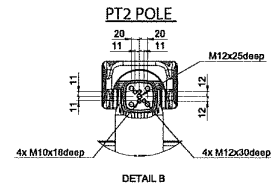
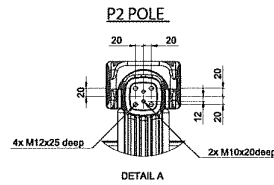
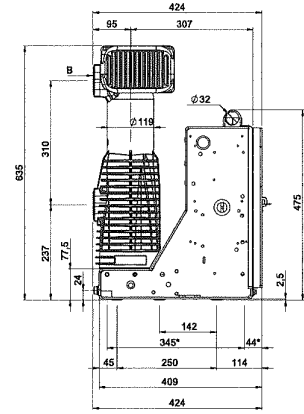
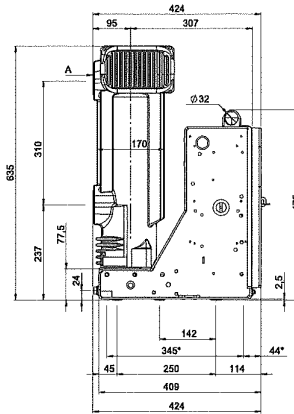
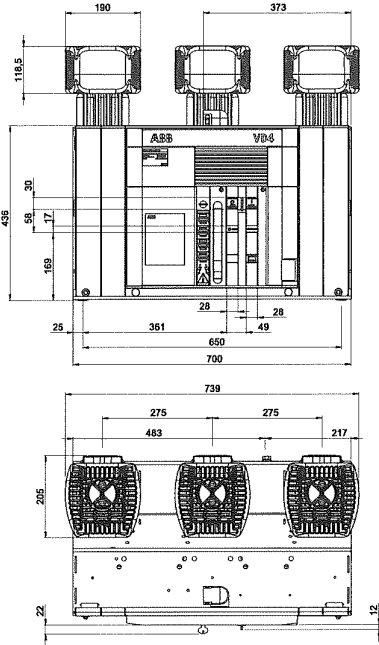


Overall dimensions

Fixed circuit breakers

VD4	
TN	1VCD000149
Ur	12 kV
	17.5 kV
Ir	3150 A
	20 kA
Isc	25 kA
	31.5 kA
	40 kA

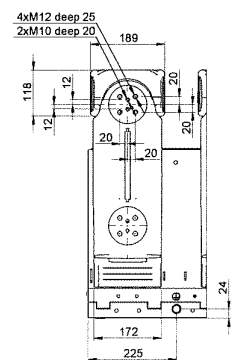
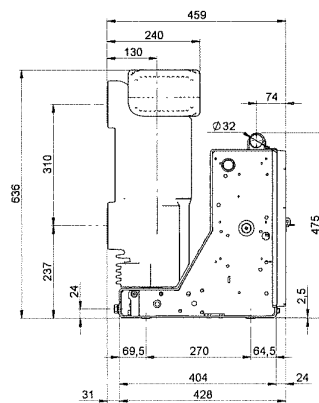
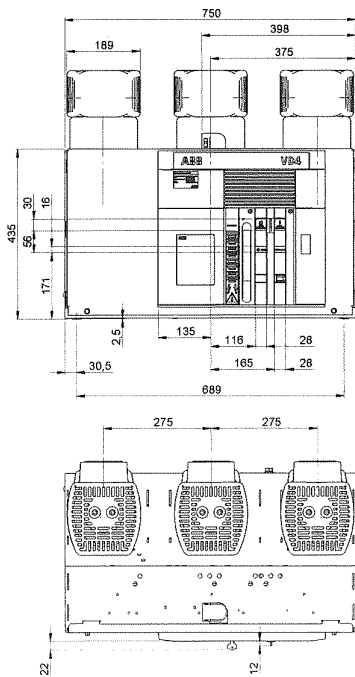


(**) WITH FORCED VENTILATION

(*) Fixing interchangeability with previous series (345 x 650).

Fixed circuit breakers

VD4	
TN	1VCD003443
Ur	12 kV
	17.5 kV
Ir	3150 A (*)
Isc	50 kA



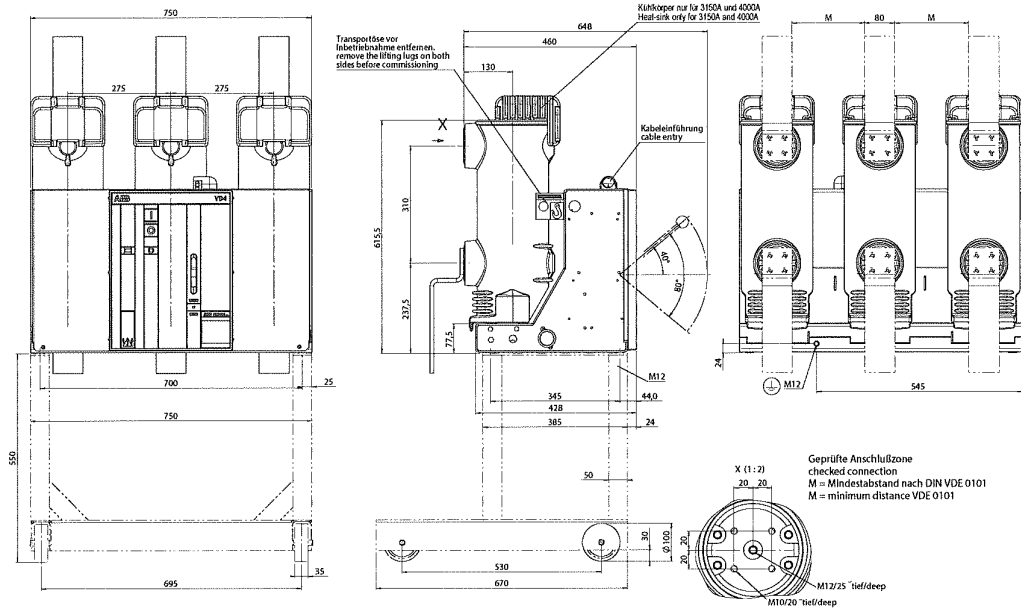
На основании чл.36а
ал.3 от ЗОП

(*) 4000 A with forced ventilation.

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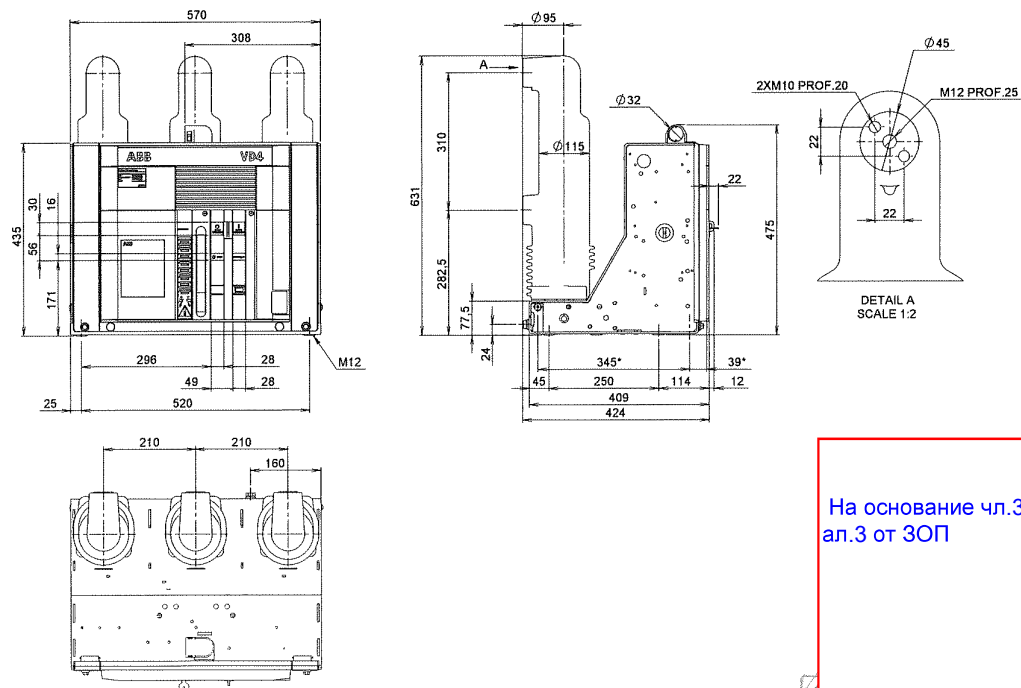
Fixed circuit breakers

VD4		
TN	GCEM370562P0100	
Ur	12	kV
	12	A
	16	A
I _r	20	A
	25	A
	32	A
	40	A
I _{sc}	63	kA



Fixed circuit breakers

VD4		
TN	7409	
Ur	24	kV
I _r	630	A
	1250	A
I _{sc}	16	kA
	20	kA
	25	kA



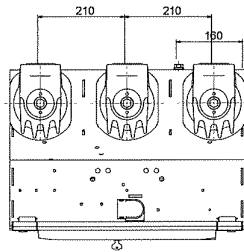
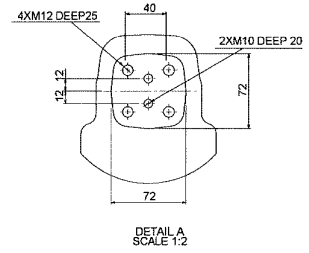
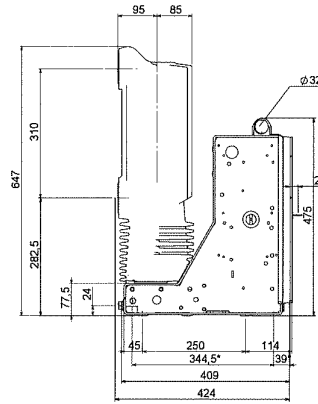
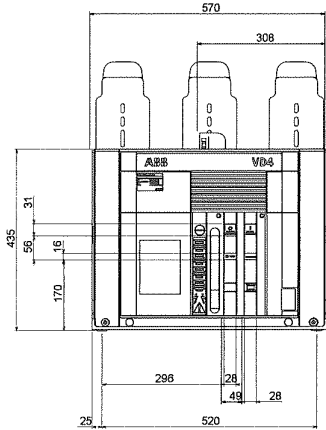
На основании чл.36а
ал.3 от ЗОП

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Overall dimensions

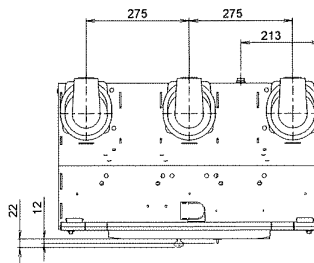
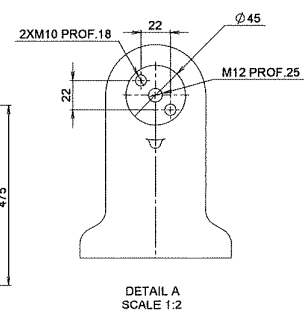
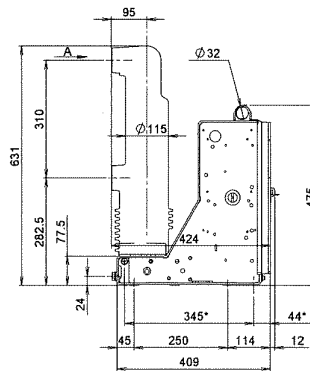
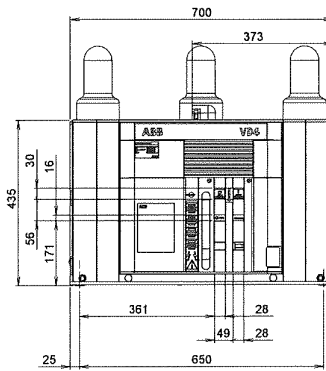
Fixed circuit breakers

VD4	
TN	1VCD000172
Ur	24 kV
I _r	630 A
	1250 A
I _{sc}	31,5 kA



Fixed circuit breakers

VD4	
TN	7410
Ur	24 kV
I _r	630 A
	1250 A
I _{sc}	16 kA
	20 kA
	25 kA

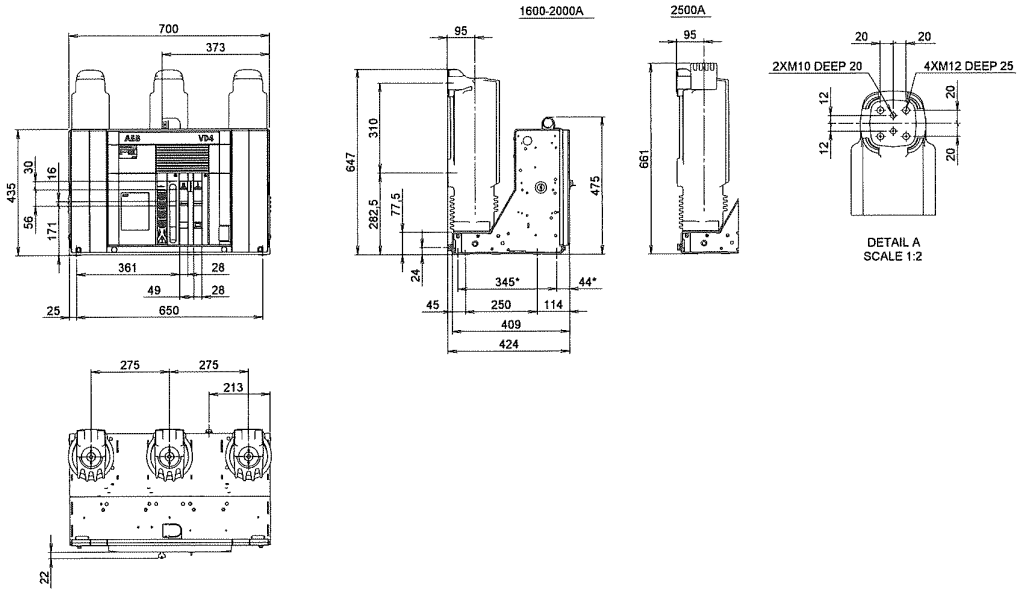


На основании чл.36а
ал.3 от ЗОП

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Fixed circuit breakers

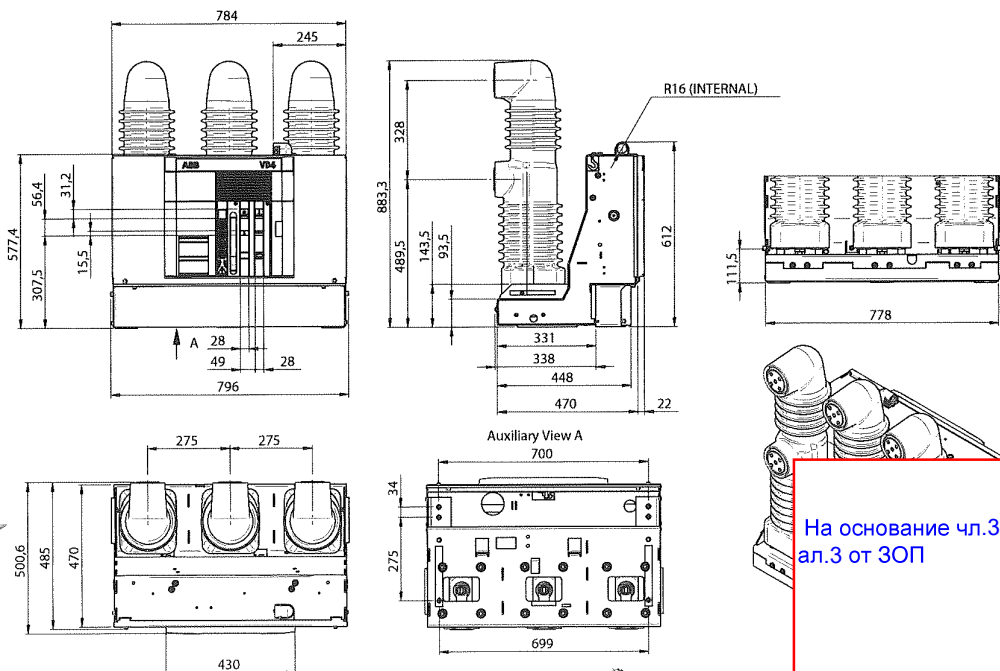
VD4	
TN	7411
Ur	24 kV
Ir	1600 A
	2000 A
	2500 A
Isc	16 kA
	20 kA
	25 kA
	31.5 kA



Fixed circuit breakers

VD4	
TN	1VYN300901-RF
Ur	36 kV
Ir	1250 A
	1600 A
	2000 A
Isc	20 kA
	25 kA
	31.5 kA

VD4	
TN	1VYN300901-RF
Ur	38 kV
Ir	1200 A
	2000 A
Isc	31.5 kA



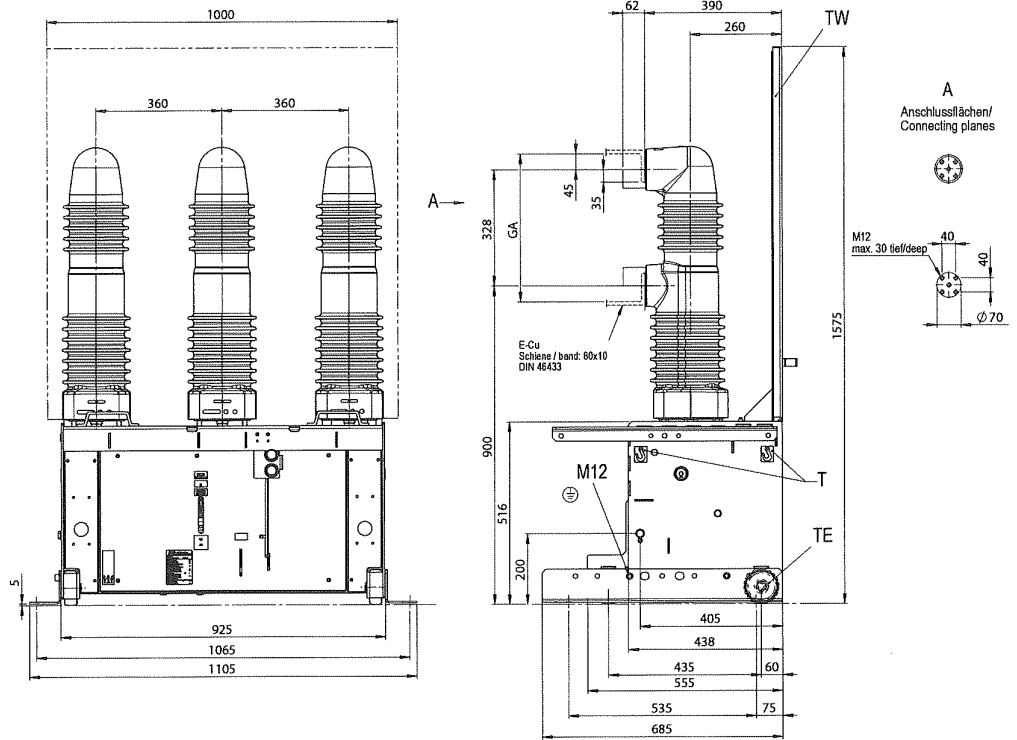
На основании чл.36а
ал.3 от ЗОП

580133

Overall dimensions

Fixed circuit breakers

VD4	
TN	GCEM700198
Ur	36-40,5 kV
Ir	1250 A
	1600 A
	2000 A
	2500 A
Isc	20 kA
	25 kA
	31.5 kA
	40 kA

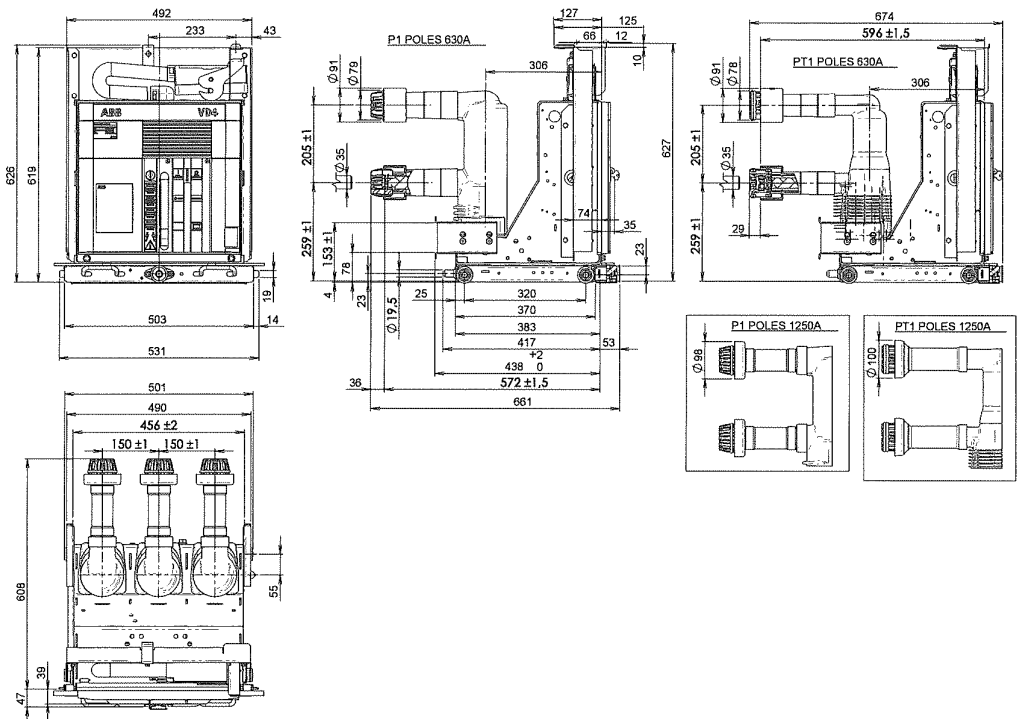


200197

На основание чл.36а
ал.3 от ЗОП

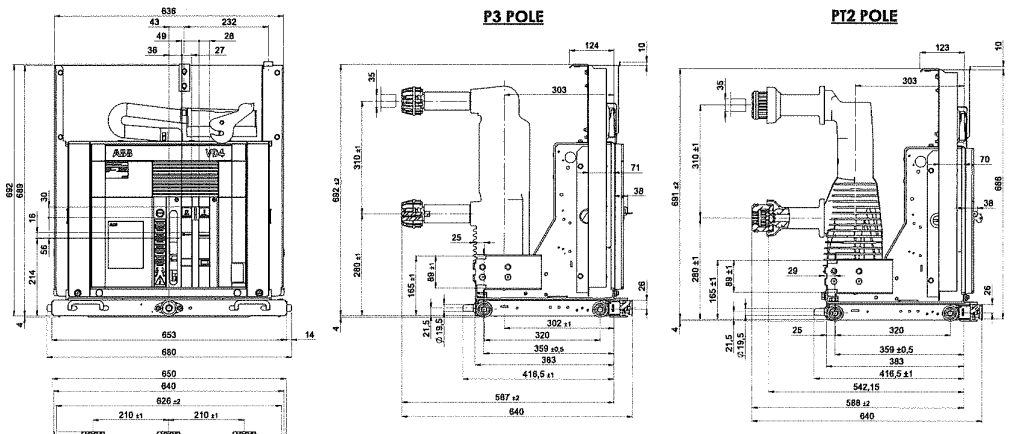
Withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube PB1 modules

VD4/P	
TN	7412
Ur	12 kV
	17.5 kV
Ir	630 A
	1250 A
	16 kA
Isc	20 kA
	25 kA
	31.5 kA



Withdrawable circuit breakers for PowerCube PB2 modules

VD4/W	
TN	7420
Ur	12 kV
	17.5 kV
Ir	630 A
	1250 A
	16 kA
Isc	20 kA
	25 kA
	31.5 kA



Type	Pole	Un	In	Isc	Operating Panel
VD4/W p.210	P3	12-17.5 kV	630-1250A	16-25-31.5	
VD4/W 12/**/ G p.210		12 kV	12 kV	16-25-31.5	
VD4/W xx.xx.xx. 5A p.210		12 kV	630A	16-20-25-31.5	
VD4/W p.210	PT2	12-17.5 kV	630-1250A	16-25-31.5	
VD4/W 12/**/ G p.210		12 kV	12 kV	16-25-31.5	

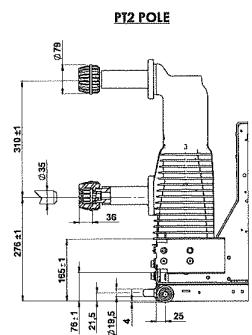
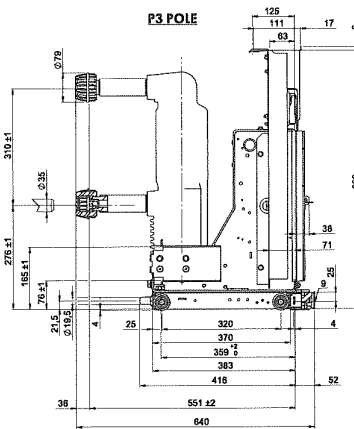
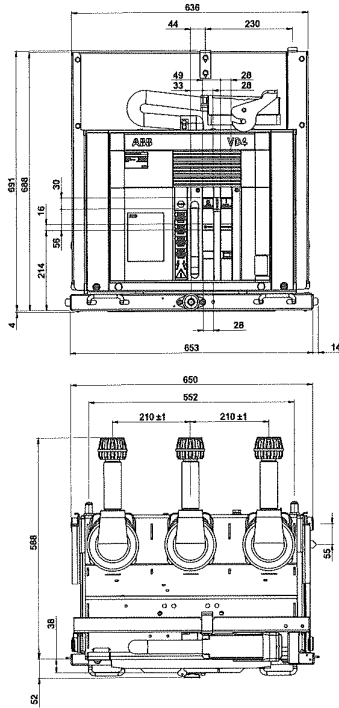
На основании чл.36а
ал.3 от ЗОП

300108

Overall dimensions

Withdrawable circuit breakers for PowerCube PB2 modules

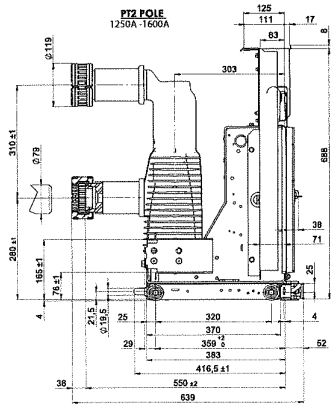
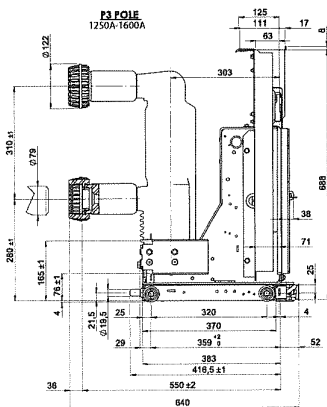
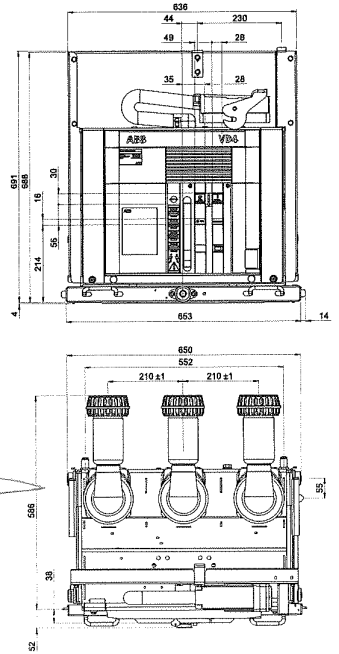
VD4/W	
TN	1VCD601243
Ur	12 kV
	17 kV
Ir	1250 A
Isc	40 kA



C.B. type	Ur	Ir	Isc	Pole	Operating mechanism	Cubicle
VD4/W p.210	12-17.5 kV	1250 A	40 kA	P3	EL	PowerCube PB2
VD4/W p.210	12-17.5 kV	1250 A	40 kA	PT2	EL	PowerCube PB2

Withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube PB2 modules

VD4/P	
TN	1VCD003284
Ur	12 kV
	17.5 kV
Ir	1250 A
	1600 A
Isc	40 kA



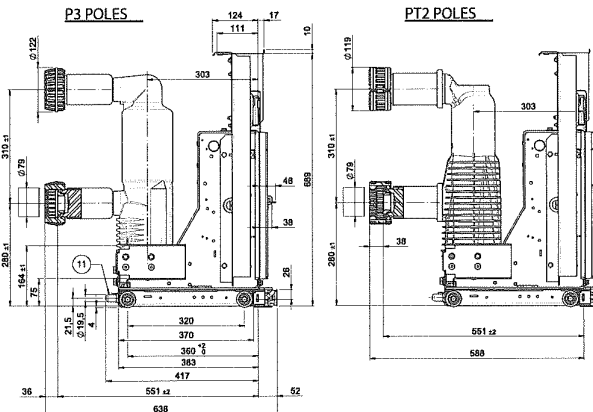
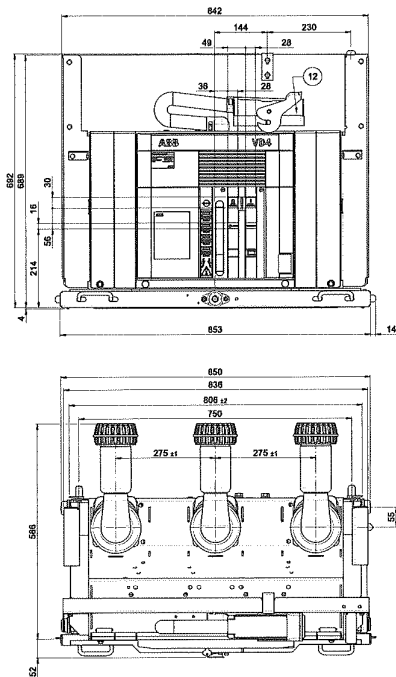
C.B. type	Ur	Ir	Isc	Pole	Operating mechanism
VD4/P p.210	12-17.5 kV	1250-1600 A	40 kA	P3	E
VD4/P p.210	12-17.5 kV	1600 A	40 kA		
VD4/P p.210	12-17.5 kV	1250-1600 A	40 kA	PT2	E
VD4/P p.210	12-17.5 kV	1600 A	40 kA		

На основание чл.36а ал.3 от ЗОП

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Withdrawable circuit breakers for UniGear ZS1 switchgear

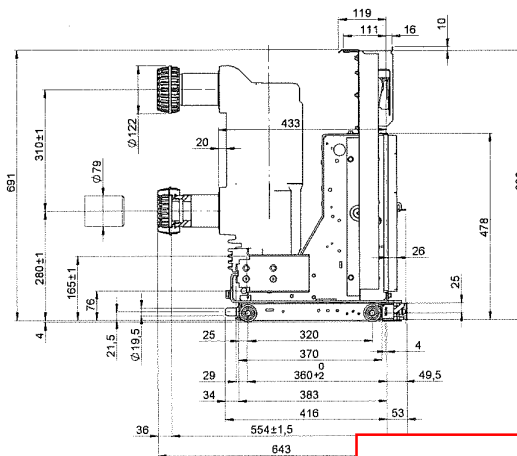
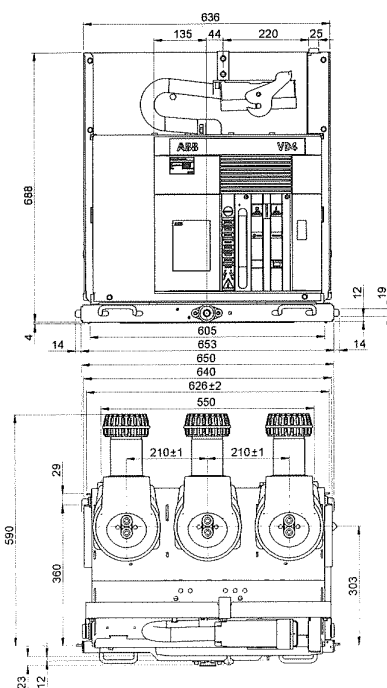
VD4/P	
TN	1VCD003286
Ur	12 kV
	17.5 kV
Ir	1250 A
	1600 A
Isc	40 kA



C.B. type	Ur	Ir	Isc	Pole	Operating mechanism	Cubicle
VD4 p.275	12-17.5 kV	1250-1600	40 kA	P	EL	UniGear ZS1
VD4 p.275	12-17.5 kV	1250-1600 A	40 kA	PT2	EL	UniGear ZS1

Withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube PB2 modules

VD4/P	
TN	1VCD 003444
Ur	12 kV
	17.5 kV
Ir	1250 A
	2000 A
Isc	50 kA



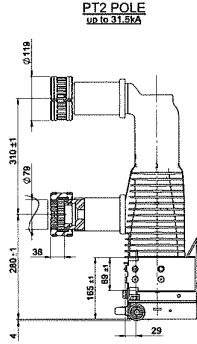
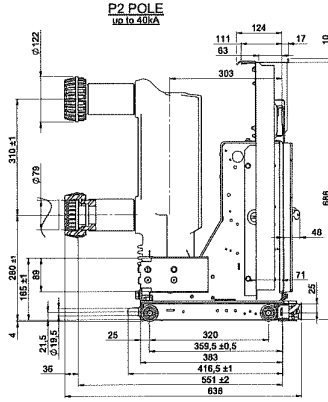
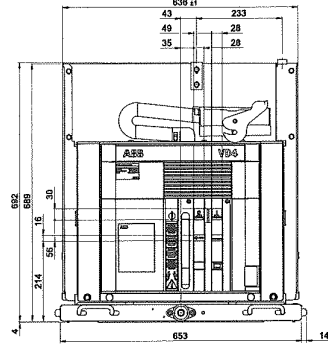
На основе чл.36а ал.3 от ЗОП

000140

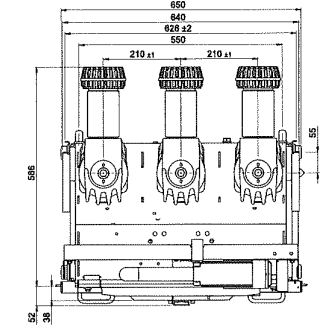
Overall dimensions

Withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube PB2 modules

VD4/P	
TN	7415
Ur	12 kV
	17.5 kV
Ir	1600 A
	2000 A
Isc	20 kA
	31.5 kA



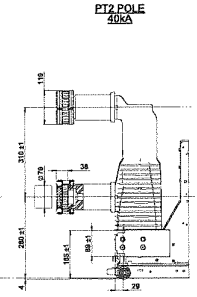
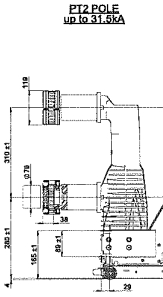
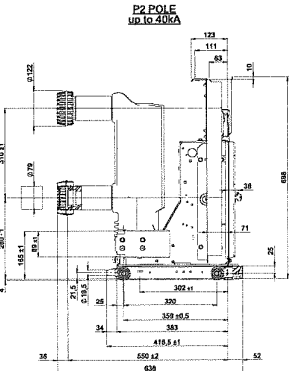
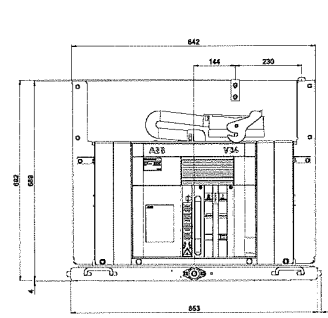
VD4/P	
TN	7415
Ur	12 kV
	17.5 kV
Ir	2000 A
Isc	40 kA



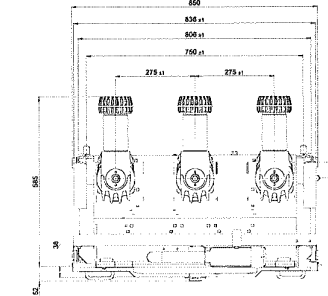
Type	Un	In	Isc	Pole	O.M.	Enclosure	Cubide
VD4/P p.210	12-17.5kV	1600A-2000A	20-25-31.5kA				UniGear UniGear ZS1
	12-17.5kV	2000A	40kA	P2	EL	CBF2-CBF2 PowerBloc-PowerCube PB2	UniGear UniGear ZS1
VD4/P 12/**/**/G p.210	12kV	1600A-2000A	20-25-31.5kA				UniGear UniGear ZS1
VD4/P XX.XX.XX.SA p.210	12-17.5kV	1600A 2000A	20-25kA 20-25-31.5kA	P2	EL	PowerCube PB2	UniGear
VD4/P p.210	12-17.5kV	1600A-2000A 2000A	20-25-31.5kA 40kA				
VD4/P 12/**/**/G p.210	12kV	1600A-2000A	20-25-31.5kA	PT2	EL	PowerCube PB2	UniGear

Withdrawable circuit breakers for UniGear ZS1 switchgear

VD4/P	
TN	7416
Ur	12 kV
	17.5 kV
Ir	1600 A
	2000 A
Isc	20 kA
	31.5 kA



VD4/P	
TN	7416
Ur	12 kV
	17.5 kV
Ir	2000 A
Isc	40 kA



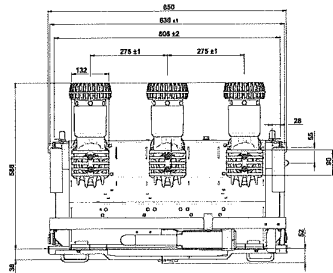
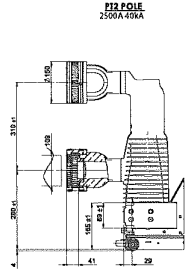
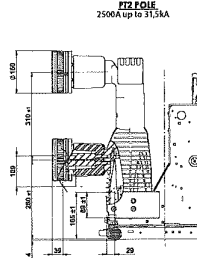
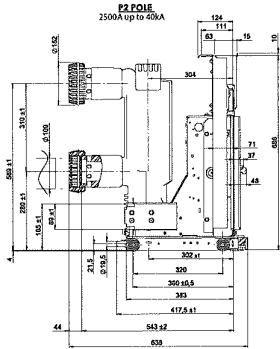
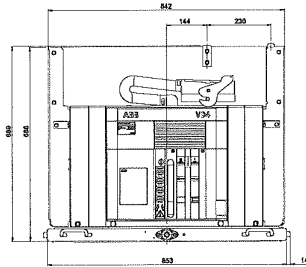
Type	Un	In	Isc	Pole	O.M.	Enclosure	Cubide
VD4/P p.275	12-17.5kV	1600A-2000A	20-25-31.5kA				PowerBloc CBF2
VD4/P 12/**/**/G p.275	12kV	1600A-2000A	20-25-31.5kA	p2	E		
VD4/P p.275	12-17.5kV	2000A	40kA				
VD4/P p.275	12-17.5kV	1600A-2000A	20-25-31.5kA				
VD4/P 12/**/**/G p.275	12kV	1600A-2000A	20-25-31.5kA	P2	E		
VD4/P p.275	12-17.5kV	2000A	40kA				
	12kV	1600A 2000A	20-25kA 20-25-31.5kA				
VD4/P XX.XX.XX.SA p.210	17.5kV	1600A 2000A	20-25kA 20-25-31.5kA	PT2	E		

На основе чл.36а
ал.3 от ЗОП

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Withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube PB3 modules

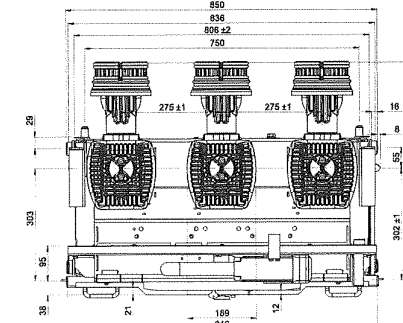
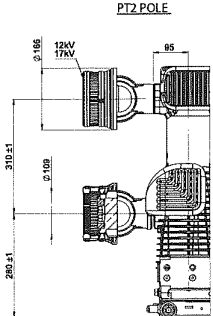
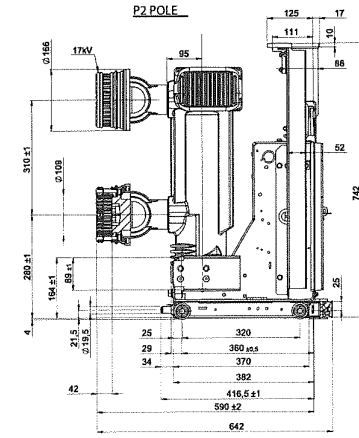
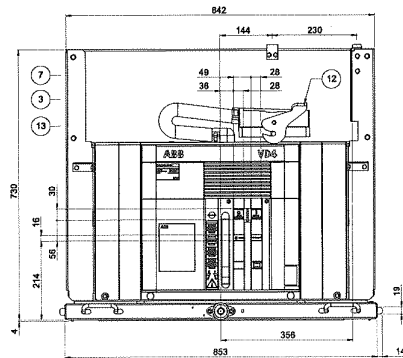
VD4/P	
TN	7417
Ur	12 kV
	17.5 kV
Ir	2500 A
	20 kA
ISC	25 kA
	31.5 kA
	40 kA



Type	Un	In	Isc	Pole	O.M.	Enclosure	Cubide
VD4/P p.275	12-17.5kV	2500A	20-25-31.5-40kA			PowerBloc CBF3	
VD4/P 12/**/**/G p.275	12kV	2500A	20-25-31.5kA	P2	EL	PowerCube	UniGear ZS1 UniSafe
VD4/P XX.XX.XX.SA p.210	12-17.5kV	2500A	40kA			PowerCube	
VD4/P p.275	12-17.5kV	2500A	20-25-31.5kA				
VD4/P 12/**/**/G p.275	12kV	2500A	20-25-31.5kA	P2	EL	PowerCube	UniGear ZS1 UniSafe
VD4/P p.275	12-17.5kV	2500A	40kA				

Withdrawable circuit breakers for PowerCube PB3 modules

VD4/W	
TN	1VCD000152
Ur	12 kV
	17.5 kV
Ir	3150 A (*)
	20 kA
ISC	25 kA
	31.5 kA
	40 kA



C.B. type	Pole	Ur	Ir	Isc
VD4/W p.275 P2	12-17kV	3150A	4000A ^(*)	20-25-31.5-40kA
VD4/W p.275 PT2	12-17kV	3150A	4000A ^(*)	20-25-31.5-40kA

На основе чл.36а ал.3 от ЗОП

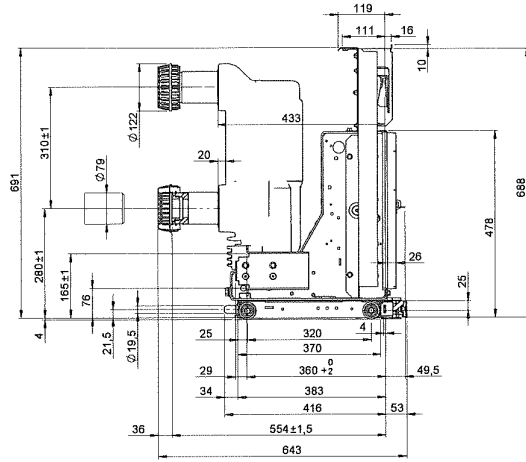
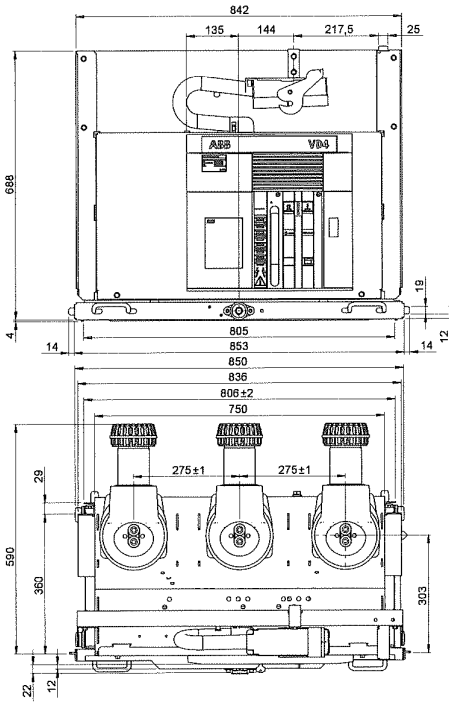
(*) 4000 A with forced ventilation.

000142

Overall dimensions

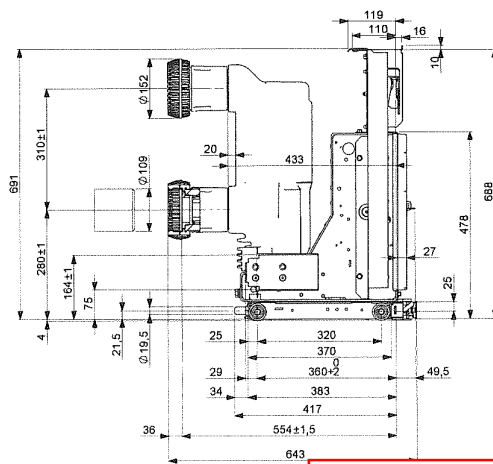
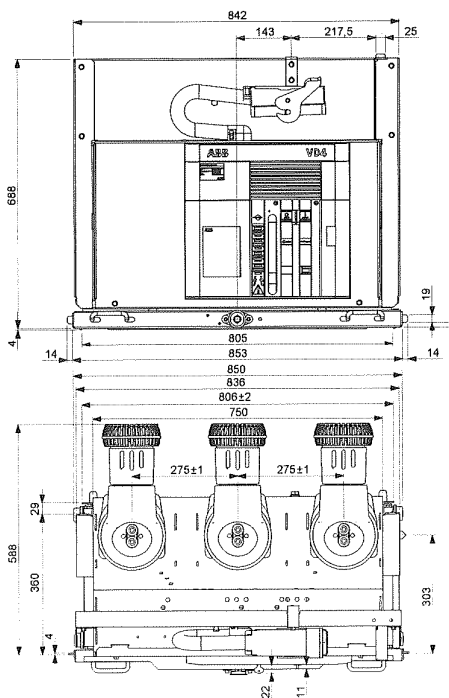
Withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube PB3 modules

VD4/P	
TN	1VCD003445
Ur	12 kV
	17.5 kV
Ir	1600 A
	2000 A
Isc	50 kA



Withdrawable circuit breakers for UniGear ZS1 switchgear

VD4/P	
TN	1VCD003446
Ur	12 kV
	17.5 kV
Ir	2500 A
Isc	50 kA

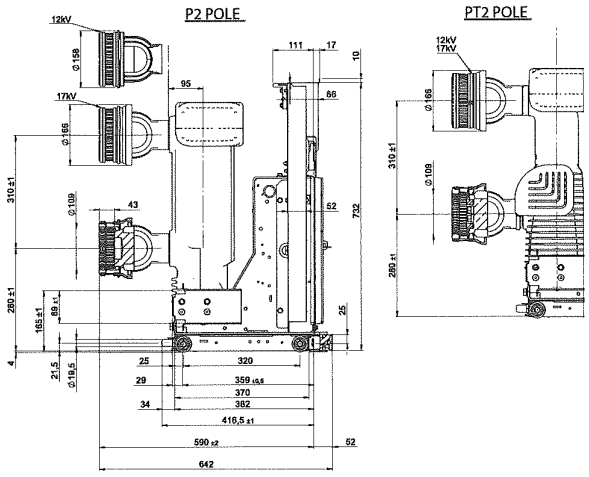
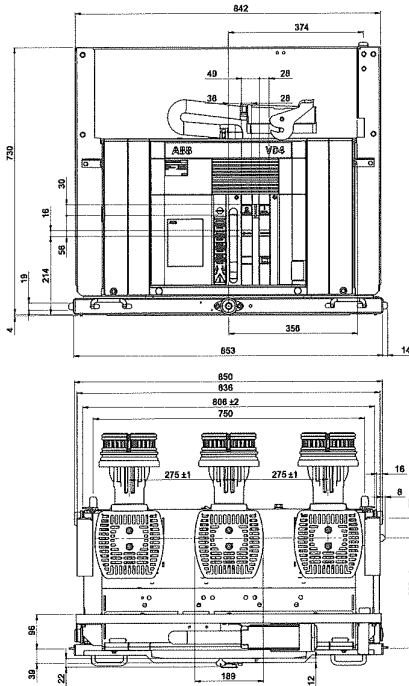


На основе чл.36а
ал.3 от ЗОП

000143

Withdrawable circuit breakers for UniGear ZS1 switchgear

VD4/P	
TN	1VCD000153
Ur	12 kV
	17.5 kV
I _r	3150 A (*)
	20 kA
	25 kA
	31.5 kA
I _{sc}	31.5 kA
	40 kA

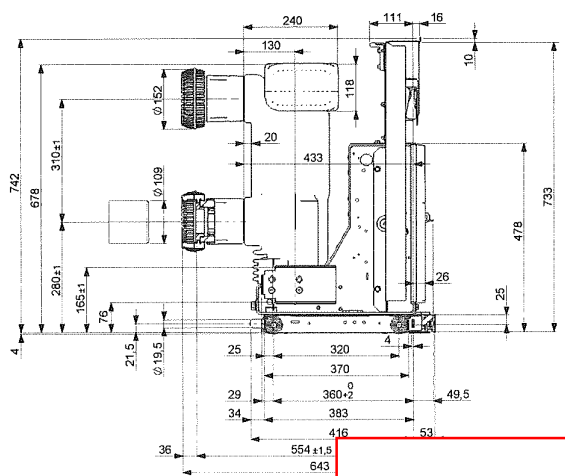
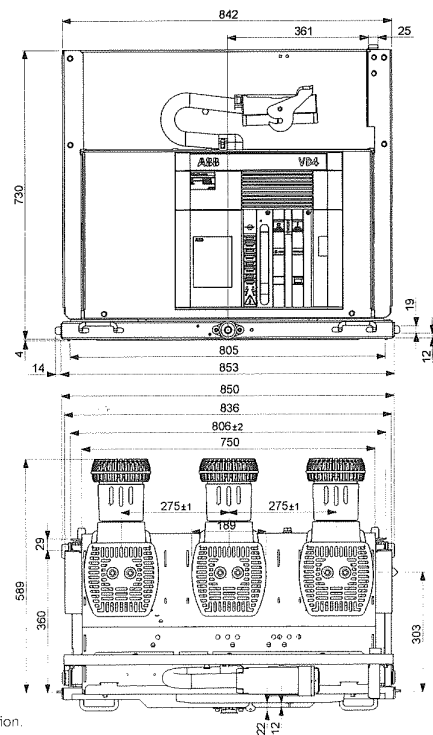


C.B. type	Pole	Ur	I _r	I _{sc}	Oper. mech.	Cubicle
VD4/P p.275	P2	12-17kV	3150A 4000A ^(*)	20-25-32-40kA	EL	UniGear
VD4/P p.275	PT2	12-17kV	3150A 4000A ^(*)	20-25-32-40kA	EL	UniGear

(*) 4000 A with forced ventilation.

Withdrawable circuit breakers for UniGear ZS1 switchgear

VD4/P	
TN	1VCD003447
Ur	12 kV
	17.5 kV
I _r	3150 A (*)
	50 kA



На основе чл.36а
ап.3 от ЗОП

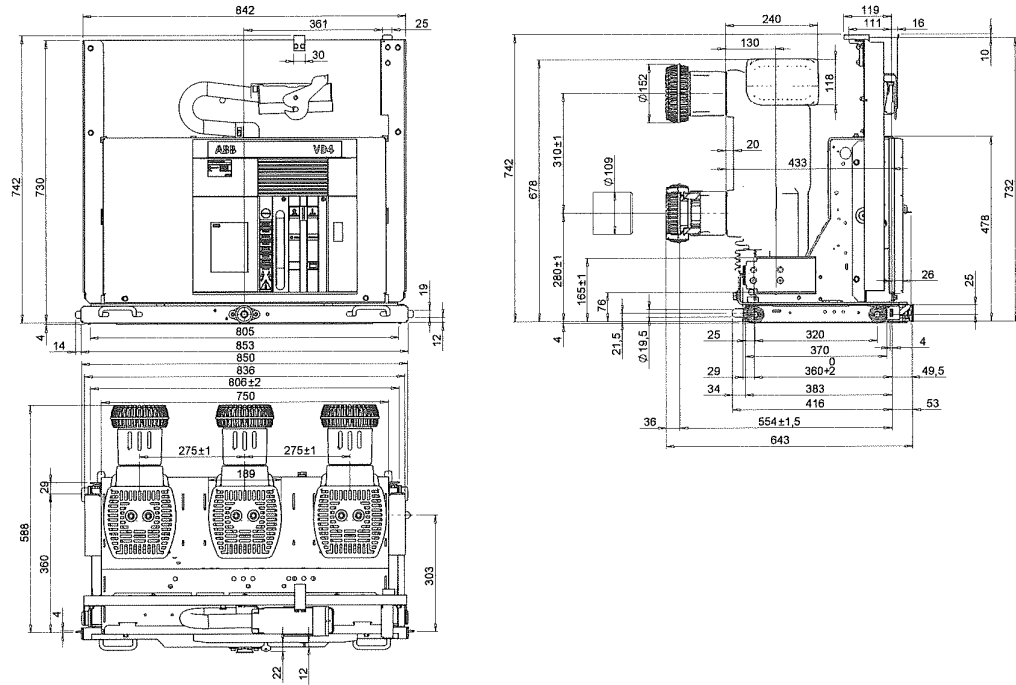
(*) 4000 A with forced ventilation.

1VCD003447

Overall dimensions

Withdrawable circuit breakers for PowerCube PB3 modules

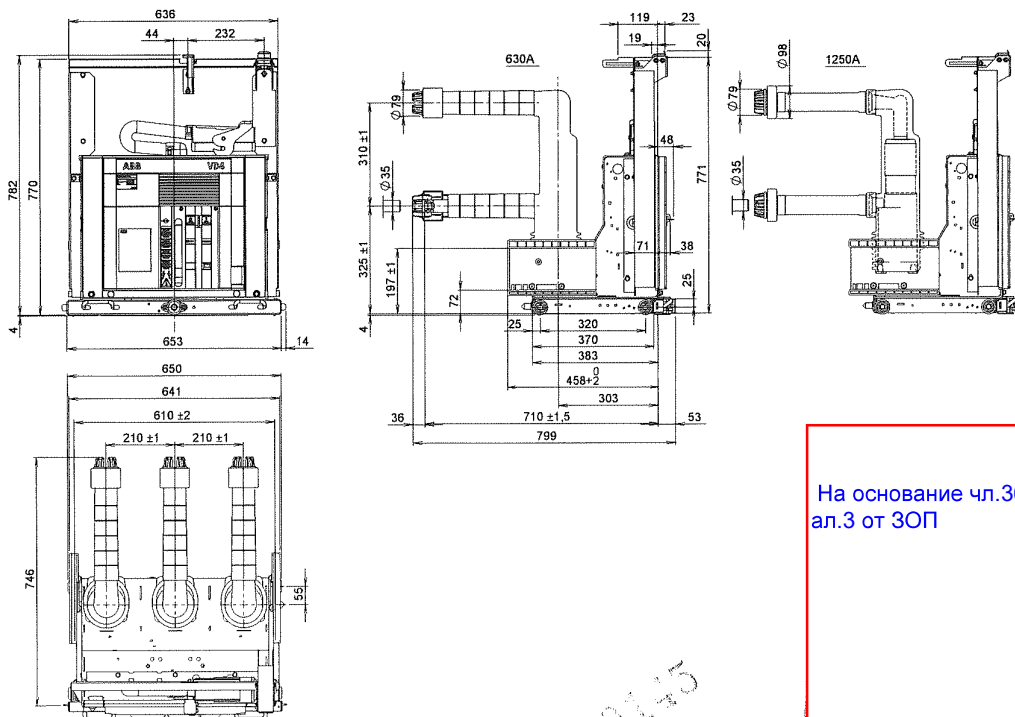
VD4/W	
TN	1VCD003596
Ur	12 kV
	17.5 kV
I _r	3150 A (*)
I _{sc}	50 kA



(*) 4000 A with forced ventilation.

Withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube PB4 modules

VD4/P	
TN	7413
Ur	24 kV
I _r	630 A
	1250 A
I _{sc}	16 kA
	20 kA
	25 kA



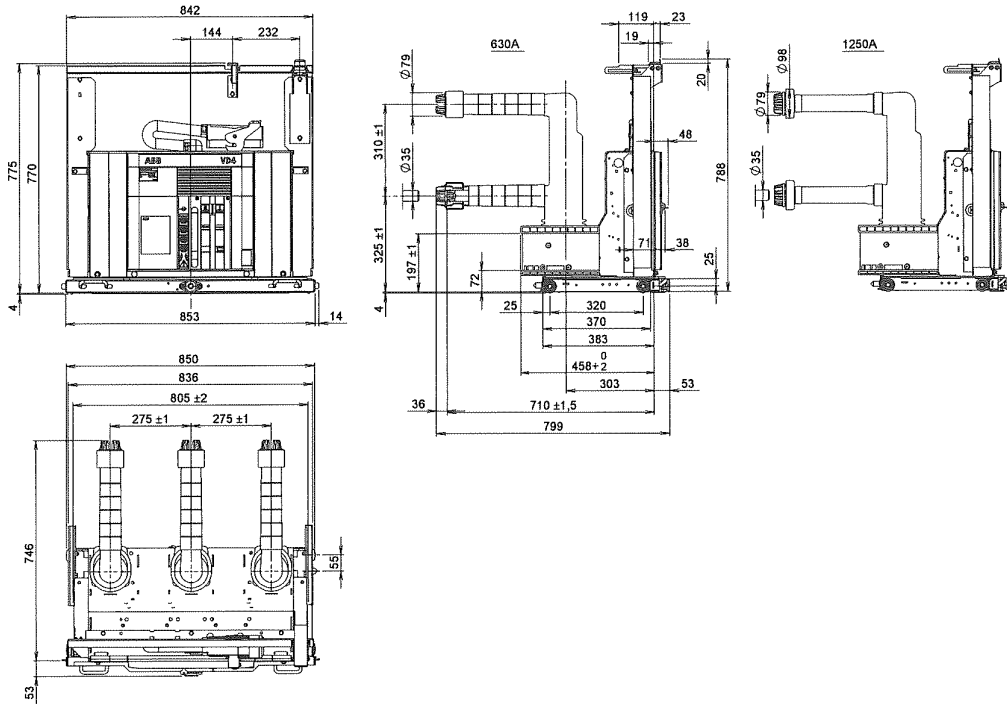
На основании чл.36а
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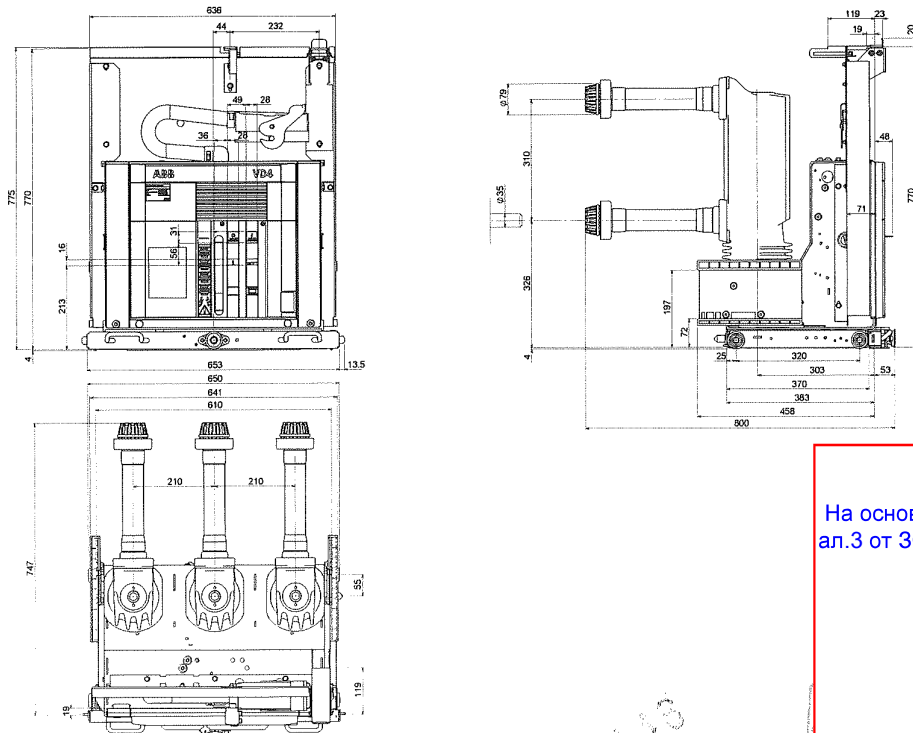
Withdrawable circuit breakers for UniGear ZS1 switchgear

VD4/P	
TN	7414
Ur	24 kV
Ir	630 A
	1250 A
Isc	16 kA
	20 kA
	25 kA



Withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube PB4 modules

VD4/P	
TN	1VCD000173
Ur	24 kV
Ir	1250 A
Isc	31.5 kA



На основании чл.36а
ал.3 от ЗОП

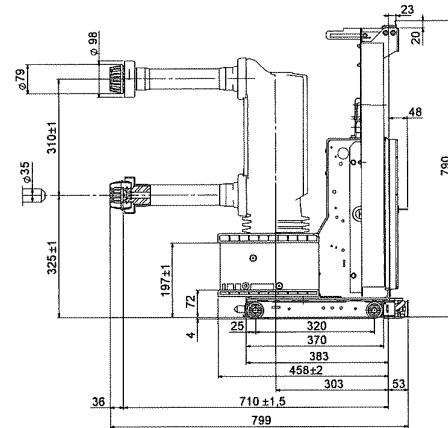
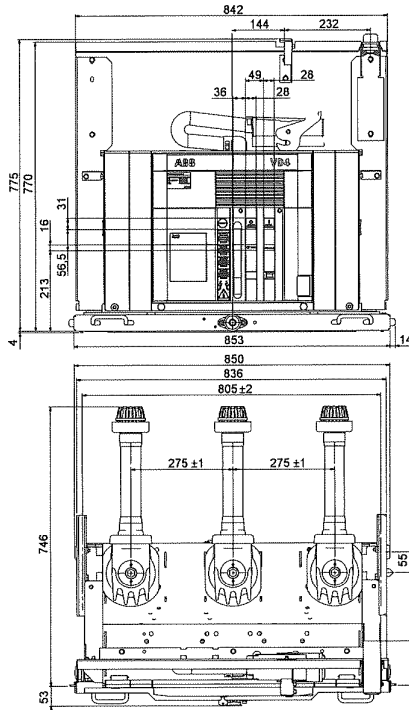
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Overall dimensions

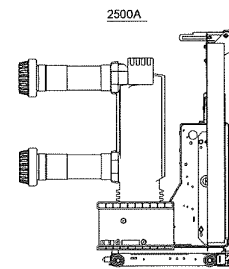
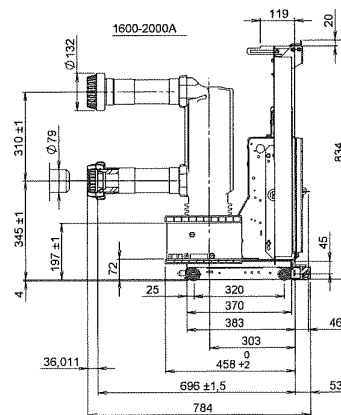
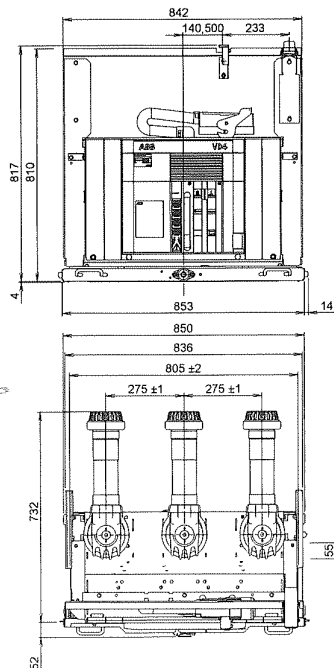
Withdrawable circuit breakers for UniGear ZS1 switchgear

VD4/P	
TN	1VCD000174
Ur	24 kV
Ir	1250 A
Isc	31.5 kA



Withdrawable circuit breakers for UniGear ZS1 switchgear and PowerCube PB5 modules

VD4/P	
TN	7418
Ur	24 kV
	1600 A
Ir	2000 A
	2500 A (1)
	16 kA
	20 kA
Isc	25 kA
	31.5 kA



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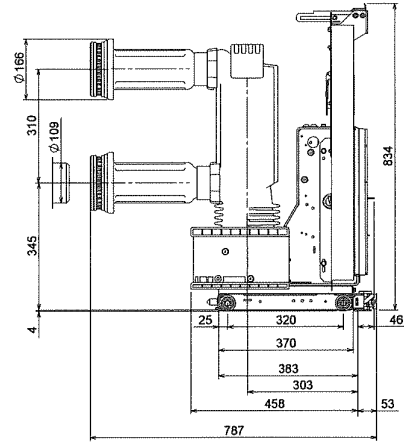
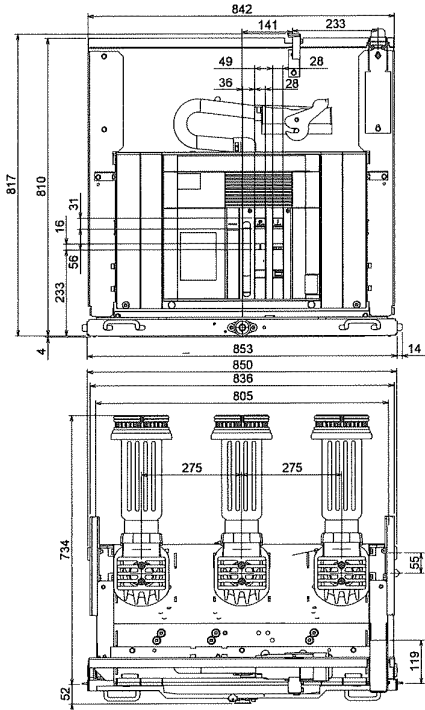
На основании чл.36а
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(1) 2300 A rated uninterrupted current is guaranteed with natural ventilation. 2500 A rated uninterrupted current is guaranteed with forced ventilation.

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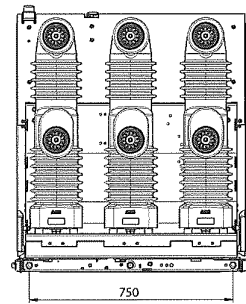
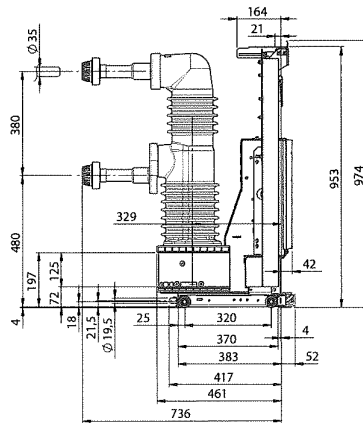
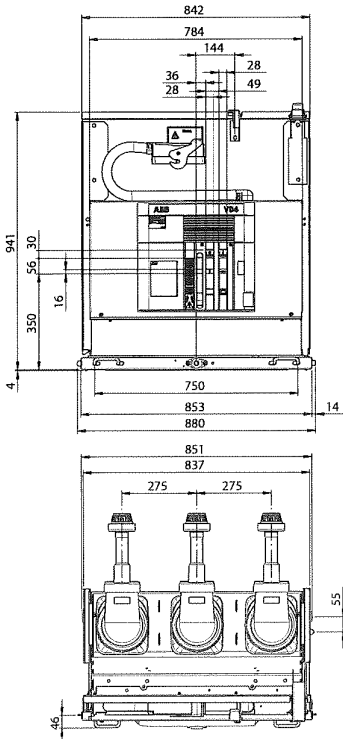
Withdrawable circuit breakers for UniGear ZS1 switchgear

VD4/P	
TN	1VCD000177
Ur	24 kV
	3150 A
Isc	31.5 kA



Withdrawable circuit breakers for UniGear ZS2 switchgear

VD4/W	
TN	1VYN300901-KG
Ur	36 kV
I _r	1250 A
	20 kA
Isc	25 kA
	31.5 kA



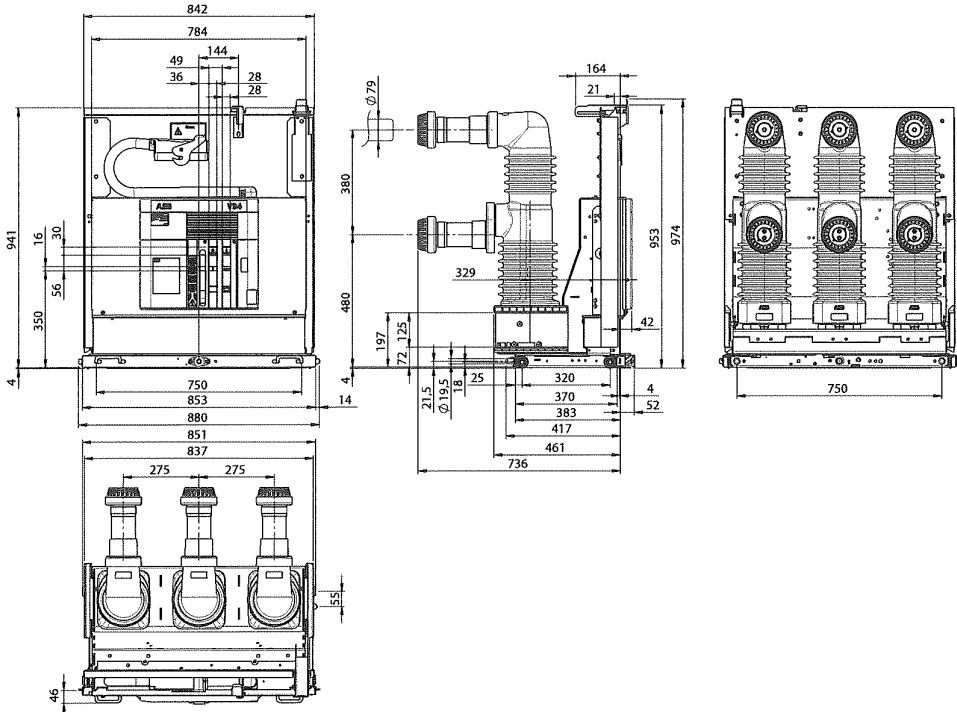
На основе чл.36а
ал.3 от ЗОП

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Overall dimensions

Withdrawable circuit breakers for UniGear ZS2 switchgear

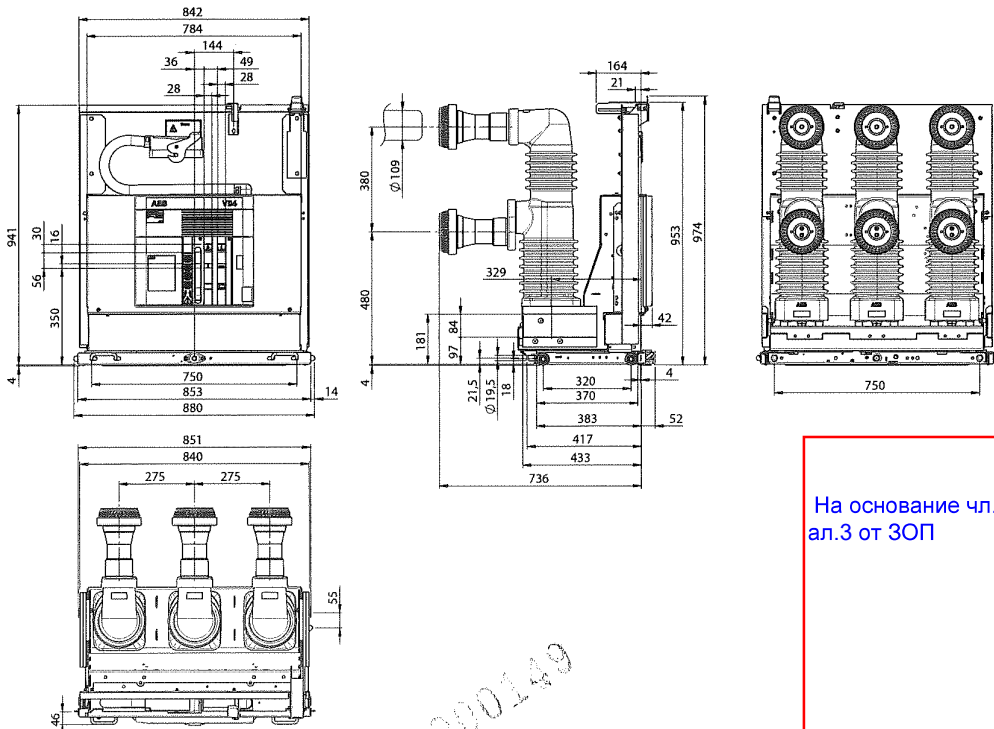
VD4/W	
TN	1VYN300901RA
Ur	36 kV
	1600 A
Ir	2000 A
	2500 A (*)
	20 kA
Isc	25 kA
	31.5 kA



(*) 2300 A rated uninterrupted current is guaranteed with natural ventilation. 2500 A rated uninterrupted current is guaranteed with forced ventilation.

Withdrawable circuit breakers for UniGear ZS2 switchgear

VD4/W	
TN	1VYN300901RB
Ur	36 kV
Ir	2500 A (*)
	20 kA
Isc	25 kA
	31.5 kA



(*) 3150 A rated uninterrupted current is guaranteed with forced ventilation.

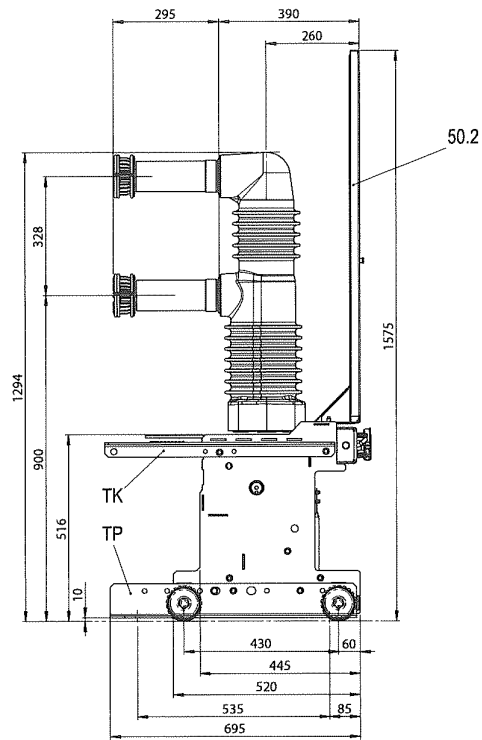
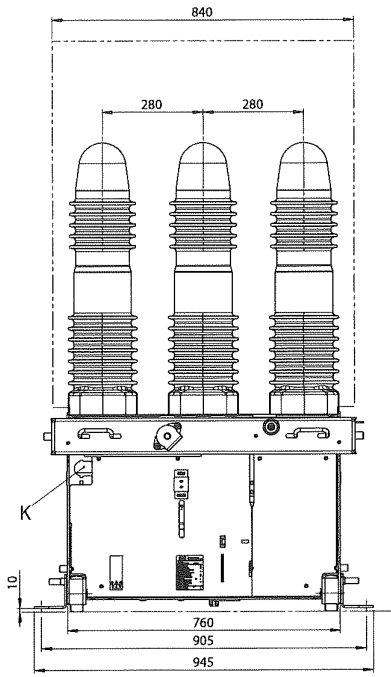
На основе чл.36а ал.3 от ЗОП

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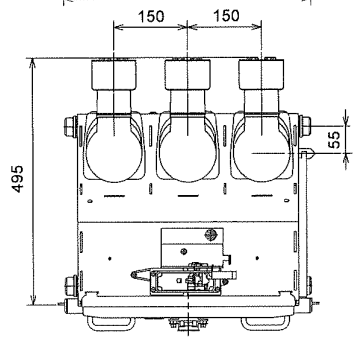
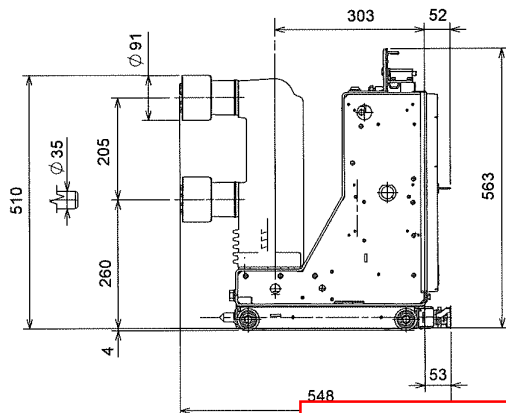
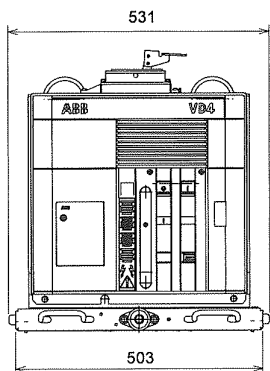
Withdrawable circuit breakers for ZS3.2 switchgear

VD4	
TN	GCEM700198
Ur	36-40.5 kV
Ir	1250 A
	1600 A
	2000 A
	2500 A
	3150 A
Isc	20 kA
	25 kA
	31.5 kA
	40 kA



Withdrawable circuit breakers for ZS8.4 switchgear

VD4/Z8	
TN	1VCD000092
Ur	12 kV
Ir	630 A
Isc	20 kA
	25 kA



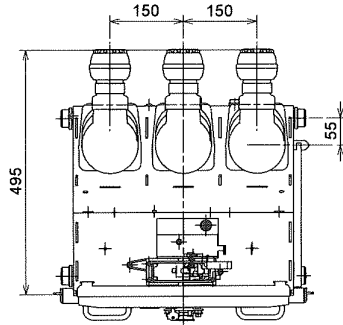
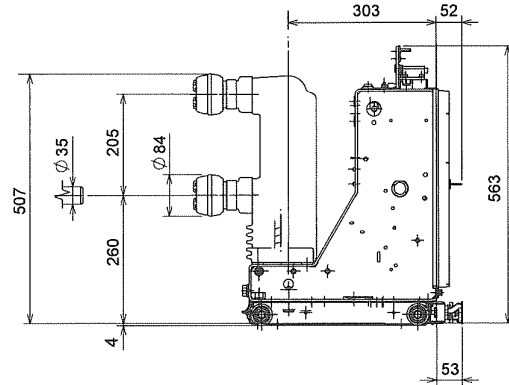
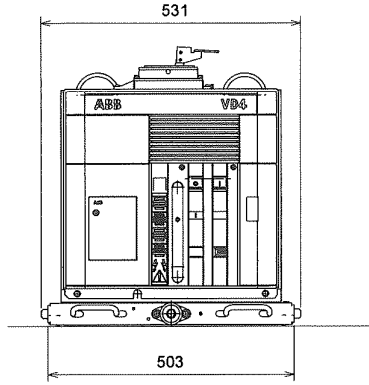
На основании чл.36а
ап.3 от ЗОП

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Overall dimensions

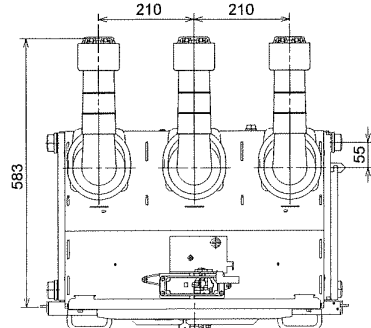
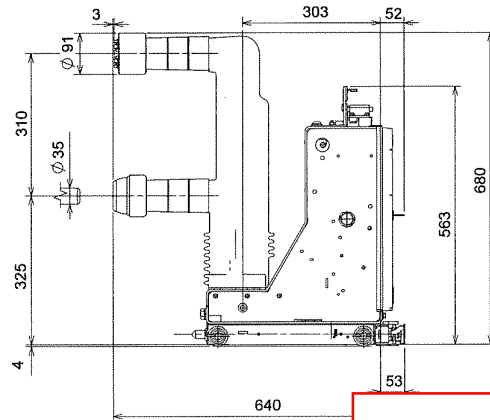
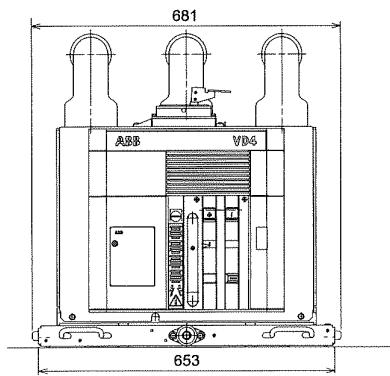
Withdrawable circuit breakers for ZS8.4 switchgear

VD4/Z8	
TN	1VCD000137
Ur	12 kV
I _r	1250 A
I _{sc}	20 kA
	25 kA
TN	1VCD000137
Ur	17.5 kV
I _r	630 A
	1250 A
I _{sc}	20 kA
	25 kA



Withdrawable circuit breakers for ZS8.4 switchgear

VD4/Z8	
TN	1VCD000089
Ur	24 kV
I _r	630 A
	16 kA
I _{sc}	20 kA
	25 kA



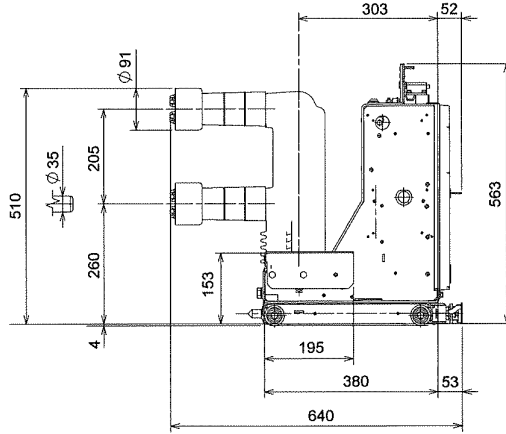
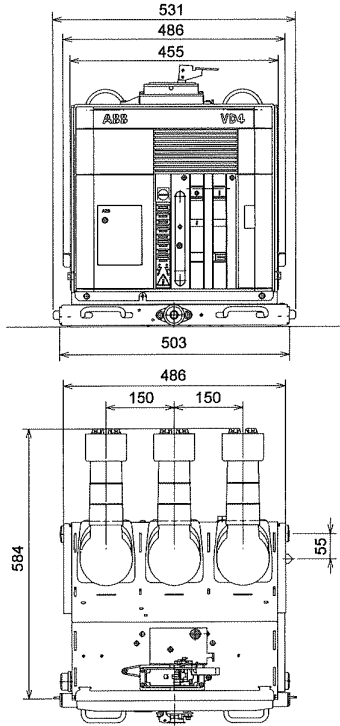
На основании чл.36а
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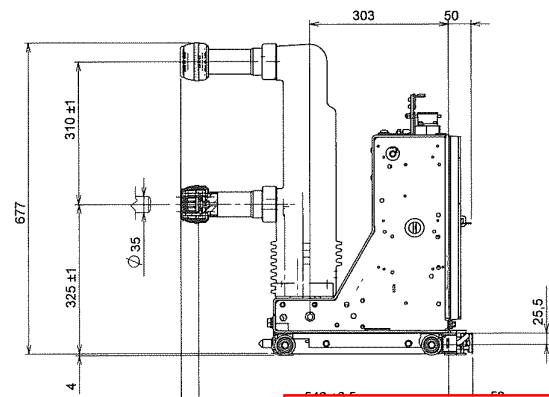
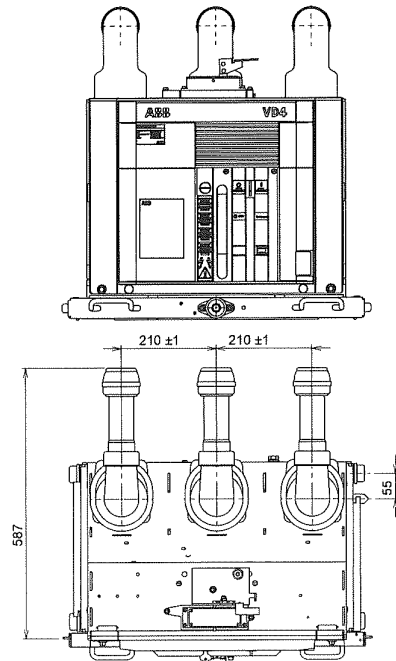
Withdrawable circuit breakers for ZS8.4 switchgear

VD4/ZT8	
TN	1VCD000093
Ur	12 kV
Ir	630 A
Isc	20 kA
	25 kA



Withdrawable circuit breakers for ZS8.4 switchgear

VD4/Z8	
TN	1VCD000138
Ur	24 kV
Ir	1250 A
Isc	16 kA
	20 kA
	25 kA



На основе чл.36а
ал.3 от ЗОП

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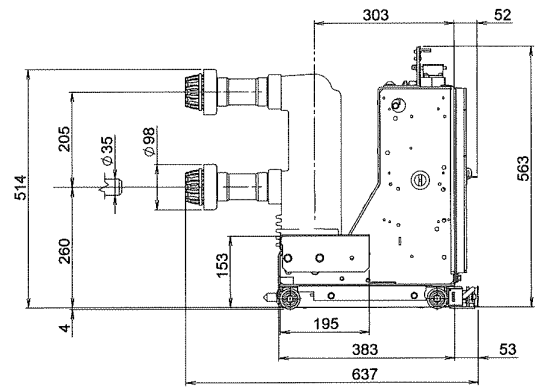
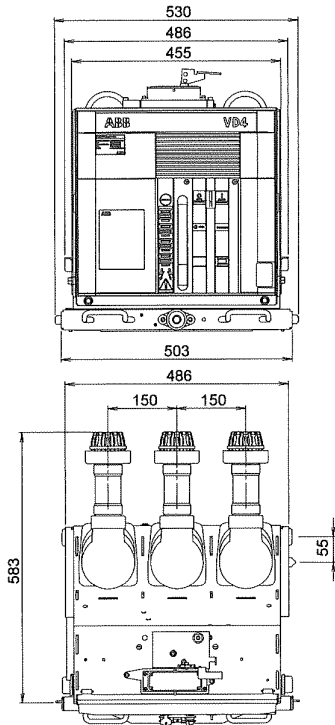
Overall dimensions

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Withdrawable circuit breakers for ZS8.4 switchgear

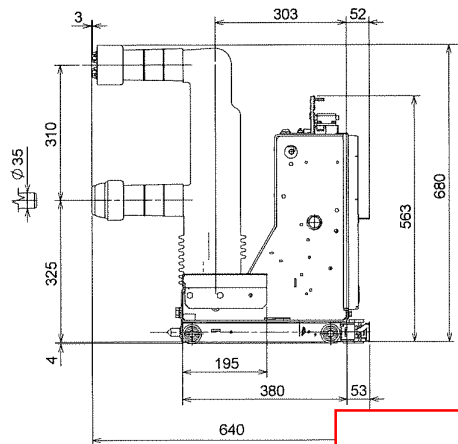
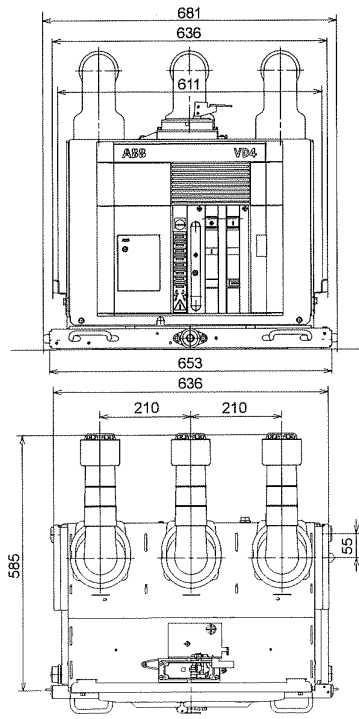
VD4/ZT8	
TN	1VCD000134
Ur	12 kV
Ir	1250 A
Isc	20 kA
	25 kA

VD4/ZT8	
TN	1VCD000134
Ur	17.5 kV
Ir	630 A
	1250 A
Isc	20 kA
	25 kA



Withdrawable circuit breakers for ZS8.4 switchgear

VD4/ZT8	
TN	1VCD000090
Ur	24 kV
Ir	630 A
	16 kA
Isc	20 kA
	25 kA



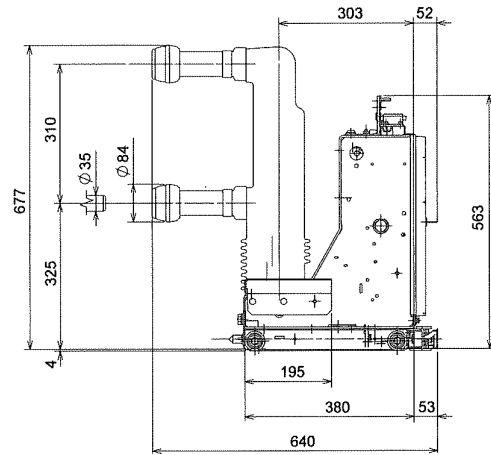
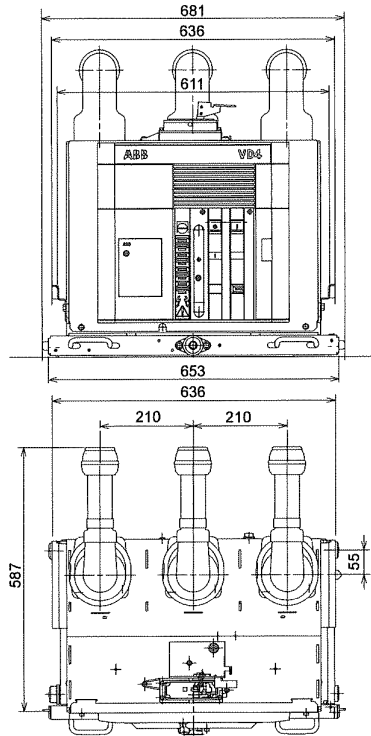
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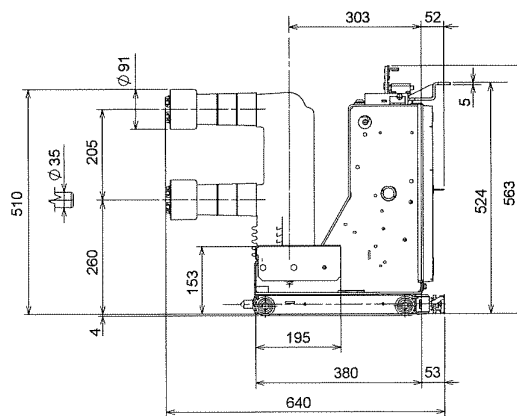
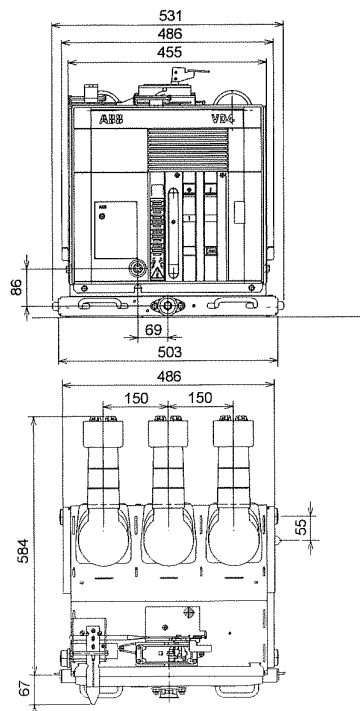
Withdrawable circuit breakers for ZS8.4 switchgear

VD4/ZT8	
TN	1VCD000136
Ur	24 kV
Ir	1250 A
	16 kA
Isc	20 kA
	25 kA



Withdrawable circuit breakers for ZS8.4 switchgear

VD4/ZS8	
TN	1VCD000091
Ur	12 kV
Ir	630 A
	20 kA
Isc	25 kA



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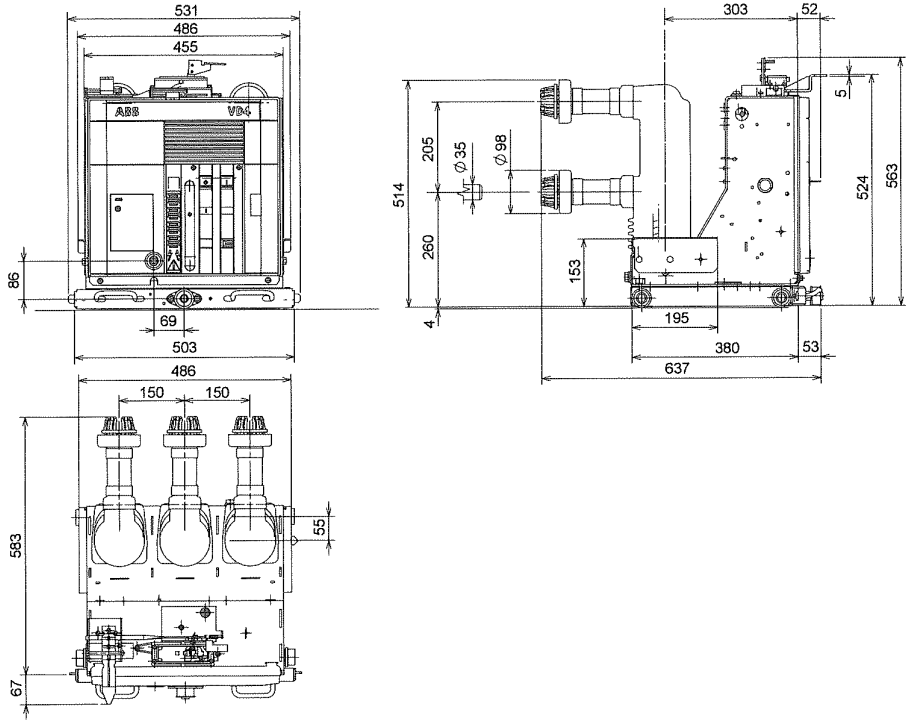
На основании чл.36а
ал.3 от ЗОП

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Overall dimensions

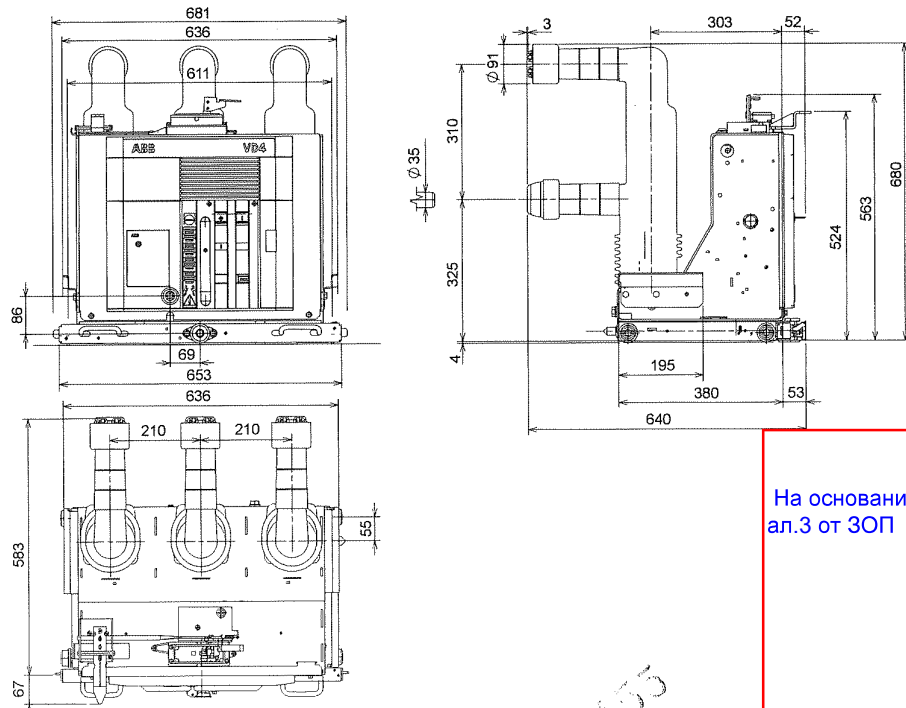
Withdrawable circuit breakers for ZS8.4 switchgear

VD4/ZS8	
TN	1VCD000133
Ur	12 kV
Ir	1250 A
Isc	20 kA
	25 kA



Withdrawable circuit breakers for ZS8.4 switchgear

VD4/ZS8	
TN	1VCD000088
Ur	24 kV
Ir	630 A
Isc	16 kA
	20 kA
	25 kA

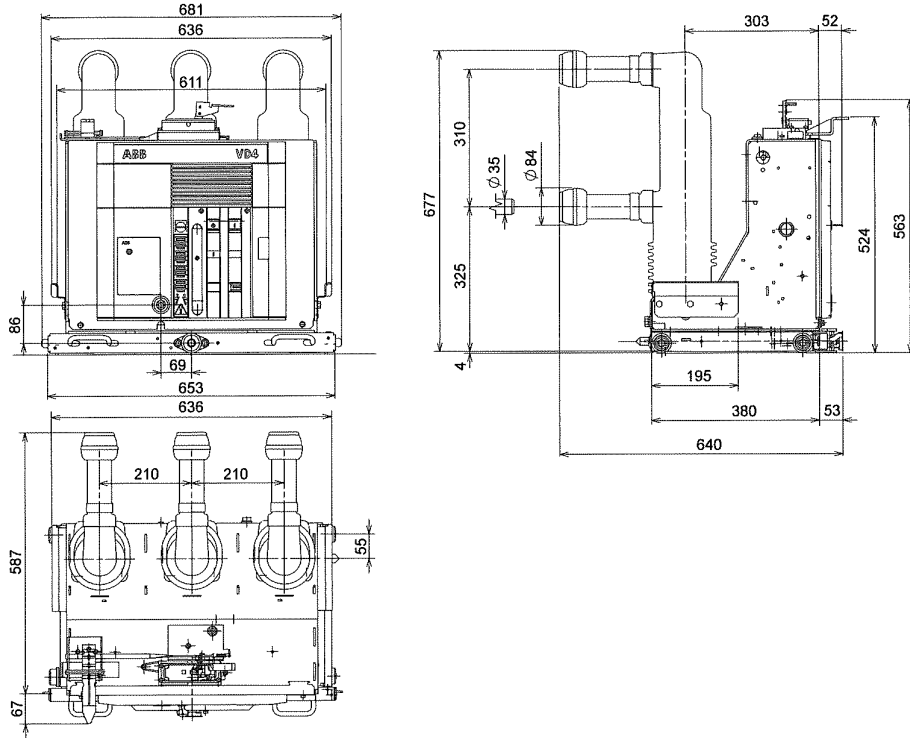


На основании чл.36а
 ал.3 от ЗОП

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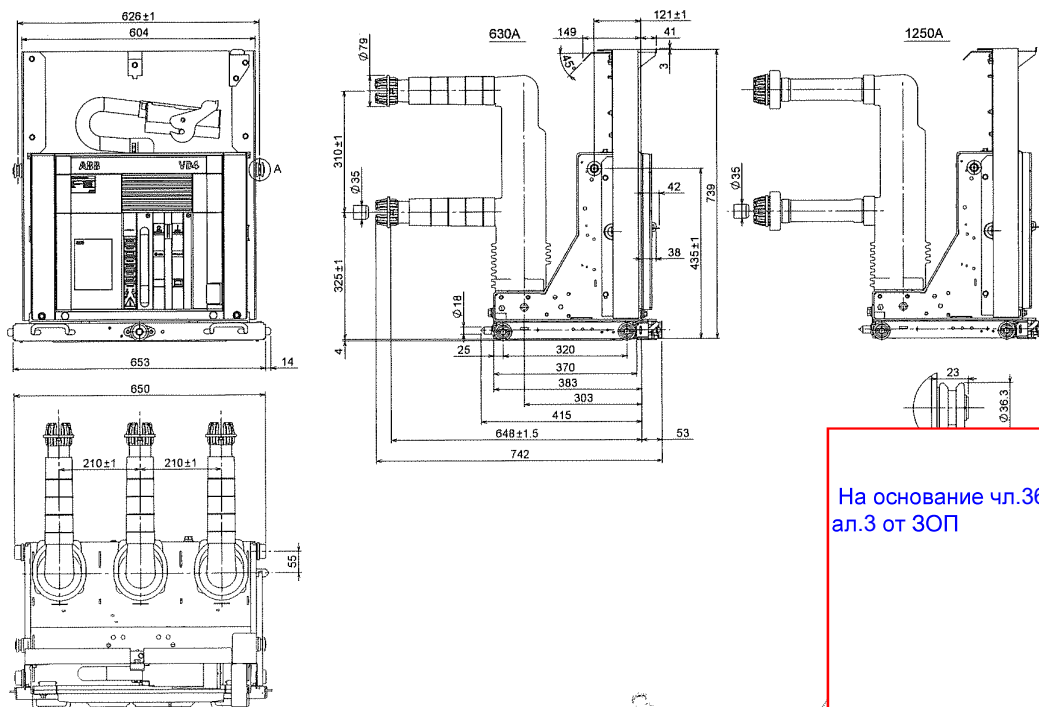
Withdrawable circuit breakers for ZS8.4 switchgear

VD4/ZS8	
TN	1VCD000135
Ur	24 kV
Ir	1250 A
	16 kA
Isc	20 kA
	25 kA



Withdrawable circuit breakers for UniSec (WBC and WBS) switchgear

VD4/Sec	
TN	1VCD000190
Ur	24 kV
Ir	630 A
	1250 A
Isc	16 kA
	20 kA



На основании чл.36а
ал.3 от ЗОП

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Electric circuit diagram

Operating state shown

The diagrams are shown the following conditions:

- Circuit breaker open and connected (only withdrawable circuit breaker)
- Circuits de-energized
- Closing springs discharged

Graphical symbols for electric diagrams

	Thermal effect		Exposed conductive part, frame		Capacitor (general symbol)		Passing make contact closing momentarily during release
	Electromagnetic effect		Conductors in shielded cable (e.g. two conductors)		Motor (general symbol)		Closing position contact (limit switch)
	Timing		Connection of conductors		Rectifier with two half-waves (bridge)		Opening position contact (limit switch)
	Pushbutton control		Terminal or clamp		Make contact		Power circuit breaker with automatic opening
	Key control		Socket and plug (female and male)		Break contact		Control coil (general symbol)
	Earth (general symbol)		Resistor (general symbol)		Change-over break before make contact		Lamp (general symbol)

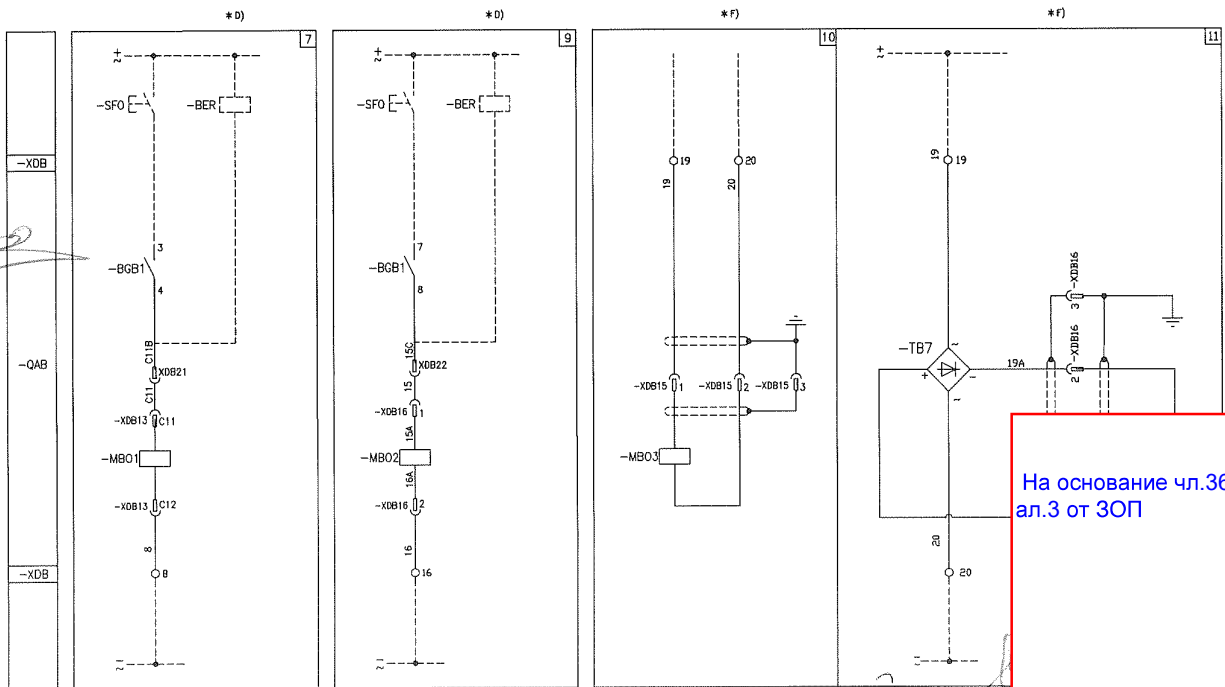
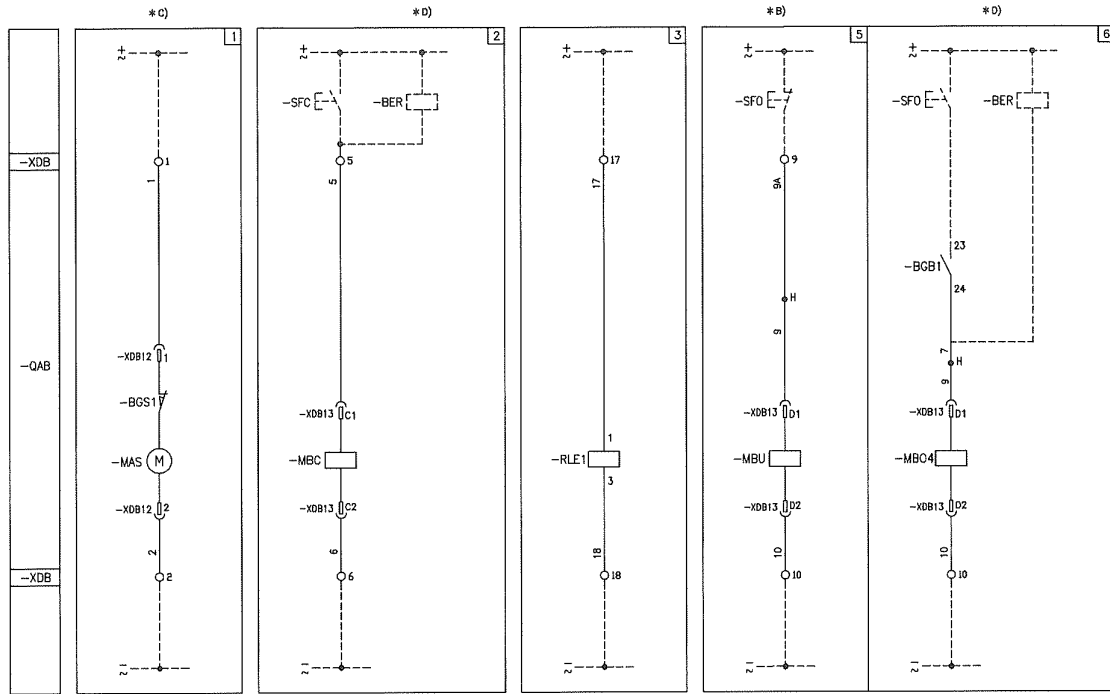
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На основании чл.36а
ал.3 от ЗОП

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Electric circuit diagram of 12 .. 36 kV fixed circuit breakers 1VCD400151

The electric circuit diagram in this section concerns 12 .. 36 kV fixed circuit breakers.

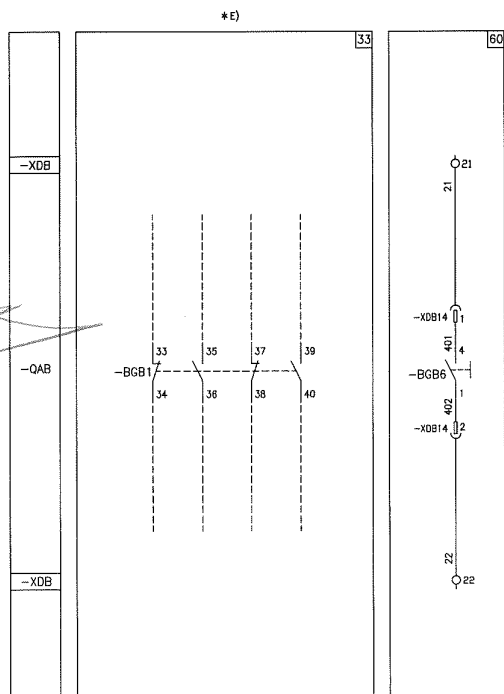
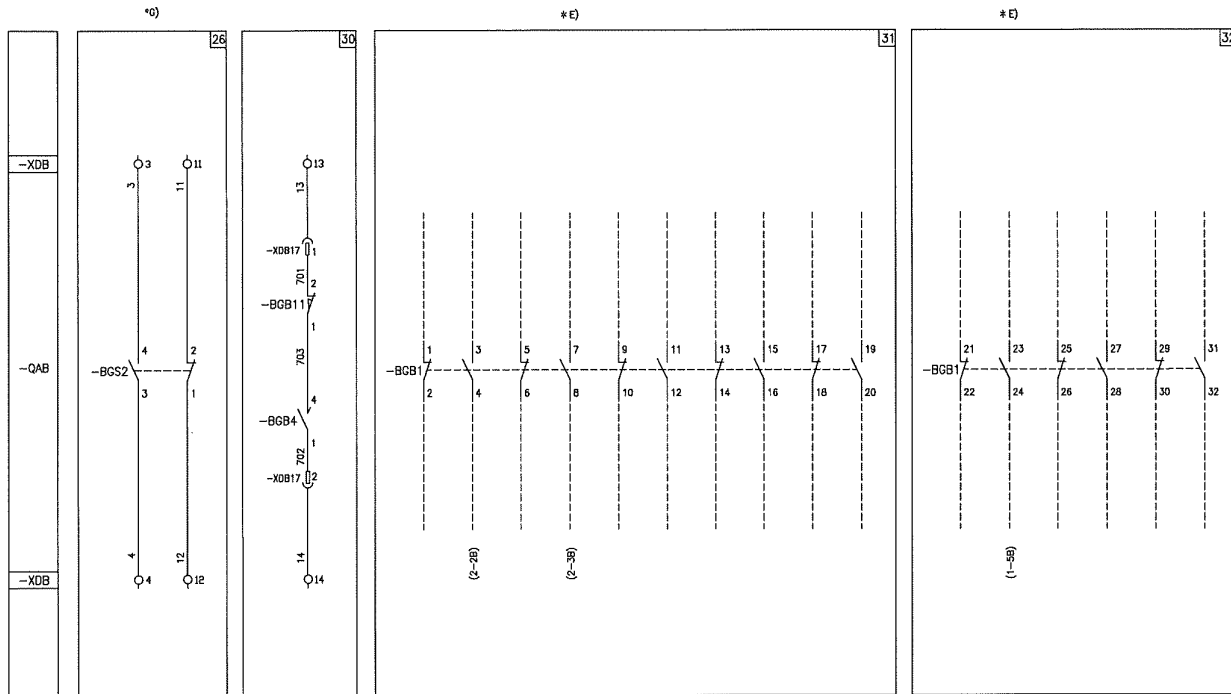


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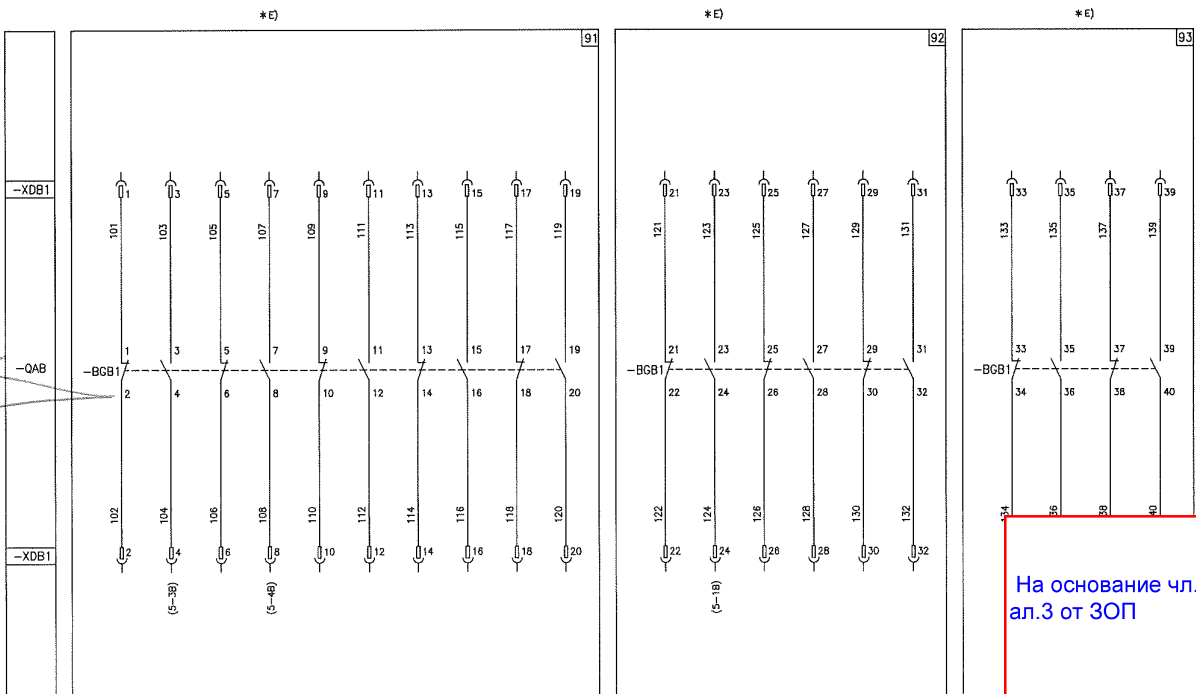
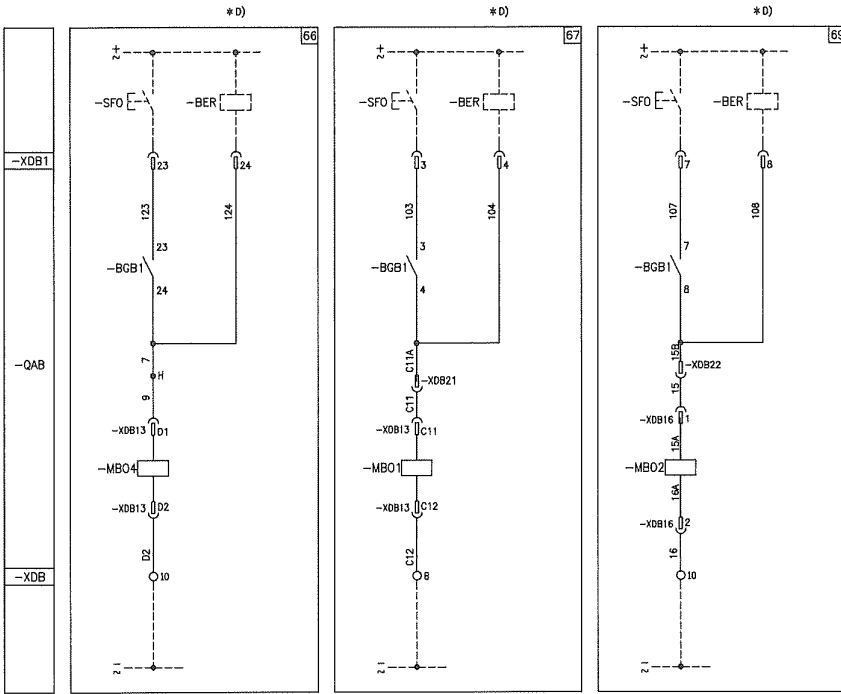
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Electric circuit diagram



На основании чл.36а
ал.3 от ЗОП



На основании чл.36а
ал.3 от ЗОП

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Electric circuit diagram

Key	
<input type="checkbox"/>	= Figure number of the diagram.
*	= See note indicated by the letter.
-BER	= SOR Test Unit device for monitoring continuity of shunt opening and closing release winding (see note D)
-BGB1	= Auxiliary contacts of circuit breaker.
-BGB4	= Auxiliary let-through contact of circuit breaker with momentary closing during circuit breaker opening.
-BGB6	= Contact for electrical signaling of undervoltage release de-energized.
-BGB11	= Contact for cutting off electrical signal -BGB4 if opening operation is performed in the manual mode.
-BGS1	= Limit contact of spring loading motor.
-BGS2	= Contact for signaling closing springs loaded-discharged.
-MAS	= Motor for loading closing springs (see note C).
-MBC	= Shunt closing release (see note D).
-MBO1	= First shunt opening release (see note D).
-MBO2	= Second shunt opening release (see note D).
-MBO3	= Opening solenoid for release outside circuit breaker (see note F).
-MBO4	= Third shunt opening release (see note D).
-MBU	= Under-voltage release (see note B).
-QAB	= Circuit breaker applications.
-RLE1	= Locking magnet. Mechanically inhibits circuit breaker closing if de-energized. (Consumption can be limited by connecting a delayed operation enabling pushbutton in series).
-SFC	= Pushbutton or contact for closing circuit breaker.
-SFO	= Pushbutton or contact for opening circuit breaker.
-TB7	= Rectifier for release -MBO3.
-XDB	= Terminal box of circuit breaker circuits.
-XDB1	= Connector of circuit breaker circuits.
-XDB10,	= Connectors of applications.
...17	

Description of the figures	
Fig. 1	= Circuit of motor for loading closing springs (see note C).
Fig. 2	= Shunt closing release (anti-pumping is achieved mechanically), (see note D).
Fig. 3	= Locking magnet. Mechanically inhibits circuit breaker closing if de-energized. Consumption can be limited by connecting a delayed operation enabling pushbutton in series.
Fig. 5	= Instantaneous undervoltage release (see note B).
Fig. 6, 66	= Circuit of third shunt opening release with possibility of continuous control of winding (see note D).
Fig. 7, 67	= Circuit of first shunt opening release with possibility of continuous control of winding (see note D).
Fig. 9, 69	= Circuit of second shunt opening release with possibility of continuous control of winding (see note D).
Fig. 10	= Opening solenoid for release outside circuit breaker.
Fig. 11	= Opening solenoid for release outside circuit breaker with AC supply.
Fig. 26	= Electrical signaling of closing springs loaded and discharged.
Fig. 30	= Auxiliary let-through contact of circuit breaker with momentary closing during circuit breaker opening.
Fig. 31, 91	= Available auxiliary contacts of circuit breaker (see note E).
Fig. 32, 92	= Available auxiliary contacts of circuit breaker (see note E).
Fig. 33, 93	= Available auxiliary contacts of circuit breaker (see note E).
Fig. 60	= Contact for electrical signaling of undervoltage release de-energized.

На основании чл.36а
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000101

Incompatibility

The circuits indicated in the following figures cannot be supplied at the same time in the same circuit breaker:

5-6-66	7-67	9-69	31-91
32-92	33-93	10-11	

Notes

- A) The circuit breaker is equipped solely with the applications specified in the order confirmation. Consult this catalog for information about how to make out an order.
- B) The undervoltage release can be supplied for energizing with voltage derived from the supply side of the circuit breaker or from an independent source. Circuit breaker closing is only allowed when the release is energized (closing lock is obtained mechanically). If there is the same power supply for the shunt closing and under-voltage releases and the circuit breaker must close automatically when auxiliary voltage returns, there must be a 50 ms delay between the under-voltage release's enabling instant and energizing of the shunt closing release.
Incompatible with -MBO4.
- C) Check power of auxiliary circuit to find out whether several motors for loading the closing springs can be started at the same time. To prevent excessive power draw, the springs must be loaded by hand before the auxiliary circuit is powered.
- D) The circuit for monitoring the continuity of the release winding must only be used for that purpose. The SOR Test Unit can be used for checking the continuity of the various different releases.
-MBO4 incompatible with -MBU.
-MBO4 not available for VD4 50 kA.
- E) When fig. 6 is required, contact -BGB1 (23-24) of fig.32 is not available.
When fig. 7 is required, contact -BGB1 (3-4) of fig. 31 is not available.
When fig. 9 is required, contact -BGB1 (7-8) of fig. 31 is not available.
When fig. 32 is required, it is obligatory to supply the auxiliary contacts of fig. 31.
When fig. 33 is required, it is obligatory to supply the auxiliary contacts of fig. 32.
When fig. 66 is required, contact -BGB1 (23-24) of fig. 92 is not available.
When fig. 67 is required, contact -BGB1 (3-4) of fig. 91 is not available.
When fig. 69 is required, contact -BGB1 (7-8) of fig. 91 is not available.
When fig. 92 is required, it is obligatory to supply the auxiliary contacts of fig. 91.
When fig. 93 is required, it is obligatory to supply the auxiliary contacts of fig. 92.
Figs. 33 and 93 are not available for VD4 50 kA.
- F) Figs. 10 and 11 are only available for VD4 up to 31.5 kA.
- G) The energizing voltage must be the same for both signals.

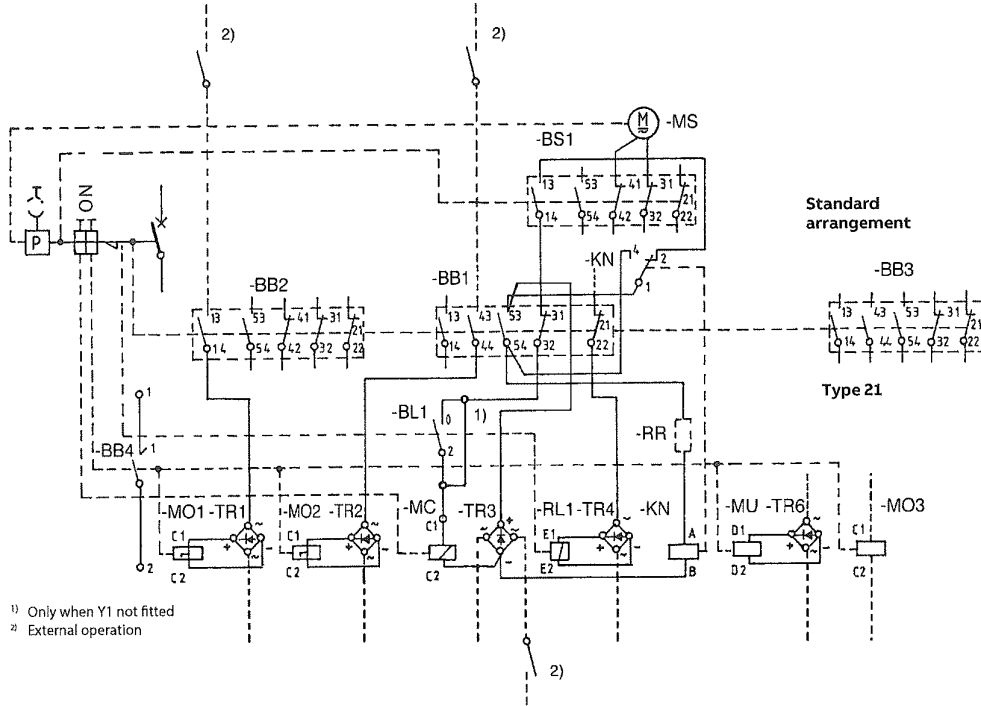
На основании чл.36а
ал.3 от ЗОП

000162

Electric circuit diagram

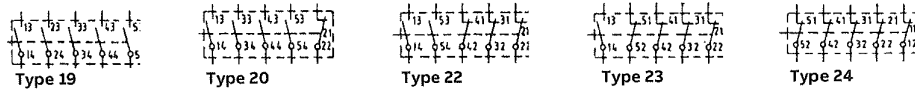
Electric circuit diagram of 36-40.5 kV fixed circuit breakers with Classic operating mechanism GCES700005

The electric circuit diagram in this section concerns 36 - 40.5 kV fixed circuit breakers with Classic operating mechanism.



1) Only when Y1 not fitted
2) External operation

Special arrangement for: -S5:



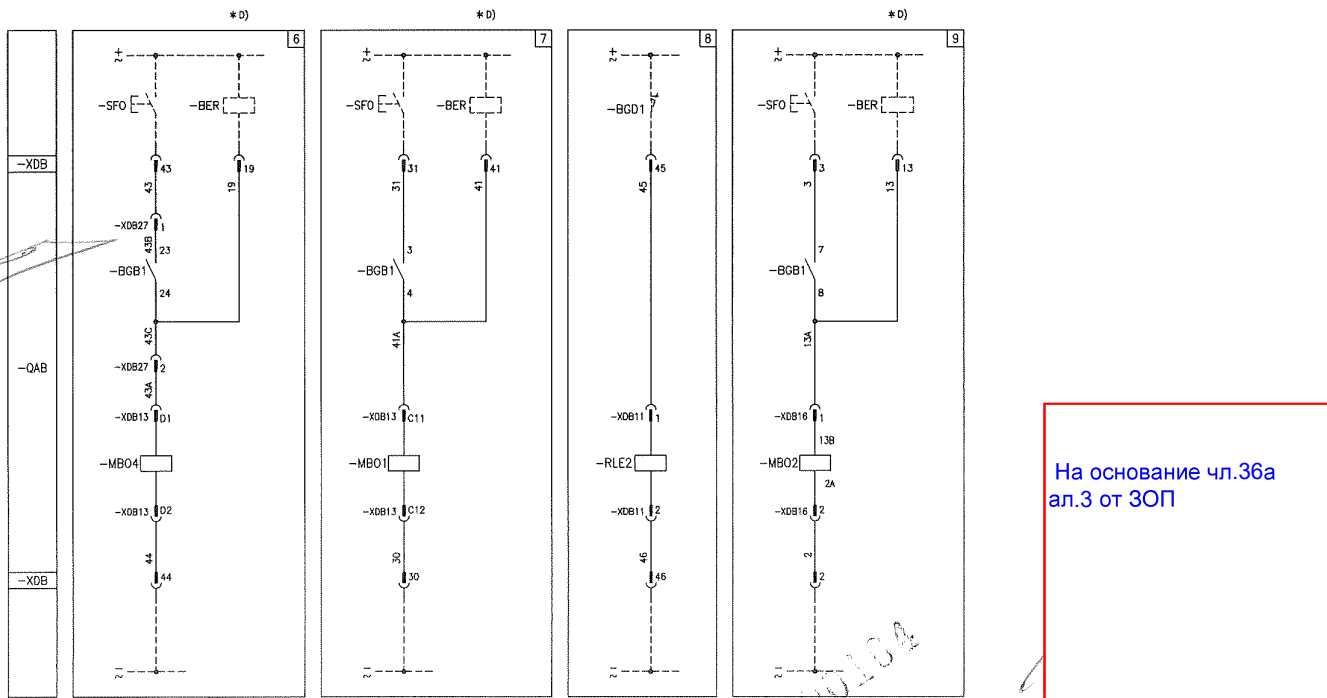
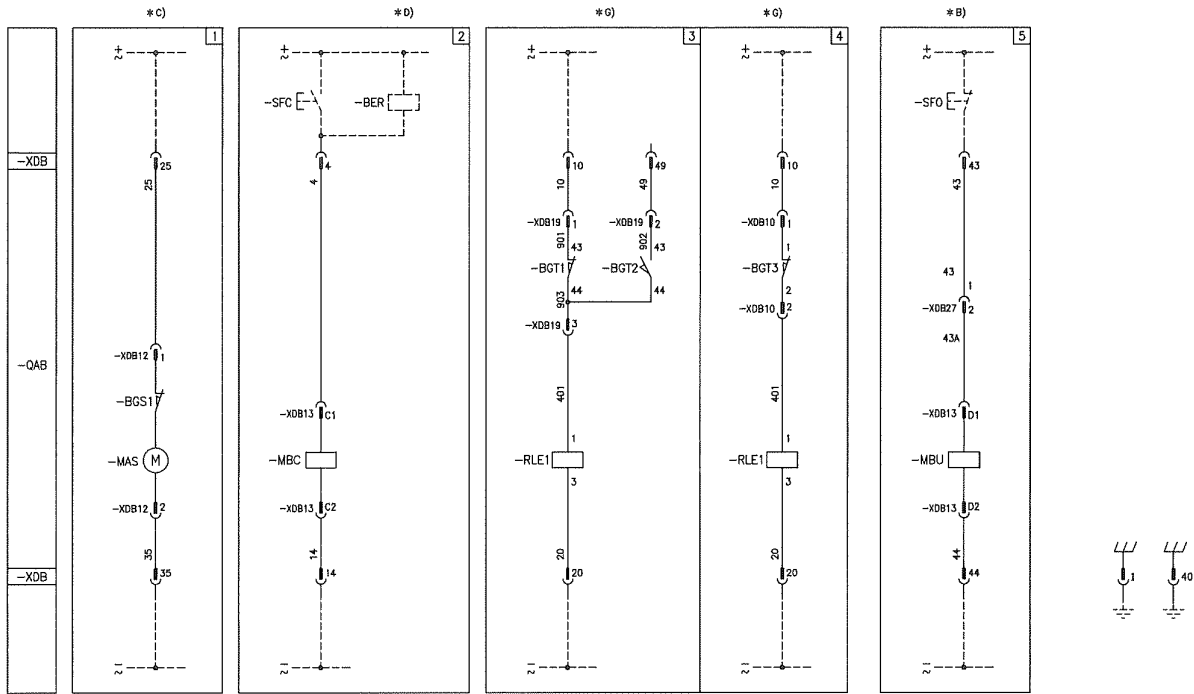
- RL1 (-Y1) Locking magnet
- MO1 (-Y2) First opening release
- MC (-Y3) Closing release
- MU (-Y4) Undervoltage release
- MO3 (-Y7) Overcurrent relay indirect release
- MO2 (-Y9) Second opening release
- MS (-M0) Spring loading motor
- KN (-K0) Antipumping relay
- RR (-R0) Standard resistor
- BS1 (-S1) Auxiliary contacts of operating mechanism
- BL1 (-S2) Auxiliary contacts of locking magnet
- BB1 (-S3) Auxiliary contacts on operating shaft
- BB2 (-S4) Auxiliary contacts on operating shaft
- BB3 (-S5) Auxiliary contacts on operating shaft
- BB4 (-S7) Delayed contact (30 ms) tripped indication
- TR4 (-V1) Standard resistor for -RL1 (-Y1)
- TR1 (-V2) Standard resistor for -MO1 (-Y2)
- TR3 (-V3) Standard resistor for -MC (-Y3)
- TR6 (-V4) Standard resistor for -MU (-Y4)
- TR2 (-V9) Standard resistor for -MO2 (-Y9)

На основании чл.36а
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Electric circuit diagram of 12 .. 24 kV withdrawable circuit breakers for UniGear switchgear and PowerCube enclosure 1VCD 400155

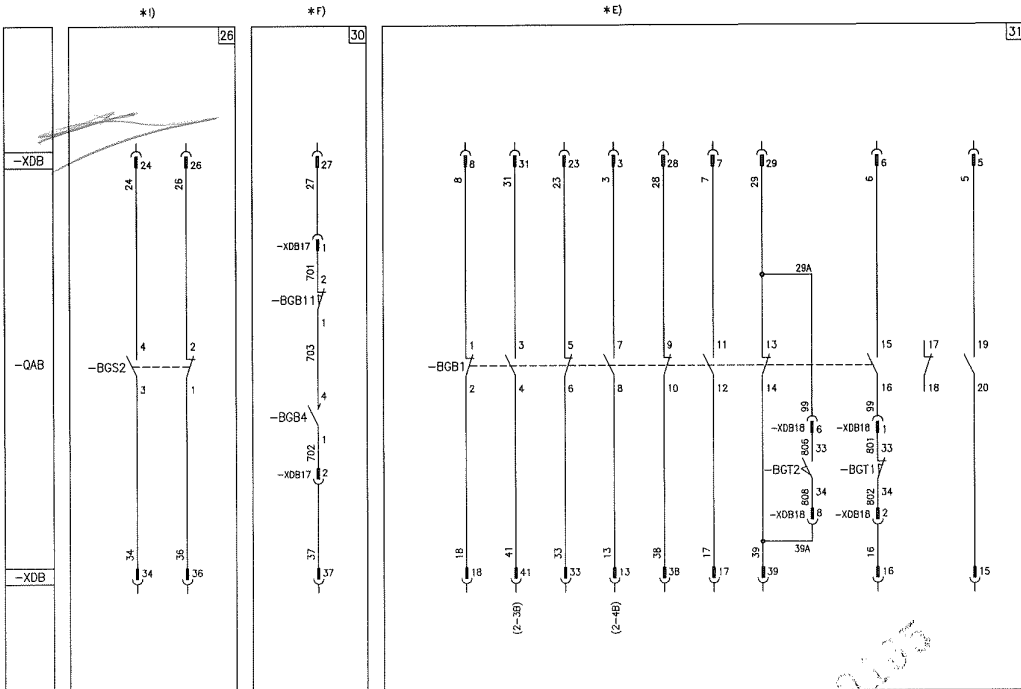
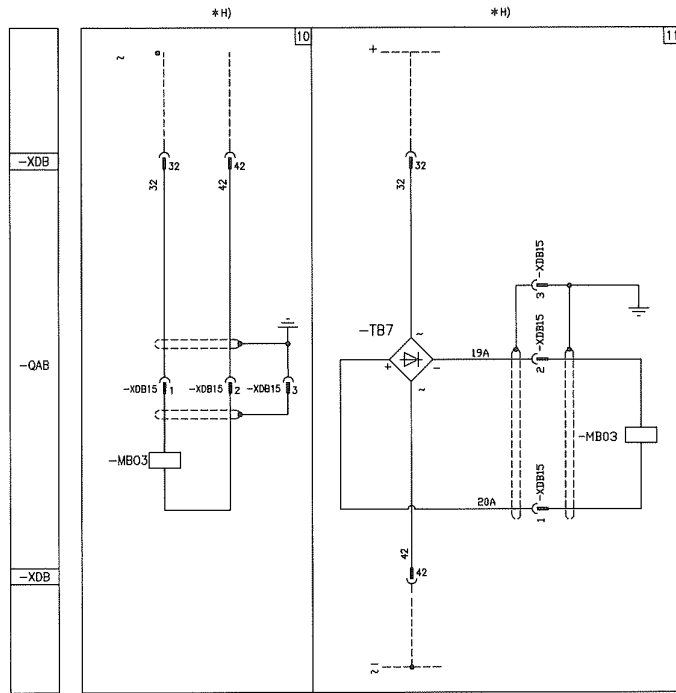


Electric circuit diagram

The electric circuit diagram in this section concerns 12.. 24 kV withdrawable circuit breakers for UniGear switchgear and PowerCube enclosures. See diagram 1VCD400156 for withdrawable circuit breakers with motor-driven truck.

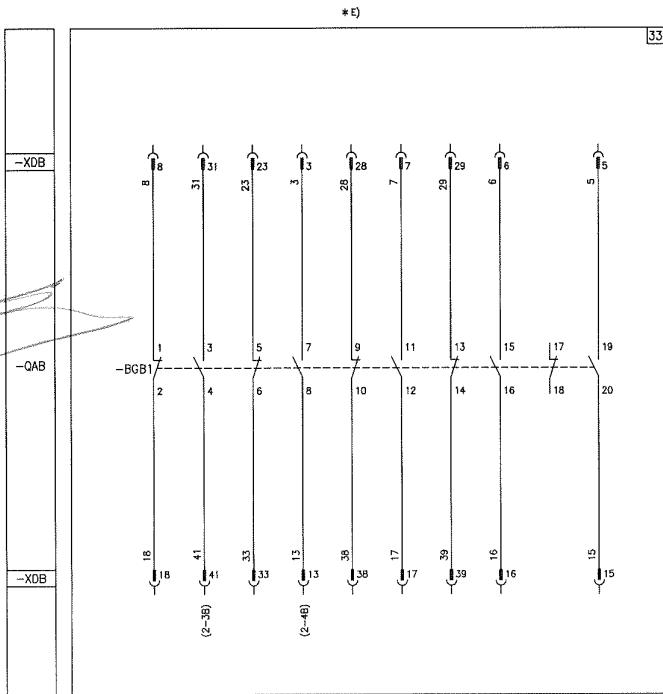
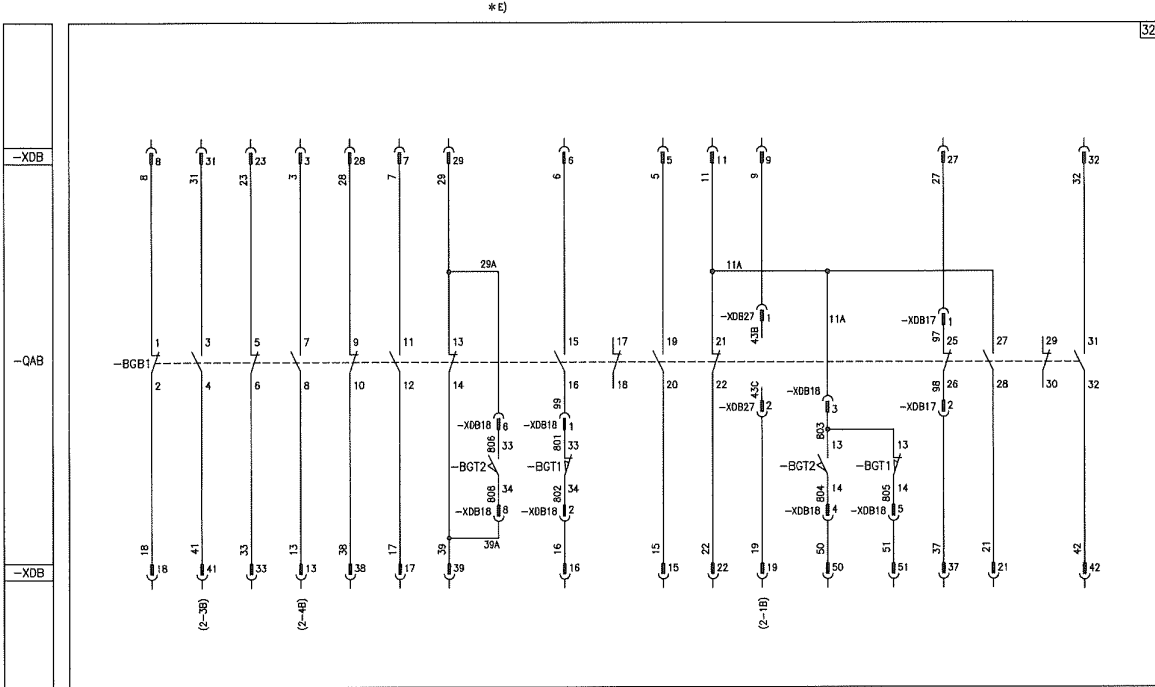
The following diagrams are available for circuit breakers for ZS8.4 switchgear:

- **1VCD400158** Standard version
- **1VCD400159** Version with motorized truck.



На основе чл.36а
ал.3 от ЗОП

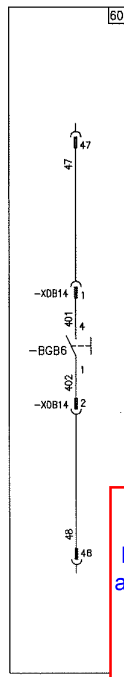
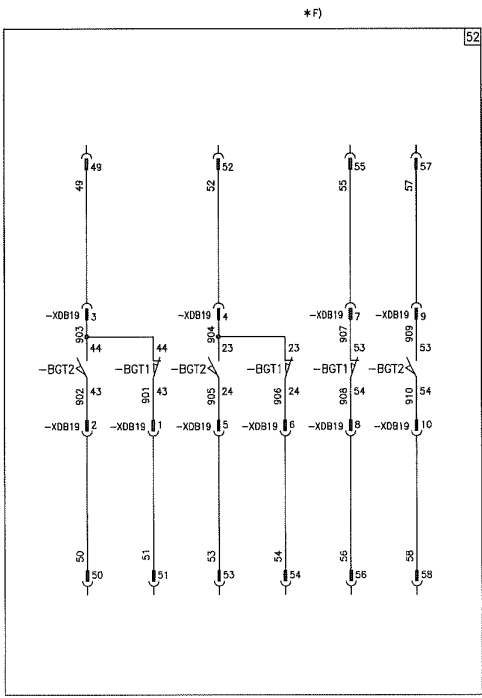
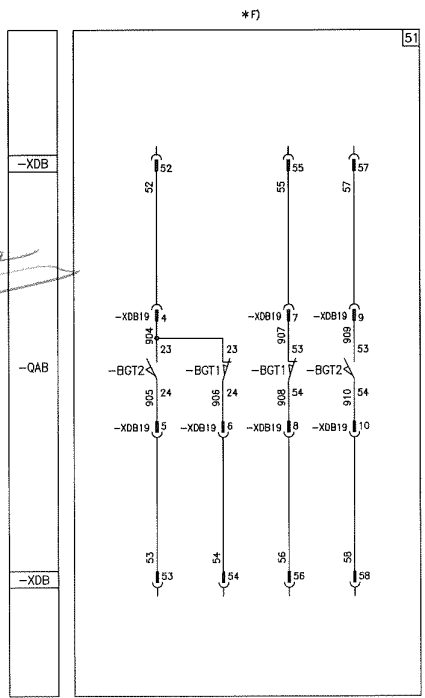
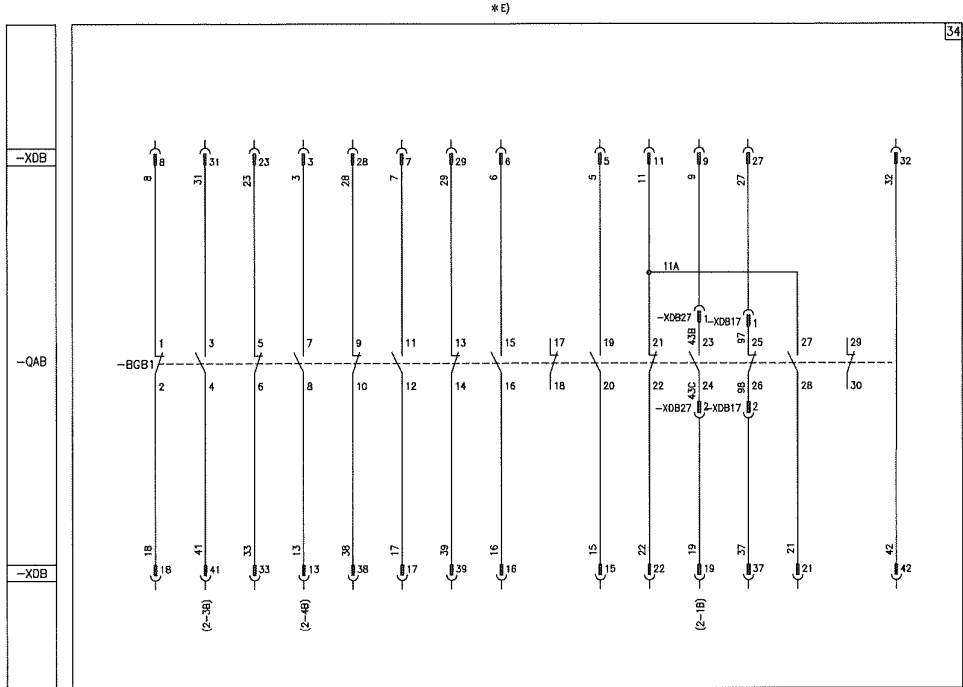
1VCD400156



На основе чл.36а
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Electric circuit diagram



На основании чл.36а
ал.3 от ЗОП

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Key	
□	= Figure number of the diagram.
*	= See note indicated by the letter.
-BER	= SOR Test Unit device for monitoring continuity of shunt opening and closing release winding (see note D).
-BGB1	= Auxiliary contacts of circuit breaker.
-BGB4	= Auxiliary let-through contact of circuit breaker with momentary closing during circuit breaker opening.
-BGB6	= Contact for electrical signaling of undervoltage release de-energized.
-BGB11	= Contact for cutting off electrical signal -BGB4 if opening operation is performed in the manual mode.
-BGD1	= Enclosure door position contact.
-BGS1	= Limit contact of spring loading motor.
-BGS2	= Contact for signaling closing springs loaded-discharged.
-BGT1	= Electrical signalling contacts for circuit breaker in racked-in position (see note F)
-BGT2	= Electrical signaling contacts for circuit breaker in isolated position (see note F).
-BGT3	= Circuit breaker position contact, open during isolating travel.
-MAS	= Motor for loading closing springs (see note C).
-MBC	= Shunt closing release (see note D).
-MBO1	= First shunt opening release (see note D).
-MBO2	= Second shunt opening release (see note D).
-MBO3	= Opening solenoid for release outside circuit breaker.
-MBO4	= Third shunt opening release (see note D).
-MBU	= Undervoltage release (see note B).
-QAB	= Circuit breaker applications.
-RLE1	= Locking magnet. Mechanically inhibits circuit breaker closing if de-energized. (Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation).
-RLE2	= Locking magnet (on truck). Mechanically inhibits circuit breaker racking-in and isolating if de-energized. (Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation).
-SFC	= Pushbutton or contact for closing circuit breaker.
-SFO	= Pushbutton or contact for opening circuit breaker.
-TB7	= Rectifier for release -MBO3.
-XDB	= Terminal box of circuit breaker circuits.
-XDB10, ..., 27	= Connectors of applications.
-XDB28	= Connectors of applications.

Description of the figures	
Fig. 1	= Circuit of motor for loading closing springs (see note C).
Fig. 2	= Shunt closing release (anti-pumping is achieved mechanically). (see note D).
Fig. 3	= Locking magnet. Mechanically inhibits circuit breaker closing if de-energized. (If -RLE1 is required, provide this figure when fig.31 or 32 are selected). Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation.
Fig. 4	= Locking magnet. Mechanically inhibits circuit breaker closing if de-energized. (If -RLE1 is required, provide this figure when fig.33 or 34 are selected). Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation.
Fig. 5	= Instantaneous undervoltage release (see note B).
Fig. 6	= Circuit of third opening release with continuous control of winding (see note D).
Fig. 7	= Circuit of first opening release with continuous control of winding (see note D).
Fig. 8	= Locking magnet (on truck). Mechanically inhibits circuit breaker racking-in and isolating if de-energized. (Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation).
Fig. 9	= Circuit of second opening release with continuous control of winding (see note D).
Fig. 10	= Opening solenoid for release outside circuit breaker.
Fig. 11	= Opening solenoid for release outside circuit breaker with AC supply.
Fig. 26	= Electrical signalling of closing springs loaded and discharged.
Fig. 30	= Auxiliary let-through contact of circuit breaker with momentary closing during circuit breaker opening.
Fig. 31, ... , 34	= Available auxiliary contacts of circuit breaker (see note E).
Fig. 51	= Contacts for electrical signaling of circuit breaker in racked-in and isolated positions located on circuit breaker truck (obligatory when fig. 31 or 32 are required).
Fig. 52	= Contacts for electrical signaling of circuit breaker in racked-in and isolated positions located on circuit breaker truck (supplied on request when fig. 33 to 34 are required).
Fig. 60	= Contact for electrical signaling of undervoltage release de-energized.

На основании чл.36а
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000103

Electric circuit diagram

Incompatibility

The circuits indicated in the following figures cannot be supplied at the same time in the same circuit breaker:

3-4	3-33-34	4-31-32	5-6	10-11
31-32-33-34	31-32-52	33-34-51	51-52	

Notes

- A) Circuit breaker is equipped solely with the applications specified in the order confirmation. Consult this catalog for information about how to make out an order.
- B) The undervoltage release can be supplied for energizing with voltage derived from the supply side of the circuit breaker or from an independent source. Circuit breaker closing is only allowed when the release is energized (closing lock is obtained mechanically). If there is the same power supply for the shunt closing and undervoltage releases and the circuit breaker must close automatically when auxiliary voltage returns, there must be a 50 ms delay between the undervoltage release's enabling instant and energizing of the shunt closing release.
Incompatible with -MBO4.
- C) Check power of auxiliary circuit to find out whether several motors for loading the closing springs can be operated at the same time. To prevent excessive power draw, the springs must be loaded by hand before auxiliary circuit is powered.
- D) The circuit for monitoring the continuity of the release windings must only be used for that purpose. The SOR Test Unit can be used for checking the continuity of the various different releases:
-MBO4 incompatible with -MBU.
-MBO4 not available on Vmax and VD4 50kA.
- E) When fig. 6 is required, contact -BGB1 (23-24) of fig. 32-34 is not available.
When fig. 7 is required, contact -BGB1 (3-4) of fig. 31-32-33-34 is not available.
When fig. 9 is required, contact -BGB1 (7-8) of fig. 31-32-33-34 is not available.
When fig. 10 or 11 are required, contact -BGB1 (31-32) of fig. 32 and 34 is not available.
When fig. 30 is required, contact -BGB1 (25-26) of fig. 32 and 34 is not available.
- F) The contacts for electrical signaling of circuit breaker in isolated and racked-in position (-BGT1 and BGT2) shown in fig. 51-52 are installed on circuit breaker truck (movable part).
- G) Fig. 3 is supplied when fig. 31 or 32 are required.
Fig. 4 is supplied when fig. 33 or 34 are required (in this case, it is obligatory to supply -BGT3).
- H) Fig. 10 is only available for VD4 up to 31.5 kA and Vmax.
Fig. 11 is only available for VD4 up to 31.5 kA.
- I) The energizing voltage must be the same for both signals.

На основании чл.36а
ал.3 от ЗОП

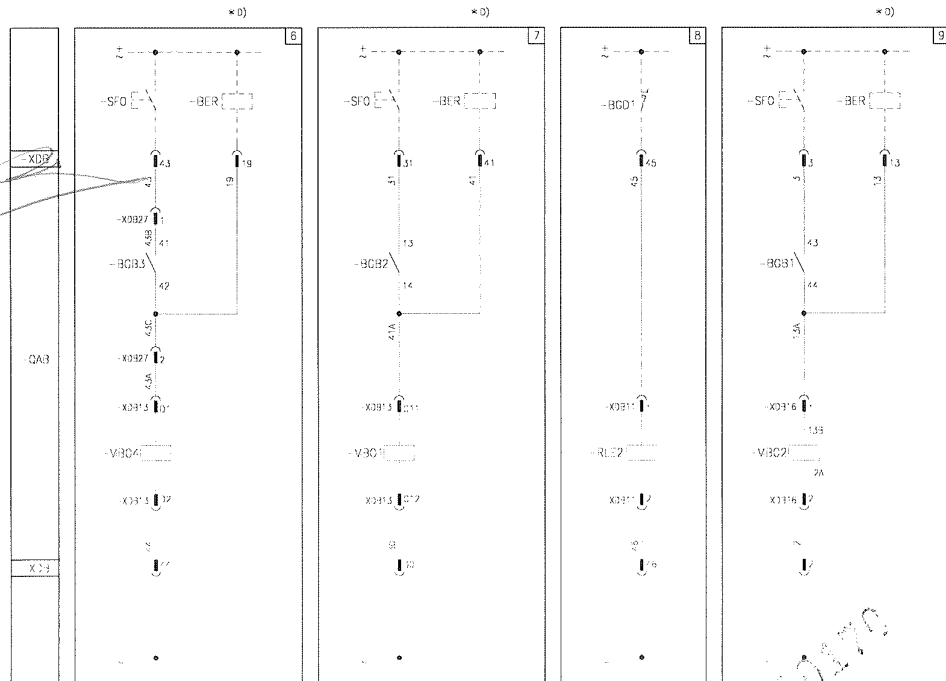
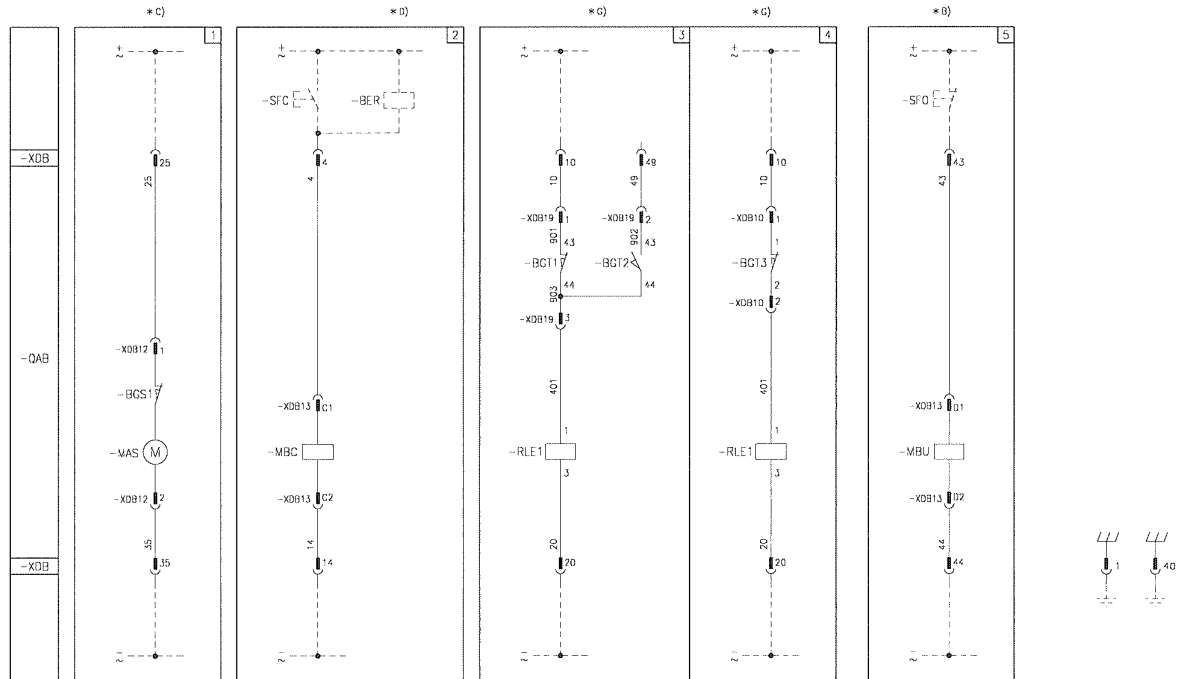
0001000



Electric circuit diagram of 36 kV withdrawable circuit breakers 1VCD 400237

The electric circuit diagram in this section concerns 36 kV withdrawable circuit breakers.

Version with motor-driven truck 1VCD 400240

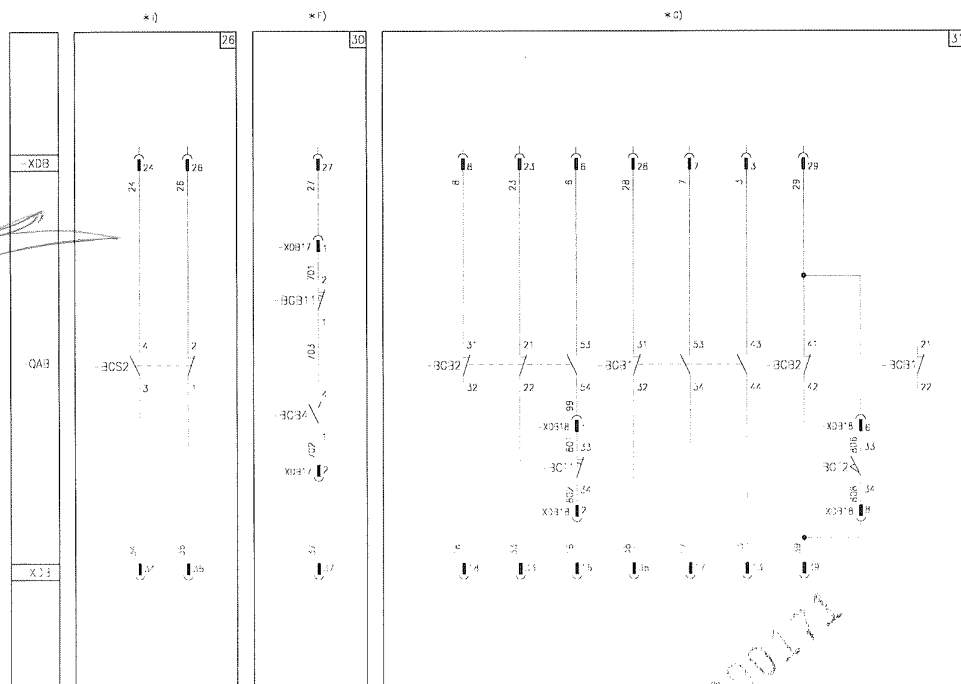
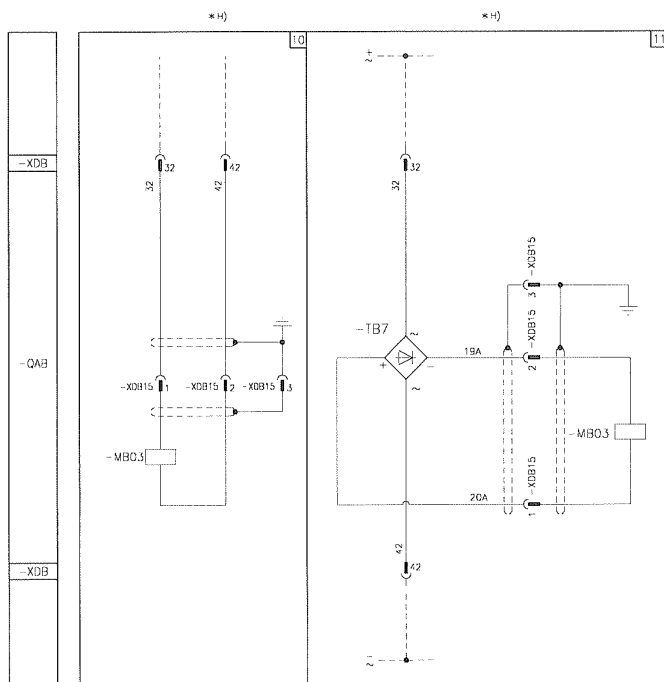


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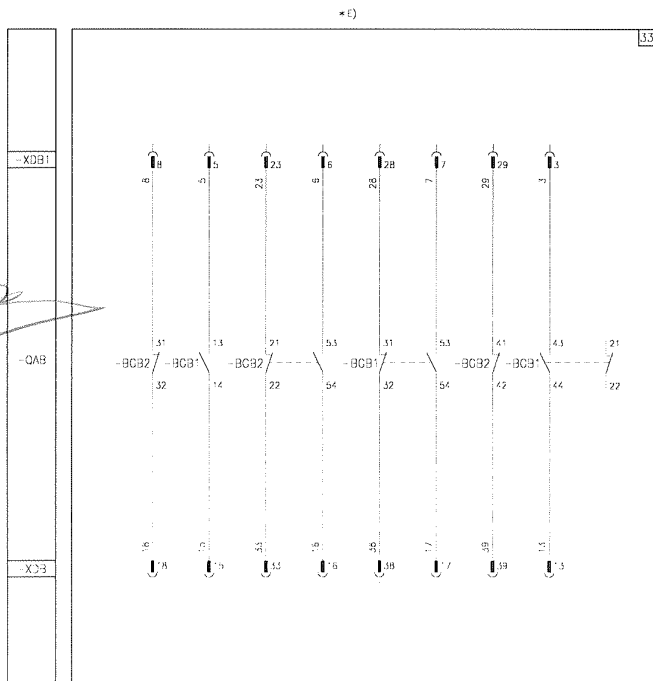
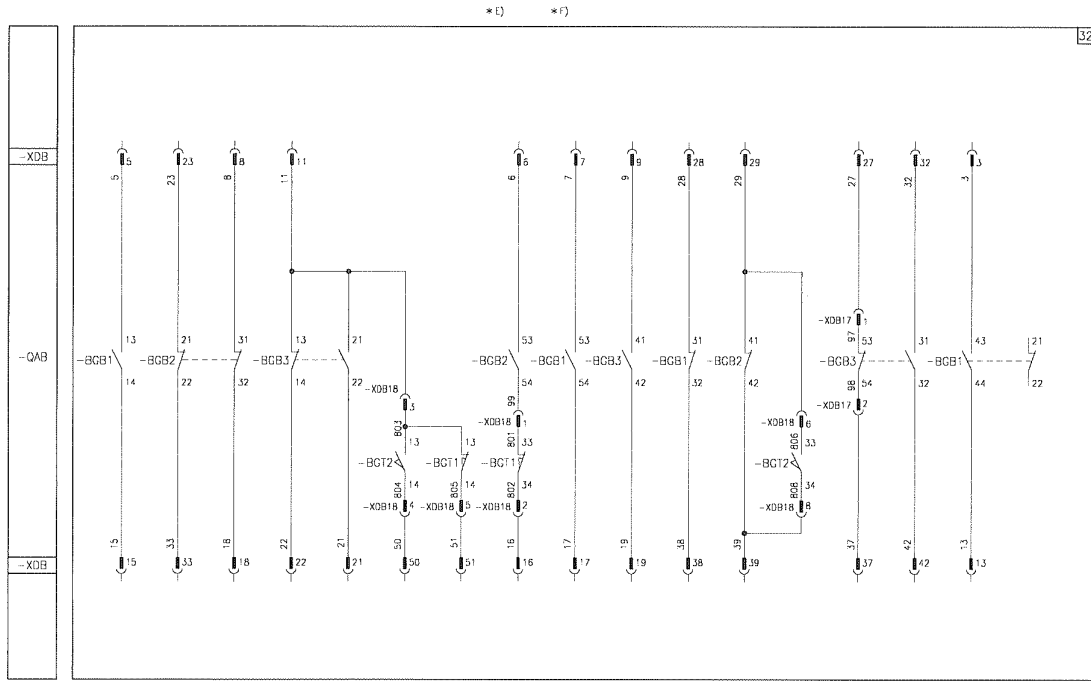
Electric circuit diagram

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На основании чл.36а
ал.3 от ЗОП

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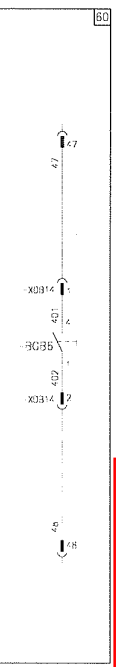
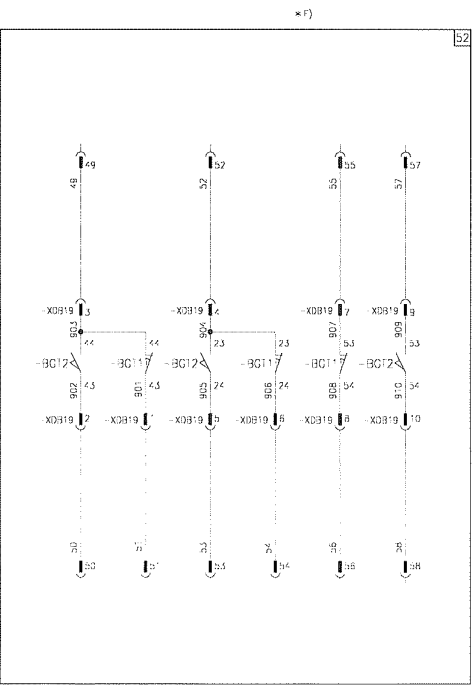
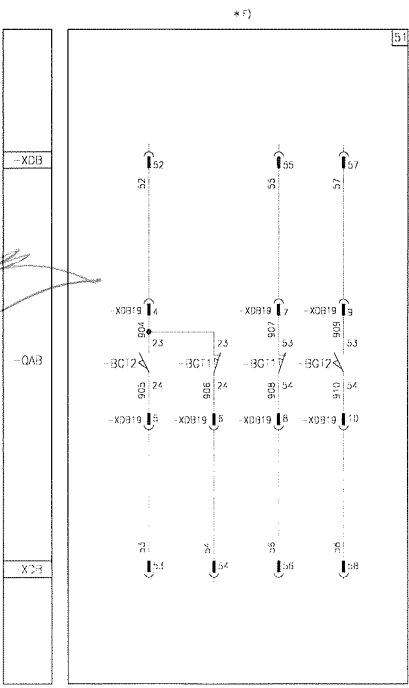
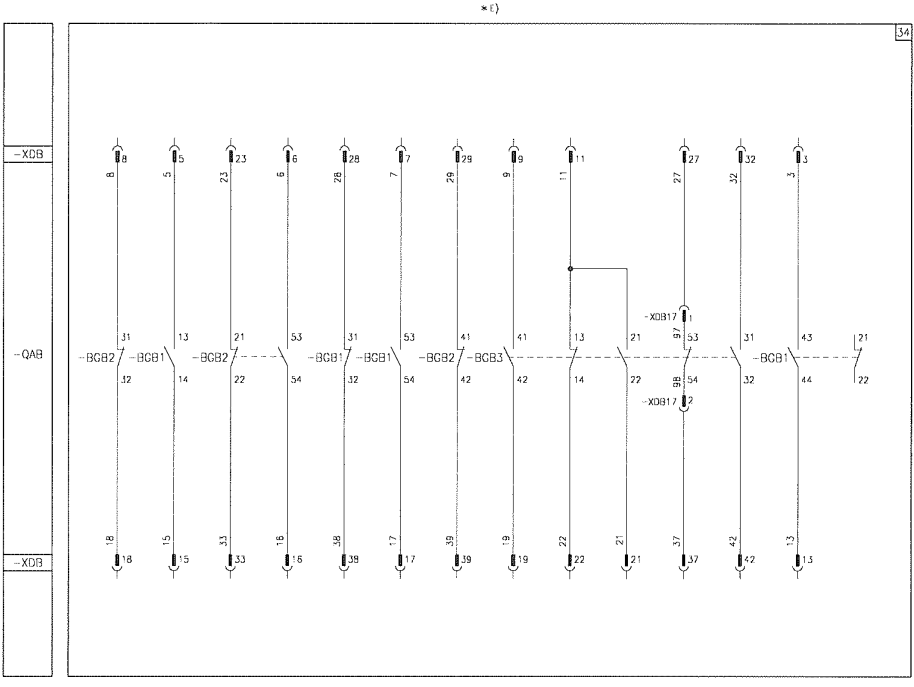


На основании чл.36а
ал.3 от ЗОП

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Electric circuit diagram

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На основании чл.36а
ал.3 от ЗОП

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Key	
<input type="checkbox"/>	= Figure number of the diagram
*	= See note indicated by the letter.
-BER	= SOR Test Unit device for monitoring continuity of shunt opening and closing release winding (see note D)
-BGB1, ... ,3	= Auxiliary contacts of circuit breaker.
-BGB4	= Auxiliary let-through contact of circuit breaker with momentary closing during circuit breaker opening.
-BGB6	= Contact for electrical signaling of undervoltage release de-energized.
-BGB11	= Contact for cutting off electrical signal -BGB4 if opening operation is performed in the manual mode
-BGD1	= Enclosure door position contact.
-BGS1	= Limit contact of spring loading motor.
-BGS2	= Contact for signaling closing springs loaded-discharged.
-BGT1	= Electrical signalling contacts for circuit breaker in racked-in position (see note F).
-BGT2	= Contacts for electrical signaling of circuit-breaker in isolated position (see note F).
-BGT3	= Circuit breaker position contact, open during isolating travel.
-MAS	= Motor for loading closing springs (see note C).
-MBC	= Shunt closing release (see note D).
-MBO1	= First shunt opening release (see note D).
-MBO2	= Second shunt opening release (see note D).
-MBO3	= Opening solenoid for release outside circuit breaker.
-MBO4	= Third shunt opening release (see note D).
-MBU	= Undervoltage release (see note B).
-QAB	= Circuit breaker applications.
-RLE1	= Locking magnet. Mechanically inhibits circuit breaker closing if de-energized. (Consumption can be limited by connecting a delayed operation enabling pushbutton in series).
-RLE2	= Locking magnet (on truck). Mechanically inhibits circuit breaker racking-in and isolating if de-energized. (Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation).
-SFC	= Pushbutton or contact for closing circuit breaker.
-SFO	= Pushbutton or contact for opening circuit breaker.
-TB7	= Rectifier for release -MBO3.
-XDB	= Terminal box of circuit breaker circuits.
-XDB10, ... , 27	= Connectors of applications.
-XDB28	= Connector of applications.

Description of the figures	
Fig. 1	= Circuit of motor for loading closing springs (see note C).
Fig. 2	= Shunt closing release (anti-pumping is achieved mechanically), (see note D).
Fig. 3	= Locking magnet. Mechanically inhibits circuit breaker closing if de-energized. (If -RLE1 is required, provide this figure when fig. 31 or 32 are selected). Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation.
Fig. 4	= Locking magnet. Mechanically inhibits circuit breaker closing if de-energized. (If -RLE1 is required, provide this figure when fig.33 or 34 are selected). Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation.
Fig. 5	= Instantaneous undervoltage release (see note B).
Fig. 6	= Circuit of third shunt opening release with continuous control of winding (see note D).
Fig. 7	= Circuit of first opening release with continuous control of winding (see note D).
Fig. 8	= Locking magnet (on truck). Mechanically inhibits circuit breaker racking-in and isolating if de-energized. (Consumption can be limited by connecting a delayed pushbutton in series so as to enable the operation).
Fig. 9	= Circuit of second shunt opening release with continuous control of winding (see note D).
Fig. 10	= Opening solenoid for release outside circuit breaker.
Fig. 11	= Opening solenoid for release outside circuit breaker with AC supply.
Fig. 26	= Electrical signaling of closing springs loaded and discharged.
Fig. 30	= Auxiliary let-through contact of circuit breaker with momentary closing during circuit breaker opening.
Fig. 31, ... , 34	= Available auxiliary contacts of circuit breaker (see note E).
Fig. 51	= Contacts for electrical signaling of circuit breaker in racked-in and isolated positions located on circuit breaker truck (obligatory when fig.31 or 32 are required).
Fig. 52	= Contacts for electrical signaling of circuit breaker in racked-in and isolated positions located on circuit breaker truck (supplied on request when fig.33 to 34 are required).
Fig. 60	= Contact for electrical signaling of undervoltage release de-energized.

На основании чл.36а
ал.3 от ЗОП

Electric circuit diagram

Incompatibility

The circuits indicated in the following figures cannot be supplied at the same time in the same circuit breaker:

3-4	3-33-34	4-31-32	5-6	10-11
31-32-33-34	31-32-52	33-34-51	51-52	

Notes

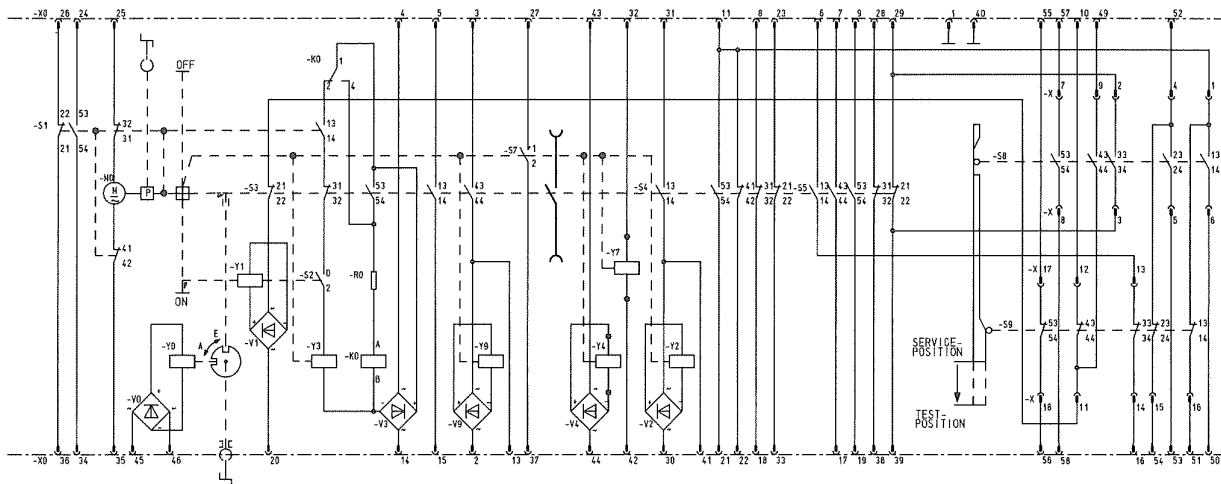
- A) The circuit breaker is equipped solely with the applications specified in the order confirmation. Consult this catalog for information about how to make out an order.
- B) The undervoltage release can be supplied for energizing with voltage derived from the supply side of the circuit breaker or from an independent source.
Circuit breaker closing is only allowed when the release is energized (closing lock is obtained mechanically). If there is the same power supply for the shunt closing and under-voltage releases and the circuit breaker must close automatically when auxiliary voltage returns, there must be a 50 ms delay between the undervoltage release's enabling instant and energizing of the shunt closing release.
Incompatible with -MBO4.
- C) Check power of auxiliary circuit to find out whether several motors for loading the closing springs can be operated at the same time. To prevent excessive power draw, springs must be loaded by hand before auxiliary circuit is powered.
- D) The circuit for monitoring the continuity of the release windings must only be used for that purpose. The SOR Test Unit can be used for checking the continuity of the various different releases.
-MBO4 incompatible with -MBU.
- E) When fig. 6 is required, contact -BGB3 (41-42) of fig. 32-34 is not available.
When fig. 9 is required, contact -BGB1 (43-44) of fig. 31-32-33-34 is not available.
When fig. 10 or 11 are required, contact -BGB3 (31-32) of fig. 32 and 34 is not available.
When fig. 30 is required, contact -BGB3 (53-54) of fig. 32 and 34 is not available.
- F) The contacts for electrical signaling of circuit breaker in racked-in and isolated positions (-BGT1 and -BGT2) shown in fig. 51-52 are located on circuit breaker truck (moving part).
- G) Fig. 3 is supplied when fig. 31 or 32 are required. Fig. 4 is supplied when fig. 33 or 34 are required (in this case, it is obligatory for -BGT3 to be supplied).
- H) Fig. 10 is only available for VD4 up to 31.5 kA.
Fig. 11 is only available for VD4 up to 31.5 kA.
- I) The energizing voltage must be the same for both signals.

На основании чл.36а
ал.3 от ЗОП

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Electric circuit diagram for 36-40.5 kV plug-in circuit breakers with Classic operating mechanisms GCES700005

The circuit diagram in this section concerns 36-40.5 kV plug-in circuit breakers with Classic operating mechanism.



На основе чл.36а
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Notes

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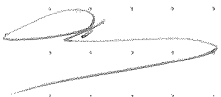
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Notes



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Notes



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На основании чл.36а
ал.3 от ЗОП

10-10

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На основание чл.36а
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For more information please contact:



More product information:
abb.com/mediumvoltage
Your contact center:
abb.com/contactcenters
More service information:
abb.com/service

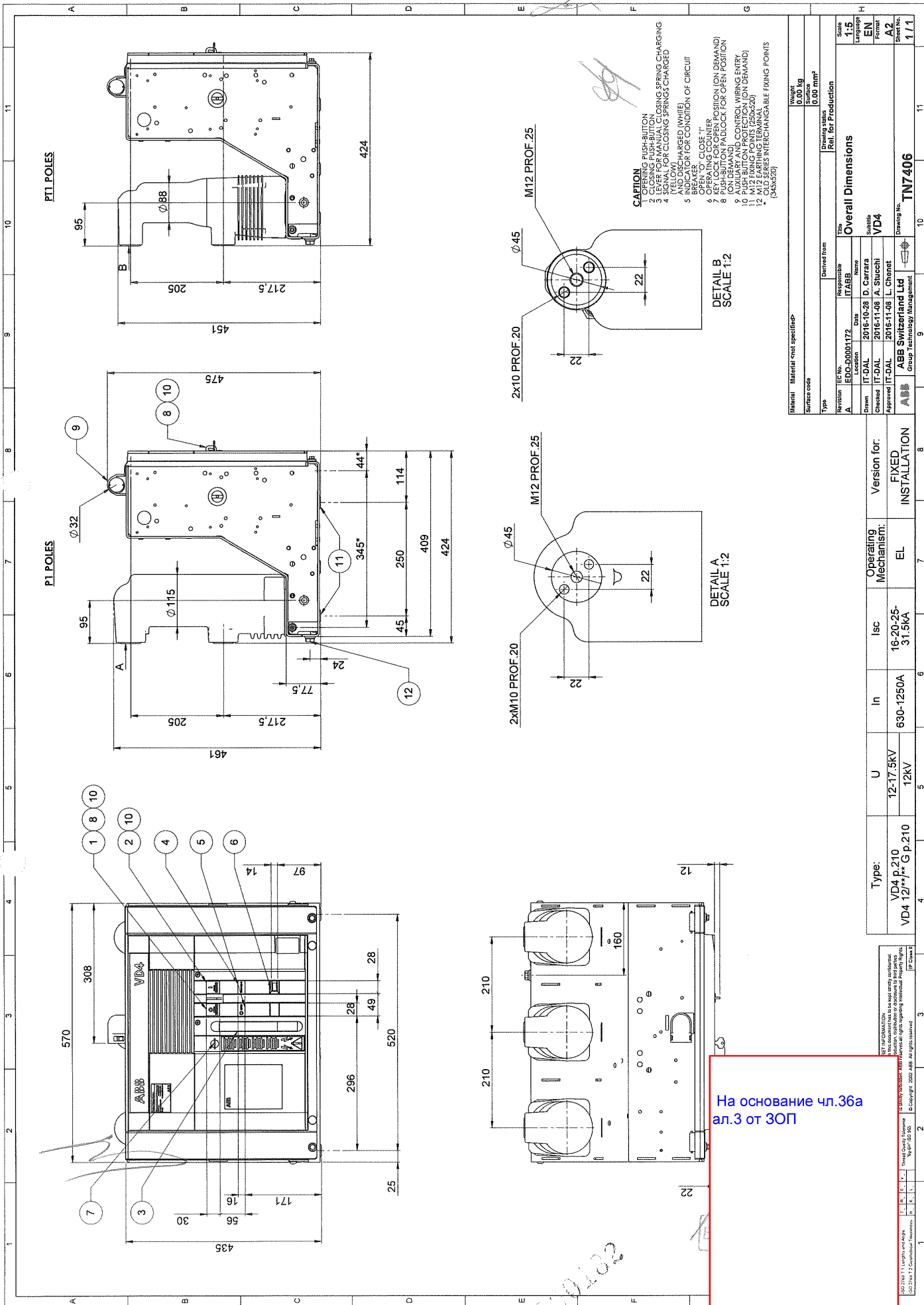
Data and illustration are not binding. We reserve the right to make changes in the course of technical development.

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На основание чл.36а
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1VCP000001 - Rev. Y, en - Technical catalog - 2019.01 (VD4-50 kA) (gs)

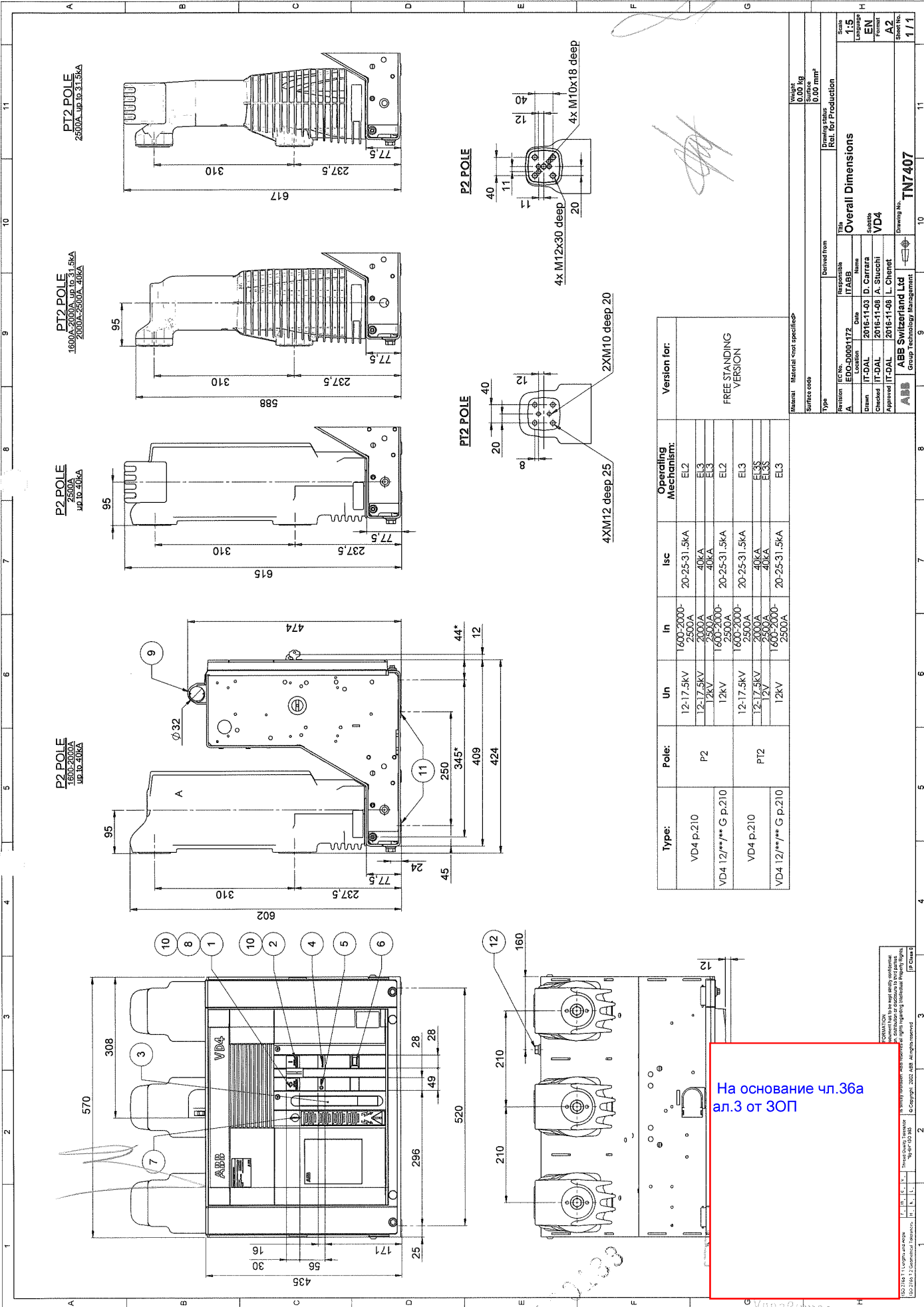


На основе чл.36а
ал.3 от ЗОП

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Surface code		Surface: 0.00 mm²	
Type	Derived from	Drawing status: Rel. for Production	
Revision: A	EDD-50001172	ITABB	Scale: 1:5
Drawn: 2016-10-28	D. Carraza	VD4	Legend: EN
Checked: 2016-11-08	A. Stucchi	ABB	Scale: A2
Approved: 2016-11-08	L. Chiodi	ABB Technology Management	Scale: 1/1
Overall Dimensions		Drawing No.: TN7406	

IEC No.:	EDD-50001172	Version for:	FIXED INSTALLATION
Revision:	A	Operating Mechanism:	EL
Drawn:	2016-10-28	Isc:	16-20-25-31.5kA
Checked:	2016-11-08	In:	630-1250A
Approved:	2016-11-08	U:	12-17.5kV / 12kV
Type:		VD4 p.210	
Type:		VD4 12 ^{1/2} G p.210	

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P2 POLE
1600-2000A
M12x40kA

P2 POLE
2500A
M12x40kA

PT2 POLE
1600A-2000A up to 31.5kA
2000A-2500A-40kA

PT2 POLE
2500A-40kA up to 31.5kA

PT2 POLE

P2 POLE

Type:	Pole:	Un	In	Isc	Operating Mechanism:	Version for:
VD4 p.210	P2	12-17.5kV 12-17.5kV 12kV	1600-2000- 2500A	20-25-31.5kA 40kA 40kA	EL2 EL3 EL3	
VD4 12/**/ ** G p.210		12kV	1600-2000- 2500A	20-25-31.5kA	EL2	FREE STANDING VERSION
VD4 p.210	PT2	12-17.5kV 12V 2500A	1600-2000- 2500A	20-25-31.5kA 40kA	EL3 EL3S EL3S	
VD4 12/**/ ** G p.210		12kV	1600-2000- 2500A	20-25-31.5kA	EL3	

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ABB Swissair Ltd
Group Technology Management
Drawing No. **TN7407**
1/1

Material: Material extra specified
Surface code
Weight: 0.00 kg
Surface: 0.00 mm²
Type: Rel. for Production
Scale: 1:5
Language: EN
Version: AZ
Drawing No.: 1/1

Overall Dimensions
Title: VD4
Responsible: D. Carreira
Date: 2018-11-03
Drawn: IT-DAL
Checked: A. Stuecht
Approved: IT-DAL
L. Christel
Group Technology Management
Drawing No. **TN7407**
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Group Technology Management
Drawing No. **TN7407**
1/1



Declaration of Conformity No. 1VCP500515_ver0 Page 1/1
(in accordance with ISO/IEC 17050-1)

Apparatus: **Medium Voltage Circuit Breaker type VD4 12.25.32 – P poles – p. 210 mm**
(Produced under license of ABB Switzerland Ltd)

Identification: Technical catalogue 1VCP000001 - rev. V
Table of dimensions TN7407

Ratings:

Rated voltage:	12	kV
Rated lighting impulse withstand voltage:	75	kV
Rated power-frequency withstand voltage:	28	kV
Rated frequency:	50	Hz
Rated normal current	2500	A
Rated short-time withstand current:	31.5	kA
Rated peak withstand current:	80	kA
Rated duration of short-circuit:	3	s
Rated breaking capacity	31.5	kA
Rated making capacity	80	kA

The apparatus of the declaration described above is in conformity with the requirements of the following standard specifications: IEC 62271-1, IEC 62271-100

Test reports verifying rating assigned by the manufacturer (1VCD500068_EDO –D0001167)

Type Tests	According to	Report number	Issued by
Dielectric tests	IEC 62271-100 sub 6.2	1VLR016311	ABB
Measurement of resistance of main circuit and temperature rise tests	IEC 62271-100 sub 6.4 – 6.5	1VLR016312	ABB
Short-time withstand current and peak withstand current tests	IEC 62271-100 sub 6.6	0505Ra	PEHLA
Mechanical operation test at ambient temperature	IEC 62271-100 sub 6.101.2	A06.011	ACAIE
Short circuit current making and breaking tests	IEC 62271-100 sub 6.102 to 6.106	0505Ra	PEHLA

Above mentioned laboratories are accredited by competent bodies according to UNI CEI EN ISO/IEC 17025
This international standard specifies the general requirements for the competence to carry out tests

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На основании чл.36а ал.3 от ЗОП

Dalmine, 2017-0

Описание на съоръжаването(окомплектовката) на Прекъсвач фиксиран тип VD4 12.25.32 P 210 – с междуполусно разстояние 210 мм. предложен за Модернизация (ретрофит) на ПС „София Център“ 110/10 кV

1. Изключвателна бобина - MBO1.
2. Включвателна бобина – MBS.
3. Моторно задвижване – MAS.
4. Помощни контакти – общо 16 броя.
5. Контакт BV4.

На основание чл.36а
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Declaration of Conformity No. 1VCP500514_ver0 Page 1/1
(in accordance with ISO/IEC 17050-1)

Apparatus: **Medium Voltage Circuit Breaker type VD4 12.12.32 – PT poles – p. 210 mm**
(Produced under license of ABB Switzerland Ltd.)

Identification: Technical catalogue 1VCP000001 - rev. V
Table of dimensions TN7406

Ratings:

Rated voltage:	12	kV
Rated lightning impulse withstand voltage:	75	kV
Rated power-frequency withstand voltage:	28	kV
Rated frequency:	50 - 60	Hz
Rated normal current	1250	A
Rated short-time withstand current:	31.5	kA
Rated peak withstand current:	82	kA
Rated duration of short-circuit:	3	s
Rated breaking capacity	31.5	kA
Rated making capacity	82	kA

The apparatus of the declaration described above is in conformity with the requirements of the following standard specifications: IEC 62271-1, IEC 62271-100

Test reports verifying rating assigned by the manufacturer (1VCD500068_EDO -D0001167)

Type Tests	According to	Report number	Issued by
Dielectric tests	IEC 62271-100 sub 6.2	10040Ra	PEHLA
Measurement of resistance of main circuit and temperature rise tests	IEC 62271-100 sub 6.4 – 6.5	HZ 134 E47	ABB
Short-time withstand current and peak withstand current tests	IEC 62271-100 sub 6.6	09148Ra	PEHLA
Mechanical operation test at ambient temperature	IEC 62271-100 sub 6.101.2	10219Ra	PEHLA
Short circuit current making and breaking tests	IEC 62271-100 sub 6.102 to 6.106	09137Ra	PEHLA

Above mentioned laboratories are accredited by competent bodies according to UNI CEI EN ISO/IEC 17025
This international standard specifies the general requirements for the competence to carry out tests

De
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Qua
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Dalmine, 2017-08-03

200108

Описание на съоръжаването(окомплектовката) на Прекъсвач фиксиран тип VD4 12.12.32 P 210 – с междуполусно разстояние 210 мм. предложен за Модернизация (ретрофит) на ПС „София Център“ 110/10 кV

1. Изключвателна бобина - MBO1.
2. Включвателна бобина – MBC.
3. Моторно задвижване – MAS.
4. Помощни контакти – общо 16 броя.
5. Контакт ВВ4.

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000-37

ПРИЛОЖЕНИЕ 2



На основание чл.36а
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000188



PEHLA

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Report

Report No.: 09137Ra

Copy No.: 0

Contents: 76 Sheets

Test object: Vacuum circuit-breaker in metal-enclosed, air-insulated switchgear
Designation: VD4/P 17.12.32 in UniGear type ZS1, width 650 mm
Rated voltage: 17.5 kV Rated normal current: 1250 A Rated frequency: 50 / 60 Hz

Manufacturer: ABB P.T. S.p.A., Dalmine, Italy (circuit-breaker and switchgear)
ABB AG, Calor Emag Medium Voltage Products, Ratingen, Germany (pole part)
both under license of ABB Technology Ltd., Zurich, Switzerland

Client: ABB Technology Ltd., Zurich, Switzerland

Testing station: PEHLA-Testing Laboratory Ratingen, Germany

Date of test: 04th to 07th August 2009

Applied test specifications:

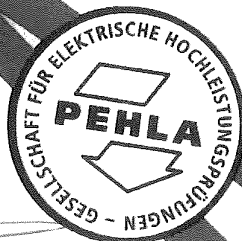
The tests have been carried out in accordance with:
IEC 62271-100 / Ed. 2.0 / 2008-04, Clauses 6.102 - 6.106, 6.108

Tests performed:

Type tests 'Basic short-circuit test duties' and 'Single-phase and double-earth fault test'.
Three-phase making and breaking capacity test based on 31.5 kA at 17.5 kV consisting of the basic test duties T10, T30, T60, T100s and T100a (dc-component of 27 %) at 50 Hz.
Single-phase and double-earth fault test based on 31.5 kA at 17.5 kV at 50 Hz.
No-load operations and measurement of the resistance of the main circuit before and after the tests.
Voltage test as a condition check at 30.4 kV – 1 min after the tests.

Test results:

The test object passed the tests performed in accordance with the applied test specifications.



Mannheim, 23rd April 2010

The test results relate only to the items tested.
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DA

Notes

Accreditation

The PEHLA-Testing Laboratory Ratingen has been approved by the TGA GmbH (German accreditation body) according to EN ISO/IEC 17025 for tests in the field of high-voltage switchgear and controlgear and power engineering equipment (Registration-No. DAT-PL-032/93-63).

STL-Member

PEHLA is founder member of the SHORT-CIRCUIT TESTING LIAISON (STL) which has been established in 1969. STL is a forum for the international cooperation of the testing organisations with the further full members ASTA (UK), CESI (IT), CPRI (IND), ESEF (FR), KEMA (NL), SATS (NO, SE, FI), STLNA (US, CA) and JSTC (JP). In the framework of EC, STL (EU) has been recognised in 1992 by EOTC as agreement group.

PEHLA-Documents

A Type Test Certificate

is issued for type tests which have successfully been carried out in full compliance with the relevant specifications or standards and STL Guides valid at the time of the test. For these tests the test object must be clearly identified by technical description, drawings and additional specifications.

A Test Document

is issued for parts of type tests which have successfully been carried out in full compliance with the relevant specifications or standards and STL Guides valid at the time of test. For these tests the test object must be clearly identified by technical description, drawings and additional specifications.

A Test Report

is issued for all other tests which have been carried out according to specifications, standards or "PEHLA-Richtlinien" (PEHLA Guides) and/or clients' instructions. Similarly, this test report contains all test results, details of the conditions under which the tests were carried out, also details relating to the behaviour of the test object, and its condition after the tests.

A Test Confirmation

is issued immediately after the tests. It confirms that the tests have been conducted and is valid only until publishing the detailed results in an entire document.

Uncertainty of the measurement systems

The PEHLA - Testing Laboratories apply the PEHLA Guide No. 12 for determining the uncertainties of measurement, based on ENV 13005 (Guide to the expression of uncertainty in measurement). As long as no explicit statements are made, the uncertainties required by the relevant standards have been complied with.

Addresses

Office: PEHLA-Geschäftsstelle
Hallenweg 40
68219 Mannheim
Germany
Internet: www.pehla.com

Testing Station: PEHLA-Testing Laboratory Ratingen
Oberhausener Str. 33
40472 Ratingen
Germany

Manufacturer: ABB P.T. S.p.A. Circuit-breaker and switchgear
Via Friuli, 4
24044 Dalmine (BG)
Italy
under licence of ABB Technology Ltd., Zurich, Switzerland

ABB AG, Calor Emag Medium Voltage Products, Pole parts
Oberhausener Str. 33
40472 Ratingen,
Germany
under licence of ABB Technology Ltd., Zurich, Switzerland

Client: ABB Technology Ltd.
Affolternstrasse 44
8050 Zurich
Switzerland

На основании чл.36а
ал.3 от ЗОП

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На основании чл.36а
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List of Test Participants

Representatives of Technical Committee:

Mr. André Schuermann	PEHLA-Testing Laboratory Ratingen, Germany
Dr. Thomas Ebke	PEHLA-Testing Laboratory Ratingen, Germany
Mr. Christopher Hackland	PEHLA-Testing Laboratory Ratingen, Germany
Mr. Herbert Feld	PEHLA-Testing Laboratory Berlin-Marzahn, Germany

Test Engineer / Test Operator:

Mr. André Schuermann	PEHLA-Testing Laboratory Ratingen, Germany
Mr. Christopher Hackland (Test Engineer)	PEHLA-Testing Laboratory Ratingen, Germany
Mr. Uwe Lisseck	PEHLA-Testing Laboratory Ratingen, Germany
Mr. Frank Idaszek (Measurement)	PEHLA-Testing Laboratory Ratingen, Germany
Mr. Frank Herff (Machine Operator)	PEHLA-Testing Laboratory Ratingen, Germany

Representatives of Client:

-

Further Participants:

-

На основании чл.36а
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**Technical Data of Test Object
Circuit-Breaker**

Test object: Vacuum circuit-breaker
Designation: VD4/P 17.12.32
Manufacturer: ABB P.T. S.p.A., Dalmine, Italy
Serial No.: 1VC1AM00012698
Year of manufacture: 2009
Serial No. of drive: -
Drawing No.: See sheets 7-8

Ratings assigned by the manufacturer:

Rated voltage	17.5 kV	
Rated normal current	1250 A	
Rated frequency	50/60 Hz	
Rated lightning impulse withstand voltage	95 kV	
Rated switching impulse withstand voltage	- kV	
Rated power-frequency withstand voltage	38 kV	
Rated peak withstand current	80/82 kA	
Rated short-time withstand current	31.5 kA	
Rated duration of short-circuit	3 s	
Rated short-circuit breaking current	31.5 kA	
DC component of the rated short-circuit breaking current	≤ 30 %	
Rated short-circuit making current	80/82 kA	
Rated transient recovery voltage	30 kV	
Rate of rise of transient recovery voltage	0.42 kV/μs	
First-pole-to-clear factor	1.5	
Rated operating sequence	O - 0.3 s - CO - 15 s - CO	
Arc extinguishing medium	vacuum	
Rated filling pressure for operation	- MPa	abs. at 20 °C
Minimum functional pressure for operation	- MPa	abs. at 20 °C
Insulating medium	air	
Rated filling pressure for insulation	- MPa	abs. at 20 °C
Minimum functional pressure for insulation	- MPa	abs. at 20 °C
Driving mechanism (type)	Spring Drive	
Number of poles	3	
Number of units per pole	1	
Rated opening time	33...60 ms	
Rated closing time	60...80 ms	
Rated supply voltage of opening device	110 V	d.c.
Rated supply voltage of closing device	110 V	d.c.
Rated supply voltage of auxiliary circuits	110 V	d.c.
Rated frequency of supply voltage	- Hz	
Rated line-charging breaking current	- A	
Rated cable-charging breaking current	31.5 A	

Further data: -

Essential characteristics: Pole parts type PT1, L1: 22-56, L2: 22-55, L3: 22-64
 Vacuum interrupters type VG4S

На основании чл.36а
 ал.3 от ЗОП

090103

**Technical Data of Test Object
Switchgear**

Test object: Metal-enclosed, air-insulated switchgear
Designation: UniGear type ZS1, width 650 mm
Manufacturer: ABB P.T. S.p.A., Dalmine, Italy
Serial No.: 8090001451/01
Year of manufacture: 2009
Drawing No.: See sheets 7-8

Ratings assigned by the manufacturer:

Rated voltage	17.5	kV
Rated normal current	1250	A
Rated frequency	50	Hz
Rated lightning impulse withstand voltage	95	kV
Rated switching impulse withstand voltage	-	kV
Rated power-frequency withstand voltage	38	kV
Rated peak withstand current	80	kA
Rated short-time withstand current	31.5	kA
Rated duration of short-circuit	3	s
Insulating medium	air	
Rated filling pressure for insulation	- MPa	abs. at 20 °C
Minimum functional pressure for insulation	- MPa	abs. at 20 °C

Permissible values for internal arc faults:

Peak current	80	kA
Short-circuit current	31.5	kA
Duration of short-circuit	1	s

Further data: -**Essential characteristics and installed devices: -**

На основание чл.36а
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List of Identified Drawings

The manufacturer has submitted to the testing laboratory drawings and other data containing sufficient information to unambiguously identify by type the essential details and parts of the test object presented for test.

The drawings have been stamped and signed by the manufacturer in order to guarantee that the drawings or data schedules truly represent the test object to be tested.

Further these drawings have been stamped and signed by PEHLA representatives and are kept at the client.

with the test documents at the test laboratory.

The testing laboratory has checked that drawings and data schedules adequately represent the essential details and parts of the test object to be tested, but is not responsible for the accuracy of the detailed information.

The drawing(s) contained in this document are identical with the checked, stamped and signed drawings.

Drawing No.	Rev.	P/D ^{*)}	Title	Additional remarks
--	--	D	Overview picture of drawings VD4 17.12.32 for type test 09137Ra under PEHLA-Observation	date: 04.08.2009
GCE8010474R0101	00	D	Abzweigfeld 17,5kV, TLG.650 Feeder panel 17,5kV PW.650	Included in this test report
1VCR016097	--	D	BASE C.B. POLES P1 INTERRUTTORE BASE POLI P1	G0020 Included in this test report
1VCR016097G	--	P	TABELLA MATERIALI	0020
1VCR016092	--	D	BASE BREAKER POLES P1 ASSEMBLY SOTTOGRUPPO INTERRUTTORE BASE POLI P1	G0002
1VCR016092G	--	P	TABELLA MATERIALI	0002
1VCR016089	--	D	FRAME + OPERATING MECHANISM P.150 STRUTTURA + COMANDO P.150	G0001
1VCR016089G	--	P	TABELLA MATERIALI	0001
1VCR003321	--	D	COMANDO CON ALBERO OPERATING MECHANISM WITH SHAFT	G0001
1VB7006200	00	D	Polteil vollständig Pole Complete	R0102
1VB7006200	00	P	PT1 Polteil vollständig mit VG4S	R0102
GCE7003142	14	D	Antriebsstange vollst. Operation stud compl.	R0132 sheet 2
GCE7001851	08	D	Stromband VM1 1250A Flexible conductor VM1 1250A	P0106
1VB7003199	--	D	Abschirmplatte Shielding Plate	P0130

*) P: Parts list, D: Drawing

На основании чл.36а
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List of Identified Drawings (2)

Drawing No.	Rev.	P/D *)	Title	Additional remarks
1VB7006200	00	D	Eingießgruppe Mold Group	R0101
1VB7006200	00	P	PT1 Eingießgruppe mit VG4S	R0101
1VB7003128	02	D	VMTG PT1 mit VG4S	R0119 sheet 19
1VB7003128	02	P	PT1 VMTG mit VG4S	R0119
1VB7005535	03	D	Assembly Group MTG Montagegruppe MTG	R0107 sheet 7
509595	--	D	ASS.MONTAGGIO CARRELLO MOUNTING TRUCK ASS.	GR811
GCE8385888	04	D	Kontaktsystem, vollst. CONTACT SYSTEM, COMPL.	R0101 sheet 1/3
GCE7003133	07	D	Kontaktarm mit Schrumpfschlauch CONTACT ARM WITH SHRINKABLE TUBE	R0131 sheet 4

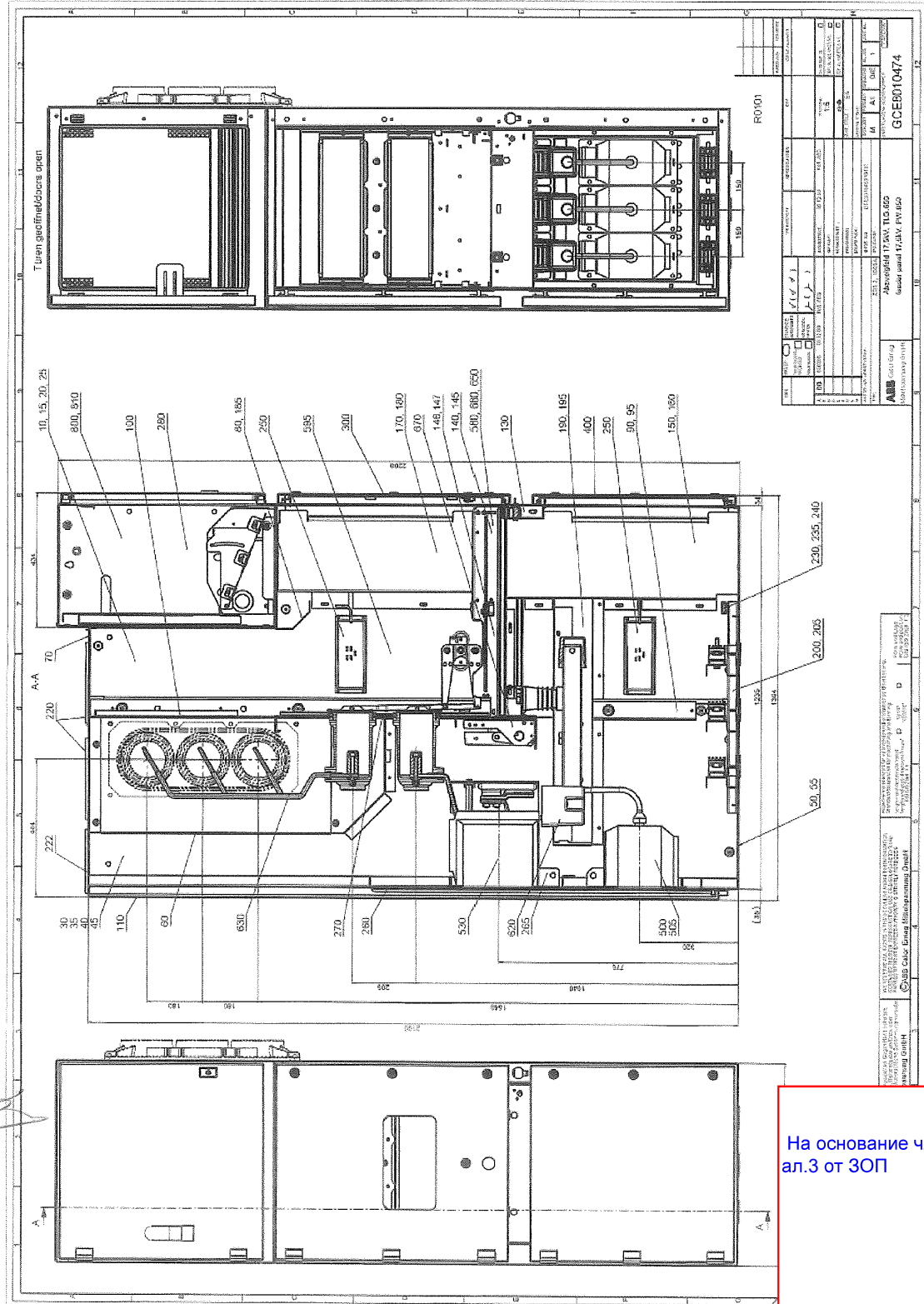
*) P: Parts list, D: Drawing

Remarks: -

На основании чл.36а
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090195

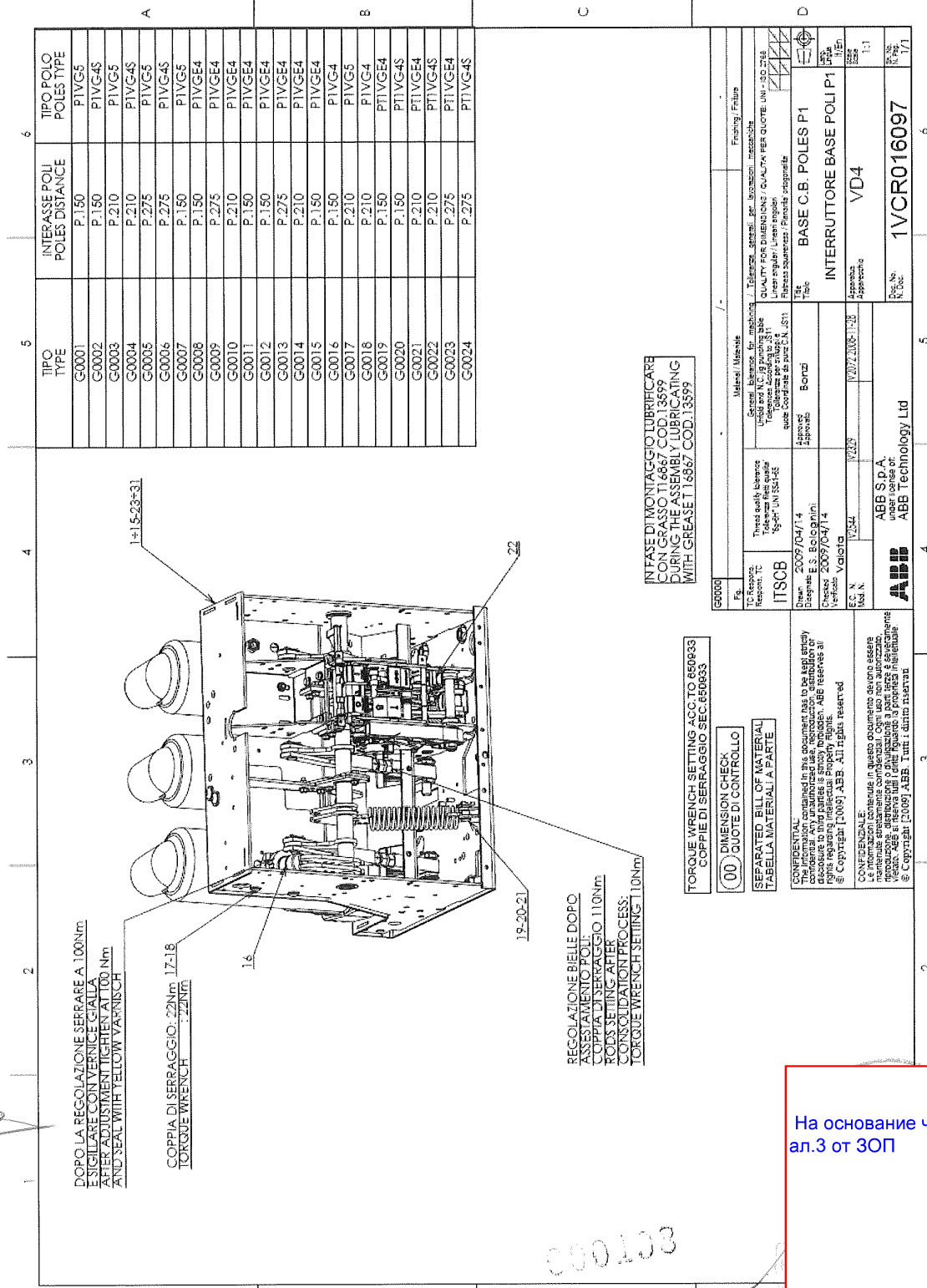
Drawing No.
GCE8010474R0101



На основе чл.36а
ал.3 от ЗОП

091030

**Drawing No.
1VCR016097**



DOPO LA REGOLAZIONE SERRARE A 100Nm
E SIGILLARE CON VERNICE GIALLA
AFTER ADJUSTMENT TIGHTEN AT 100 Nm
AND SEAL WITH YELLOW VARNISH

COPIA DI SERRAGGIO: 22Nm 1.7-1.8
TORQUE WRENCH

REGOLAZIONE BELLE DOPO
ANNESTAMENTO POLI:
COPIA DI SERRAGGIO 110Nm
RODS SETTING AFTER
CONSOLIDATION PROCESS:
TORQUE WRENCH SETTING 110Nm

INFASO DI MONTAGGIO LUBBRIFICARE
CON GRASSO T16867 COD.13599
DURING THE ASSEMBLY LUBRICATING
WITH GREASE T16867 COD.13599

TORQUE WRENCH SETTING ACC. TO 650833
COPIE DI SERRAGGIO SEC.650833

00 DIMENSIONI DI CONTROLLO
SEPARATED BILL OF MATERIAL
TABELLA MATERIALI A PARTE

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TIPO	TIPO POLO
G0001	PIVG5
G0002	PIVG4S
G0003	PIVG5
G0004	PIVG4S
G0005	PIVG5
G0006	PIVG4S
G0007	PIVG5
G0008	PIVG4
G0009	PIVG4
G0010	PIVG4
G0011	PIVG4
G0012	PIVG4
G0013	PIVG4
G0014	PIVG4
G0015	PIVG4
G0016	PIVG4
G0017	PIVG5
G0018	PIVG4
G0019	PIVG4
G0020	PIVG4S
G0021	PIVG4
G0022	PIVG4S
G0023	PIVG4
G0024	PIVG4S

INTERASSE POLI	TIPO	TIPO POLO
P.150	G0001	PIVG5
P.150	G0002	PIVG4S
P.210	G0003	PIVG5
P.210	G0004	PIVG4S
P.275	G0005	PIVG5
P.275	G0006	PIVG4S
P.150	G0007	PIVG5
P.150	G0008	PIVG4
P.275	G0009	PIVG4
P.210	G0010	PIVG4
P.150	G0011	PIVG4
P.150	G0012	PIVG4
P.275	G0013	PIVG4
P.210	G0014	PIVG4
P.150	G0015	PIVG4
P.210	G0016	PIVG4
P.210	G0017	PIVG5
P.150	G0018	PIVG4
P.150	G0019	PIVG4
P.210	G0020	PIVG4S
P.210	G0021	PIVG4
P.275	G0022	PIVG4S
P.275	G0023	PIVG4
P.275	G0024	PIVG4S

Thread quality tolerance according to ISO 13715 Npt - UN ISO 228-2	Material / Materiale General tolerance for casting and N.C. in punching table Tolleranze secondo ISO 1101 Linear equal / Linear equal quote Coordinate di parte C.N. JS11	Finishing / Finitura
ITSCB Design: E.S. Belgiojini Check: 2009/04/14 Verifica: Valotta	Approved / Approvato Bontal	Base C.B. POLES P1 INTERRUITTORE BASE POLI P1
E.C. N. Mod. N.	17234 2007-2008-1723	V.D.4 1:1
ABB S.p.A. under license of ABB Technology Ltd		1VCR016097

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**Technical Data of Test Circuit
Basic Short-Circuit Test Duties**

Test performed		T10		T30	
Test No.	PEHLA 09137Ra /	12 - 13		05 - 06	
Circuit diagram (test circuit)	see sheet	13		13	
Test object					
Rated voltage	kV	17.5		17.5	
Rated frequency	Hz	50		50	
Short-circuit breaking current	kA	3.15		9.45	
Units under test		1 per phase		1 per phase	
Voltage distribution	%	-		-	
Number of phases (test circuit)		3		3	
Power factor (test circuit)		< 0.15		< 0.15	
Frequency (test circuit)	Hz	50		50	
Earthing conditions					
Generator		earthed via 5 kΩ		earthed via 5 kΩ	
Transformer		not earthed		not earthed	
Short-circuit point		earthed		earthed	
Prospective transient recovery voltage		Required values	Tested values	Required values	Tested values
Evaluation of oscillogram	No.	-	prosp.	-	05
Crest value u_c	kV	36.4	35.8 ¹⁾	34.3	34.5
Time t_3	μs	16	49.8 ²⁾	16	28.3 ³⁾
Time delay t_d	μs	2	5.3 ²⁾	2	2.5 ³⁾
Rate of rise u_c/t_3	kV/μs	2.28	0.72	2.14	1.22
u_1	kV	-	-	-	-
t_1	μs	-	-	-	-

- Remarks:**
- 1) Due to limitations of the test plant the crest value u_c could not be reached.
 - 2) For test duty T10 the shortest time which can be met by the test circuit is used acc. IEC 62271-100, clause 6.104.5.5
 - 3) For test duty T30 the shortest time which can be met by the test circuit is used acc. IEC 62271-100, clause 6.104.5.4

На основании чл.36а
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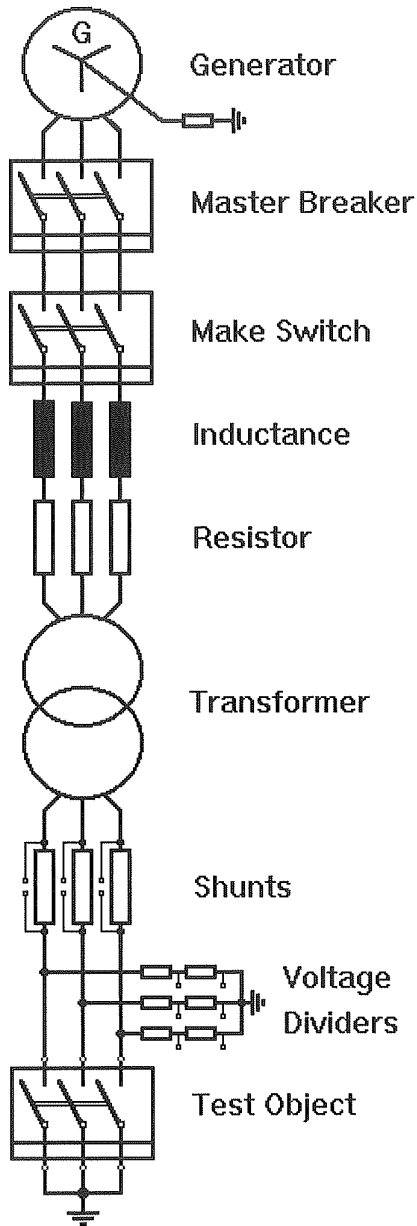
**Technical Data of Test Circuit
Basic Short-Circuit Test Duties**

Test performed		T60		T100	
Test No.	PEHLA 09137Ra /	10 - 11		22 - 23	
Circuit diagram (test circuit)	see sheet	13		13	
Test object					
Rated voltage	kV	17.5		17.5	
Rated frequency	Hz	50		50	
Short-circuit breaking current	kA	18.9		31.5	
Units under test		1 per phase		1 per phase	
Voltage distribution	%	-		-	
Number of phases (test circuit)		3		3	
Power factor (test circuit)		< 0.15		< 0.15	
Frequency (test circuit)	Hz	50		50	
Earthing conditions					
Generator		earthed via 5 kΩ		earthed via 5 kΩ	
Transformer		not earthed		not earthed	
Short-circuit point		earthed		earthed	
Prospective transient recovery voltage		Required values	Tested values	Required values	Tested values
Evaluation of oscillogram	No.	-	prosp.	-	prosp.
Crest value u_c	kV	32.1	35.2	30.0	33.6
Time t_3	μs	31.0	30.3	71.0	69.7
Time delay t_d	μs	5	3.5	11	9.7
Rate of rise u_d/t_3	kV/μs	1.04	1.16	0.42	0.48
u_1	kV	-	-	-	-
t_1	μs	-	-	-	-

Remarks: -

На основании чл.36а
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**Circuit Diagram
Basic Short-Circuit Test Duties**



На основании чл.36а
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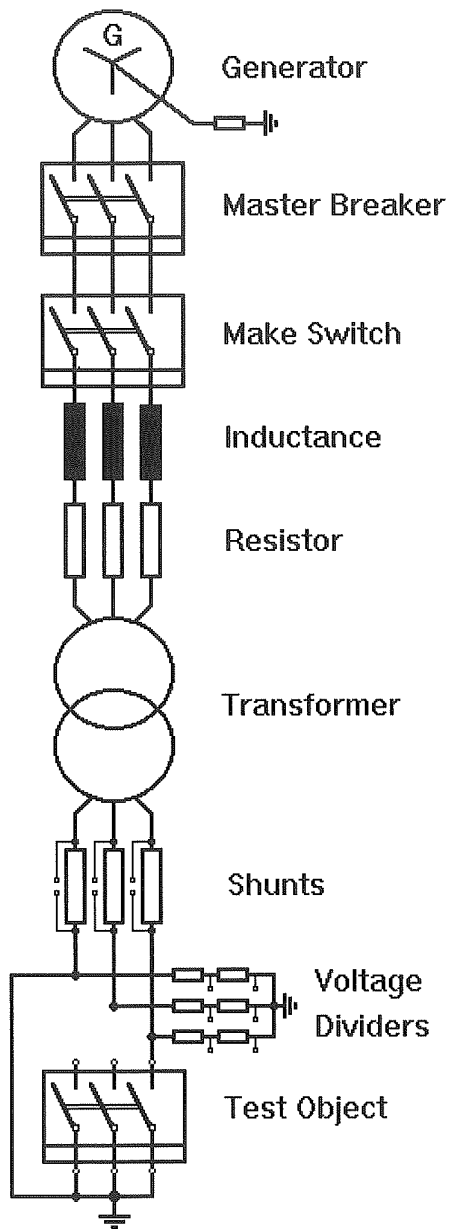
**Technical Data of Test Circuit
Single-Phase and Double-Earth Fault Test**

Test performed		Single-phase fault		Double-earth fault	
Test No.	PEHLA 09137Ra /	40 - 41		36 - 39	
Circuit diagram (test circuit)	see sheet	15		15	
Test object					
Rated voltage	kV	17.5		17.5	
Rated frequency	Hz	50		50	
Short-circuit breaking current	kA	31.5		27.4	
Units under test		1		1	
Voltage distribution	%	-		-	
Number of phases (test circuit)		1		1	
Power factor (test circuit)		< 0.15		< 0.15	
Frequency (test circuit)	Hz	50		50	
Earthing conditions					
Generator		earthed via 5 kΩ		earthed via 5 kΩ	
Transformer		not earthed		not earthed	
Short-circuit point		earthed		earthed	
Prospective transient recovery voltage		Required values	Tested values	Required values	Tested values
Evaluation of oscillogram	No.	-	prosp.	-	prosp.
Crest value u_c	kV	20.0	23.1	34.6	39.1
Time t_3	μs	47.0	48.7	82.0	71.9
Time delay t_d	μs	-	5.4	-	8.2
Rate of rise u_c/t_3	kV/μs	0.42	0.47	0.42	0.54
u_1	kV	-	-	-	-
t_1	μs	-	-	-	-

Remarks: -

На основании чл.36а
ал.3 от ЗОП

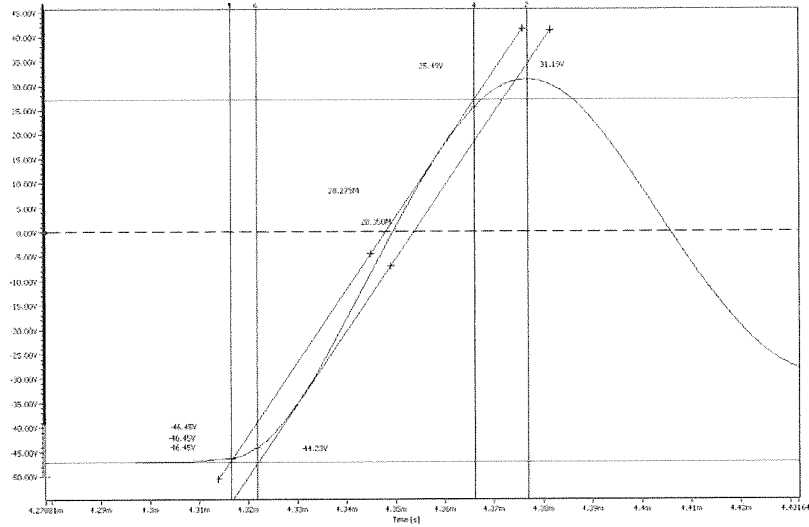
Circuit Diagram
Single-Phase and Double-Earth Fault Test



На основании чл.36а
ал.3 от ЗОП

Oscillograms Determination of Prospective TRV

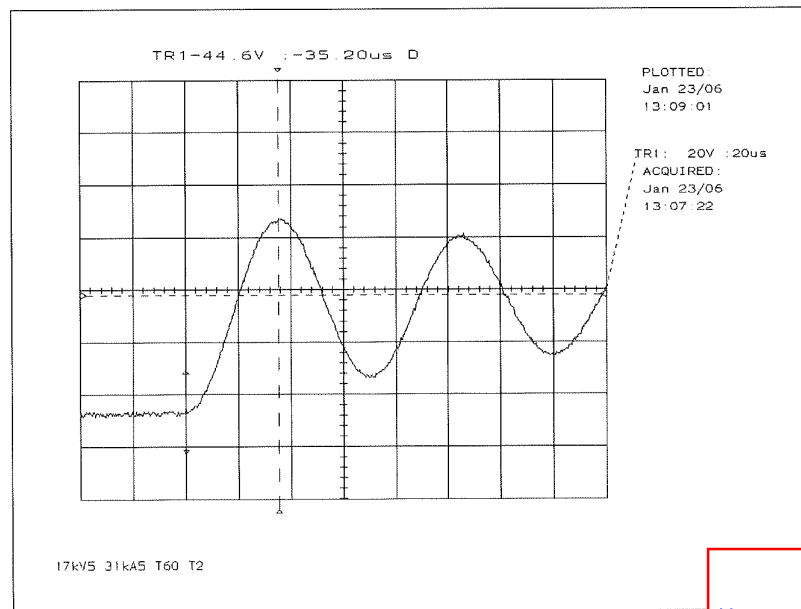
T10:



13.17µs/div
40.00ms : 50.000ms
20.000V : 50.000V

Values derived from oscillogram: Amplitude factor $k_{af} = 1.67$; time to peak value $t_2 = 60.6 \mu s$

T60:



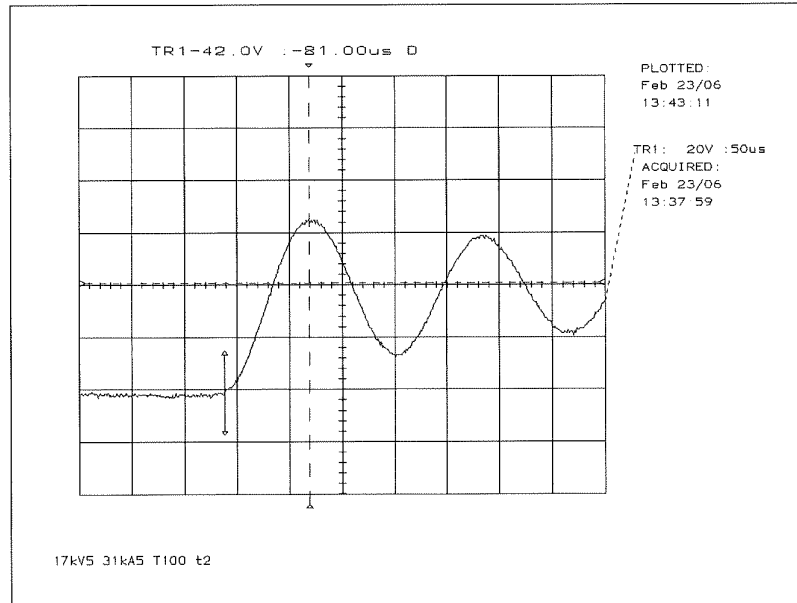
Values derived from oscillogram: Amplitude factor $k_{af} = 1.64$; time to peak

На основе чл.36а
ал.3 от ЗОП

000204

**Oscillograms
Determination of Prospective TRV**

T100:



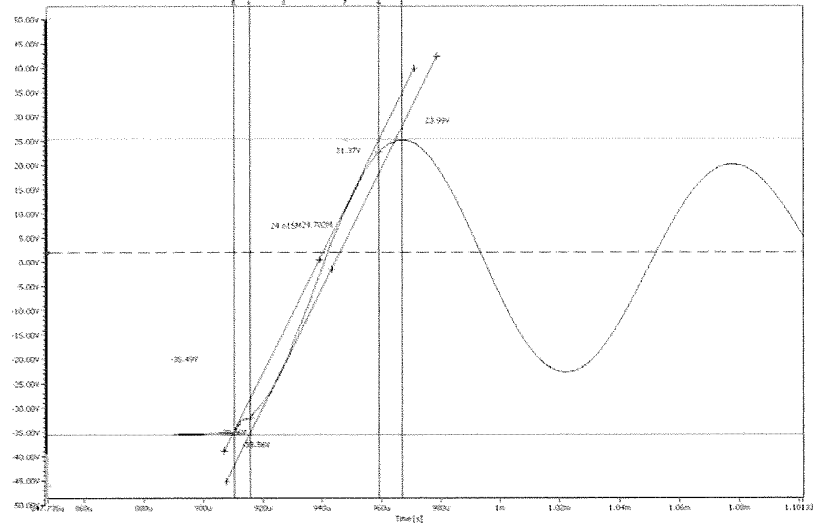
Values derived from oscillogram: Amplitude factor $k_{af} = 1.57$; time to peak value $t_2 = 81.0 \mu s$

На основании чл.36а
ал.3 от ЗОП

000205

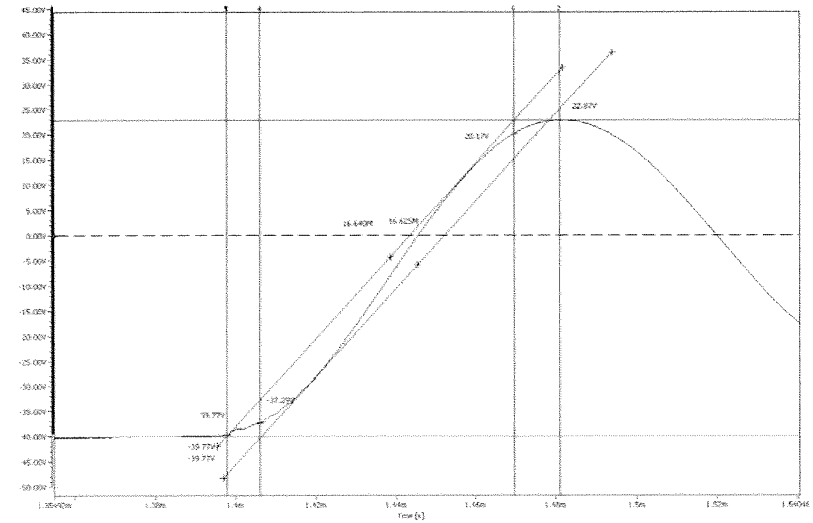
**Oscillograms
Determination of Prospective TRV**

SPF:



Values derived from oscillogram: Amplitude factor $k_{af} = 1.62$; time to peak value $t_2 = 56.2 \mu s$

DEF:



Values derived from oscillogram: Amplitude factor $k_{af} = 1.58$; time to peak value $t_2 = 56.2 \mu s$

На основании чл.36а
ал.3 от ЗОП

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090203

Test Results
Basic Short-Circuit Test Duty T30

Test performed: Basic short-circuit making and breaking tests (T30)
Date of test: 04th August 2009
Condition of test object before test: Pre-stressed with short-time withstand current and peak withstand current test performed as PEHLA 09132Ra.
Test arrangement: Direct test circuit, vacuum circuit-breaker in metal-enclosed, air insulated switchgear.
Connections to test object: Infeed via copper bars to the busbars of the metal-enclosed, air-insulated switchgear. Short-circuited at the cable-terminals of the switchgear via copper bar, short-circuit point and switchgear earthed via cable.
Gas pressure (abs. rel. to 20 °C): -

Test No.	PEHLA 09137Ra /	05	06	-	-	-			
Operating sequence and time intervals		O-0.3s-CO-3min-CO			-	-	-		
Applied voltage	kV	-	19.4	18.7	-	-	-		
Making current (peak)	L1	kA	-	25.2	25.2	-	-	-	
	L2	kA	-	24.8	20.4	-	-	-	
	L3	kA	-	16.4	20.9	-	-	-	
Breaking current (r.m.s.)	L1	kA	10.4	10.4	9.97	-	-	-	
	L2	kA	10.7	10.7	10.4	-	-	-	
	L3	kA	10.5	10.5	10.2	-	-	-	
	Average value	kA	10.5	10.6	10.2	-	-	-	
Recovery voltage (r.m.s.)	L1	kV	10.7	10.5	9.47	-	-	-	
	L2	kV	10.3	10.8	9.50	-	-	-	
	L3	kV	10.8	10.7	9.86	-	-	-	
	Average value between phases	kV	18.4	18.5	16.6	-	-	-	
Transient recovery voltage	Voltage u_1	kV	-	-	-	-	-	-	
	Time t_1	μ s	-	-	-	-	-	-	
	TRV peak value u_c	kV	34.5	33.8	29.3	-	-	-	
	Time t_3	μ s	28.3	28.1	26.5	-	-	-	
	Time delay t_d	μ s	2.5	2.5	2.3	-	-	-	
	Rate of rise u_c/t_3	kV/ μ s	1.22	1.20	1.11	-	-	-	
C-Operation	Voltage of closing device	V	-	94	94	-	-	-	
	Closing time	ms	-	61.9	61.8	-	-	-	
	Pre-arcing time	ms	-	0.7	0.9	-	-	-	
	Make time	ms	-	61.2	59.0	-	-	-	
O-Operation	Voltage of opening device	V	77	77	77	-	-	-	
	Opening time	ms	56.4	56.4	57.0	-	-	-	
	Arcing time	L1	ms	8.1	10.1	8.1	-	-	-
		L2	ms	3.1	10.1	8.1	-	-	-
		L3	ms	8.0	5.1	2.5	-	-	-
Break time	ms	64.5	66.5	65.1	-	-	-		
Emission of flame/gas/oil, occurrence of NSDD		no	no	no	-	-	-		
Number of valid test		-	-	-	-	-	-		
Test result		P	P	P	-	-	-		

Legend: P: Passed in terms of the applied standard N: Not passed in terms of the applied standard

Remarks: PEHLA 09137Ra / 01: Current Calibration
 PEHLA 09137Ra / 02 to 04: No-load operations

Condition of test object after test: Test object not inspected, continued with test duty

На основании чл.36а
 ал.3 от ЗОП

Test Results
Basic Short-Circuit Test Duty T60

Test performed: Basic short-circuit making and breaking tests (T60)
Date of test: 04th August 2009
Condition of test object before test: As after test PEHLA 09137Ra / 06.
Test arrangement: Direct test circuit, vacuum circuit-breaker in metal-enclosed, air insulated switchgear.
Connections to test object: Infeed via copper bars to the busbars of the metal-enclosed, air-insulated switchgear. Short-circuited at the cable terminals of the switchgear via copper bar, short-circuit point and switchgear earthed via cable.
Gas pressure (abs. rel. to 20 °C): -

Test No.			PEHLA 09137Ra /		10	11	-	-	-
Operating sequence and time intervals					O-0.3s-CO-3min-CO		-	-	-
Applied voltage			kV	-	18.1	18.4	-	-	-
Making current (peak)	L1	kA	-	50.0	50.7	-	-	-	
	L2	kA	-	47.3	44.0	-	-	-	
	L3	kA	-	33.3	39.2	-	-	-	
Breaking current (r.m.s.)	L1	kA	18.8	18.9	18.8	-	-	-	
	L2	kA	19.7	19.8	19.2	-	-	-	
	L3	kA	19.1	19.2	19.3	-	-	-	
	Average value	kA	19.2	19.3	19.1	-	-	-	
Recovery voltage (r.m.s.)	L1	kV	9.56	9.68	9.72	-	-	-	
	L2	kV	9.54	9.52	9.54	-	-	-	
	L3	kV	9.85	9.64	10.0	-	-	-	
	Average value between phases	kV	16.7	16.7	16.9	-	-	-	
Transient recovery voltage	Voltage u_1	kV	-	-	-	-	-	-	
	Time t_1	μ s	-	-	-	-	-	-	
	TRV peak value u_c	kV	27.4	26.4	26.9	-	-	-	
	Time t_3	μ s	26.6	26.3	29.0	-	-	-	
	Time delay t_d	μ s	2.5	2.4	5.4	-	-	-	
	Rate of rise u_c/t_3	kV/ μ s	1.03	1.00	0.93	-	-	-	
C-Operation	Voltage of closing device	V	-	94	94	-	-	-	
	Closing time	ms	-	61.4	61.4	-	-	-	
	Pre-arcing time	ms	-	0.0	0.0	-	-	-	
	Make time	ms	-	61.4	61.4	-	-	-	
O-Operation	Voltage of opening device	V	77	77	77	-	-	-	
	Opening time	ms	56.9	56.9	56.3	-	-	-	
	Arcing time L1	ms	8.2	7.6	8.9	-	-	-	
	L2	ms	3.2	2.5	8.9	-	-	-	
	L3	ms	8.2	7.6	3.8	-	-	-	
Break time	ms	65.1	64.5	65.2	-	-	-		
Emission of flame/gas/oil, occurrence of NSDD			no	no	no				
Number of valid test			-	-	-				
Test result			P	P	P				

Legend: P: Passed in terms of the applied standard N: Not passed in terms of the applied standard

Remarks: PEHLA 09137Ra / 07 to 09: Tests with reduced values

Condition of test object after test: Test object not inspected, continued with test duty

На основании чл.36а
ал.3 от ЗОП

Test Results
Basic Short-Circuit Test Duty T10

Test performed: Basic short-circuit making and breaking tests (T10)
Date of test: 05th August 2009
Condition of test object before test: As after test PEHLA 09137Ra / 11.
Test arrangement: Direct test circuit, vacuum circuit-breaker in metal-enclosed, air insulated switchgear.
Connections to test object: Infeed via copper bars to the busbars of the metal-enclosed, air-insulated switchgear. Short-circuited at the cable terminals of the switchgear via copper bar, short-circuit point and switchgear earthed via cable.
Gas pressure (abs. rel. to 20 °C): -


Test No.	PEHLA 09137Ra /	12	13	-	-	-			
Operating sequence and time intervals		O-0.3s-CO-3min-CO			-	-	-		
Applied voltage	kV	-	18.2	17.8	-	-	-		
Making current (peak)	L1	kA	-	7.52	8.63	-	-	-	
	L2	kA	-	8.82	7.44	-	-	-	
	L3	kA	-	6.28	6.48	-	-	-	
Breaking current (r.m.s.)	L1	kA	3.50	3.56	3.57	-	-	-	
	L2	kA	3.60	3.68	3.70	-	-	-	
	L3	kA	3.48	3.55	3.57	-	-	-	
	Average value	kA	3.53	3.60	3.61	-	-	-	
Recovery voltage (r.m.s.)	L1	kV	10.3	9.95	9.55	-	-	-	
	L2	kV	9.94	10.0	9.75	-	-	-	
	L3	kV	10.2	9.71	9.78	-	-	-	
	Average value between phases	kV	17.6	17.1	16.8	-	-	-	
Transient recovery voltage	Voltage u_1	kV	-	-	-	-	-	-	
	Time t_1	μ s	-	-	-	-	-	-	
	TRV peak value u_c	kV	33.7	32.3	28.8	-	-	-	
	Time t_3	μ s	49.1	54.1	44.6	-	-	-	
	Time delay t_d	μ s	3.2	6.6	2.8	-	-	-	
	Rate of rise u_c/t_3	kV/ μ s	0.69	0.60	0.65	-	-	-	
C-Operation	Voltage of closing device	V	-	94	94	-	-	-	
	Closing time	ms	-	61.4	62.0	-	-	-	
	Pre-arcing time	ms	-	0.0	0.0	-	-	-	
	Make time	ms	-	61.4	62.0	-	-	-	
O-Operation	Voltage of opening device	V	77	77	77	-	-	-	
	Opening time	ms	56.9	56.9	56.6	-	-	-	
	Arcing time	L1	ms	7.0	8.0	7.8	-	-	-
		L2	ms	2.2	8.0	7.8	-	-	-
		L3	ms	7.0	7.9	2.4	-	-	-
Break time	ms	63.9	64.9	64.4	-	-	-		
Emission of flame/gas/oil, occurrence of NSDD		no	no	no	-	-	-		
Number of valid test		-	-	-	-	-	-		
Test result		P	P	P	-	-	-		

На основании чл.36а
ал.3 от ЗОП

Legend: P: Passed in terms of the applied standard N: Not passed in terms of the

Remarks: -

Condition of test object after test: Test object not inspected, continued with test duty


31PE0707

000203

Test Results
Basic Short-Circuit Test Duty T100s

Test performed: Basic short-circuit making and breaking tests (T100s)
Date of test: 05th August 2009
Condition of test object before test: As after test PEHLA 09137Ra / 13.
Test arrangement: Direct test circuit, vacuum circuit-breaker in metal-enclosed, air insulated switchgear.
Connections to test object: Infeed via copper bars to the busbars of the metal-enclosed, air-insulated switchgear. Short-circuited at the cable terminals of the switchgear via copper bar, short-circuit point and switchgear earthed via cable.
Gas pressure (abs. rel. to 20 °C): -

Test No.	PEHLA 09137Ra /	22	23	-	-	-		
Operating sequence and time intervals		O-0.3s-CO-3min-CO			-	-	-	
Applied voltage	kV	-	19.8	20.0	-	-	-	
Making current (peak)	L1	kA	-	57.1	59.5	-	-	-
	L2	kA	-	72.9	93.5	-	-	-
	L3	kA	-	81.0	99.2	-	-	-
Breaking current (r.m.s.)	L1	kA	31.0	30.6	32.1	-	-	-
	L2	kA	33.1	32.9	34.2	-	-	-
	L3	kA	31.9	31.5	32.9	-	-	-
	Average value	kA	32.0	31.7	33.1	-	-	-
Recovery voltage (r.m.s.)	L1	kV	10.7	9.97	9.97	-	-	-
	L2	kV	10.5	10.1	10.1	-	-	-
	L3	kV	10.4	10.2	10.2	-	-	-
	Average value between phases	kV	18.3	17.0	17.4	-	-	-
Transient recovery voltage	Voltage u_1	kV	-	-	-	-	-	-
	Time t_1	μ s	-	-	-	-	-	-
	TRV peak value u_c	kV	28.4	25.7	28.0	-	-	-
	Time t_3	μ s	62.4	63.7	63.5	-	-	-
	Time delay t_d	μ s	5.5	5.7	5.8	-	-	-
	Rate of rise u_c/t_3	kV/ μ s	0.46	0.40	0.44	-	-	-
C-Operation	Voltage of closing device	V	-	94	94	-	-	-
	Closing time	ms	-	62.6	61.4	-	-	-
	Pre-arcing time	ms	-	0.3	0.0	-	-	-
	Make time	ms	-	62.1	61.4	-	-	-
O-Operation	Voltage of opening device	V	77	77	77	-	-	-
	Opening time	ms	57.6	57.6	57.8	-	-	-
	Arcing time L1	ms	12.4	2.9	4.4	-	-	-
	L2	ms	12.4	8.4	10.1	-	-	-
	L3	ms	7.1	8.4	10.1	-	-	-
	Break time	ms	70.0	66.0	67.9	-	-	-
Emission of flame/gas/oil, occurrence of NSDD		no	no	no	-	-	-	
Number of valid test		-	-	-	-	-	-	
Test result		P	P	P	-	-	-	

На основании чл.36а
ал.3 от ЗОП

Legend: P: Passed in terms of the applied standard N: Not passed in terms of the

Remarks: PEHLA 09137Ra / 14 to 21: Tests with reduced values

Condition of test object after test: Test object not inspected, continued with test duty

000219

Test Results
Basic Short-Circuit Test Duty T100a

Test performed: Basic short-circuit making and breaking tests (T100a)
Date of test: 05th August 2009
Condition of test object before test: As after test PEHLA 09137Ra / 23.
Test arrangement: Direct test circuit, vacuum circuit-breaker in metal-enclosed, air insulated switchgear.
Connections to test object: Infeed via copper bars to the busbars of the metal-enclosed, air-insulated switchgear. Short-circuited at the cable terminals of the switchgear via copper bar, short-circuit point and switchgear earthed via cable.
Gas pressure (abs. rel. to 20 °C): -

Test No.	PEHLA 09137Ra /	27	28	29	30	31	32	
Operating sequence and time intervals		O	O	O	O	O	O	
Breaking current (r.m.s.)	L1	kA	31.0	31.8	31.8	30.5	30.5	
	L2	kA	32.6	32.6	32.6	33.9	33.9	
	L3	kA	31.8	31.5	31.5	31.9	31.9	
	Average value	kA	31.8	32.0	32.0	32.1	32.1	
Breaking current - last current loop (peak)	L1	kA	55.2	43.5	43.5	28.8	53.9	
	L2	kA	30.8	42.5	57.6	46.1	46.1	
	L3	kA	44.7	30.3	30.3	56.4	56.4	
Duration of the last current loop	L1	ms	11.9	10.2	10.2	8.1	11.8	
	L2	ms	8.1	7.9	11.8	10.2	10.2	
	L3	ms	10.1	8.2	8.2	11.8	11.8	
DC-component	L1	%	28.0	< 20	< 20	30.8	27.2	
	L2	%	31.3	34.7	29.9	< 20	< 20	
	L3	%	< 20	37.7	33.0	26.3	23.0	
Recovery voltage (r.m.s.)	L1	kV	10.2	10.3	10.0	10.3	10.4	
	L2	kV	10.3	10.3	10.2	9.92	9.94	
	L3	kV	10.0	10.2	10.5	10.3	10.4	
	Average value between phases	kV	17.6	17.8	17.8	17.7	17.5	
Transient recovery voltage	Voltage u_1	kV	-	-	-	-	-	
	Time t_1	µs	-	-	-	-	-	
	TRV peak value u_c	kV	28.5	26.5	28.2	28.7	28.8	
	Time t_3	µs	61.9	62.0	63.4	61.1	61.0	
	Time delay t_d	µs	5.5	5.5	5.8	5.3	5.2	
	Rate of rise u_c/t_3	kV/µs	0.46	0.43	0.45	0.47	0.47	
O-Operation	Voltage of opening device	V	121	121	121	121	121	
	Opening time	ms	41.3	41.4	41.4	41.4	41.9	
	Arcing time	L1	ms	10.6	11.5	6.7	9.8	7.1
		L2	ms	10.6	11.5	12.3	4.2	1.5
		L3	ms	4.8	5.3	12.3	9.8	7.1
	Break time	ms	51.9	52.9	53.7	51.9	51.9	
Emission of flame/gas/oil, occurrence of NSDD			no	no	no	no	no	
Number of valid test			1	-	2	-	-	
Test result			P	P	P	P	P	

На основании чл.36а
ап.3 от ЗОП

Legend: P: Passed in terms of the applied standard N: Not passed in terms of the applied standard
Remarks: PEHLA 09137Ra / 24: No-Load Operation
 PEHLA 09137Ra / 25 to 26: Tests with reduced values
Condition of test object after test: Condition check performed, no visible or functional damage

 31PE0707

000211

Test Results
Single-Phase and Double-Earth Fault Test

Test performed: Single-phase and double-earth fault test
Date of test: 07th August 2010
Condition of test object before test: As after test PEHLA 09137Ra / 32.
Test arrangement: Direct test circuit, vacuum circuit-breaker in metal-enclosed, air insulated switchgear.
Connections to test object: Single-phase infeed via copper bars to the busbar terminal of the relevant phase under test. Cable terminal of the same phase connected to another phase of the test circuit and earthed via cable. Third phase of test circuit and test object not connected.
Gas pressure (abs. rel. to 20 °C): -

Test No.	PEHLA 09137Ra /		39	41	-	-	-	-
Operating sequence and time intervals			O (DEF)	O (SPF)	-	-	-	-
Applied voltage		kV	-	-	-	-	-	-
Making current (peak)	L1	kA	-	-	-	-	-	-
	L2	kA	-	-	-	-	-	-
	L3	kA	-	-	-	-	-	-
Breaking current (r.m.s.)	L1	kA	-	31.5	-	-	-	-
	L2	kA	28.2	-	-	-	-	-
	L3	kA	-	-	-	-	-	-
	Average value	kA	-	-	-	-	-	-
Recovery voltage (r.m.s.)	L1	kV	-	9.72	-	-	-	-
	L2	kV	16.6	-	-	-	-	-
	L3	kV	-	-	-	-	-	-
	Average value between phases	kV	-	-	-	-	-	-
Transient recovery voltage	Voltage u_1	kV	-	-	-	-	-	-
	Time t_1	μ s	-	-	-	-	-	-
	TRV peak value u_c	kV	30.5	17.0	-	-	-	-
	Time t_3	μ s	62.9	47.1	-	-	-	-
	Time delay t_d	μ s	5.3	5.2	-	-	-	-
	Rate of rise u_c/t_3	kV/ μ s	0.49	0.36	-	-	-	-
C-Operation	Voltage of closing device	V	-	-	-	-	-	-
	Closing time	ms	-	-	-	-	-	-
	Pre-arcing time	ms	-	-	-	-	-	-
	Make time	ms	-	-	-	-	-	-
O-Operation	Voltage of opening device	V	121	121	-	-	-	-
	Opening time	ms	41.5	41.1	-	-	-	-
	Arcing time L1	ms	-	12.2	-	-	-	-
	L2	ms	11.6	-	-	-	-	-
	L3	ms	-	-	-	-	-	-
Break time	ms	53.1	53.3	-	-	-	-	
Emission of flame/gas/oil, occurrence of NSDD			no	no				
Number of valid test			1	1				
Test result			P	P				

На основании чл.36а
ал.3 от ЗОП

Legend: P: Passed in terms of the applied standard N: Not passed in terms of the applied standard
Remarks: PEHLA 09137Ra / 33 to 35: No-load operations
 PEHLA 09137Ra / 36 to 38: Tests with reduced values
Condition of test object after test: Condition check performed, no visible or functional damage

**Test Results
No-Load Operations**

Test performed: No-load operations
Date of test: 04th August 2009
Condition of test object before test: Pre-stressed with short-time withstand current and peak withstand current test performed as PEHLA 09132Ra.
Gas pressure (abs. rel. to 20 °C): -

Test No.	PEHLA 09137Ra /		02		03		04		
Operating sequence			O-0.3s-CO		O-0.3s-CO		O-0.3s-CO		
C-Operation	Voltage of closing device	V	-	110	-	121	-	94.0	
	Closing time	L1	ms	-	58.3	-	56.3	-	62.5
		L2	ms	-	58.4	-	56.4	-	62.7
		L3	ms	-	58.5	-	56.4	-	62.6
O-Operation	Voltage of opening device	V	110	110	121	121	77.0	77.0	
	Opening time	L1	ms	43.4	43.4	41.3	41.4	56.7	56.7
		L2	ms	43.4	43.4	41.3	41.5	56.7	56.8
		L3	ms	43.5	43.3	41.4	41.5	56.9	56.7

Legend: -

Remarks: The voltage values correspond to 100% of the rated supply voltage in PEHLA 09137Ra / 02, 110% in PEHLA 09137Ra / 03 and 85% (C) resp. 70% (O) in PEHLA 09137Ra / 04.

Test performed: No-load operations
Date of test: 07th August 2009
Condition of test object before test: As after test PEHLA 09137Ra / 41.
Gas pressure (abs. rel. to 20 °C): -

Test No.	PEHLA 09137Ra /		42		43		44		
Operating sequence			O-0.3s-CO		O-0.3s-CO		O-0.3s-CO		
C-Operation	Voltage of closing device	V	-	110	-	121	-	94.0	
	Closing time	L1	ms	-	58.6	-	57.0	-	63.1
		L2	ms	-	58.6	-	57.0	-	63.2
		L3	ms	-	58.5	-	56.8	-	63.0
O-Operation	Voltage of opening device	V	110	110	121	121	77.0	77.0	
	Opening time	L1	ms	43.3	43.1	41.4	41.3	56.8	56.7
		L2	ms	43.4	43.3	41.5	41.4	56.8	56.9
		L3	ms	43.3	43.1	41.3			

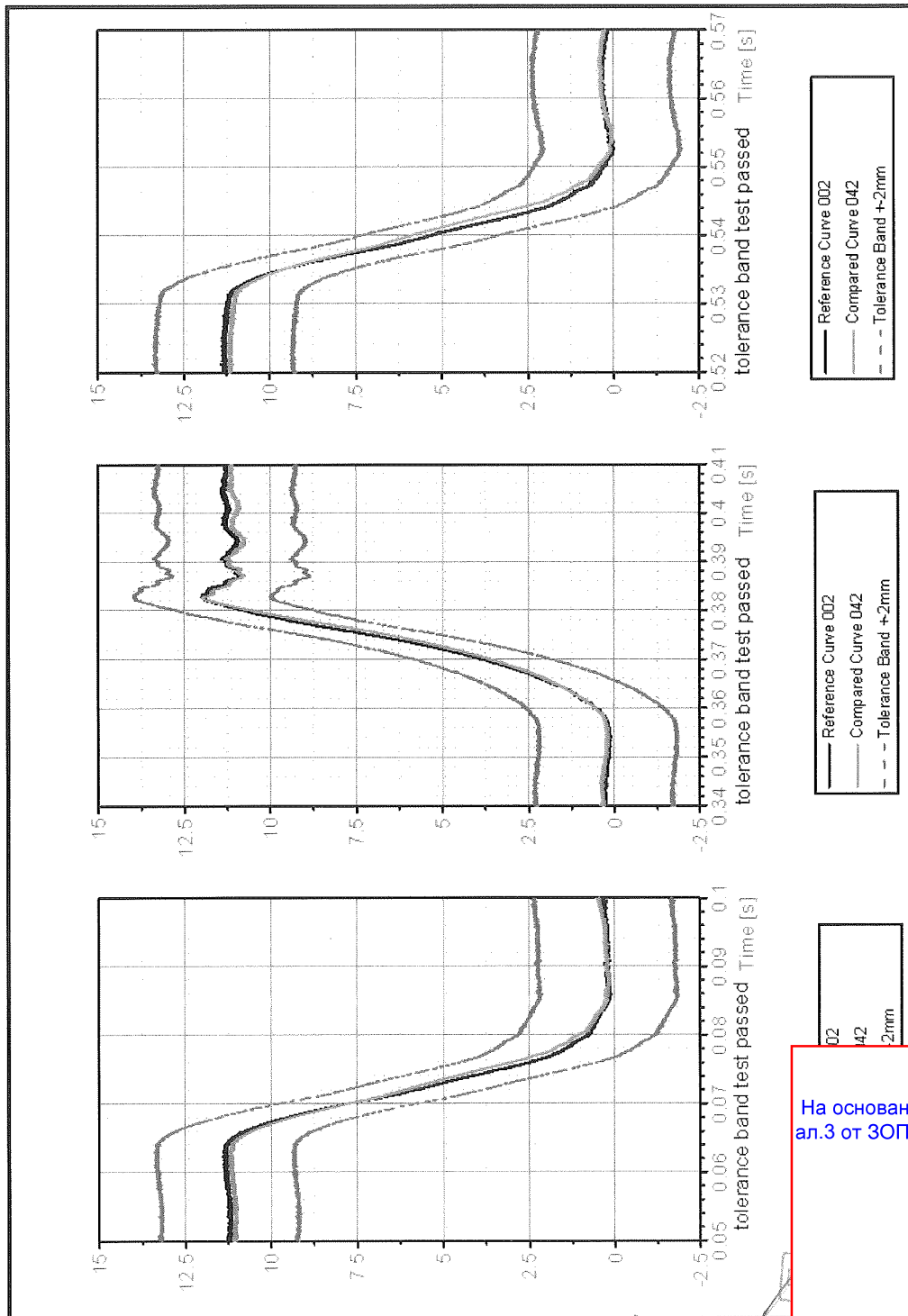
Legend: -

Remarks: The voltage values correspond to 100% of the rated supply voltage in 110% in PEHLA 09137Ra / 43 and 85% (C) resp. 70% (O) in PEHLA (

На основании чл.36а
 ал.3 от ЗОП

Reference Mechanical Travel Characteristics

The mechanical behaviour after tests corresponds to the mechanical travel characteristics established before the test with a tolerance of $\pm 2\text{mm}$ according to IEC 62271-100, cl. 6.101.1.1 and the STL-Guide to IEC 62271-100, cl. 6.101.1.1. (Measurement of an auxiliary voltage that corresponds to the time-travel characteristics of the circuit-breaker.)



02
42
2mm

На основе чл.36а
ал.3 от ЗОП

Measurement of the Resistance of the Main Circuit

Test performed: Measurement of the resistance of the main circuit

Date of test: 04th August 2009

Condition of test object: Factory new.

Measurement before test PEHLA 09137Ra / 02.			
Ambient air temperature:		24.7 °C	
Resistance measurement at direct current of:		100 A (d.c.)	
Measurement between points (see sheet 28)	Resistance of the main circuit μΩ		
	L1	L2	L3
1 - 2	107	103	101
-	-	-	-

Remarks: -

Test performed: Measurement of the resistance of the main circuit

Date of test: 07th August 2009

Condition of test object: As after test PEHLA 09137Ra / 44.

Measurement after test PEHLA 09137Ra / 44.			
Ambient air temperature:		23.8 °C	
Resistance measurement at direct current of:		100 A (d.c.)	
Measurement between points (see sheet 28)	Resistance of the main circuit μΩ		
	L1	L2	L3
1 - 2	112	111	107
-	-	-	-

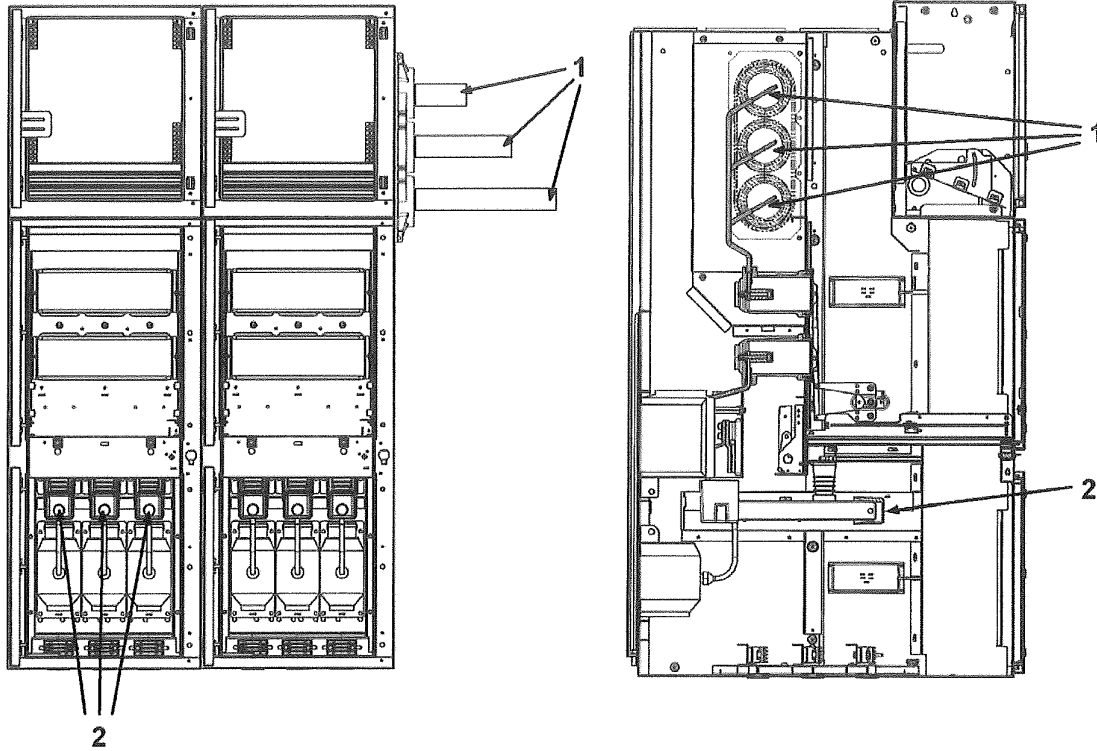
Remarks: -

Result: The variation of the resistance of the main circuit is within the limits given in the applied test specifications.

На основании чл.36а
ал.3 от ЗОП

050215

Measurement of the Resistance of the Main Circuit Measurement Points



На основании чл.36а
ап.3 от ЗОП

090216

Test Results Voltage Test as a Condition Check

Test performed: Voltage test as a condition check according to IEC 62271-100, cl. 6.2.11

Date of test: 06th and 07th August 2009

Condition of test object before test: As after test PEHLA 09137Ra / 35 –
as after test PEHLA 09137Ra / 44

Test arrangement: See below.

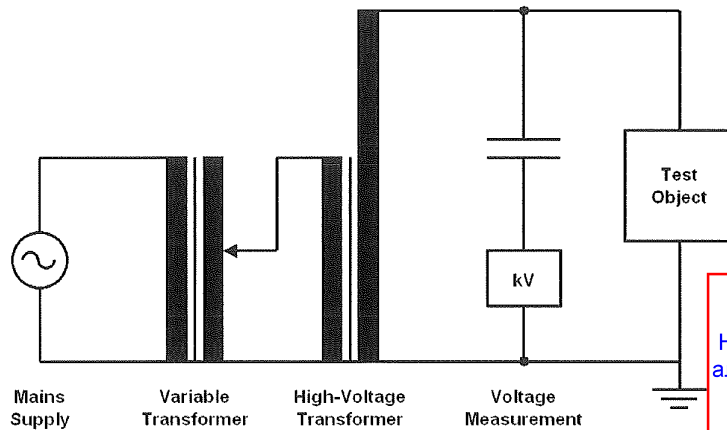
Connections to test object: High-voltage transformer connected to the upper contact arms of the circuit-breaker via copper wire, lower contact arms and frame earthed.

Test arrangement			Test voltage kV	Result Test Duration / Number of disruptive discharges
Condition	Voltage applied to	Earthed		
Circuit-breaker OFF (after test PEHLA 09137Ra / 35)	upper contact arms (L1,L2,L3)	lower contact arms (L1,L2,L3) and frame	30.4	1.0 min / 0
Circuit-breaker OFF (after test PEHLA 09137Ra / 44)	upper contact arms (L1,L2,L3)	lower contact arms (L1,L2,L3) and frame	30.4	1.0 min / 0

Remarks: -

Result: The a.c. voltage test as a condition check was passed successfully.

Condition of test object after test: No visible or functional change or damage.



На основании чл.36а
ап.3 от ЗОП



Photos

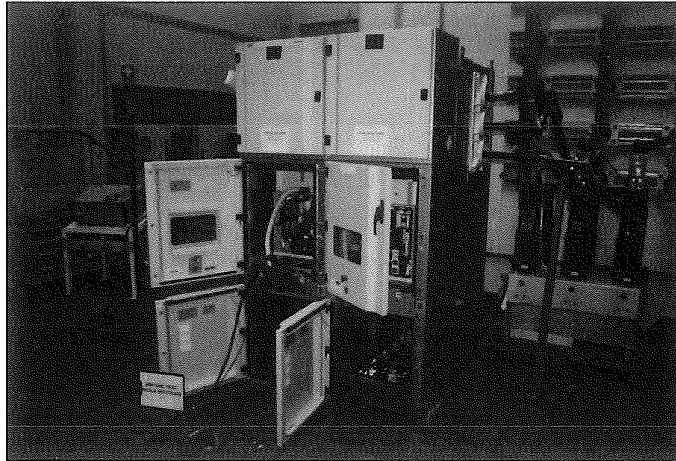


Photo No. 01:
Before test PEHLA 09137Ra / 02

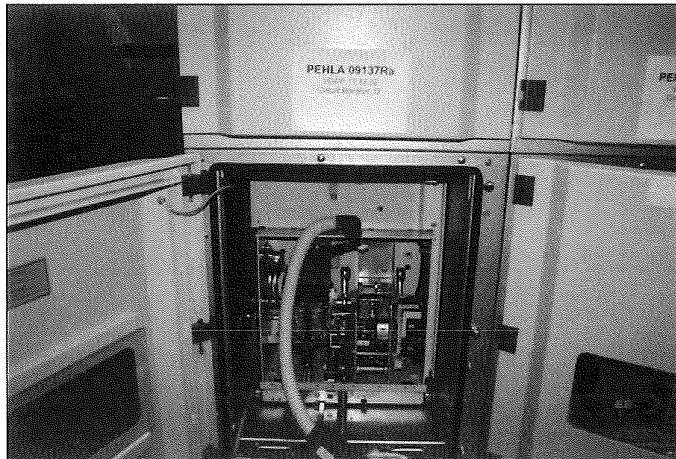


Photo No. 02:
Before test PEHLA 09137Ra / 02

На основании чл.36а
ал.3 от ЗОП

350218



Photos

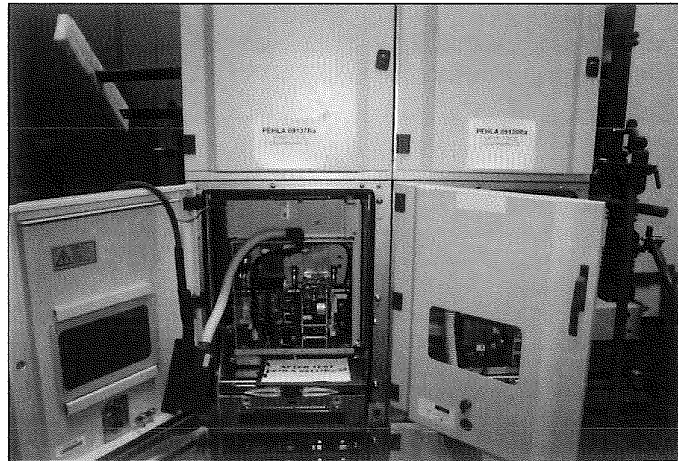


Photo No. 03:
After test PEHLA 09137Ra / 35

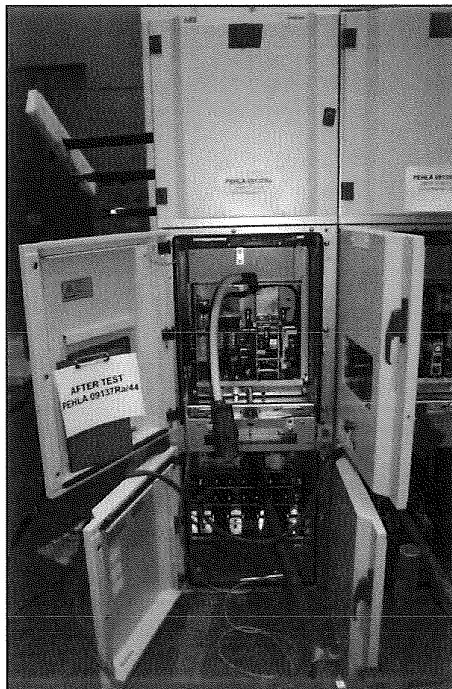
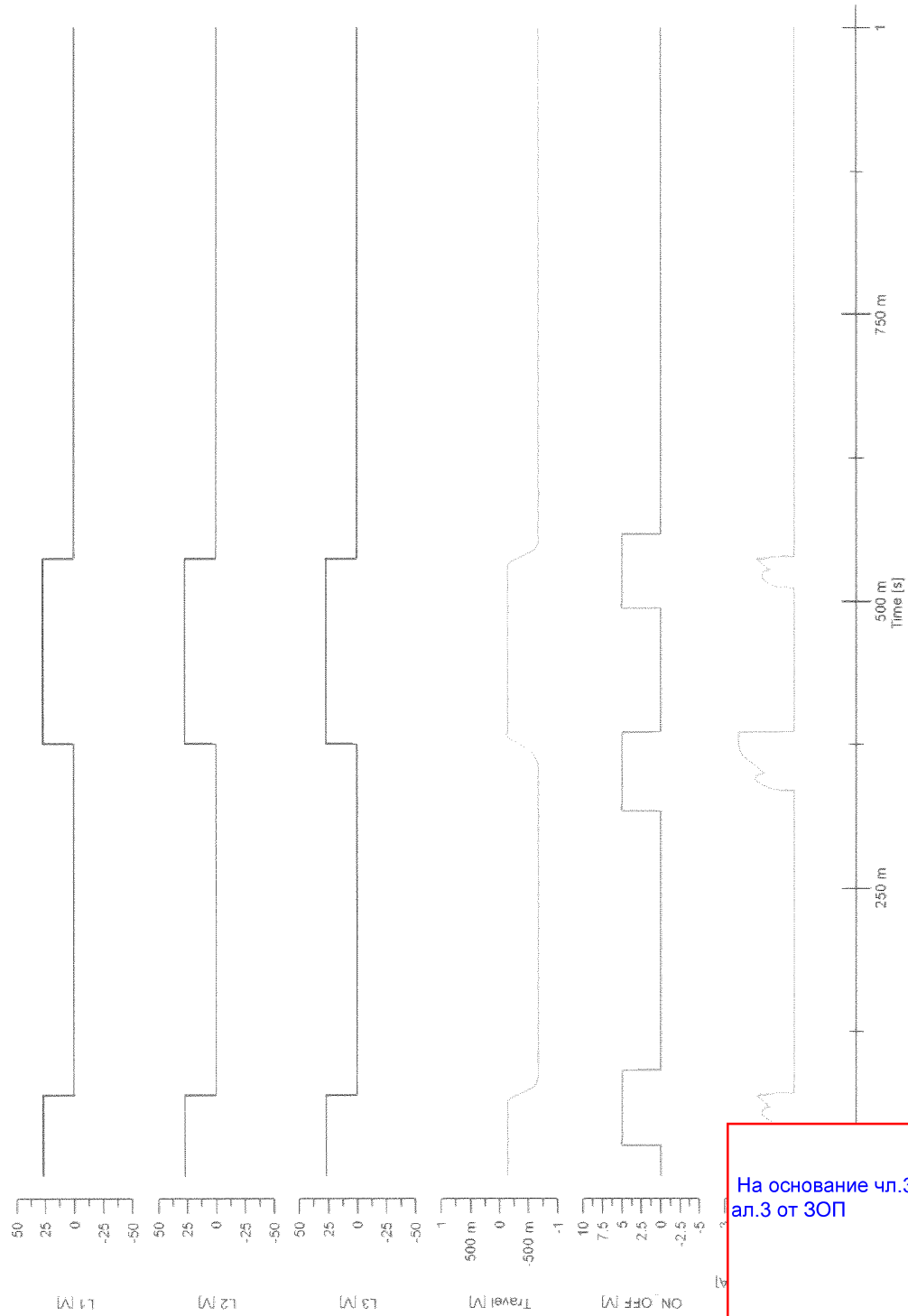


Photo No. 04:
After test PEHLA 09137Ra / 44

На основании чл.36а
ал.3 от ЗОП

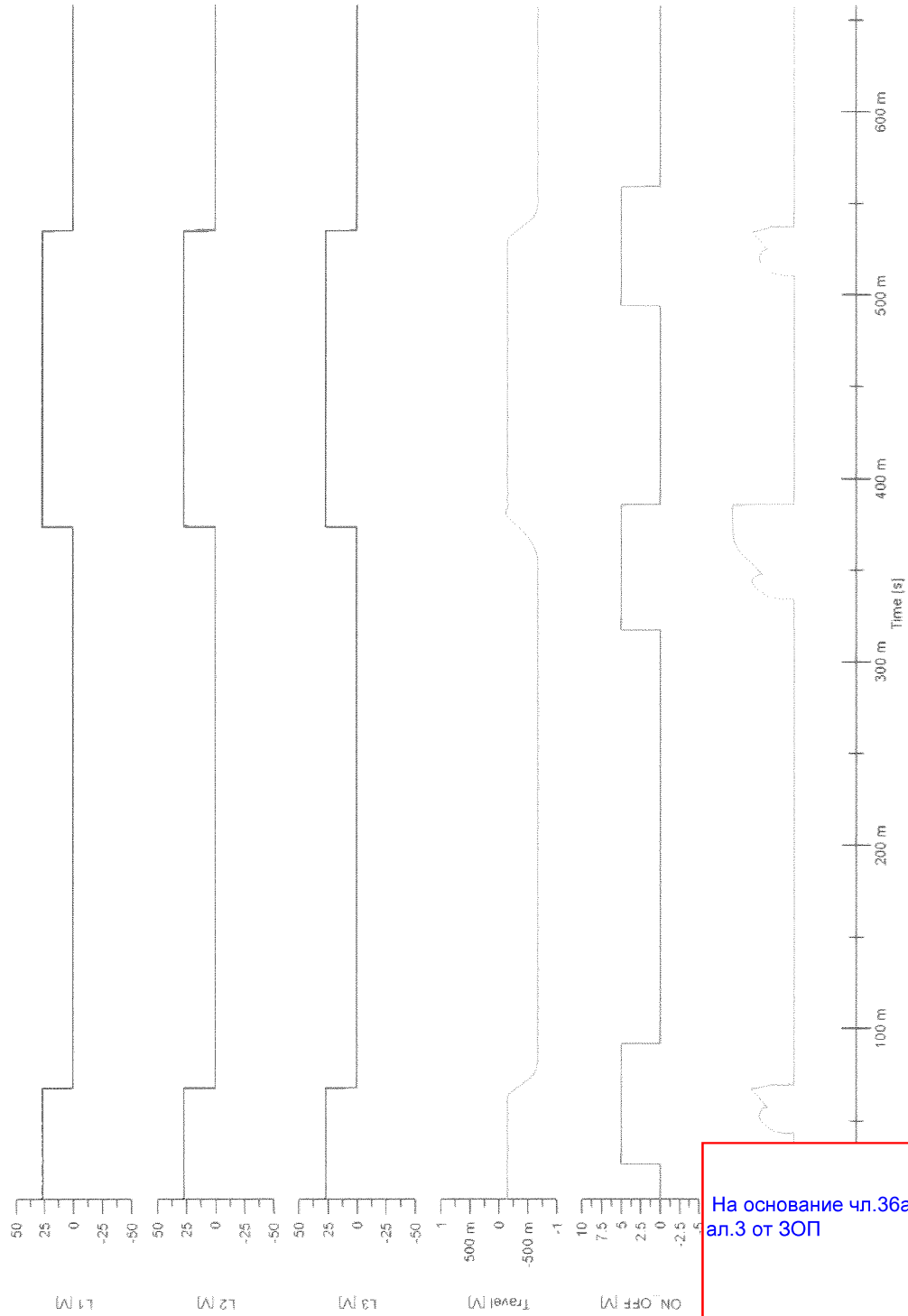
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Oscillogram No. PEHLA 09137Ra / 02
No-Load Operation (Rated Auxiliary Voltage)



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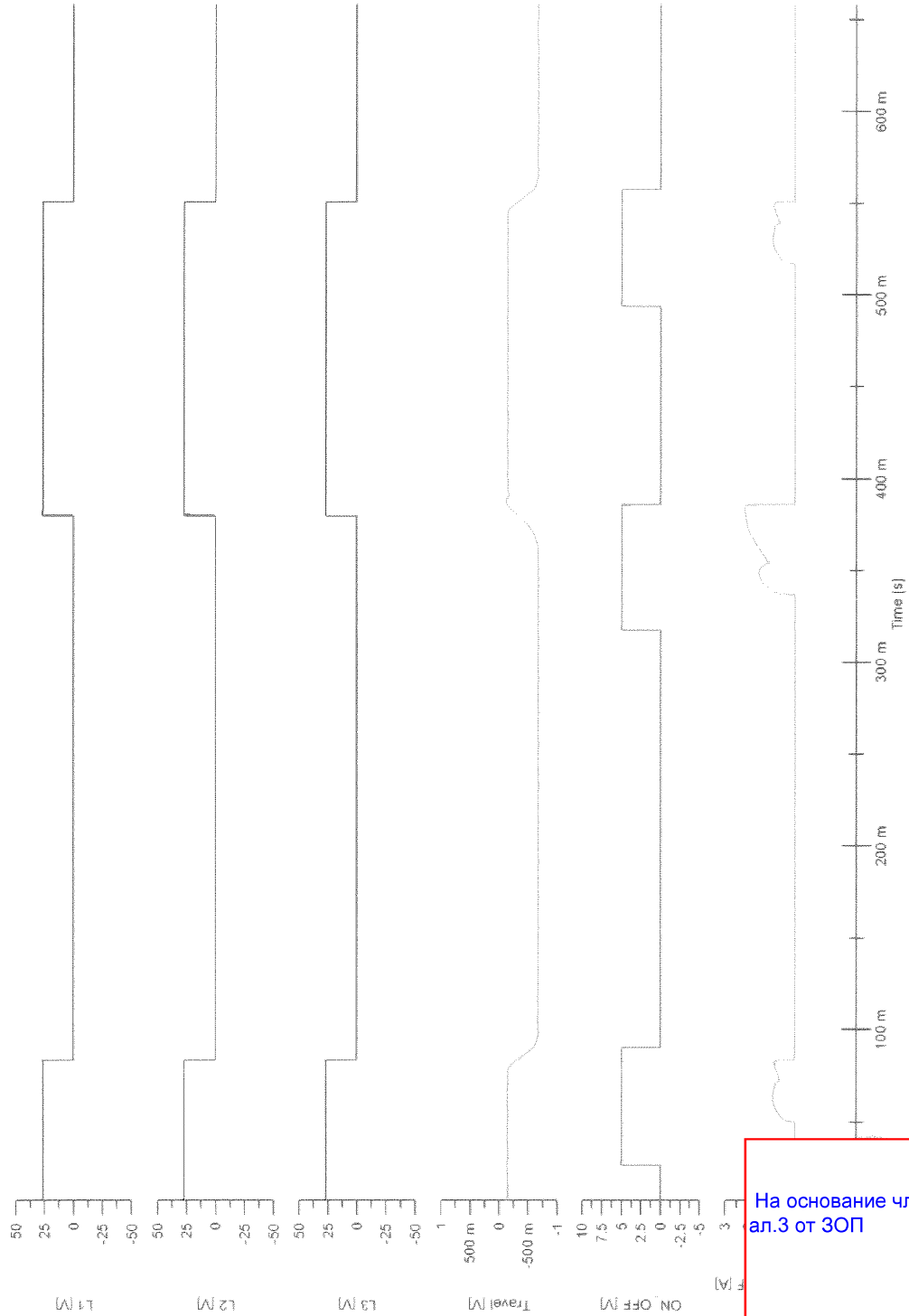
Oscillogram No. PEHLA 09137Ra / 03
No-Load Operation (Maximum Auxiliary Voltage)



На основании чл.36а
ал.3 от ЗОП

000221

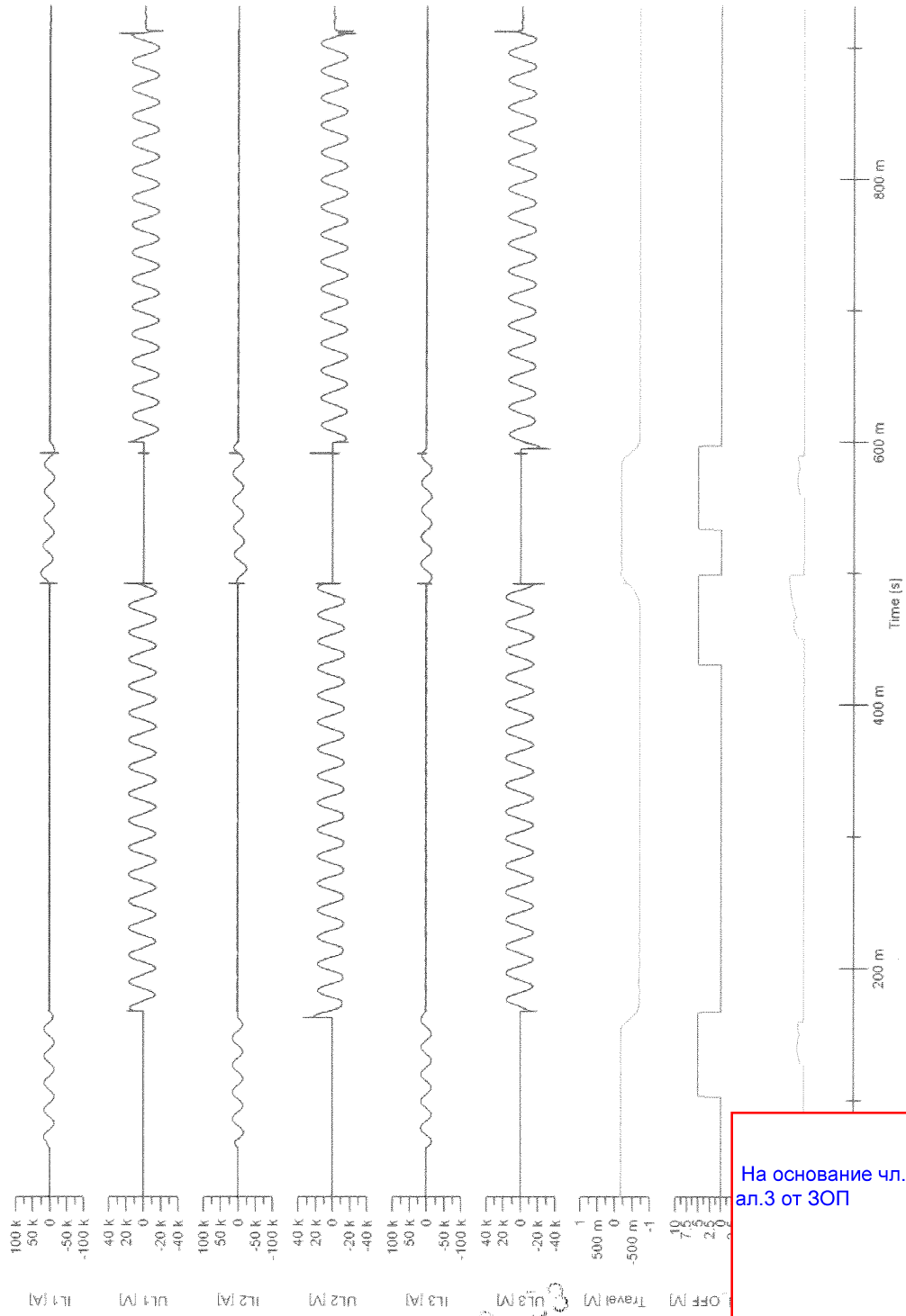
Oscillogram No. PEHLA 09137Ra / 04
No-Load Operation (Minimum Auxiliary Voltage)



На основании чл.36а
ал.3 от ЗОП

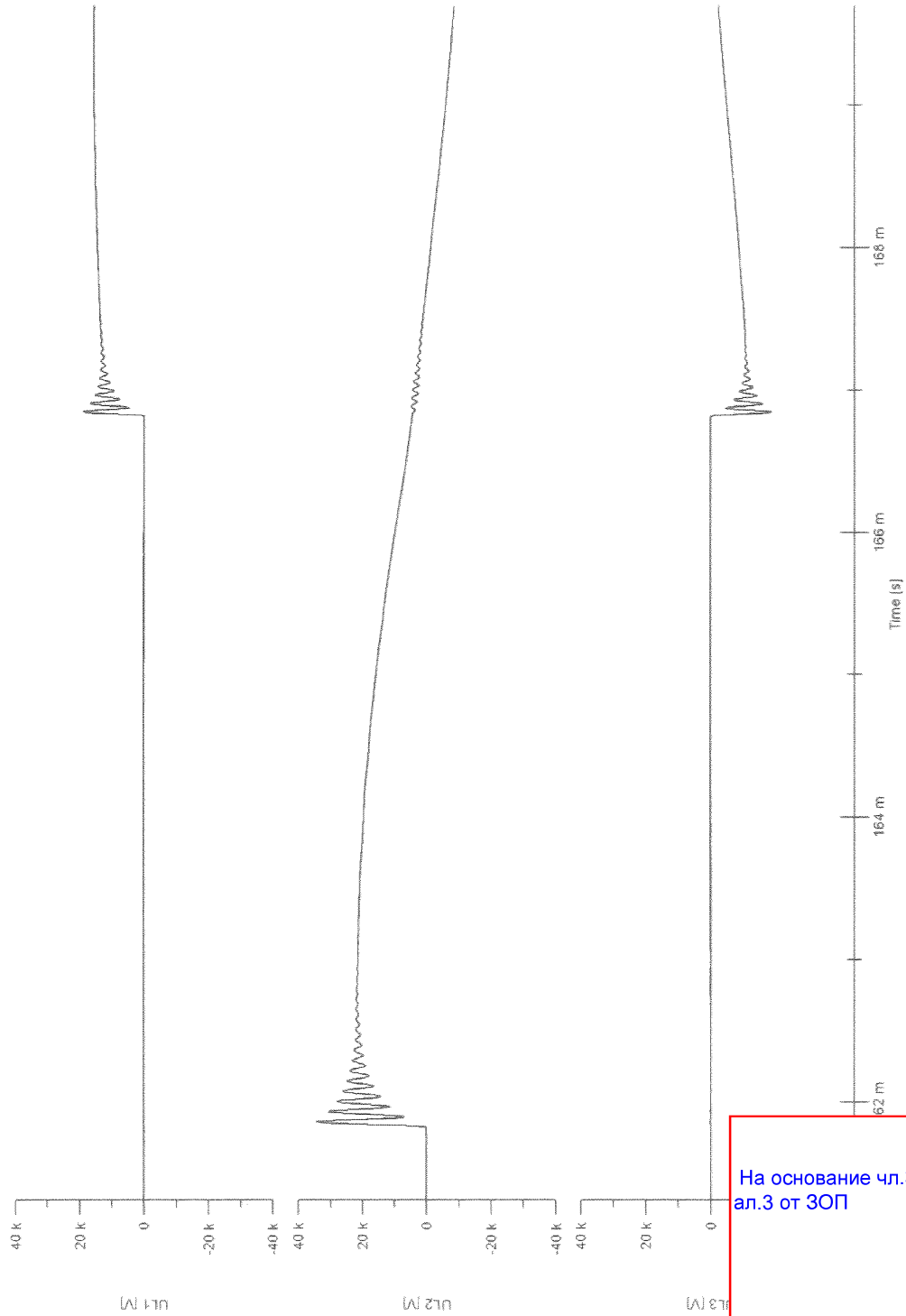
090222

Oscillogram No. PEHLA 09137Ra / 05
Test Duty T30: O-0.3s-CO



На основании чл.36а
ал.3 от ЗОП

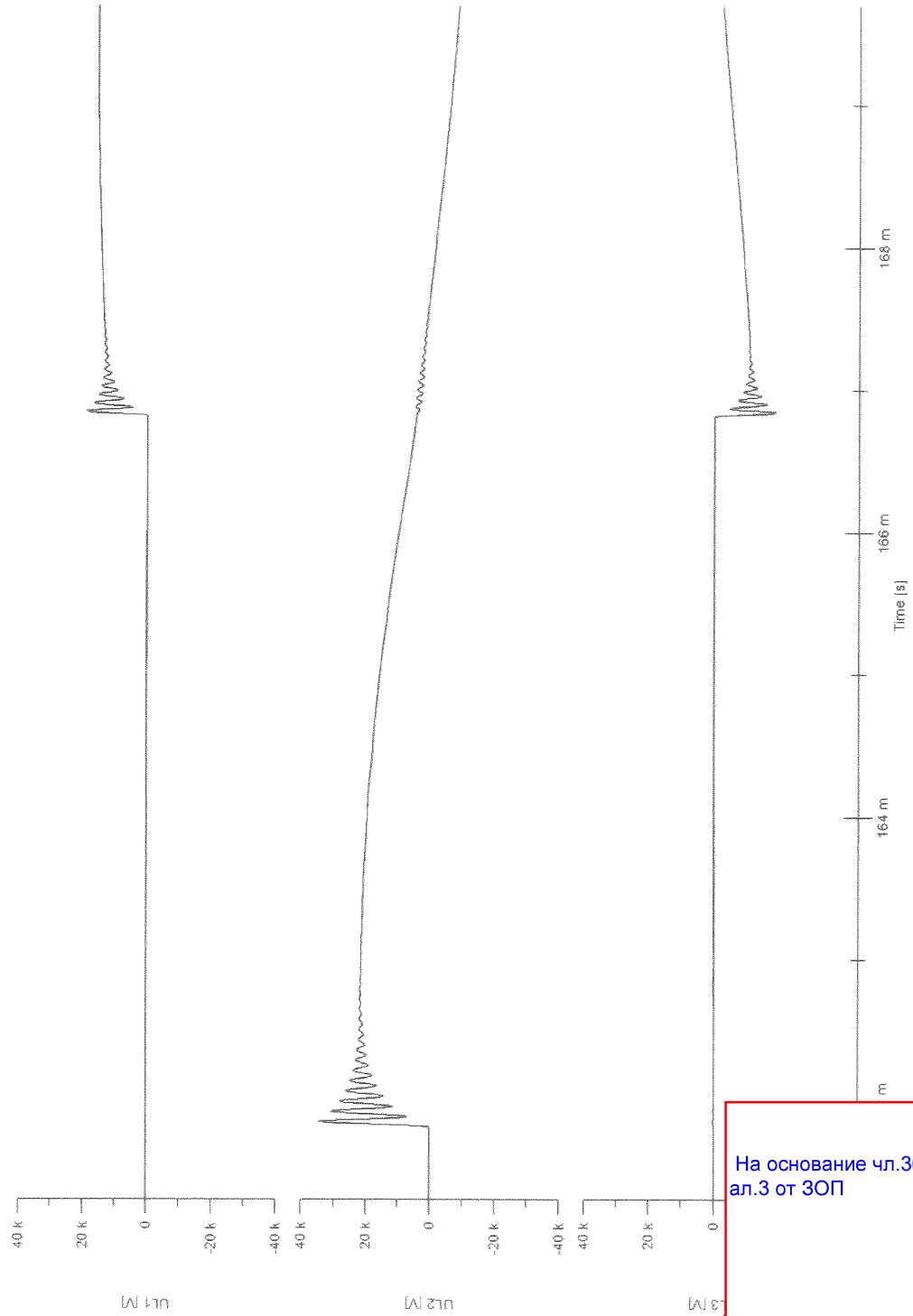
Oscillogram No. PEHLA 09137Ra / 05
Test Duty T30: O-0.3s-CO (TRV, 1st O)



На основе чл.36а
ал.3 от ЗОП

000224

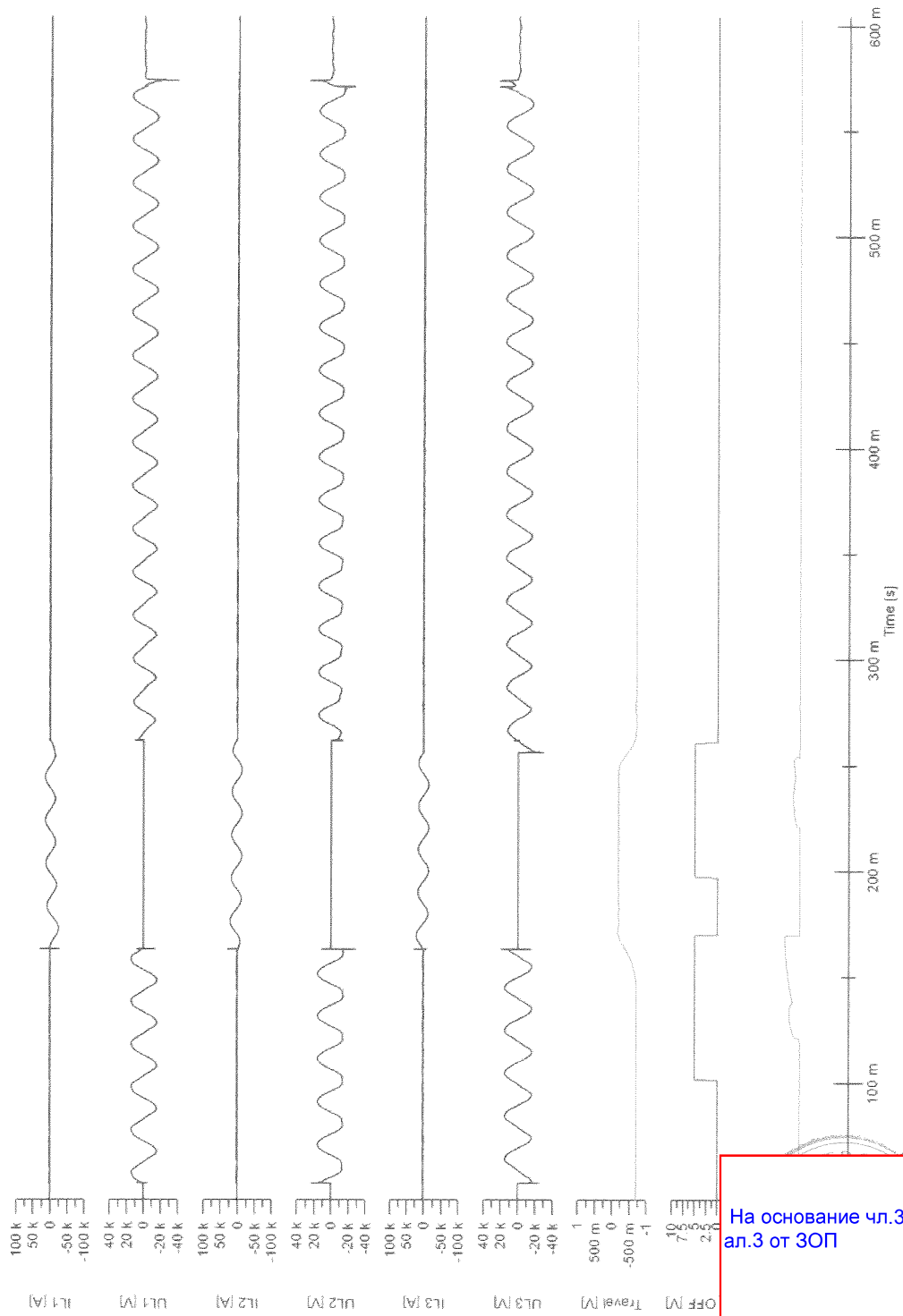
Oscillogram No. PEHLA 09137Ra / 05
Test Duty T30: O-0.3s-CO (TRV, 2nd O)



На основании чл.36а
ал.3 от ЗОП

350325

Oscillogram No. PEHLA 09137Ra / 06
Test Duty T30: CO



На основании чл.36а
ап.3 от ЗОП

090223