

# OptiMat D Range of automatic molded case circuit breakers



Range of automatic molded case circuit breakers OptiMat D - is a modern generation of 3 pole automatic breakers of fixed, plug-in and retractable design, equipped with a microprocessor trip system designed for electronic circuits protection from overloads and short circuits, including single-phase short circuits. Breakers with the acceptance from Russian Maritime Register of Shipping (RS) (RS further) and with the acceptance from Russian Sea Register (RRR further) are designed to protect ship electronic equipment and port infrastructure.

## Designation

### OptiMat D 250 N - MR1 - U3



1	<b>Product range</b>	OptiMat					
2	<b>Configuration</b>	D - automatic molded case circuit breakers					
3	<b>Rated current In, A</b>	100	250	400	630	1000	1600
4	<b>Limiting breaking capacity, kA</b>	N - 40 H - 65	N - 40 H - 65	N - 40 H - 65	N - 40 H - 65	N - 50 H - 85	N - 50 H - 85
5	<b>Type of a microprocessor trip system</b>	<sup>1)</sup> MR1 - an electrical circuits protection from overloading and short circuits with adjustable time delay in the overload zone and with adjustable short-time delay in short circuits zone with customisable function of thermal memory		<sup>2)</sup> MR1 - an electrical circuits protection from overloading and short circuits with fixed time delay in the overload zone and with fixed short-time delay in short circuits zone with preselected function of thermal memory and customisable parameters indication		<sup>3)</sup> MR2 - an electrical circuits protection from overloading and short circuits including single-phase short circuits, with adjustable time delay in overload zone and with adjustable short-time delay in short circuit zone with customisable function of thermal memory and customisable parameters indication	
6	<b>Symbol of environment and environmental class of location</b>	U3 (international T) - QCD (quality control department) acceptance		U3-REG (international T) - approved by RRR (Russian River Register)		OM4-REG - (international UM4) - approved by RS (Registry of Shipping)	

<sup>1)</sup> For OptiMat D100 and D250 breakers

<sup>2)</sup> For OptiMat D400 and D630 breakers

<sup>3)</sup> For OptiMat D400, D630, D1000 and D1600 breakers

Basic configuration of Optimat D circuit breakers includes:

- interphase barriers (4 pcs);
- set of attaching screws.

Listed in the chapter tables references are subject to change. If the references you need are not found on the website, please, contact KEAZ technical support service.

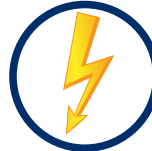
## Batch effectiveness

Intellectual microprocessor trip units provide all required types of protection with high measurement accuracy of network parameters.



It's possible to install the breaker in any position, with the supply lead either from above or from under, not damaging technical specifications of the breaker.

Automatic breakers OptiMat D can be used within temperature rate -40 ... +70 °C.



Effective current limitation allows to decrease a short-circuit current impact on network elements and the machine itself significantly.

Tolerance to switching overloads and radio frequency interference.



Warranty 5 years. Each unit undergoes multi-stage quality control from assembling to the finished goods warehouse.

"Dual distribution" system of the main contacts guarantees an instant current shutdown if there is a sort-circuit and significantly decreases wearing of the main contacts, which increases the breaker's service.



The location in the central part of Russia and domestic manufacture allow to fulfill equipment delivery as soon as possible.

## Technical specifications

Range of automatic breakers		OptiMat D100	OptiMat D250	OptiMat D400	OptiMat D630	OptiMat D1000	OptiMat D1600						
<b>General characteristics</b>													
Rated operational voltage, Ue V		690											
Rated insulation voltage Ui, V		800											
Rated sustainable pulsed voltage Uimp, kV		8											
Application category		A		A (MR1), B (MR2)		B							
Suitability for isolation		available											
Number of poles		3											
<b>Control</b>													
Manual	control lever	+		+		+							
	standard or extended rotary handle	+		+		-							
Electrical	motor drive	+		+		+							
<b>Design</b>													
Stationary	frontal	+		+		+							
	rear	+		+		-							
Plug-in		+		+		-							
Retractable		+		+		+							
<b>Rated and ultimate parameters of a main circuit the breaker</b>													
Rated current In, A		100	250	400	630	1000	1600						
Rated frequency, Hz		50											
Levels of the breaking capacity		N	H	N	H	N	H	N	H	N	H	N	H
Rated limiting breaking capacity Icu, kA	Ue 400 V	40	65	40	65	40	65	40	65	50	85	50	85
	Ue 690 V	8	10	8	10	8	10	8	10	20	30	20	30
Short-circuit making capacity Ics, % of Icu		100											
Rated service short-circuit breaking capacity Icm, kA	Ue 400 V	84	143	84	143	84	143	84	143	105	154	105	154
	Ue 690 V	13,6	17	13,6	17	13,6	17	13,6	17	40	63	40	63
Rated short-time withstand current Icw, kA	0,5 s	3		5		7		-					
	1 s	-		-		-		19,2	19,2				
Overall wear resistance, cycles		25000		16000		10000		10000					
Electrical wear resistance, cycles	Ue 400 V	10000		6300		2500		2000		1000			
<b>Devices for protection, indication and measurement</b>													
Microprocessor trip system		MR1		MR1/MR2		MR2							
Overload protection	with fixed time setting	-		+/-		-							
	with adjustable time setting	+		-/+		+							
Short circuit protection	with time delay	+		-/+		+							
	instant actuation	+		+/+		+							
Ground short circuit protection		-		-/+		+							
Indication of current on phase		-		+/+		+							
Apparatus state indication		+		+/+		+							
<b>Add-on equipment for protection and indication</b>													
Auxiliary contacts	auxiliary contacts VK	+		+		+							
	auxiliary contacts SK1 and SK2	+		+		+							
Voltage trip units	shunt trip	+		+		to develop							
	minimum current tripping device	+		+		to develop							
Accessories	terminal cover	+		+		to develop							
	pole spreader	+		+		to develop							
	pole partitions	as a set		as a set		to develop							
<b>Installation and connection</b>													
Connection of copper and aluminium wires with section, mm		10 - 70		25 - 120		70 - 180							
Connection of copper and aluminium busbars with maximum section, mm		from 2x25 to 6x25		from 3x32 to 2x(6x32)		from 3x50 to 2x(6x50)							
<b>Overall dimensions and weight</b>													
Overall dimensions W*H*D, mm		105 x 162,5 x 94		140 x 256 x 111		210 x 378 x 156							
Weight, kg		2,2		6,2		17,0							

## Reference (series)

Physical appearance	Rated current, A	Nomenclature (general purpose industrial version)	Reference	Nomenclature (RRR acceptance design)	Reference	Nomenclature (RS acceptance design)	Reference	Accessories			
								Auxiliary contact	Auxiliary terminal shield		
	40...100	OptiMat D100N-MR1-U3	144412	OptiMat D100N-MR1-U3-REG	244073	OptiMat D100N-MR1-OM4-REG	255731	 	OptiMat D100...250 UHL3-2 pcs. ref. 232987 UHL3-REG-2 pcs. ref. 244079 OM4-REG-2 pcs. ref. 255773		
		OptiMat D100H-MR1-U3	144414	OptiMat D100H-MR1-U3-REG	244072	OptiMat D100H-MR1-OM4-REG	255734				
	100...250	OptiMat D250N-MR1-U3	137335	OptiMat D250N-MR1-U3-REG	244075	OptiMat D250N-MR1-OM4-REG	255733				
		OptiMat D250H-MR1-U3	144411	OptiMat D250H-MR1-U3-REG	244074	OptiMat D250H-MR1-OM4-REG	255732				
	160...400	OptiMat D400N-MR1-U3	279892	OptiMat D400N-MR1-U3-REG	on request	OptiMat D400N-MR1-OM4-REG	on request			OptiMat D UHL3-4 pcs. ref. 143490 UHL3-REG-4 pcs. ref. 244078 OM4-REG-4 pcs. ref. 255772	OptiMat D400...630 UHL3-2 pcs. ref. 251068 UHL3-REG-2 pcs. ref. 256941
		OptiMat D400N-MR2-U3	249225	OptiMat D400N-MR2-U3-REG	on request	OptiMat D400N-MR2-OM4-REG	on request				
		OptiMat D400H-MR1-U3	279891	OptiMat D400H-MR1-U3-REG	on request	OptiMat D400H-MR1-OM4-REG	on request				
		OptiMat D400H-MR2-U3	249226	OptiMat D400H-MR2-U3-REG	on request	OptiMat D400H-MR2-OM4-REG	on request				
	250...630	OptiMat D630N-MR1-U3	279890	OptiMat D630N-MR1-U3-REG	on request	OptiMat D630N-MR1-OM4-REG	on request				
		OptiMat D630N-MR2-U3	144413	OptiMat D630N-MR2-U3-REG	244090	OptiMat D630N-MR2-OM4-REG	255727				
		OptiMat D630H-MR1-U3	279889	OptiMat D630H-MR1-U3-REG	on request	OptiMat D630H-MR1-OM4-REG	on request				
		OptiMat D630H-MR2-U3	144415	OptiMat D630H-MR2-U3-REG	244089	OptiMat D630H-MR2-OM4-REG	255730				
	400...1000	OptiMat D1000N-MR2-U3	270314	OptiMat D1000N-MR2-U3-REG	on request	OptiMat D1000N-MR2-OM4-REG	on request			OptiMat D1000...1600- UHL-2 pcs. to develop	
		OptiMat D1000H-MR2-U3	270315	OptiMat D1000H-MR2-U3-REG	on request	OptiMat D1000H-MR2-OM4-REG	on request				
	640...1600	OptiMat D1600N-MR2-U3	233946	OptiMat D1600N-MR2-U3-REG	on request	OptiMat D1600N-MR2-OM4-REG	on request				
		OptiMat D1600H-MR2-U3	233947	OptiMat D1600H-MR2-U3-REG	on request	OptiMat D1600H-MR2-OM4-REG	on request				

\* Using automatic breakers OptiMat D630H-MR2-U3 and OptiMat D630N-MR2-U3 together with a set for plug-in connection OptiMat D400...630-UHL3 and retractable design OptiMat D400...630-UHL3 current-carrying rating is 570 A within permission temperature range according to GOST P 50030.2-2010.

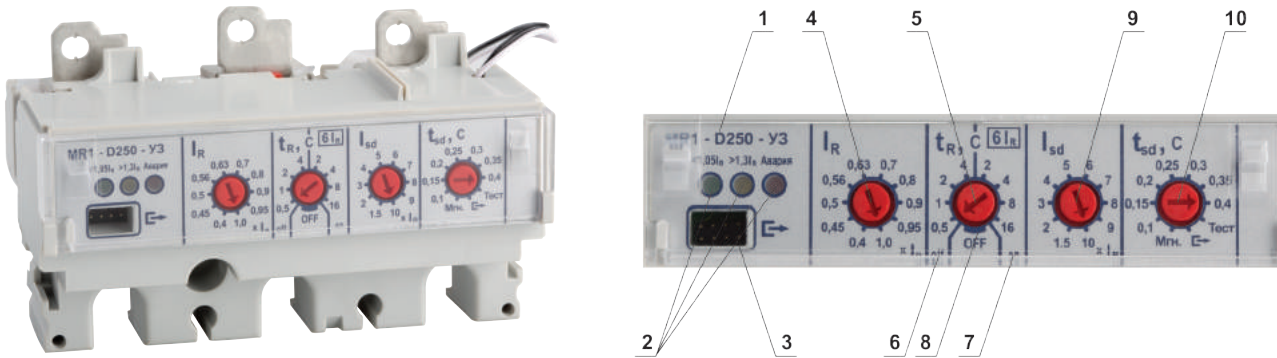
Accessories									
Shunt trip	Minimum current tripping device	Set for rear attachment	Pole spreader	Motor drive	Manual drive	Set for plug-in attachment	Set for drawout attachment		
<p>OptiMat D 24DC-UHL3 to develop 24AC-UHL3 to develop 48DC-UHL3 to develop 48AC-UHL3 to develop 110DC-UHL3 to develop 110AC-UHL3 to develop 220DC-UHL3 to develop 230AC-UHL3 ref. 254589 400AC-UHL3 to develop</p> <p>OptiMat D 24DC-UHL3 ref. 254582 24DC/48AC-UHL3 ref. 143498 48DC/110AC-UHL3 ref. 143495 110DC/230AC-UHL3 ref. 143496 220DC/400AC-UHL3 ref. 143497</p> <p>OptiMat D 24DC-UHL3-REG ref. 255775 24DC/48AC-UHL3-REG ref. 244086 48DC/110AC-UHL3-REG ref. 244087 110DC/230AC-UHL3-REG ref. 244084 220DC/400AC-UHL3-REG ref. 244085</p> <p>OptiMat D-24DC/48AC-OM4-REG ref. 255777 48DC/110AC-OM4-REG ref. 255779 110DC/230AC-OM4-REG ref. 255778 220DC/400AC-OM4-REG ref. 255780</p>	<p>OptiMat D 24DC-UHL3 to develop 24AC-UHL3 to develop 48DC-UHL3 to develop 48AC-UHL3 to develop 110DC-UHL3 to develop 110AC-UHL3 to develop 220DC-UHL3 to develop 230AC-UHL3 ref. 254589 400AC-UHL3 to develop</p> <p>OptiMat D 24DC-UHL3-REG to develop 24AC-UHL3-REG to develop 48DC-UHL3-REG to develop 48AC-UHL3-REG to develop 110DC-UHL3-REG to develop 110AC-UHL3-REG to develop 220DC-UHL3-REG to develop 230AC-UHL3-REG ref. 255806 400AC-UHL3-REG to develop</p> <p>OptiMat D 24DC-OM4-REG to develop 24AC-OM4-REG to develop 48DC-OM4-REG to develop 48AC-OM4-REG to develop 110DC-OM4-REG to develop 110AC-OM4-REG to develop 220DC-OM4-REG to develop 230AC-OM4-REG ref. 255807 400AC-OM4-REG to develop</p>	<p>OptiMat D100...250 UHL3 - long ref. 238709 UHL3 - short ref. 234089 UHL3-REG - long ref. 244076 UHL3-REG - short ref. 244077 OM4-REG - long ref. 255810 OM4-REG - short ref. 255811</p> <p>OptiMat D400...630 UHL3 - long ref. 238710 UHL3 - short ref. 234090 UHL3-REG - long ref. 244094 UHL3-REG - short ref. 244095 OM4-REG - long ref. 255812 OM4-REG - short ref. 255813</p>	<p>OptiMat D100...250 - 3 pcs. ref. 255857</p> <p>OptiMat D400...630-UHL3-short-3 pcs. to develop</p> <p>OptiMat D400...630-UHL3-long-3 pcs. ref. 258210</p>	<p>OptiMat D100...250 230AC-UHL3 ref. 247695 400AC-UHL3 to develop 230AC-OM4-REG ref. 255817 400AC-OM4-REG to develop</p> <p>OptiMat D400...630 230AC-UHL3 ref. 233121 400AC-UHL3 to develop 230AC-UHL3-REG ref. 244100 400AC-UHL3-REG to develop 230AC-OM4-REG ref. 255815 400AC-OM4-REG to develop</p>	<p>OptiMat D100...250 UHL3 ref. 240958 OM4-REG ref. 244103</p> <p>OptiMat D400...630 UHL3 ref. 240959 OM4-REG ref. 244105</p>	<p>OptiMat D100...250 UHL3 ref. 234092 OM4-REG ref. 244096</p> <p>OptiMat D400...630-UHL3 ref. 234091 OM4-REG ref. 244097</p>	<p>OptiMat D100...250 UHL3 ref. 239381 OM4-REG ref. 244098</p> <p>OptiMat D400...630 UHL3 ref. 234093* OM4-REG ref. 244099*</p>	<p>OptiMat D1000...1600-230AC-UHL3 to develop</p> <p>OptiMat D1000...1600-230AC-UHL3 to develop</p> <p>OptiMat D1000...1600-UHL3-3 pcs. to develop</p> <p>OptiMat D1000...1600-UHL3-3 pcs. to develop</p> <p>OptiMat D1000...1600-230AC-UHL3 to develop</p>	<p>нет</p> <p>нет</p> <p>в разработке</p>

To ease the operating it's recommended to connect auxiliary circuits and control circuits of plug-in circuit breakers versions and retractable circuit breakers versions through the socket for secondary circuits OptiMat/VA57-UMSTBVK-2.5/13 ref. 273633 and plug for secondary circuits OptiMat/VA57-MSTB-2.5/13 ref. 273632. Socket and plug are not included.

## Microprocessor trip systems

Automatic breakers Optimat D modification N and H are provided with trip systems MR1 and MR2. The microprocessor release consists of the following parts: actuating electromagnet, measuring devices and trip control unit. The trip control unit allows to build a user-defined program, according to which the circuit breaker will release the main contacts. Microprocessor trip system has advantages in comparison with thermomagnetic trip unit: a diverse selection of settings needed by user; high accuracy of given program execution; performance indicators and tripping causes.

### ➤ Trip system MR1 (for OptiMat D100 and OptiMat D250)



1. Marking
2. Color indicators of loading
3. Test connector
4. Protection current from overloads
5. Protection time from overloads
6. Setting at tripping time in overload zone without "thermal memory" function
7. Setting at tripping time in overload zone with "thermal memory" function
8. Switch position to switch off overload protection
9. Selectivity current of current cutoff (only short circuit protection)
10. Selectivity time of current cutoff

Note. "Thermal memory" is an updating program for tripping time depending on current that caused opening of the breaker and time elapsed since the shutdown moment.  
 "Thermal memory" is work emulation of overload current trip.

Current and time tripping values in short circuit and overload zones:

Name of parameters	Value	Tolerance
Operating current value $I_r$ in multiples to rated current ( $I_r/I_n$ )	0,4; 0,45; 0,5; 0,56; 0,63; 0,7; 0,8; 0,9; 0,95; 1,0	-
Tripping time value at current $6I_r$ ( $t_{tr}$ ), s	0,5; 1; 2; 4 – without "thermal memory" function; 2; 4; 8; 16 – with "thermal memory" function	±10%
Tripping current value in short circuit zone $I_{sd}$ in multiples to operating current ( $I_{sd}/I_r$ )	1,5; 2; 3; 4; 5; 6; 7; 8; 9; 10	±15%
Tripping time value in a short circuit zone ( $t_{sd}$ ), s	0 (without intentional time-delay); 0,1; 0,15; 0,2; 0,25; 0,3; 0,35; 0,4	±0,02
Instant tripping current value $I_i$ , A (unregulated)	3000	±20%

#### Signalling

Indication device shows following modes:

- 1) permanent glow of green light diode - the scheme is in an operational mode, current of protected circuit  $I \leq 1,05I_r$ ;
- 2) flickering of green light diode with frequency 0,5...1 Hz - the scheme is in an operational mode, current in a protected circuit  $1,05I_r < I \leq 1,3I_r$ ;
- 3) flickering of orange diode (frequency increases from 0,5 to 3 Hz depending on overload current value) - the scheme is in an operating mode, current in a protected circuit  $I > 1,3I_r$ ;
- 4) permanent glow of red light diode - trip system malfunction.

#### Testing

Circuit breaker operational test is carried out when any operating current flows through the phases of the circuit breaker (by pole or through all poles in series).

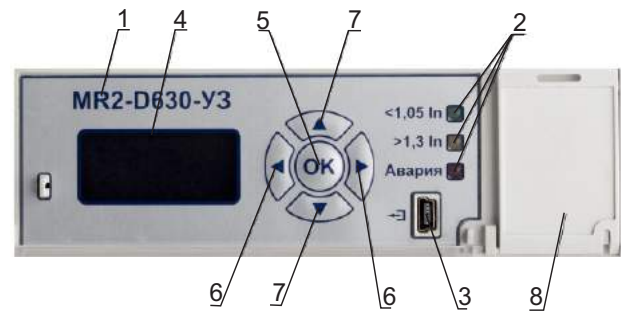
To run a self test, you must:

- set the  $t_{sd}$  switch to the "Test" position, with the position of the  $I_r$  switches;  $t_{tr}$ ;  $I_{sd}$  can be arbitrary.
- move the handle to the upper position that corresponds to the on state of the switch (the contacts of the poles are closed).
- apply any operating current  $I_r = (0,4-1,0) I_n$ .

The diagnostic program will signal the circuit breaker operation indicators (LEDs should turn on and off alternately) and the actuating release, after this the circuit breaker should turn off.

To exit the diagnostic mode, you must set the  $t_{sd}$  switch to any position except for "Test" and "[->". The "[->" position is intended only for acceptance tests of a semiconductor over-current release by manufacturer.

## Microprocessor trip system MR1 (for OptiMat D400 and D630) and MR2 (for OptiMat D400, D630, D1000 and D1600)



1. Name of a semiconducting trip unit
2. Indicators of protected circuit state and operating mode of the semiconducting block
3. Test device connector
4. Digital display for adjustable parameters
5. "OK" button is used to switch between the modes, sleeping mode turn off, select the adjustable parameter ( $I_r$ ,  $t_r$ ,  $I_{sd}$ ,  $t_{sd}$ ,  $I_g$ ,  $t_g$ ) and save setting after menu quitting, according to the microprocessor trip system version
6. Buttons left/right to choose from previous/next parameter
7. Buttons up/down to increase/decrease parameters
8. Jack for changeable Li-ion battery

Note (only for MR2): it is possible to enable and disable the "thermal memory" function when choosing tripping time setting in overload zone.

Current and time tripping values in short circuit and overload zones:

Name of parameters	Value for MR1	Value	Tolerance
Operating current value $I_R$ in amperes	from 160 to 400 with 20A step (for OptiMat D400) from 250 to 630 with 20A step (for OptiMat D630)	from 250 to 630 with 20 A pitch from 160 to 400 with 20 A pitch (for OptiMat D400)	$\pm 2\%$
Tripping time value at current $6I_R$ ( $t_R$ ), s	16, with thermal memory function	0,5; 1; 2; 4 – without thermal memory function; 2; 4; 8; 16 – with thermal memory function	$\pm 10\%$
Tripping current value in short circuit zone $I_{sd}$ in multiples to operating current ( $I_{sd}/I_R$ )	1,5; 2; 3; 4; 5; 6; 7; 8; 9; 10	1,5; 2; 3; 4; 5; 6; 7; 8; 9; 10	$\pm 15\%$
Tripping time value in a short circuit zone ( $t_{sd}$ ), s	off (without intentional time-delay)	off (without intentional time-delay); 0,1; 0,15; 0,2; 0,25; 0,3; 0,35; 0,4	$\pm 0,02$
Instant tripping current value $I_i$ , A (not adjustable)	5000 for OptiMat D400 7000 for OptiMat D630	5000 for OptiMat D400 7000 for OptiMat D630 19200 for OptiMat D1000 and D1600	$\pm 20\%$
Tripping current value at a single-phase short circuit in multiples of operating current ( $I_g/I_R$ )	not available	0,4 - 0,6 - 0,8 - 1,0	$\pm 10\%$
Tripping time value at a one-phase short circuit ( $t_g$ ), s	not available	0,1; 0,2; 0,3; 0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 1,0	$\pm 0,02$

### Note

Response time requirements are valid for switches that were preloaded with a current of at least  $0,3 I_R$  for a time period not less than 1 min.

### Indication

The indication of the microprocessor release MR2 turns on when the total current flowing through the switch phases equals or is higher than 180 A. At a current less than 180 A, the indication of the microprocessor unit turns on at any key press.

### Signalling

Indication device shows following modes:

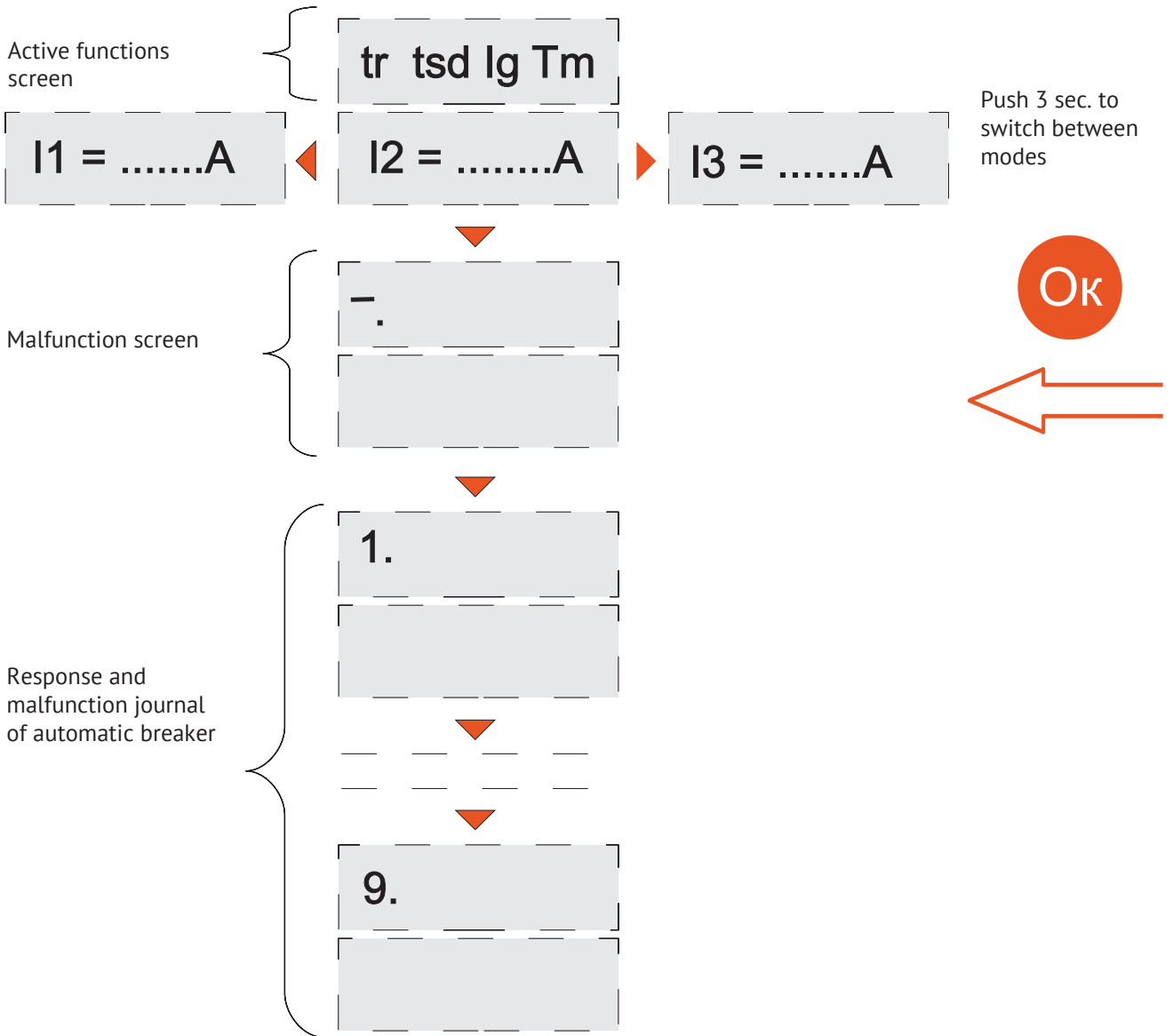
- 1) permanent glow of green light diode - the scheme is in an operational mode, current of protected circuit  $I \leq 1,05I_R$ ;
- 2) flickering of green light diode with frequency 0,5...1 Hz - the scheme is in an operational mode, current in a protected circuit  $1,05I_R < I \leq 1,3I_R$ ;
- 3) flickering of orange diode (frequency increases from 0,5 to 3 Hz depending on overload current value) - the scheme is in an operating mode, current in a protected circuit  $I > 1,3I_R$ ;
- 4) permanent glow of red light diode - trip system malfunction.

### Testing

The mini USB connector, located on the front panel, is used to connect an external power source in order to test the capacity of the over-current releaser MR2 without rated current loading of the OptiMat D circuit breaker. Testing is carried out on switched off circuit breaker. The handle must be in the upper position, which corresponds to the switched on state of circuit breaker (poles contacts are closed). The current must not flow through the poles of the switch during testing! It is necessary to connect a DC source with voltage from 5 to 24 V with a loading capacity of 1A to mini USB connector. To start self-diagnostics it is necessary to select the "On" value in the settings menu on the "TEST" tab, using the "▼", "▲" keys, and exit the menu. The test will run. After checking current sensors and calculating the Joule integral, program diagnostic will signal the actuating trip unit and ask to press the "OK" key. If the circuit breaker turned off, press the "OK" key. The program by itself will come out from diagnostic mode. A red LED indicates a fault in the circuit breaker. You could clarify the circuit breaker's fault in operations log.

## Menu for microprocessor trip unit MR2

Indication mode of measured values and response journal






**Malfunction signs:**

**Isd:** short-circuit

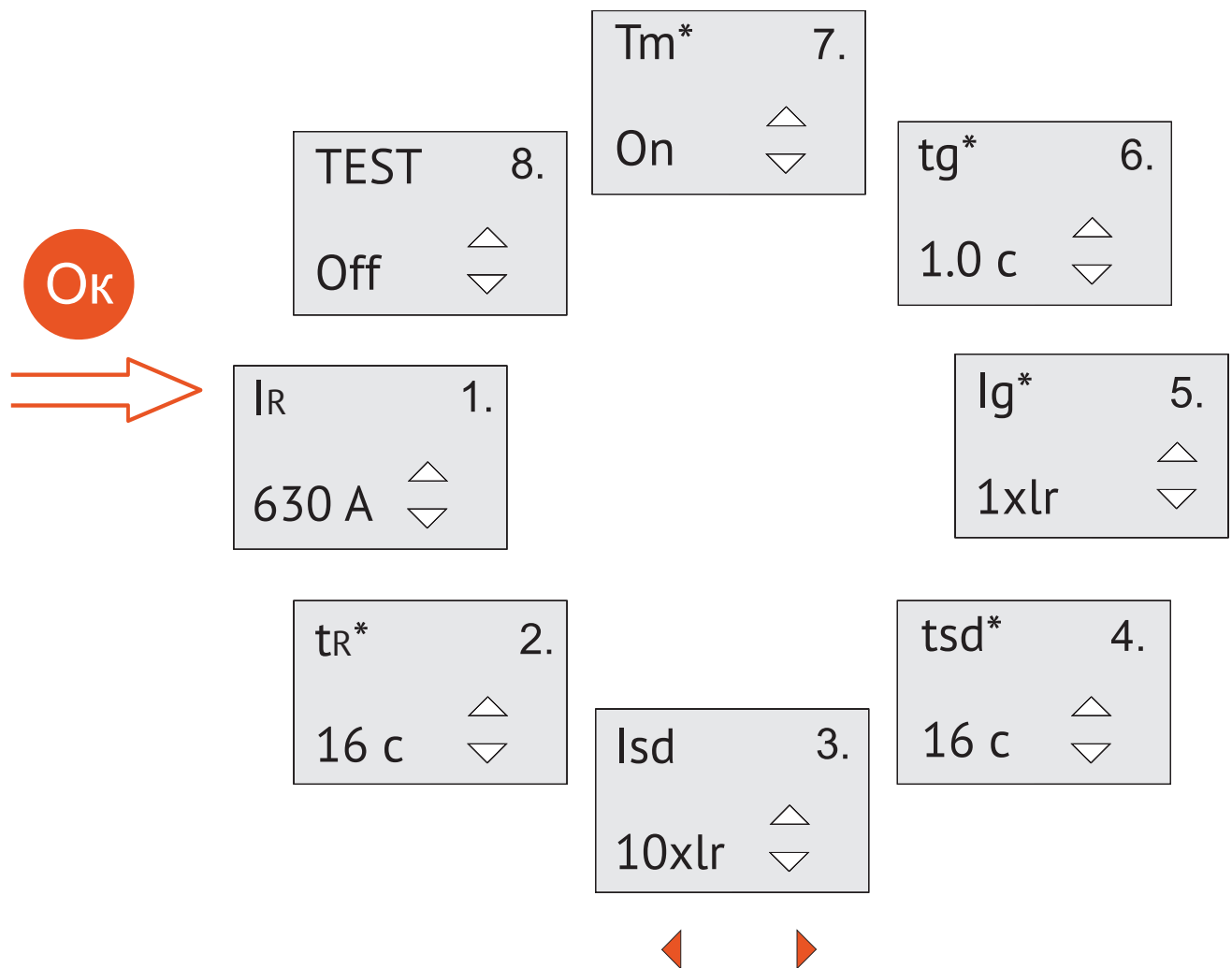
**Ig:** one-phase short circuit

**Q:** overload

 - current transducer breakout

 - machine is not turned off or control trip breakout

Mode of settings indication

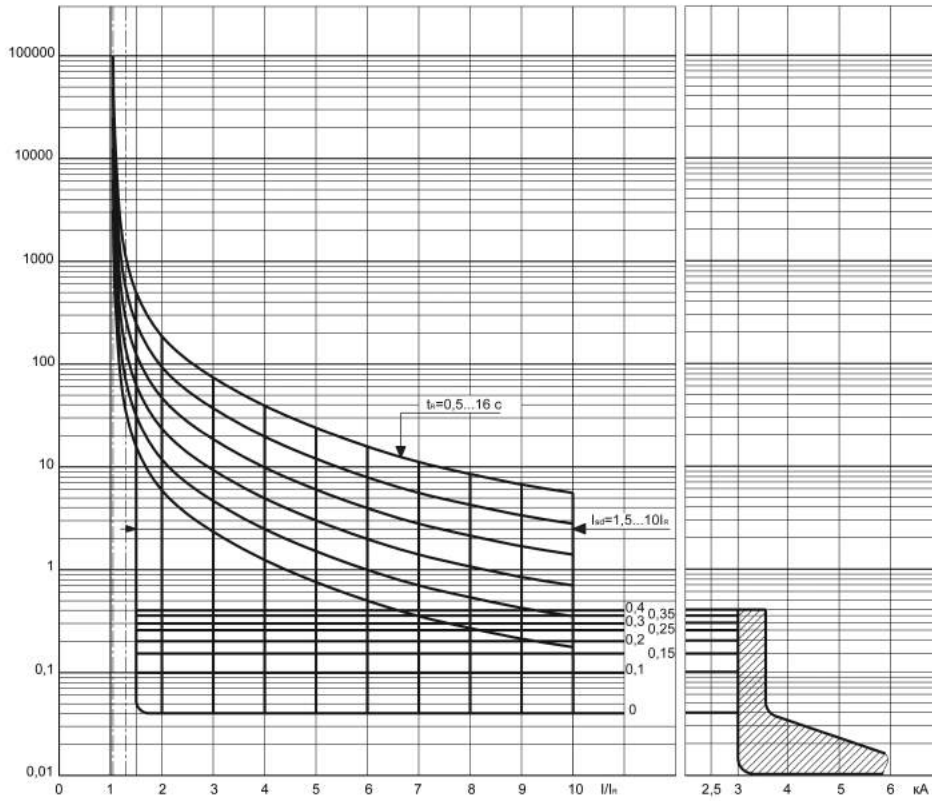


\* Adjusting of the parameters  $t_R$ ,  $t_{sd}$ ,  $I_g$ ,  $t_g$ ,  $T_m$  is possible in MR2 microprocessor trip unit.

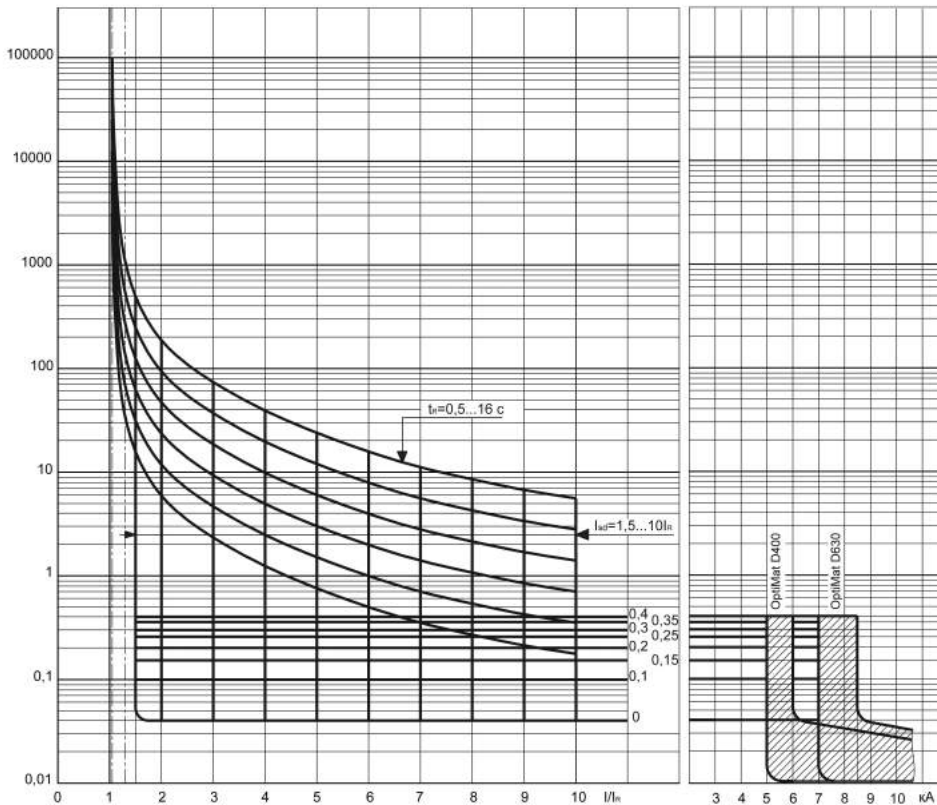
More detailed information about the MR1 and MR2 microprocessor trip units could be found in operations manual.

# Time-current characteristics

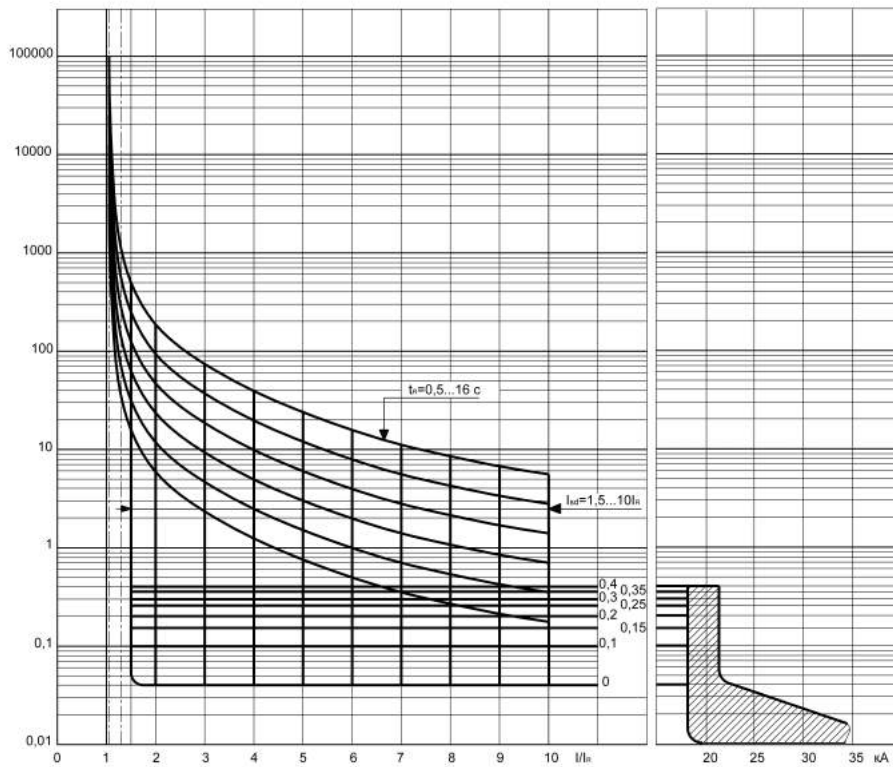
## Time-current characteristics in overload and short-circuit zone for OptiMat D100 and D250



## OptiMat D400 и D630



### OptiMat D1000 и D1600

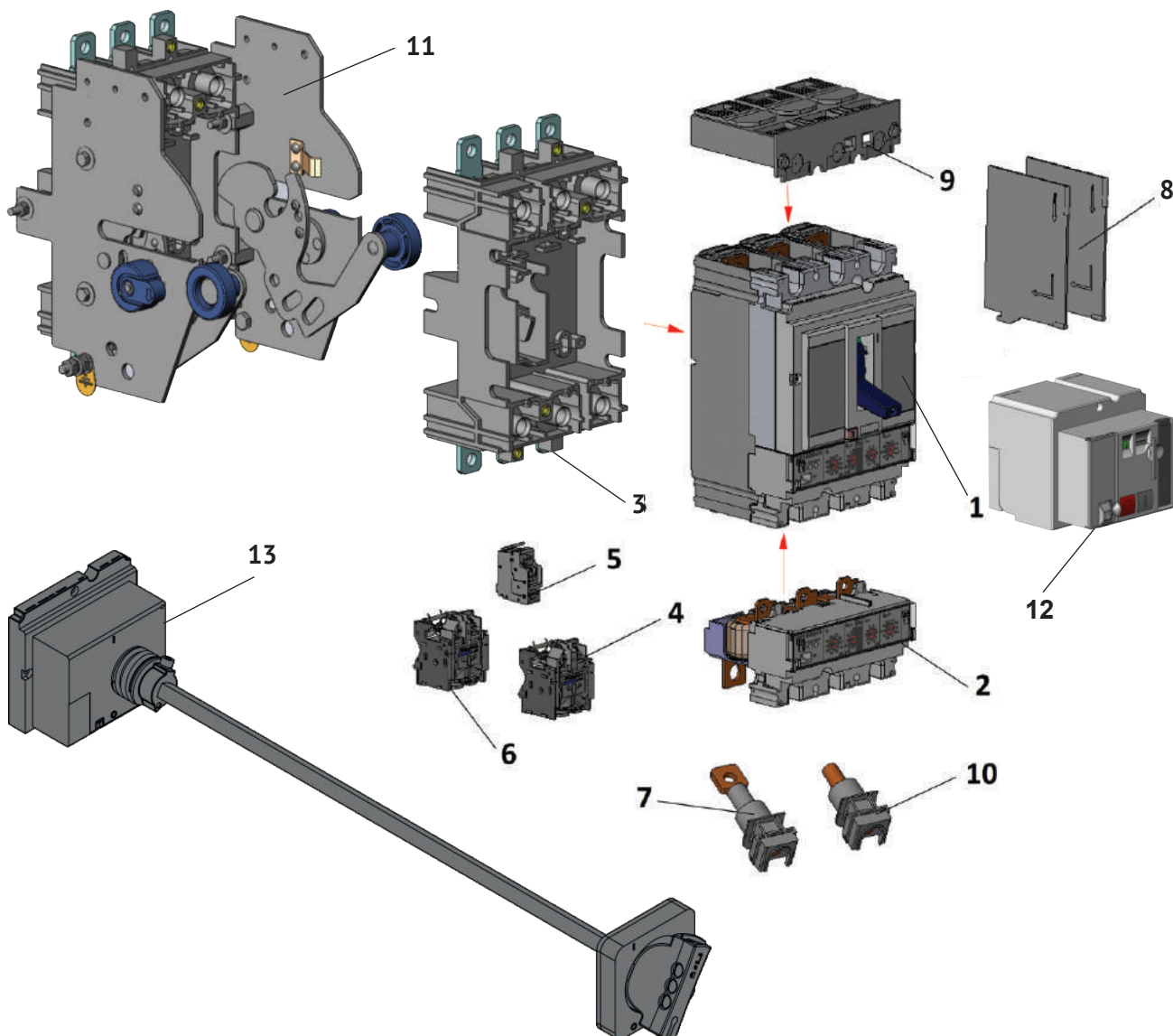


Breaker tripping time with loading on every pole separately by current 2Ir with different tr settings are given in the table:

Time at 6Ir, s	0,5	1	2	4	2	4	8	16
Load	without thermal memory				with thermal memory			
1,3Ir	16...22	32...44	64...88	128...175	65...90	135...190	252...350	505...705
1,5Ir	11...15	22...30	44...60	88...120	45...61	92...125	190...260	415...580
2Ir	5...7	10...14	21...27	42...54	21...28	43...55	85...120	180...250
3Ir	2...3	4...6	8...12	16...24	8...13	16...25	31...44	65...90
4Ir	1...1,5	2...3	4...6	8...12	4...6	8,5...12,5	18...25	36...50
6Ir	0,4...0,6	0,8...1,2	1,8...2,5	3,5...5	1,8...2,5	3,5...5	7...10	14...20
8Ir	0,2...0,35	0,4...0,7	0,8...1,4	1,6...2,8	0,8...1,5	1,6...3	3,2...6	6,5...11
10Ir	0,1...0,25	0,2...0,5	0,4...0,9	0,8...1,8	0,4...0,9	0,8...1,8	1,6...4	3,2...7

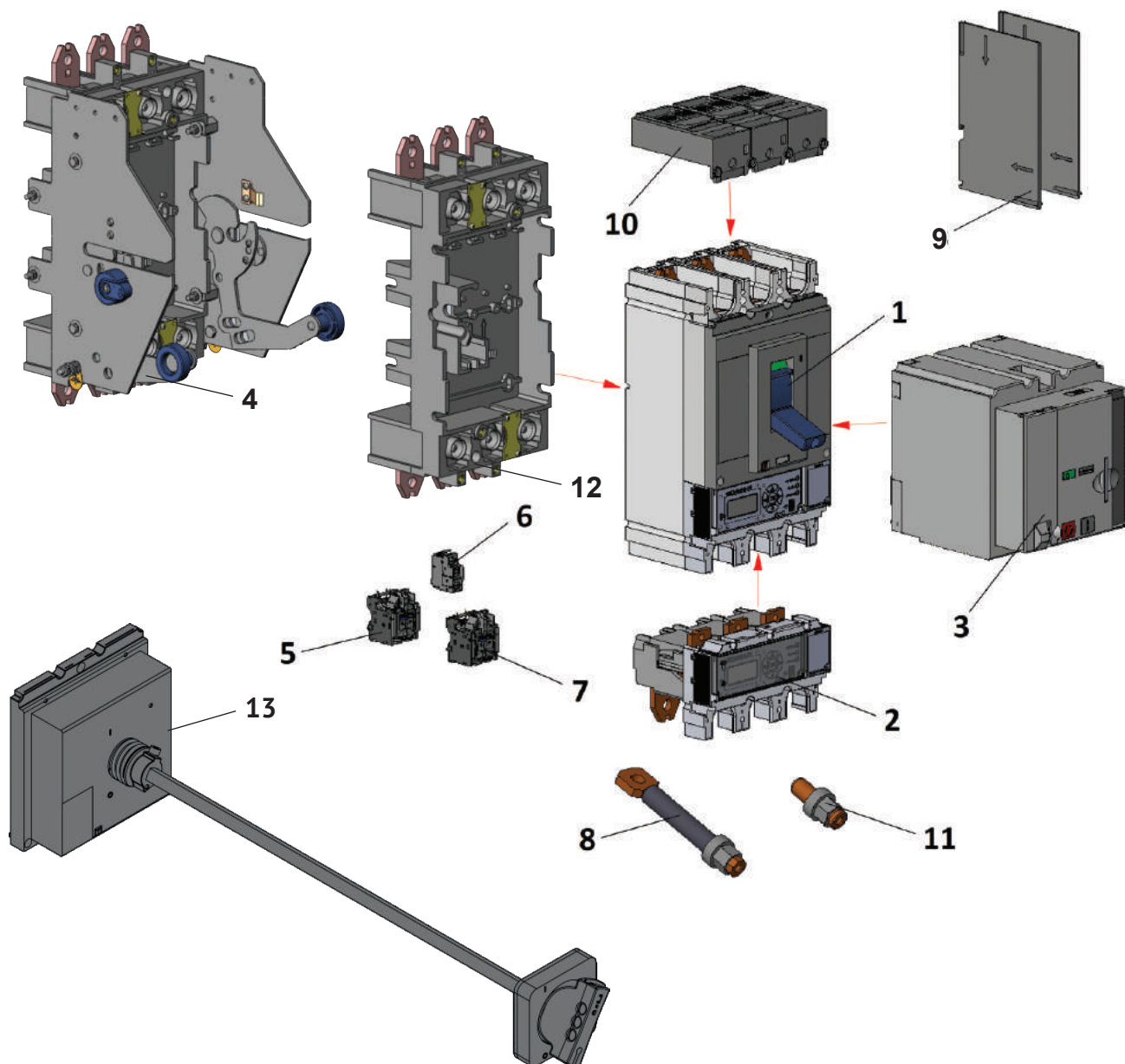
## Configuration

### Configuration OptiMat D100 и D250



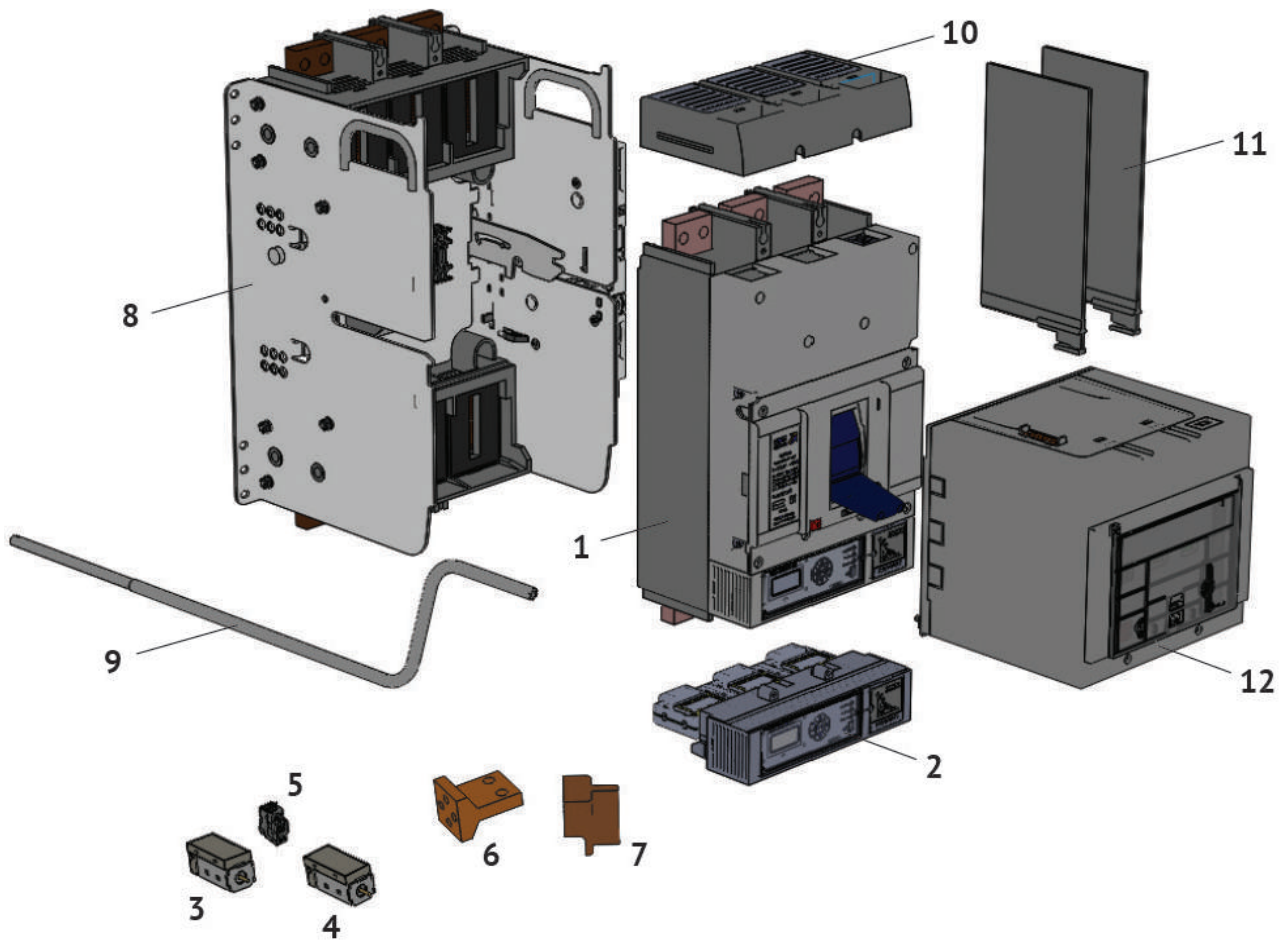
- 1 Base unit
- 2 Microprocessor trip system
- 3, 10 Set for plug-in attachment
- 4 Shunt trip
- 5 Auxiliary contacts
- 6 Minimum current tripping unit
- 7 Contacts for rear attachment of the breaker
- 8 Interphase barriers
- 9 Auxiliary terminal shield
- 10, 11 Set of drawout design
- 12 Motor drive
- 13 Remote manual drive

## Configuration OptiMat D400 и D630



- 1 Base unit (switching)
- 2 Microprocessor trip system
- 3 Motor drive
- 4, 11 Contact of rear attachent
- 5 Minimum current tripping unit
- 6 Auxiliary contacts
- 7 Shunt unit
- 8 Contacts for rear attachment of the breaker
- 9 Interphase barriers
- 10 Auxiliary terminal shield
- 11, 12 Set for plug-in attachment
- 13 Remote manual drive

## Configuration of OptiMat D1000 and D1600

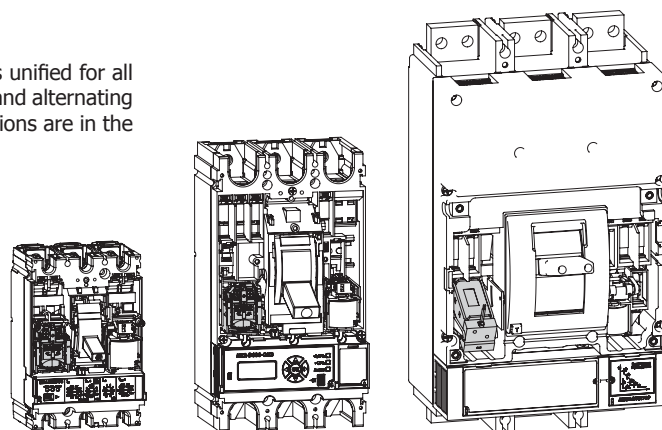


- 1 Base unit (switching)
- 2 Microprocessor trip system
- 3 Shunt unit
- 4 Minimum current tripping unit
- 5 Auxiliary contacts (controlling and indicating)
- 6 Rear attachment set
- 7 Output for rear attachment
- 8 Chassis for drawout design
- 9 Lever moving the switch in the chassis
- 10 Auxiliary terminal shield
- 11 Interphase barriers
- 13 Motor drive

## Accessories

### Shunt trip

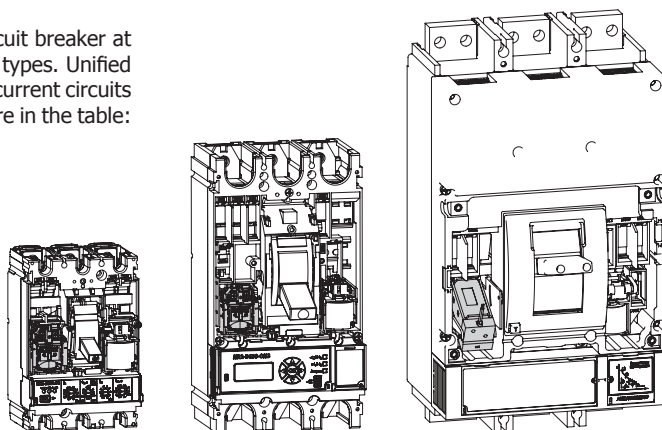
Shunt trip is made for remote switching of circuit breakers and is unified for all OptiMat D types. The trip unit is used in control circuits for direct and alternating current 50 Hz. Rated control voltage ( $U_c$ ) and technical specifications are in the table:



Designation		OptiMat D100, D250, D400 and D630					OptiMat D1000 and D1600
		NR 24DC	NR 24DC/48AC	NR 48DC/110AC	NR 110DC/230AC	NR 220DC/400AC	NR 230AC
Reference	general purpose industrial design	254582	143498	143495	143496	143497	to develop
	RRR acceptance	255775	244086	244087	244084	244085	-
	RS acceptance	-	255777	255779	255778	255780	-
Rated voltage for shunt trip control ( $U_c$ ), V		24DC	24DC/48AC	48DC/110AC	110DC/230AC	220DC/400AC	230AC
Operating voltage range		0,7-1,1 $U_c$					
Consumed voltage, VA or W		30					
Control command		Power supply duration from 0,02 to 3 s					
Maximum consumed current at 110% $U_c$ (~230 V), A		1,0					
Maximum shutdown time before (before opening of power contacts), ms		40					

### Minimum current tripping device

Minimum current tripping device is made for switching of the circuit breaker at voltage decrease below normal and is unified for all OptiMat D types. Unified for breakers OptiMat D of all types. Used in alternating and direct current circuits at 50 Hz. Rated control voltage ( $U_c$ ) and technical specifications are in the table:



Designation		OptiMat D100, D250, D400 and D630								OptiMat D1000 and D1600	
		MR 24DC	MR 24AC	MR 48DC	MR 48AC	MR 110DC	MR 110AC	MR 220DC	MR 230AC	MR 400AC	MR 230AC
Reference	general purpose industrial design	to develop							254589	to develop	to develop
	RRR acceptance	to develop							255806	to develop	-
	RS acceptance	to develop							255807	to develop	-
Rated control voltage ( $U_c$ ), V		24DC	24AC	48DC	48AC	110DC	110AC	220DC	230AC	400AC	230AC
Operating range		0,85-1,1 $U_c$									
Threshold pickup: closing opening		0,35-07 $U_c$ 0,85 $U_c$									
Consumed voltage, VA or W		6									
Operate mode		prolonged									

### Auxiliary contact

Auxiliary contacts are used to indicate the circuit breaker status. Auxiliary contacts of a single structural model are installed in the circuit breaker sockets, according to the scheme below. The functions performed by the auxiliary contacts depending on the socket shield in which they are installed (see Single-line diagram for OptiMat D circuit breakers):

VK1...VK4 – switching position indication of main contacts (closed/open).

SK1 - indication of the circuit breaker disconnection with tripping of the mechanism due to:

- tripping of protective trip;
- tripping of shunt trip or minimum circuit tripping device;
- pushing test button;
- pushing emergency button of a motor drive.

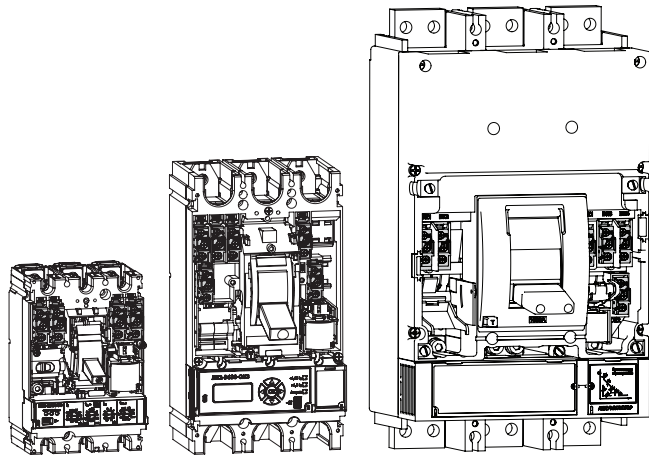
SK2 - indication of the circuit breaker disconnection due to the overcurrent release tripping.

The maximum possible number of auxiliary contacts is given in the table:

Breaker current		Functional design of auxiliary contacts		
		VK	SK1	SK2
Reference	general purpose industrial design	143490		
	RRR acceptance	244078		
	RS acceptance	255772		
Optimat D250		2	1	1
Optimat D630		4	1	1

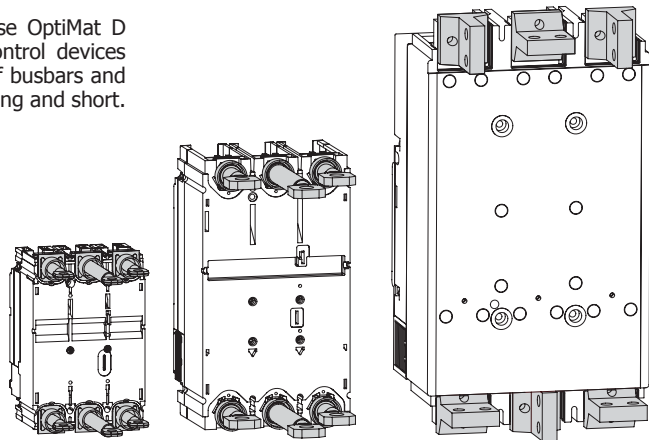
Rated currents (Ic) at various volages (Uc):

	Alternating current (AC)					Direct current (DC)			
	24	48	110	230	400	24	48	110	250
Rated voltage (Uc), V	24	48	110	230	400	24	48	110	250
Rated operating current (Ic), A	6	6	5	4	2	3	1,5	0,5	0,2



### Rear connection set

The use of pins for the rear conductor connection allows to use OptiMat D circuit breakers in low-voltage distribution switchboards and control devices for double-sided maintenance where making a rear connection of busbars and conductors with cable lugs is required. They have two versions: long and short.



Designation		RCS OptiMat D100...250-UHL3-long	RCS OptiMat D100...250-UHL3-short	RCS OptiMat D400...630-UHL3-long	RCS OptiMat D400...630-UHL3-short	RCS OptiMat D1000...D1600
Reference	general purpose industrial design	238709	234089	238710	234090	to develop
	RRR acceptance	244076	244077	244094	244095	on request
	RS acceptance	255810	255811	255812	255813	on request



## Manual remote drive

Manual remote drive allows to control the apparatus, which is installed in the panel, from the frontal panel. It provides following functions:

1) Mechanical door locking - when the device is on.

The manual remote actuator is equipped with a lock integrated with the extension axis, which prevents the door from opening if the circuit breaker is in the "on" or "emergency shutdown" position. To open the door with the automatic circuit breaker actuated, this lock can be neutralized with the tool. This operation is not possible if the handle is locked with padlocks.

2) Forced neutralization of mechanical lock-out of the door.

An on-site handle reworking allows to prohibit door locking completely, including locking with padlocks. However, if it is necessary, the door locking can be restored.

If several remote manual drives are installed on one door, this function allows to block the door from one apparatus.

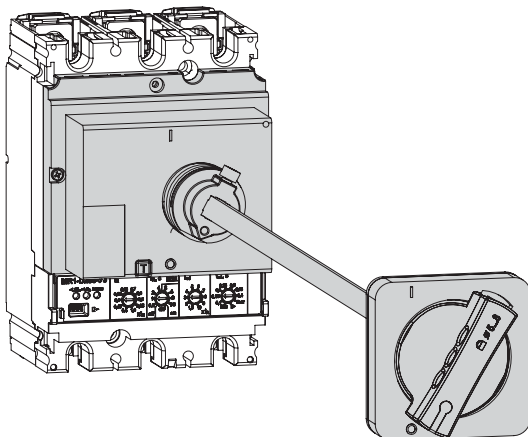
3) Apparatus and door blocking with padlocks.

Padlocks can lock the control handle of the circuit breaker and prohibit opening the door in the "off" position with one or three padlocks Ø5 - 8 mm (not included).

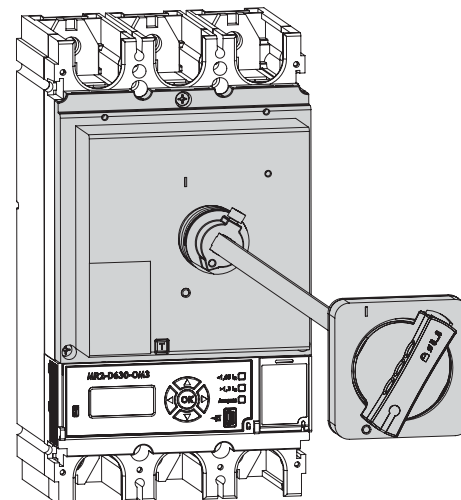
If the door control was modified to ensure the forced neutralization of the door lock, padlocks do not block the door, but block the device control handle, preventing commutation performing.

Designation		Manual remote drive OptiMat D100...250-UHL3	Manual remote drive OptiMat D400...630-UHL3
Reference	general purpose industrial design	240958	240959
	RS acceptance	244103	244105

OptiMat D100 and D250

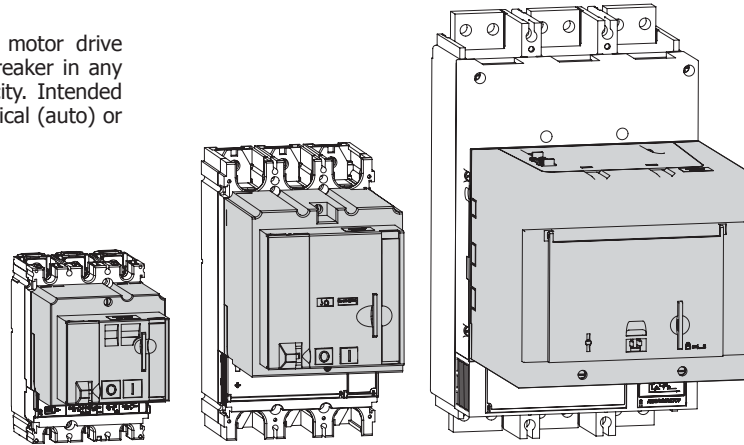


OptiMat D400 and D630



### Motor drive

OptiMat D circuit breakers can be equipped with a motor drive with energy storage, ensuring closing of the circuit breaker in any conditions - from rated load to rated switching capacity. Intended for remote control of the switch. Control modes: electrical (auto) or manual (P). Main characteristics are in the table:

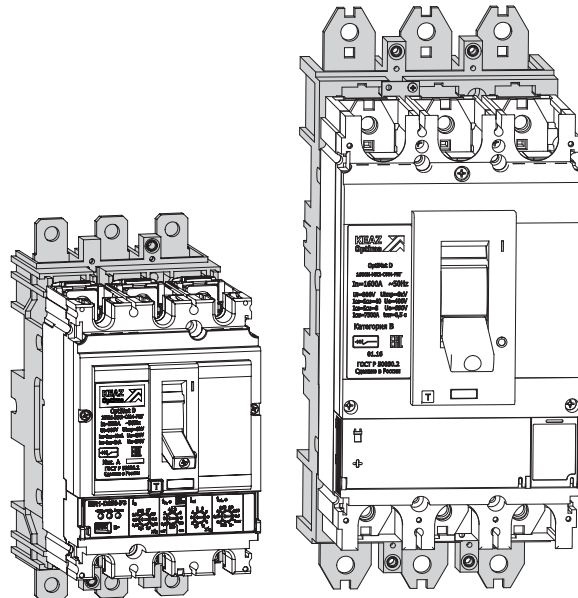


Designation		OptiMat D100...250-230AC-UHL3	OptiMat D100...250-400AC-UHL3	OptiMat D400...630-230AC-UHL3	OptiMat D400...630-400AC-UHL3	OptiMat D1000...1600-230AC-UHL3	OptiMat D1000...1600-400AC-UHL3
Reference	general purpose industrial design	247695	to develop	233121	to develop	to develop	to develop
	RRR acceptance	-	-	244100		on request	on request
	RS acceptance	255817	to develop	255815			
Operating voltages range (Us), V		0,85-1,1					
Motor capacity, V·A		250					
Resetting time, s		not more than 3					
General tripping time, ms		≤80					
General shutdown time, ms		≤1000					
Operation frequency		not more than 3 in a minute					

### Set for a plug-in connection

The fixed part is the basis for plug-in switch movable part fixing and can be installed in various ways on the mounting plate with front or rear connection. The circuit breaker is connected to the base using leads for plug-in connections (included in the delivery).

The plug-in set allows quickly remove the circuit breaker and inspect or replace it. The power cables or busbars remain attached to the fixed base. It also allows to provide backup outgoing lines in the switchboard, on which the circuit breakers will be installed later. A special lock (included in the delivery) automatically turns off the device when it is installed or removed in turned on state, and allows switching of the removed device.



Designation		Set for a plug-in connection OptiMat D100...250-UHL3	Set for a plug-in connection OptiMat D400...630-UHL3
Reference	general purpose industrial design	234092	234091
	RS acceptance	244096	244097

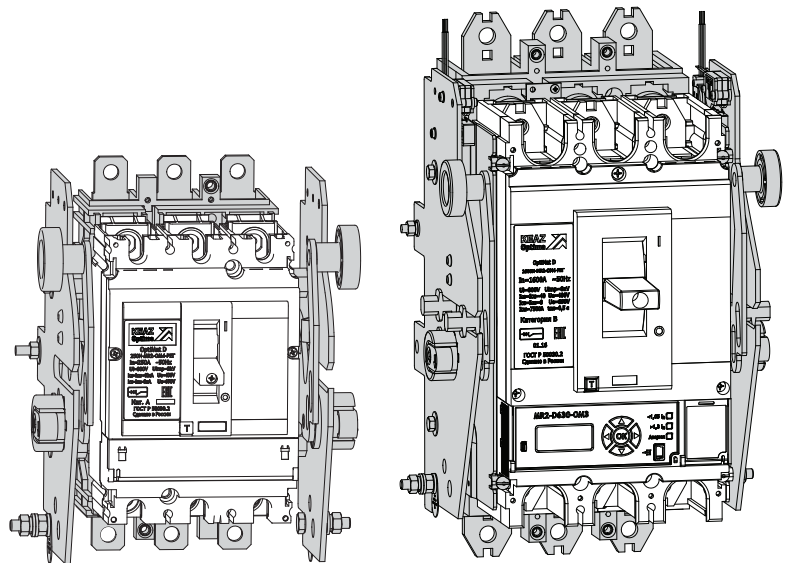
To ease the operating it's recommended to connect auxiliary circuits and control circuits of plug-in circuit breakers versions and retractable circuit breakers versions through the socket for secondary circuits OptiMat/VA57-UMSTBVK-2.5/13 ref. 273633 and plug for secondary circuits OptiMat/VA57-MSTB-2.5/13 ref. 273632. Socket and plug are not included.

### Set for a retractable design

In addition to functions fulfilled by plug in connection, retractable one, makes control easier. It provides 3 possible positions, jumping from one to another is possible after the mechanic lockup was taken off:

1. "pumped in" the power circuit is on;
2. "pumped out" the power circuit is off, switching to check secondary wiring can be done;
3. "extracted" the apparatus is extracted.

Retractable design in the chassis can be done by installing still parts of the chassis to the base, but moving parts -to the apparatus. retractable design provides visual clearance doing commissioning procedure. Special lockup automatically witches off the apparatus when it is being installed or extracted in operating mode but allows to do switching of the extracted apparatus.



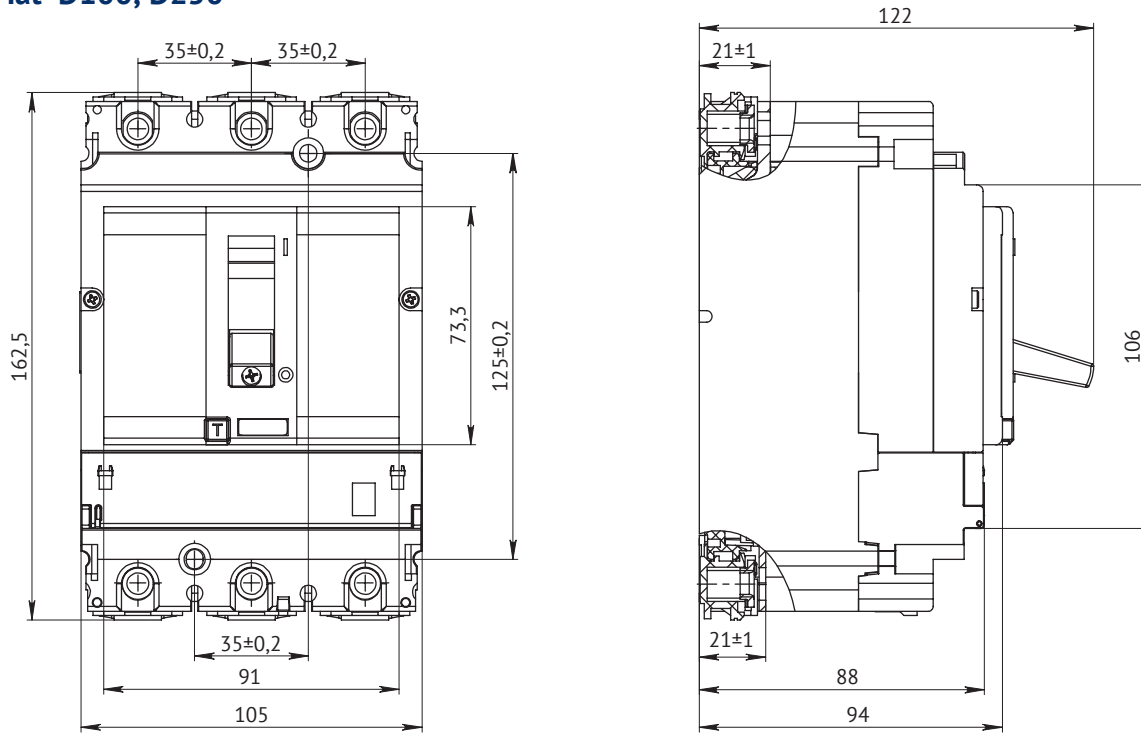
Designation		Set for a retractable design OptiMat D100...250-UHL3	Set for a retractable design OptiMat D400...630-UHL3	Retractable design circuit breaker OptiMat D1000 и OptiMat D1600
Reference	general purpose industrial design	239381	234093*	to develop
	RS acceptance	244098	244099*	on request

\* Using automatic breakers OptiMat D630H-MR2-U and OptiMat D630N-MR2-U3 together with a set for plug-in connection OptiMat D400...630-UHL3 and retractable design OptiMat D400...630-UHL3 current-carrying rating is 570 A within permission temperature range according to GOST P 50030.2-2010.

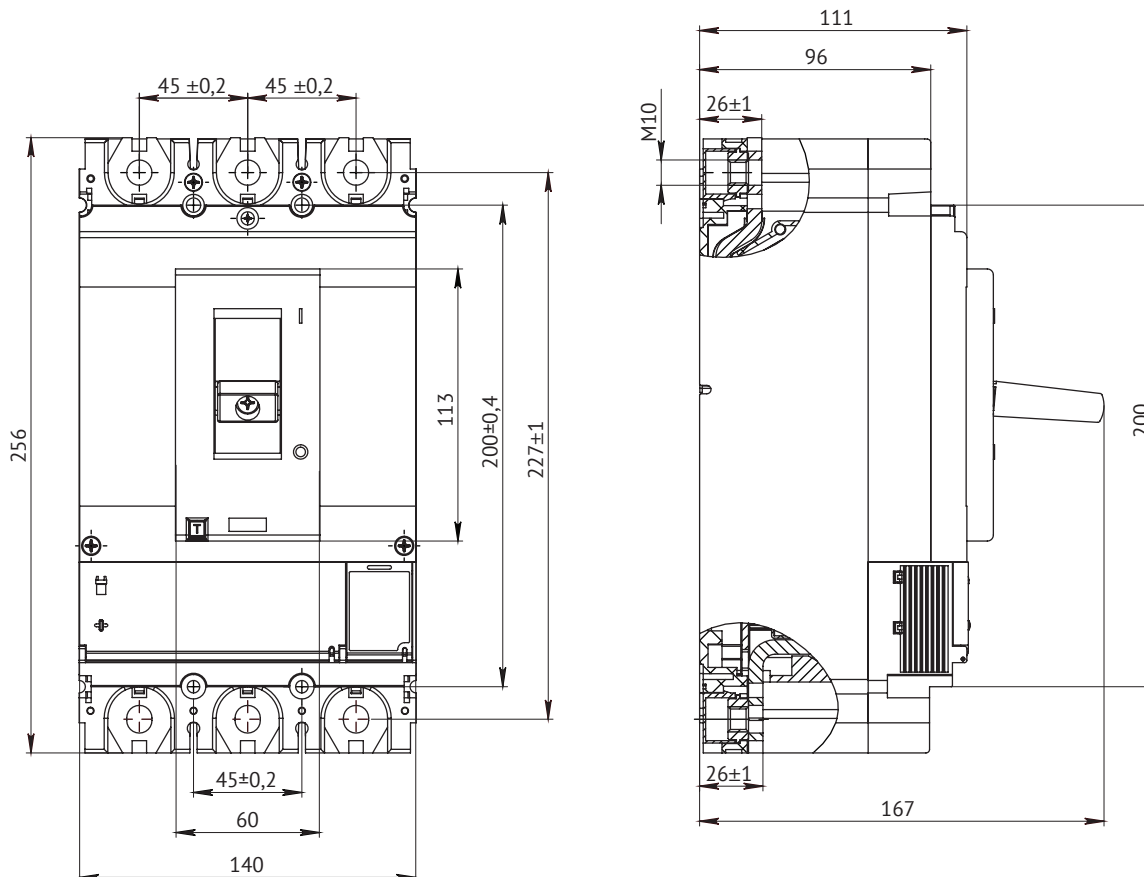
To ease the operating it's recommended to connect auxiliary circuits and control circuits of plug-in circuit breakers versions and retractable circuit breakers versions through the socket for secondary circuits OptiMat/VA57-UMSTBVK-2.5/13 ref. 273633 and plug for secondary circuits OptiMat/VA57-MSTB-2.5/13 ref. 273632. Socket and plug are not included.

## Overall dimensions (mm)

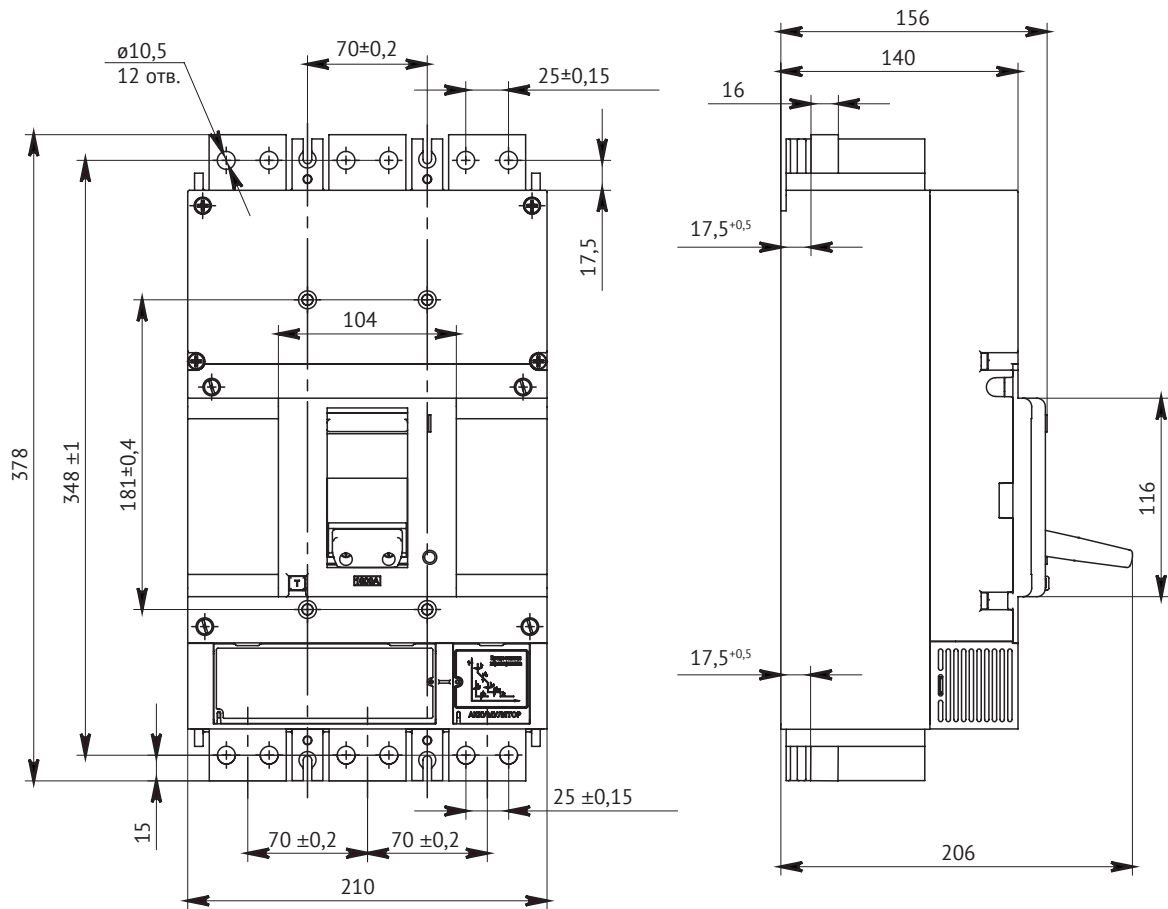
### OptiMat D100, D250



### OptiMat D400, D630

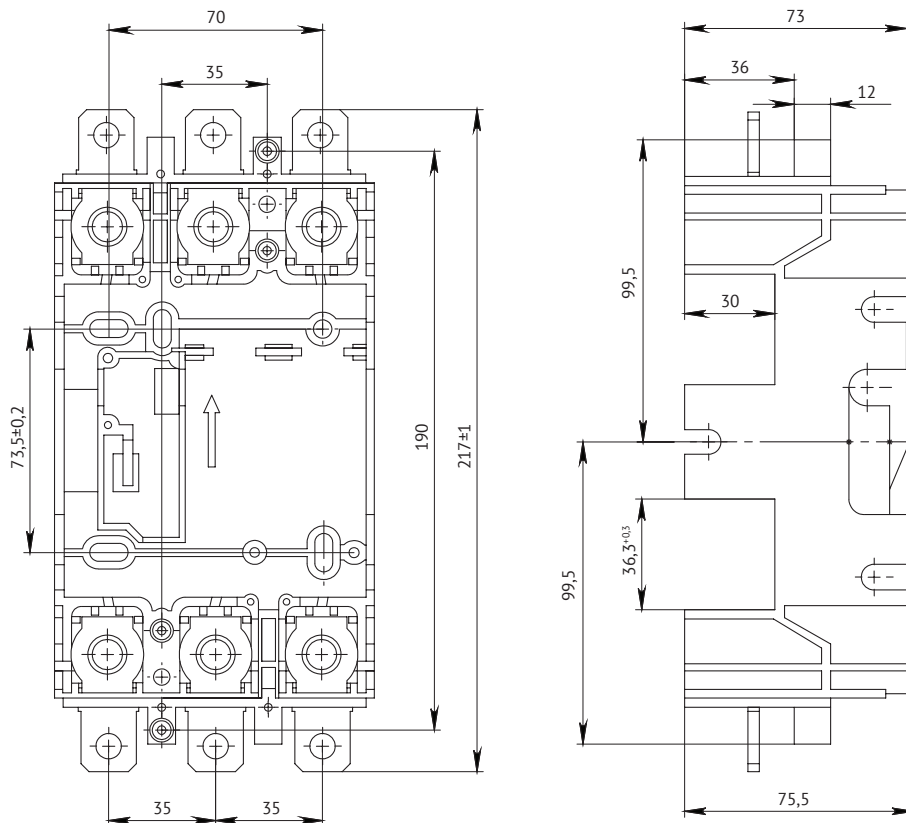


### OptiMat D1000, D1600

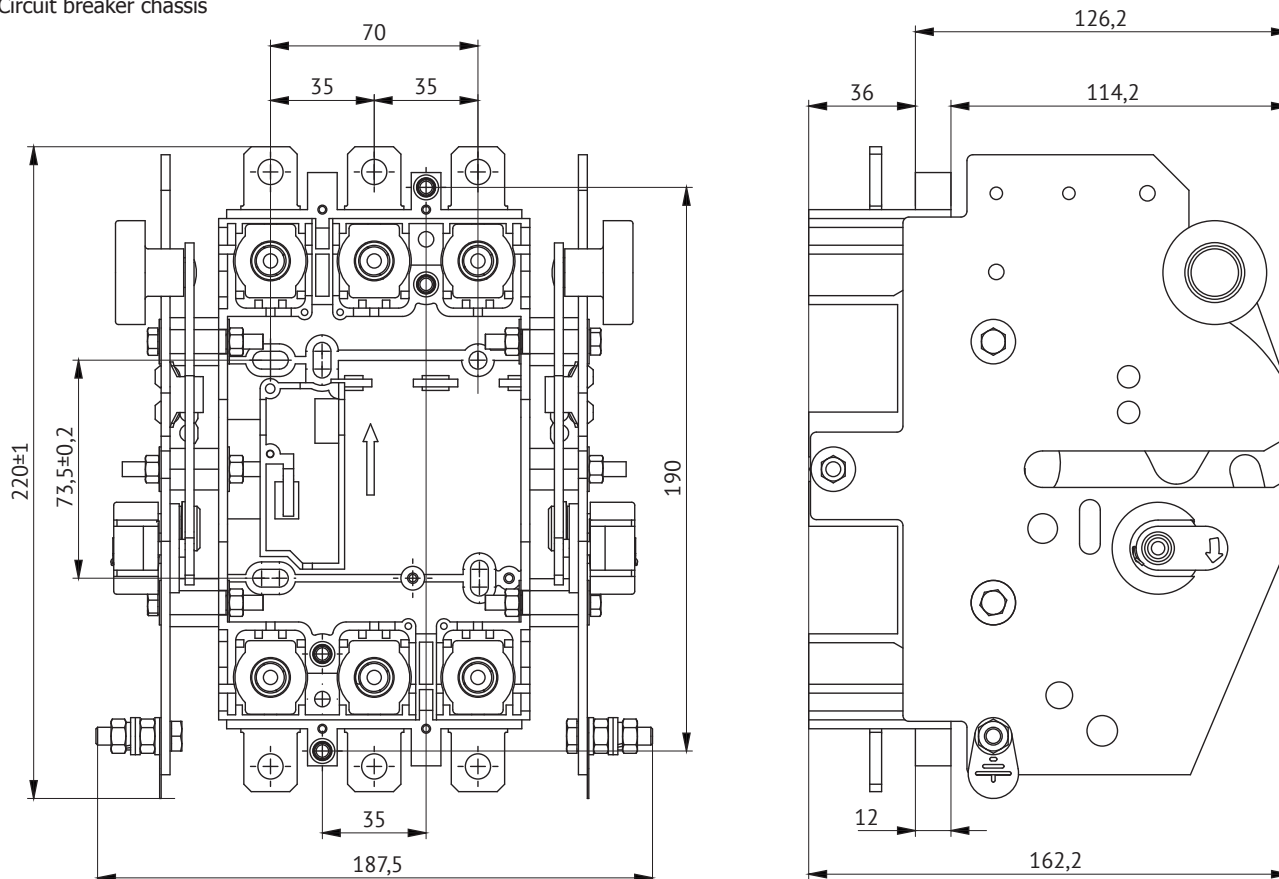


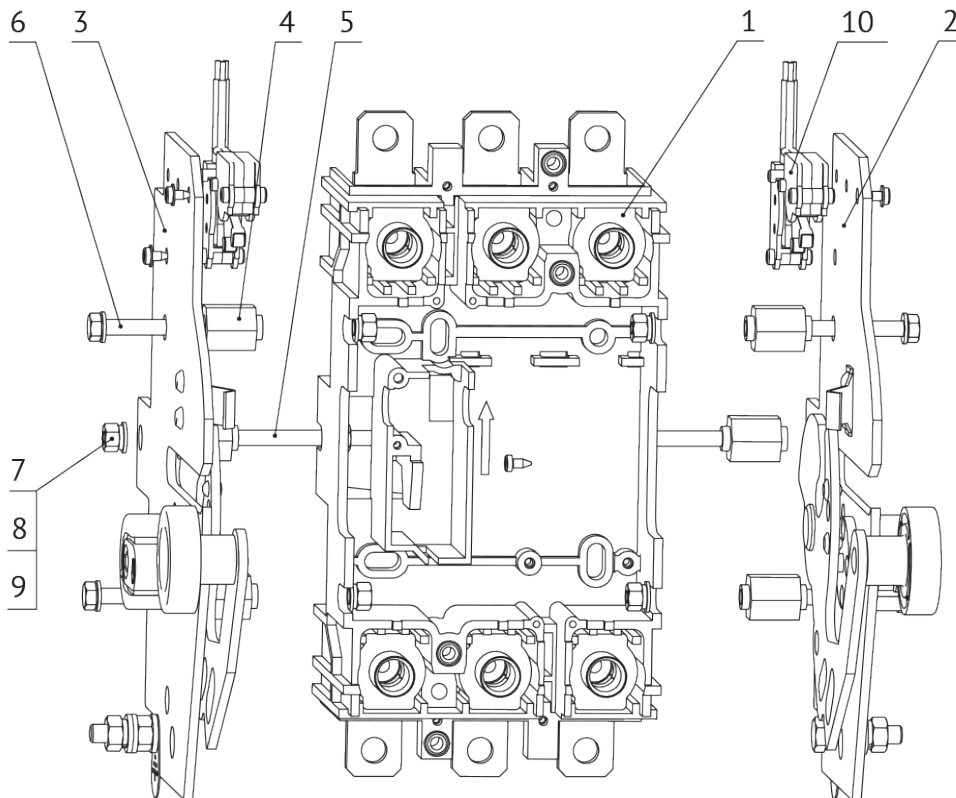
Set for plug-in attachment and drawout design for breakers OptiMat D100 и OptiMat D250

Base for plug-in attachment of the circuit breaker



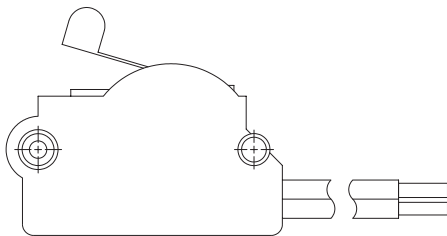
Circuit breaker chassis



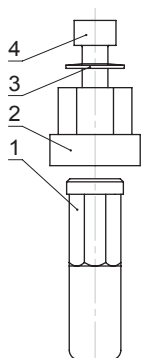


- Breaker chassis
- 1. base for plug-in attachment
  - 2. right hand column
  - 3. left hand column
  - 4. limiting sleeve
  - 5. stud - coupling - 2pieces
  - 6. screw M5x35 - 4 pieces
  - 7. nut M5 - 8 pieces
  - 8. washer - 12 pieces
  - 9. split lock washer- 6 pieces
  - 10. signalling contact for breaker position in the chassis - 4 pieces

Signalling contact for breaker position in the chassis.

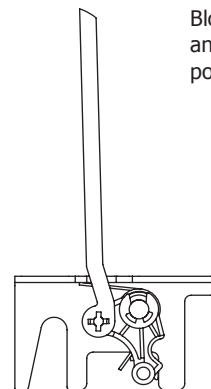


**Additional units included in delivery for plug-in and retractable design of OptiMat D100 and OptiMat D250 circuit breakers**



- Base for plug-in breaker attachment
- Lead for plug-in attachment and drawout design
- 1. lead
  - 2. reducer
  - 3. disc spring
  - 4. screw M6x16.

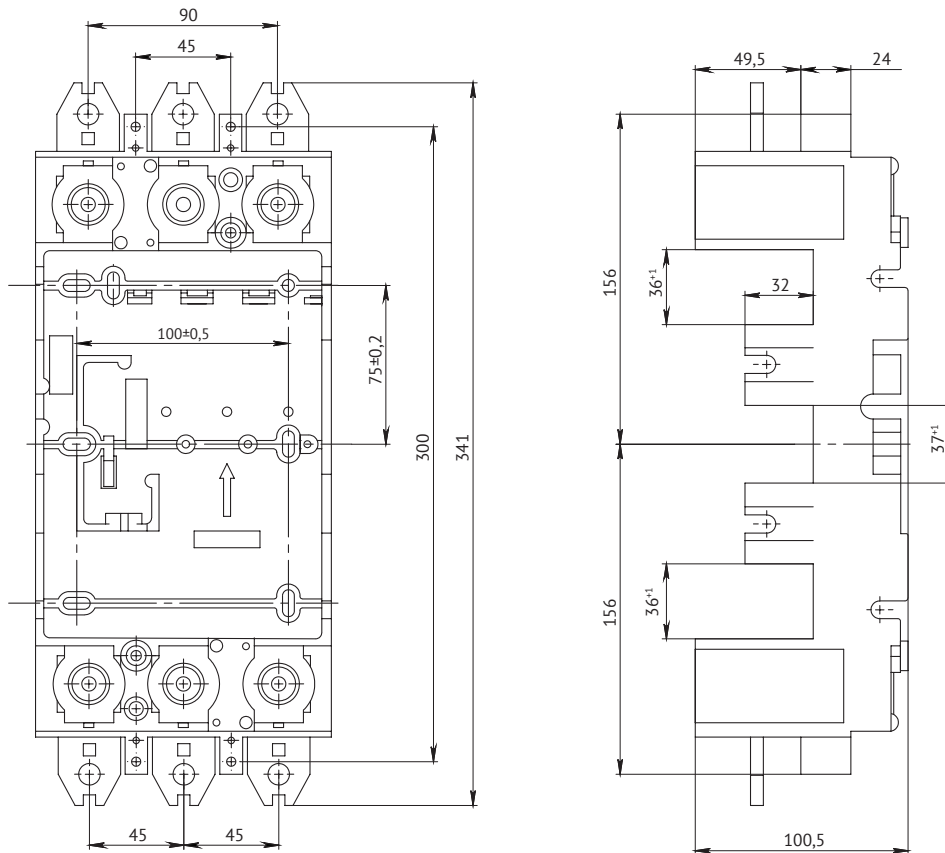
Lead of position 1 is installed in the breaker through frontal detail of position 2 with the help of the screw of position 4 and the spring of position 3.



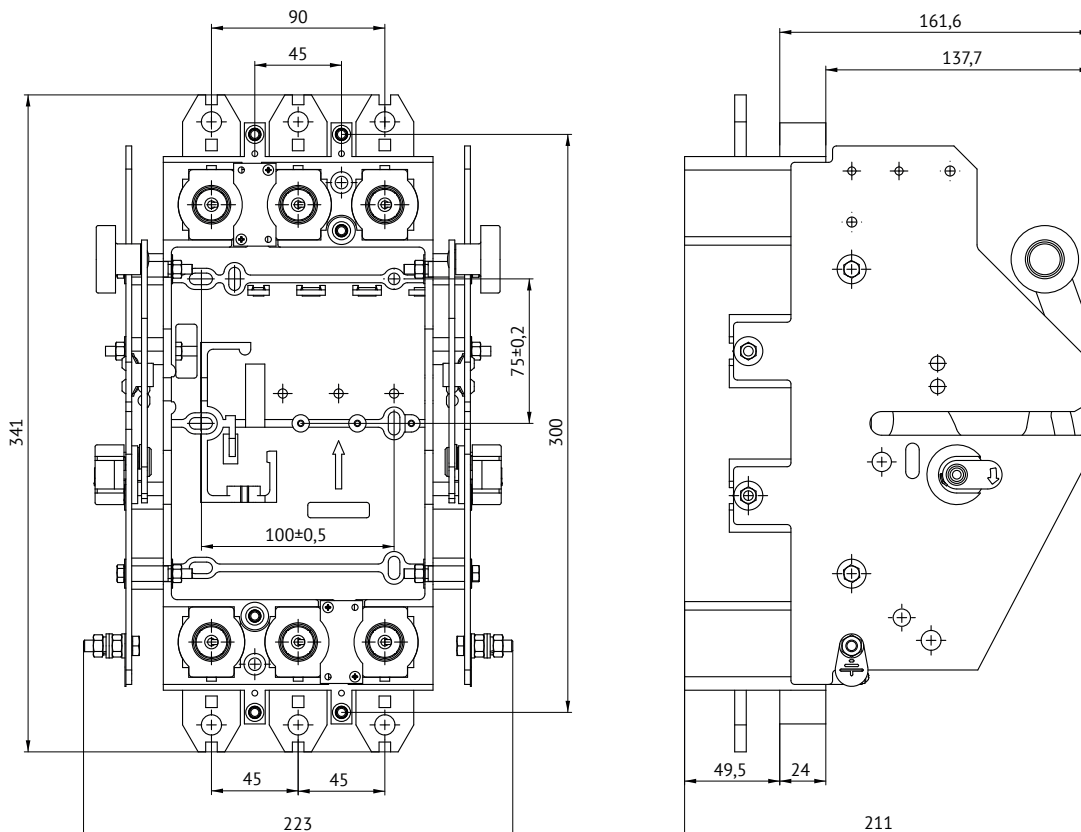
Blocking mechanisms to prevent installation and extraction of the breaker in switching position "on".

**Set for plug-in attachment and drawout design for breakers OptiMat D400 and OptiMat D630**

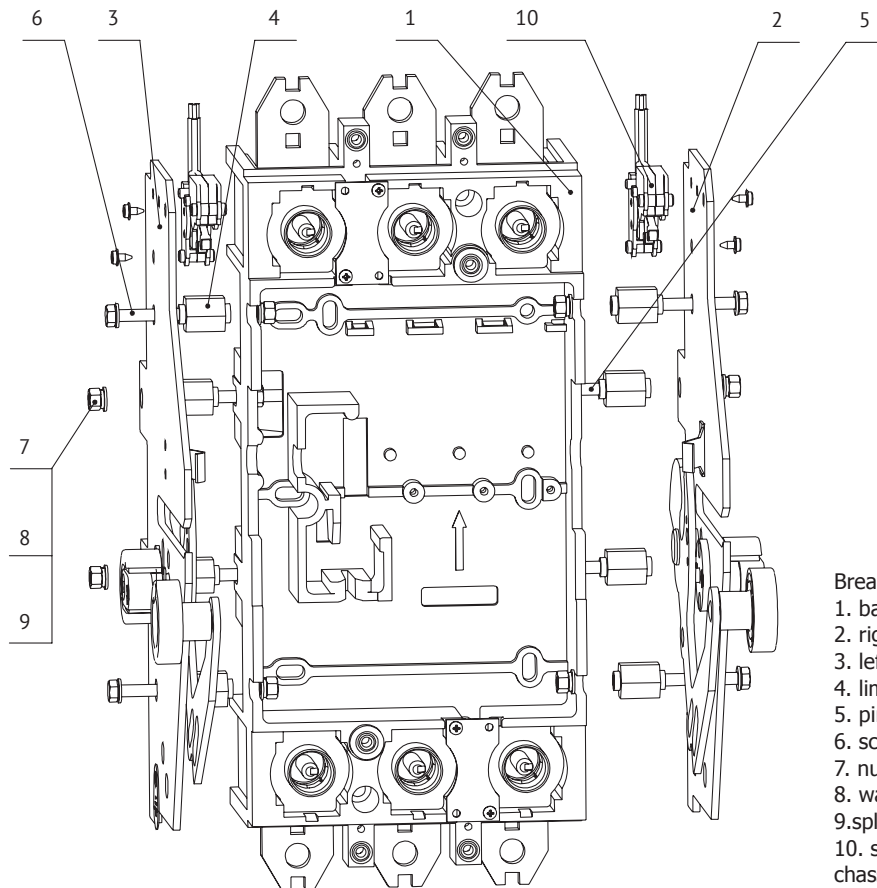
Base for plug-in attachment of the circuit breaker



Circuit breaker chassis



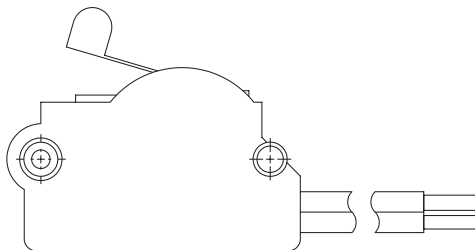




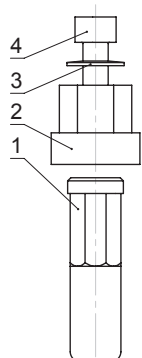
**Breaker chassis**

- 1. base for plug-in attachment
- 2. right hand column
- 3. left hand column
- 4. limiting sleeve - 6 pieces
- 5. pin - coupling - 1 piece
- 6. screw M5x35 - 4 pieces
- 7. nut M5 - 8 pieces
- 8. washer - 12 pieces
- 9. split lock washer - 6 pieces
- 10. signalling contact for breaker position in the chassis - 4 pieces

Signalling contact for breaker position in the chassis.



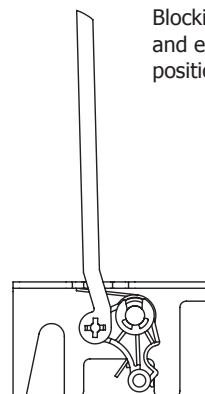
**Additional units included in delivery for plug-in and retractable design of OptiMat D400 and OptiMat D630 circuit breakers**



Lead for plug-in attachment and retractable design

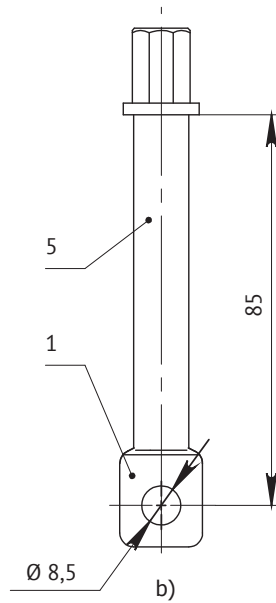
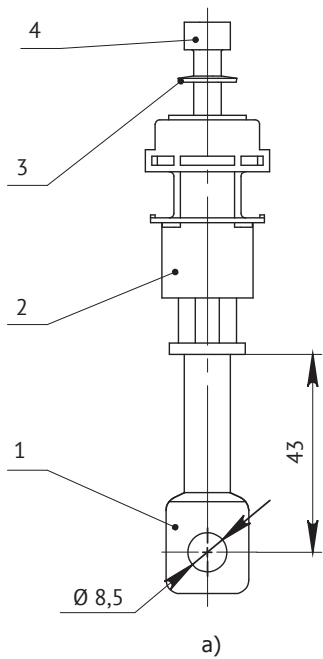
- 1. lead
- 2. reducer
- 3. disc spring
- 4. screw M8x25

Lead of position 1 is installed in the breaker through frontal detail of position 2 with the help of the screw of position 4 and the spring of position 3.



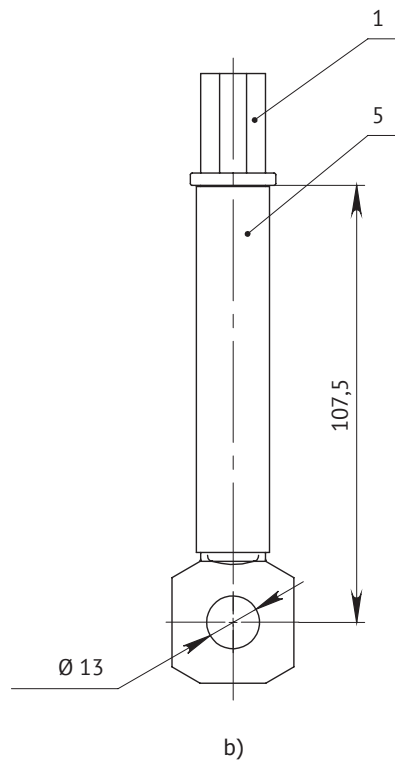
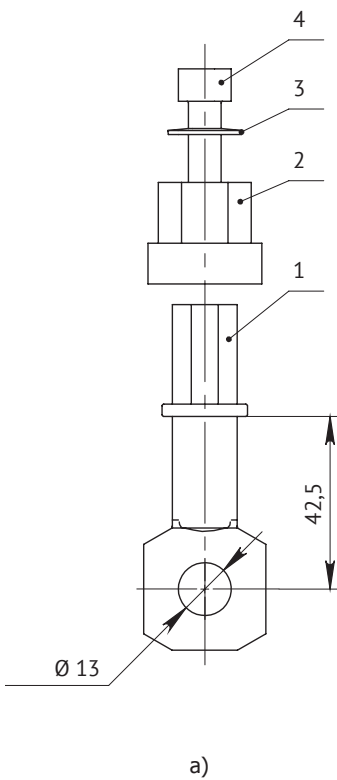
Blocking mechanisms to prevent installation and extraction of the breaker in switching position "on".

Insert terminal for rear attachment of OptiMat D100, OptiMat D250, OptiMat D400 and OptiMat D630 breakers



Insert terminal for rear attachment of OptiMat D100 and OptiMat D250 breakers

- a) short b) long  
 1. insert terminal  
 2. reducer  
 3. disc spring  
 4. screw M6x16  
 5. insulating tube

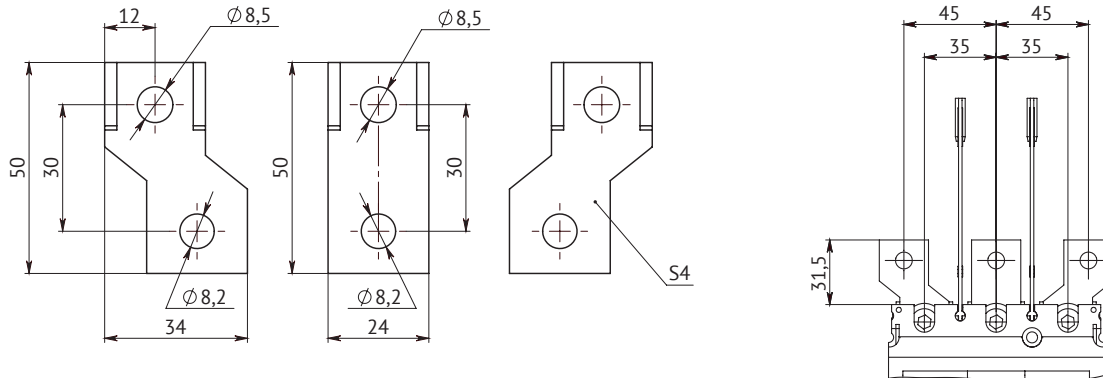


Insert terminal for rear attachment of OptiMat D400 and OptiMat D630 breakers

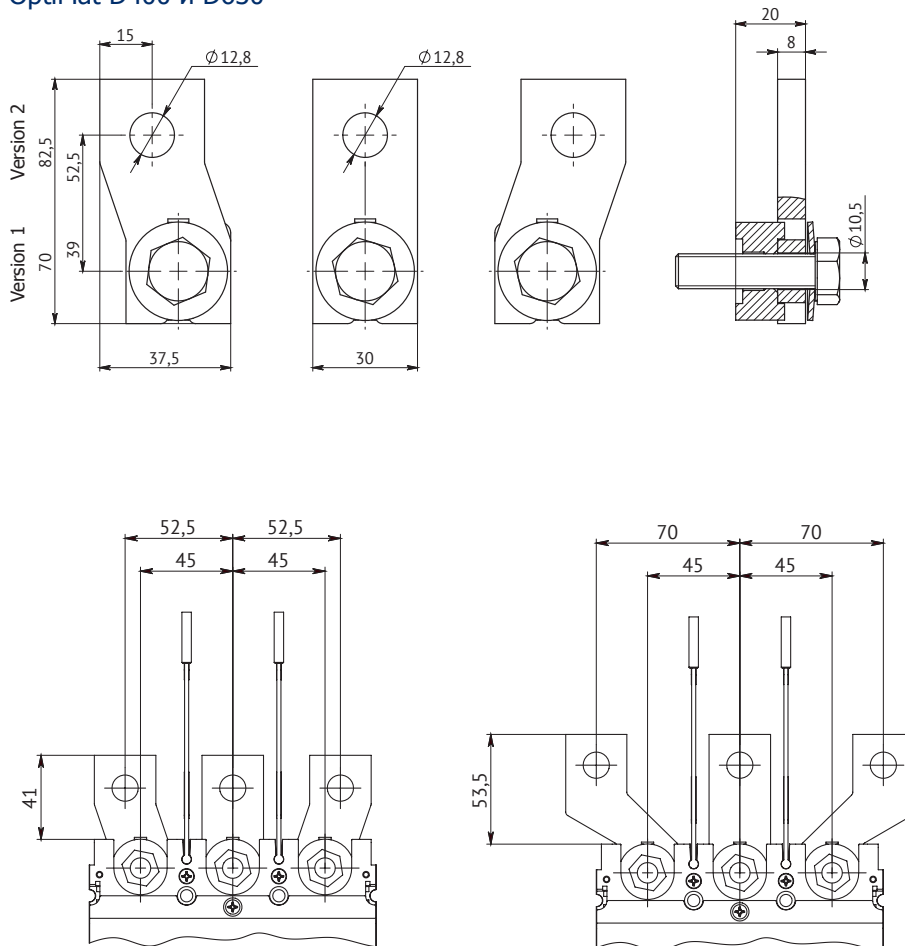
- a) short b) long  
 1. insert terminal  
 2. reducer  
 3. disc spring  
 4. screw M8x20  
 5. insulating tube.

## Overall dimensions of pole spreaders

### OptiMat D100 и D250



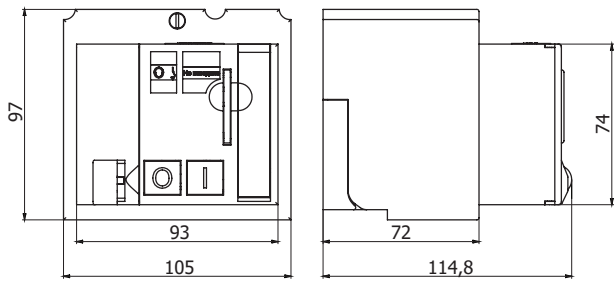
### OptiMat D400 и D630



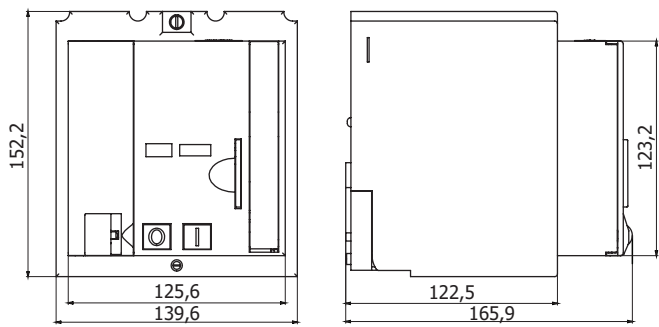
Designation	Reference
Version 1 OptiMat D400..630-UHL3-short	to develop
Version 2 OptiMat D400..630-UHL3-long	258210

## Габаритные размеры привода двигательного

OptiMat D100 and D250

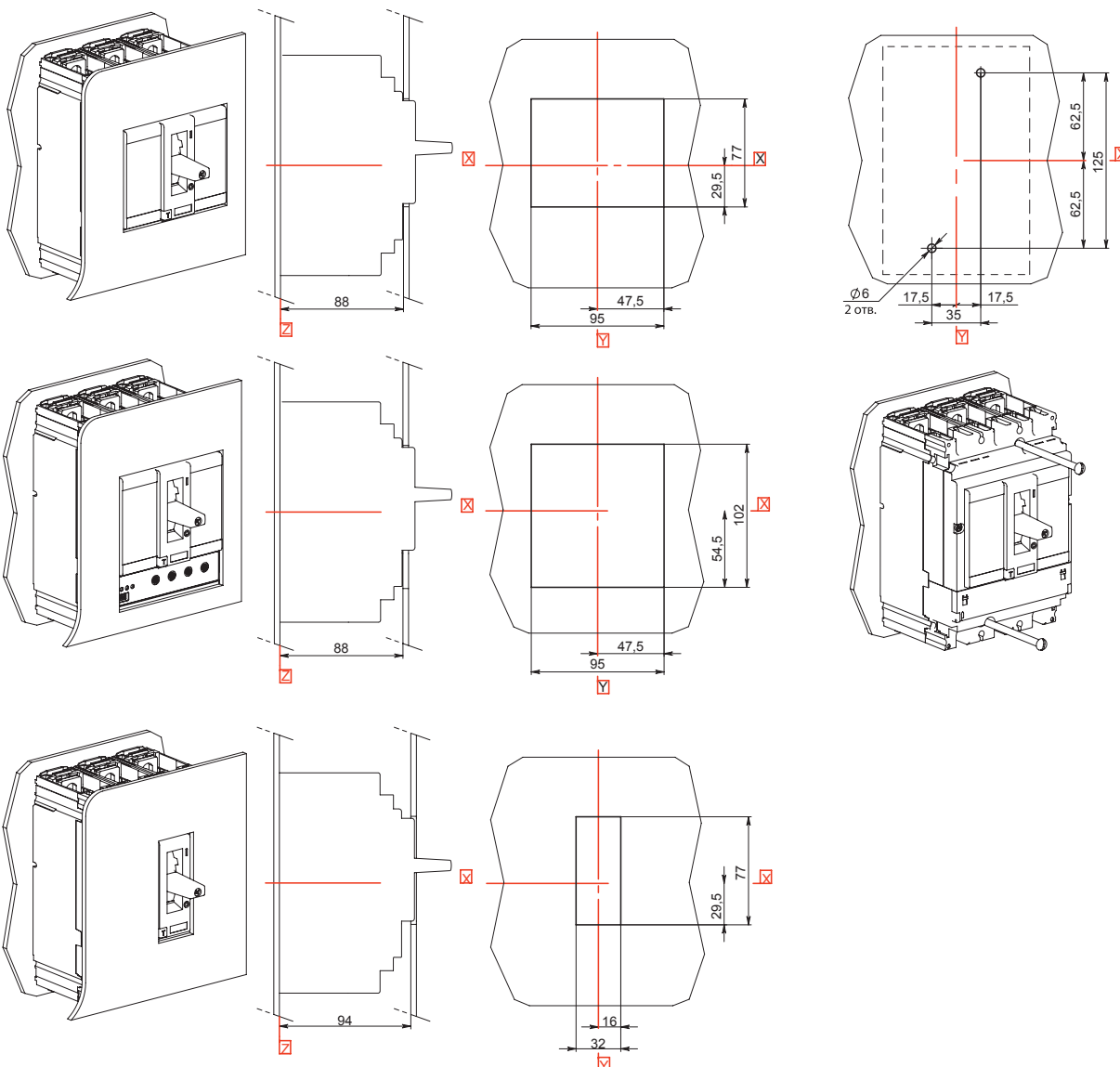


OptiMat D400 and D630

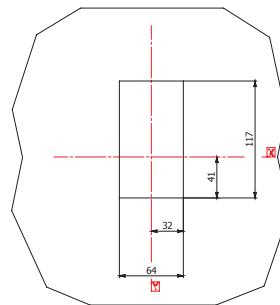
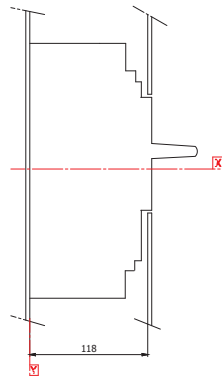
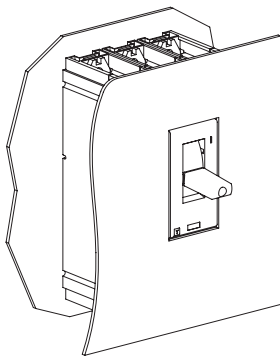
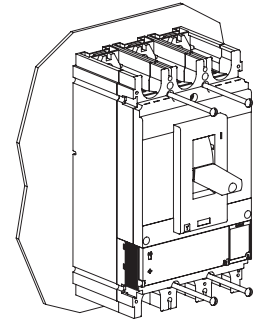
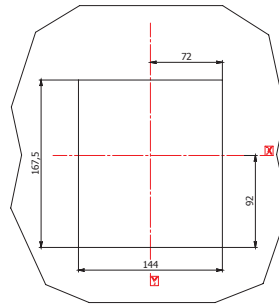
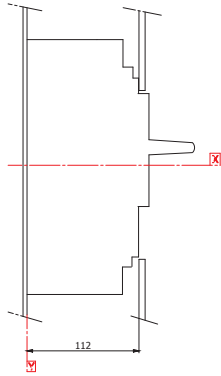
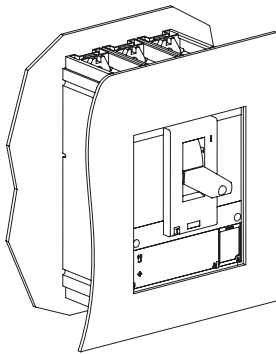
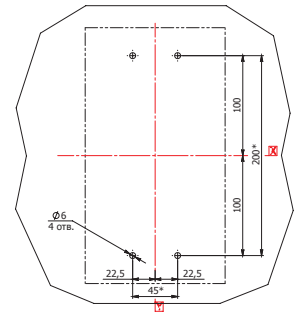
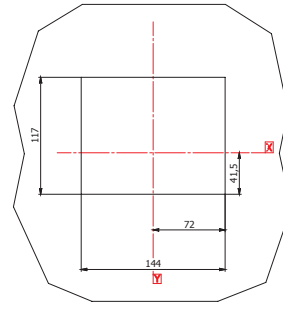
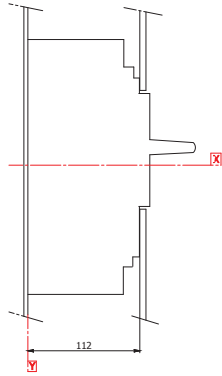
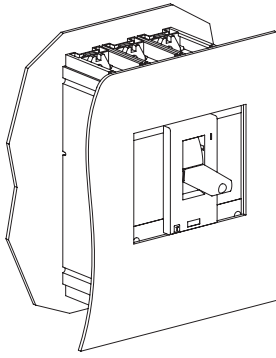


## Models for box marking and drilling

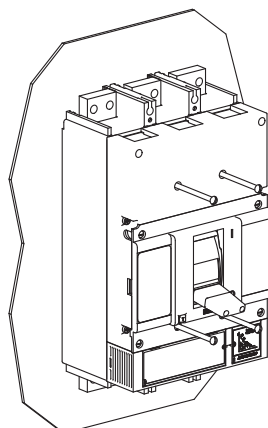
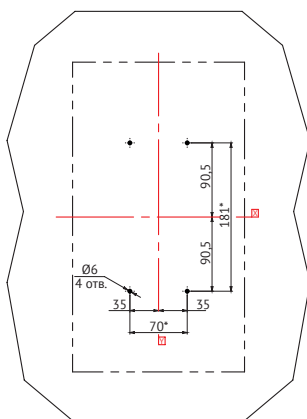
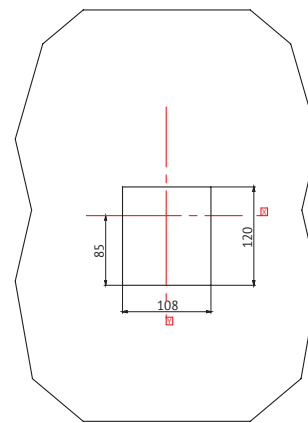
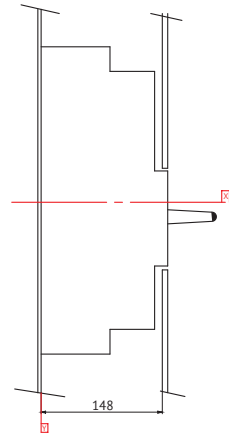
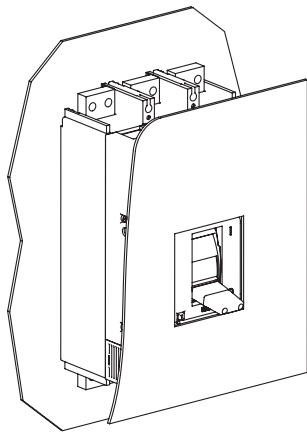
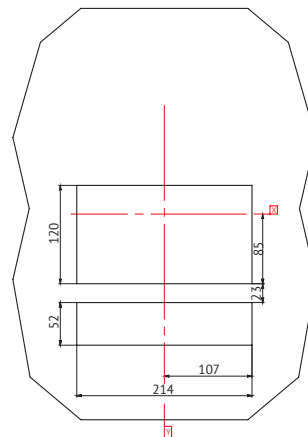
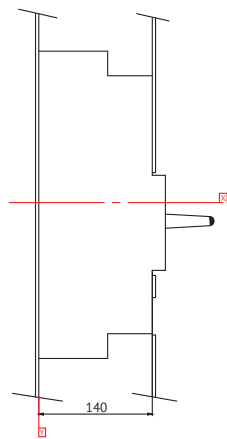
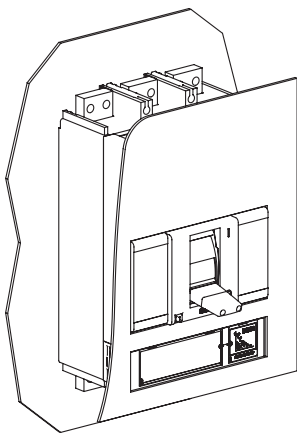
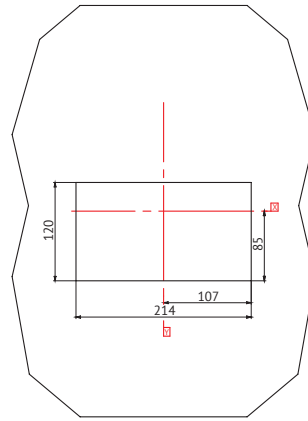
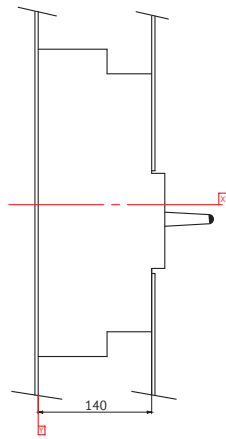
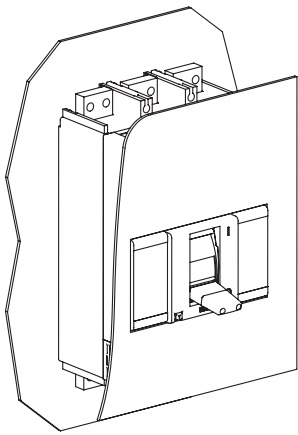
OptiMat D100 and D250



OptiMat D400 and D630

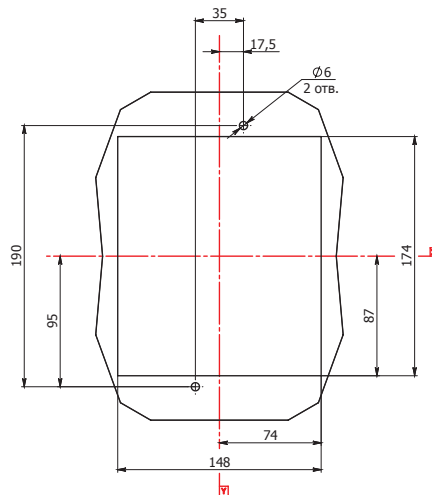
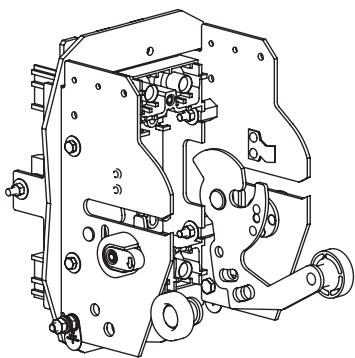
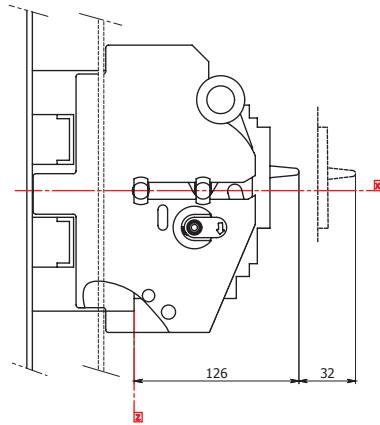
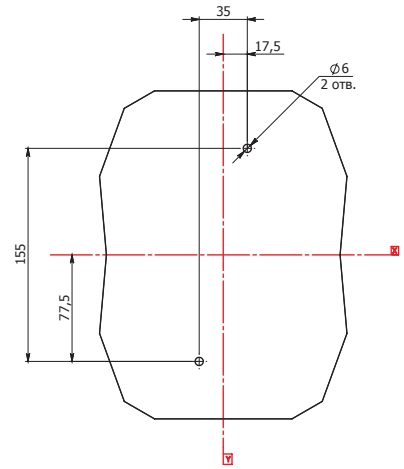
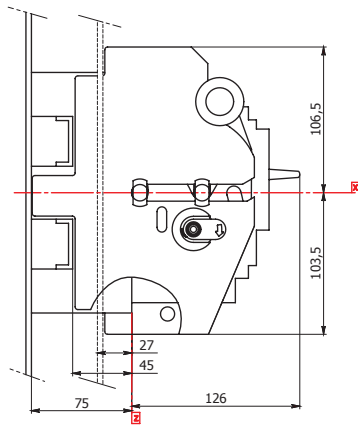
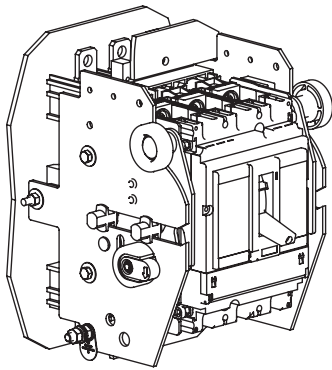


OptiMat D1600

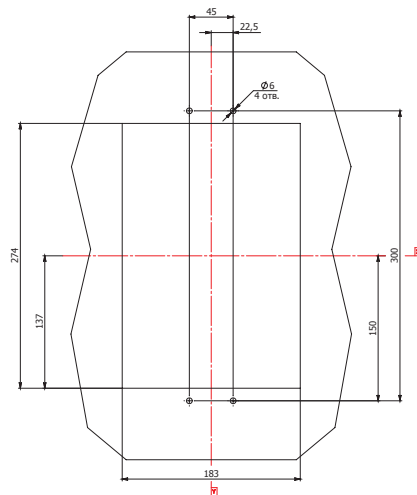
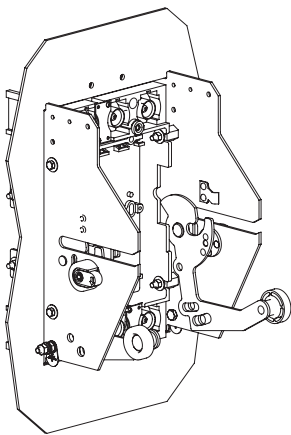
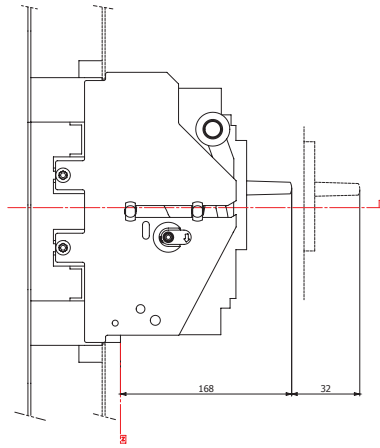
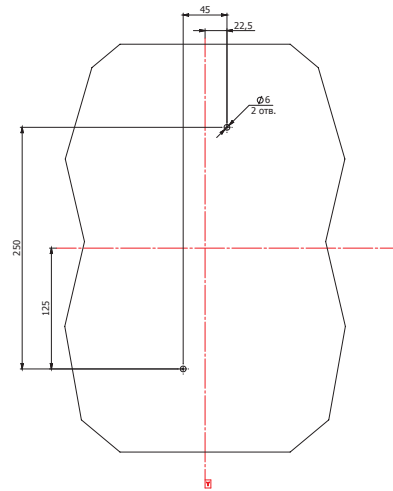
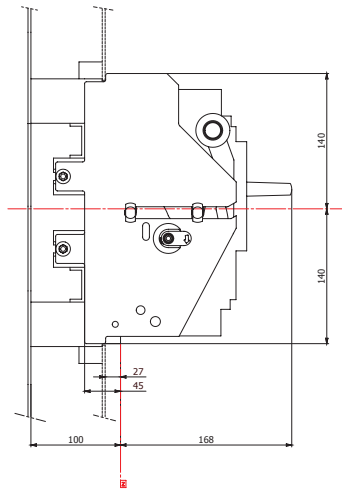
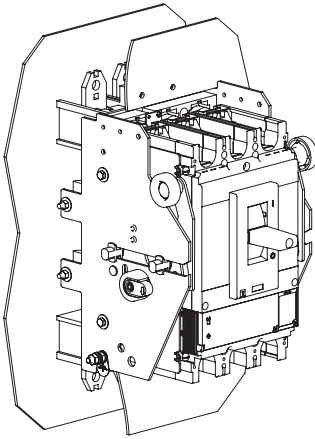


## Plug-in attachment and drawout design

OptiMat D100 and D250



OptiMat D400 and D630





## Circuit schematics

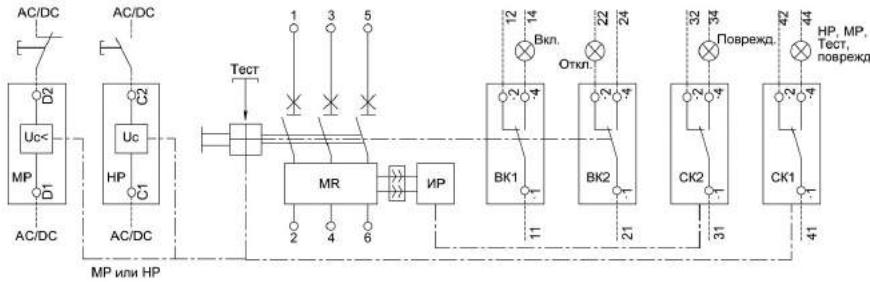
conventional signs  
 Q: automatic breaker  
 MR: semiconducting trip unit  
 MP: minimum circuit tripping unit  
 HP: shunt trip  
 IP: control trip  
 BK1...BK4 auxiliary contacts, showing switching breaker position (close/open)  
 CK1 : breaker signalling contacts in work mode and emergency switching-off by semiconducting trip unit

CK2: Tripping signal contact of the breaker at emergency shutdown by semiconducting trip unit

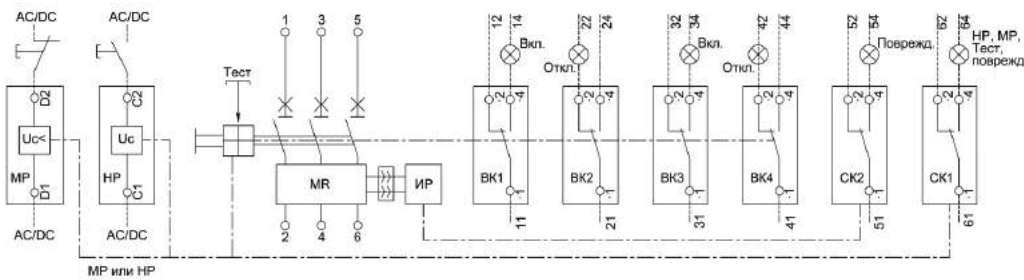
Connections of the dash-line are done by the user.

Schematics are for "off" breaker position. Schematics show maximum amount of auxiliary contacts and tripping units.

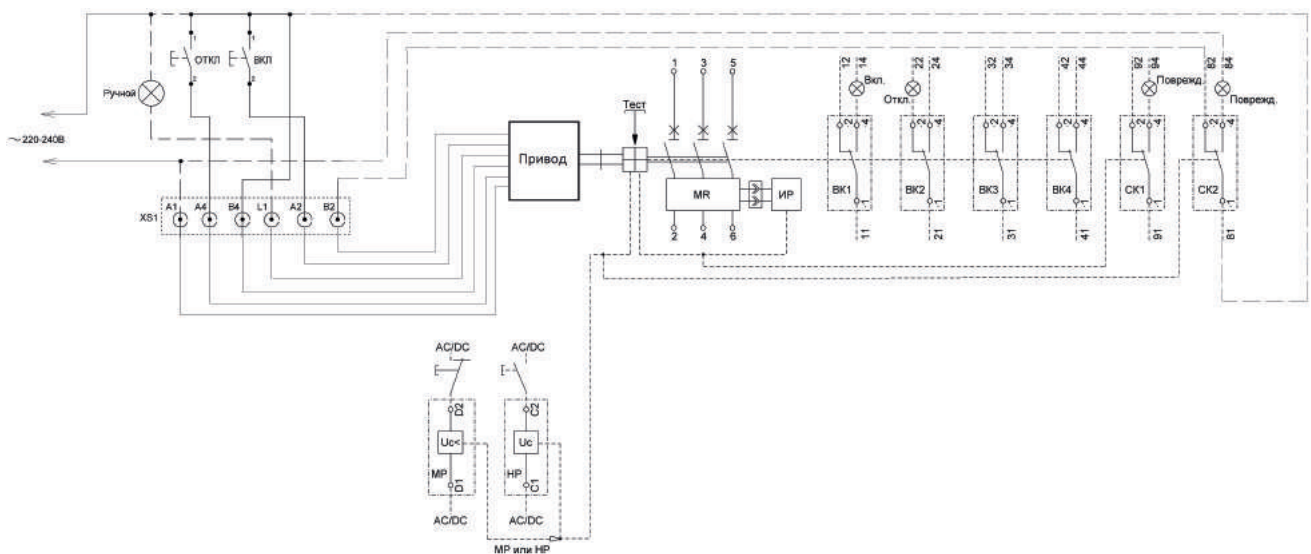
### Circuit schematics for breakers OptiMat D100 and OptiMat D250



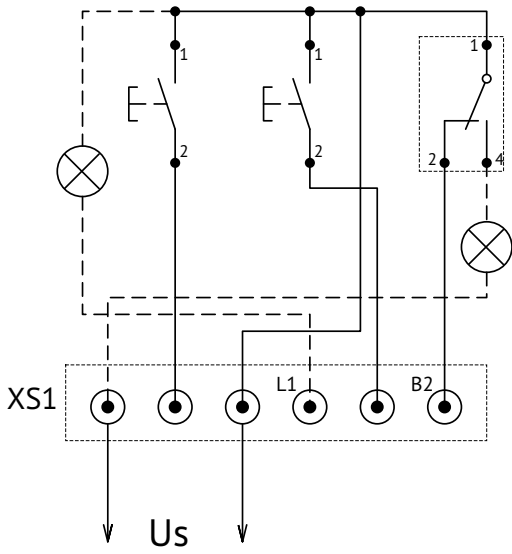
### Circuit schematics for breakers OptiMat D400 and OptiMat D630



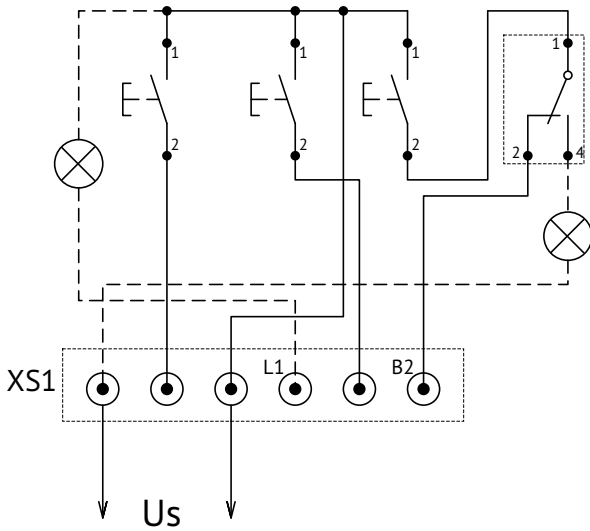
### Circuit schematics for breakers OptiMat D400 and OptiMat D630 with motor drive



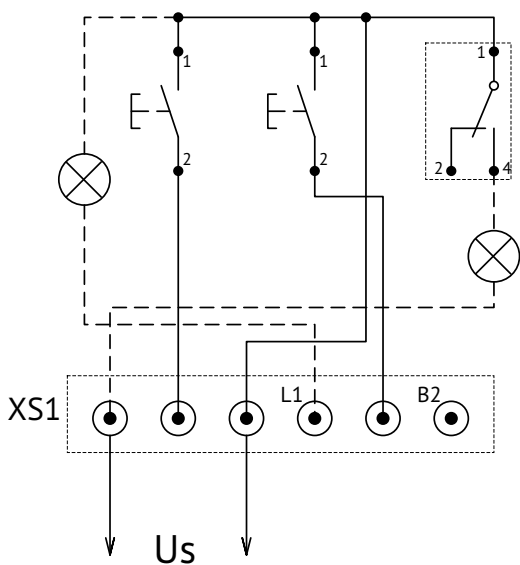
**Possible motor drive connection diagrams**



Motor drive connection wiring diagram with automatic activation of the spring, where SK2 - signal contact of the switch, XS1 -connection module (connector), "SK" - indication of the switch tripping by short circuit or overload, "Manual" - control mode's switch position (manual/auto).



Motor drive connection wiring diagram with remote activation of the spring

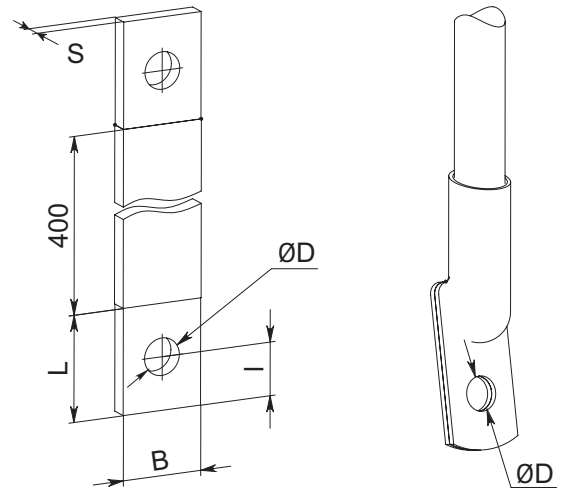


Motor drive connection wiring diagram with manual activation of the spring

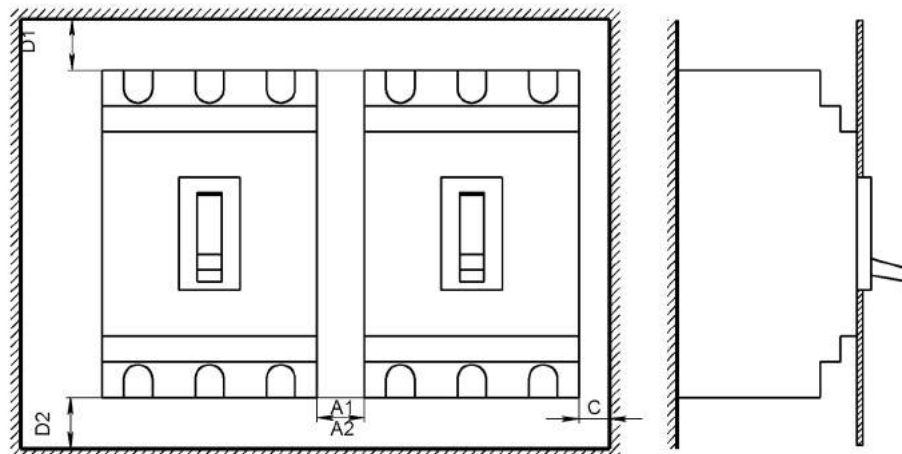
## Size and type of busbar attachment OptiMat D

Main circuit clamps allow attachment of busbars and wires with end fitting  
 Sizes and sections of attached busbars and wires with end fitting are shown in the picture and mentioned in the table:

Way of attachment	Dimensions		
Screw connection	screw	M8	M10
Busbars	B (mm)	≤25	≤32
	l (mm)	≤10	≤15
	L (mm)	l+10	l+15
	D (mm)	8,5	10,5
	S (mm)	2≤S≤6	3≤S≤12
End fittings according to GOST 7386	B (mm)	≤24	≤31
	D (mm)	8,4-10,5	10,4÷12,5
	cross-section (mm <sup>2</sup> )	10-70	25-120



## Minimum permissible distance between the breaker and metallic parts of the distribution device OptiMat D



Automatic breaker OptiMat D		Dimensions, mm				
		C	D1	D2	A1 <sup>1</sup>	A2 <sup>2</sup>
100, 250 A	400 V	5	35	35	0	10
	690 V	20	35	35	0	40
400, 630 A	400 V	5	60	60	0	10
	690 V	20	100	100	0	40

1- with terminal cover  
 2-without terminal cover.