	I_n	630, 1 000, 1 250, 1 600 A	-
Rated normal current	I_u	1 600 A	1 600 A
Rated operating current	I_e	-	1 600 A
Rated operating voltage	U_e	max. 690 V a.c.[2] -	max. 690 V a.c.[2] max. 440 V d.c.
Rated frequency	f_n	50/60 Hz	50/60 Hz
Rated impulse withstand voltage	U_{imp}	8 kV	8 kV
Rated insulation voltage	U_i	690 V	690 V
Utilization category (selectivity)	690 V a.c.	A, B	-
Utilization category (switching mode)	690 V a.c. 440 V d.c.	- -	AC-23B DC-23B
Rated short-time withstand current at U_e = 690 V a.c.	I_{cw} / t	20 kA/1 s	20 kA/1 s
Rated short-circuit ultimate breaking capacity (rms) [1]	I_{cu} / U_e	85 kA/230 V a.c. 65 kA/415 V a.c. 45 kA/500 V a.c. 20 kA/690 V a.c.	-
Switching off time at I_{cw}		30 ms	-
Rated short-circuit service breaking capacity (rms)	I_{cs} / U_e	45 kA/230 V a.c. 36 kA/415 V a.c. 30 kA/500 V a.c. 20 kA/690 V a.c.	-
Rated short-circuit making capacity	I_{cm} / U_e	140 kA/415 V a.c.	40 kA/415 V a.c. 40 kA/440 V d.c.
Losses per 1 pole fixed/withdrawable design		120 W/300 W	120 W/300 W
Mechanical endurance		10 000 cycles	10 000 cycles
Electrical endurance		4 000 cycles	4 000 cycles
Switching frequency		120 cycles/hr	120 cycles/hr
Control force		230 N	230 N
Degree of protection from front side of the device		IP40	IP40
Degree of protection of terminals		IP20	IP20
Operating conditions			
Reference ambient temperature		40 °C	40 °C
Ambient temperature range		-40 ÷ +55 °C	-40 ÷ +55 °C
Working environment		dry and tropical climate	dry and tropical climate
Climatic resistance		EN 60068	EN 60068
Pollution degree		3	3
Max. sea level		2 000 m	2 000 m
Seismic resistance		3g (8 ÷ 50) Hz	3g (8 ÷ 50) Hz
Design modifications			
Front/rear connection		•/•	•/•
Plug-in design		–	–
Withdrawable design		•	•
Accessories			
Switches - auxiliary/relative/signal/early		•/•/–/–	•/•/–/–
Shunt trip		•	•
Undervoltage release/with early switch		•/–	•/–
Front hand drive/with adjustable lever		•/•	•/•
Mechanical interlocking - with Bowden cable/for hand drive		•/•	•/•
Motor drive/with counter of cycles		•/•	•/•
Lever with locking		•	•
Bolt sealing insert/additional cover for overcurrent release		•/–	•/–

• available, – unavailable

[1] - in case circuit breaker connection is reversed (input terminals 2, 4, 6, output terminals 1, 3, 5) I_{cu} does not change

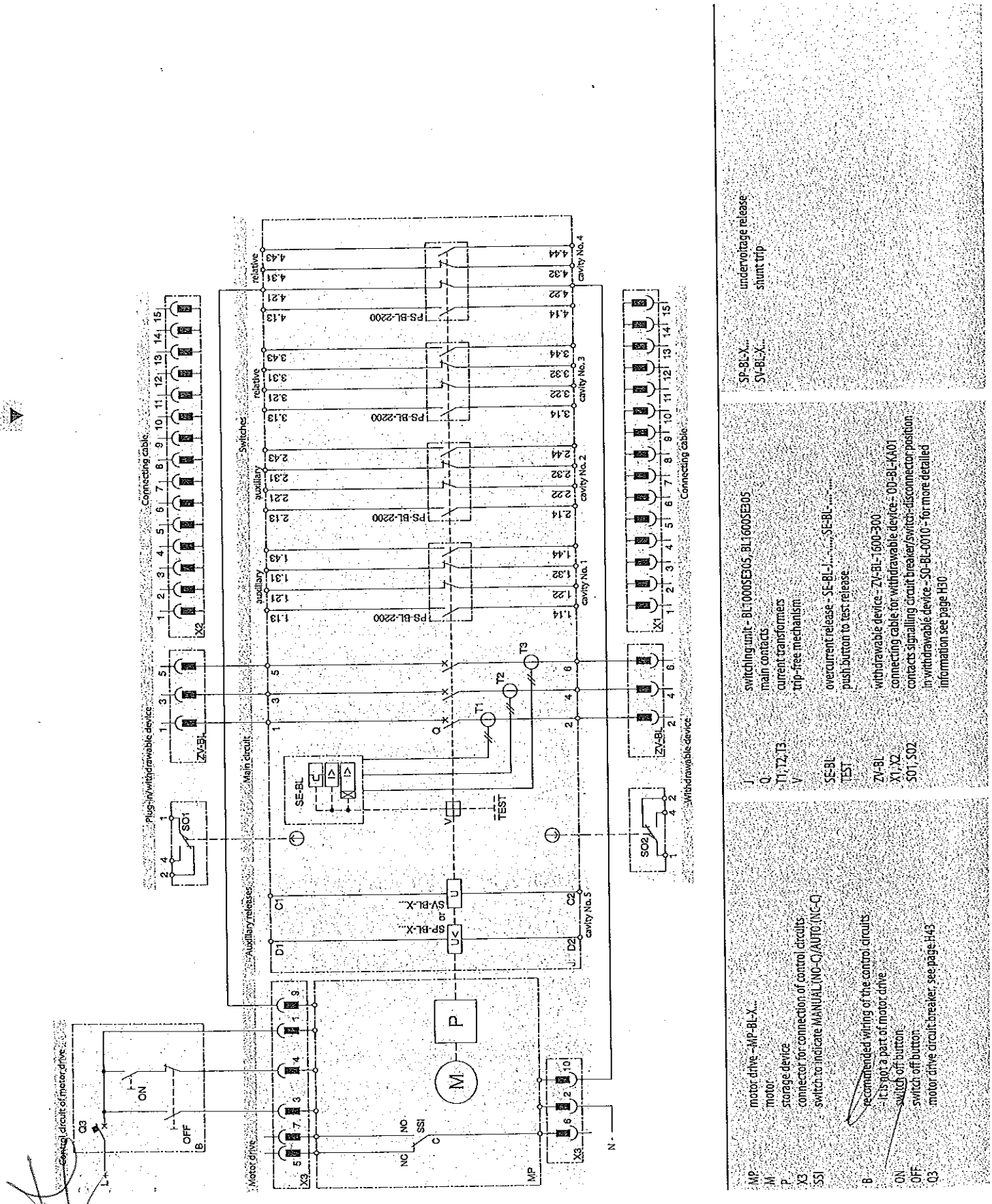
[2] - in IT networks up to 500 V a.c.

- protection of Modeion switch-disconnectors, see page R

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Diagram

Circuit breaker with accessories



CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

Connecting and installation

Power circuit

- connected with Cu/Al busbars or cables, and possibly cables with cable lugs
- connection sets are produced to provide greater connecting options see page H7
- generally, conductors from the supply are connected to input terminals 1, 3, 5 and conductors from the load to terminals 2, 4, 6; however, it is possible to reverse the connection (exchanging input and output terminals without limiting rated short-circuit ultimate breaking capacity I_{cu})
- **in case of reversed connection, circuit breaker/switch-disconnector must be fitted with ODBL-S02 insulating barriers also on the side of terminals 2, 4, 6, for more detailed information see page H16**
- we recommend painting the connecting busbars
- **input and output conductors/busbars must be mechanically reinforced to avoid transfering electrodynamic force to the circuit breaker/switch-disconnector during short-circuiting**
- **the method of connecting the power circuit must observe the deionization space of the circuit breaker/ switch-disconnector, see page H16**

Auxiliary circuits

- switches, shunt trips or undervoltage releases are connected using flexible Cu conductors with cross-section 0.5 ÷ 1 mm² directly to terminals on these devices
- motor drive and auxiliary circuits of the plug-in or withdrawable design are connected using a connector

Recommended min. cross-section of cables and busbars (flexibars) for fixed and withdrawable design

I_n (40 °C) [A]	Cables S [mm²]		Busbars W x H [mm]	
	Cu	Al	Cu	Al
250	120	150		
400	185	240		
500	2x 150	2x 185		
630	2x 185	2x 240		
800	2x 240	3x 240	50 x 10; 2x 50 x 5	2x 50 x 8
1 000	2x 240	3x 240	2x 50 x 6	2x 50 x 10
1 300	3x 240	4x 240	2x 50 x 10	
1 500 (1 450) [1]	4x 240			
1 600 (1 450) [1]			2x 50 x 10 [1]	

[1] withdrawable device connected by 2x 50 x 10 mm Cu busbar can be loaded with max. 1 450 A. For 1 600 A loading, the withdrawable device must be connected with 2x 50 x 12 mm busbar.

- it is necessary to follow the relevant valid standards when cables are designed

Maximum circuit breaker/switch-disconnector loads in accordance with ambient temperature

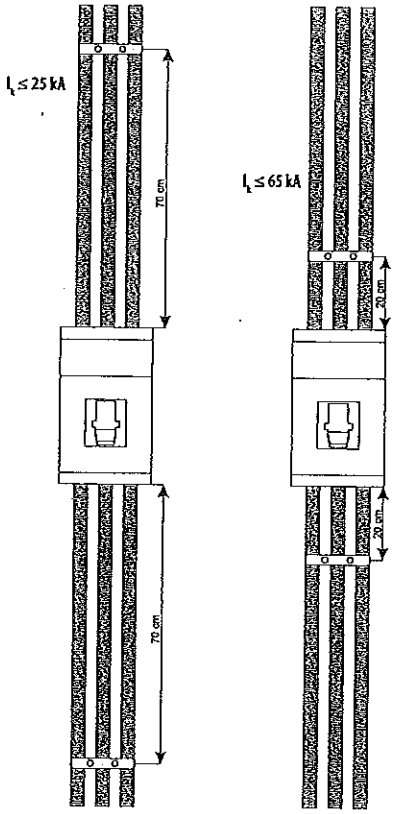
Circuit breaker/switch-disconnector BL1000S
- connection by Cu busbars 2x 50 x 6 mm per pole

50 °C	55 °C	60 °C	65 °C	70 °C
1 000 A	1 000 A	940 A	870 A	800 A

Circuit breaker/switch-disconnector BL1600S
- connection by Cu busbars 2x 50 x 10 mm per pole

50 °C	55 °C	60 °C	65 °C	70 °C
1 400 A	1 300 A	1 200 A	1 100 A	1 000 A

Mechanical reinforcement of conductors for BL1000, BL1600



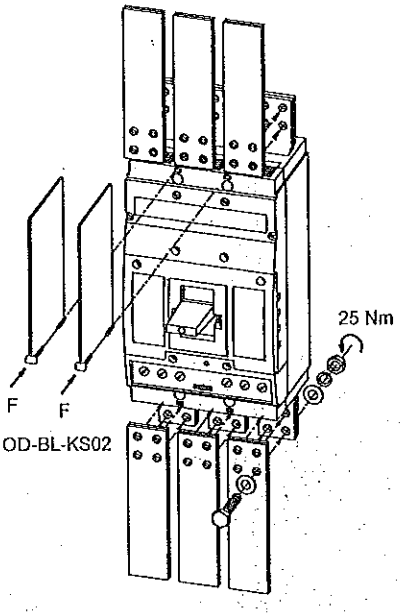
Connecting set specification

Type	I_n [A]	Cable range of connection cross-sections S [mm²]				
		type of cable: sector stranded	sector solid	round stranded	round solid	Busbars W x H [mm] — Dimensional drawing
CS-BL-W010	800	2x (70 ÷ 240) Cu/Al	2x (95 ÷ 300) Cu/Al	2x (50 ÷ 185) Cu/Al	2x (70 ÷ 240) Cu/Al	page H18, H25
CS-BL-W011	500	70 ÷ 240 Cu/Al	95 ÷ 300 Cu/Al	50 ÷ 185 Cu/Al	70 ÷ 240 Cu/Al	page H18, H26
CS-BL-B002	1 000	2x (150 ÷ 300) Cu/Al	2x (150 ÷ 300) Cu/Al	2x (150 ÷ 300) Cu/Al	2x (150 ÷ 300) Cu/Al	page H19
CS-BL-B003	1 500	3x (150 ÷ 300) Cu/Al	3x (150 ÷ 300) Cu/Al	3x (150 ÷ 300) Cu/Al	3x (150 ÷ 300) Cu/Al	page H19, H26
CS-BL-B004	1 600	4x (150 ÷ 300) Cu/Al	4x (150 ÷ 300) Cu/Al	4x (150 ÷ 300) Cu/Al	4x (150 ÷ 300) Cu/Al	page H20, H27
CS-BL-A022	1 000					50 x ... page H17/H27
CS-BL-A021	1 600					50 x ... page H17
CS-BL-A010	1 600					50 x ... page H24
CS-BL-A020	1 600					50 x ... page H25
CS-BL-A015	1 600					50 x ... page H20
CS-BL-A016	1 000					50 x ... page H21

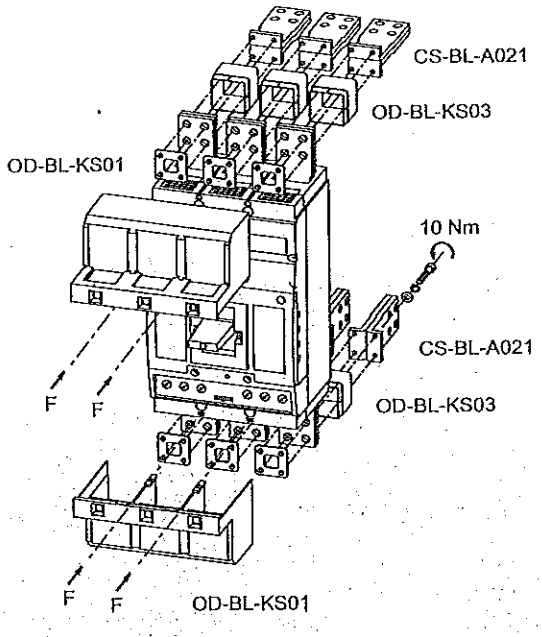
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Connecting and installation

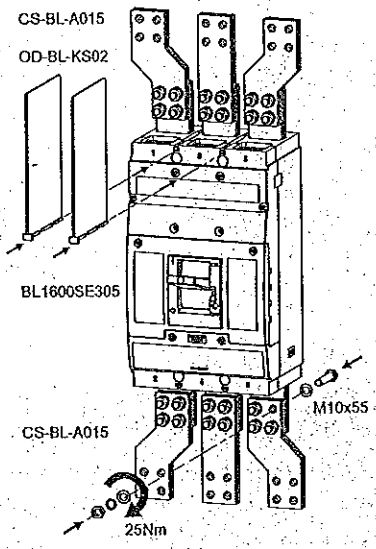
Front connection - busbars



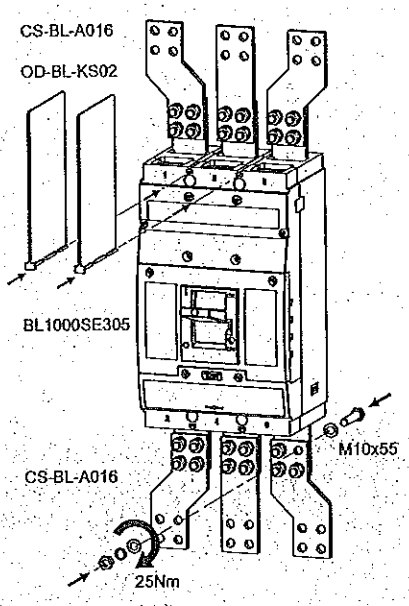
Rear connection



Front connection - busbars



Front connection - busbars

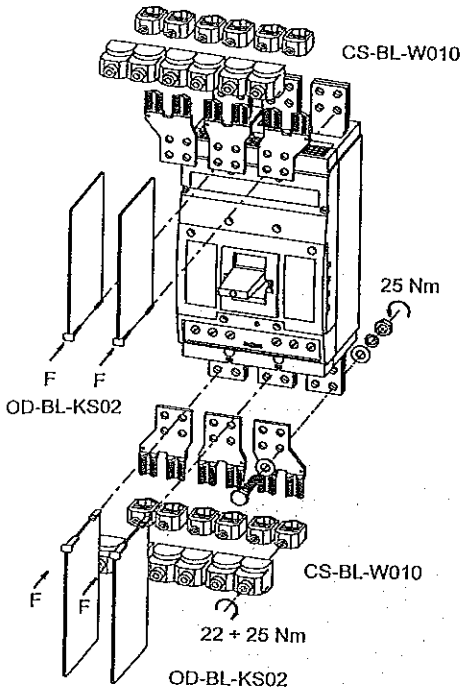


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

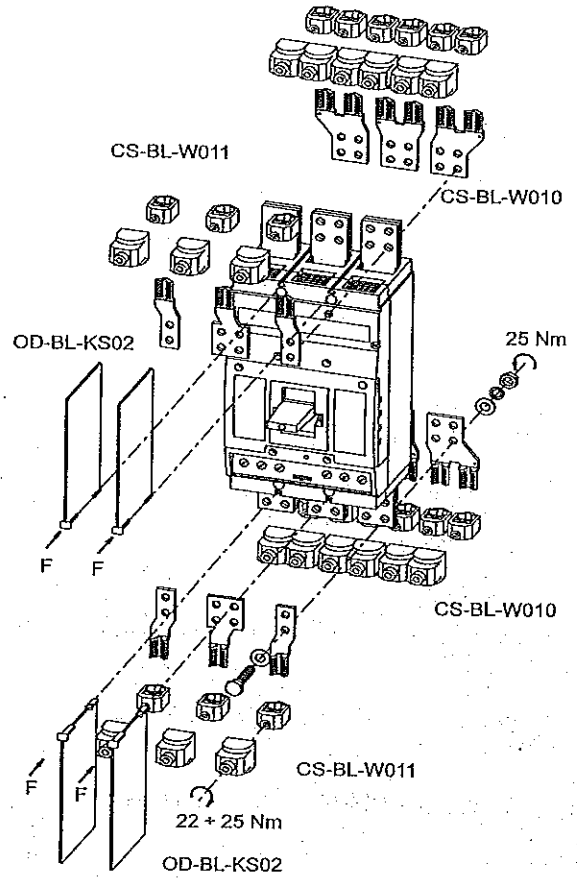
3P

Connecting and installation

Front connection - 2 Cu, Al cables

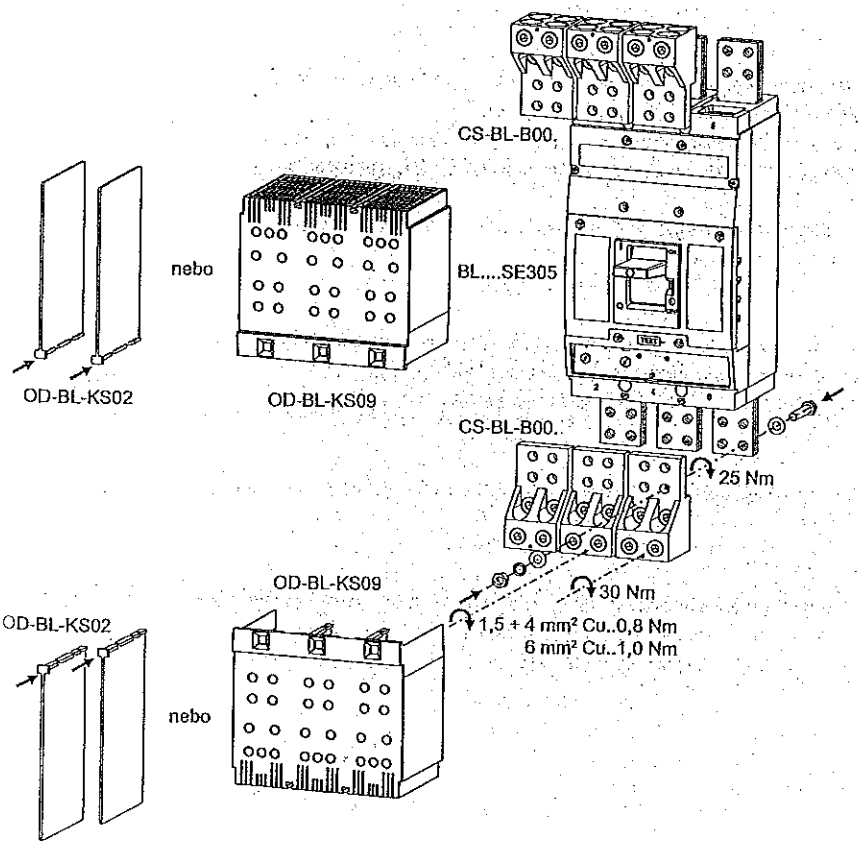


Front connection - 3 Cu, Al cables (not for BL1000SE305 switching unit)



Front connection - cables

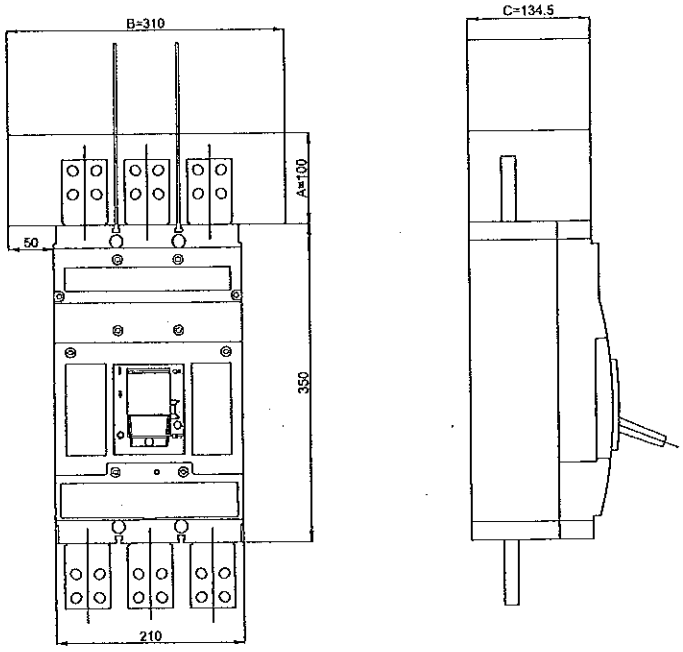
2 Cu/Al cables - connecting sets CS-BL-B002
3 Cu/Al cables - connecting sets CS-BL-B003
4 Cu/Al cables - connecting sets CS-BL-B004



CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Deionization spaces

A, B, C - minimum deionization space free of earthed metal parts



Applicable for operational voltage $U_e \leq 690$ V a.c./d.c. (DC only for switch-disconnector)

USE OF INSULATING BARRIERS AND TERMINAL COVERS WITH CIRCUIT BREAKERS AND SWITCH-DISCONNECTORS

FIXED DESIGN

- front connection	- terminals 1, 3, 5 (upper side)	**- OD-BL-KS02 insulating barriers must always be installed on circuit breaker/switch-disconnector**
	- terminals 2, 4, 6 (lower side)	**a) if circuit breaker/switch-disconnector is connected to the supply using terminals 2, 4, 6, OD-BL-KS02 insulating barriers must always be installed on it** **b) if circuit breaker/switch-disconnector is connected on lower side using clamp or block type terminals, OD-BL-KS02 insulating barriers must always be installed on it**
- rear connection	- terminals 1, 3, 5 (upper side)	**- OD-BL-KS01 insulating cover or OD-BL-KS02 insulating barriers must always be installed on circuit breaker/switch-disconnector** - we recommend installing OD-BL-KS03 insulating grommets with all sets for rear connection
	- terminals 2, 4, 6 (lower side)	**- if circuit breaker/switch-disconnector is connected to the supply using terminals 2, 4, 6, OD-BL-KS01 insulation cover must always be installed on it** - we recommend installing OD-BL-KS03 insulating grommets with all sets for rear connection

WITHDRAWABLE DESIGN

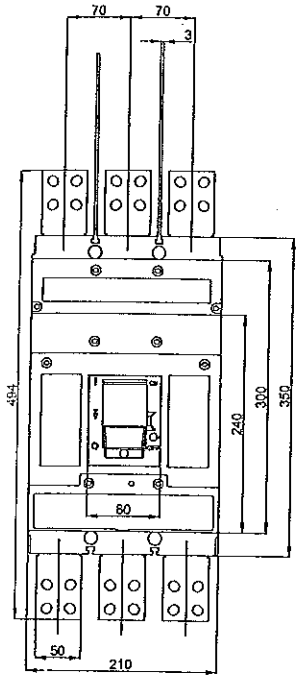
- front connection	- terminals 1, 3, 5 (upper side)	**- withdrawable device is connected on upper side using clamp or block type terminals, OD-BL-KS08 insulating barriers must always be installed** – in all other cases, we recommend installing OD-BL-KS04 insulating cover on upper side of the device
	- terminals 2, 4, 6 (lower side)	**- if withdrawable device is connected on lower side using clamp or block type terminals, OD-BL-KS08 insulating barriers must always be installed** – in all other cases, we recommend installing OD-BL-KS04 insulating cover on lower side of withdrawable device

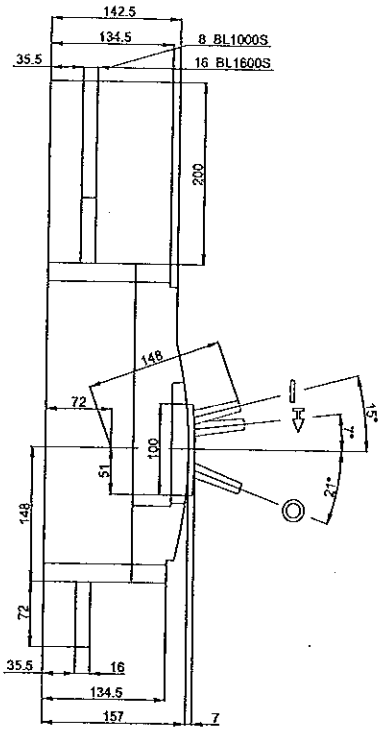
IRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

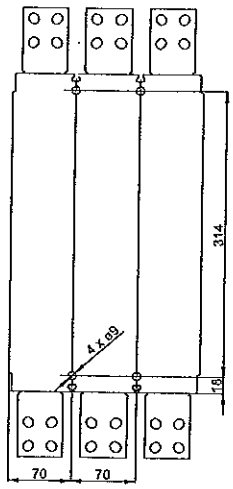
imensions

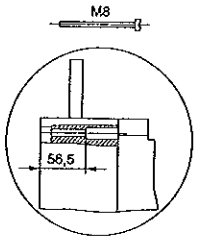
xed design, front connection



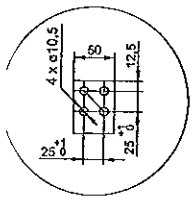


Drilling diagram

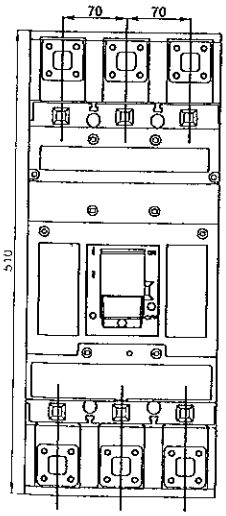


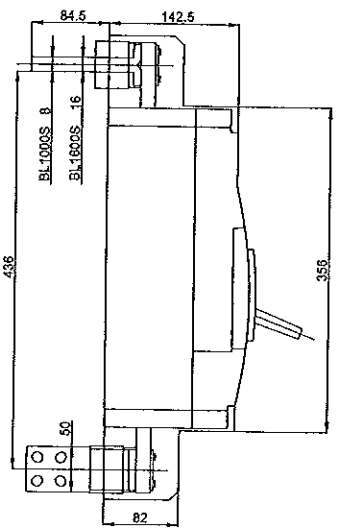


nnecting busbar modification

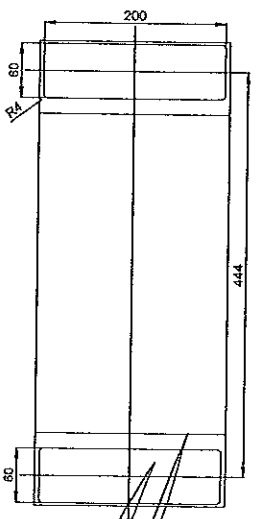


ted design, rear connection (CS-BL-A021, CS-BL-A022 connecting sets)





Openings for insulation grommets

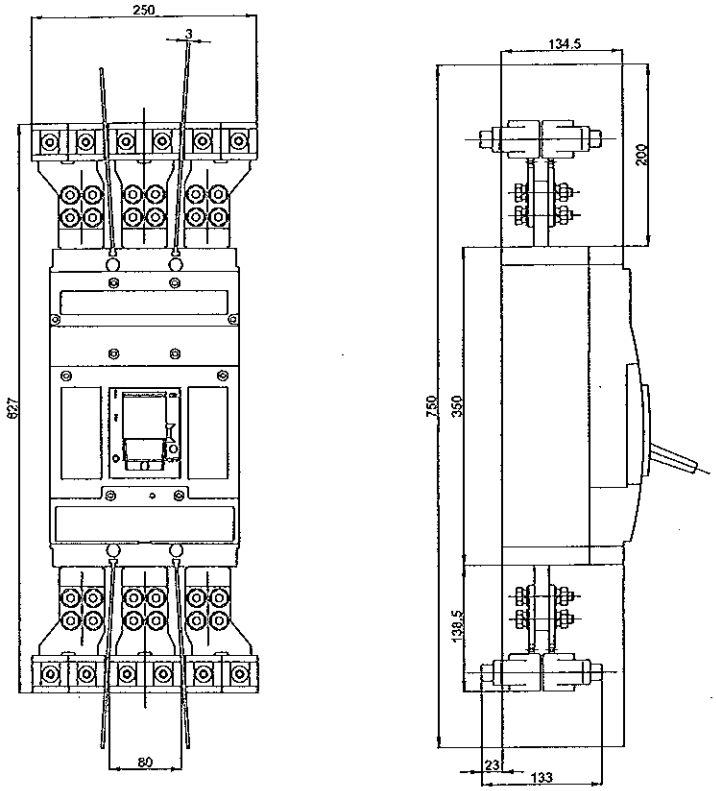


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

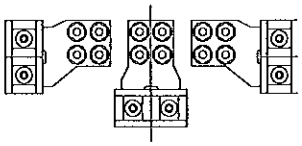
3P

Dimensions

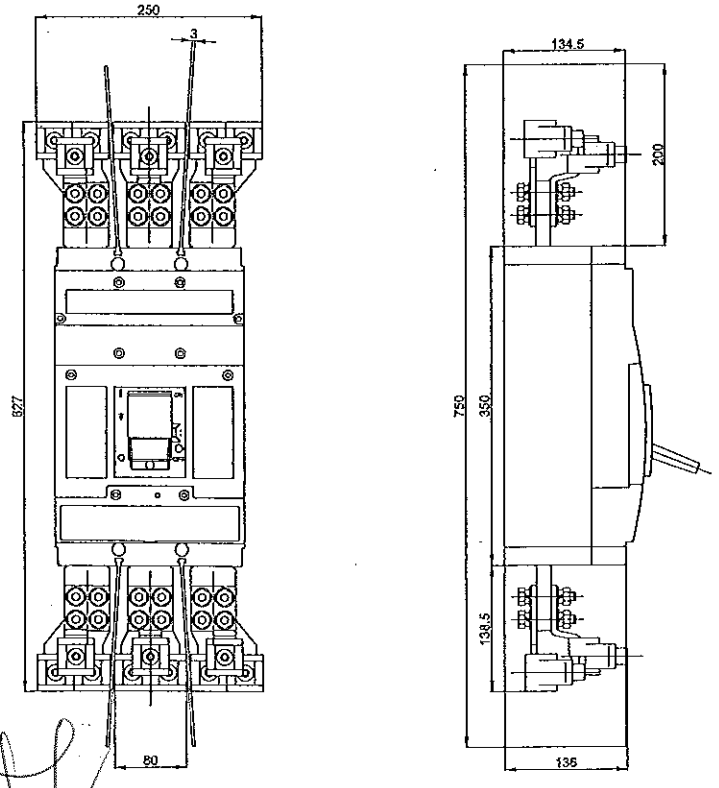
Fixed design, clamp terminals (CS-BL-W010 connecting sets) - combination of two sets arranged vertically can not be applied for BL1000SE305 switching unit



Another possibility of connection



Fixed design, clamp terminals (CS-BL-W010 and CS-BL-W011 connecting sets) - combination of two sets arranged vertically can not be applied for BL1000SE305 switching unit

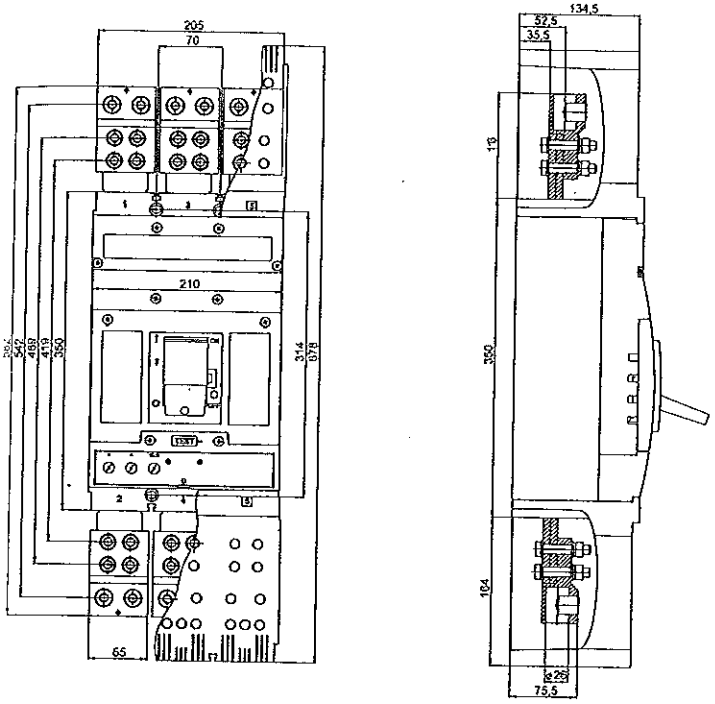


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

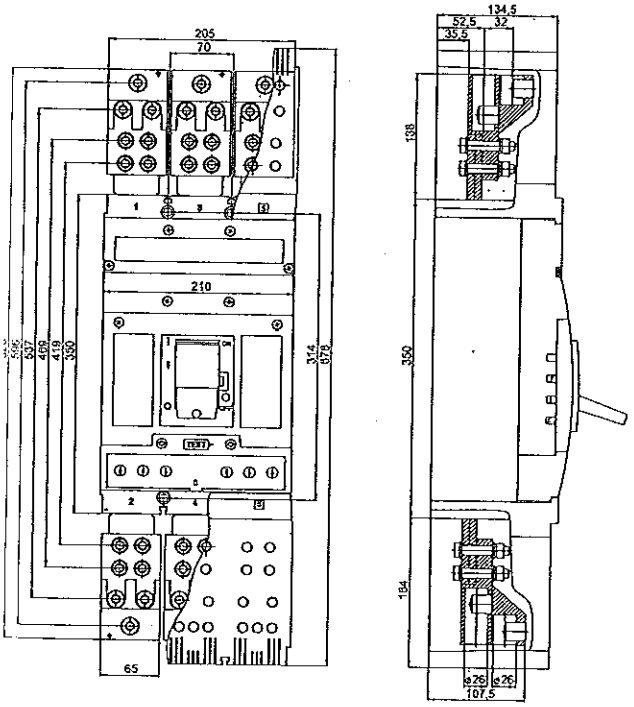
3P

Dimensions

Fixed design, block terminals (CS-BL-B002)

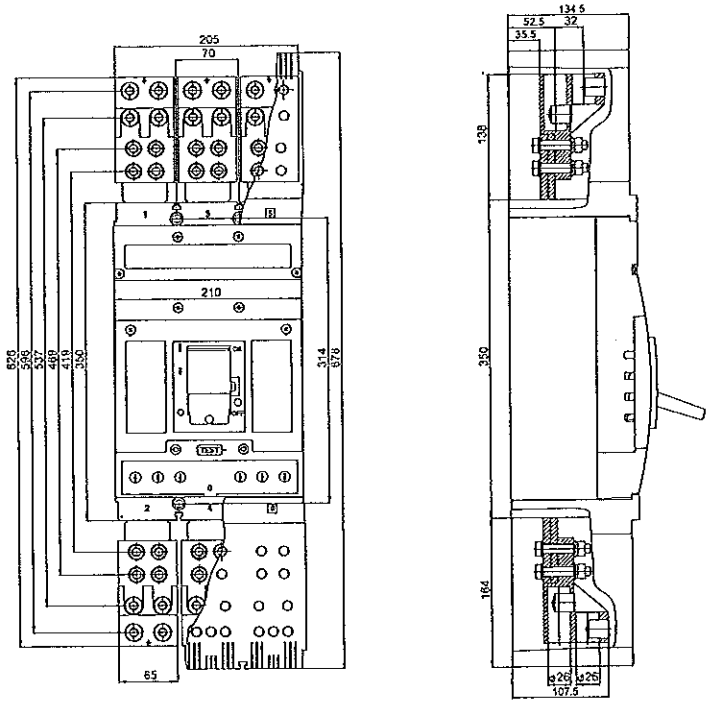


Fixed design, block terminals (CS-BL-B003)

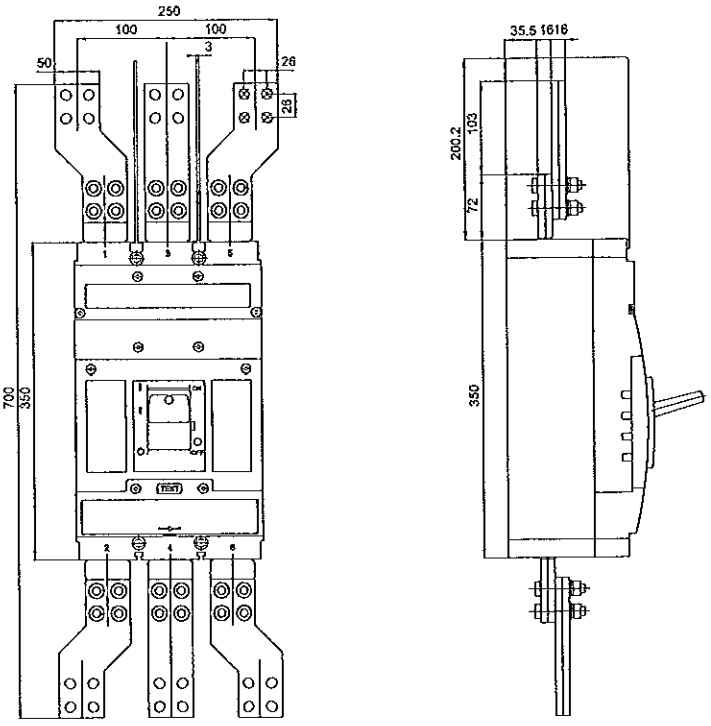


Dimensions

Fixed design, block terminals (CS-BL-B004)



Fixed design, CS-BL-A015 front connection

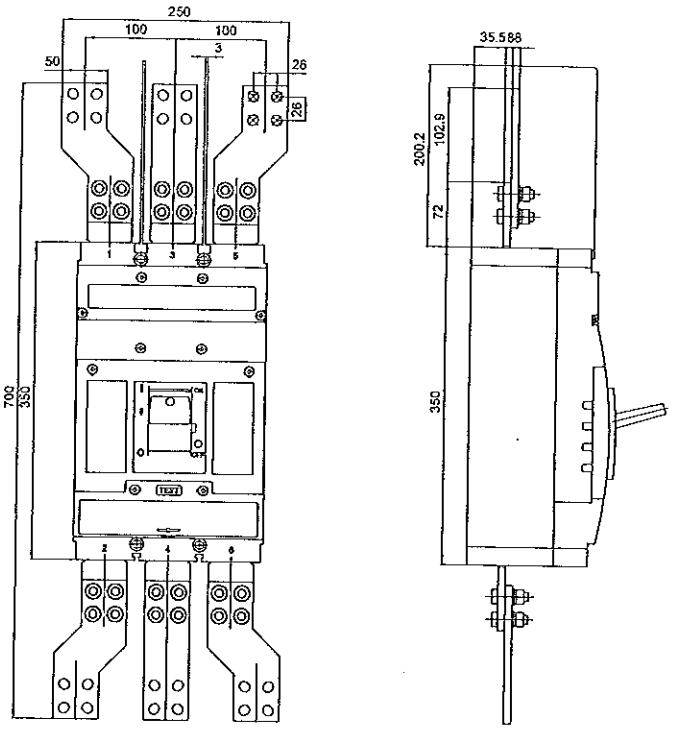


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

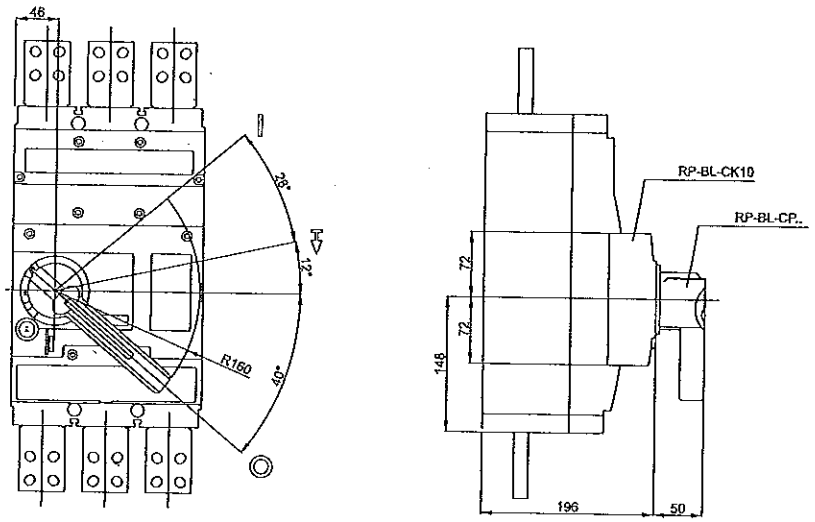
3P

Dimensions

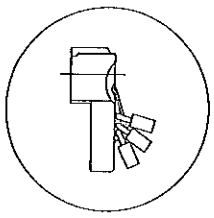
Fixed design, CS-BL-A016 front connection



Fixed design, front hand drive



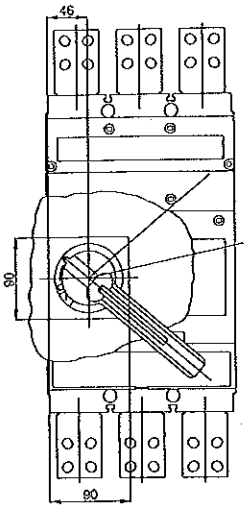
Hand drive lever - with locking (RP-BL-CP10, RP-BL-CP11)

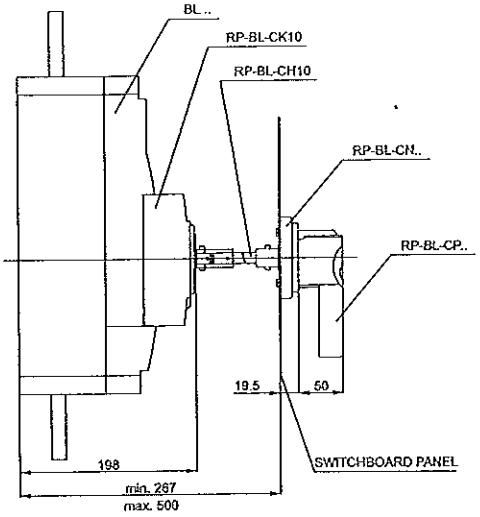


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

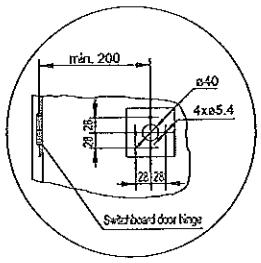
Dimensions

Fixed design, front hand drive, adjustable lever

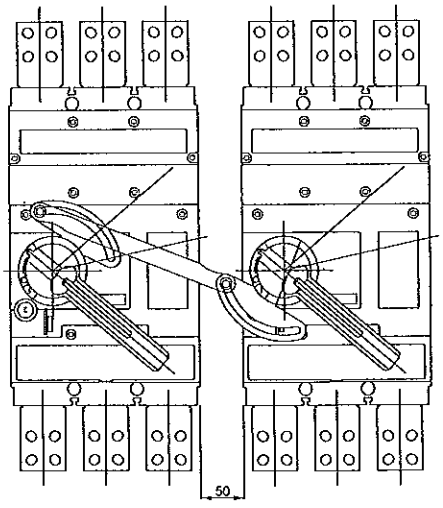


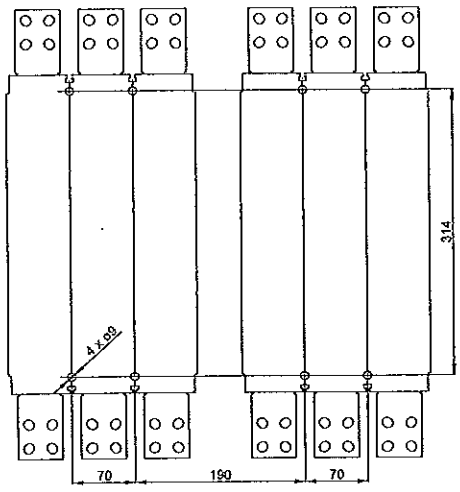


Switchboard door modification

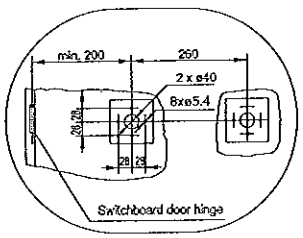


RP-BL-CB10 mechanical interlocking





Switchboard door modification

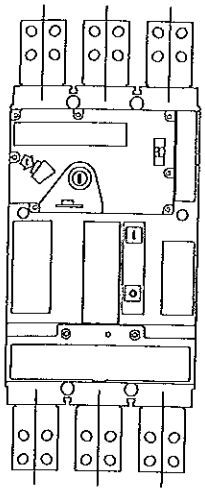


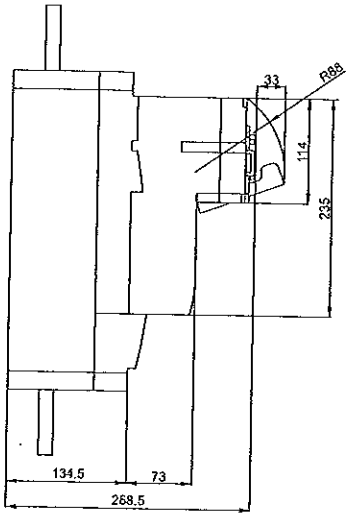
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

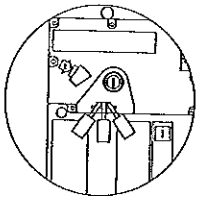
Dimensions

Fixed design, MP-BL-X... motor drive

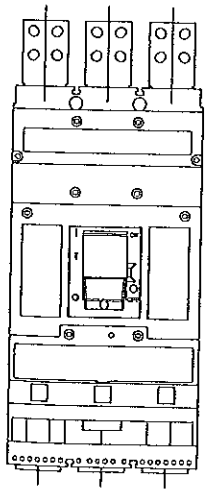


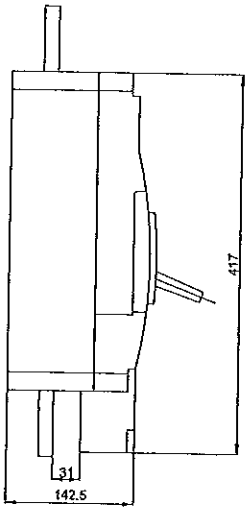


Locking using three padlocks



Fixed design, SB-BL-0002 signalling unit

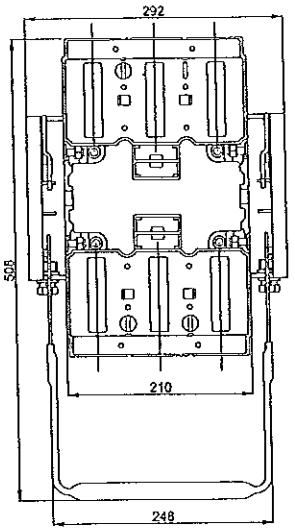


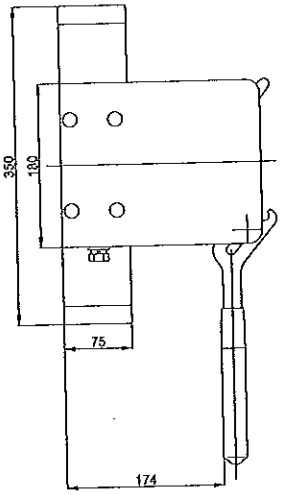


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

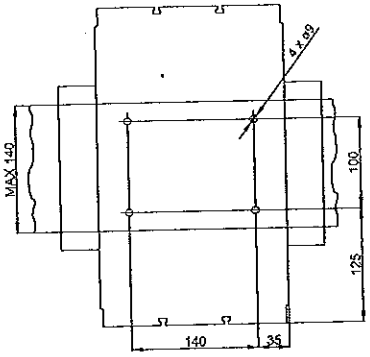
Dimensions

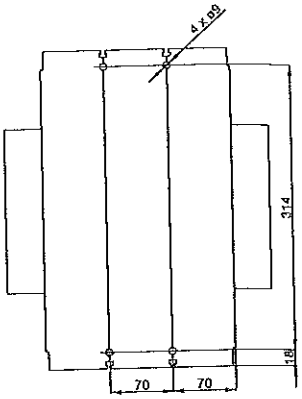
ZV-BL-1600-300 withdrawable device



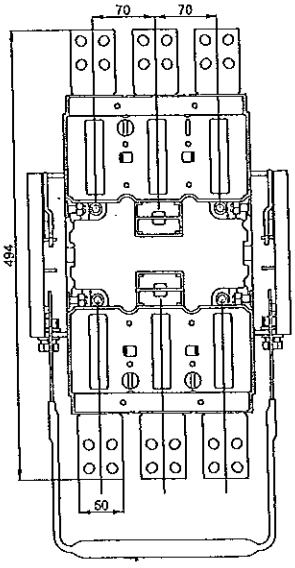


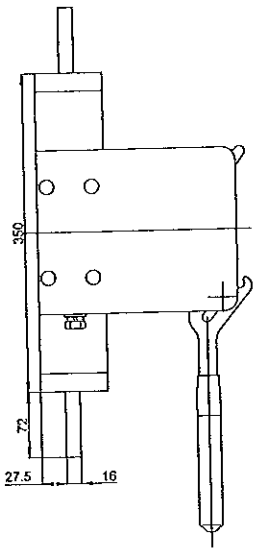
Drilling diagram

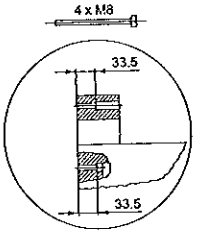




Withdrawable device, front connection (CS-BL-A010 connecting sets)





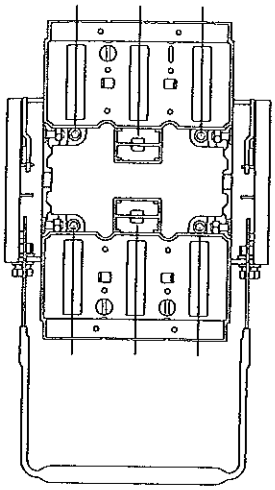


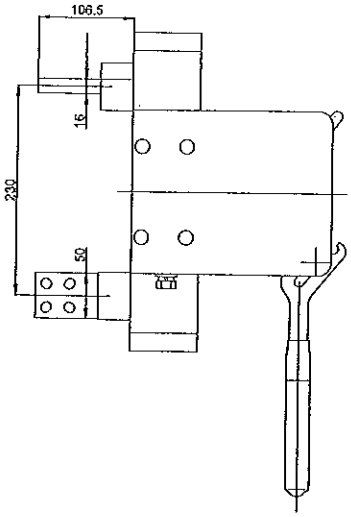
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

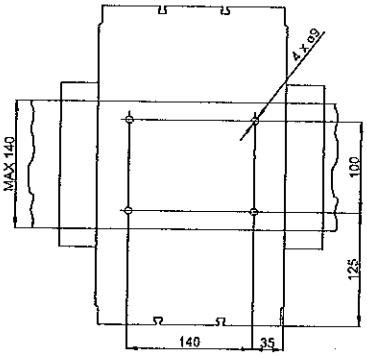
Dimensions

Withdrawable device, rear connection (CS-BL-A021 connecting set)

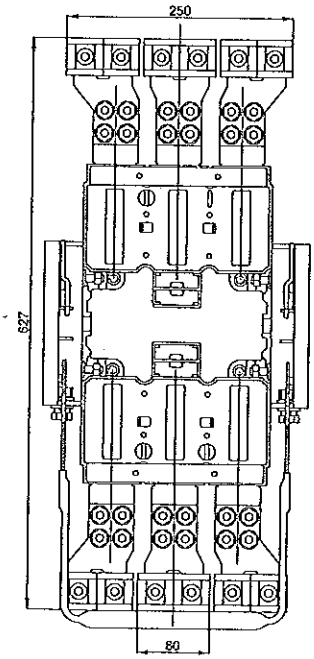


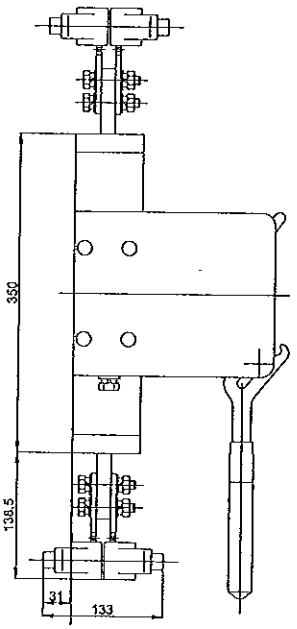


Drilling diagram



Withdrawable device, clamp terminals (CS-BL-W010 connecting set)

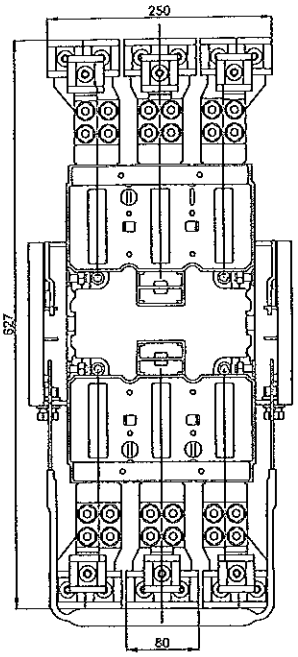


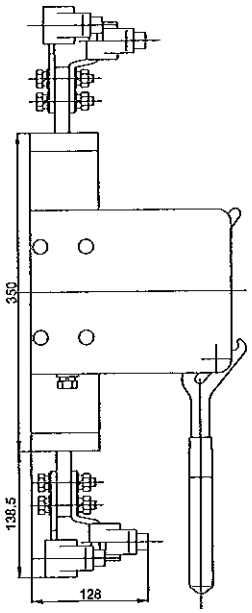


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

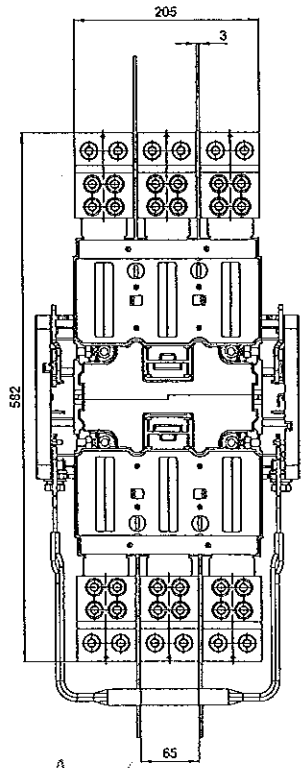
Dimensions

Withdrawable device, clamp terminals (CS-BL-W010 and CS-BL-W011 connecting sets)

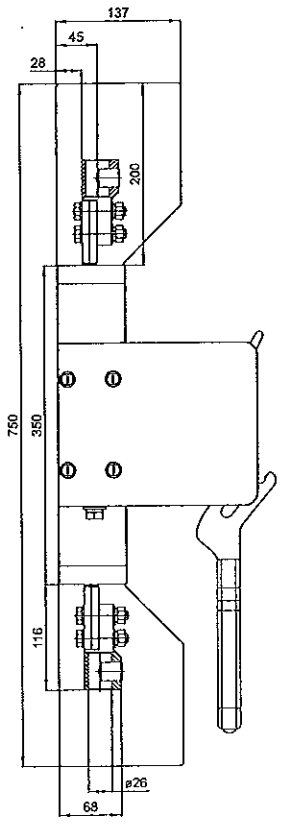




Withdrawable device, block terminals



Working position

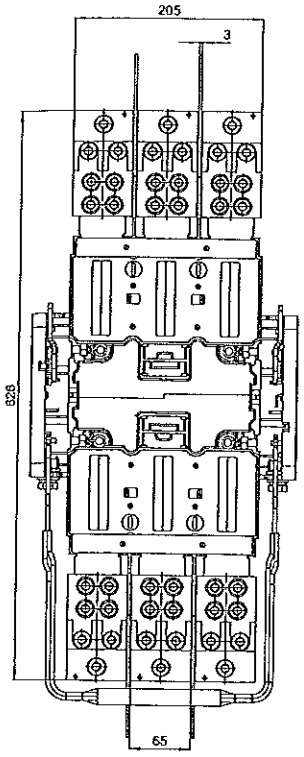


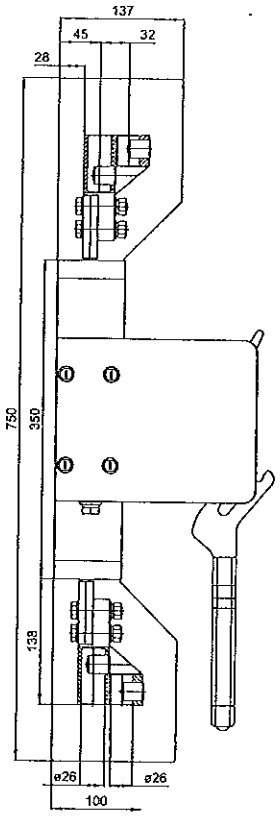
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

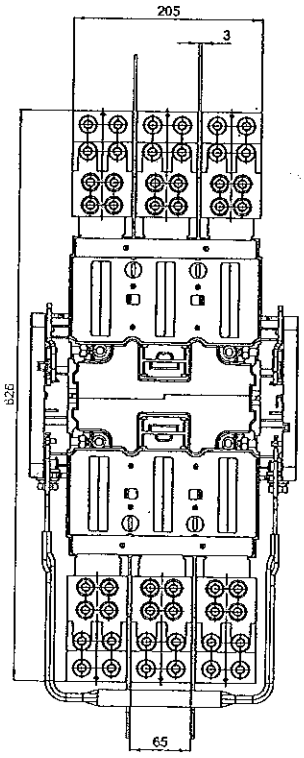
Dimensions

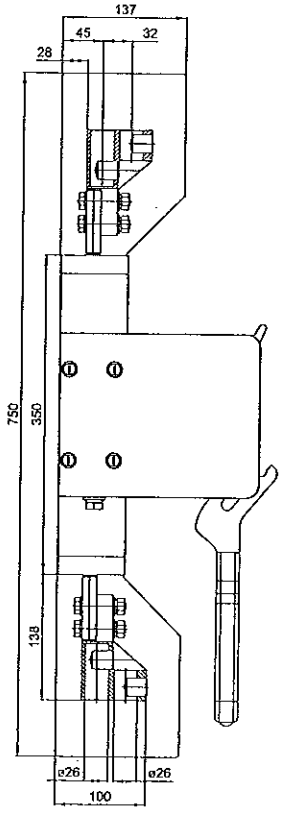
Withdrawable device, block terminals (CS-BL-B003)





Withdrawable device, block terminals (CS-BL-B004)

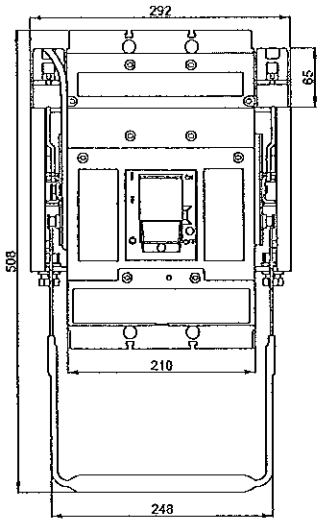




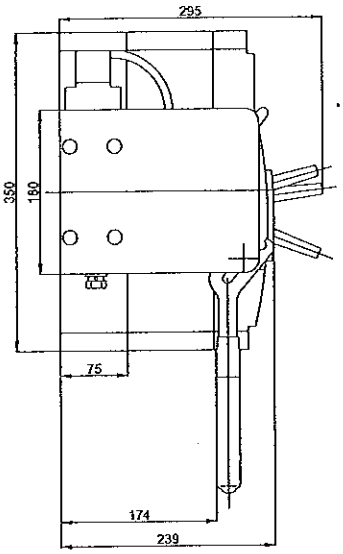
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

Dimensions

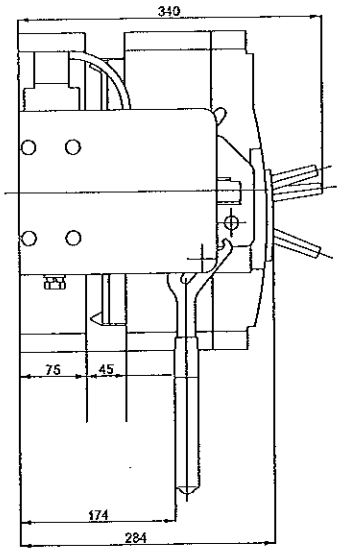
Withdrawable design



Working position



Inspection position

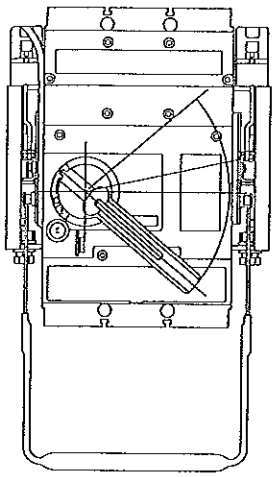


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

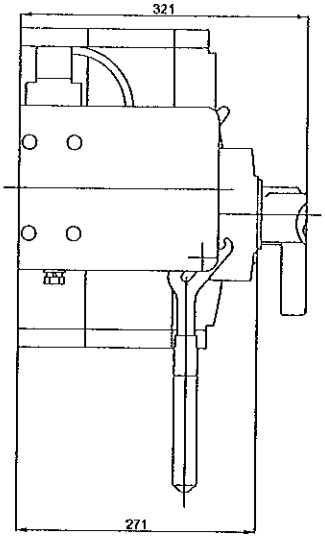
3P

Dimensions

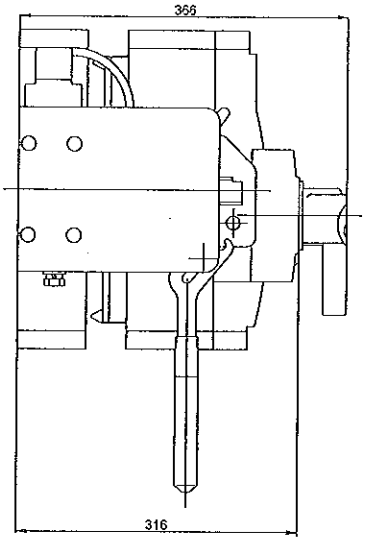
Withdrawable design, hand drive



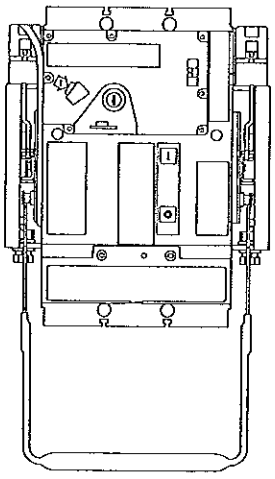
Working position



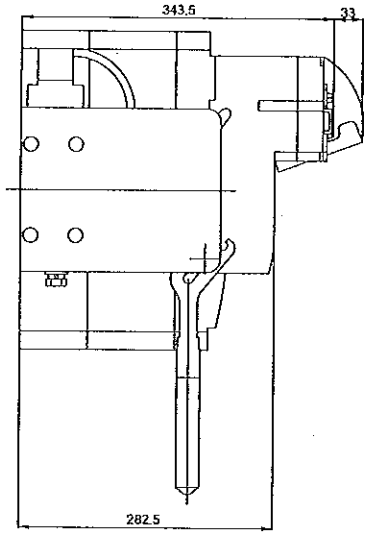
Inspection position



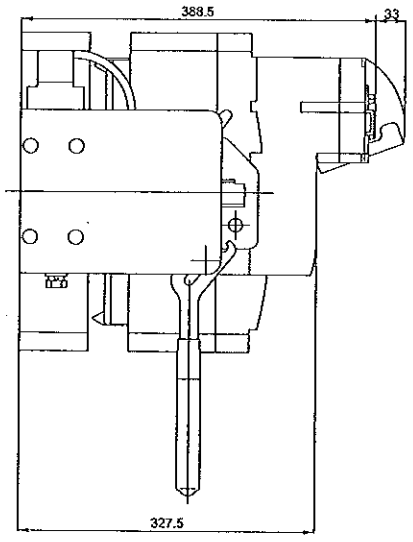
Withdrawable design, MP-BL-X230 motor drive



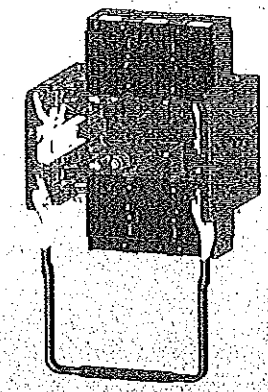
Working position



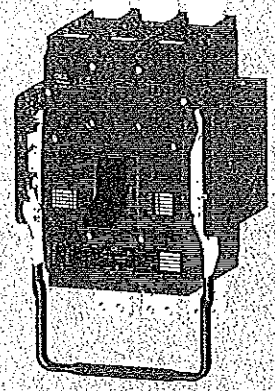
Inspection position



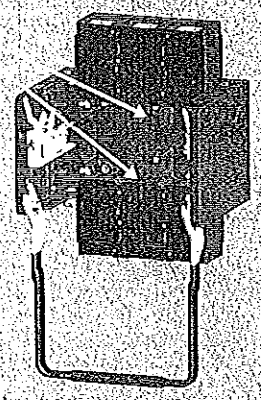
WITHDRAWABLE DEVICE



Withdrawable device
ZV-BL-1600-300



Circuit breaker in withdrawable design



Signalling of position
SO-BL-0010

Description

Withdrawable design of the circuit breaker/switch-disconnector is intended for demanding industrial applications where rapid exchange of the circuit breaker, frequent checking and both visual and conductive disconnection of the circuit are needed.

- withdrawable device must be fitted with connecting the sets:
  2 sets CS-BL-A010 - pro front connection
  or 2 sets CS-BL-A020 - for rear connection
- OD-BL-MS02 set of mounting bolts is used to fasten the withdrawable device into the switchboard, see page H10

Circuit breaker positions

Circuit breaker in withdrawable design has three positions:
1. inserted (working position)
2. withdrawn (inspection position)
3. removed

Power circuit

- connecting set CS-BL-A010 is used for connecting with busbars or cable lugs (front connection) or CS-BL-A020 connecting set (rear connection)
- for connection using cables, it is necessary in addition to a connection set CS-BL-A010 or CS-BL-A020 to use connection sets, see page H7
- the method of power circuit connection must observe recommendations, see page H12, as well as deionization space, see page H16

Auxiliary circuits

These are connected using 15-wire cable OD-BL-KA01.

Circuit breaker accessories in withdrawable design

Circuit breaker in withdrawable design has the same accessories as fixed circuit breaker.

Signalling of position SO-BL-0010

Withdrawable device can be fitted with up to four switches for signalling the position of the circuit breaker inserted, see table.

Advantages and enhanced safety for operator:

- remote signalling of circuit breaker`s inserted position (position of locking is not signalled)
- checking of circuit breaker and accessories function in the inspection position
- locking withdrawable device against inserting circuit breaker, locking of circuit breaker in withdrawn (checking) position – locking by means of padlocks
- visible and conductive disconnection of the power circuit
- easy exchange of circuit breakers in case of failure

Auxiliary circuits
OD-BL-KA01

Signalling of position
SO-BL-0010

States of switches SO-BL-0010 in withdrawable device according to circuit breaker and arrestment positions

Circuit breaker position	State of switch	
		
Inserted (arrested and not arrested)	0	1
Other positions	1	0

note: 0 - contact open, 1 - contact closed

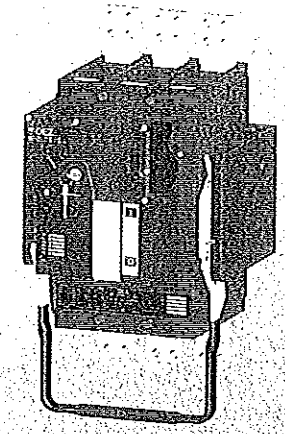
Specifications SO-BL-0010

Type		SO-BL-0010
Rated operating voltage	U_e	230 V a.c. 220 V d.c.
Rated frequency	f_n	50/60 Hz
Rated operating current	I_e/U_e AC-13 I_e/U_e DC-15	6 A/230 V a.c. 3.5 A/24 V d.c., 1 A/48 V d.c., 0.3 A/110 V d.c., 0.15 A/220 V d.c.
Arrangement of contacts		001
Connection cross-section	S	0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)		IP20

For wiring diagram of circuit breaker in withdrawable device with accessories, see page H12

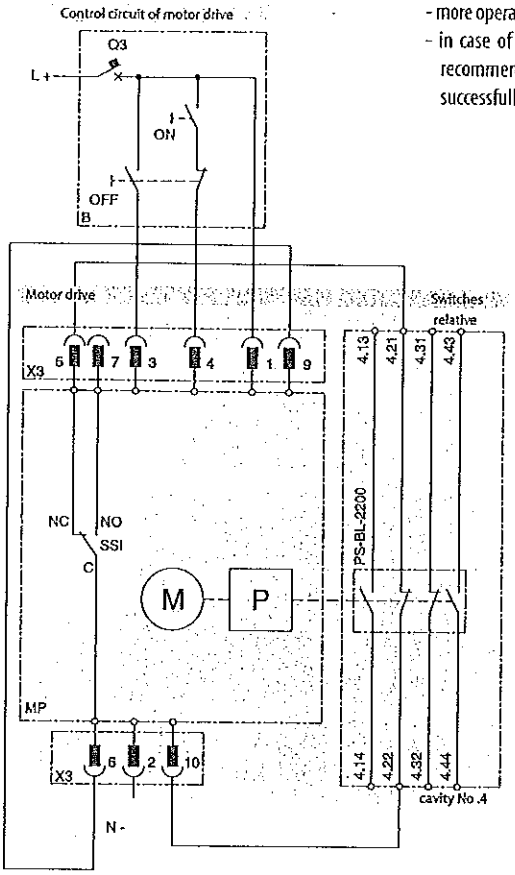
WITHDRAWABLE DEVICE

3P



Circuit breaker in withdrawable design with motor drive

Recommended connection of circuit breaker in withdrawable design with motor drive



Inserting and withdrawing the circuit breaker with motor drive

- each time before inserting or withdrawing the circuit breaker we recommend at first to run the AUTO/MANUAL switch on the motor drive to the MANUAL position
- more operating information can be found in the operating instructions
- in case of infringement of this procedure or failing to follow the recommended wiring could mean that the circuit breaker will not successfully switch on at the first attempt

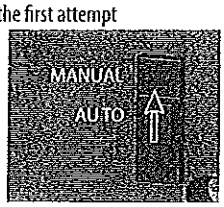


Diagram description

Symbol	Description
MP	motor drive MP-BL-X...
M	motor
P	storage device
X3	connector for connection of control circuits
SSI	switch to indicate MANUAL (NO-C)/AUTO (NC-C)
B	recommended wiring of the control circuits (not included in motor drive order)
ON	switch on button
OFF	switch off button
Q3	motor drive circuit breaker for 110 V a.c. LPN-4C-1 for 230 V a.c. LPN-2C-1 for 110 V d.c. LPN-DC-4C-1 for 220 V d.c. LPN-DC-2C-1

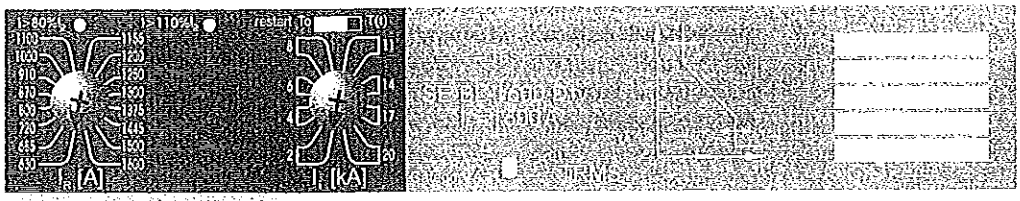
Changes in states of switches in cavities of switching unit when inserting and withdrawing circuit breaker

State of circuit breaker before insertion/withdrawal			State of circuit breaker after insertion/withdrawal			
State of circuit breaker before insertion			State of switches before insertion - withdrawn position →		State of switches after insertion - inserted position	
State of circuit breaker before withdrawal			State of switches before withdrawal - Inserted position →		State of switches after withdrawal - withdrawn position	
			Cavity 1, 2	3, 4	1, 2	3, 4
Circuit breaker lever position	State of the main contacts		PS-BL-2200	PS-BL-2200	PS-BL-2200	PS-BL-2200
Switched on	‖	1	1 0	1 0	0 1	0 1
Switched off manually or by motor drive electrically (loaded state)	◯	0	0 1	1 0	0 1	1 0
Switched off from switched on state: by the releases or TEST push buttton	⊼	0	0 1	0 1	0 1	0 1

note: 0 - contact open, 1 - contact closed

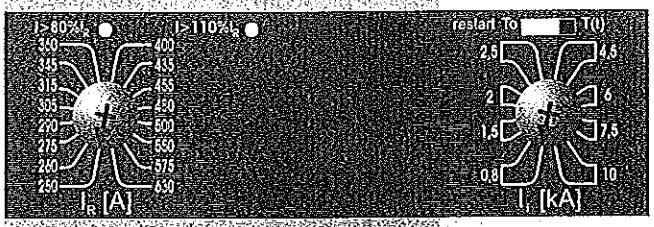
OVERCURRENT RELEASES - DTV3

3P

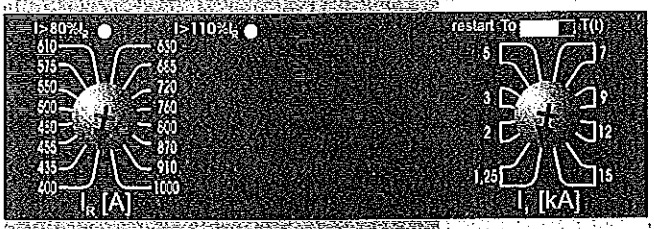


Reduced current | Short-circuit release

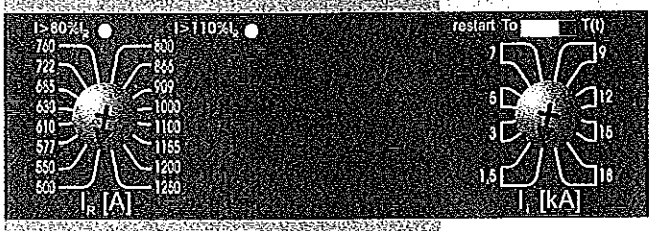
$I_n = 630$ A
SE-BL-0630-DTV3



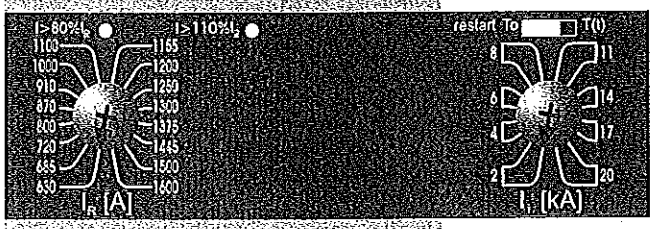
$I_n = 1\,000$ A
SE-BL-1000-DTV3



$I_n = 1\,250$ A
SE-BL-1250-DTV3



$I_n = 1\,600$ A
SE-BL-1600-DTV3

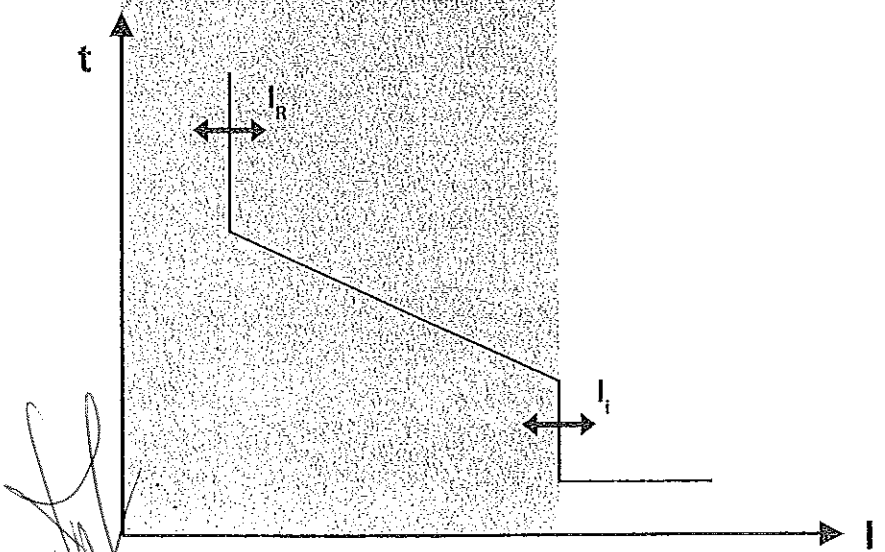


Properties

- suitable for protection of lines and distribution transformers
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\,I_n$
- thermal memory can be switched on/off (ON = $T_{(x)}$, OFF = $T_{(c)}$)
- setting of the value of the short-circuit release I_i in 8 steps
- setting of I_R and I_i by means of the rotary switches is stepwise
- the overcurrent release indicates the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

Switching unit		BL1600...
Overcurrent release		SE-BL-...
Overcurrent release setting		
Reduced current	I_R	....A
Thermal memory	T	....
Short-circuit release current	I_i	....A

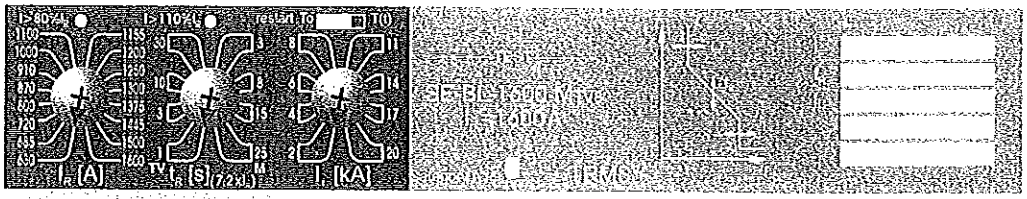


IMPORTANT

- thermal memory must be switched on in protection of transformers and lines - thus the transformer or the line will be protected against repeated overload

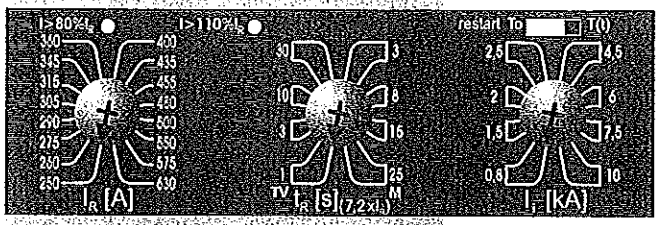
CURRENT RELEASES - MTV8, TV mode

3P

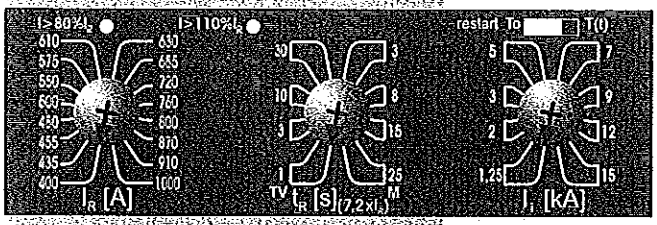


Reduced current | Thermal release delay | Short-circuit release

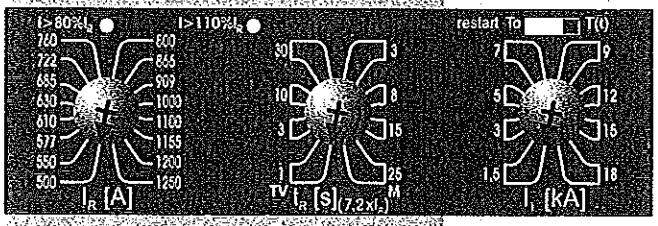
= 630 A
630-MTV8



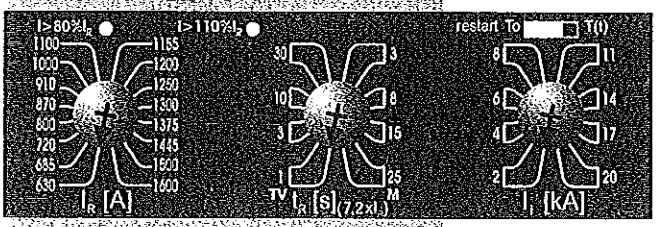
1 000 A
000-MTV8



1 250 A
250-MTV8



1 600 A
1600-MTV8

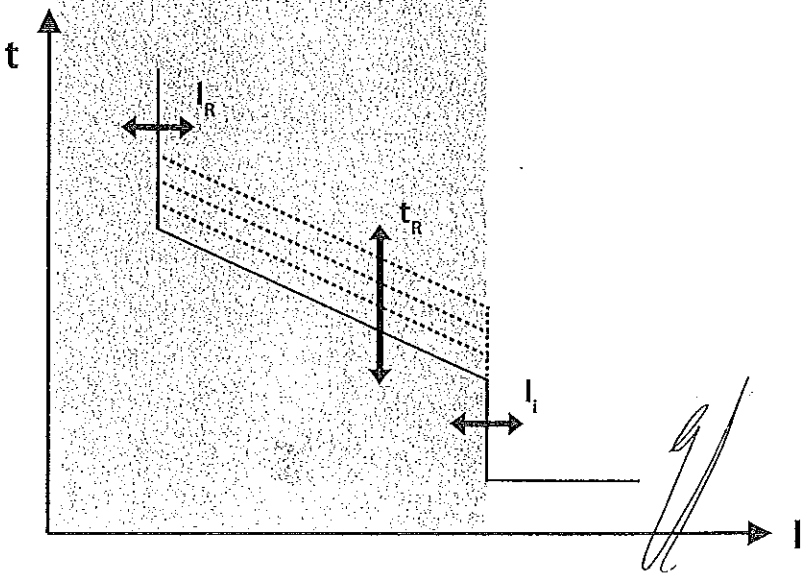


Properties

- TV mode - suitable for protection of lines, distribution transformers and generators
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(0)}$)
- in TV mode the undercurrent release is inactive
- setting of delay of the thermal release t_R 1 s, 3 s, 10 s and 30 s
- setting of the value of the short-circuit release I_i in 8 steps
- setting of I_R, t_R and I_i by means of the rotary switches is stepwise
- the overcurrent release indicates the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

Switching unit		BL1600...
Overcurrent release		SE-BL...
Overcurrent release setting		
Reduced current	I_R	... A
Mode		TV
Thermal memory	T	...
Thermal release delay	t_R	... s
Short-circuit release current	I_i	... A

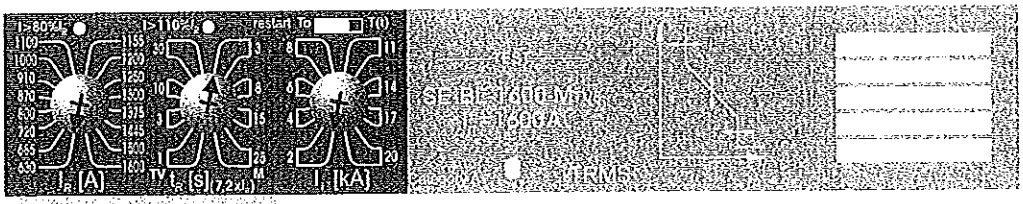


IMPORTANT

- the set value of current of the short-circuit release must correspond to the impedance loop - conditions must be fulfilled for automatic disconnection from power supply in case of failure

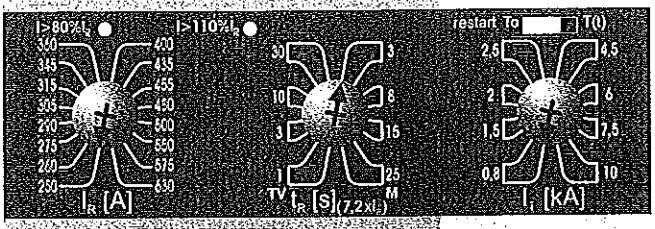
OVERCURRENT RELEASES - MTV8, M mode

3P

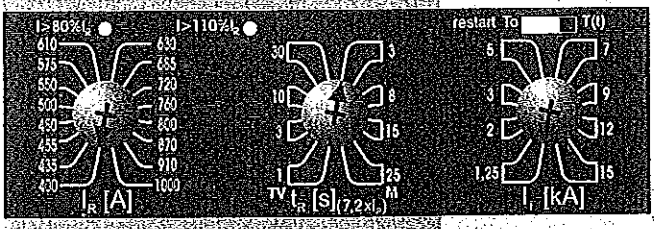


Reduced current | Motor starting | Short-circuit release

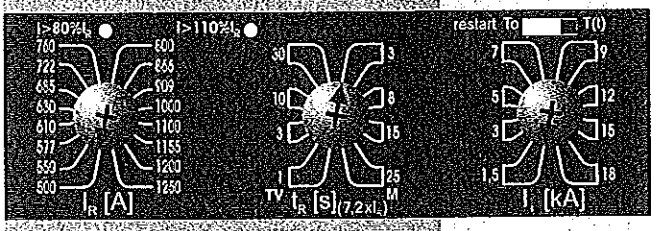
$I_n = 630$ A
SE-BL-0630-MTV8



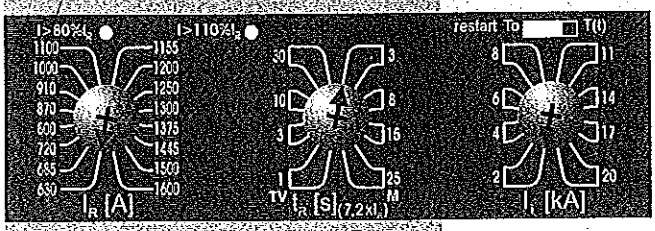
$I_n = 1\,000$ A
SE-BL-1000-MTV8



$I_n = 1\,250$ A
SE-BL-1250-MTV8



$I_n = 1\,600$ A
SE-BL-1600-MTV8

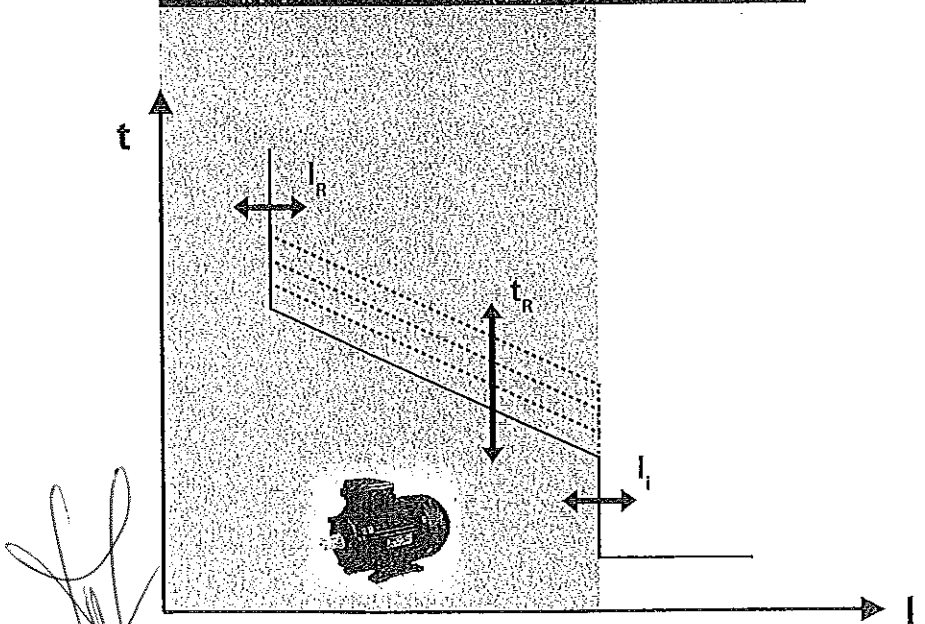


Properties

- M mode - suitable for protection of motors
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(c)}$)
- in M mode the undercurrent release is active
- setting of delay of the thermal release t_R 3 s, 8 s, 15 s and 25 s according to the motor starting class
- setting of the value of the short-circuit release I_i in 8 steps
- setting of I_R, t_R and I_i by means of the rotary switches is stepwise
- the overcurrent release indicates the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

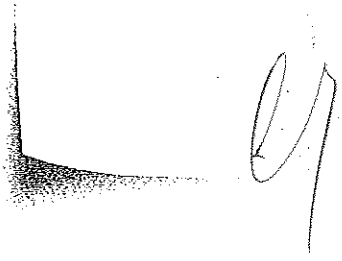
Data for the project

Switching unit		BL1600...
Overcurrent release		SE-BL-...
Overcurrent release setting		
Reduced current	I_R	... A
Mode		M
Thermal memory	T	...
Thermal release delay	t_R	... s
Short-circuit release current	I_i	... A



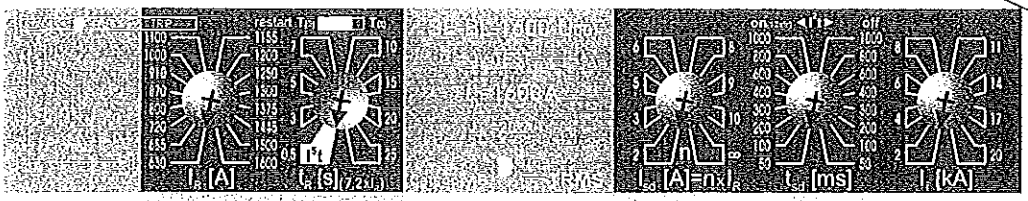
IMPORTANT

- M mode must be selected in protection of motors - the motor will be protected in phase failure
- thermal release delay t_R must correspond to the motor starting class



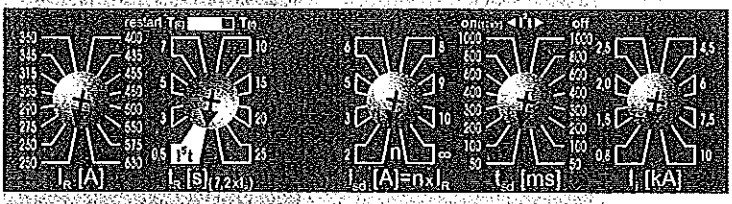
OVERCURRENT RELEASES - U001

3P

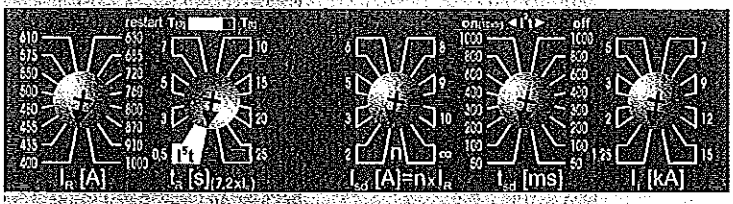


Rated current | Motor starting | Selective release | Short-circuit release

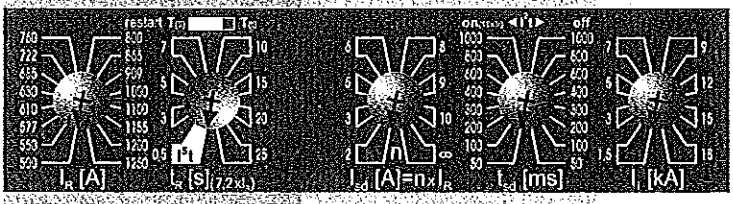
$I_n = 600$ A
SE-BL-600-U001



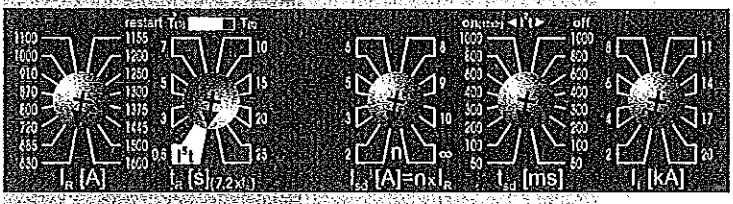
$I_n = 1000$ A
SE-BL-1000-U001

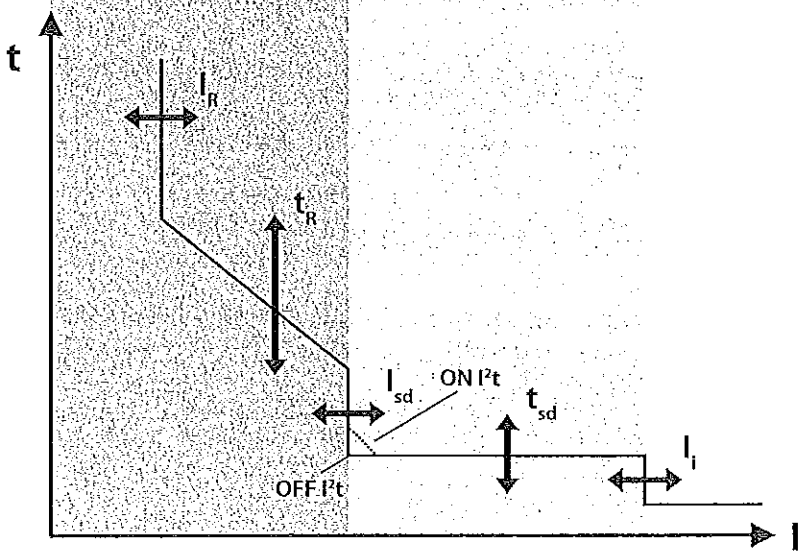


$I_n = 1250$ A
SE-BL-1250-U001



$I_n = 1600$ A
SE-BL-1600-U001





Properties

- it is designed for demanding applications with a complicated load and required high selectivity with fuses or circuit breakers
- protects against both overcurrent and short circuit
- reduced current setting $I_R = 0.4 \div 1\ I_n$
- thermal memory can be switched on/off (ON = $T_{(t)}$, OFF = $T_{(-)}$)
- setting of the value of selective release t_R in 8 steps, possibility of setting of gradient of characteristic of the thermal release I^5t (adaptation of time-current characteristic of the fuse)
- setting of the value of selective release I_{sd} in 8 steps (independent time-delayed release)
- setting of delay of the selective release t_{sd} 50 to 1000 ms including possibility of setting of a gradient of characteristic of the short-circuit release (adaptation of the time-current characteristic of the fuse)
- setting of the value of the short-circuit release I_i in 8 steps
- setting of I_R, t_R, I_{sd}, t_{sd} and I_i by means of rotary switches is stepwise
- the overcurrent release indicates operating state and the value of the passing current by means of LED
- the values of parameters of the overcurrent release are set by the manufacturer to minimum

Data for the project

Switching unit		BL1600...
Overcurrent release		SE-BL-...
Overcurrent release setting		
Reduced current	I_R	... A
Thermal memory	T	....
Setting of the gradient of characteristic of the thermal release	I^5t	....
Thermal release delay	t_R	... s
Selective release value	I_{sd}	... A (... x I_R)
Selective release delay	t_{sd}	... ms
Setting of the gradient of characteristic of the short-circuit release	I^2t	....
Short-circuit release value	I_i	... A

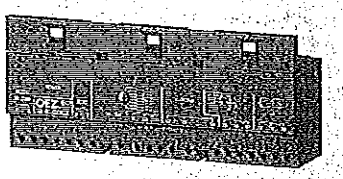
IMPORTANT

- to achieve as high selectivity as possible, use the possibility of setting of the current and delay including gradient of the time-current characteristic of the independent (short-circuit) time-delayed release.

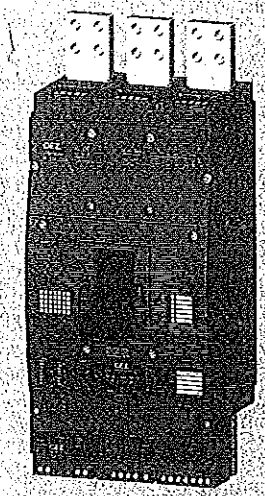
For selectivity solution, use the calculation program Sichr.

SIGNALLING UNITS

3P



SB-BL-0002



DIMENSIONS see page H23

Description

- the SB-BL-0002 signalling unit is a modular accessory for the BL1000S and BL1600S circuit breakers and collaborates with the electronic releases SE-BL-....-DTV3, SE-BL-....-MTV8 and SE-BL-....-U001
- it is intended for applications in automated-control systems
- the unit signals reaching a certain current value in a circuit and the tripping of the circuit breaker by releases (dependent, independent, undercurrent)
  - user has an option to set up (by steps, using a rotary switch) an amount of currenthe wishes to indicate if it has been reached
  - can be set 70; 80; 90; 100; 120; 140; 160 or 180 % I_R (for more details see table)
- local indication regarding the state of the circuit breaker and the protected circuitry is carried out by LED indicators on the front panel of the unit
- the information on the state of the circuit breaker is transferred from the release to the signalling unit by means of optical coupling
- remote indication on the state of the circuit breaker and the protected circuitry is ensured by a relay, the make and break contacts of which are pulled into the terminal strip on the unit
  - relays to indicate tripping of dependent or undercurrent and independent releases have storage - they do not change their state after disconnection from supply voltage
  - after the storage relay is activated by tripping of a release, it is necessary to reset the relay using the front panel RESET switch or by an external push button remotely - reset is functional in case the supply voltage is connected to the signalling block
- supply voltage values are given in the table
- **the main power supply and the reset circuit are not concurrently conformable with conditions for safe separation of the circuits**
- the external RESET push button must be connected using a screened cable or a twisted wire with maximum resistence of the loop 100 Ohm

The signalling unit will not work without power supply!

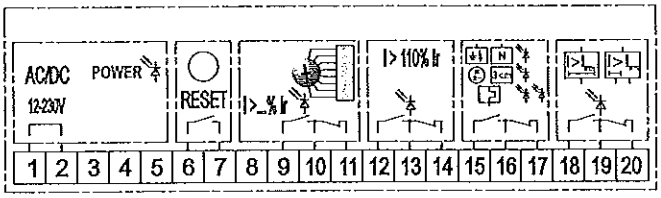
Specifications

Type		SB-BL-0002
Rated operating voltage	U_e	12 ÷ 230 V a.c./d.c.
Short-circuit protection	tube fuse	T1,6 A
Rated frequency	f_n	50/60 Hz
Current consumption (rms) max. at U_e	12 V a.c./d.c.	370 mA
	24 V a.c./d.c.	170 mA
	48 V a.c./d.c.	100 mA
	110 V a.c./d.c.	60 mA
	230 V a.c./220 V d.c.	50 mA
Rated operating current (of relay contact)	I_e/U_e AC-1	8 A/230 V a.c.
	I_e/U_e DC-1	0.25 A/220 V d.c., 8 A/30 V d.c.
Connection cross-section	S	0.5 ÷ 1 mm²

Power circuit status indication

Signalling		Relay contacts	LED
Reaching	< 70 % I_R	–	+
	110 % I_R	+	+
	70; 80; 90; 100; 120; 140; 160; 180	–	+
	Settings	+	+
Tripping by release	By dependent/undercurrent	+	+/+
	Independent	+	+

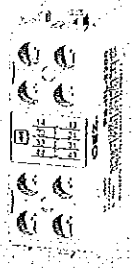
Connection



1,2	- supply
6,7	- external RESET push button
9,10,11	- relay contacts indicating preset I_R
12,13,14	- relay contacts indicating reaching 110 % I_R
15,16,17	- relay contacts indicating tripping by dependent or undercurrent releases
18,19,20	- relay contacts indicating tripping by independent release (instantaneous or delayed ones)

ILIARY SWITCHES

3P

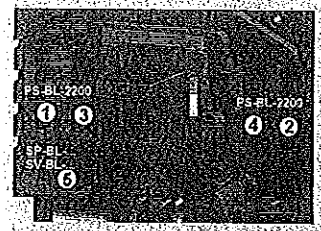


Specifications

Type		PS-BL-2200	PS-BL-2200-Au[1]
Rated operating voltage	U_e	60 ÷ 500 V a.c. 60 ÷ 240 V d.c.	5 ÷ 60 V a.c. 5 ÷ 60 V d.c.
Rated insulation voltage	U_i	500 V	500 V
Rated frequency	f_n	50/60 Hz	50/60 Hz
Rated operating current	I_e/U_e AC-15 I_e/U_e DC-13	6 A/60 V ÷ 240 V, 3 A/400 V, 1.5 A/500 V 1 A/60 V, 0.7 A/110 V, 0.3 A/240 V	AC-12, DC-12 0.004 ÷ 0.5 A/5 V, 0.004 ÷ 0.01/60 V
Thermal current	I_{th}	6 A	0.5 A
Arrangement of contacts		22	22
Connection cross-section	S	0.5 ÷ 1 mm²	0.5 ÷ 1 mm²
Degree of protection of terminals (connected switch)		IP20	IP20

[1] - PS-BL-....- Au is not suitable to control electromagnetic loads

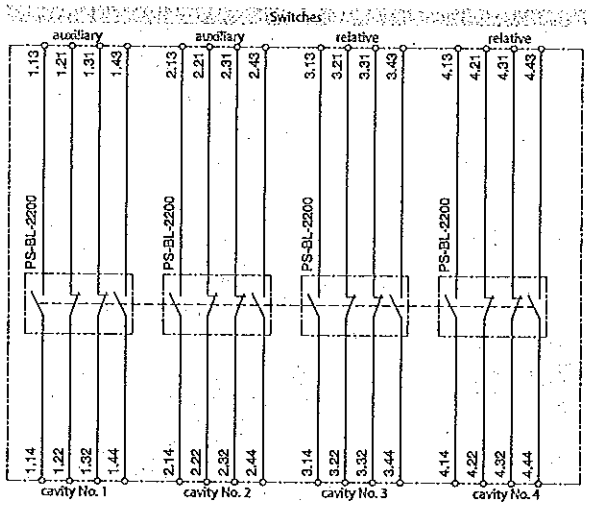
Arrangement of contacts	Number of contacts	Contact types
22	2 + 2	break + make



Cavities in switching unit
BL1000SE305
BL1600SE305

Names and functions of switches according to their location in cavities

Position of switch	Switch name	Switch function
Cavity 3, 4	Relative switch	to indicate tripping of the circuit breaker by releases, TEST push button or by motor
Cavity 1, 2	Auxiliary switch	signals position of circuit breaker/switch-disconnector's main contacts



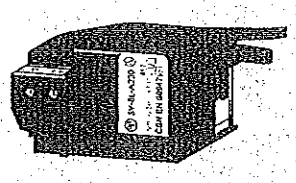
States of switches in the circuit breaker cavities

Cavity			1	2	3	4	1	2	3	4
State of circuit breaker		Circuit breaker lever position	State of the main contacts	PS-BL-2200			PS-BL-2200			
Switched on	I	I	1	1	0	0	1	1	0	0	1
Switched off manually or by motor drive electrically (loaded state)	O	◎	0	0	1	1	0	1	0	0	1
Switched off from switched on state: by the releases or TEST push buttton	O	▽	0	0	1	1	0	0	1	1	0

note: 0 - contact open, 1 - contact closed

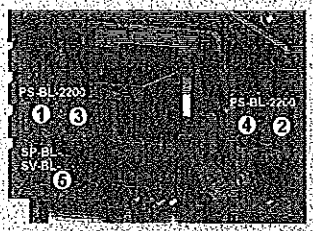
SHUNT TRIPS

3P

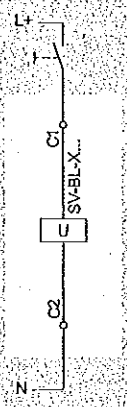


Specifications

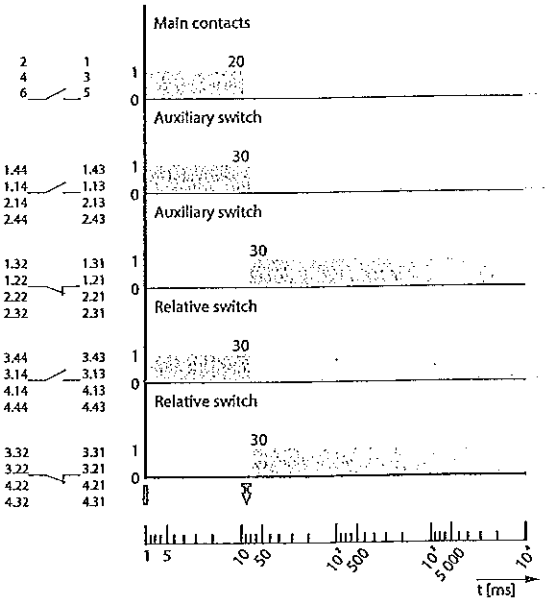
Type		SV-BL-X...
Rated operating voltage	U_e	24, 48, 110, 230, 400, 500 V a.c. 24, 48, 110, 220 V d.c.
Rated frequency	f_e	50/60 Hz
Input power at 1.1 U_e		< 2,5 VA < 2 W
Characteristic		$U \geq 0,7\ U_e$ the circuit breaker must trip
Time to switching off		20 ms
Loading time		∞
Connection cross-section	S	0,5 ÷ 1 mm²
Degree of protection of terminals (connected release)		IP20
Position in cavity No.		5



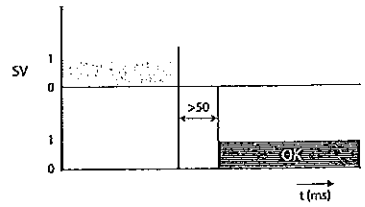
Cavities in switching unit
BL1000SE305
BL1600SE305



Circuit breaker/switch-disconnector switching off by shunt trip

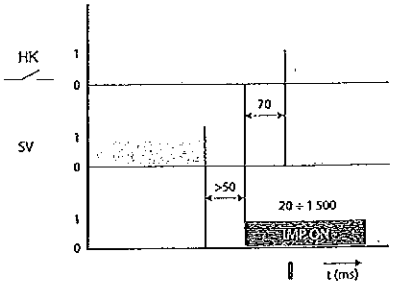


Reaction time of the shunt trip



Cooperation of motor drive and shunt trip

It is necessary to keep time delay when the control of the circuit breaker is done by motor drive and shunt trip at once. The following time delays have to be kept between the disconnection of voltage from the shunt trip and the control impulse for switch on of the motor drive:



States and positions of circuit breaker/switch-disconnector lever

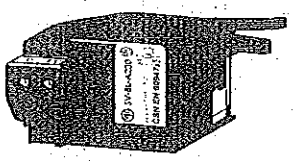
States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases or by TEST push button	
Switched off manually or by motor drive electrically (loaded state)	

Description of graphs

Symbol	Description
HK	Main contacts
OK	Circuit breaker is ready for further handling
IMP ON	Make impulse for the motor drive
SV	Control voltage on the shunt trip

RVOLTAGE RELEASES

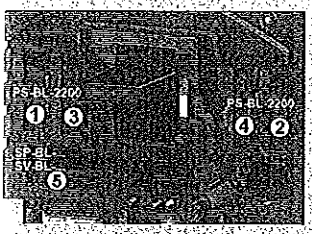
3P



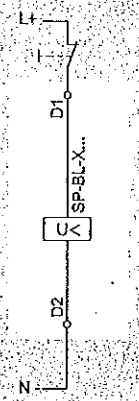
Specifications

Type		SP-BL-X
Rated operating voltage	U_e	24, 48, 110, 230, 400, 500 V a.c. 24, 48, 110, 220 V d.c.
Rated frequency	f_e	50/60 Hz
Input power at 1.1 U_e		< 2.5 VA < 2 W
Characteristic [1]		$U \geq 0.85\ U_e$ it is possible to switch on the circuit breaker $U \leq 0.35\ U_e$ the circuit breaker must trip
Time to switching off		20 ms
Loading time		∞
Connection cross-section	S	0.5 ÷ 1 mm²
Degree of protection of terminals (connected release)		IP20
Position in cavity No.		5

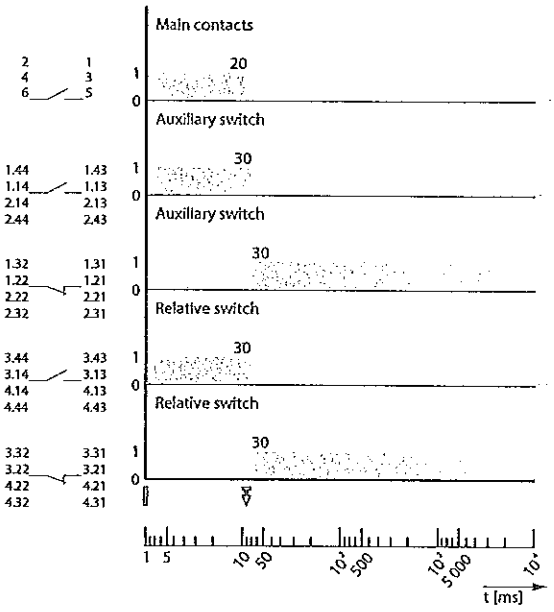
[1] - tripping of the undervoltage release can be delayed using the delay unit BZ-BX-X230-A, see page P2



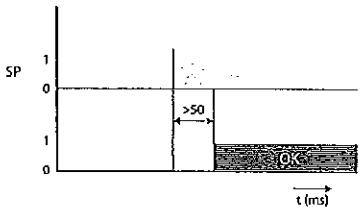
Cavities in switching unit
BL1000SE305
BL1600SE305



Circuit breaker/switch-disconnector switching off by undervoltage release



Reaction time of the undervoltage release

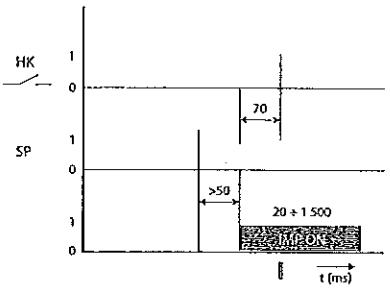


States and positions of circuit breaker/switch-disconnector lever

States of circuit breaker/switch disconnector	Lever position of circuit breaker/switch disconnector
Switched on	
Switched off by releases or by TEST push button	
Switched off manually or by motor drive electrically (loaded state)	

Cooperation of motor drive and undervoltage release

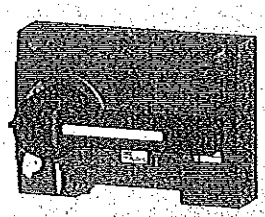
It is necessary to keep time delay when the control of the circuit breaker is done by motor drive and undervoltage release at once. The following time delays have to be kept between bringing the voltage to the undervoltage release and the control impulse for switch on of the motor drive:



Description of graphs

Symbol	Description
HK	Main contacts
OK	Circuit breaker is ready for further handling
IMP ON	Make impulse for the motor drive
SP	Control voltage on the undervoltage release

HAND DRIVES



Description

The hand drive is the accessory of the circuit breaker/ /switch-disconnector which enable circuit breakers BL800S and BL1600S to be controlled locally by applying rotary movement on the lever, e.g. for switching electrical equipment on and off. Modular conception of the drives enables simple mounting on the circuit breaker after the circuit breaker cover of cavities is removed. The drive and its accessories are ordered separately according to your choice, see page H9.

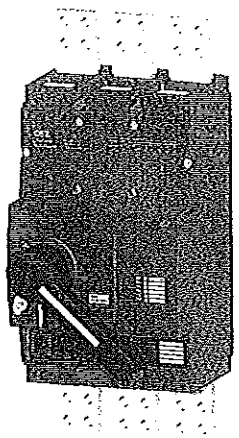
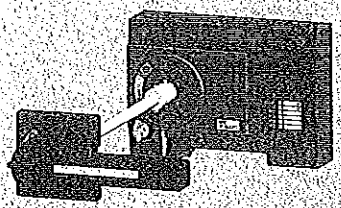


Fig. 1 - DIMENSIONS see page H21



- The hand drive enables to control the circuit breaker through the front panel or through the switchboard door, the outlet for the operating shaft has the IP44 or IP66 degree of protection for bearings.
- Hand drive control lever can be fitted with an extension shaft which makes possible to control the circuit breaker also in deeper switchboards.
- In order to enhance safety for the operator of the electrical equipment, the mechanism of the drive is furnished with locking system preventing the switchboard door from opening when the circuit breaker is in closed position.
- When the circuit breaker is in position for manual open, the drive handle can be locked up using the built-in cylinder type lock (FAB) and as many as three padlocks with shank diameter up to 6+8 mm.
- When the drive lever is in position manual open, it is possible to remove the handle.
- The circuit breaker with hand drives can be fitted with mechanical interlocking system, see page H41.

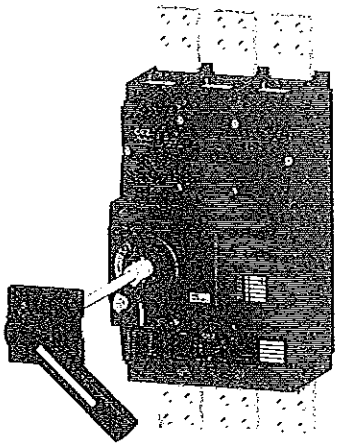


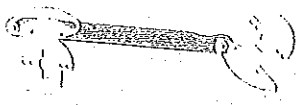
Fig. 2 - DIMENSIONS see page H22

Specification

Type	Description	Colour	Locking of the circuit breaker in OFF state	Degree of protection	Locking of the switchboard door opening in the circuit breaker's state switched on or off by release	Length [mm]
RP-BL-CK10	Hand drive unit	-	yes	-	-	-
RP-BL-CP10	Hand drive lever	black	yes			
RP-BL-CP11	Hand drive lever	red	yes	-	-	-
RP-BL-CN10	Hand drive bearing			IP44	yes	
RP-BL-CN20	Hand drive bearing	-	-	IP66	yes	-
RP-BL-CH10	Extension shaft					365

ECHANICAL INTERLOCKING

3P



RP-BL-CB10 Mechanical interlocking

- Provides mechanical interlocking of two circuit breakers so that they cannot both be tripped simultaneously, but only one of them at a time.
- Interlocking can be used between two BL1000S or BL1600S circuit breakers or between a BL1000S and BL1600S circuit breaker. Both circuit breakers must be equipped with a hand drive (at least one with a hand drive unit and hand drive lever) see page H40. In order to use the interlocking, it is absolutely necessary to comply with the dimensions that are shown in Fig. 1 and 2.

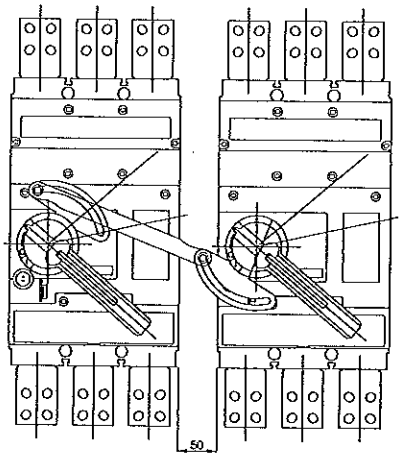


Fig. 1

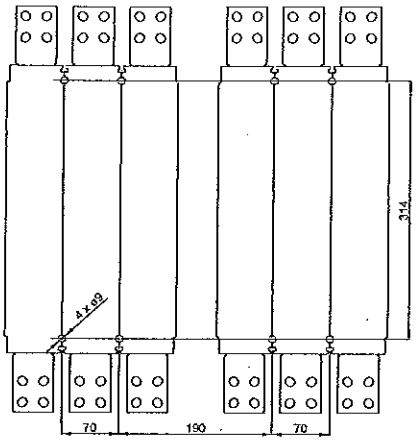
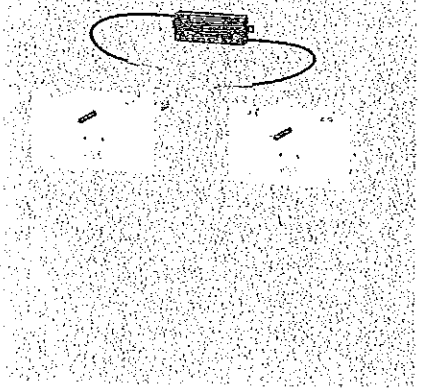


Fig. 2



MB-BL-PP07 Mechanical blocking with Bowden cable

- Provides mechanical interlocking of two circuit breakers so that they cannot both be tripped simultaneously, but only one of them at a time.
- Interlocking can be used between two BL1000S or BL1600S circuit breakers or between a BL1000S and BL1600S circuit breaker. For interlocking, circuit breakers can be equipped with a hand or motor drive. In order to use the interlocking, it is absolutely necessary to comply with the dimensions that are shown on page H42. Mechanical interlocking allows to be switched on of the first circuit breaker and loaded position of the second circuit breaker.

Type of mechanical interlocking	Combination of circuit breaker/switch disconnector designs
MB-BL-PP07	fixed - fixed
MB-BL-PV08	fixed - withdrawable
MB-BL-VV06	withdrawable - withdrawable

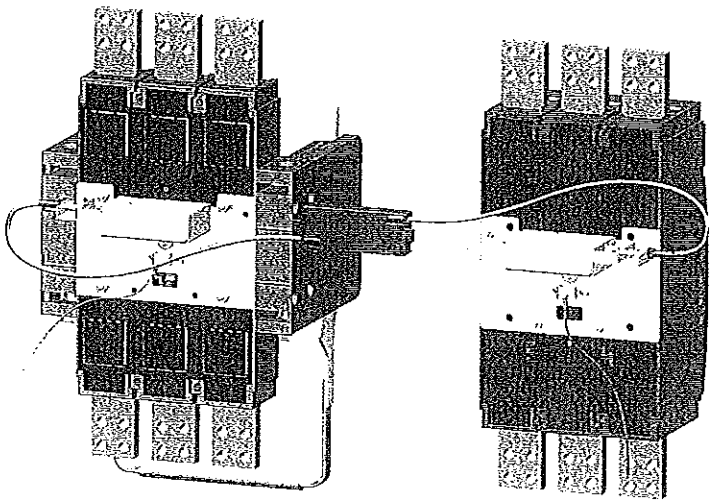
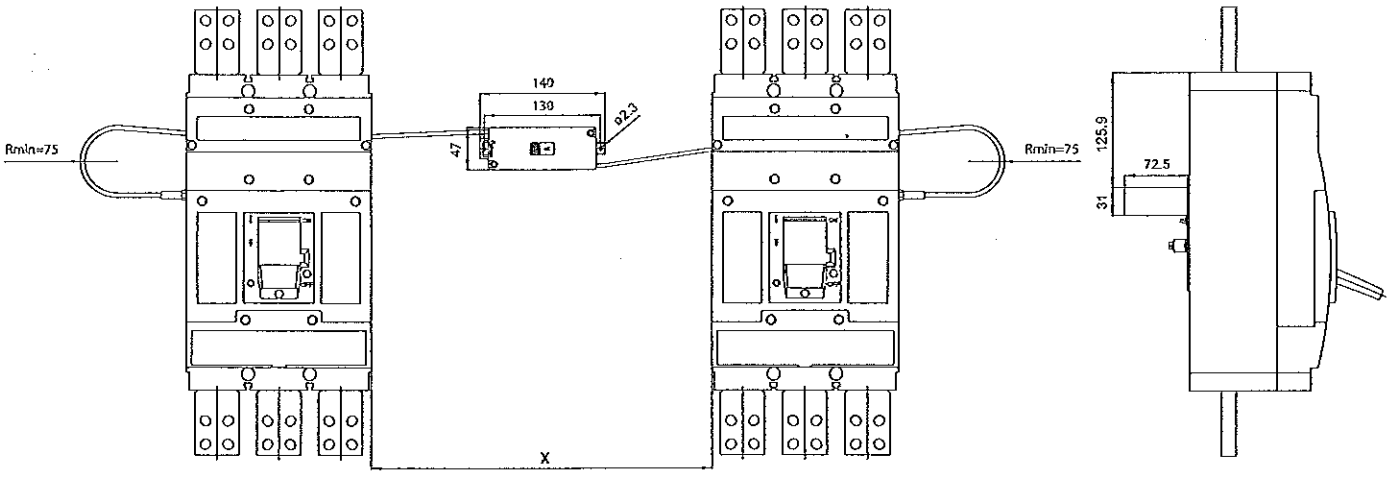


Fig. 3 - Mechanical blocking with Bowden cable between fixed and withdrawable BL circuit breakers

MECHANICAL INTERLOCKING

3P

Mechanical interlocking - option for locating the circuit breaker/switch-disconnector

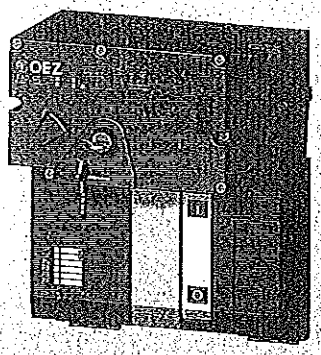


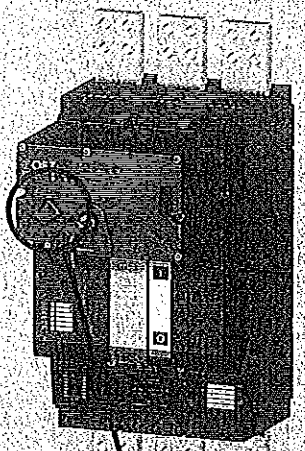
Combination of circuit breakers designs	Distance between the circuit breakers X (mm)		
fixed - fixed	0	or	100 ÷ 1 450
fixed - withdrawable	0	or	50 ÷ 1 400
withdrawable - withdrawable	0	or	50 ÷ 1 350

[1] - TECHNICAL INFORMATION, see Instruction for use

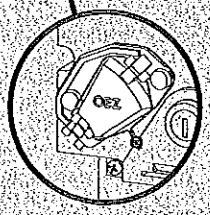
MOTOR DRIVES

3P

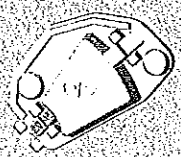




DIMENSIONS, see page H23



Cover of switch on button OD-BL-KT01



Description

- It is used for remote control of the circuit breaker (switch off/on).
- Simple mounting on the circuit breaker after the circuit breaker cover of cavities is removed.
- Usage in industrial applications e.g. switching of stand by units, synchronization of two sources or wherever the automated and unmanned operation of electric devices is needed.
- In order to speed up the circuit breaker's switch off (e.g. safety STOP button) the undervoltage release or shunt trip can be used.
- On the motor drive front panel there is a change-over switch to select the drive modes AUTO/MANUAL:
  - mode AUTO – remote control. The circuit breaker is controlled by buttons for electric switch off/on. The circuit breaker can be switched off by TEST button on the overcurrent release.
  - mode MANUAL – manual control. Control voltage is not needed. The circuit breaker can be switched on using the green button on the motor drive front panel and switched off using the red button on the overcurrent release. Electric switch on is blocked. Electric switch off is functional. The accumulation of energy can be done by means of hinged lever.
  - possibility of remote signalling of the state of the switch AUTO/MANUAL.
- The presence of control voltage U_e is signalled by green LED
- If the circuit breaker is not stored by motor drive until 30 s., e.g. due to undervoltage, extremely low temperature, mechanical or electrical failure, the LED diode on the front panel is shining in red. During the lighting of the red LED, the drive is disconnected electronically, and cannot be remotely controlled. In order to restore remote control it is necessary to disconnect the drive for 30 s. At tripping of the circuit breaker by the overcurrent release, by auxiliary releases, or by TEST push button (in drive mode AUTO), the motor drive automatically accumulates energy (circuit breaker loading), motor drive is then ready to switch on the circuit breaker
- Drive can be locked in off position by lamellar lock (it is part of the drive with two keys) or by up to three padlocks (shank diameter max. 4 ÷ 7 mm).
- Drive can by furnished with the counter of cycles.
- Switch on button can be covered and sealed (OD-BL-KT01).
- The transparent part of front panel enables to determine the state of circuit breaker according to the lever position.
- Drive can be connected by terminal block with screws or by means of multi-pole connector with cavities (in order to connect cables special tongs have to be used).

Specifications

Type		MP-BL-X, <MP-BL-X>-P
Operating voltage	U_e	110, 230 V a.c. 110, 220 V d.c.
Rated frequency	f_n	50/60 Hz
Control impulse length for switching on		>20 ÷ 1 500 ms[1]
Control impulse length for switching off		>20 ms ÷ ∞ [1]
Time to switching on		<70 ms
Time to storage (loading) of motor drive at	U_e 230 V a.c. 220 V d.c.	14 s 18 s
Time to switch-off of circuit breaker U_e 230 V a.c. 220 V d.c.		10 s 12 s
Frequency of cycles ON/OFF		2 cycles/min
Frequency of cycles - instant successive ON/OFF		8 cycles
Mechanical endurance		10 000 cycles
Input power	AC DC	200 VA 200 W
Protection	110 V a.c., 230 V a.c. 110 V d.c., 220 V d.c.	LPN-4C-1, LPN-2C-1 LPN-DC-4C-1, LPN-DC-2C-1
Rated operating current of the change-over switch AUTO/MANUAL	I_e / U_e	6 A/250 V a.c.

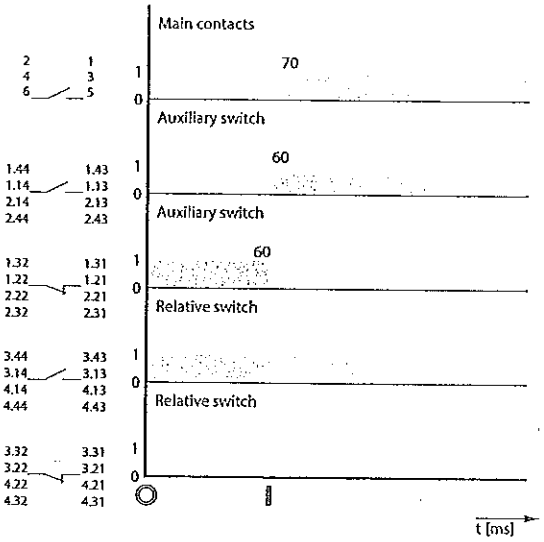
[1] – for sequence of control impulses, see page H46

MOTOR DRIVES

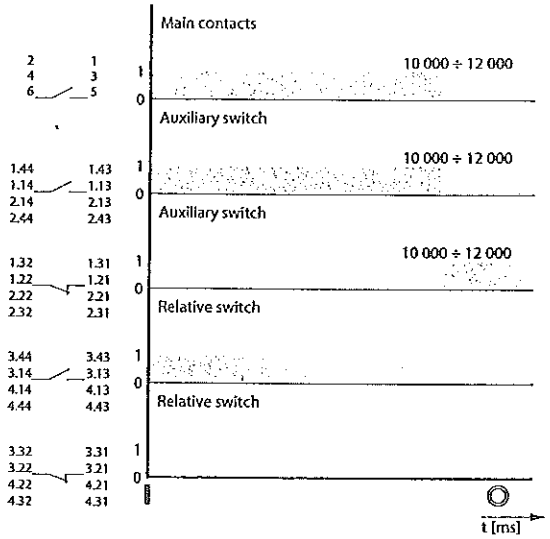
3P

Specifications

Circuit breaker switching on by motor drive - electrically by ON push button

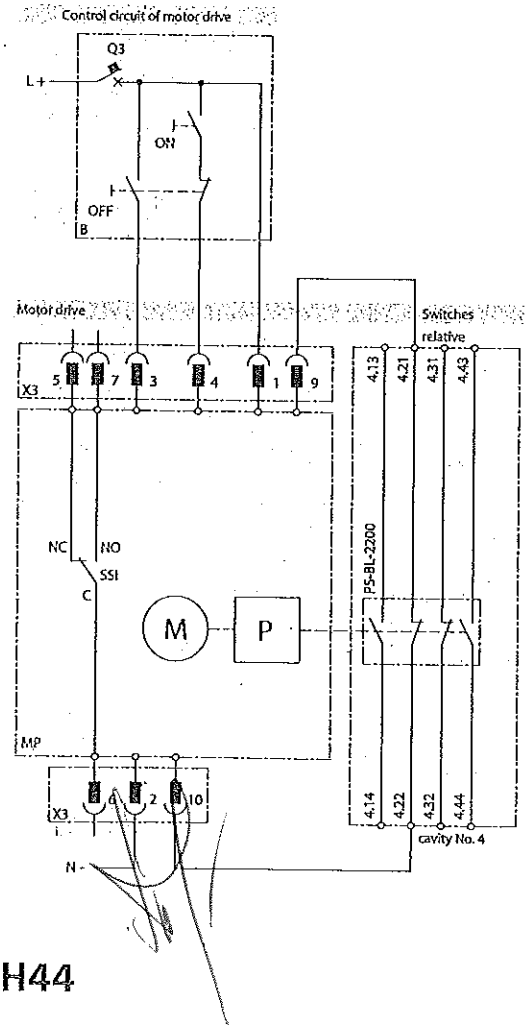


Circuit breaker switching off by motor drive - electrically by OFF push button



Diagram

Circuit breaker switching on and off by motor drive - electrically by ON and OFF push button



States and positions of circuit breaker/switch-disconnector lever

States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases or by TEST push button	
Switched off manually or by motor drive electrically (loaded state)	

Diagram description

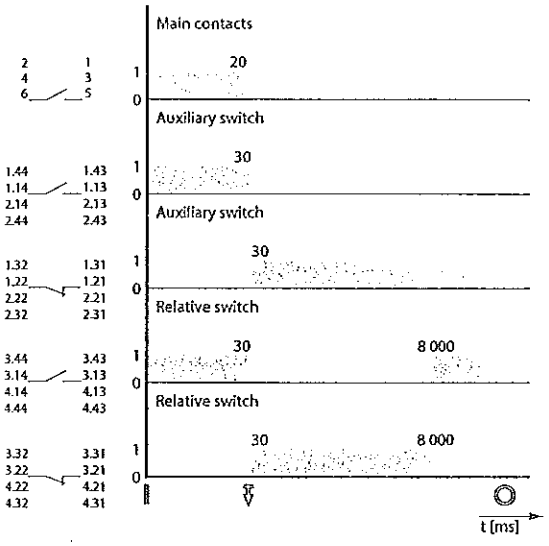
Symbol	Description
MP	motor drive MP-BL-X...
M	motor
P	storage device
X3	connector for connection of control circuits
SSI	switch to indicate MANUAL (NO-C)/AUTO (NC-C)
B	recommended wiring of the control circuits - it is not a part of motor drive
ON	switch on button
OFF	switch off button
Q3	motor drive circuit breaker - see page H43

MOTOR DRIVES

3P

Specifications

Switching off of the circuit breaker with motor drive by shunt trip or undervoltage release



States and positions of circuit breaker/switch-disconnector lever

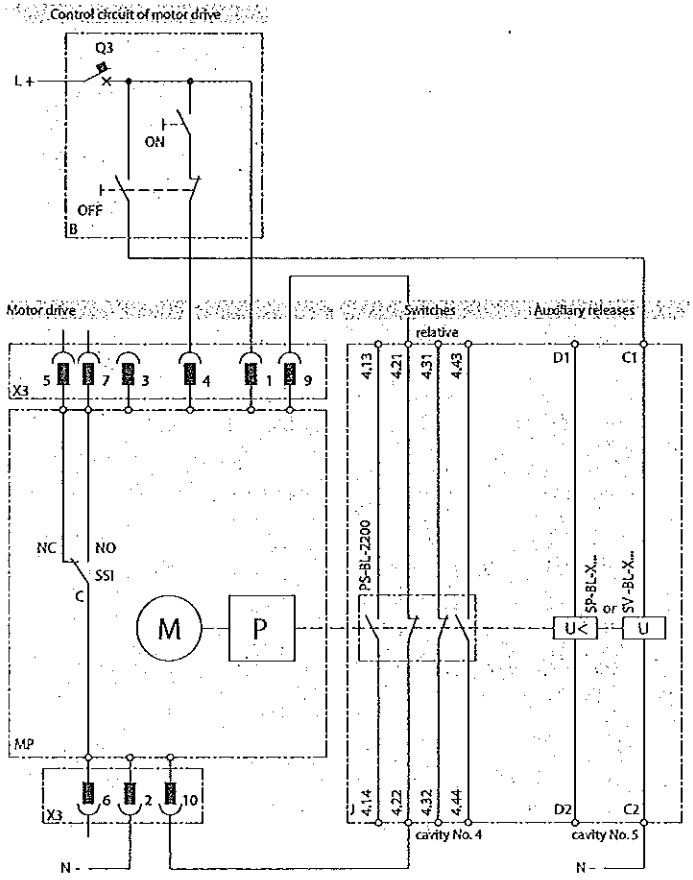
States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases or by TEST push button	
Switched off manually or by motor drive electrically (loaded state)	

Diagram description

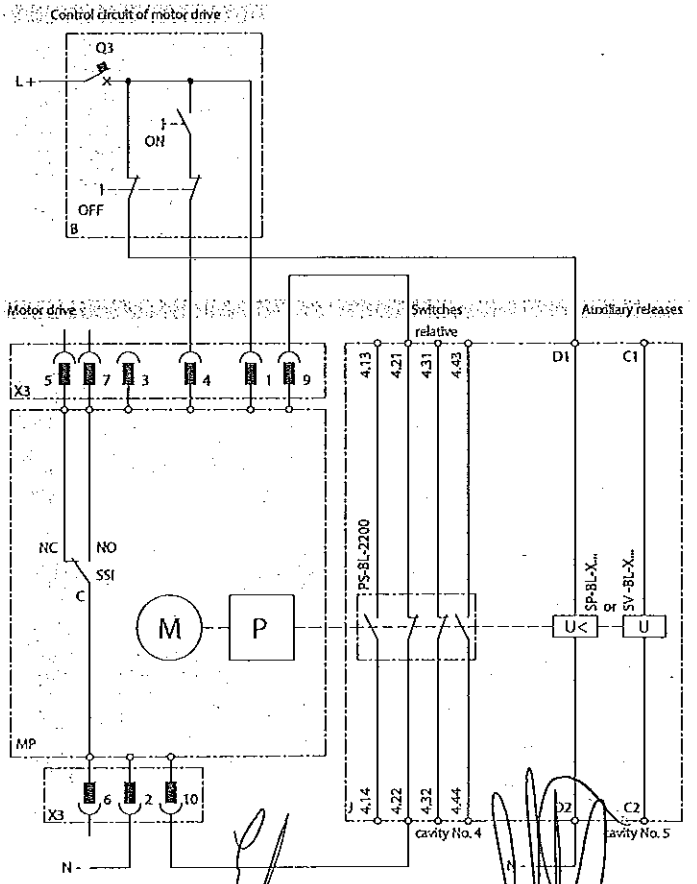
Symbol	Description
MP	motor drive MP-BL-X...
M	motor
P	storage device
X3	connector for connection of control circuits
SSI	switch to indicate MANUAL (NO-C)/AUTO (NC-C)
B	recommended wiring of the control circuits - not included in motor drive order
ON	switch on button
OFF	switch off button
Q3	motor drive circuit breaker - see page H43

Diagram

Circuit breaker switching on by motor drive (electrically by ON push button) and tripping by shunt trip



Circuit breaker switching on by motor drive (electrically by ON push button) a tripping by undervoltage release

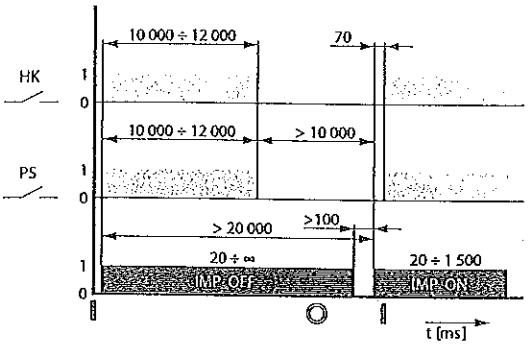


MOTOR DRIVES

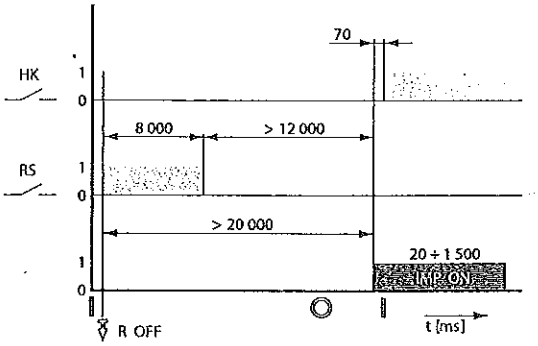
Specifications

Recommended control impulses

Circuit breaker switching on and off by motor drive



Circuit breaker switching off by overcurrent release, shunt trip or undervoltage release and switching on by motor drive



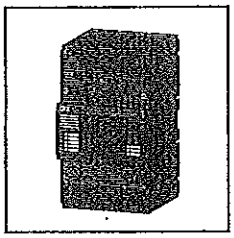
States and positions of circuit breaker/switch-disconnector lever

States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases or by TEST push button	
Switched off manually or by motor drive electrically (loaded state)	

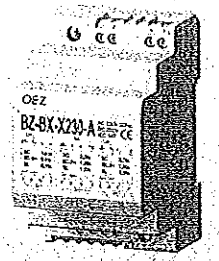
Description of graphs

Symbol	Description
HK	main contacts
PS	auxiliary switch
RS	relative switch
R OFF	circuit breaker closing instant by release
IMP ON	make impulse for the motor drive
IMP OFF	break impulse for the motor drive

OTHER ACCESSORIES OF MOULDED CASE CIRCUIT BREAKERS



DELAY UNIT

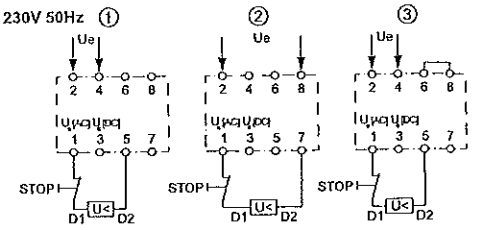


Type	Product code	Description	Weight [kg]	Package [pc]
BZ-BX-X230-A	36696	enables to delay the undervoltage release tripping of circuit breakers	0.12	1

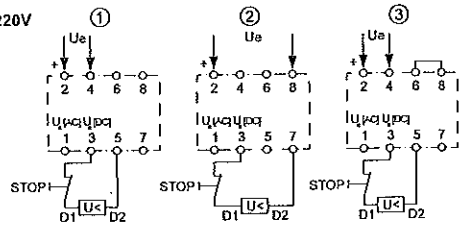
- the delay can be set up at three levels (according to wiring)

Circuit breaker	Delay [s]		
	1st level	2nd level	3rd level
BC160	1.0	2.0	3.2
BD250, BH630	0.6	1.2	1.9
BL1000, BL1600	0.5	1.0	1.5

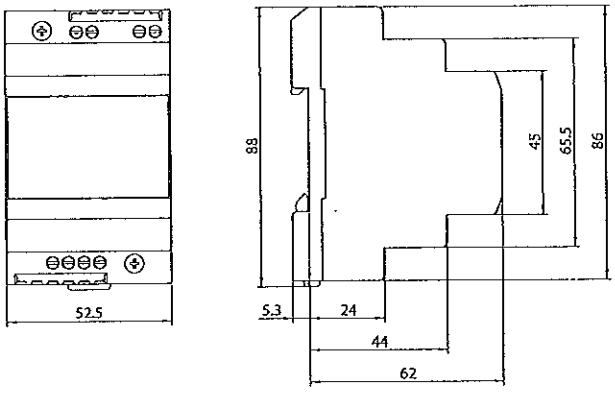
AC 230V 50Hz



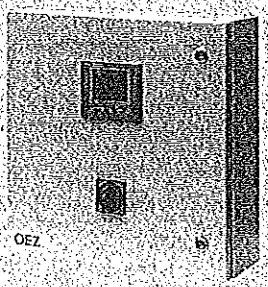
DC 220V



BZ-BX-X230-A



AUTOMATIC STANDBY UNIT MODI



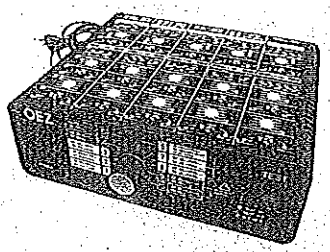
Type	Description	Weight [kg]	Package [pc]
MODI ZA...	- enables safe control of switching of two power supplies to one or two loads with exclusion of parallel operation of the power supplies - enables various adaptations according to the customer's requirements - for backup operation with a transformer or generator - from 16 to 6 300 A	10	1

- for circuit breakers and switch-disconnectors Modeion and Arion WL
- for detail information see catalogue Automatic standby unit MODI ZA

Type	Description	Weight [kg]	Package [pc]
MODI ZB...	- enables safe control of two power supplies to one load with exclusion of parallel operation of the power supplies - for backup operation, in particular with a generator - from 40 to 630 A	10	1

- for Modeion circuit breakers
- for detail information see catalogue Automatic standby unit MODI ZB

TESTER OF OVERCURRENT RELEASES OF CIRCUIT BREAKERS



Type	Product code	Description	Weight [kg]	Package [pc]
ZES4	17273	Tester of overcurrent releases of circuit breakers BD250.., BH630.., BL1000S and BL1600S	3.75	1

- service device for checking the functionality of electronic overcurrent releases and switching units for Modeion circuit breakers
- tests: - overcurrent releases
  - functionality of switching unit tripping mechanism
  - current transformers
- tests overcurrent releases: L001, DTV3, MTV8, MTV9, U001
- tests switching units for circuit breakers: BD250N, BD250S, BH630N, BH630S, BL1000S, BL1600S

Tester must be connected to an external power supply. Power supply voltage of tester is 230 V a.c.

For more detailed information and documentation contact our technical support No.: +420 465 672 191 or visit our websites www.oez.com

CONTROL RELAYS FOR BD250 AND BH630

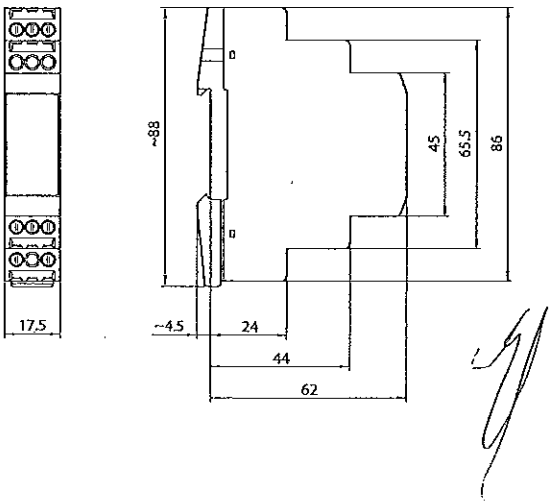
Type	Product code	Specification	Weight [kg]	Package [pc]
OD-BHD-RX01	37425	24 V a.c./d.c.	0.06	1
OD-BHD-RX02	37426	48 V a.c./d.c.	0.06	1
OD-BHD-RA03	37427	110 ÷ 230 V a.c.	0.06	1
OD-BHD-RD04	37428	110 V d.c.	0.06	1

- control relay is suitable for control of the circuit breaker with motor drive in withdrawable/plug-in device or in combination with mechanical interlocking by Bowden, see page E72, E73, F70, F71

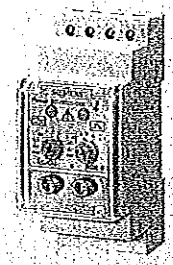
Specifications

Type		OD-BHD-R...
Standards		EN 61812-1
Approval marks		CE EAC
Control circuit		
Rated operating voltage	U_e	24 V a.c./d.c., 48 V a.c./d.c., 110 ÷ 230 V a.c./d.c., 110 V d.c.
Rated frequency		50 Hz
Consumption at U_s	at 24 ÷ 230 V a.c. at 24 ÷ 220 V d.c.	1.2 VA ÷ 2.6 VA 1.4 W ÷ 1.7 W
Mechanical endurance		30 000 cycles
Electrical endurance		30 000 cycles
Connection		0.2 ÷ 2.5 mm²
Torque		0.5 Nm
Control impulse		
Min. excitation time		15 ms
Max. excitation time		unlimited
Other data		
Mounting on „U" rail according to EN 60715 - type		TH 35
Degree of protection		IP20
Ambient temperature		-20 ÷ +50 °C
Working position		arbitrary
Seismic resistance		3g / 8 ÷ 50 Hz

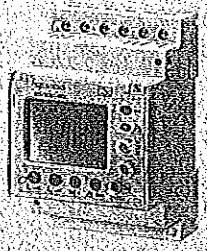
OD-BHD-R...



RESIDUAL CURRENT MONITOR



5SV8000-6KK



5SV8001-6KK, 5SV8200-6KK

Specifications

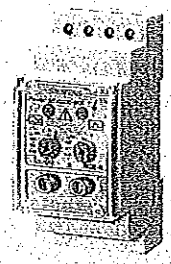
Type designation	5SV8 000-6KK	5SV8 001-6KK	5SV8 200-6KK
Dimensions - number of modules	2	3	3
Weight	0.17 kg	0.24 kg	0.24 kg
Standards	EN 62020 IEC 62020	EN 62020 IEC 62020	EN 62020 IEC 62020
Approval marks	CE	CE	CE
Number of independent circuits	1	1	4
Rated residual current	0.03 ÷ 5 A	0.03 ÷ 30 A	0.03 ÷ 30 A
Maximum inactivity time	0.02 ÷ 5 s	0.02 ÷ 10 s	0.02 ÷ 10 s
Type	A (up to $I_{\Delta n}$ = 3 A) AC ($I_{\Delta n}$ from 3 to 5 A)	A (up to $I_{\Delta n}$ = 3 A) AC ($I_{\Delta n}$ from 3 to 30 A)	A (up to $I_{\Delta n}$ = 3 A) AC ($I_{\Delta n}$ from 3 to 30 A)
Rated voltage	230 V a.c.	230 V a.c.	230 V a.c.
Rated operating voltage	164 ÷ 284 V a.c.	164 ÷ 284 V a.c.	164 ÷ 284 V a.c.
Rated frequency	50 Hz	50 Hz	50 Hz
Electrical endurance	10 x 10^3 cycles	10 x 10^3 cycles	10 x 10^3 cycles
Degree of protection from front side of the device	IP41	IP41	IP41
Degree of protection of terminals	IP20	IP20	IP20
Method of mounting	„U" rail 35 mm	„U" rail 35 mm	„U" rail 35 mm
Ambient temperature range	-10 ÷ 50 °C	-10 ÷ 50 °C	-10 ÷ 50 °C
Max. sea level	2 000 m	2 000 m	2 000 m
Relative humidity	5 ÷ 95 %	5 ÷ 95 %	5 ÷ 95 %
Connection cross-section	0.2 ÷ 2 mm²	0.2 ÷ 2 mm²	0.2 ÷ 2 mm²
External remote trip/reset	–/●	●/●	●/●
Internal diameter of the transformer	30 ÷ 210 mm	30 ÷ 210 mm	30 ÷ 210 mm
Local signalling of reach of relative low value of $I_{\Delta n}$ (ALARM)	●	●	●
Remote signalling of reach of relative low value of $I_{\Delta n}$ (ALARM)	–	●	●
Local signalling of power supply/ALARM/failure/value of $I_{\Delta n}$	●/●/●/●	●/●/●/●	●/●/●/●
Display	–	●	●
Sealing of setting/control panel	●	●	●
Control circuit - outputs			
Rated operating voltage	230 V a.c.	230 V a.c.	230 V a.c.
Rated current	6 A	6 A	6 A
Max. switched power - AC1	2 500 VA	2 500 VA	2 500 VA
Rated frequency	50 Hz	50 Hz	50 Hz
Number of control contacts	1 CO	2 CO	4 NO
Control circuit - inputs			
Rated voltage	–	110 ÷ 230 V a.c./d.c.	230 V a.c.
Rated operating voltage		110 ÷ 284 V a.c./d.c.	230 ÷ 284 V a.c.
Input power	–	0.7 W	0.7 W

● available, – unavailable, + being prepared

Total max. switching off time

	Maximum inactivity time - adjusted value							
	20 ms	100 ms	200 ms	300 ms	400 ms	500 ms	750 ms	1000 ms
1x $I_{\Delta n}$	< 80 ms	< 135 ms	< 240 ms	< 340 ms	< 440 ms	< 540 ms	< 790 ms	< 1 050 ms
2x $I_{\Delta n}$	< 60 ms	< 130 ms	< 230 ms	< 330 ms	< 435 ms	< 540 ms	< 780 ms	< 1 040 ms

RESIDUAL CURRENT MONITOR – ANALOG



5SV8000-6KK

Description

- designed for monitoring of leakage current (residual/ /fault current) and protection against fire e.g. due to worsened insulation or sneak currents
- possibility of setting of residual current $I_{\Delta n}$ and setting of limit time of inactivity of $I_{\Delta t}$ (see parameters) by means of rotary switches
- mounting on „U" rail
- measurement by means of external summation current transformer
- circuit breaker switching off by means of shunt trip or undervoltage release

Local signalling

- first LED signals functionality of the relay and current transformer:
  LED is lighting - the relay is in order
  LED does not light - the relay is not supplied
  LED is flashing - interrupted connection between the relay and the transformer, or broken secondary winding
- the second LED signals value of the passing current:
  LED is lighting - signalling reach of 100 % residual current
  LED is flashing - flashing period increases with increasing residual current

Remote signalling:

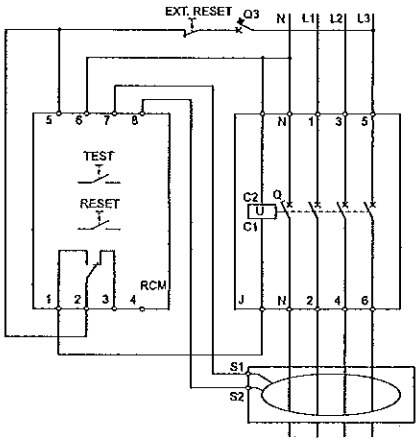
- by means of make-and-break contact (CO)
- serves for signalling of reach of the set value of $I_{\Delta n}$ and/or for circuit breaker switching off via undervoltage release or shunt trip

Control

- the TEST push-button serves for testing of the function of both the relay and circuit breaker - disconnects the circuit
- if the relay trips (switches the circuit breaker off) it is necessary to reset it by the „RESET" push-button, or interrupt its supply and thus perform the remote reset
- setting can be sealed

Wiring diagram

Wiring diagram with shunt trip



Wiring diagram with undervoltage release

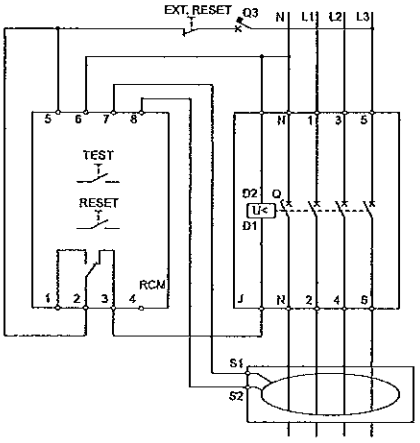
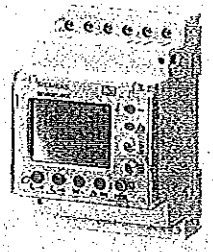


Diagram description

Symbol	Description
J	circuit breaker
RCM	residual current monitor
TEST	test push-button of the relay
RESET	local reset push-button
EXT. STOP/RESET	remote reset push-button or STOP push-button[1]
S1,S2	current transformer terminals
Q3	protection of relay LPN-2C-1

[1] only in combination with an undervoltage release

RESIDUAL CURRENT MONITOR - DIGITAL



5SV8001-6KK

Description

- designed for monitoring of leakage current (residual// fault current) and protection against fire e.g. due to worsened insulation or sneak currents
- possibility of setting of residual current $I_{\Delta n}$ and setting of maximum inactivity time $I_{\Delta t}$ by means of push-buttons and the display (see table)
- presentation of cause of trip and of current value of residual current on the display
- mounting on „U" rail
- measurement by means of external transformer
- circuit breaker switching off by means of shunt trip or undervoltage release
- possibility of setting of characteristic S - selective

Local signalling

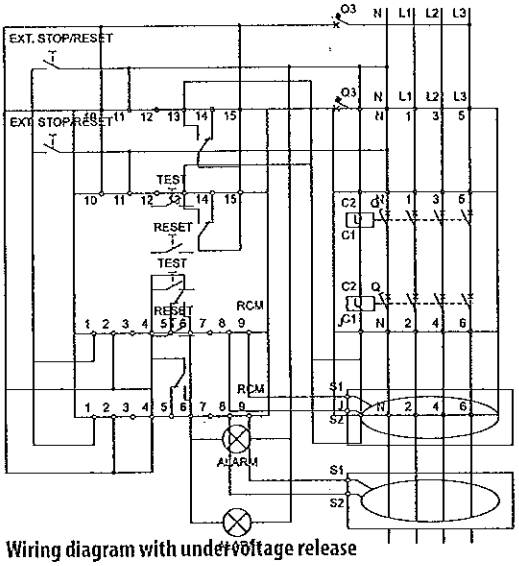
- the first LED signals functionality of the relay and trip in reach of the set residual current:
  LED gives a green light - the relay is supplied
  LED gives a red light - signalling of reach of 100 % residual current
- the second LED signals reach of relative low set value:
  LED gives a yellow light - signalling of reach of the set value

Remote signalling

- by means of make-and-break contact (CO)
- serves for signalling of reach of the set value of $I_{\Delta n}$ and/or for circuit breaker switching off via undervoltage release or shunt trip
- possibility of remote switching off by applying voltage 110 ÷ 230 V a.c./d.c. on potential free terminals number 1 and 2
- the TEST push-button serves for testing of the function of both the relay and circuit breaker - disconnects the circuit
- if the relay trips (switches the circuit breaker off) it is necessary to reset it by the "RESET" push-button, or interrupt its supply and thus perform the remote reset
- setting can be sealed

Wiring diagram

Wiring diagram with shunt trip



Wiring diagram with undervoltage release

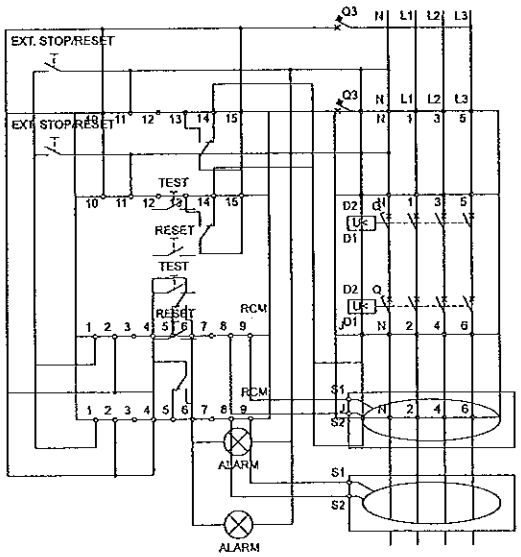
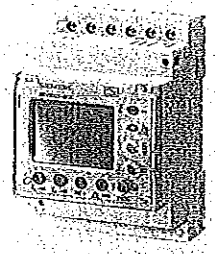


Diagram description

Symbol	Description
J	circuit breaker
RCM	residual current monitor
TEST	test push-button of the relay
RESET	local reset push-button
EXT. STOP/RESET	remote reset push-button or STOP push-button
S1, S2	current transformer terminals
ALARM	signalling of reach of the set value of $I_{\Delta n}$
Q3	protection of relay LPN-2C-1

RESIDUAL CURRENT MONITOR - DIGITAL, 4-CHANNEL



5SV8200-6KK

Description

- designed for monitoring of leakage current (residual/fault current) and protection against fire e.g. due to worsened insulation or sneak currents
- possibility of setting of residual current $I_{\Delta n}$ and setting of maximum inactivity time $t_{\Delta t}$ by means of push-buttons and the display (see table)
- presentation of cause of trip and of current value of residual current on the display
- mounting on „U" rail
- measurement by means of an external transformer; it is possible to connect up to 4 transformers
- circuit breaker switching off by shunt trip
- possibility of setting of characteristic S – selective

Local signalling

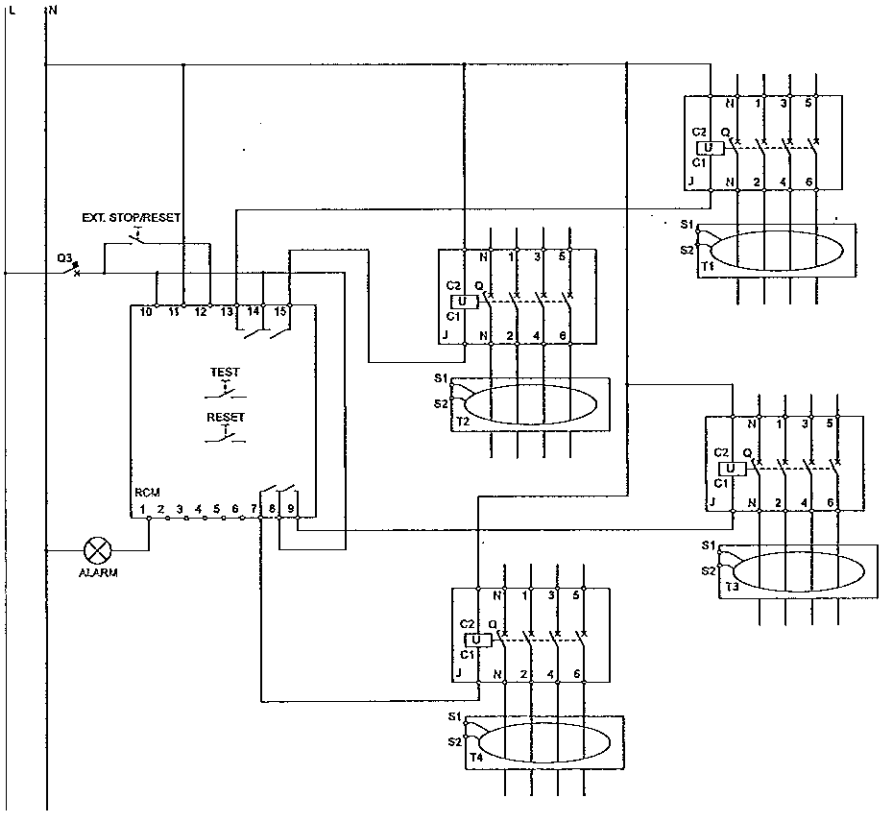
- the first LED signals functionality of the relay and trip in reach of the set residual current:
  LED gives a green light - the relay is supplied
  LED gives a red light - signalling of reach of 100 % residual current
- the second LED signals reach of relative low set value:
  LED gives a yellow light - signalling of reach of the set value

Remote signalling

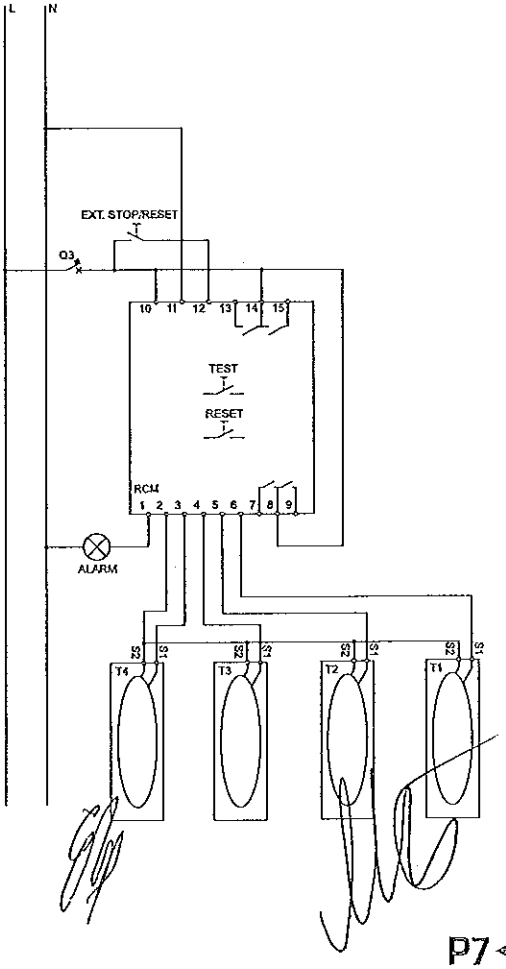
- by means of make-and-break contact (CO)
- serves for signalling of reach of the set value of $I_{\Delta n}$ and/or for circuit breaker switching off via undervoltage release or shunt trip
- possibility of remote switching off by applying voltage 110 ÷ 230 V a.c./d.c. on potential free terminal number 12
- the TEST push-button serves for testing of the function of both the relay and circuit breaker - disconnects the circuit
- if the relay trips (switches the circuit breaker off) it is necessary to reset it by the „RESET" push-button, or interrupt its supply and thus perform the remote reset
- setting can be sealed

Wiring diagram

Wiring diagram with shunt trip - connecting of circuit breakers



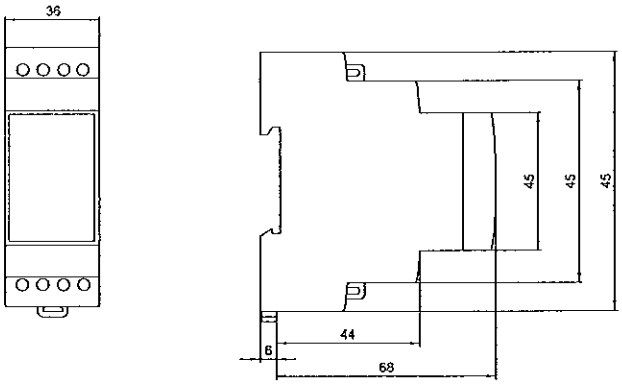
- connecting of current transformers



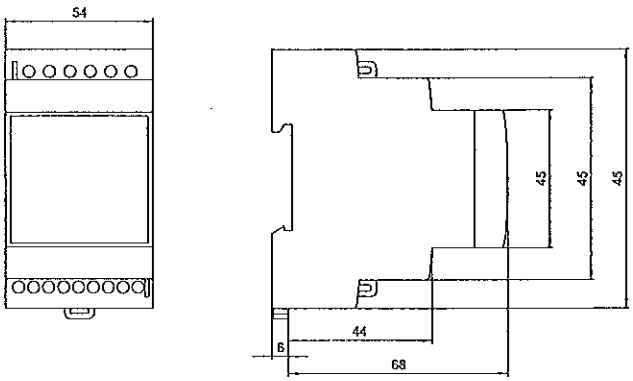
RESIDUAL CURRENT MONITOR

Dimensions

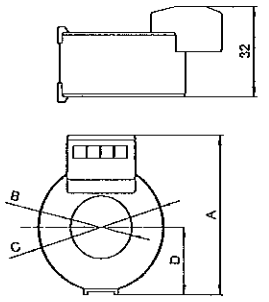
Residual current monitor 5SV8000-6KK



Residual current monitor 5SV8001-6KK, 5SV8200-6KK

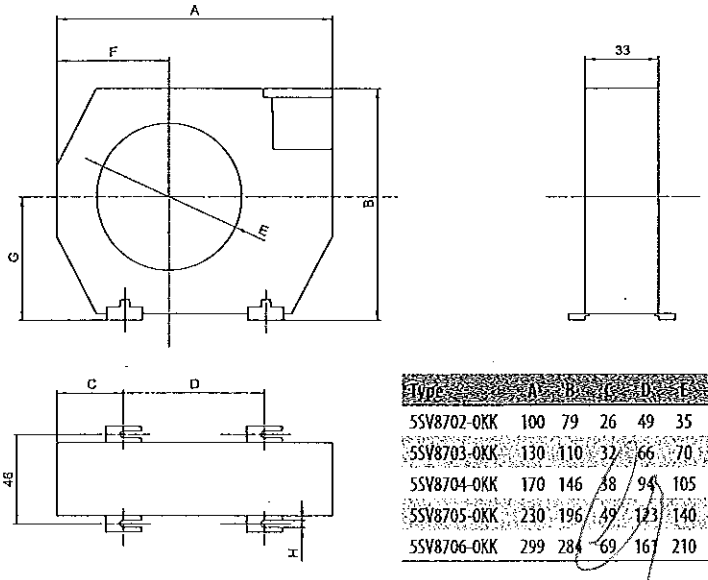


Measuring current transformers 5SV8700-0KK, 5SV8701-0KK



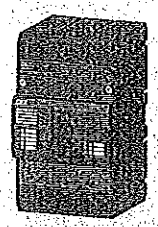
Type	A	B	C	D
5SV8700-0KK	60	20	46	24
5SV8701-0KK	70	30	59	30

Measuring current transformers 5SV87...-0KK



Type	A	B	C	D	E	F	G	H
5SV8702-0KK	100	79	26	49	35	35	43	6.
5SV8703-0KK	130	110	32	66	70	52	57	6.
5SV8704-0KK	170	146	38	94	105	72	73	6.
5SV8705-0KK	230	196	49	123	140	97	98	6.
5SV8706-0KK	299	284	69	161	210	141	142	6.

SPARE PARTS OF CIRCUIT BREAKERS AND SWITCH-DISCONNECTORS MODEION

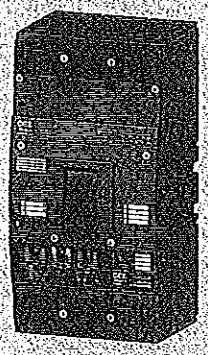


Spare parts for BC160N

Type	Product code	Name, description	Weight [kg]	Package
OD-BC-SP01	34456	Control lever	0.002	1
OD-BC-DV01	20606	Conductor holder	0.001	1
OD-BC-MS01	20607	Set of screws M3x30, 2 pcs	0.005	1
CS-BC-T411	33656	Connecting terminal	0.094	1
CS-BC-T412	33657	Connecting terminal	0.095	1
OD-BC-KS01	20624	Terminal cover, upper or lower terminals, 3P design, 1 pc	0.01	1
OD-BC-KS41	33659	Terminal cover, upper or lower terminals, 4P design, 1 pc	0.015	1
OD-BC-KON2	37798	Connector and sockets for MP-BC-X...-B	0.02	1

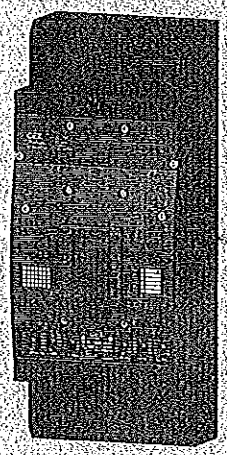
Spare parts for BD250N, BD250S

Type	Product code	Name, description	Weight [kg]	Package
OD-BD-SP01	34457	Control lever	0.007	1
OD-BD-DV01	15329	Conductor holder	0.002	1
OD-BD-MS01	14419	Set of screws M4x35, 4 pcs	0.018	1
OD-BD-KS01	24720	Terminal cover, upper or lower terminals, 3P design, 4 pc	0.1	1
OD-BD-KS44	35896	Terminal cover, lower terminals, 4P design, 1 pc	0.1	1
OD-BD-KS45	35897	Terminal cover, upper terminals, 4P design, 1 pc	0.1	1
OD-BHD-JUMP	34460	Jumper for auxiliary releases	0.001	1
OD-BHD-KON2	34461	Connector and sockets for MP-BD,BH	0.004	1
OD-BX-KON1	34462	Connector and sockets for OD-xx-KA01	0.017	1



Spare parts for BH630N, BH630S

Type	Product code	Name, description	Weight [kg]	Package
OD-BH-SP01	34458	Control lever	0.012	1
OD-BH-DV01	15331	Conductor holder	0.002	1
OD-BH-MS01	14420	Set of screws M5x25, 4 pcs	0.03	1
OD-BH-KS01	24730	Terminal cover, upper or lower terminals, 3P design, 1 pc	0.15	1
OD-BH-KS44	35894	Terminal cover, lower terminals, 4P design, 1 pc	0.2	1
OD-BH-KS45	35895	Terminal cover, upper terminals, 4P design, 1 pc	0.2	1
OD-BHD-JUMP	34460	Jumper for auxiliary releases	0.001	1
OD-BHD-KON2	34461	Connector and sockets for MP-BD,BH	0.004	1
OD-BX-KON1	34462	Connector and sockets for OD-xx-KA01	0.017	1

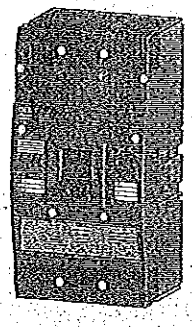


Spare parts for BL1000S, BL1600S

Type	Product code	Name, description	Weight [kg]	Package
OD-BL-SP01	34459	Control lever	0.03	1
OD-BL-MS01	14854	Set of screws M8x80, 4 pcs	0.144	1
OD-BL-KON2	34463	Connector and sockets for MP-BL-X...	0.004	1
OD-BX-KON1	34462	Connector and sockets for OD-xx-KA01	0.017	1

NOTES

HE USAGE OF SWITCH-DISCONNECTORS AT GIVEN OVERCURRENT PROTECTION



Particular designs of Modeion switch-disconnectors can be used together with the assigned device (circuit breaker, fuse-link) at the spot of electrical circuit where the value of initial peak short-circuit current I_k'' is lower or max equal to the related value from the table:

Backup protective device	Type of Modeion switch-disconnector I_k'' [kA]/400 V a.c.				
	BC	BD	BH	BL1000	BL1600
BC160 (all overcurrent releases types)	25	25	25	25	25
BD250 (all overcurrent releases types)	18	18	36[1], 65[2]	36[1], 65[2]	36[1], 65[2]
BH630 (all overcurrent releases types)	–	–	36[1], 65[2]	36[1], 65[2]	36[1], 65[2]
BL1000 (all overcurrent releases types)	–	–	–	50	50
BL1600 (all overcurrent releases types)	–	–	–	–	50
PN, PLN, PHN gG max. I_n = 125 A[3]	100	●[3]	●[3]	●[3]	●[3]
PN, PLN, PHN gG max. I_n = 224 A[3]	–	65	●[3]	●[3]	●[3]
PN, PHN gG max. I_n = 500 A[3]	–	–	65	●[3]	●[3]
PN, PHN gG max. I_n = 630 A[3]	–	–	–	65	65

Notes:

[1] Additional values in table 1) are related to the back-up circuit breaker of design N.

[2] Additional values in table 2) are related to the back-up circuit breaker of design S.

[3] Max value of initial peak short-circuit current that enables the usage of switch-disconnector with backup fuse-links of lower rated currents (see [3]) is determined on the basis of equality of their limited current I_s.

- I_n rated current of backup fuse-link has to be min by one degree lower than I_e rated current of the switch-disconnector.
- Given values are valid for voltage 400 V a.c.

NOTES

OSSARY OF TERMS

:: Precise wording of definitions and texts relating to a given term are detailed in the respective standards, see Name.

me	Symbol	Explanation
ted operating voltage 60947-1; 4.3.1.1	U_e	Voltage fixed by the manufacturer. Several pertinent tests relate to its determination, as may also the utilization category. Along with the rated (operating) current, it determines the device's utilization. The highest value of rated operating voltage may in no case be greater than the value of the rate insulation voltage U_i.
ted insulation voltage 60947-1; 4.3.1.2	U_i	Voltage measure to which are related tests of dielectric strength and creepage distance.
ted current 60947-2; 4.3.2.3	I_n	Current value of particular circuit breaker that can be handled uninterruptedly. The highest current valued tripping the circuit breaker in conformity with a specifically stated tripping characteristic.
duced rated current	I_R	Specifically established, reduced value of I_n current for a regulated time-dependent (thermal) release and that the circuit breaker can handle continuously. Maximum setting is at value equal to I_n. Changing I_R moves the release's tripping characteristic along the current axis. $I_r = k \times I_n$ holds where $k \leq 1$
pping time at a given I_r multiple	t_R	Time after which circuit breaker will trip, if a current flows through it that is equal to the given multiple of I_R. Changing t_R moves the tripping characteristic along the time axis.
lease current of independent instantaneous lective) release	I_{sd}	Minimum current value that causes tripping of the time-independent delayed release.
lay of time-independent delayed release	t_{sd}	If a current flows through the circuit breaker equal to at least I_{sd} but not reaching I_{sd} the circuit breaker will trip with time delay t_{sd}. Total switching off time is influenced by the tripping of the circuit breaker itself and is about 10 ÷ 20 ms longer.
lease current of independent instantaneous ort-circuit) release	I_i	Minimum current value that causes tripping of the time-independent instantaneous release.
ted operating current 60947-1; 4.3.2.3	I_e	Rated operating current of device (switch-disconnector) is fixed by the manufacturer with consideration for the rated operating voltage, rated frequency, rated operation, utilization category and type of protective cover, if that comes into consideration.
ted normal current 60947-1; 4.3.2.4	I_u	Current value set by the manufacturer and which the device can handle in continuous operation, i.e. during a period longer than 8 hours (weeks, months, or longer).
ted short-circuit ultimate breaking capacity 60947-2; 2.15.1; 4.3.5.2.1	I_{cu}	Value of ultimate short-circuit breaking capacity expressed as the rms value of the alternating component of the assumed short-circuit current that the circuit breaker must be able to manage in the mode: 1x switching off of the short-circuit and a following 1x make-break sequence. After testing, the circuit breaker need not be able to conduct the rated current uninterruptedly. I_{cu} is set for the rated operating voltage at the rated frequency and at the established power factor for alternating current or at the time constant for direct current. Must fulfil the condition: $I_{cu} \geq I_k''$
ted short-circuit service breaking capacity 60947-2; 2.15.2; 4.3.5.2.2	I_{cs}	Value of the operating short-circuit breaking capacity expressed as the rms value of the alternating component of the assumed short-circuit current that the circuit breaker must be able to manage in the mode: 1x switching off of the short-circuit and a following 2x make-break sequence. May also be expressed as a percentage of I_{cu}. After testing, the circuit breaker must be able uninterruptedly to conduct the rated current and to switch off the overcurrent. Temperature increase of the main terminals may be greater. I_{cs} is set for the rated operating voltage at the rated frequency and at the established power factor for alternating current or at the time constant for direct current. Permitted: $I_{cs} \geq I_k''$
ted short-time withstand current 60947-1; 4.3.6.1 60947-2; 4.3.5.4 60947-3; 4.3.6.1	I_{cw}	Value of short-time withstand current specified by the manufacturer that the device is able to handle without damage during a designated time period (short-time delay). In case of alternating current, it is the rms value of the alternating component of the assumed short-circuit current I_k''

GLOSSARY OF TERMS

Note: Precise wording of definitions and texts relating to a given term are detailed in the respective standards, see Name.

Name	Symbol	Explanation
Rated short-circuit making capacity EN 60947-1; 4.3.6.2 EN 60947-2; 4.3.5.1 EN 60947-3; 4.3.6.2	I_{cm}	Value of short-circuit making capacity specified by the manufacturer for the rated operating voltage at the rated frequency and at the established power factor for alternating current or at the time constant for direct current. It is expressed as the maximum assumed peak current. Must fulfil the condition: $I_{cm} \geq i_p$
Initial peak short-circuit current EN 60909-0; 1.3.5	I_k''	Short-circuit current value at the moment of its arising at a given point in the electrical distribution expressed as the rms value of the alternating symmetrical component of the assumed short-circuit current.
Surge short-circuit current EN 60909-0; 1.3.8	i_p	Maximum possible momentary value of the assumed short-circuit current. (Corresponds to the moment the short arises, as a result of which there occurs the peak value of the short-circuit current.)
Prospective short-circuit current EN 60947-1; 2.5.5 EN 60909-0; 1.3.3	I_p	Short-circuit current value, which would flow through the circuit if the protection device were replaced and a short-circuit were experienced by conductors with negligible impedance. (In a three-phase distribution, it is assumed that the short-circuit is simultaneous in all phases.)
Rated impulse withstand voltage EN 60947-1; 4.3.1.3	U_{imp}	Peak value of the voltage impulse of the prescribed form and polarity which the device is able to withstand without failure at the established conditions and pertinent to which is the value of the separating air distance. U_{imp} of the device must be equal to or higher than the value established for momentary overvoltage at the point in the circuit (overvoltage category) where the device is used.
Overvoltage category EN 60947-1; 2.5.60		Numerically defined level of momentary overvoltage, i.e. overvoltage having its origin in atmospheric or switching. Standard EN 60664-1 establishes for electrical equipment the overvoltage categories: **Overvoltage category IV** - service entrance, outside lead **Overvoltage category III** - fixed wiring **Overvoltage category II** - appliances **Overvoltage category I** - light-current appliances
Rated frequency EN 60947-1; 4.3.3	f_n	Frequency of the supply network for which the device is proposed and that corresponds to its other characteristics values.
Utilization category (circuit breakers – time selectivity) EN 60947-2; 4.4		Utilization category of circuit breaker establishes whether or not the circuit breaker specifically is intended for providing selectivity by means of intentional time delay (timing selectivity) with other protective devices connected in series on the load side in short-circuiting conditions. **Utilization category:** **A** - circuit breakers are not specifically intended for providing timing selectivity **B** - circuit breakers are specifically intended for providing timing selectivity
Utilization category (switch-disconnectors – switching mode) EN 60947-3; 4.4		Utilization category defines the assumed use of switch devices (switch-disconnectors). Characterized by values of current and voltage, expressed as multiples of rated operating current and rated operating voltage, and further by power factors or time constants of the circuit. **Utilization category:** **AC-21B (DC-21B)** - infrequent switching of resistive loads, including moderate overloading **AC-22B (DC-21B)** - infrequent switching of mixed resistive and inductive loads, including moderate overloading **AC-23B (DC-23B)** - infrequent switching of motor loads or other highly inductive loads
Pollution degree EN 60947-1; 2.5.58; 6.1.3.2		Pollution degree relates to the conditions of the surrounding environment for which the device is intended. **Pollution degree:** **1** - No contamination will occur, or only dry, non-conducting contamination. **2** - Normally occurs only non-conducting contamination, but sometimes there may occur temporary conductibility due to condensation. **3** - There occurs conductive contamination or dry non-conducting contamination that with the effect of condensation will become conductive. **4** - Contamination generates continuous conductibility, by means of, for example, conductive dust, rain or snow.

NOTE

NOTE

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