CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

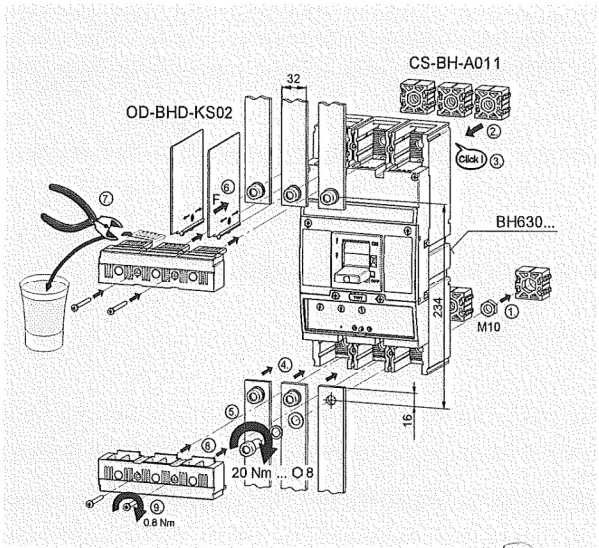
3P 4P

Connecting and installation

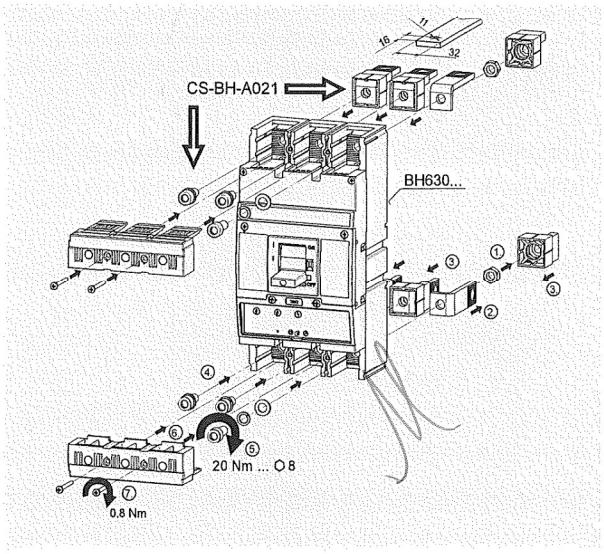
Connecting set specifications

Type	I_{max} [A]	Cable - ranges of connection cross-sections S [mm²]				Busbars and cable lugs W x H [mm]	Dimensional drawing 3P/4P
		Type of cable	sector stranded	sector solid	round stranded	round solid	
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	Reduction for circuit breaker BA...*37 with front connection page F27					page F27
CS-BH-A039	630	Reduction for circuit breaker BA...*39 with front connection page F27					page F27
CS-BH-Z039	630	Reduction for circuit breaker BA...*39 with rear connection page F27					page F27
CS-BH-JX75	630	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	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					

Front connection - Cu/Al busbars



Rear connection - Cu/Al busbars

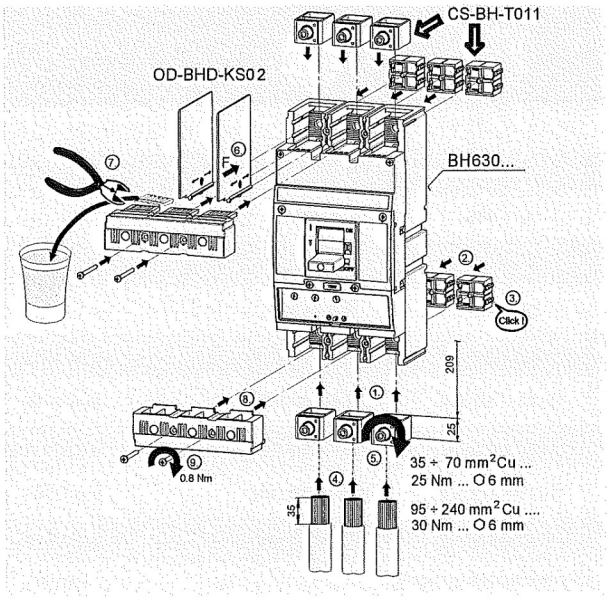


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

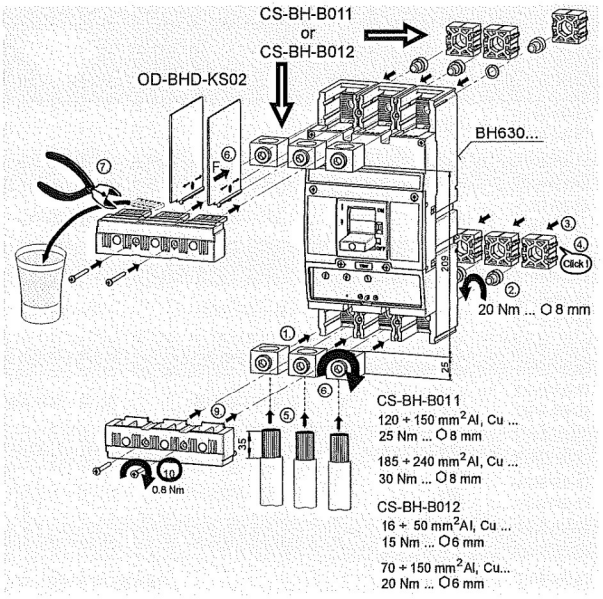
3P 4P

Connecting and installation

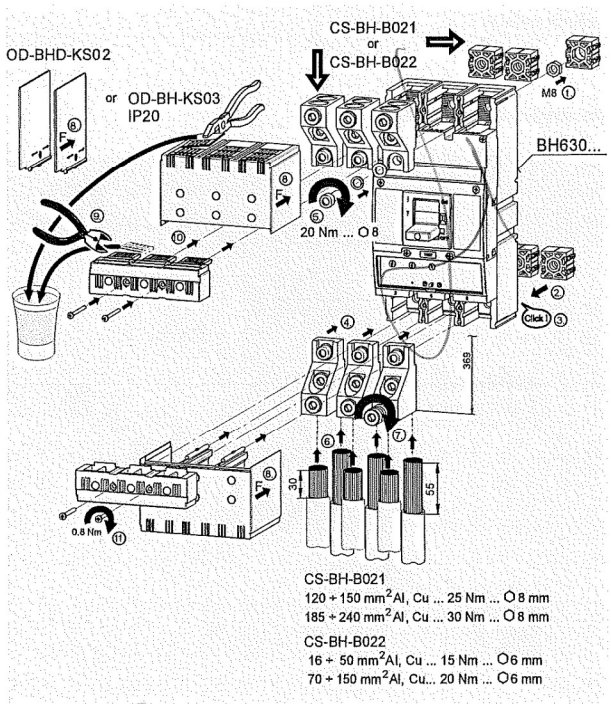
Front connection - Cu cables



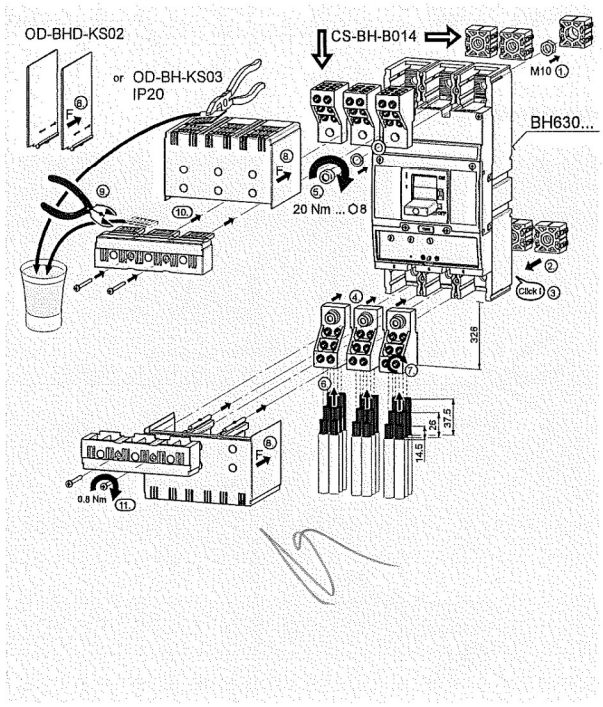
Front connection - Cu/Al cables



Front connection - 2 Cu/Al cables



Front connection - 6 Cu/Al cables

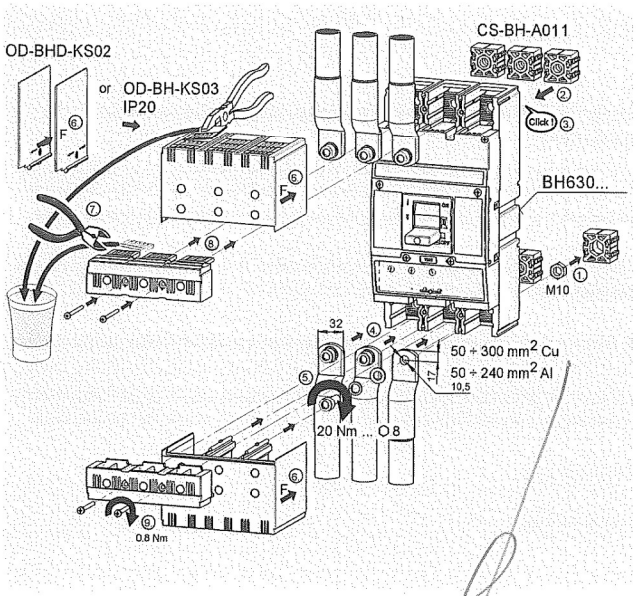


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

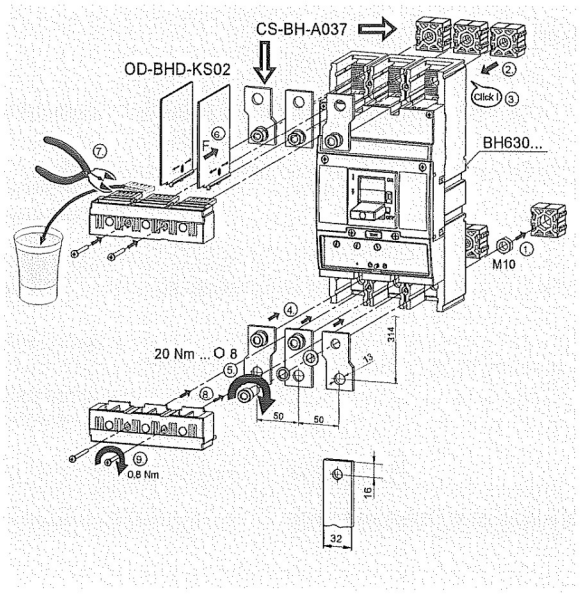
3P 4P

Connecting and installation

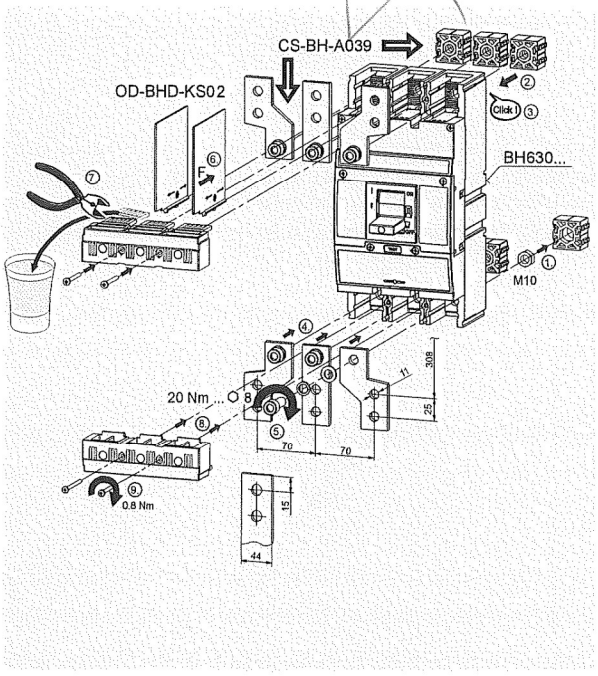
Front connection - cable lugs



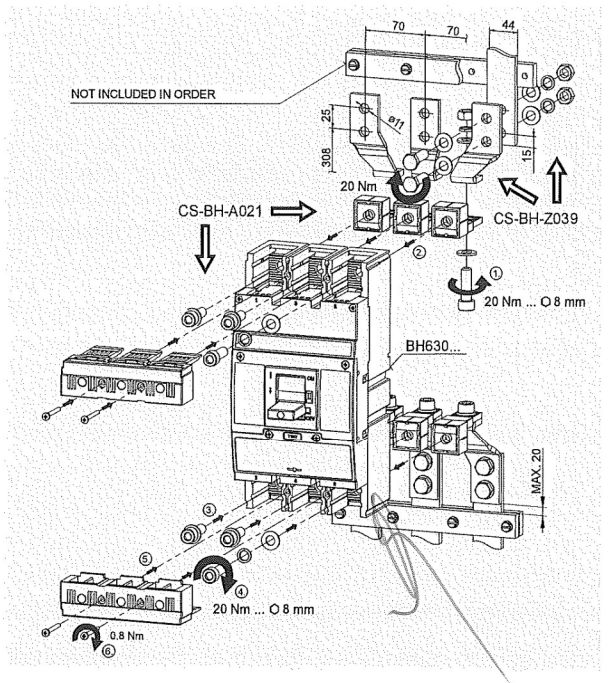
Front connection- BH reduction for circuit breaker BA...37



Front connection- BH reduction for circuit breaker BA...39 and J2UX



Rear connection - BH reduction for circuit breaker BA...39 and J2UX with rear connection



CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P 4P

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 $U_e \geq$ AC 415 V, 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 $U_e \geq$ AC 415 V, 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 2, 4, 6, flexibars or rear connection, it is necessary to use OD-BHD-KS02 insulating barriers or a OD-BHD-KS03 terminal cover

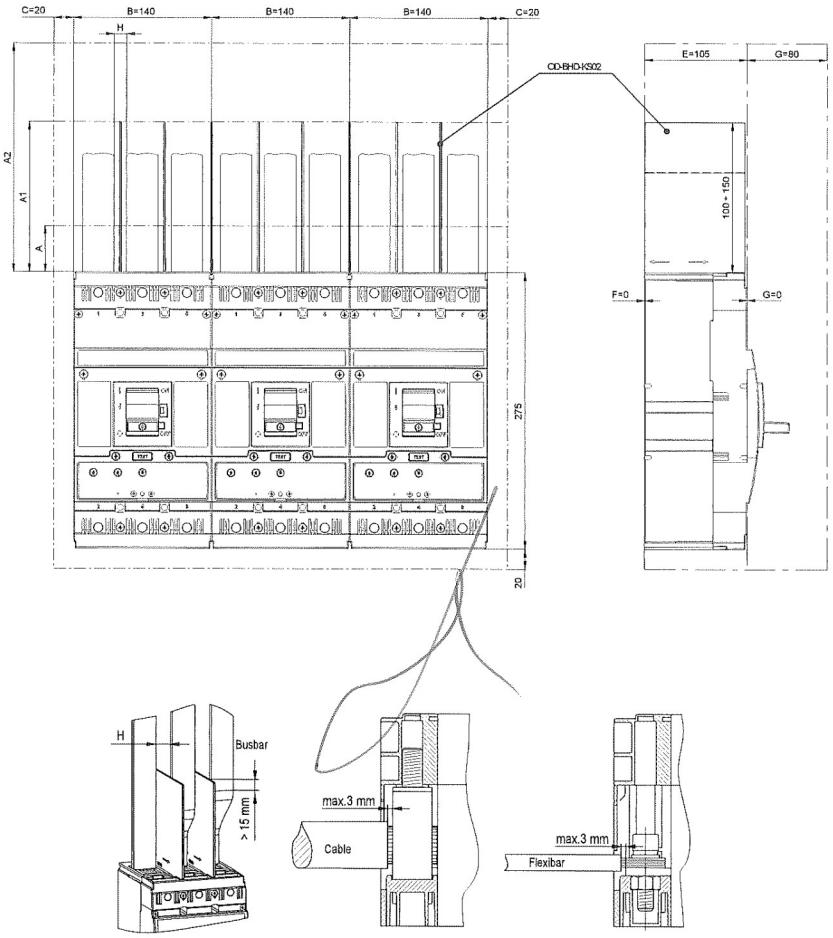
- rear connection - insulating barriers and terminal covers need not be used

■ **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 I_k''			[kA]	≤ 100	> 36 ÷ 65	≤ 36	> 20 ÷ 35	≤ 20	> 15 ÷ 20	≤ 15
BH630N wired with I_k''			[kA]	≤ 60		≤ 36		≤ 20		≤ 15
G [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)

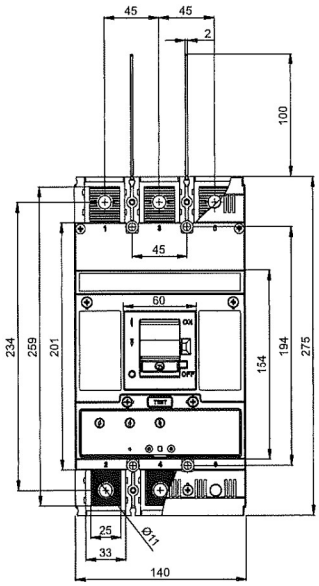
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

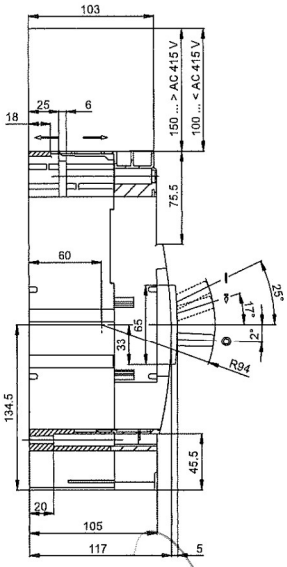
3P

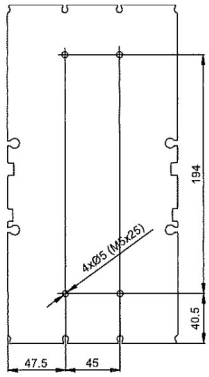
Dimensions

Fixed design, front connection

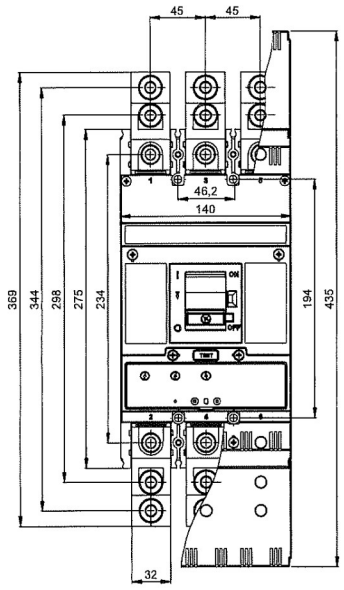
Drilling diagram

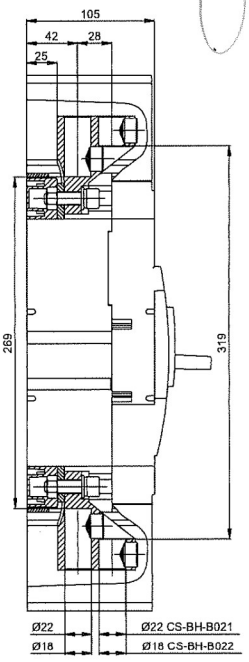






Fixed design, front connection (CS-BH-B021, CS-BH-B022 connecting sets)



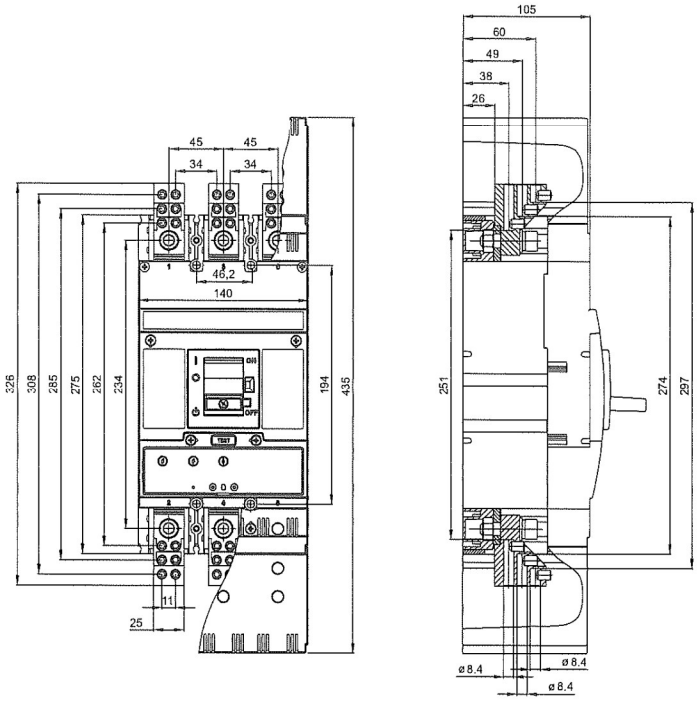


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

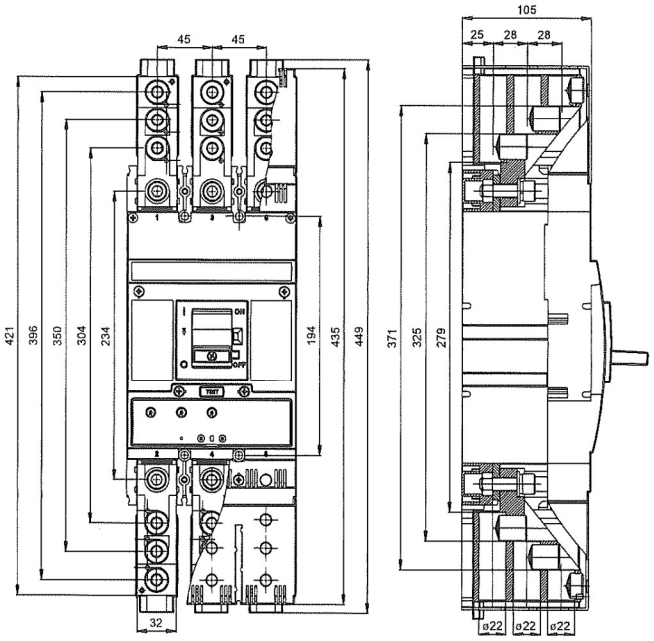
3P

Dimensions

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



Fixed design, front connection (CS-BH-B031 connecting set)

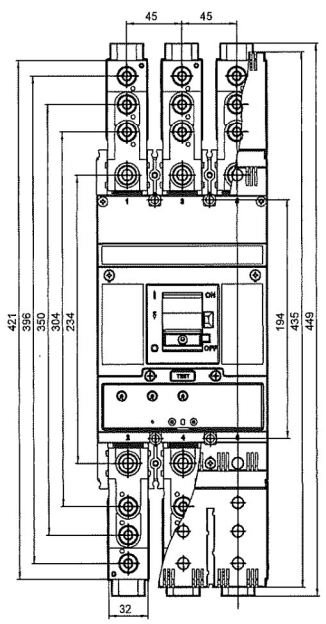


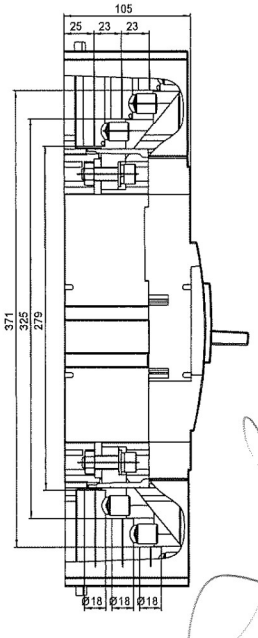
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

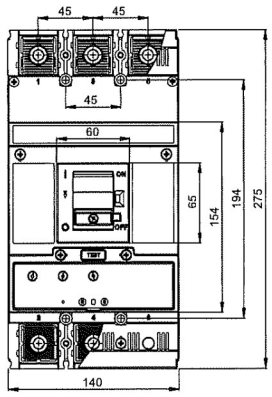
Dimensions

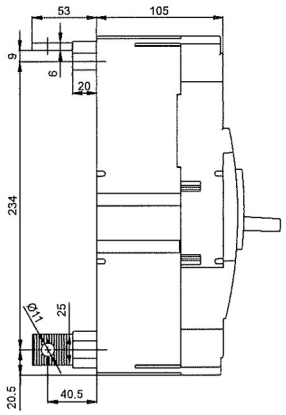
Fixed design, front connection (CS-BH-B032 connecting set)



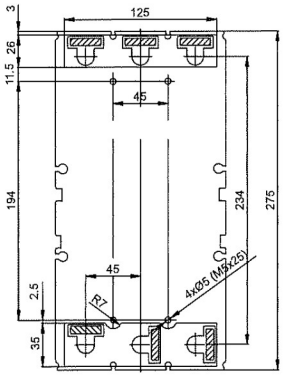


Fixed design, rear connection (CS-BH-A021 connecting set)





Drilling diagram

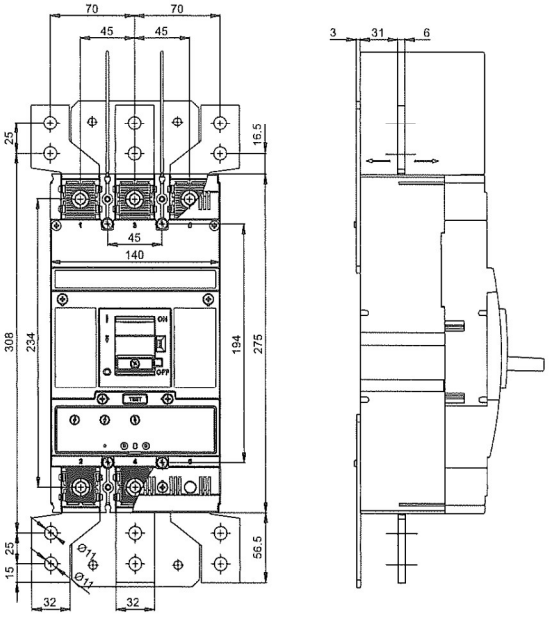


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

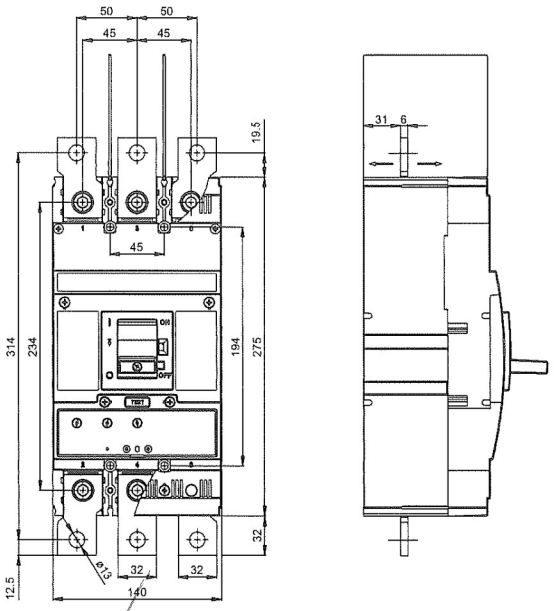
3P

Dimensions

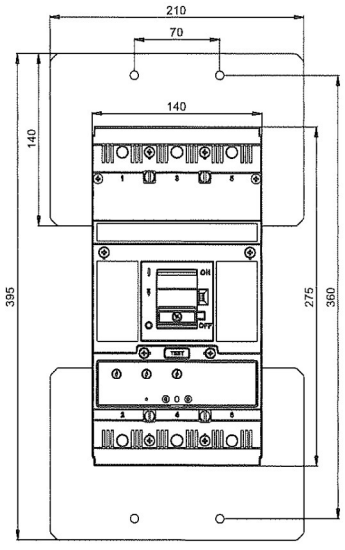
Fixed design, front connection
(CS-BH-A039 connecting set, OD-BHD-MS39 mounting set)

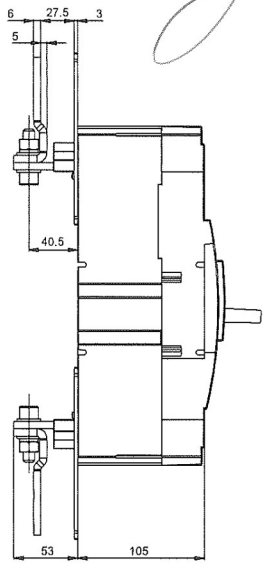


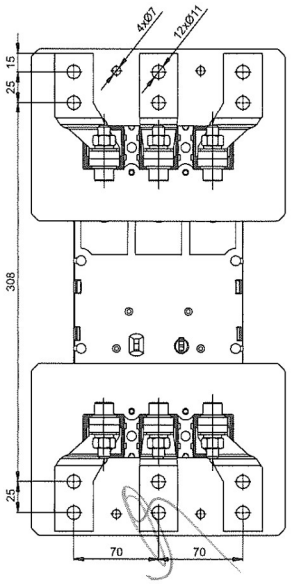
Fixed design, front connection
(CS-BH-A037 connecting set)



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





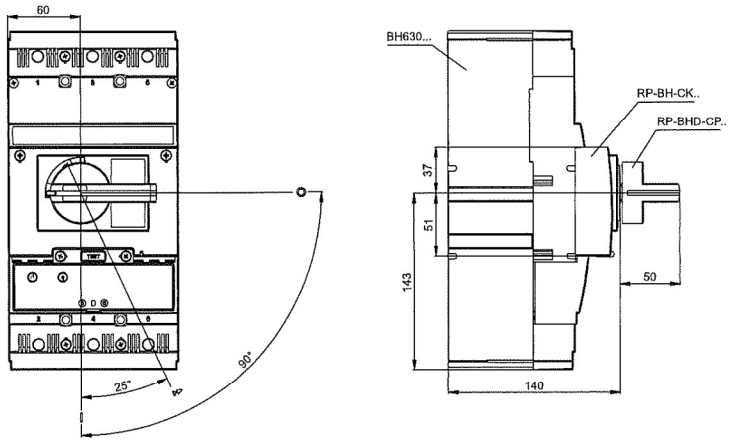


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

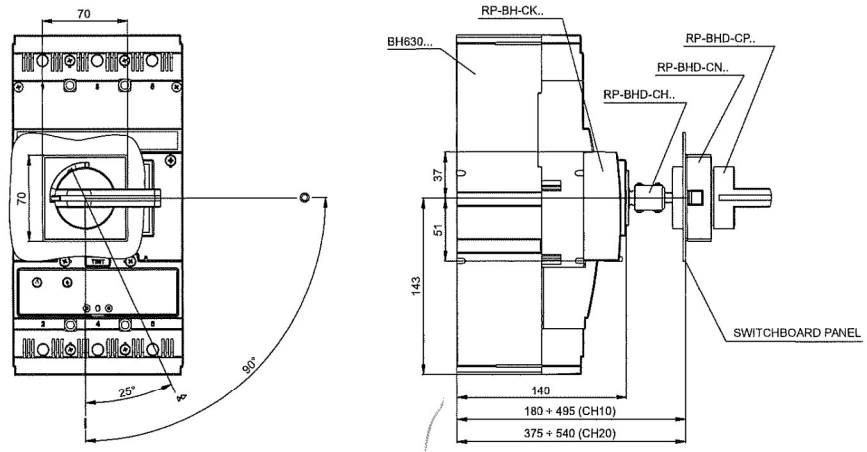
3P

Dimensions

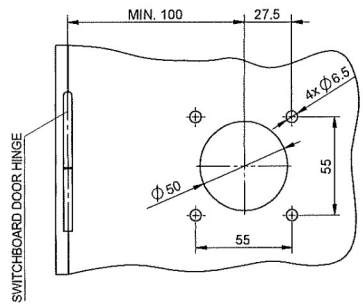
Fixed design, hand drive



Fixed design, hand drive - front, with adjustable lever



Switchboard door modification

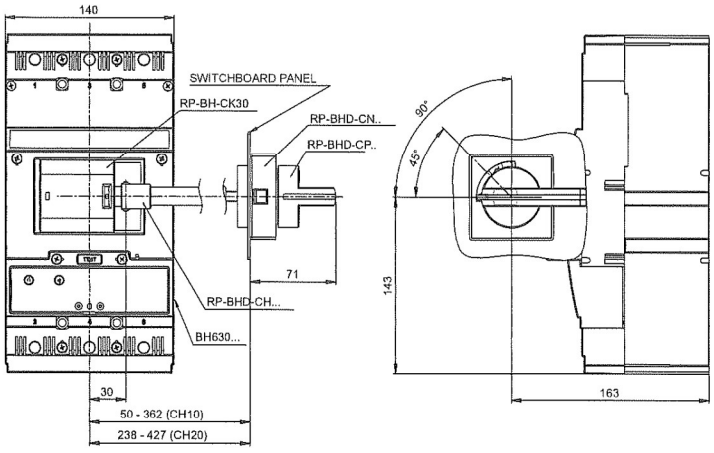


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

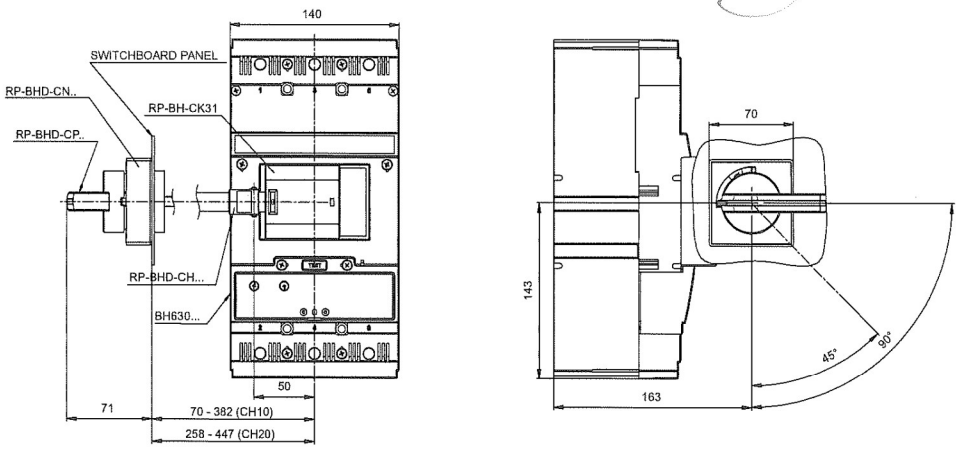
3P

Dimensions

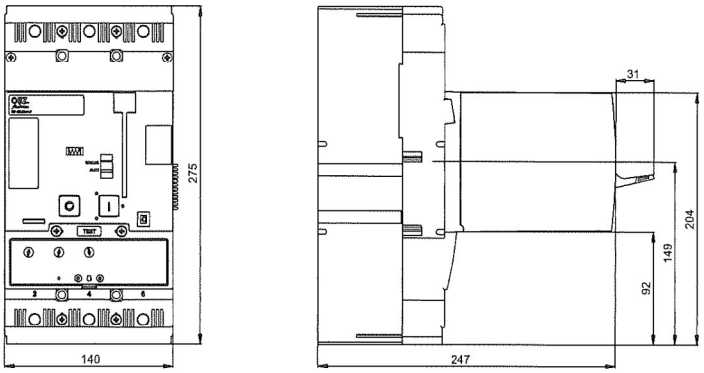
Fixed design, hand drive - control on right side, with adjustable lever



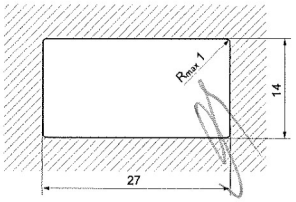
Fixed design, hand drive - control on left side, with adjustable lever



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



Opening dimensions in switchboard door for external counter of cycles

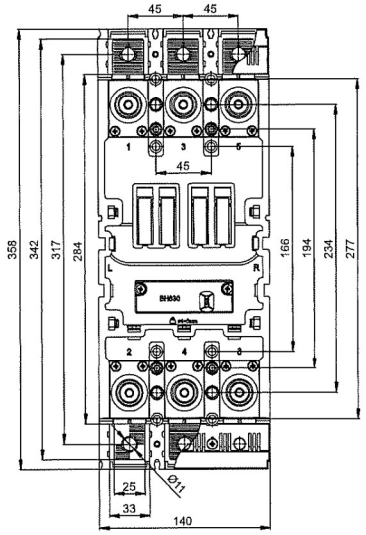


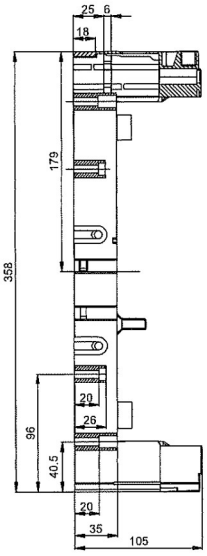
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

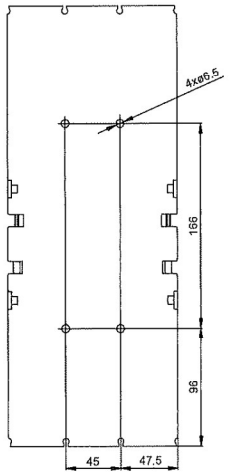
Dimensions

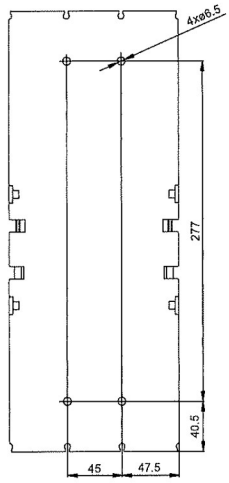
Plug-in device



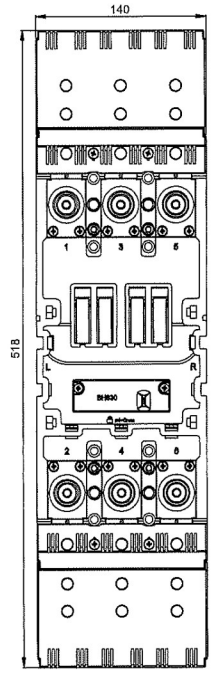


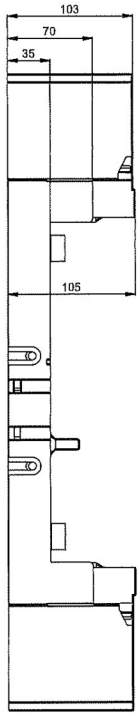
Drilling diagram





Plug-in device, OD-BH-KS03 terminal cover



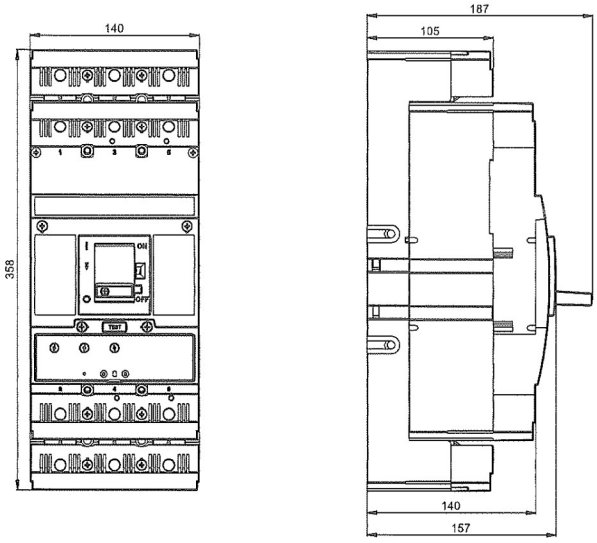


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

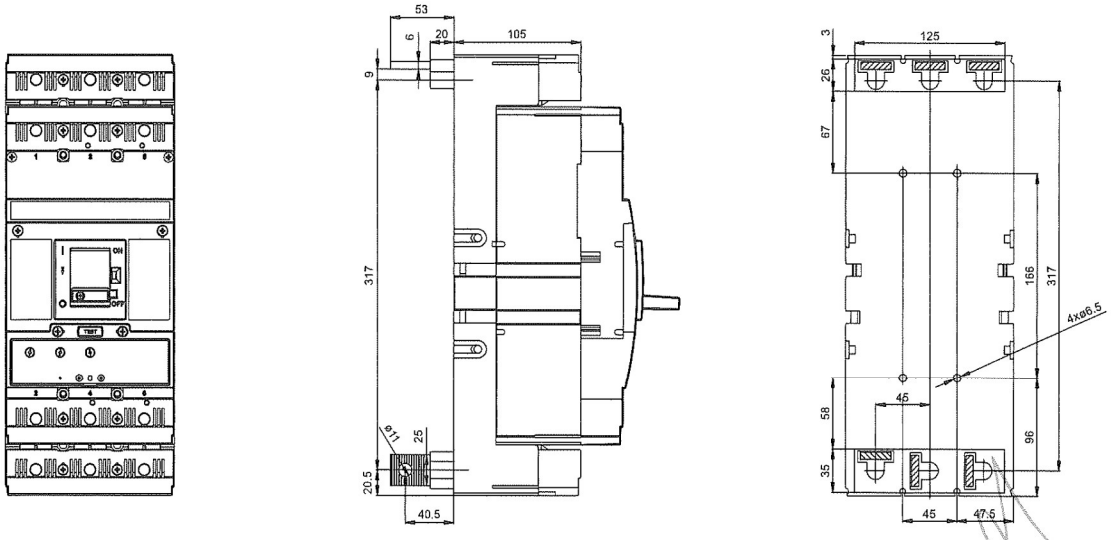
Dimensions

Plug-in design



Plug-in design, rear connection (CS-BH-A021 connecting set)

Drilling diagram

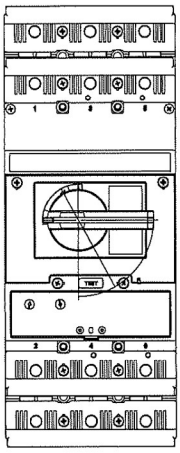


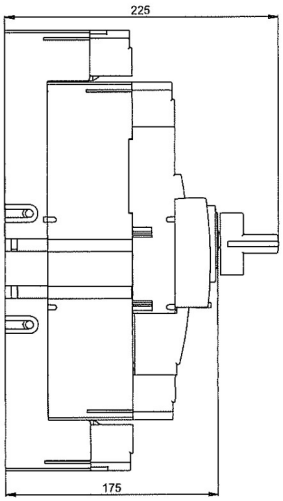
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

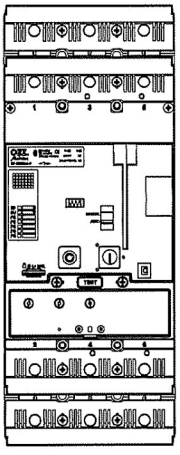
Dimensions

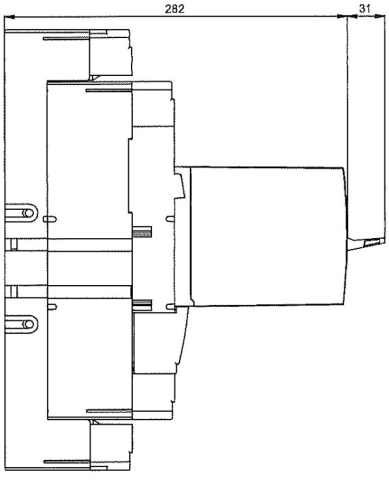
Plug-in design, hand drive





Plug-in design, motor drive



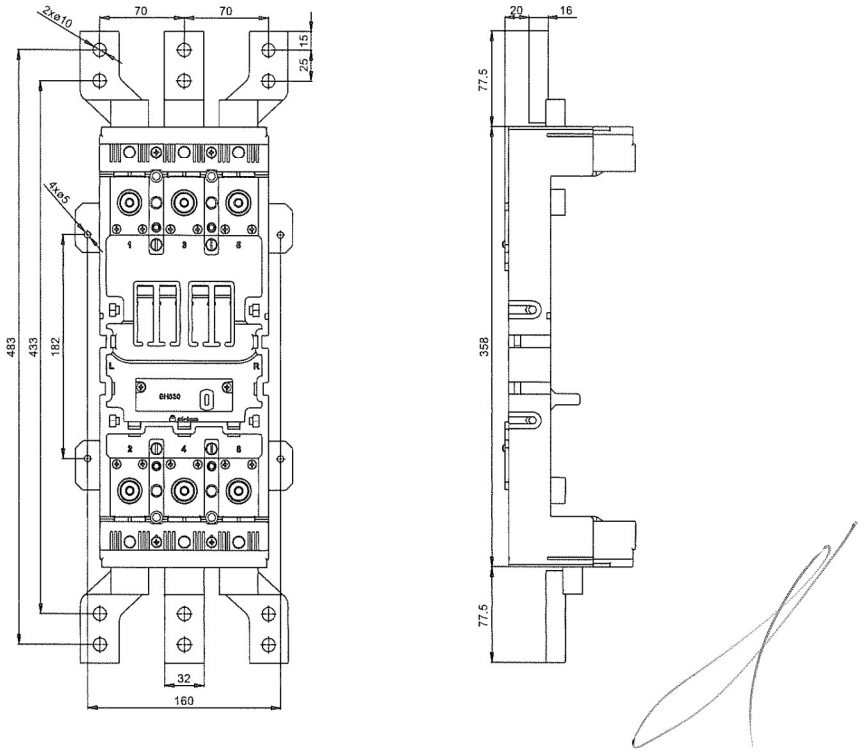


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

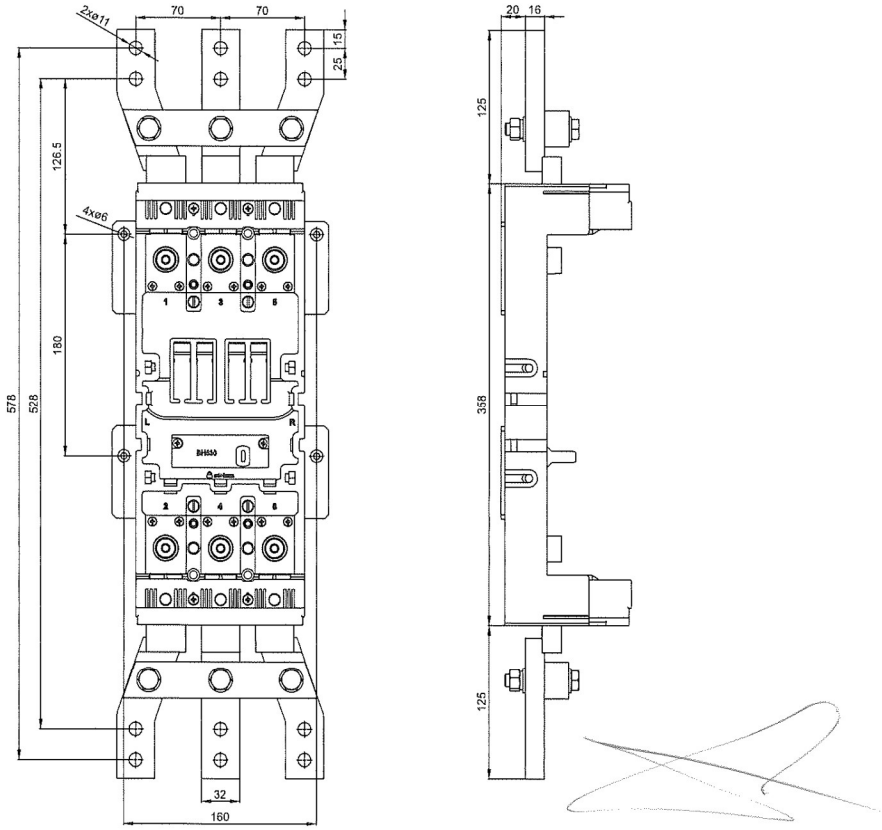
3P

Dimensions

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



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



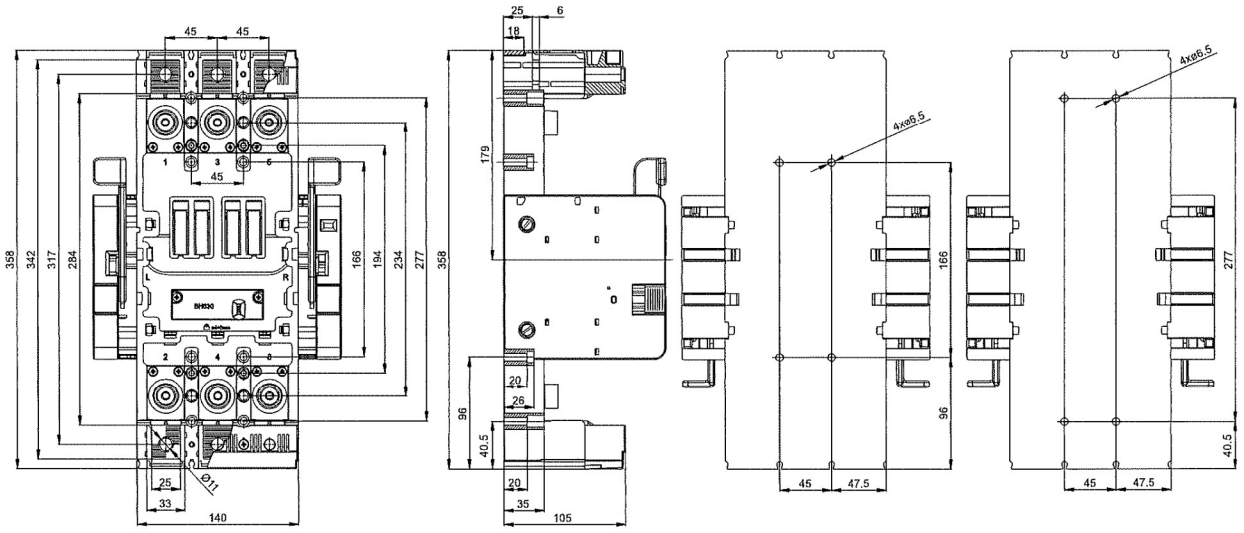
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

3P

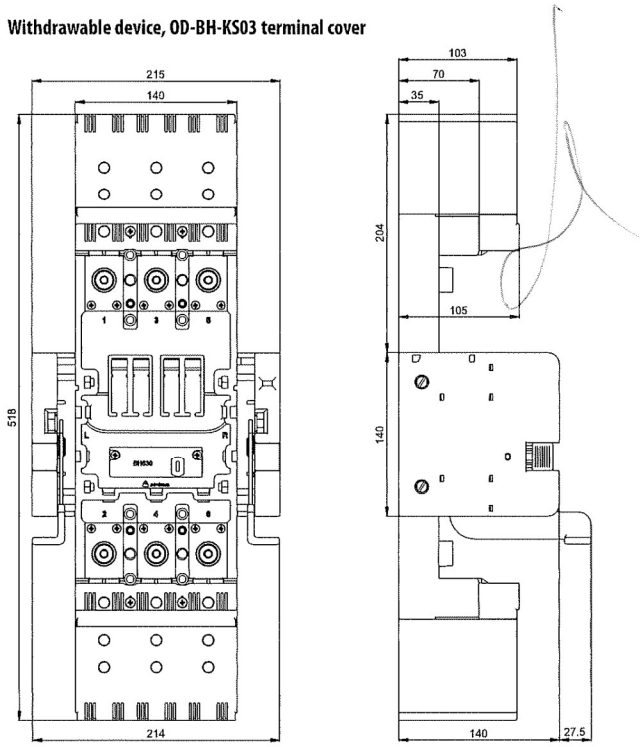
Dimensions

Withdrawable device

Drilling diagram



Withdrawable device, OD-BH-KS03 terminal cover



CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

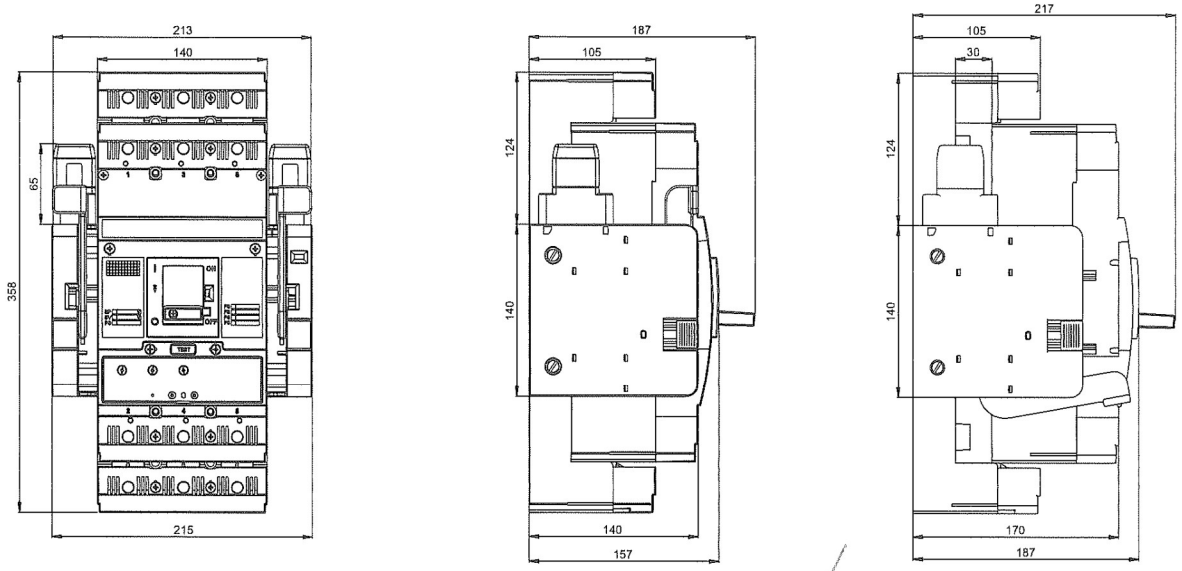
3P

Dimensions

Withdrawable design

Working position

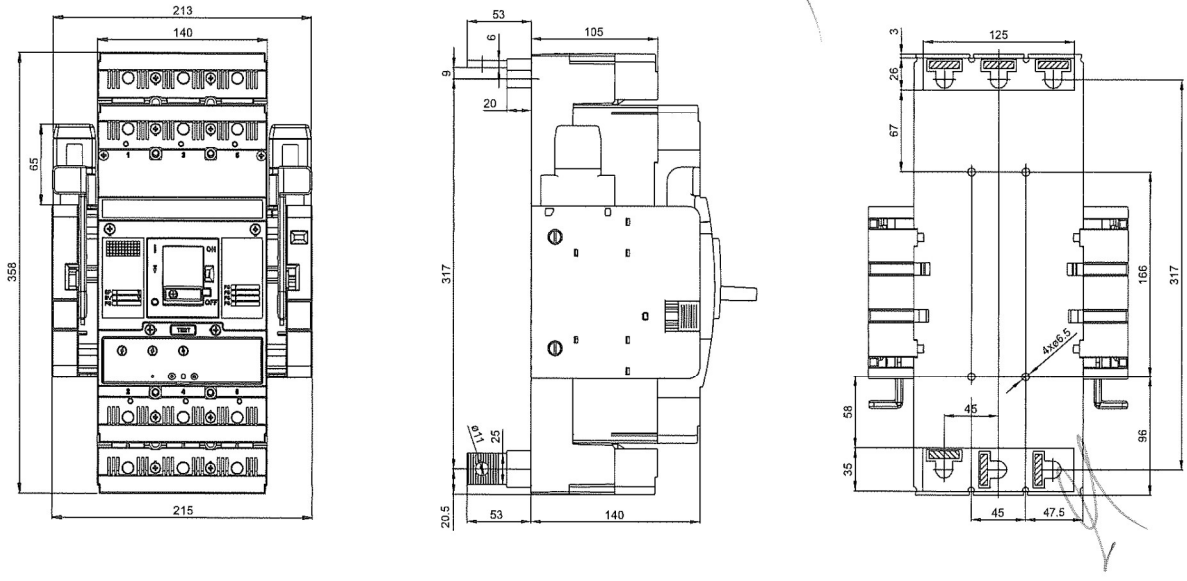
Inspection position



Withdrawable design, rear connection (CS-BH-A021 connecting set)

Working position

Inspection position

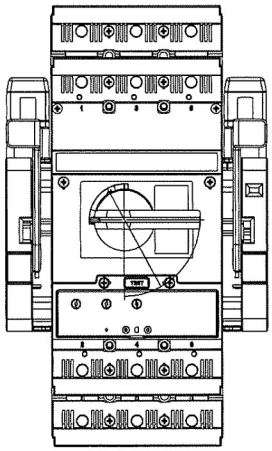


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

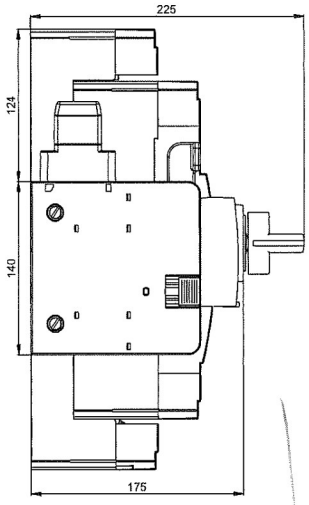
3P

Dimensions

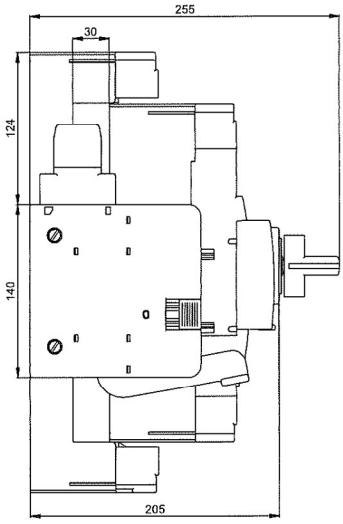
Withdrawable design, hand drive



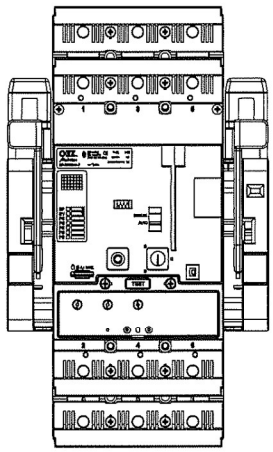
Working position



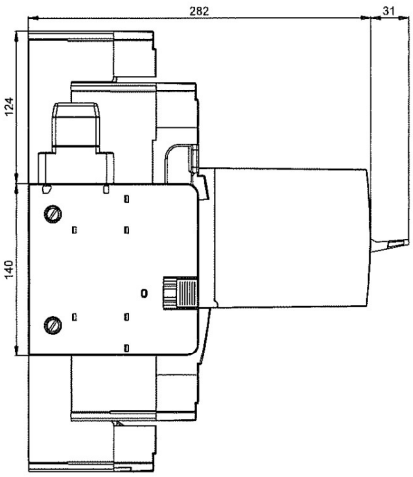
Inspection position



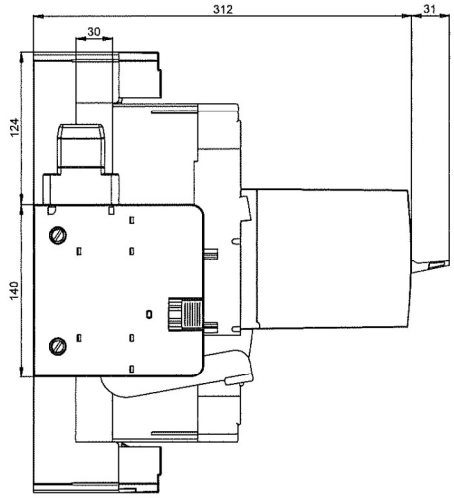
Withdrawable design, motor drive



Working position



Inspection position

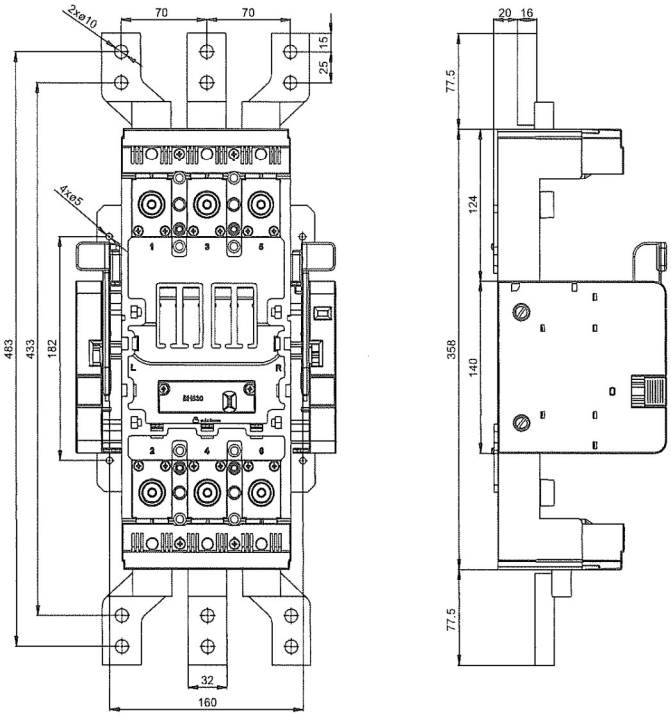


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

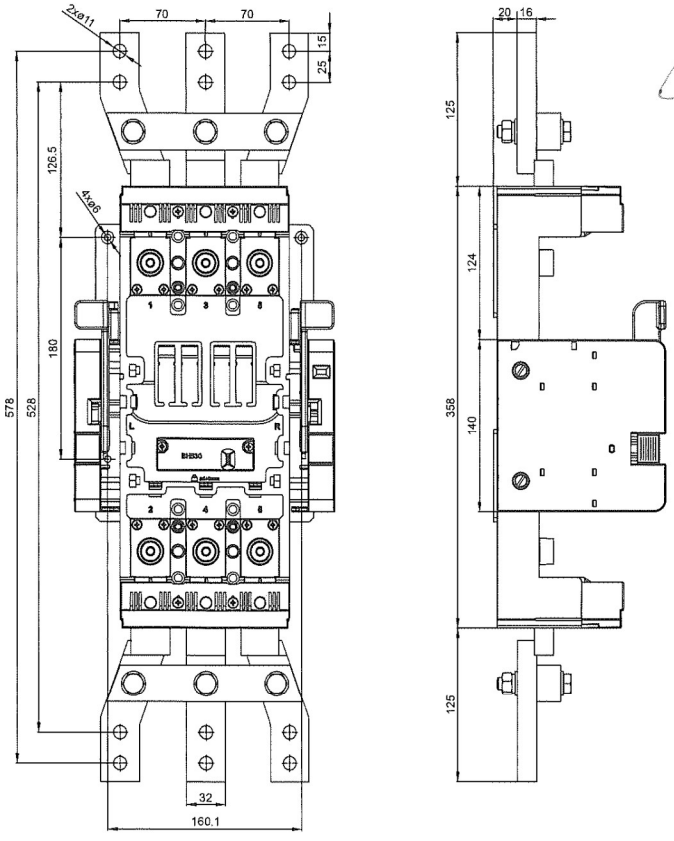
3P

Dimensions

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



Withdrawable device (CS-BH-JX75 connecting set, OD-BHD-MS75 connecting set)



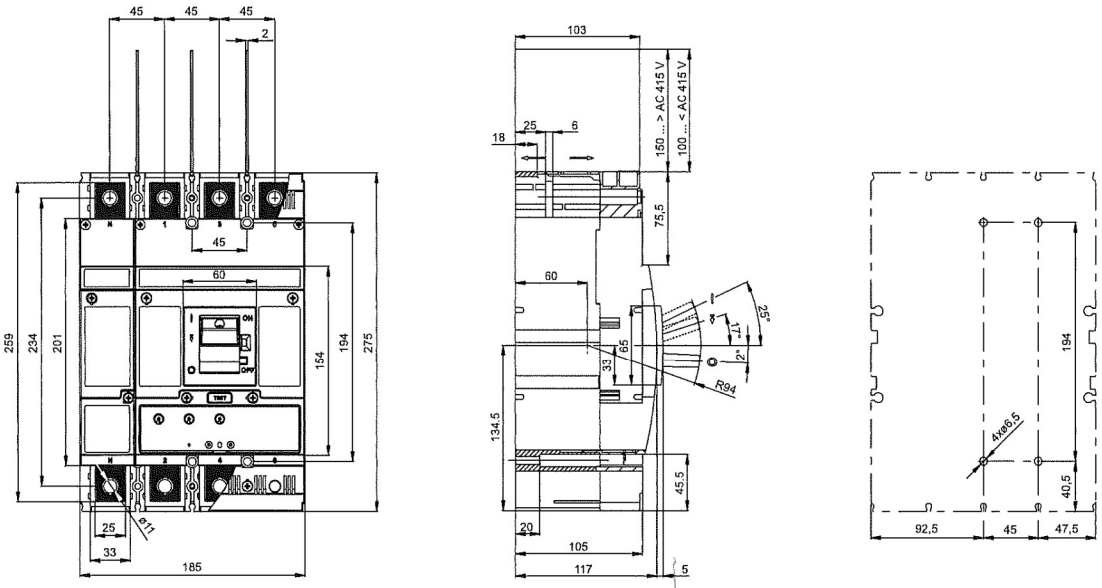
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

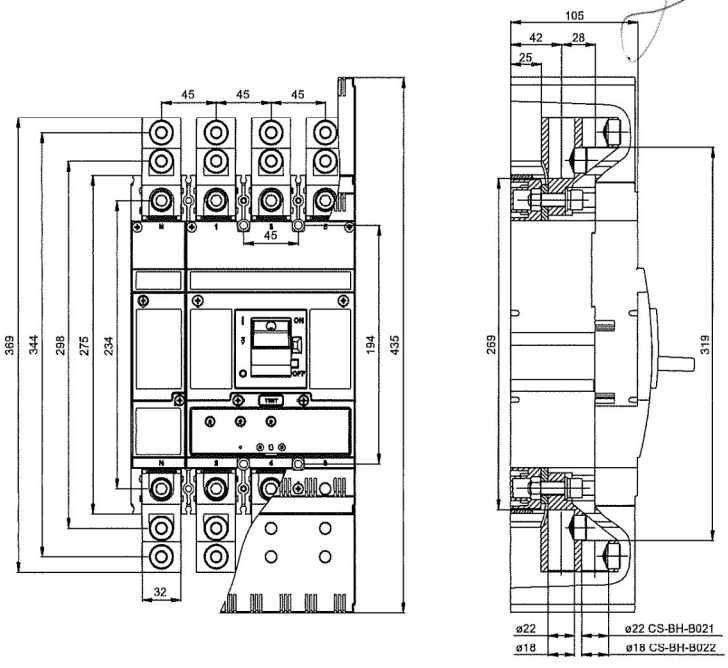
Dimensions

Fixed design, front connection

Drilling diagram



Fixed design, front connection (CS-BH-B021 + CS-BH-B421, CS-BH-B022 + CS-BH-B422 connecting sets)

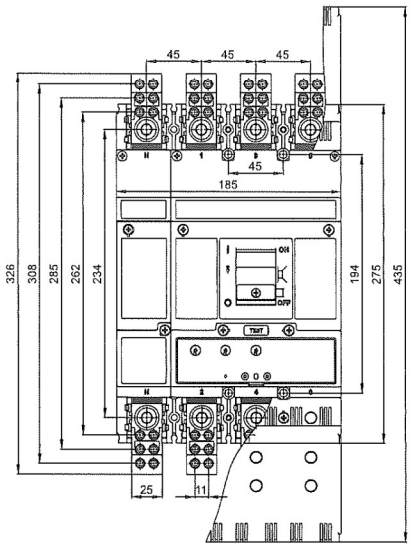


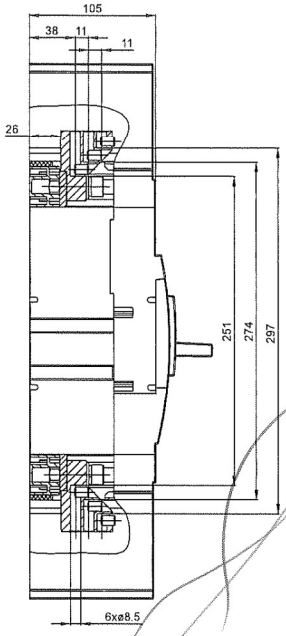
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

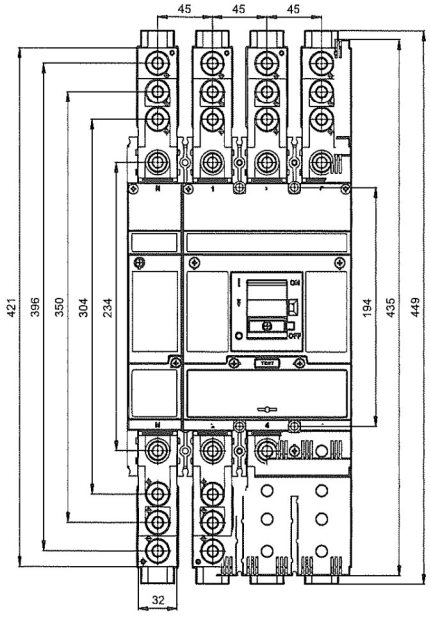
Dimensions

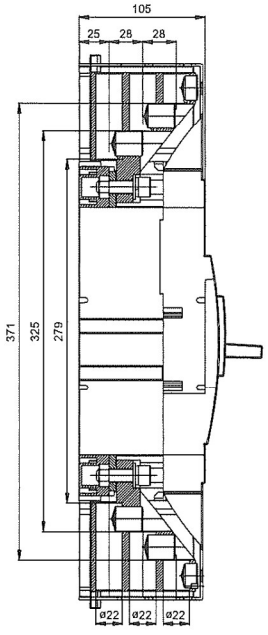
Fixed design, front connection (CS-BH-B014 + CS-BH-B414 connecting sets)





Fixed design, front connection (CS-BH-B031 + CS-BH-B431 connecting sets)



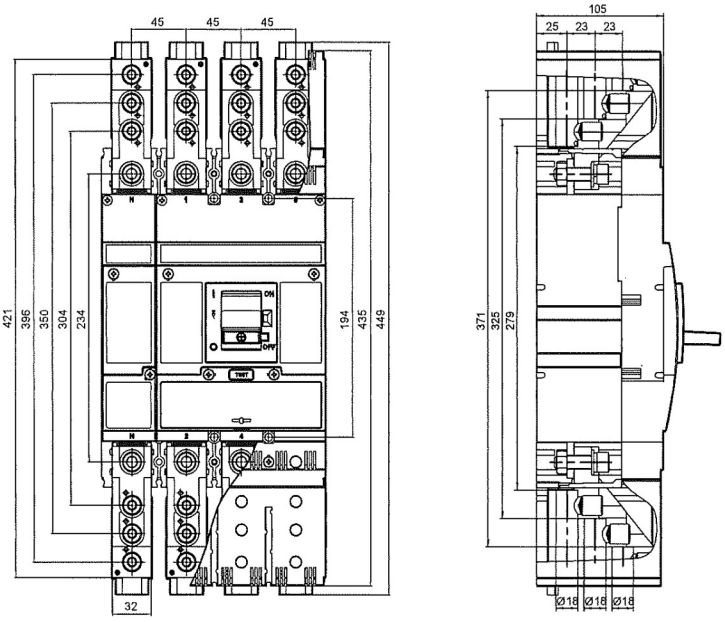


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

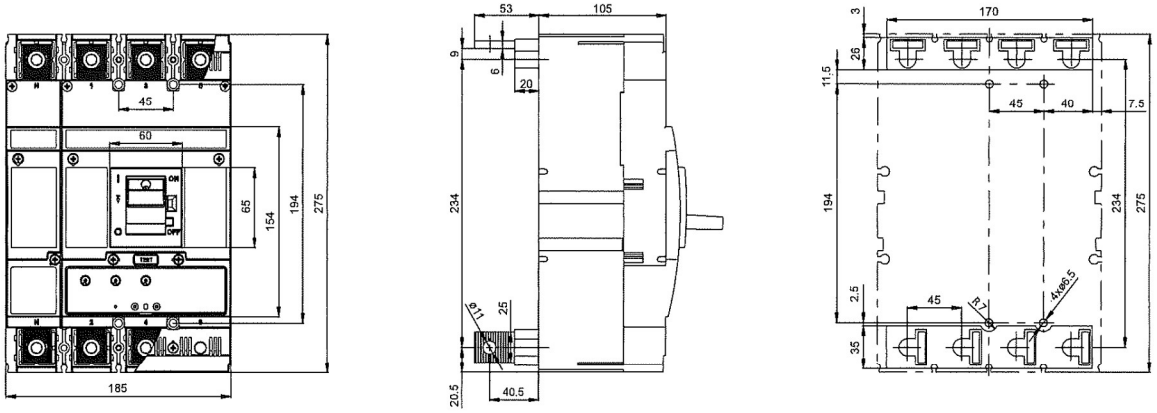
Dimensions

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

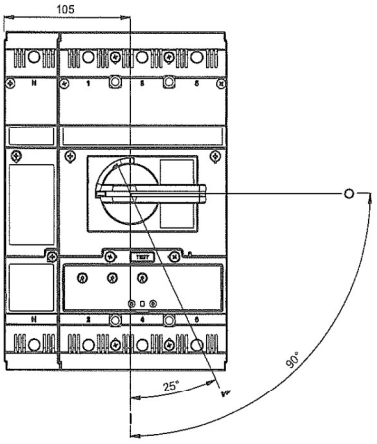


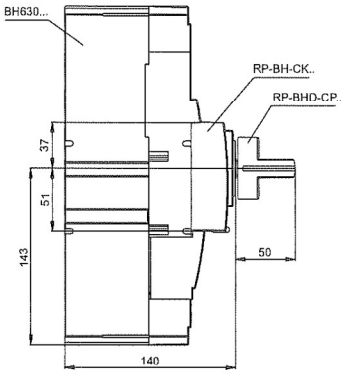
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

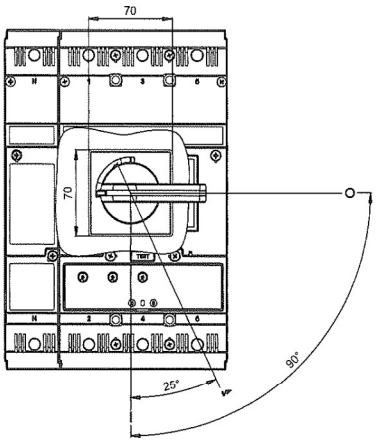
Dimensions

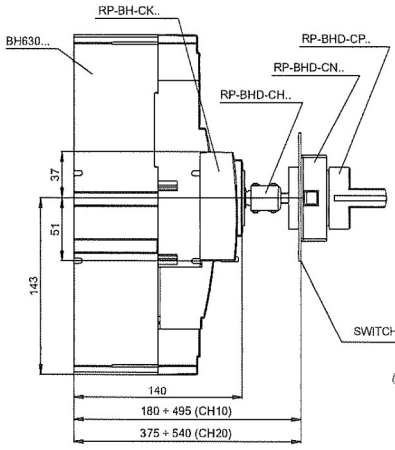
Fixed design, hand drive



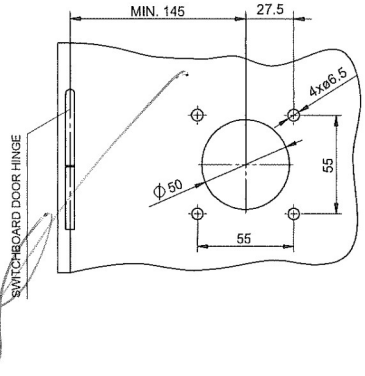


Fixed design, hand drive - front, with adjustable lever

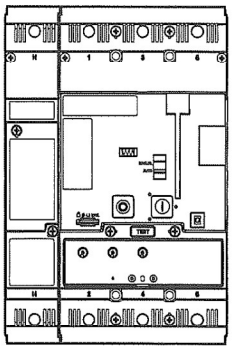


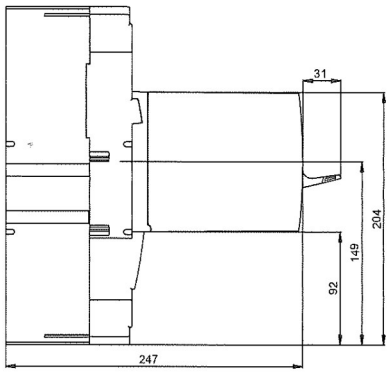


Switchboard door modification

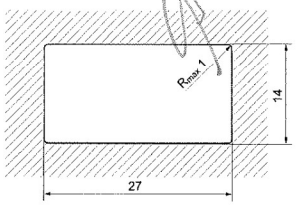


Fixed design, motor drive





Opening dimensions in switchboard door for external counter of cycles

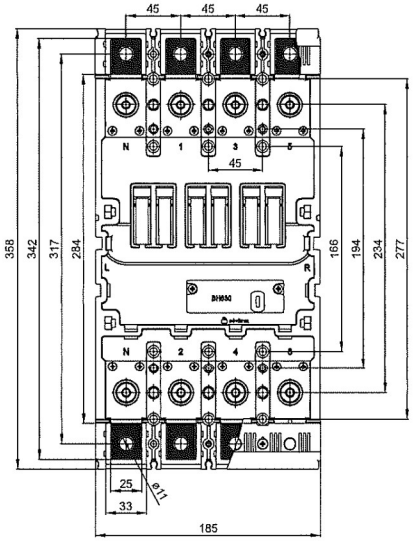


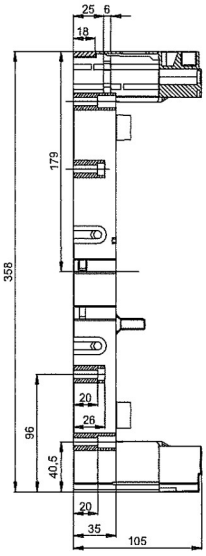
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

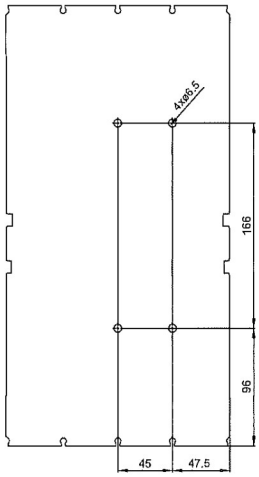
Dimensions

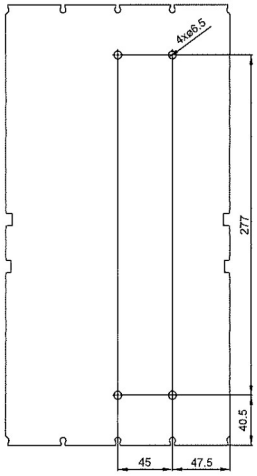
Plug-in device



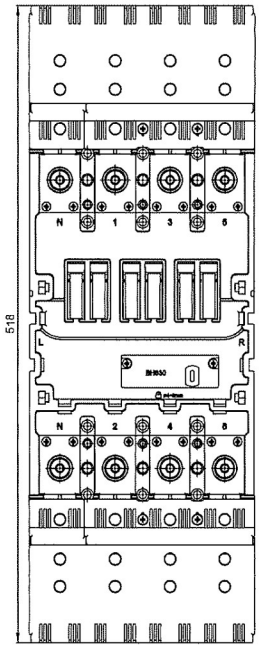


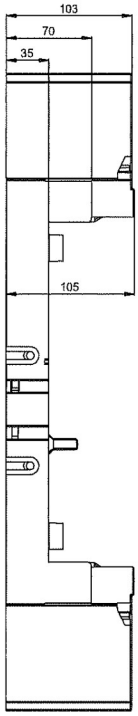
Drilling diagram





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



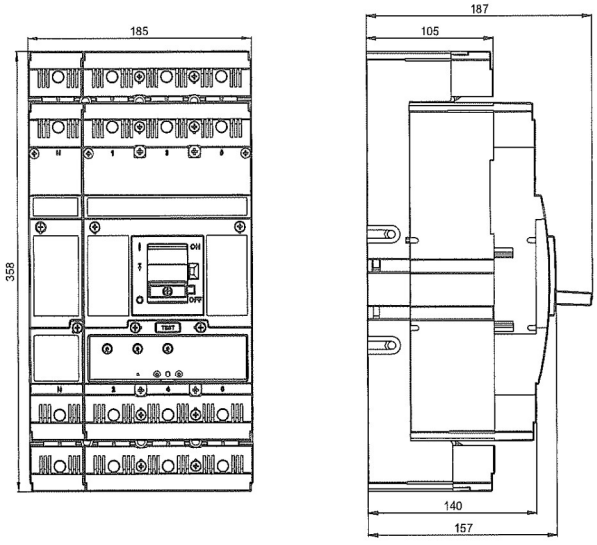


На основание чл.36а ал.3 от ЗОП

CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

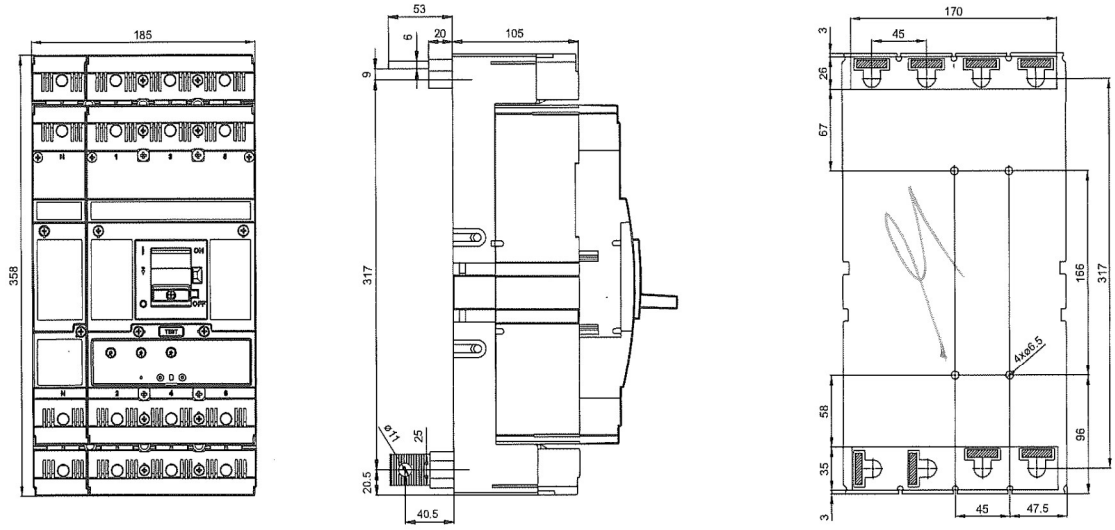
Dimensions

Plug-in design



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

Drilling diagram

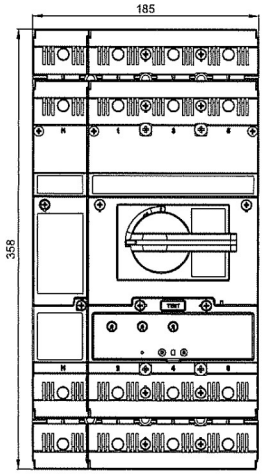


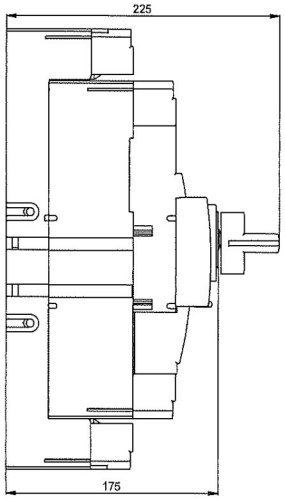
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

4P

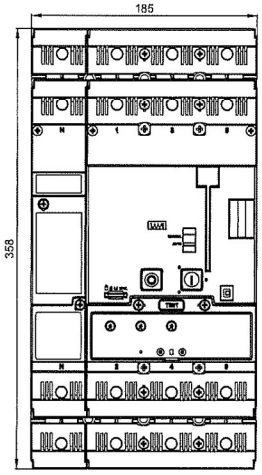
Dimensions

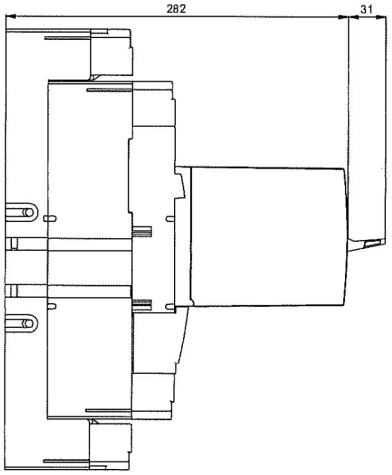
Plug-in design, hand drive





Plug-in design, motor drive



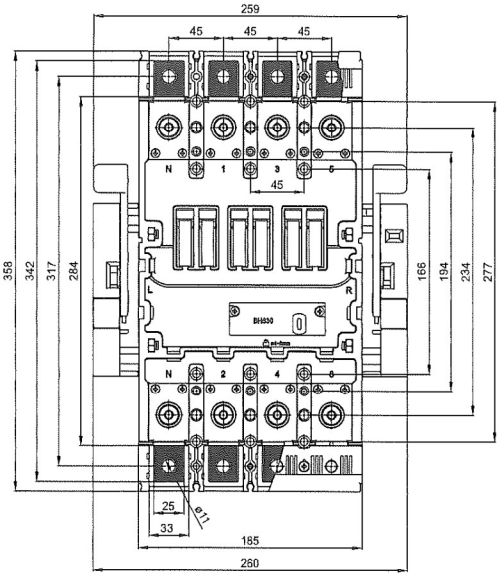


CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

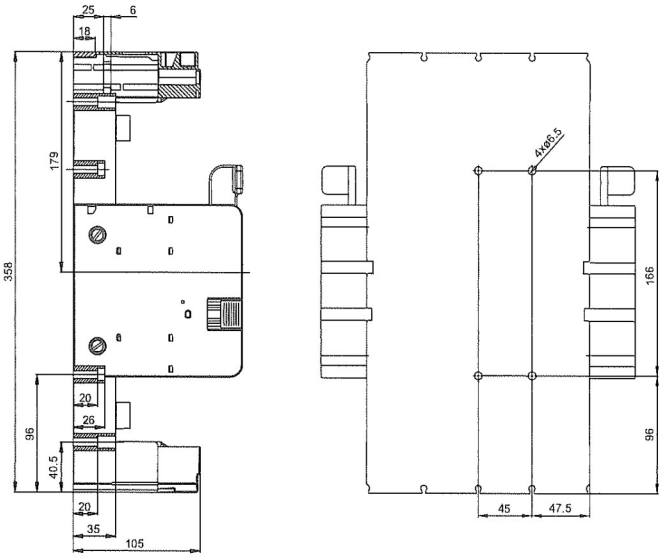
4P

Dimensions

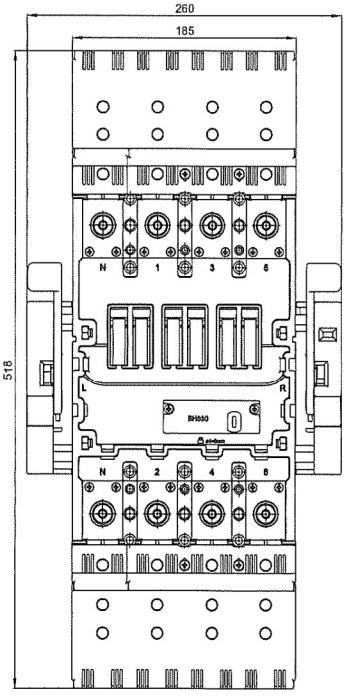
Withdrawable device

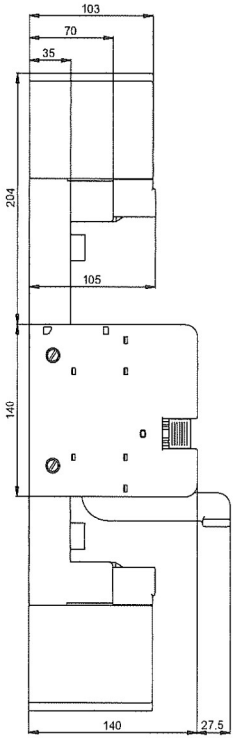


Drilling diagram



Withdrawable device, OD-BH-KS43 terminal cover





CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

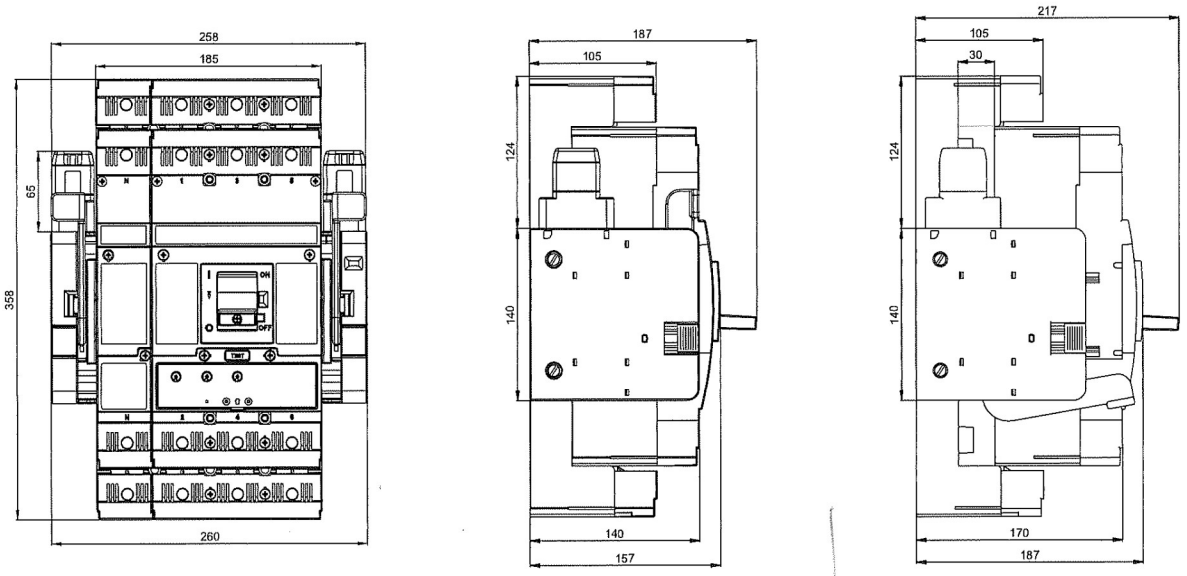
4P

Dimensions

Withdrawable design

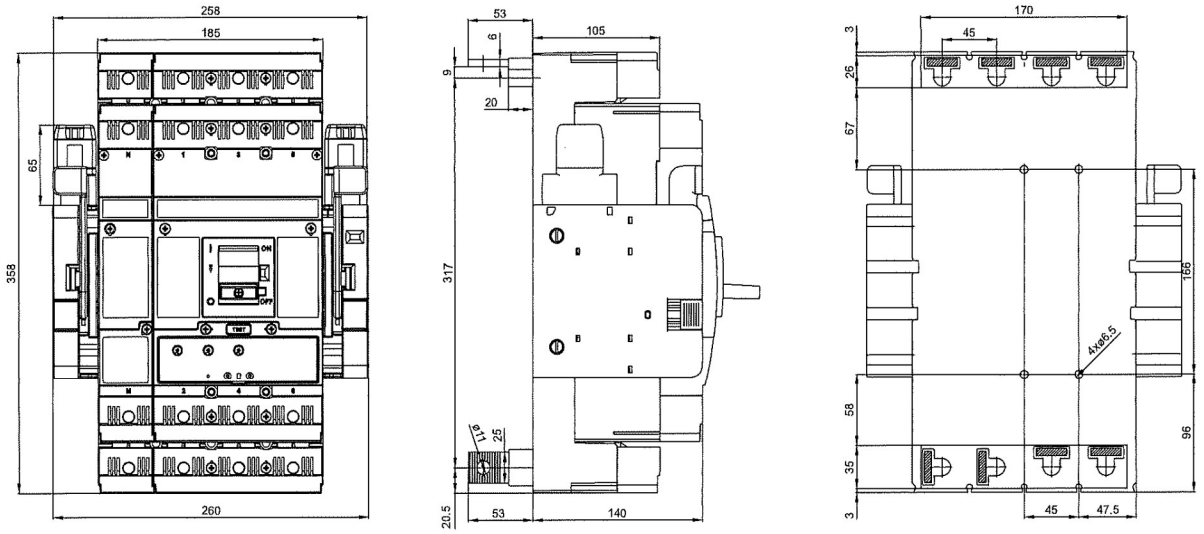
Working position

Inspection position



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

Drilling diagram



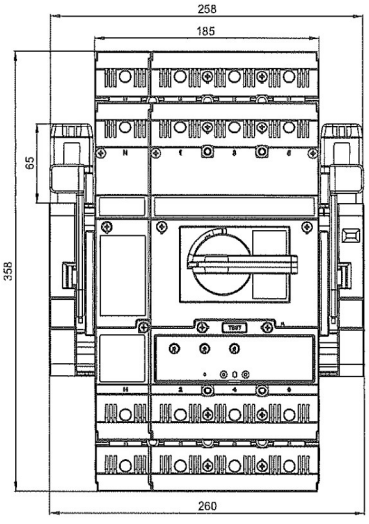
CIRCUIT BREAKERS, SWITCH-DISCONNECTORS

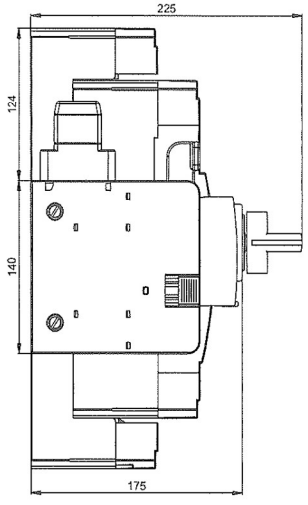
4P

Dimensions

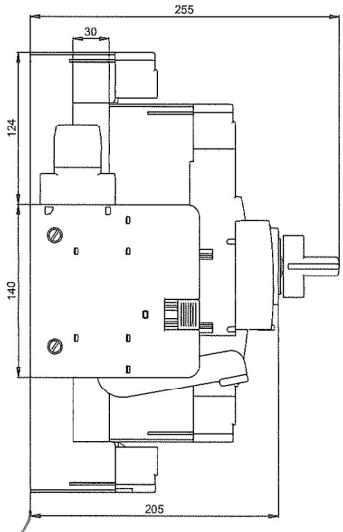
Withdrawable design, hand drive

Working position



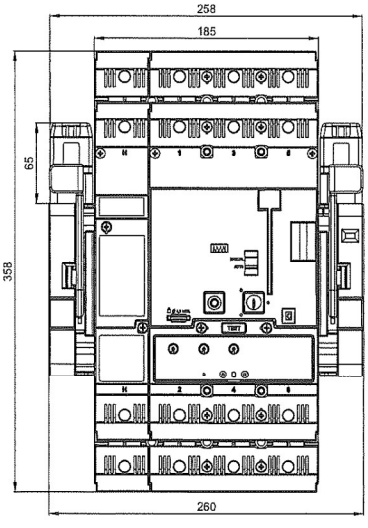


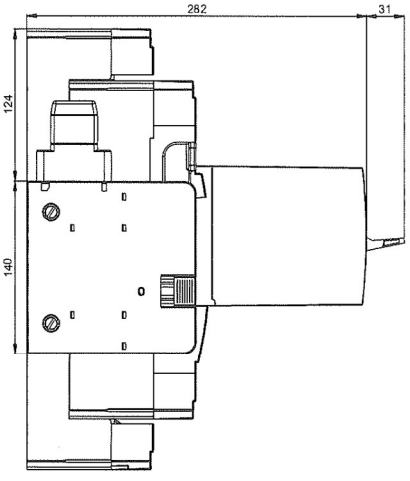
Inspection position



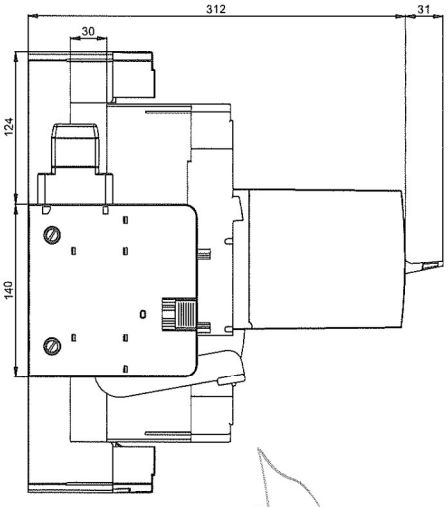
Withdrawable design, motor drive

Working position



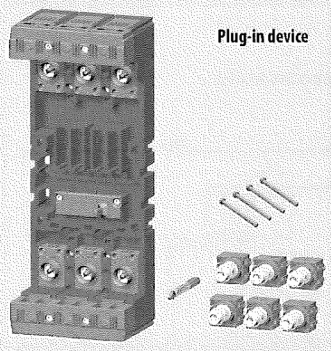


Inspection position



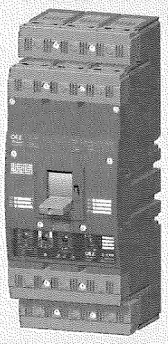
PLUG-IN DEVICE

3P 4P

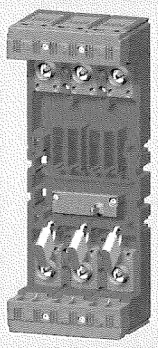


Plug-in device

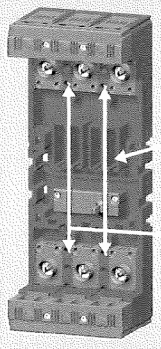
ZO-BH-0630-300



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

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)[1]
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

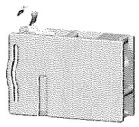
Circuit breaker in plug-in design has the same accessories as the fixed circuit breaker.

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

OD-BH-KK01

OD-BHD-KA01



SO-BHD-0010

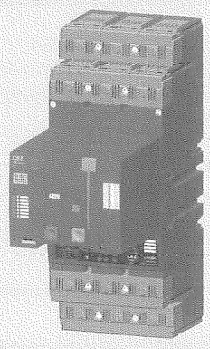
Specifications SO-BHD-0010

Type		SO-BHD-0010
Rated operating voltage	U_e	AC 400 V DC 220 V
Rated insulation voltage	U_i	AC 500 V
Rated frequency	f_n	50/60 Hz
Rated operating current	I_e/U_e AC-13 I_e/U_e DC-15	3 A / AC 400 V, 3.5 A / DC 24 V, 1 A / DC 48 V, 0.3 A / DC 110 V, 0.15 A / DC 220 V
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
Ambient temperature range		-25 °C ÷ +55 °C

For wiring diagram of circuit breaker in plug-in device with accessories see page F16.

PLUG-IN DEVICE

3P 4P



Circuit breaker in plug-in design with motor drive

Recommended circuit breaker manipulation

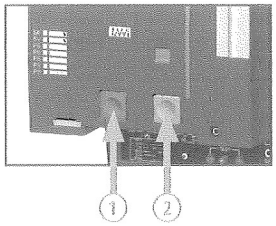
During the manipulation with circuit breaker in plug-in design with motor drive, the circuit breaker may reach the state, in which the first attempt at switching on by motor drive is unsuccessful. Switching on is executed after repeated make impulse. To avoid this effect, some of the following steps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



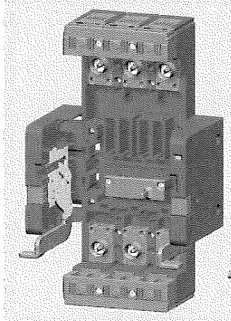
Changes in states of switches in cavities of switching unit when removing circuit breaker

State of circuit breaker before removing			State of switches before removing - inserted position →						State of switches after removing - 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
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

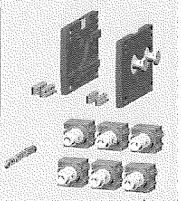
note: 0 - contact open, 1 - contact closed
[1] cavities 6, 7, 8, 9 are only for 4-pole design

WITHDRAWABLE DEVICE

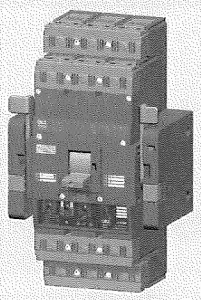
3P 4P



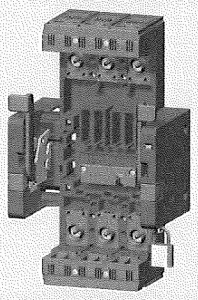
Withdrawable device



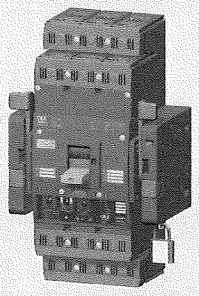
ZV-BH-0630-300



Circuit breaker in withdrawable design

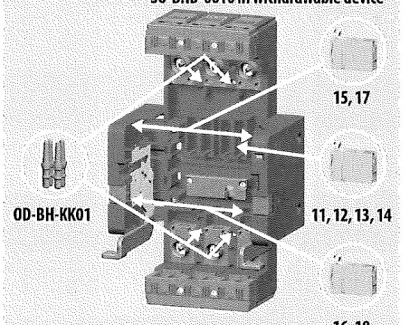


Locking withdrawable device against inserting circuit breaker



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	2	4	2	4	2	4
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

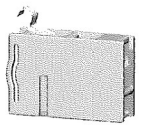
Circuit breaker in withdrawable design has the same accessories as fixed circuit breaker.

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

OD-BH-KK01

OD-BHD-KA01



SO-BHD-0010

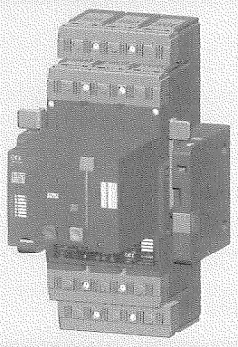
Specifications SO-BHD-0010

Type			SO-BHD-0010
Rated operating voltage	U_e		AC 400 V DC 220 V
Rated insulation voltage	U_i		AC 500 V
Rated frequency	f_n		50/60 Hz
Rated operating current	I_e/U_e I_e/U_e	AC-13 DC-15	3 A / AC 400 V, 3.5 A / DC 24 V, 1 A / DC 48 V, 0.3 A / DC 110 V, 0.15 A / DC 220 V
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
Ambient temperature range			-25 °C ÷ +55 °C

For wiring diagram of circuit breaker in withdrawable device with accessories see page F16.

WITHDRAWABLE DEVICE

3P 4P



Circuit breaker in withdrawable design with motor drive

Recommended circuit breaker manipulation

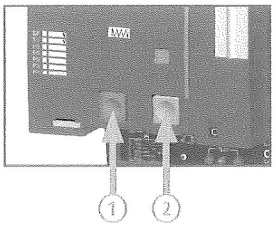
During the manipulation with circuit breaker in withdrawable design with motor drive, the circuit breaker may reach the state, in which the first attempt at switching on by motor drive is unsuccessful. Switching on is executed after repeated make impulse. To avoid this effect, some of the following steps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

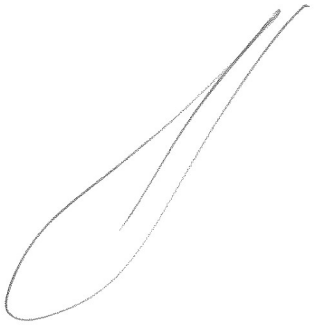
1) To keep the process of manipulation with the circuit breaker, see „Recommended circuit breaker manipulation" below
2) To connect OD-BHD-R... control relay into the motor drive circuit according to wiring diagram, see page F71

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.





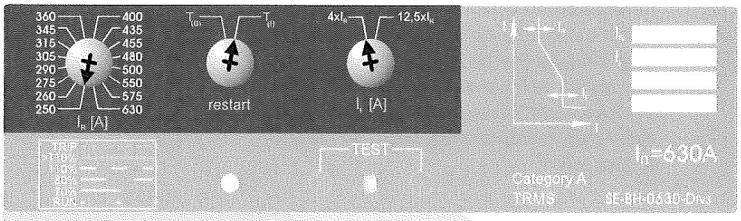
Changes in states of switches in cavities of switching unit when inserting and withdrawing circuit breaker

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,(6,7,8,9)[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
				4 2 3 1											
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 6, 7, 8, 9 are only for 4-pole design

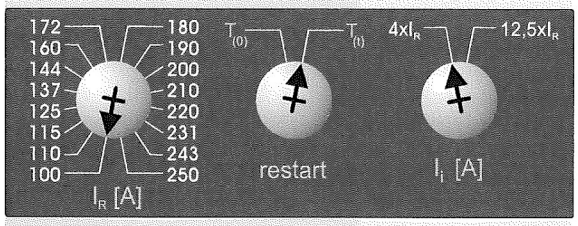
OVERCURRENT RELEASES - DTV3

3P 4P

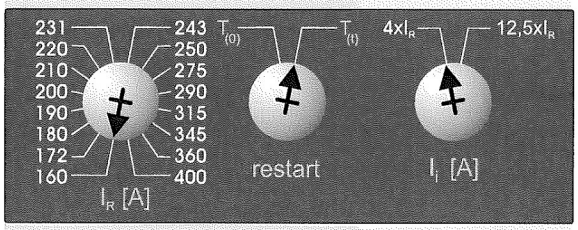


Short-circuit release | Reduced current | Thermal memory

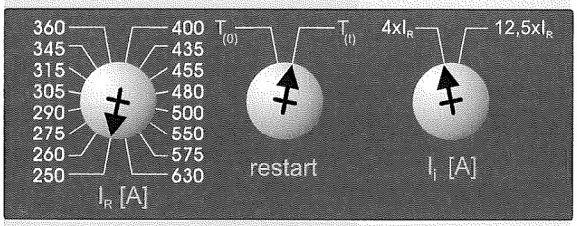
I_n = 250 A
SE-BH-0250-DTV3

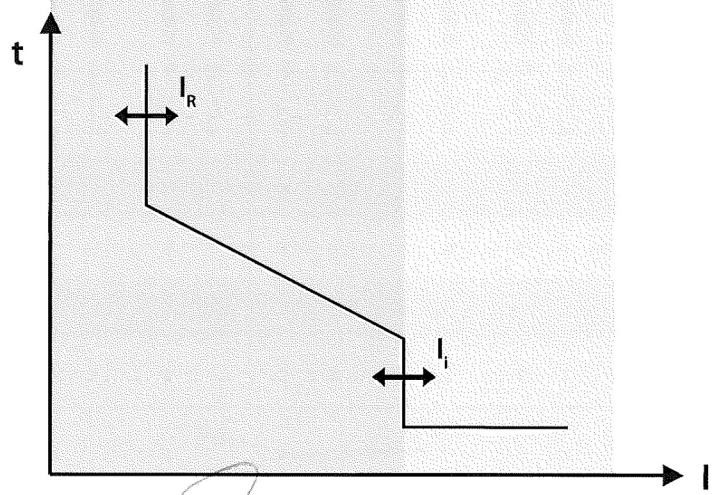


I_n = 400 A
SE-BH-0400-DTV3



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 = $T_{(t)}$, 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

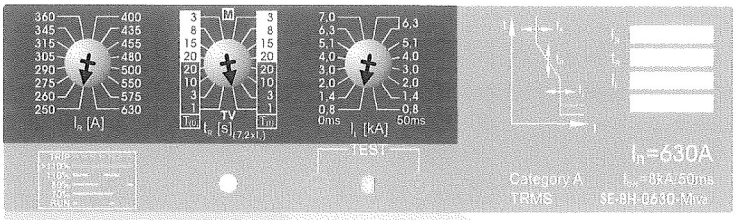
Switching unit		BH630...
Overcurrent release		SE-BH-...
Overcurrent release setting		
Reduced current	I_R	.... A
Thermal memory	T	....
Short-circuit release current	I_i	.... A (.... x I_R)

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

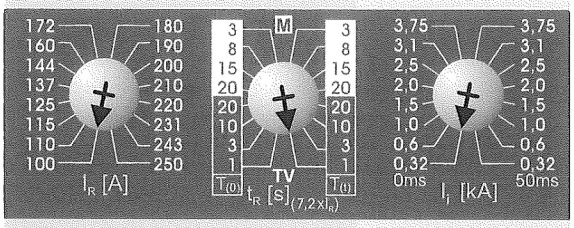
OVERCURRENT RELEASES - MTV8, TV mode

3P 4P

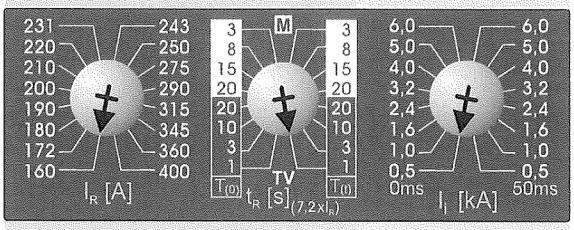


Reduced current | Thermal release delay | Short-circuit release

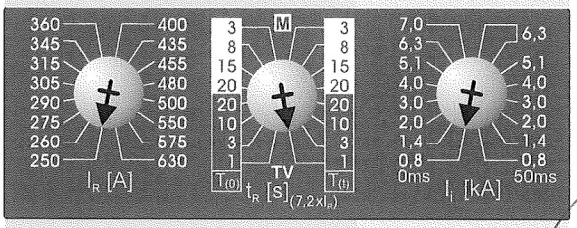
I_n = 250 A
SE-BH-0250-MTV8



I_n = 400 A
SE-BH-0400-MTV8



I_n = 630 A
SE-BH-0630-MTV8

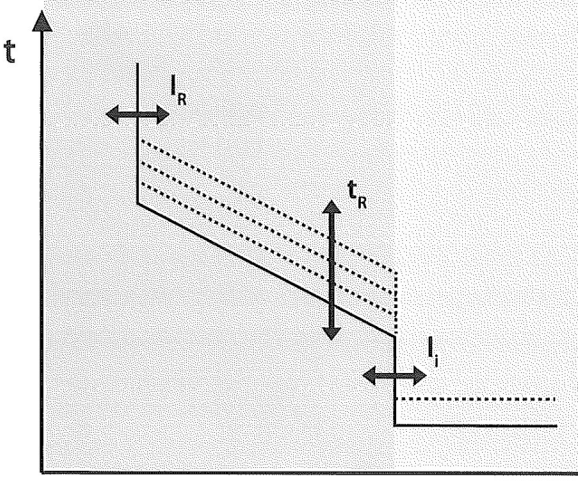


Properties

- 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 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

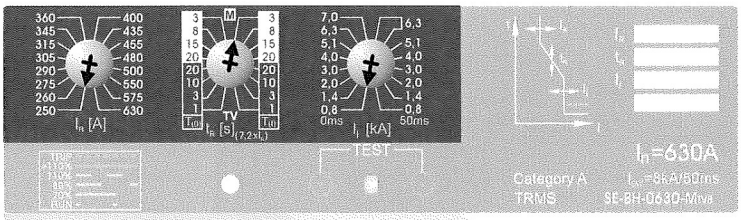


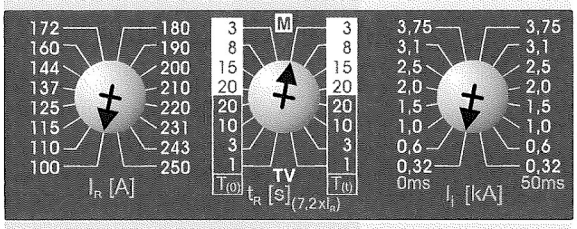
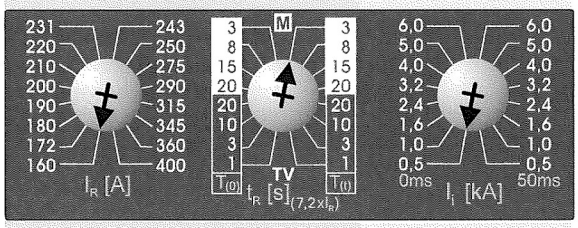
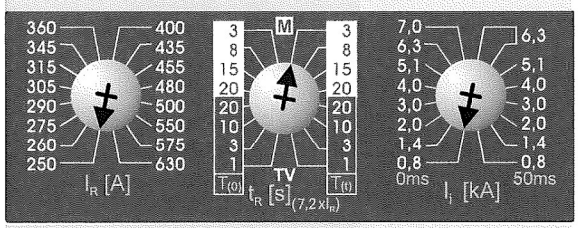
IMPORTANT

- 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



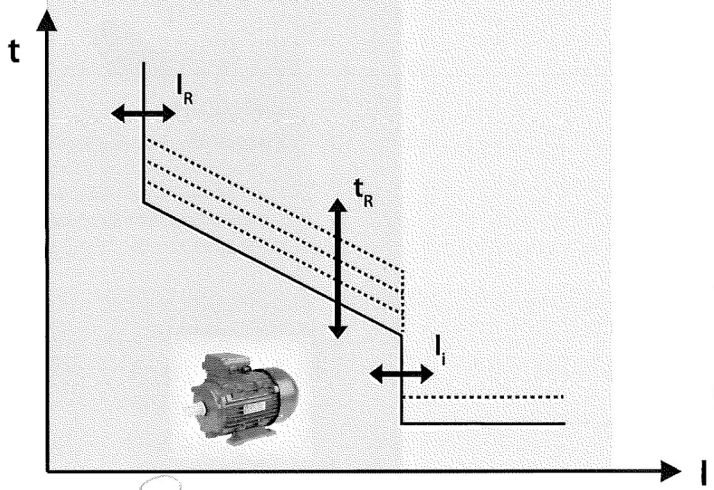
	Reduced current	Motor starting	Short-circuit release
$I_n = 250$ A SE-BH-0250-MTV8			
$I_n = 400$ A SE-BH-0400-MTV8			
$I_n = 630$ A SE-BH-0630-MTV8			

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



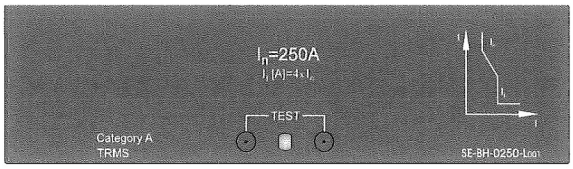
IMPORTANT

- 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
SE-BH-0250-L001

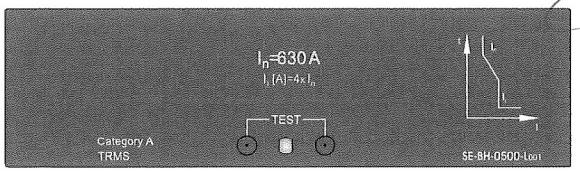


$I_n = 315$ A
SE-BH-0315-L001

$I_n = 400$ A
SE-BH-0400-L001

$I_n = 500$ A
SE-BH-0500-L001

$I_n = 630$ A
SE-BH-0630-L001

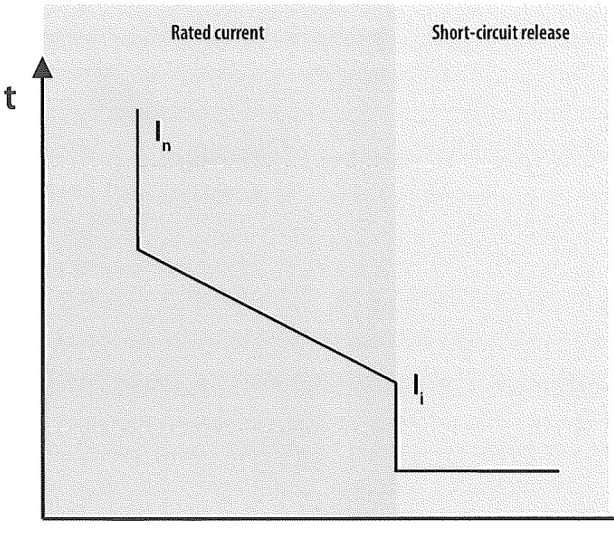


Properties

- 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)

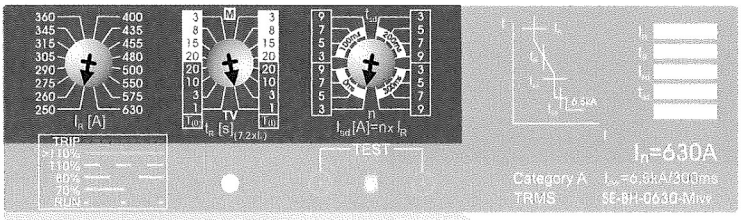


IMPORTANT

- 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

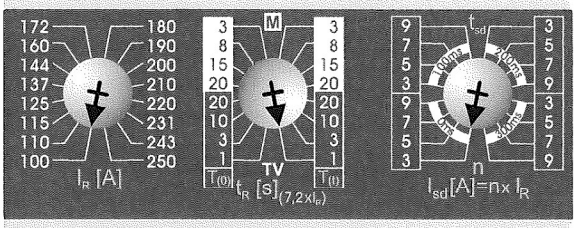
OVERCURRENT RELEASES - MTV9, TV mode

3P 4P

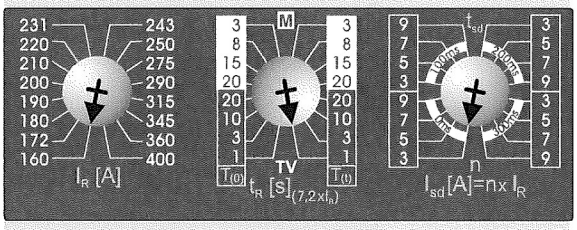


Rated current | Motor starting | Selective release

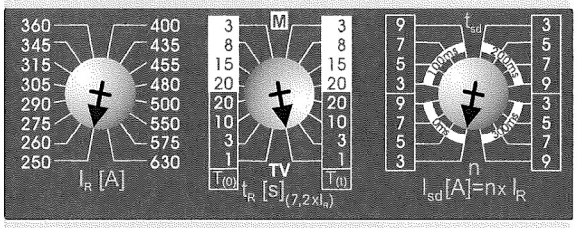
I_n = 250 A
SE-BH-0250-MTV9



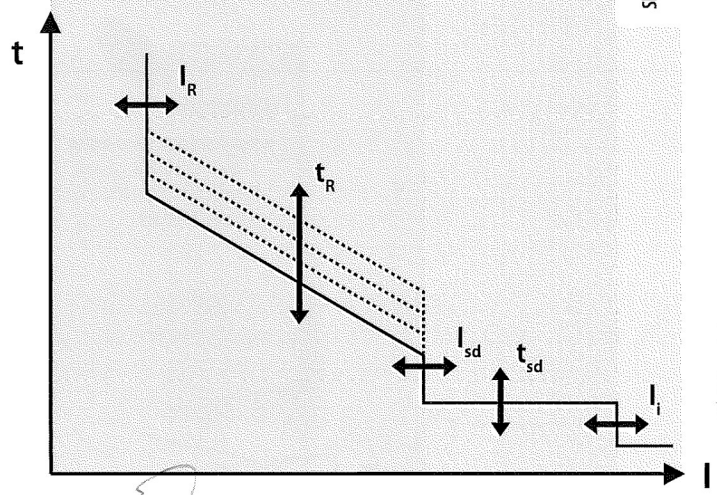
I_n = 400 A
SE-BH-0400-MTV9



I_n = 630 A
SE-BH-0630-MTV9



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 = $T_{(t)}$, 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 s
- 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

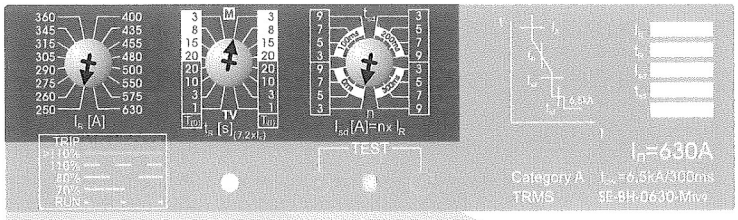
Switching unit		BH630...
Overcurrent release		SE-BH-...
Overcurrent release setting		
Reduced current	I_R	.... A
Mode		TV
Thermal memory	T	....
Thermal release delay	t_R	.... s
Selective release value	I_{sd}	.... A (... x I_R)
Selective release delay	t_{sd}	.... ms

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**

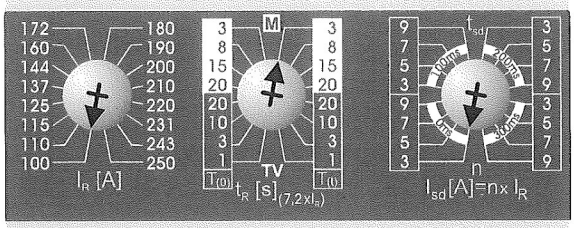
OVERCURRENT RELEASES - MTV9, M mode

3P 4P

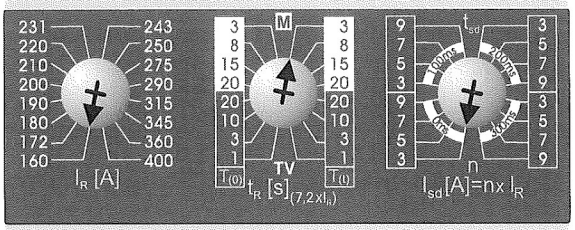


Rated current | Motor starting | Selective release

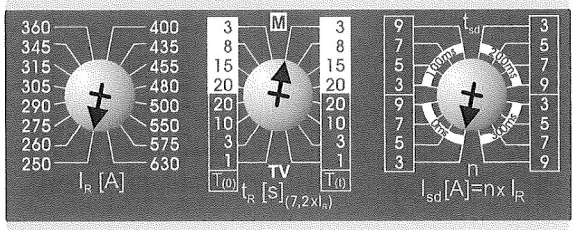
I_n = 250 A
SE-BH-0250-MTV9



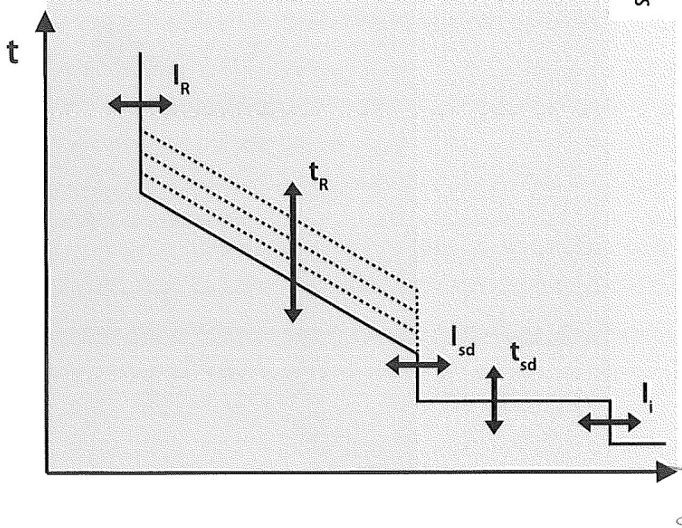
I_n = 400 A
SE-BH-0400-MTV9



I_n = 630 A
SE-BH-0630-MTV9



Short-circuit release



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 = $T_{(I)}$, 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

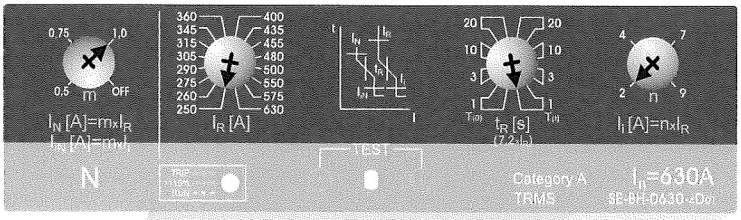
Switching unit		BH630...
Overcurrent release		SE-BH-...
Overcurrent release setting		
Reduced current	I_R	....A
Mode		M
Thermal memory	T	....
Thermal release delay	t_R	....s
Selective release value	I_{sd}	....A (...x I_R)
Selective release delay	t_{sd}	.... ms

IMPORTANT

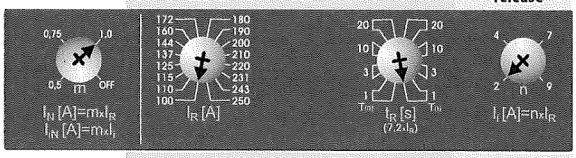
- M mode must be selected in protection of motors - the motor will be protected in phase failure
- thermal release delay t_R must correspond to the motor starting class

OVERCURRENT RELEASES - 4D01

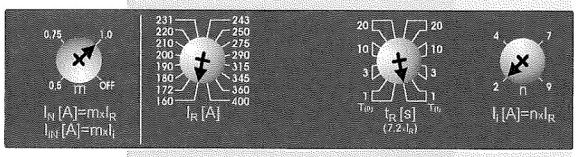
4P



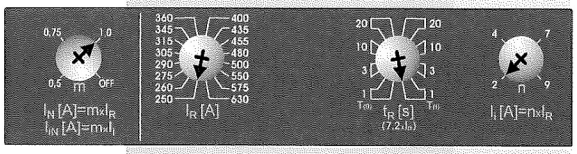
I_n = 250 A
SE-BH-0250-4D01



I_n = 400 A
SE-BH-0400-4D01



I_n = 630 A
SE-BH-0630-4D01

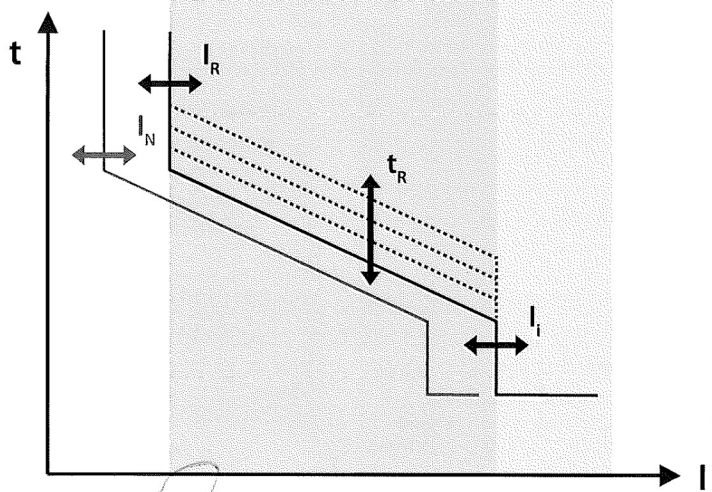


Properties

- 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 = $T_{(0)}$)
- setting of delay of the thermal release t_R 1 s, 3 s, 10 s and 20 s
- 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 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	....
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

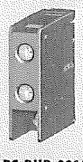
- the set value of current of the short-circuit release must correspond to the impedance loop - conditions must be fulfilled for **automatic disconnection from power supply in case of failure**

SWITCHES

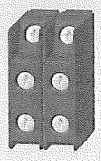
3P 4P

PS-BHD-1000

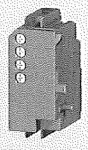
PS-BHD-1100



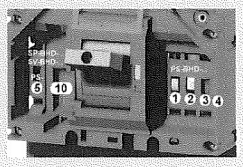
PS-BHD-0010



PS-BHD-0020



SP-BHD-0002



Cavities in BH630... switching unit

Specifications

Type		PS-BHD-..00	PS-BHD-..00-Au[1]
Rated operating voltage	U_e	AC 60 ÷ 500 V	AC 5 ÷ 60 V
	U_e	DC 60 ÷ 500 V	DC 5 ÷ 60 V
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
Ambient temperature range		-25 °C ÷ +55 °C	-25 °C ÷ +55 °C

Type		SP-BHD-0002	PS-BHD-0010/0020	PS-BHD-0010-Au/0020-Au[1]
Rated operating voltage	U_e	AC 250 V	AC 60 ÷ 250 V	AC 5 ÷ 60 V
	U_e	-	AC 60 ÷ 250 V	DC 5 ÷ 60 V
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 / AC 250 V	AC-15 1.5 A / AC 250 V	AC-12, DC-12 0.004 ÷ 0.5 A/5V,
	I_e/U_e		DC-13 0.2 A / DC 250 V	0.004 ÷ 0.01/60V
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
Ambient temperature range		-25 °C ÷ +55 °C	-25 °C ÷ +55 °C	-25 °C ÷ +55 °C

[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
10	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

States of switches in the circuit breaker cavities

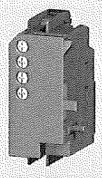
Cavity			1		2		3, 4, 5 (6, 7, 8, 9)[1]		10		2 and 3	2 and 3	2 and 3	1	2	3, 4, 5 (6, 7, 8, 9)[1]
State of circuit breaker	Circuit breaker lever position	State of the main contacts	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	PS-BHD-1000	PS-BHD-0100	SP-BHD-0002 SP-BHD-X...-0001		PS-BHD-2000	PS-BHD-1100	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	0	1	1	0	1	0
Switched off manually or by motor drive electrically (loaded state)	O	0	1	0	0	1	0	1	0	1	0	1	0	1	0	0	1
Switched off by overcurrent release		0	0	1	1	0	0	1	0	1	0	1	0	0	1	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	1	0	0	1	0	1

note: 0 - contact open, 1 - contact closed

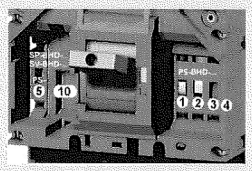
[1] cavities 6, 7, 8, 9 are only for 4-pole design

SHUNT TRIPS

3P 4P



SV-BHD-X230



Cavities in BH630... switching unit

Specifications

Type		SV-BHD-X...
Rated operating voltage	U_e	AC 24, 40, 48, 110, 230, 400, 500 V DC 24, 40, 48, 110, 220 V
Rated frequency	f_n	50/60 Hz
Input power at 1.1 U_e	AC	< 3 VA
	DC	< 3 W
Characteristic		U ≥ 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
Ambient temperature range		-25 °C ÷ +55 °C

Type designation according to rated operating voltage

U_e	Type
AC/DC 24, 40, 48 V	SV-BHD-X024
AC/DC 110 V	SV-BHD-X110
AC 230, 400, 500 V / DC 220 V	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).

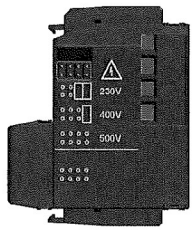
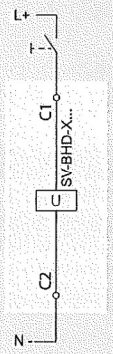
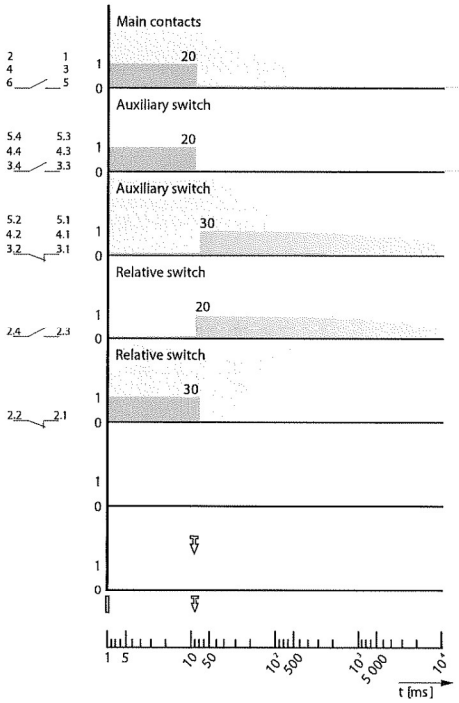
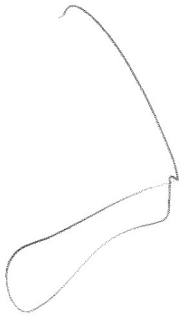


Fig. 1 - The rated operating voltage setting



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)	

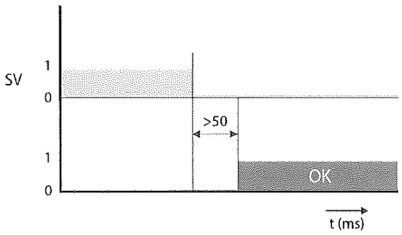
SHUNT TRIPS

3P 4P

Specifications

Reaction time of the auxiliary releases

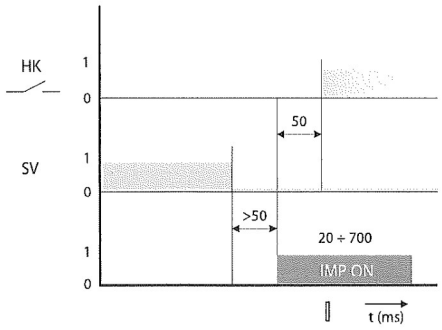
Shunt trip



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

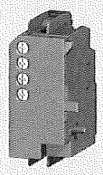
States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases, TEST or by switch off button on the motor drive	
Switched off manually or by motor drive electrically (loaded state)	

Description of graphs

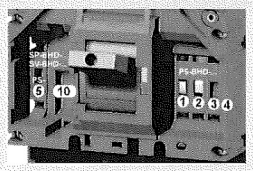
Symbol	Description
HK	Main contacts
OK	Circuit breaker is ready for further handling
IMP ON	Make impulse for the motor drive
SV	Control voltage on the shunt trip
SP	Control voltage on the undervoltage release

UNDERVOLTAGE RELEASES

3P 4P



SP-BHD-X230



Cavities in BH630... switching unit

Specifications

Type		SP-BHD-X...	SP-BHD-X...-0001[2]
Rated operating voltage	U_e	AC 24, 40, 48, 110, 230, 400, 500 V DC 24, 40, 48, 110, 220 V	AC 24, 40, 48, 110, 230, 400, 500 V DC 24, 40, 48, 110, 220 V
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
Ambient temperature range		-25 °C ÷ +55 °C	-25 °C ÷ +55 °C
Early switch			
Rated operating voltage	U_e	-	AC 250 V
Rated frequency	f_n	-	50/60 Hz
Rated operating current	I_e / U_e	-	1 A / AC 250 V
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 page P2
[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 types
01	1	break
10	1	make

Type designation according to rated operating voltage

U_e	Type
AC 24, 40, 48 V	SP-BHD-X024
AC/DC 110 V	SP-BHD-X110
AC 230, 400, 500 V / DC 220 V	SP-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).

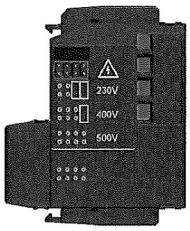
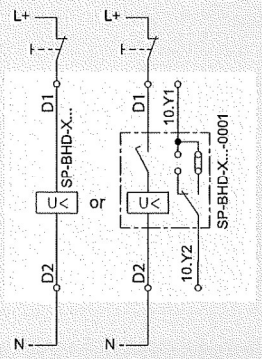
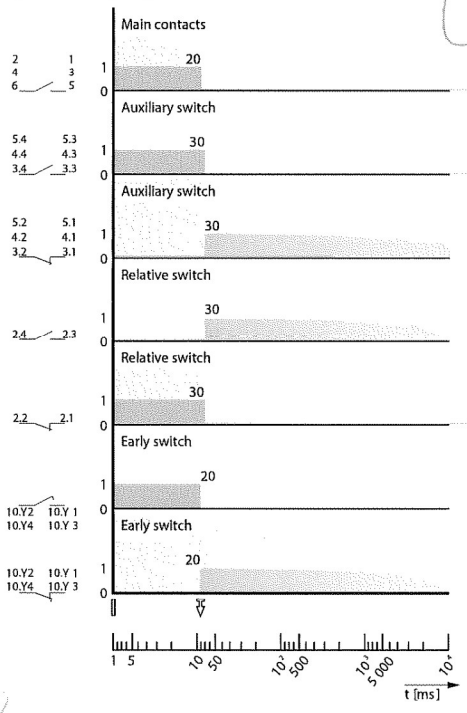


Fig. 1 - The rated operating voltage setting



Circuit breaker/switch-disconnector switching off by undervoltage repase



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)	

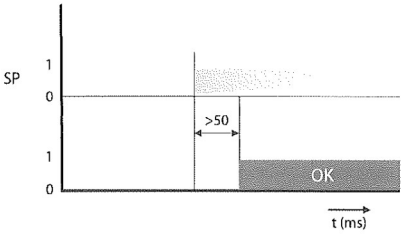
UNDERVOLTAGE RELEASES

3P 4P

Specifications

Reaction time of the auxiliary releases

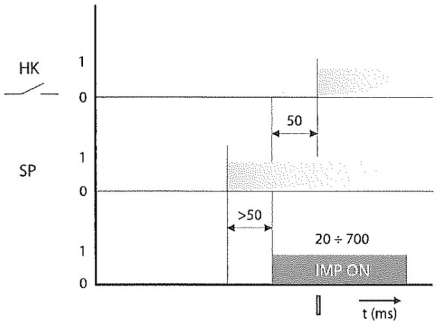
Undervoltage release



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

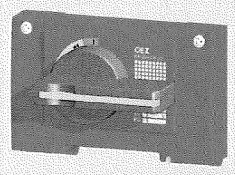
States of circuit breaker/switch-disconnector	Lever position of circuit breaker/switch-disconnector
Switched on	
Switched off by releases, TEST or by switch off button on the motor drive	
Switched off manually or by motor drive electrically (loaded state)	

Description of graphs

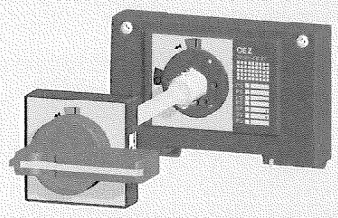
Symbol	Description
HK	Main contacts
OK	Circuit breaker is ready for further handling
IMP ON	Make impulse for the motor drive
SV	Control voltage on the shunt trip
SP	Control voltage on the undervoltage release

HAND DRIVES

3P 4P



RP-BH-CK10 + RP-BHD-CP10



RP-BH-CK21 + RP-BHD-CH10 + RP-BHD-CN41 + RP-BHD-CP21

Description

The hand drive permits control 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 252 ÷ 416 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.

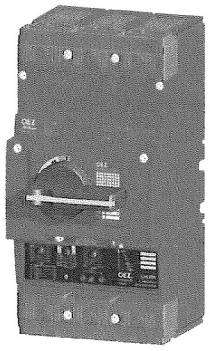


Fig. 1 - DIMENSIONS see page F28

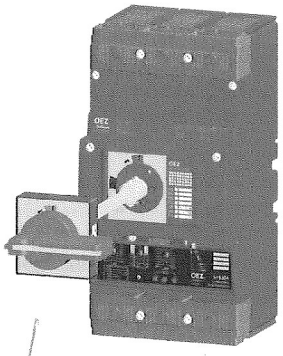
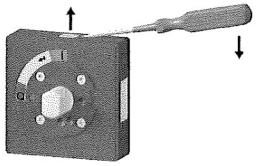


Fig. 2 - DIMENSIONS see page F28

By a screwdriver it is possible to unlock the mechanism blocking the switchboard door opening with the circuit breaker 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 opening in the circuit breaker state: switched on	Locking of the switchboard door opening in the circuit breaker state: „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	-	-	-	-	-	-	252 ÷ 416

MECHANICAL INTERLOCKING AND PARALLEL SWITCHING

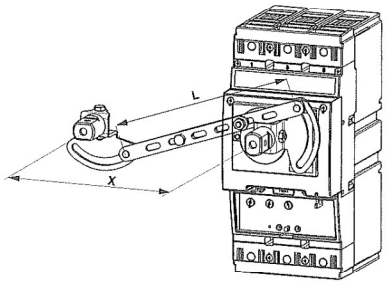
3P 4P

RP-BHD-CB10

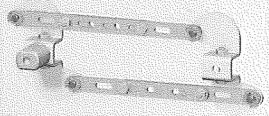
RP-BHD-CB10 Mechanical interlocking

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.



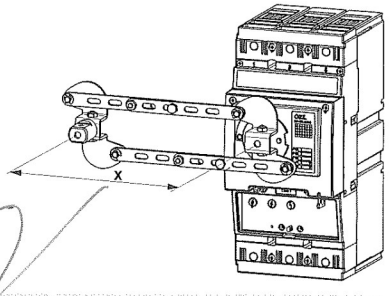
		Right switching unit							
		BD250..3..		BD250..4..		BH630..3..		BH630..4..	
	Dimension [mm]	X	L	X	L	X	L	X	L
Left switching unit	BD250..3..	105	112	140	145.5	122.5	128.5	181	185.5
	BD250..4..	105	112	140	145.5	122.5	128.5	181	185.5
	BH630..3..	122.5	128.5	157.5	162.5	140	145.5	185	189
	BH630..4..	122.5	128.5	157.5	162.5	140	145.5	185	189



RP-BHD-CD10

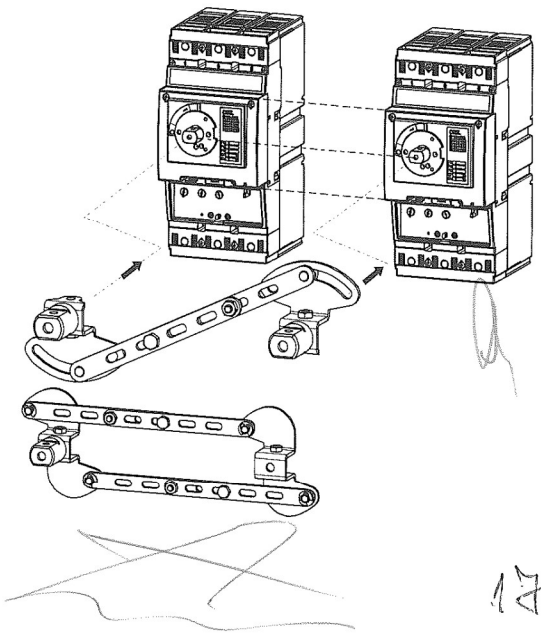
RP-BHD-CD10 Mechanical parallel switching

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 hand drive unit and 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. Cannot be used in combination with extension shaft (RP-BHD-CH10 and RP-BHD-CH20).



		Right switching unit							
		BD250..3..		BD250..4..		BH630..3..		BH630..4.. [1]	
	Dimension [mm]	X^{min}	X^{max}	X^{min}	X^{max}	X^{min}	X^{max}	X^{min}	X^{max}
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



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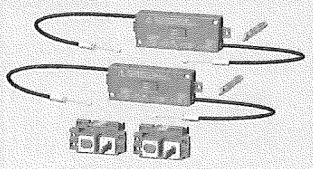
MECHANICAL INTERLOCKING

3P 4P

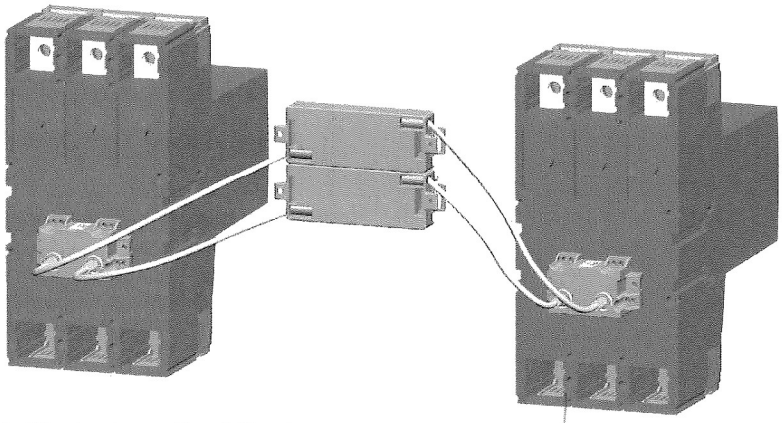


MB-BHD-PV04

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.

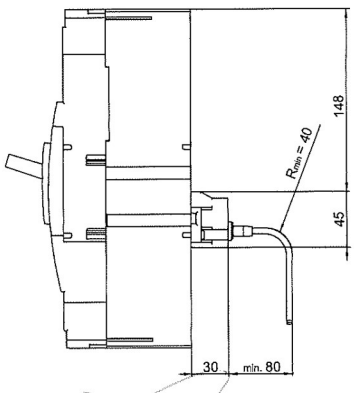
Recommended circuit breaker manipulation

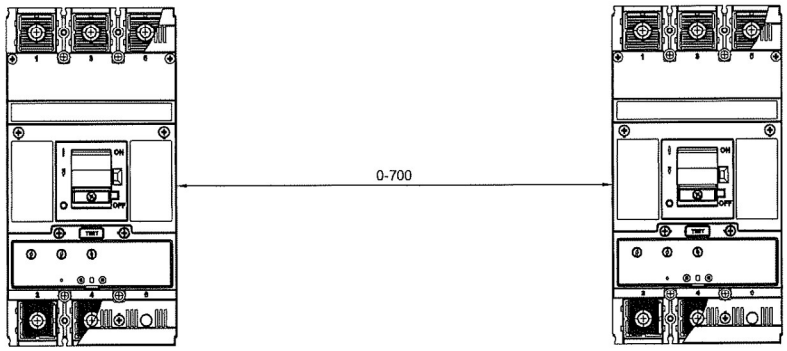
During the manipulation with circuit breaker with mechanical interlocking and motor drive, the circuit breaker may reach the state, in which the first attempt at switching on by motor drive is unsuccessful. Switching on is executed after repeated make impulse. To avoid this effect, some of the following 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

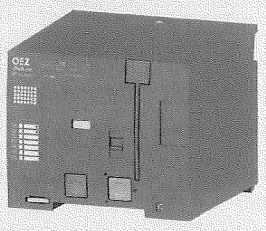
1) Shunt trip/undervoltage release must be used to switch off the circuit breaker. Circuit breaker switching off cannot be made by motor drive
2) Circuit breaker can be stored and switched on only if the second circuit breaker is in switch-off mode. Circuit breaker status indicator on motor drive is 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.



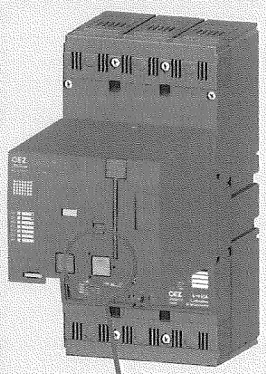


MOTOR DRIVES

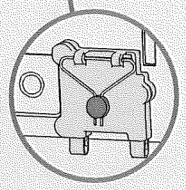
3P 4P

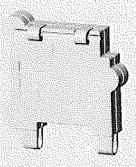


MP-BH-X230



DIMENSIONS, see page F29





OD-BHD-KT01

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-X...-P
Operating voltage	U_e	AC 24, 48, 110, 230 V DC 24, 48, 110, 220 V
Rated frequency	f_n	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	AC 24, 48, 110 V; AC 230 V	LTN-4C-1; LTN-2C-1
	DC 24, 48, 110 V; DC 220 V	LTN-UC-4C-1; LTN-UC-2C-1
Rated operating current of the change-over switch AUTO/MANUAL	I_e/U_e	5 A / AC 250 V 0.5 A / DC 250 V
Ambient temperature range		-25 °C ÷ +55 °C

Type		OD-BHD-KA02
Number of conductors		12
Conductor cross-section	S	0.35 mm²
Conductor lengths		0.6 m

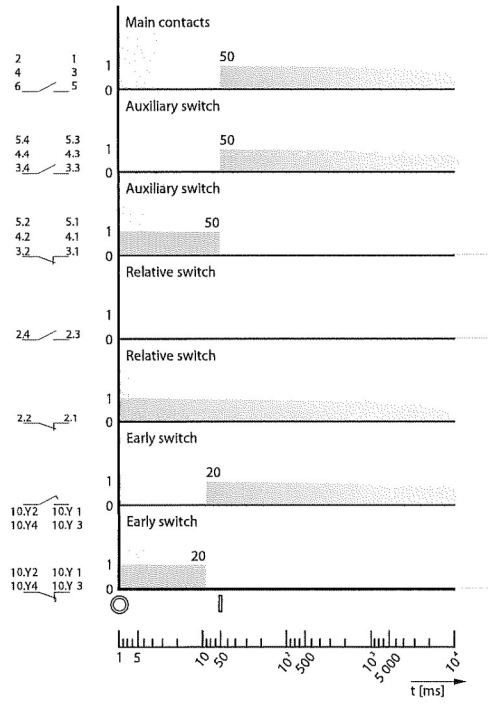
[1] for sequence of control impulses, see page F70

MOTOR DRIVES

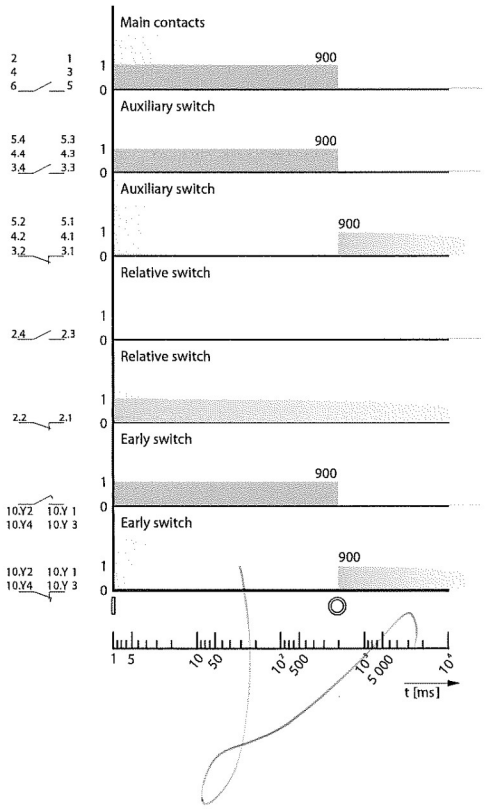
3P 4P

Specifications

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

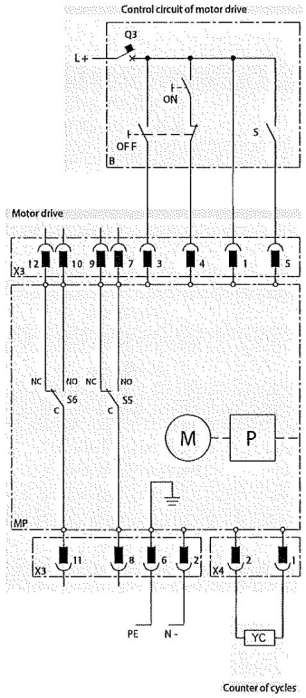


Circuit breaker switching off by motor drive - electrically by OFF push button



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, TEST or by switch off button on the motor drive	
Switched off manually or by motor drive electrically (loaded state)	

Wiring diagram description

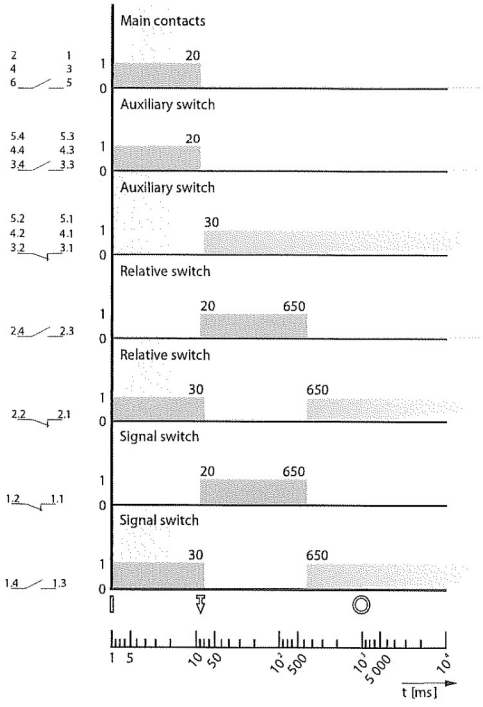
Symbol	Description
MP	motor drive MP-BH-X...
M	motor
P	storage device
X3	connector for connection of control circuits
X4	connector for external counter of cycles
S5	switch to indicate AUTO (NO-C)/MANUAL modes (NC-C)
S6	switch to indicate full storage (ready to switch on: NO-C)
YC	external counter of 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

MOTOR DRIVES

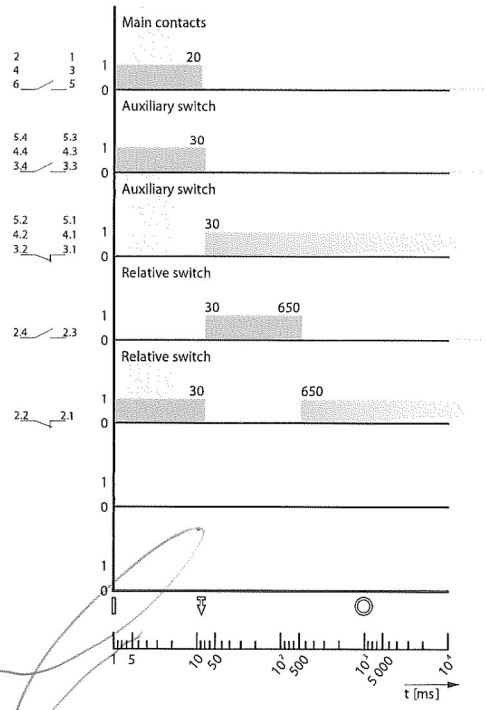
3P 4P

Specifications

Switching off of the circuit breaker with motor drive by overcurrent release (S switch in switched on state-automatic storage)

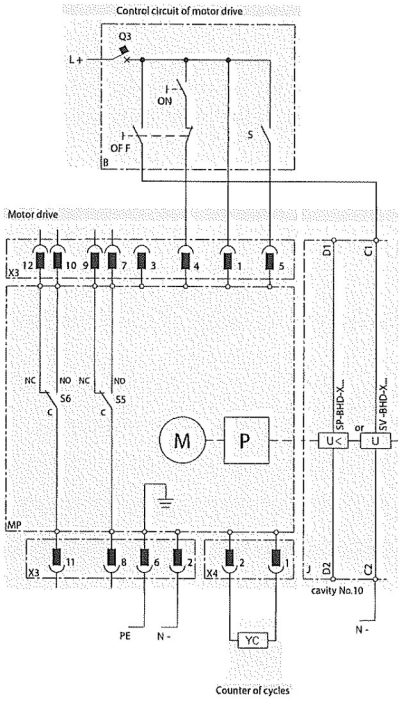


Switching off of the circuit breaker with motor drive by shunt trip or undervoltage release (switch S in switched on state-automatic storage)

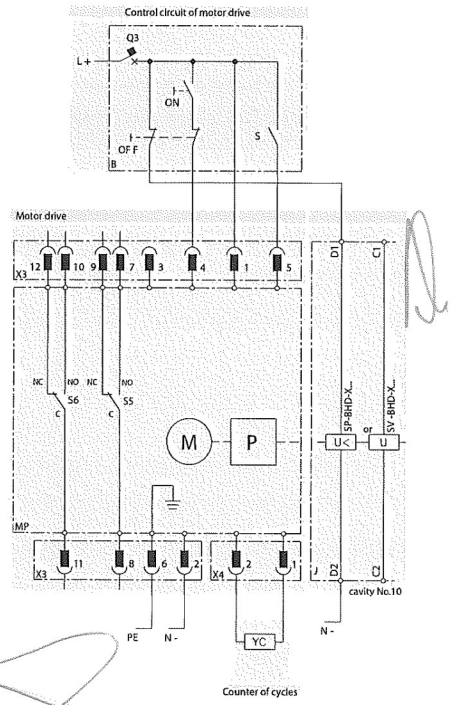


Diagram

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) a tripping by undervoltage release



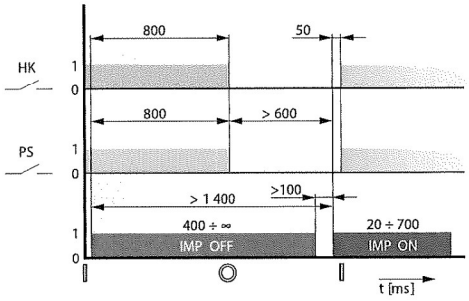
MOTOR DRIVE

3P 4P

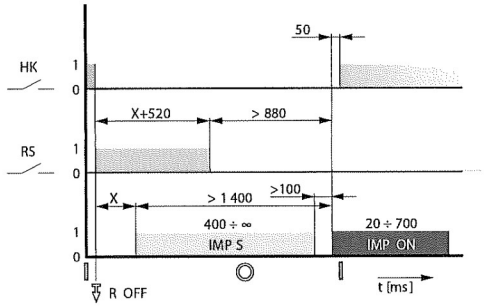
Specifications

Recommended control impulses

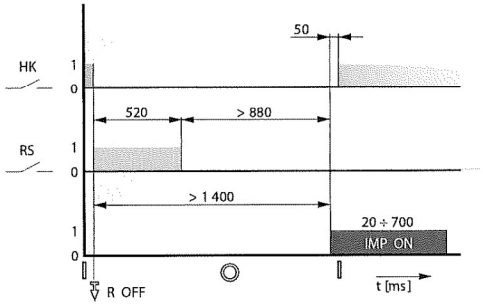
Circuit breaker switching on and off by motor drive
- S switch permanently switched on (automatic storage) or open



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 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 AC/DC 24 V, AC/DC 48 V, AC 110 ÷ 230 V, DC 110 V

Switching off by motor drive

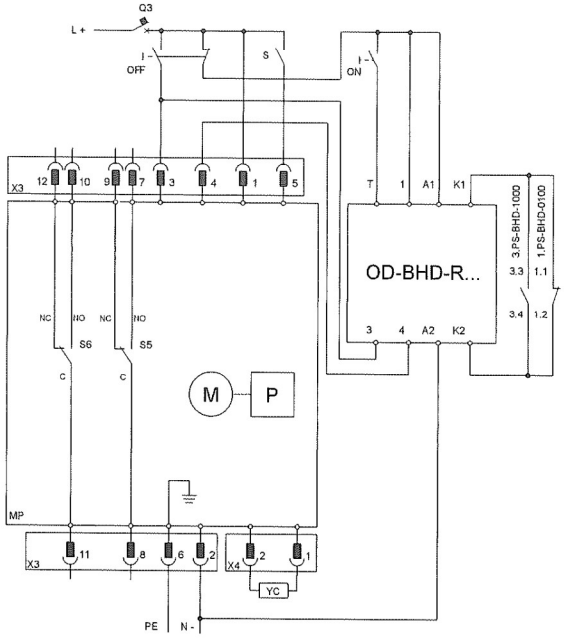


Diagram description

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 AC 24 V LTN-4C-1 for AC 48 V LTN-4C-1 for AC 110 V LTN-4C-1 for AC 230 V LTN-2C-1 for DC 24 V LTN-UC-4C-1 for DC 48 V LTN-UC-4C-1 for DC 110 V LTN-UC-4C-1 for DC 220 V LTN-UC-2C-1
OD-BHD-R...	control relay for AC/DC 24 V for AC/DC 48 V for AC 110 ÷ 230 V for DC 110 V
3.PS-BHD-1000	auxiliary switch
1.PS-BHD-0100	signal switch

- impulse on T terminal reacts to trailing edge

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 AC/DC 24 V, AC/DC 48 V, AC 110 ÷ 230 V, DC 110 V

Switching off is possible only by undervoltage release or shunt trip

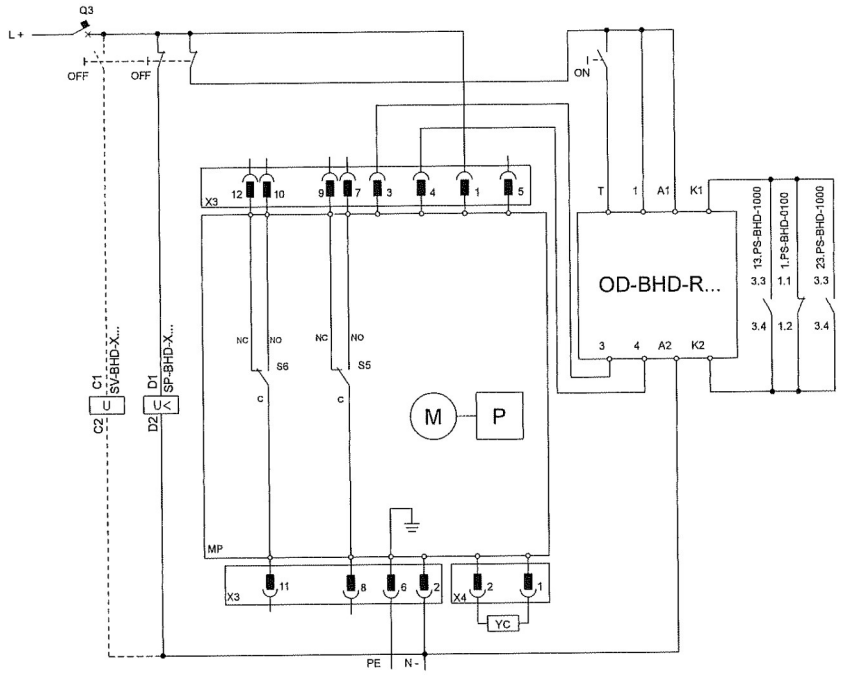


Diagram description

Symbol	Description
MP	motor drive - U_e of drive must be the same as 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 AC 24 V LTN-4C-1 for AC 48 V LTN-4C-1 for AC 110 V LTN-4C-1 for AC 230 V LTN-2C-1 for DC 24 V LTN-UC-4C-1 for DC 48 V LTN-UC-4C-1 for DC 110 V LTN-UC-4C-1 for DC 220 V LTN-UC-2C-1
OD-BHD-R...	control relay for AC/DC 24 V for AC/DC 48 V2 for AC 110 ÷ 230 V for DC 110 V
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