

OptiMat D Range of automatic molded case circuit breakers



OptiMat D Range of automatic molded case circuit breakers series is modern generation of three-pole circuit breakers of fixed, clip-on and extended design equipped with thermomagnetic regulated and microprocessing releases aimed at protecting electric circuits from overload and short circuits, including one-phase short circuits. Circuit breakers approved by the Russian Maritime Register of Shipping (hereinafter – RS) and the Russian River Register (hereinafter – RRR) are designed to protect electrical equipment on ships and port infrastructure. Circuit breakers approved by the NPP are designed to protect nuclear power stations.



Designation

For circuit breakers with a microprocessor trip system

OptiMat D 250 N - D - MR1 - U3 - NPP



1	Product range	OptiMat							
2	Configuration	D - automatic molded case circuit breakers							
3	Rated current I_n , A	100	160	250	400	630	1000	1600	
4	Limiting breaking capacity, kA	N - 40 H - 65	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	Design of the circuit breaker	For rated currents 100, 160, 250, 400, 630 A: fixed. Fixed design does not need an additional designation. Clip-on and extended design imply the use of sets for clip-on connection and extended design (see Accessories section)					For rated currents 1,000 and 1,600 A: D – extended design, if absent – fixed design		
6	Type of a microprocessor trip system	1) MR1 - protection of electric circuits from overload and short circuits with regulated time delay in the overload zone and regulated short-term time delay in short circuit zone, with programmable thermal memory			2) MR1 - protection of electric circuits from overload and short circuits with fixed time delay in the overload zone and fixed short-term time delay in short circuit zone, with preset thermal memory and programmable parameters indication		3) MR2 - protection of electric circuits from overload and short circuits (including one-phase short circuits) with regulated time delay in the overload zone and regulated short-term time delay in short circuit zone, with programmable thermal memory and programmable parameters indication		
7	Symbol of environment and environmental class of location	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)		
8	Approval designation	REG – for circuit breakers with RS and RRR		E – for deliveries with approval by export		NPP – for nuclear power plants		power plants QCD	

1) For OptiMat D100, D160 и D250 breakers

2) For OptiMat D400, D630 breakers

3) For OptiMat D400, D630, D1000 и D1600 breakers

Basic configuration of OptiMat D circuit breaker includes:

- interpole partitions (4 pcs);
- fastening screws set.

Articles indicated in the tables can be amended. If you did not find the necessary articles on the website, please call KEAZ customer service.

For circuit breakers with thermomagnetic regulated releases

OptiMat D 250 N - TM 250 - UHL3 - NPP



1	Product range	OptiMat		
2	Configuration	D - automatic molded case circuit breakers		
3	Circuit breaker designation with maximum current	250 – с расцепителями от 16 до 250 А	630 – с расцепителями от 320 до 630 А	
4	Limiting breaking capacity, kA	L – 25 N – 40 F – 50	N – 40 F – 50 H – 65	
5	Release designation	TM – thermomagnetic regulated release protecting electric circuits from overload and short circuits		
6	Release rated currents	016, 020, 025, 032, 040, 050, 063, 080, 100, 125 - with operating current I_r regulated setpoints from overload currents and fixed SCT currents protection setpoints 160, 200, 250 - with regulated setpoints from overload currents and SCT currents	320, 400, 500, 630 - with regulated setpoints from overload currents and SCT currents	
7	Symbol of environment and environmental class of location	UHL3		
8	Approval designation	REG – for circuit breakers with RS and RRR	E – for deliveries with approval by export	NPP – for nuclear power plants power plants QCD

Basic configuration of OptiMat D circuit breaker includes:

- interpole partitions (4 pcs);
- fastening screws set.

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.



OptiMat D circuit breakers can be operated at -40...+70 °C (for microprocessing releases) and -60...+70 °C (for thermomagnetic releases)



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.



Main contact "double break" system guarantees instantaneous short circuit current breaking and significantly decreases main contact wear, which results in longer service life of the switch.






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

Technical specifications



Type of release		Thermomagnetic regulated						Microprocessing													
Range of automatic breakers		OptiMat D250		OptiMat D630		OptiMat D100		OptiMat D160		OptiMat D250		OptiMat D400		OptiMat D630		OptiMat D1000		OptiMat D1600			
General characteristics																					
Rated operational voltage, Ue V		690						690													
Rated insulation voltage Ui, V		800						800													
Rated sustainable pulsed voltage Uimp, kV		8						8													
Application category		A						A		A (MR1), B (MR2)				B							
Suitability for isolation		available						available													
Number of poles		3						3													
Control																					
Manual	control lever	+						+		+				+							
	standard or extended rotary handle	+						+		+				-							
Electrical	motor drive	+						+		+				+							
Design																					
Stationary	frontal	+						+		+				+							
	rear	+						+		+				-							
Plug-in		+						+		+				-							
Retractable		+						+		+				+							
Rated and limiting parameters of the main circuit of circuit breakers																					
Rated current In, A		16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250				320, 400, 500, 630		100		160		250		400		630		1000		1600	
Rated frequency, Hz		50						50													
Levels of the breaking capacity		L	N	F	N	F	H	N	H	N	H	N	H	N	H	N	H	N	H	N	H
Rated limiting breaking capacity Icu, kA	Ue 400 V	25	40	50	40	50	65	40	65	40	65	40	65	40	65	40	65	50	85	50	85
	Ue 690 V	8	8	10	8	10	15	8	10	8	10	8	10	8	10	8	10	20	30	20	30
Short-circuit making capacity Ics, % of Icu		100						100													
Rated service short-circuit breaking capacity Icm, kA	Ue 400 V	55	88	110	88	110	143	84	143	84	143	84	143	84	143	84	143	105	154	105	154
	Ue 690 V	12	12	13,6	12	13,6	17	13,6	17	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		3		5		7		-		-		-		19,2		19,2	
	1 s	-		-		-		-		-		-		-		-		-		-	
Overall wear resistance, cycles		16000				10000		25000		16000		10000		10000		10000		10000		10000	
Electrical wear resistance, cycles		Ue 400 V		6300		2500		10000		6300		2500		2000		1000		1000		1000	
Devices for protection, indication and measurement																					
Thermomagnetic/microprocessing release		TM						MR1		MR1/MR2				MR2							
Overload protection	with regulated current setpoint	+						+		+/-				+							
	with fixed time setpoint	-						-		+/-				-							
	with regulated time setpoint	-						+		+/-				+							
Protection against short circuit currents	with regulated setpoint	+						+		+/-				+							
	with time delay	-						+		+/-				+							
	instant actuation	-						+		+/-				+							
Protection against earth short circuit		-						-		+/-				+							
Indication of modified current		-						-		+/-				+							
Indication of apparatus condition		+						+		+/-				+							
Supplementary devices for control and signaling																					
Auxiliary contacts	auxiliary contacts (AC)	+						+		+				+							
	auxiliary contacts CK1 and CK2	+						+		+				+							
Voltage releases	shunt trip	+						+		+				+							
	undervoltage release	+						+		+				developed							
Accessories	terminal cover	+						+		+				developed							
	pole extenders	+						+		+				developed							
	interpole partitions	included						included		included				developed							
Installation and connection																					
Connection of copper and aluminium wires with section, mm		10 - 70		25 - 120		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 2x25 to 6x25		from 3x32 to 2x(6x32)		from 3x50 to 2x(6x50)											
Overall dimensions and weight																					
Overall dimensions W*H*D, mm		105 x 162,5 x 122		140 x 256 x 167		105 x 162,5 x 94		140 x 256 x 111		210 x 378 x 156											
Weight, kg		1,7		5,5		2,2		6,2		17,0											

Reference (series)



Design with thermomagnetic regulated release

Appearance	Rated current, A	Title	Reference	Title	Reference	Title	Reference	Title	Reference		
Rated limiting breaking capacity											
		Icu=25 kA at 400 V AC			Icu=40 kA at 400 V AC			Icu=50 kA at 400 V AC		Icu=65 kA at 400 V AC	
	16	OptiMat D250L-TM16-UHL3	291409	OptiMat D250N-TM16-UHL3	291422	OptiMat D250F-TM16-UHL3	291435				
	20	OptiMat D250L-TM20-UHL3	291410	OptiMat D250N-TM20-UHL3	291423	OptiMat D250F-TM20-UHL3	291436				
	25	OptiMat D250L-TM25-UHL3	291411	OptiMat D250N-TM25-UHL3	291424	OptiMat D250F-TM25-UHL3	291437				
	32	OptiMat D250L-TM32-UHL3	291412	OptiMat D250N-TM32-UHL3	291425	OptiMat D250F-TM32-UHL3	291438				
	40	OptiMat D250L-TM40-UHL3	291413	OptiMat D250N-TM40-UHL3	291426	OptiMat D250F-TM40-UHL3	291439				
	50	OptiMat D250L-TM50-UHL3	291414	OptiMat D250N-TM50-UHL3	291427	OptiMat D250F-TM50-UHL3	291440				
	63	OptiMat D250L-TM63-UHL3	291415	OptiMat D250N-TM63-UHL3	291428	OptiMat D250F-TM63-UHL3	291441				
	80	OptiMat D250L-TM80-UHL3	291416	OptiMat D250N-TM80-UHL3	291429	OptiMat D250F-TM80-UHL3	291442				
	100	OptiMat D250L-TM100-UHL3	291417	OptiMat D250N-TM100-UHL3	291430	OptiMat D250F-TM100-UHL3	291443				
	125	OptiMat D250L-TM125-UHL3	291418	OptiMat D250N-TM125-UHL3	291431	OptiMat D250F-TM125-UHL3	291444				
	160	OptiMat D250L-TM160-UHL3	291419	OptiMat D250N-TM160-UHL3	291432	OptiMat D250F-TM160-UHL3	291445				
	200	OptiMat D250L-TM200-UHL3	291420	OptiMat D250N-TM200-UHL3	291433	OptiMat D250F-TM200-UHL3	291446				
	250	OptiMat D250L-TM250-UHL3	291421	OptiMat D250N-TM250-UHL3	291434	OptiMat D250F-TM250-UHL3	291447				
	320			OptiMat D630N-TM320-UHL3	291465	OptiMat D630F-TM320-UHL3	291469	OptiMat D630H-TM320-UHL3	291473		
	400			OptiMat D630N-TM400-UHL3	291466	OptiMat D630F-TM400-UHL3	291470	OptiMat D630H-TM400-UHL3	291474		
	500			OptiMat D630N-TM500-UHL3	291467	OptiMat D630F-TM500-UHL3	291471	OptiMat D630H-TM500-UHL3	291475		
	630			OptiMat D630N-TM630-UHL3	291468	OptiMat D630F-TM630-UHL3	291472	OptiMat D630H-TM630-UHL3	291476		

Design with microprocessor trip system MR1

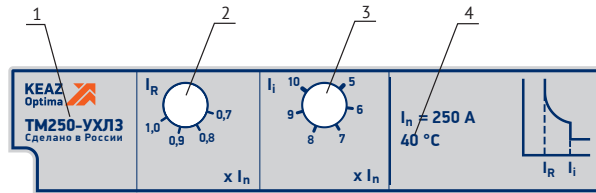
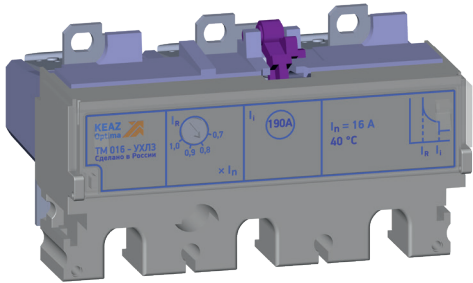
Appearance	Rated current, A	Title	Reference	Title	Reference
Rated limiting breaking capacity		Icu=40 kA at 400 V AC		Icu=65 kA at 400 V AC	
 OptiMat D250	40...100	OptiMat D100N-MR1-U3	144412	OptiMat D100H-MR1-U3	144414
		OptiMat D100N-MR1-U3-REG	244073	OptiMat D100H-MR1-U3-REG	244072
		OptiMat D100N-MR1-OM4-REG	255731	OptiMat D100H-MR1-OM4-REG	255734
	64...160	OptiMat D160N-MR1-U3	285502	OptiMat D160H-MR1-U3	285503
		OptiMat D160N-MR1-U3-REG	on request	OptiMat D160H-MR1-U3-REG	on request
		OptiMat D160N-MR1-OM4-REG	on request	OptiMat D160H-MR1-OM4-REG	on request
	100...250	OptiMat D250N-MR1-U3	137335	OptiMat D250H-MR1-U3	144411
		OptiMat D250N-MR1-U3-REG	244075	OptiMat D250H-MR1-U3-REG	244074
		OptiMat D250N-MR1-OM4-REG	255733	OptiMat D250H-MR1-OM4-REG	255732
 OptiMat D630	160...400	OptiMat D400N-MR1-U3	279892	OptiMat D400H-MR1-U3	279891
		OptiMat D400N-MR1-U3-REG	on request	OptiMat D400H-MR1-U3-REG	on request
		OptiMat D400N-MR1-OM4-REG	on request	OptiMat D400H-MR1-OM4-REG	on request
	250...630	OptiMat D630N-MR1-U3	279890	OptiMat D630H-MR1-U3	279889
		OptiMat D630N-MR1-U3-REG	285388	OptiMat D630H-MR1-U3-REG	285389
		OptiMat D630N-MR1-OM4-REG	285390	OptiMat D630H-MR1-OM4-REG	285391

Design with microprocessor trip system MR2

Appearance	Rated current, A	Title	Reference	Title	Reference	
Rated limiting breaking capacity		Icu=40 kA at 400 V AC		Icu=65 kA at 400 V AC		
 OptiMat D630	160...400	OptiMat D400N-MR2-U3	249225	OptiMat D400H-MR2-U3	249226	
		OptiMat D400N-MR2-U3-REG	on request	OptiMat D400H-MR2-U3-REG	on request	
		OptiMat D400N-MR2-OM4-REG	on request	OptiMat D400H-MR2-OM4-REG	on request	
	250...630	OptiMat D630N-MR2-U3	144413	OptiMat D630H-MR2-U3	144415	
		OptiMat D630N-MR2-U3-REG	244090	OptiMat D630H-MR2-U3-REG	244089	
		OptiMat D630N-MR2-OM4-REG	255727	OptiMat D630H-MR2-OM4-REG	255730	
	Rated limiting breaking capacity		Icu=50 kA at 400 V AC		Icu=85 kA at 400 V AC	
	 OptiMat 1600	400...1000	OptiMat D1000N-MR2-U3	270314	OptiMat D1000H-MR2-U3	270315
			OptiMat D1000N-D-MR2-U3	294415	OptiMat D1000H-D-MR2-U3	294416
OptiMat D1000N-MR2-U3-REG			on request	OptiMat D1000H-MR2-U3-REG	on request	
OptiMat D1000N-MR2-OM4-REG			on request	OptiMat D1000H-MR2-OM4-REG	on request	
640...1600		OptiMat D1600N-MR2-U3	233946	OptiMat D1600H-MR2-U3	233947	
		OptiMat D1600N-D-MR2-U3	293576	OptiMat D1600H-D-MR2-U3	294414	
		OptiMat D1600N-MR2-U3-REG	on request	OptiMat D1600H-MR2-U3-REG	on request	
		OptiMat D1600N-MR2-OM4-REG	on request	OptiMat D1600H-MR2-OM4-REG	on request	

Thermomagnetic regulated releases

OptiMat D circuit breaker models up to 630 A with L, N, F and H designs can be equipped with regulated TM releases. Thermomagnetic regulated release can adjust operating current I_R to protect from overload current. It also has a setpoint for short circuit current protection, including regulated setpoints for rated current from 160 to 630 A.



1. Release marking.
2. Switch of setpoint of operating current (I_R) in multiplicity to the circuit breaker rated current (I_n).
3. Switch of tripping current setpoints in short circuit zone (I_i) in multiplicity to the operating current (I_n).
4. Release control temperature

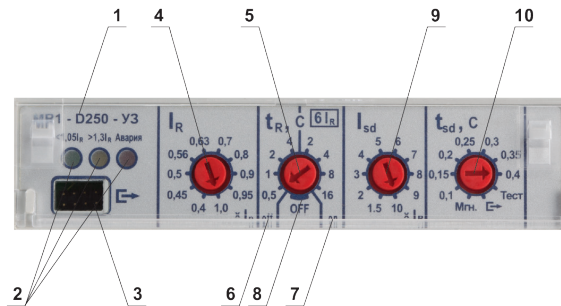
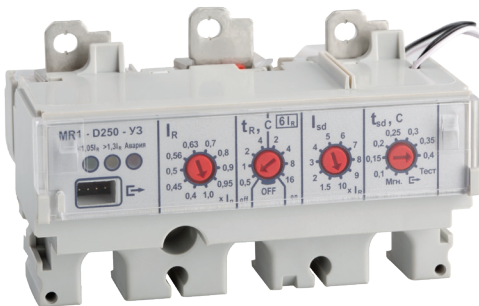
Setpoints for current and tripping time in the zones of overload and short circuit are presented in the table below:

Parameter designation	Parameter value			Permissible tolerance
	from 16 to 125 A	from 160 to 250 A	from 320 to 630 A	
Setpoint of operating current I_R of the release in multiplicity to the circuit breaker nominal current (I_R/I_n)	Regulated 0,7; 0,8; 0,9; 1,0			-
Time delay (s) tr	Non-regulated			-
tr at $1.5 \times I_n$	120 – 600			-
tr at $2 \times I_n$	60 – 250			-
tr at $6 \times I_r$	5 – 15			-
Tripping current setpoints in short circuit zone I_{sd} in multiplicity to the operating current (I_{sd}/I_n)	10xIn	Regulated 5; 6; 7; 8; 9; 10		±20%

Microprocessor trip system

Optimat D circuit breakers of N and H modifications can be equipped with microprocessor trip system MR1 and MR2. Microprocessor trip system is comprised of the following parts: actuating electromagnet, measuring devices and release control block. Release control block allows setting a customer program with an algorithm of releasing the main contact by the circuit breaker. A microprocessor release has the following advantages over a common thermomagnetic release: a wide range of user settings, high precision in program execution, health indicators and reasons for tripping.

Microprocessor trip system MR1 (for OptiMat D100, D160 and D250)



1. Release marking.
2. Color load and emergency indicators.
3. A slot for external release testing device at the manufacturer's facility.
4. Switch of setpoint of operating current (I_R) in multiplicity to the circuit breaker rated current (I_n).
5. Switch of tripping time setpoints (t_R) at a current $6I_R$.
6. Zone of tripping time setpoints in overload zone without «thermal memory» function (off).
7. Zone of tripping time setpoints in overload zone with function «thermal memory» (on).
8. Position of switch disabling overload protection.
9. Switch of tripping current setpoints in short circuit zone (I_{sd}) in multiplicity to the operating current (I_n).
10. Switch of tripping time setpoints in short circuit zone, (t_{sd}).
11. Position «[->]» of switch 10. Position «[->]» is selected when the release is tested by an external device. It is designed for acceptance tests of the release at the manufacturer's facility.

Setpoints for current and tripping time in the zones of overload and short circuit are presented in the table below:

Parameter designation	Parameter value	Permissible tolerance
Setpoint of operating current I_R of the release in multiplicity to the circuit breaker nominal 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 setpoints at current of $6I_R$ (t_R), s	0,5; 1; 2; 4 – without «thermal memory»; 2; 4; 8; 16 – with «thermal memory» OFF - overload protection is off	±10%
Tripping current setpoints in short circuit zone I_{sd} in multiplicity to the operating current (I_{sd}/I_n)	1,5; 2; 3; 4; 5; 6; 7; 8; 9; 10	±15%
Tripping time setpoints in short circuit zone (t_{sd}), s	Мгн. (без преднамеренной выдержки); 0,1; 0,15; 0,2; 0,25; 0,3; 0,35; 0,4	±0,02 c
Instantaneous current setpoint I_i , unit (non-regulated)	12	±20%

Testing

Health test of maximal releases is conducted with the circuit breaker «on» (pole contacts closed).

To launch a health test:

- set switch 10 into «Test» position; at that, switches 4, 5 and 9 can have any position;
- turn the switch on;
- energize with operating current $I_r = (0,4-1,0) I_n$.

Health test program will send a signal to switch work indicators (LEDs shall light in a sequence) and the actuating release, which should result in switch deactivation.

To exit the health test mode, set switch 10 in any position except for «Test» and «[->».

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



1. Designation of microprocessing release.
2. Alarms of the protected circuit and release health.
3. MiniUSB slot is designed to connect an external DC source in the TEST mode and connecting an external release testing device at the manufacturer's facility.
4. Screen for programmable parameters.
5. OK button switches the modes, makes processor exit from sleep mode and saves the changes when exiting the menu.
6. Left/right buttons for choosing the previous/next parameter of function (I_r , t_R , I_{sd} , t_{sd} , I_g , t_g , T_m , TEST).
7. Up/down buttons for increasing/decreasing the value of the set parameter and viewing the tripping and errors log;
8. Li-ion changeable battery compartment.

Note (only for MR2 release): When choosing the tripping time setpoint in overload zone, one can switch «thermal memory» on and off.

Setpoints for current and tripping time in the zones of overload and short circuit are presented in the table below:

Parameter designation	MR1 parameter value	MR2 parameter value	Permissible tolerance
Setpoint of operating current I_r of the release, A	from 160 to 400 with 20 A increments (for OptiMat D400) from 250 to 630 with 20 A increments (for OptiMat D630)	from 160 to 400 with 20 A increments (for OptiMat D400) from 250 to 630 with 20 A increments (for OptiMat D630) from 400 to 1000 with 60 A increments (for OptiMat D1000) from 640 to 1600 with 60 A increments (for OptiMat D1600)	±2%
Tripping time setpoints at current of $6I_r$ (t_R), s	12, with «thermal memory»	0,5; 1; 2; 4 – without «thermal memory»; 2; 4; 8; 16 – with «thermal memory»	±10%
Tripping current setpoints in short circuit zone I_{sd} in multiplicity to the 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	±15%
Tripping time setpoints in 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	±0,02 s
Instantaneous current setpoint I_i , A (non-regulated)	5000 for OptiMat D400 7000 for OptiMat D630	5000 for OptiMat D400 7000 for OptiMat D630 19200 for OptiMat D1000 and D1600	±20%
Tripping current setpoints at a single phase short circuit in multiplicity to the operating current (I_{sp}/I_r)	Off (cannot be changed)	Off; 0,4; 0,6; 0,8; 1,0	±10%
Tripping time setpoints at single phase short circuit (t_{sp}), s	Off (cannot be changed)	0 (without intentional time delay); 0,1; 0,2; 0,3; 0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 1,0	±0,02 s

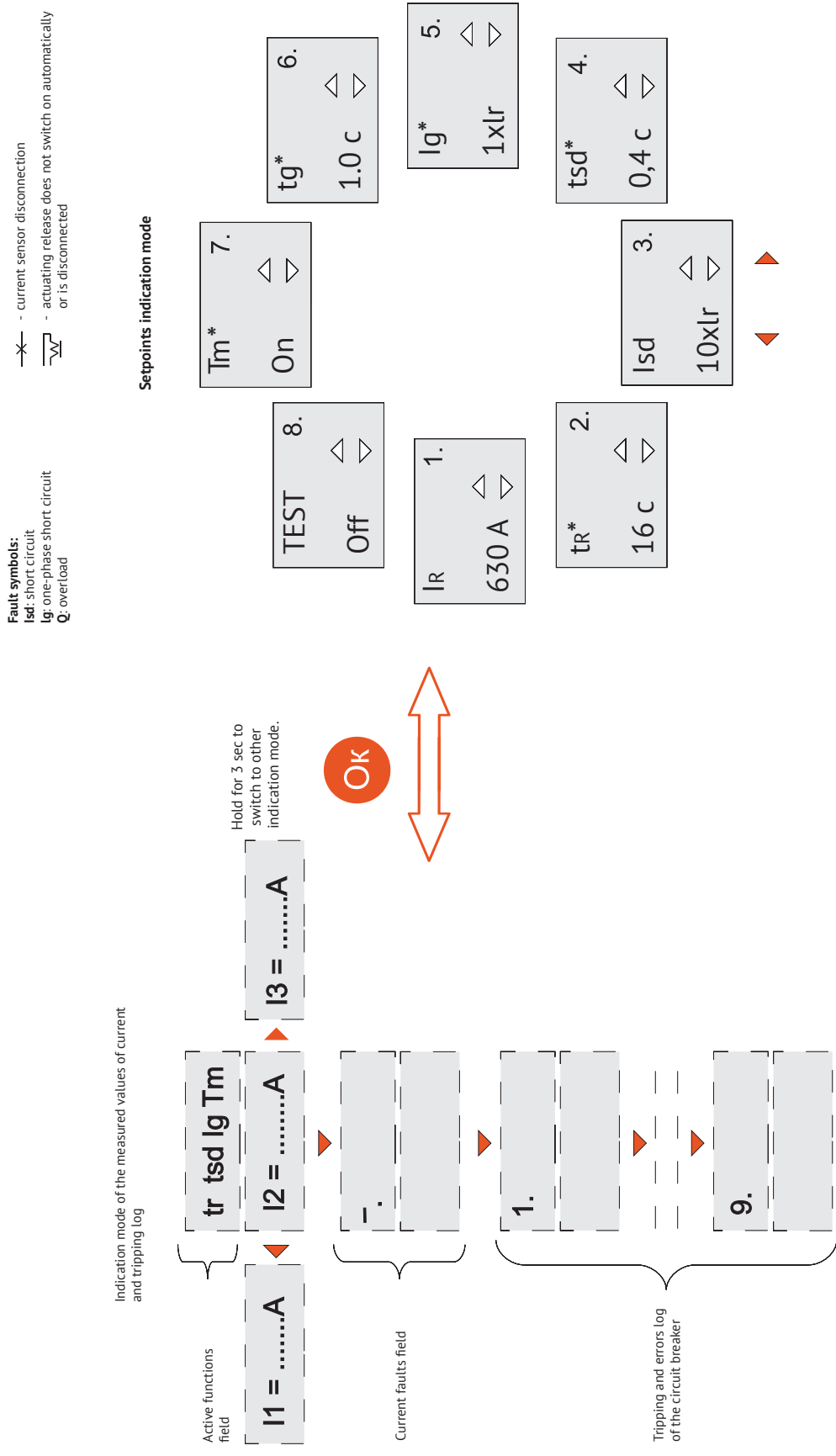
Notes:

1. Requirements for the tripping time are valid for all the switches with pre-loaded current at least $0,3I_r$ applied for at least 1 min.
2. When the switch is turned off in case of short circuit, switch turning off time is increased compared to tripping curve by 0,05 sec with the currents up to 7500 A.

Testing

Releases are health-tested only with the circuit breaker de-energized. Handle shall be up, which is a switch active position (pole contacts closed). Switch poles shall not be subject to current load during the test! Connect a DC power source to miniUSB (5 to 24 V, output capacity: 1 A). To start the test, in the setpoint menu open the tab «TEST», use keys «▼» and «▲» to select «On», and then exit the menu pressing and holding «OK» key for 3 sec. The test will start. After checking the current sensors and the correctness of the calculated Joule integral, health test program will send a signal to the actuating release. «OK» key needs to be pressed if the switch is off. If the circuit breaker is off, press «OK». The program will automatically exit the «TEST» mode 8. If a red LED is on, the circuit breaker is faulty. The type of fault can be viewed in the tripping and errors log.

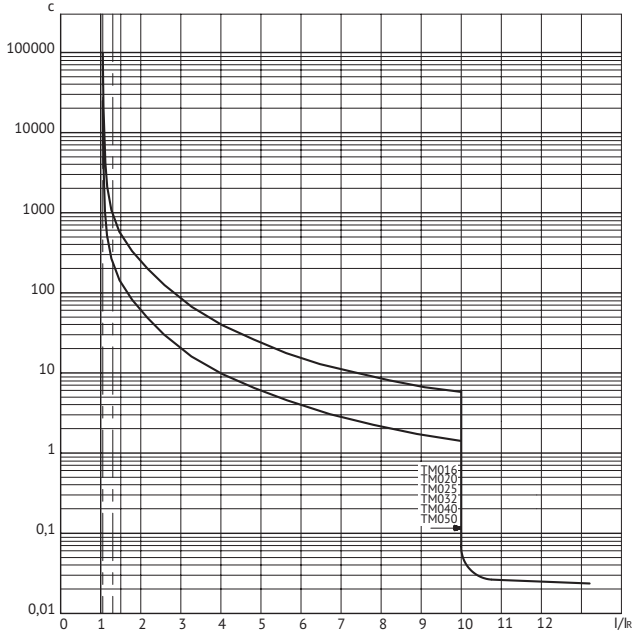
Menu of microprocessor trip system MR1 (for OptiMat D400 and D630) and MR2 (for OptiMat D400, D630, D1000 and D1600)



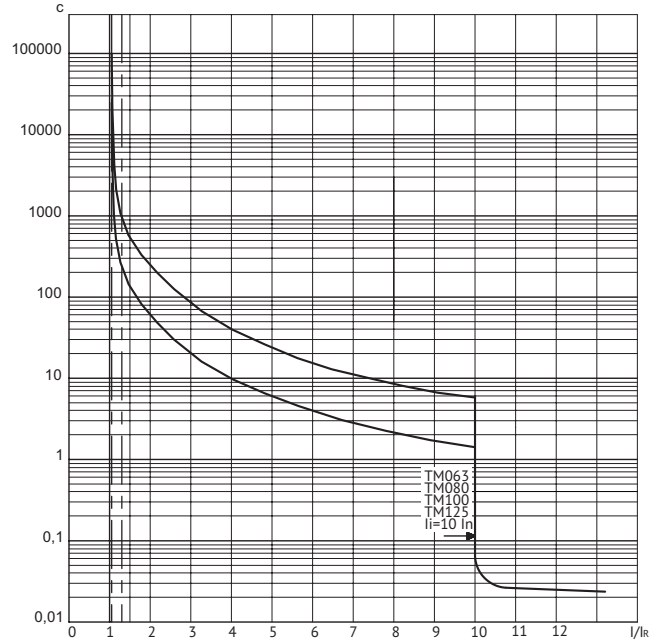
* Regulation of parameters t_{tr} , t_{sd} , t_{lg} , T_m is available in microprocessing release MR2. See more information about microprocessing releases MR1 and MR2 in operating manual.

Time-current characteristics

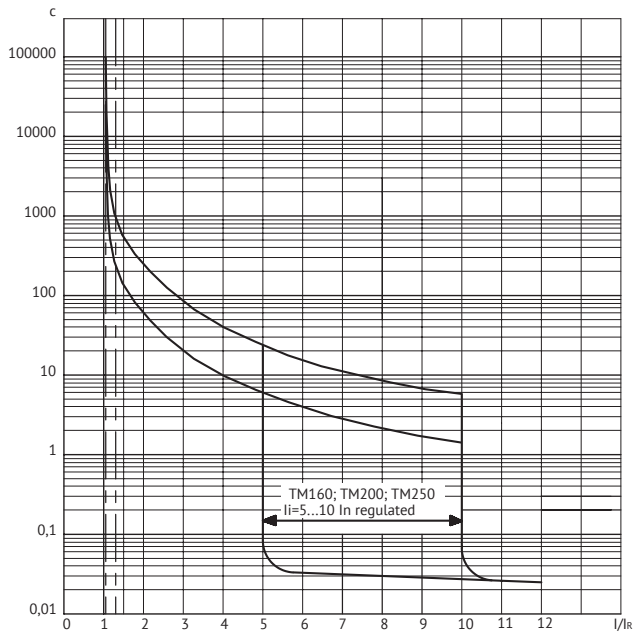
OptiMat D250 with thermomagnetic regulated release
TM016, TM020, TM025, TM032, TM040, TM050



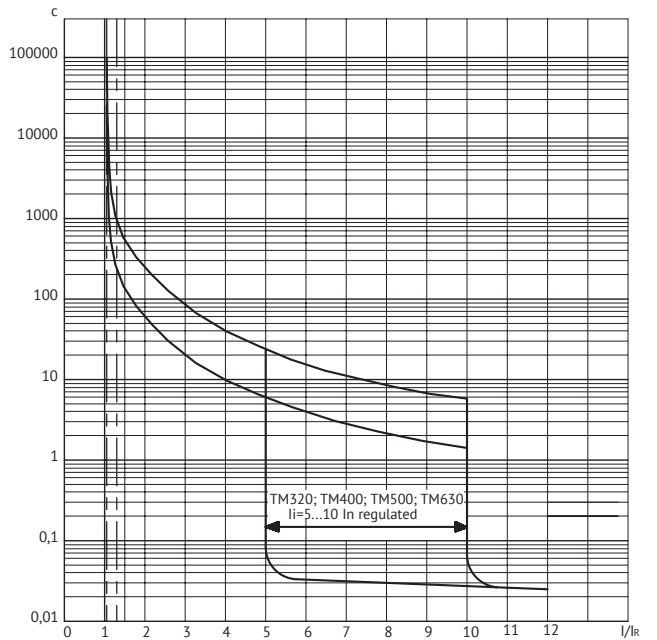
OptiMat D250 with thermomagnetic regulated release
TM063, TM080, TM100, TM125



OptiMat D250 with thermomagnetic regulated release
TM160, TM200, TM250

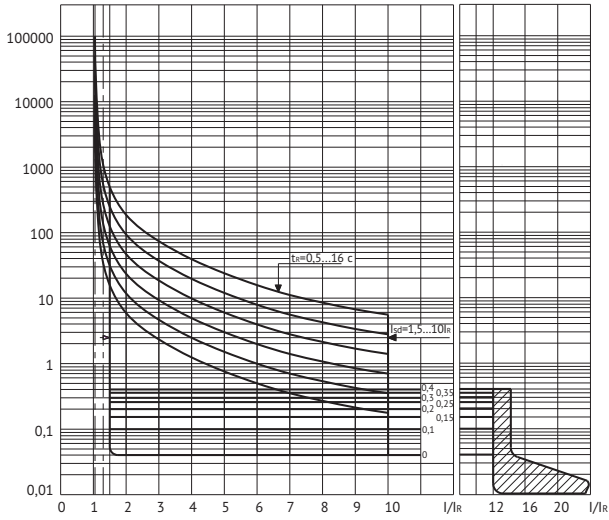


OptiMat D630 with thermomagnetic regulated release
TM320, TM400, TM500, TM630

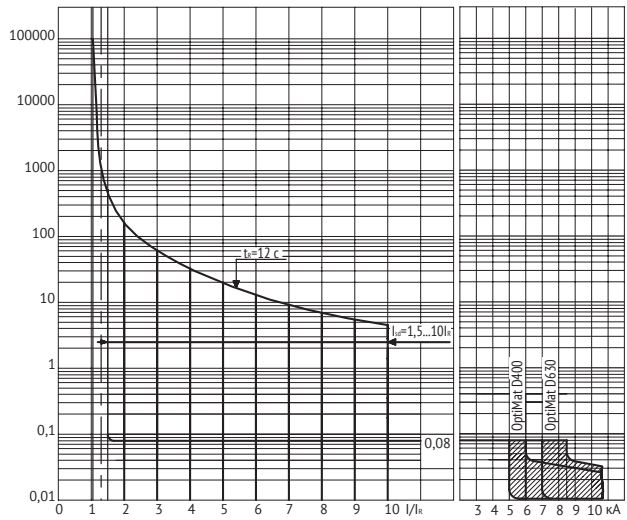


Tripping curve in the overload zone and in short circuit zone

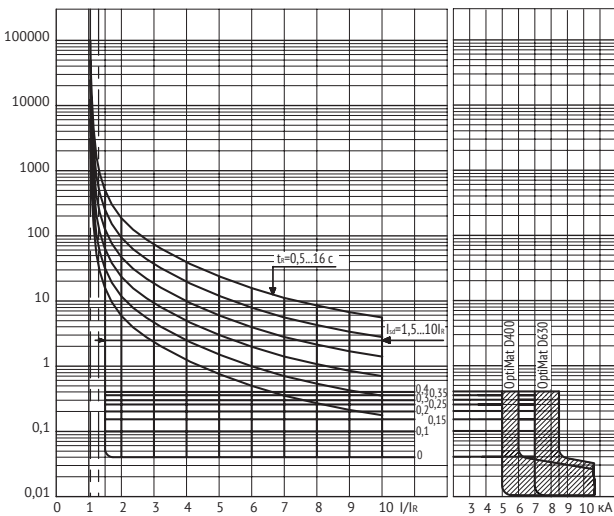
OptiMat D100, D160 and D250 with microprocessing release MR1



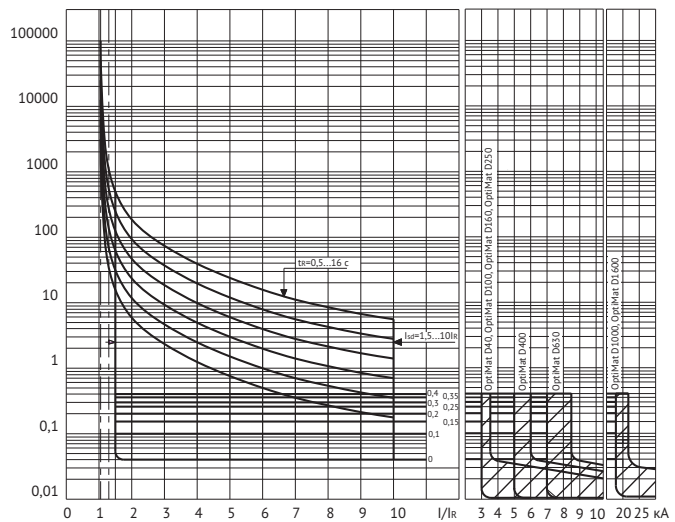
OptiMat D400 and D630 with microprocessing release MR1



OptiMat D400 and D630 with microprocessing release MR2



OptiMat D1000 and D1600 with microprocessing release MR2



Switch tripping time in each pole separately with 2I_R current and different t_R setpoints is shown in the table below:

Time at 6I _R c	0,5	1	2	4	8	12*	16
load	without thermal memory, s				with thermal memory, s		
1,3I _R	16,7...20,4	33,3...40,7	66,6...81,4	133,1...162,7	70,7...86,4	151...184	354...433
1,5I _R	11,3...13,8	22,5...27,5	45...55	90...110	46,8...57,2	97,7...119,4	215...262
2I _R	5,4...6,6	10,8...13,2	21,6...26,4	43...52,7	22...26,8	45...55	93...114
3I _R	2,1...2,5	4,1...5,1	8,3...10,1	16,5...20,2	8,3...10,1	16,6...20,5	34...41,6
4I _R	1,1...1,3	2,2...2,6	4,3...5,3	8,6...10,6	4,3...5,3	8,7...10,7	17,6...21,5
6I _R	0,45...0,55	0,9...1,1	1,8...2,2	3,6...4,4	1,8...2,2	3,6...4,4	7,2...8,8
8I _R	0,27...0,33	0,45...0,55	0,9...1,1	2...2,4	1...1,2	2...2,4	4...4,8
10I _R	0,18...0,22	0,27...0,33	0,6...0,8	1,2...1,5	0,6...0,8	1,3...1,5	2,4...3

* For MR1-D400/630 only

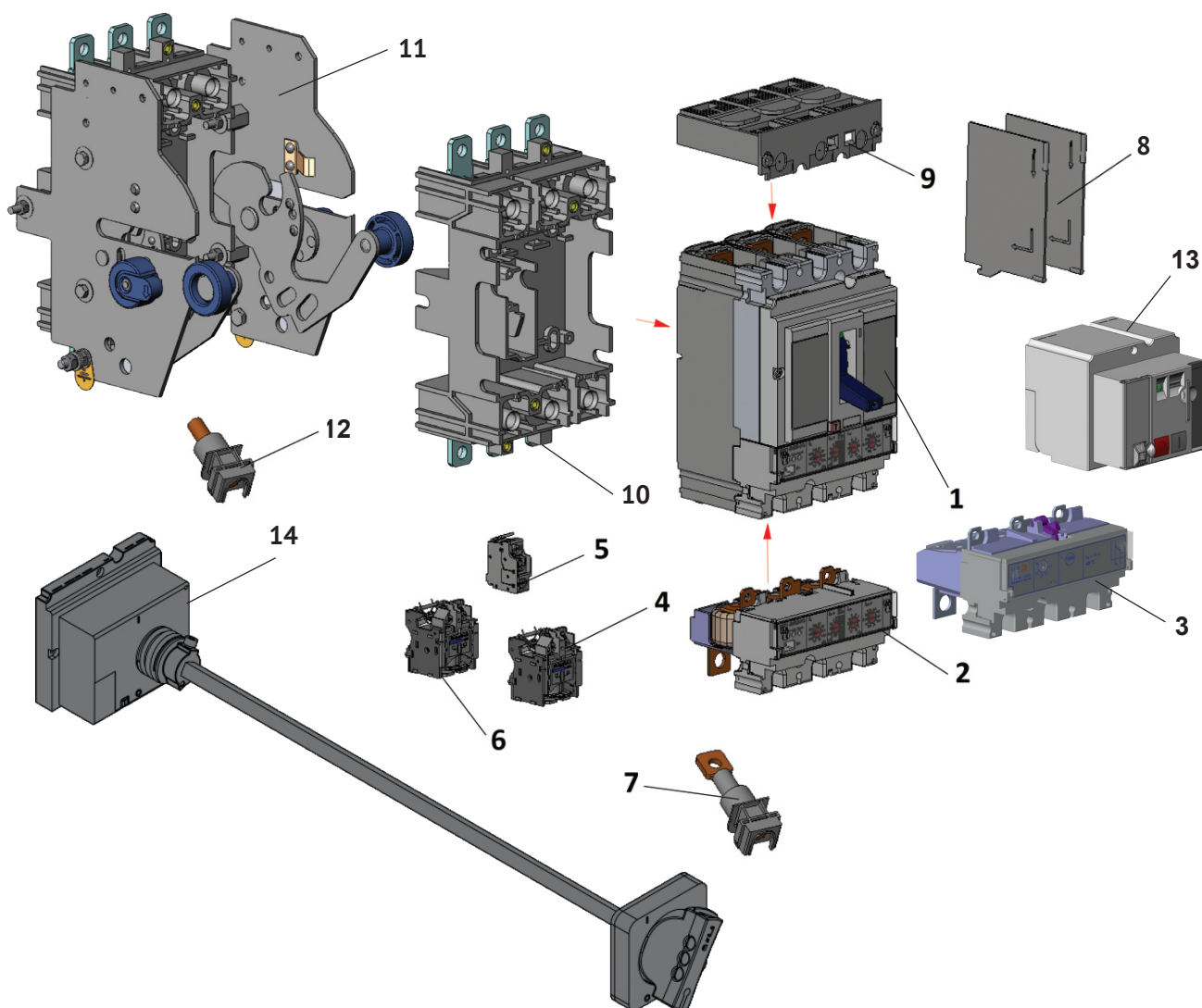
Note - for time setpoints t_R in the thermal memory zone are shown for the first release check. When subsequent release checks are conducted for 20 minutes, there can be allowable deviations from the indicated tripping times due to program adjustment of thermal memory.

Configuration

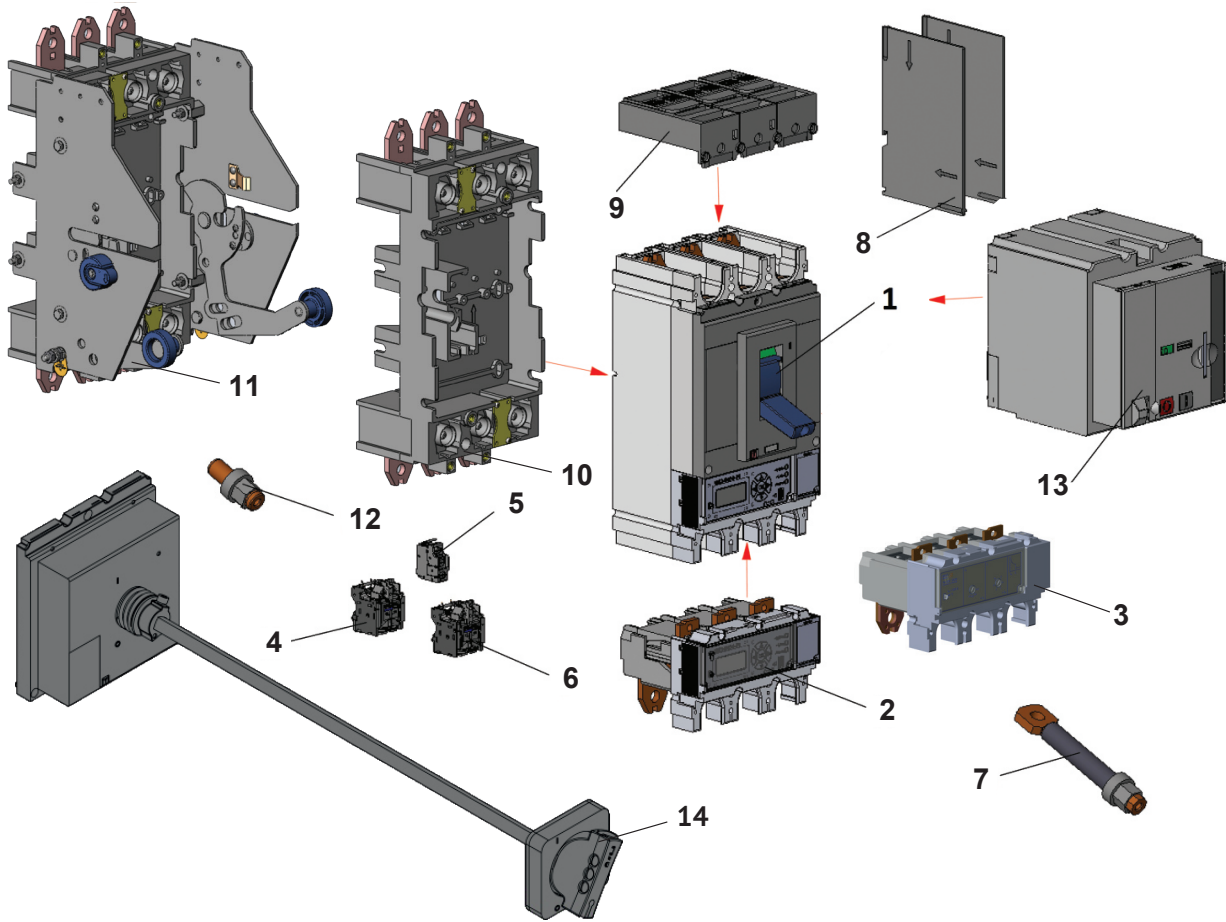
- 1* Switching block
- 2* Microprocessing release
- 3* Thermomagnetic release
- 4 Shunt trip
- 5 Auxiliary (control and signal) contacts
- 6 Minimum voltage release
- 7 Contacts for rear connection
- 8* Interpole partitions
- 9 Terminal cover
- 10 Terminal cover
- 11, 12 Clip-on connection set
- 11, 12 Extended design set
- 13 Motor drive
- 14 Manual remote actuator

*scope of supply

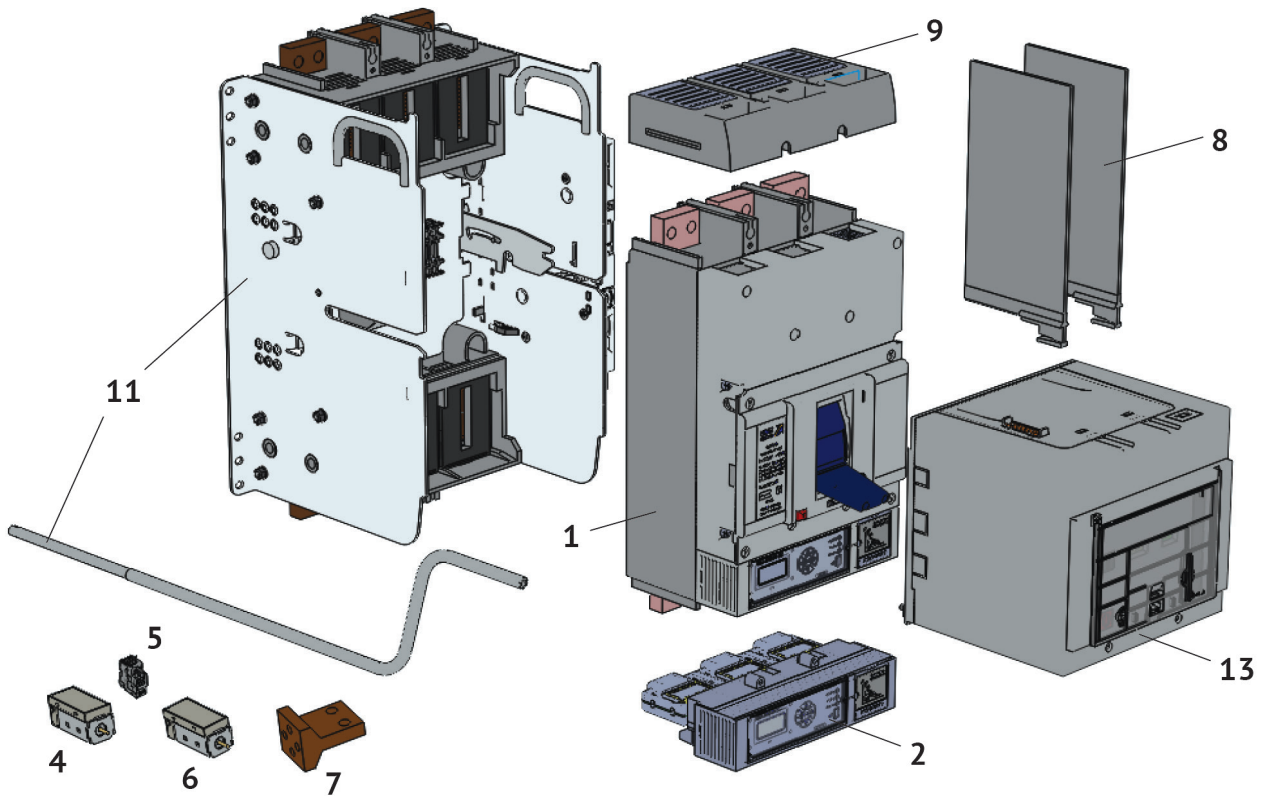
Configuration of OptiMat D100, D160 and D250



Configuration of OptiMat D400 and D630



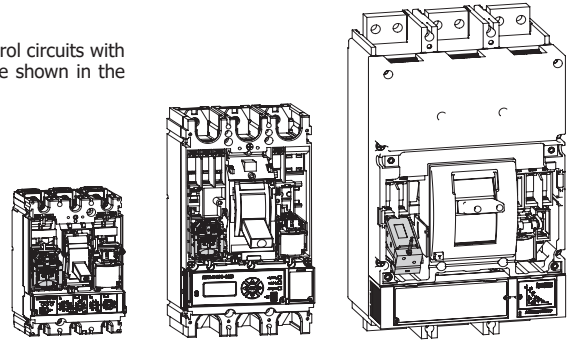
Configuration of OptiMat D1000 and D1600



Accessories

Shunt trip

Shunt trip is designed for circuit breaker remote opening. It is used in DC and AC control circuits with 50 Hz frequency. Rated control voltage (Uc) and technical features of the release are shown in the table below:

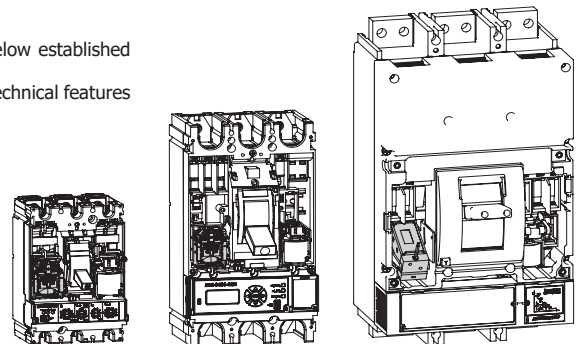


Designation		OptiMat D100, D160, D250, D400 и D630				OptiMat D1000 и D1600
		HP 24DC/48AC	HP 48DC/110AC	HP 110DC/230AC	HP 220DC/400AC	HP 230AC
Reference	general purpose industrial design	143498	143495	143496	143497	281764
	RRR acceptance	244086	244087	244084	244085	-
	RS acceptance	255777	255779	255778	255780	-
Rated voltage for shunt trip control (Uc), V		24DC/48AC	48DC/110AC	110DC/230AC	220DC/400AC	230AC
Operating voltage range		0,7-1,1 Uc				
Consumed voltage, VA or W		30				
Control command		Power supply duration from 0,02 to 3 s				
Maximum consumed current at 110% Uc (~230 V), A		1,0				
Maximum shutdown time before (before opening of power contacts), ms		40				

Undervoltage release

Undervoltage release is designed for circuit breaker opening when voltage drops below established parameters.

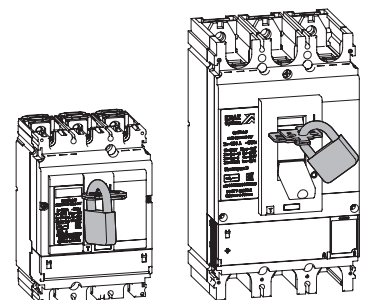
It is used in DC and AC circuits with 50 Hz frequency. Rated control voltage (Uc) and technical features of the release are shown in the table below:



Designation		OptiMat D100, D160, D250, D400 и D630									OptiMat D1000 и D1600
		MP 24DC	MP 24AC	MP 48DC	MP 48AC	MP 110DC	MP 110AC	MP 220DC	MP 230AC	MP 400AC	MP 230AC
Reference	general purpose industrial design	254583	254587	254584	143494	254585	254588	254586	254589	254590	to develop
	RRR acceptance	255794	255801	244083	244082	255802	255803	244081	255806	255808	-
	RS acceptance	-									
Rated control voltage (Uc), V		24DC	24AC	48DC	48AC	110DC	110AC	220DC	230AC	400AC	230AC
Operating range		0,85-1,1 Uc									
Threshold pickup:											
closing		0,35-07Uc									
opening		0,85Uc									
Consumed voltage, VA or W		6									
Operate mode		prolonged									

Position blocking device is «Off»

When the position blocking device is "Off", the equipment and personnel is kept safe during maintenance checks or commissioning at the facilities by preventing the manual actuation of the circuit breaker. When the circuit breaker is blocked when off, circuit is broken according to IEC 60947-2. One can also hang 1 to 3 padlocks with 5 to 8 mm shackles (purchased separately).



Designation	Position blocking device (off) of OptiMat D16...630-UHL3
Reference	290397

Auxiliary contact

Auxiliary contacts are designed for signaling of the circuit breaker condition. Auxiliary contacts of unified design are installed into switch ports according to the scheme below. Functions of auxiliary contacts depending on the cover lid where they are installed (see Circuit diagrams of OptiMat D switches):

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

SK1 – alarm of deactivation of the switch with mechanism release due to:

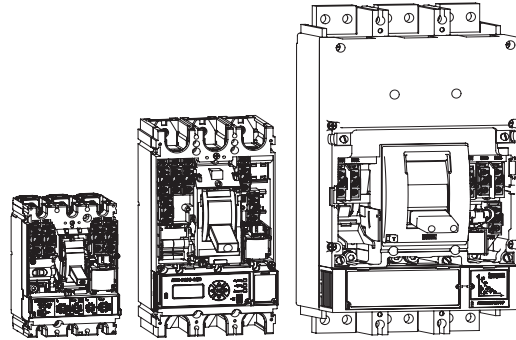
- tripping of protection releases;
- tripping of the independent or minimal release;
- pressing the test button; or
- pressing the motor drive alarm.

SK2 – alarm of deactivation of the switch due to maximum current release tripping. Maximum number of auxiliary contacts is shown in the table:

Breaker current		Functional design of auxiliary contacts		
		VK	SK1	SK2
Reference	general purpose		143490	
	industrial design			
	RRR acceptance		244078	
	RS acceptance		255772	
Optimat D250		2	1	1
Optimat D630		4	1	1
OptiMat D1600		4	1	1

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

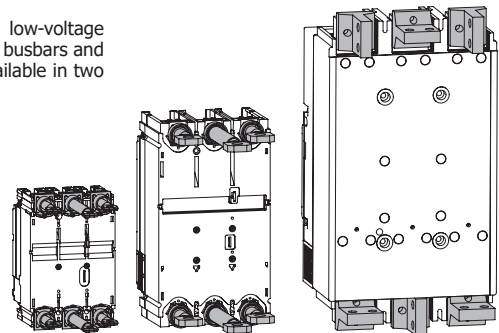
Rated voltage (Uc), V	Alternating current (AC)					Direct current (DC)				
	24	48	110	230	400	24	48	110	250	
Rated operating current (Ic), A	6	6	5	4	2	3	1,5	0,5	0,2	



Rear connection set

With outputs for rear connection of conductors, OptiMat D circuit breakers can be used in low-voltage complex devices for distribution and control of two-side servicing where one needs to connect busbars and conductors with cable ends at the rear side. OptiMat D250 and OptiMat D630 outputs are available in two designs: 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	238709	234089	238710
	industrial design					
	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.

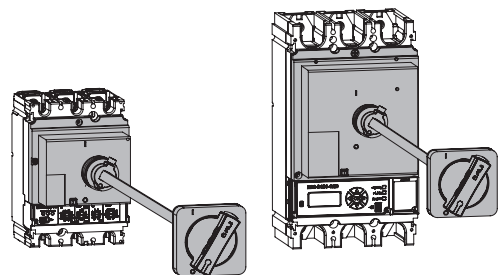
If several remote manual drives are installed on one door, this function allows to block the door from one apparatus.

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		
	RS acceptance	244103	244105

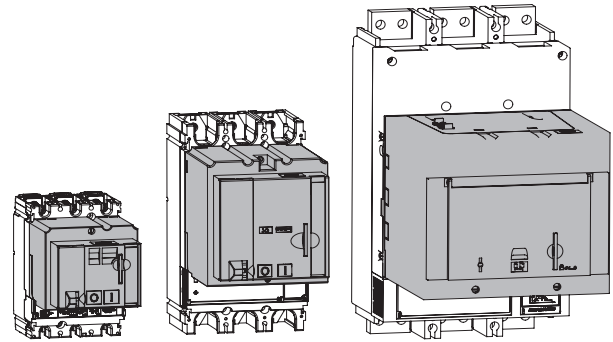


OptiMat D100 and D250

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:

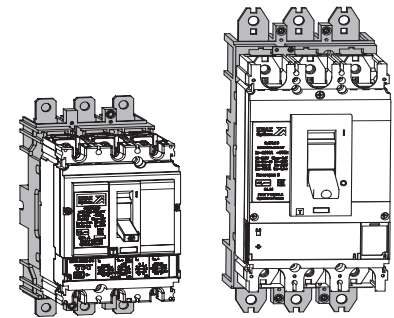


Designation		OptiMat D100...250-230AC-UHL3	OptiMat D100...250-220DC-UHL3	OptiMat D400...630-230AC-UHL3	OptiMat D400...630-220DC-UHL3	OptiMat D1000...1600-230AC-UHL3	OptiMat D1000...1600-400AC-UHL3
Reference	general purpose industrial design	247695	to develop	233121	to develop	250716	to develop
	RRR acceptance	-	-	244100	-	-	-
	RS acceptance	255817	-	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 a base for mounting the moveable part of the clip-on switch. It can be installed on the mounting plate in different ways, with front or back connection. Circuit breaker is connected to the base with the help of clip-on outputs (included in the scope of supply).

With clip-on connection set, one can quickly remove the circuit breaker, check or replace it. At that, the power cables and busbars are not disconnected from the fixed base. One can also install redundant output lines in the cabinet for further installation of circuit breakers. A special block (included in the scope of supply) automatically deenergizes the device during installation and removal if on yet it does not interrupt the switching capacity 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*

* When OptiMat D630 circuit breakers are used together with a clip-on connection set OptiMat D400...630-YXЛ3 and extended design set OptiMat D400...630-YXЛ3, maximum allowable current with the temperature within the set limits of GOST R 50030.2-2010 totals 570 A.

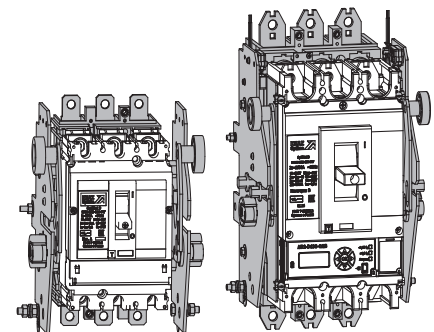
For simpler operation, we recommend connecting auxiliary circuits and control circuits of circuit breakers with clip-on and extended design using a socket for secondary circuits OptiMat/BA57-UMSTBVK-2.5/13, Reference 273633, and a plug for secondary circuits OptiMat/ BA57-MSTB-2.5/13, Reference 273632. Socket and plug are purchased separately.

Set for a retractable design

In addition to functions of a clip-on connection, an extended chassis makes device control simpler. It offers three positions which can be chosen after lifting the mechanic block of retainers:

- 1) «retrieved»: power circuit is on;
- 2) «extended»: power circuit is off, one can switch the device to check the secondary circuits;
- 3) «removed»: the device is removed from the chassis.

A retractable chassis design can imply the installation of immovable chassis parts on the base and moveable chassis parts directly on the device. Extended design provides for a visible clearance during commissioning. A special block (included in the scope of supply) automatically deenergizes the device during installation and removal if on yet it does not interrupt the switching capacity of the removed appliance.



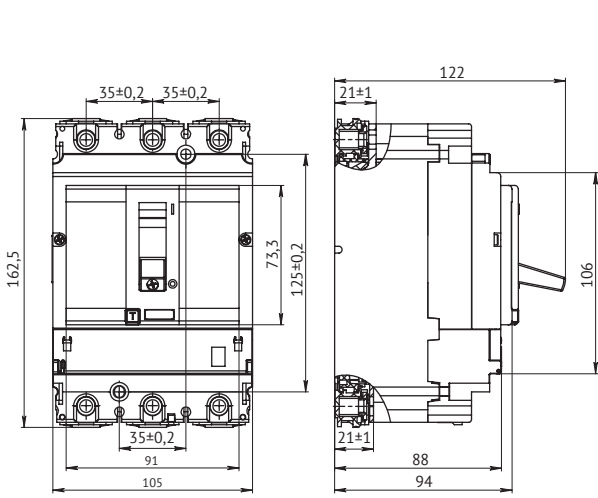
Designation		Set for a retractable design OptiMat D100...250-UHL3	Set for a retractable design OptiMat D400...630-UHL3
Reference	general purpose industrial design	239381	234093*
	RS acceptance	244098	244099*

* When OptiMat D630 circuit breakers are used together with a clip-on connection set OptiMat D400...630-YXЛ3 and extended design set OptiMat D400...630-YXЛ3, maximum allowable current with the temperature within the set limits of GOST R 50030.2-2010 totals 570 A.

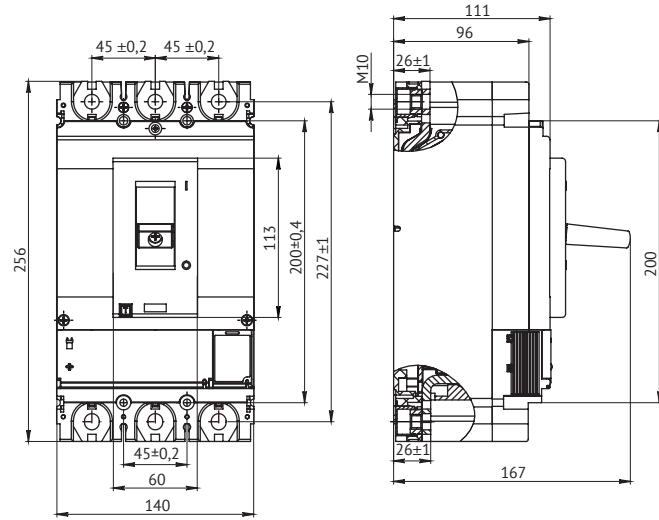
For simpler operation, we recommend connecting auxiliary circuits and control circuits of circuit breakers with clip-on and extended design using a socket for secondary circuits OptiMat/BA57-UMSTBVK-2.5/13, Reference 273633, and a plug for secondary circuits OptiMat/ BA57-MSTB-2.5/13, Reference 273632. Socket and plug are purchased separately.

Overall dimensions (mm)

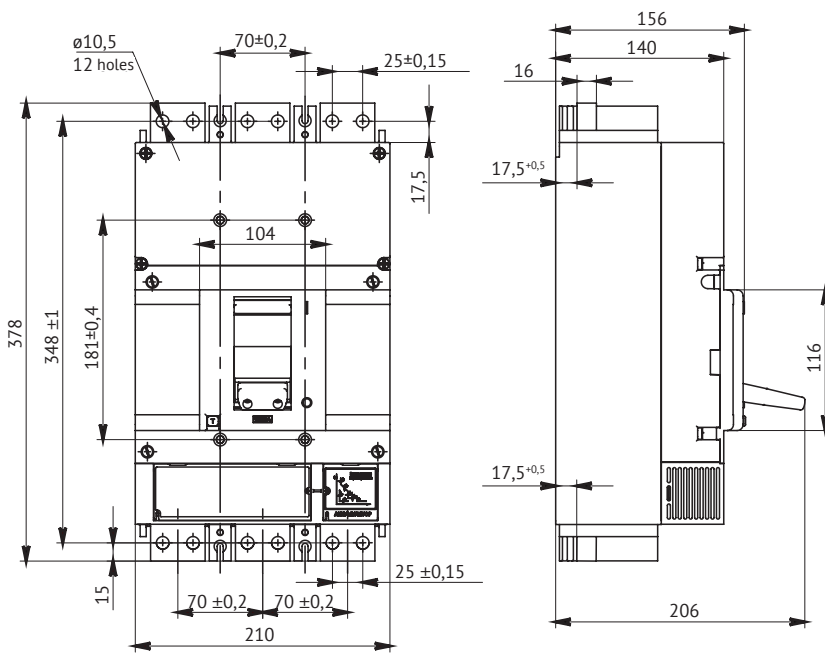
OptiMat D100, D160 and D250



OptiMat D400, D630



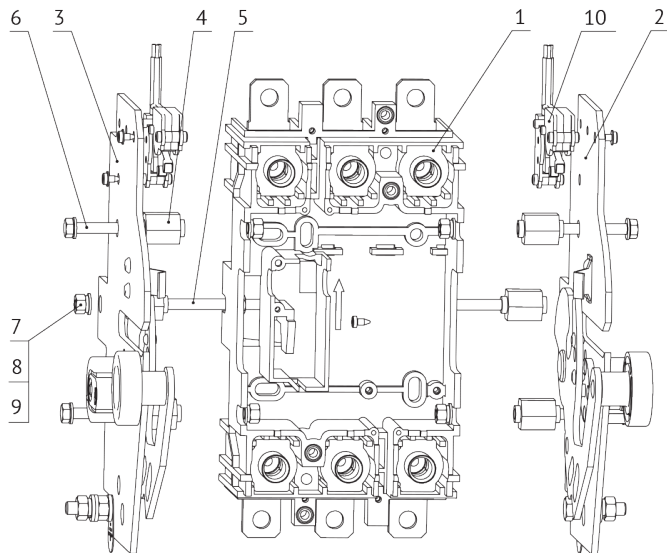
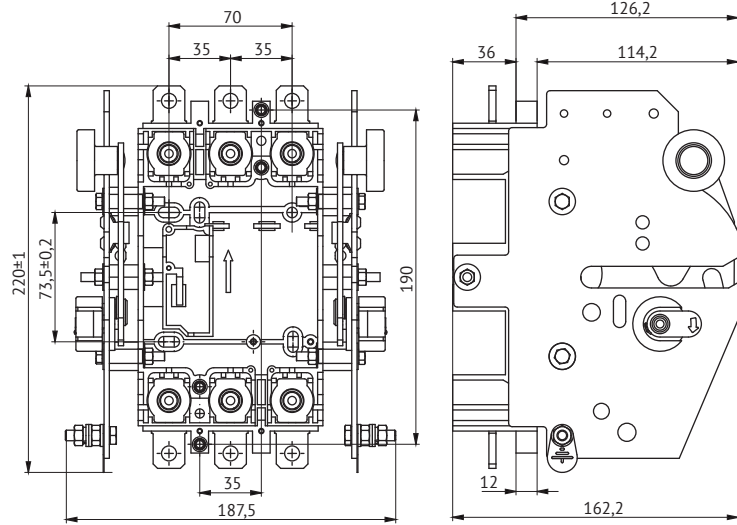
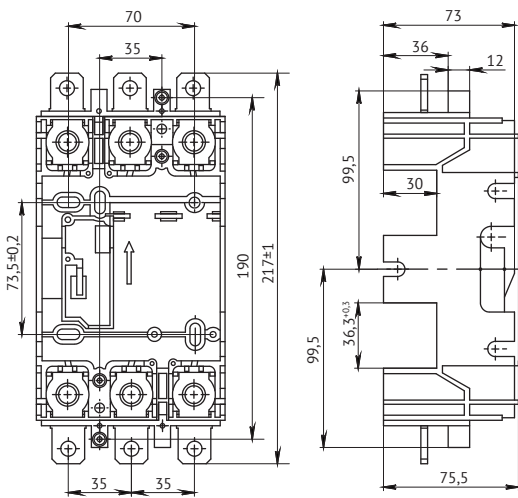
OptiMat D1000, D1600 fixed design



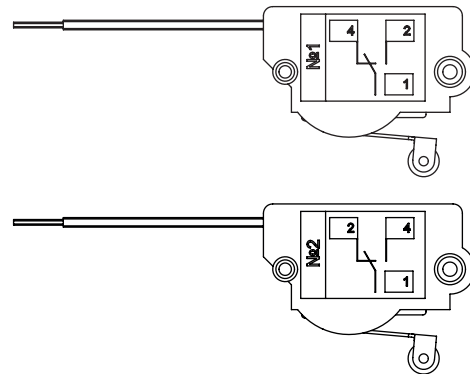
Set for plug-in attachment and drawout design for breakers OptiMat D100, OptiMat D160 and OptiMat D250

Base for plug-in attachment of the circuit breaker

Circuit breaker basket



Alarm contact of circuit breaker's position in its basket

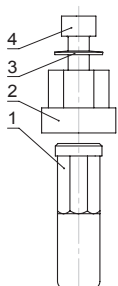


- 1. Alarm contact – 1 pcs;
- 2. Self-tapping screw – 1 pcs.

- 1 – Base for plug-in attachment;
- 2 – Right stand;
- 3 – Left stand;
- 4 – Limiting sleeve – 6 pcs;
- 5 – Buckle pin – 1 pcs;
- 6 – M5x35 bolt – 4 pcs;
- 7 – M5 nut – 8 pcs;
- 8 – Washer – 12 pcs;
- 9 – Spring washer - 6 pcs;
- 10 - Contact for signaling the position of the circuit breaker in the basket - 4 pcs.

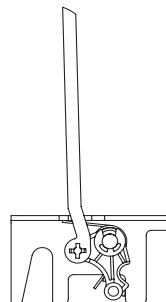
Rated operating current at a voltage, A					
AC, 125-250 V (50 Hz)	DC, V				
	30	50	75	125	220
5	5	1	0,75	0,5	0,25

Additional units included in delivery for plug-in and retractable design of OptiMat D100, OptiMat D160 and OptiMat D250 circuit breaker



Output for circuit breaker:
 1 – output,
 2 – in-between piece,
 3 – disk spring,
 4 – M6x16 screw.

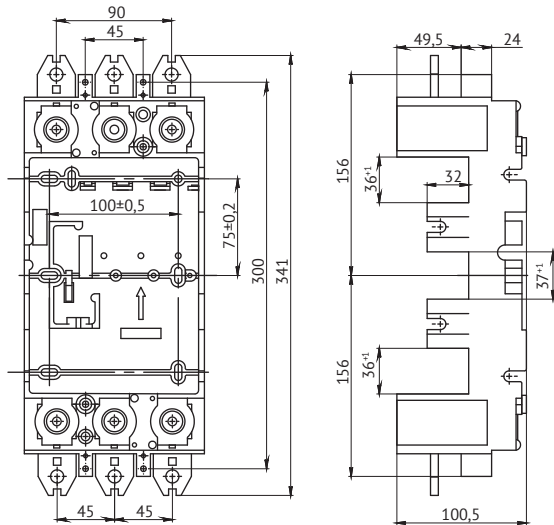
Output of pos. 1 is installed into the switch using an in-between piece pos. 2 with a screw pos. 4 and a spring pos. 3.



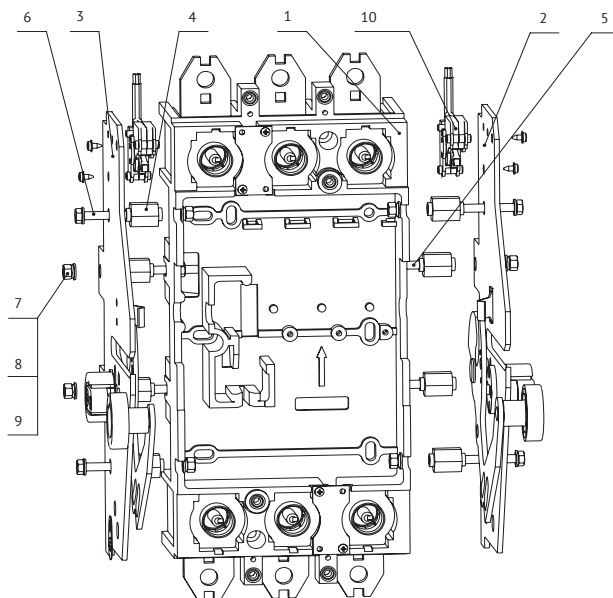
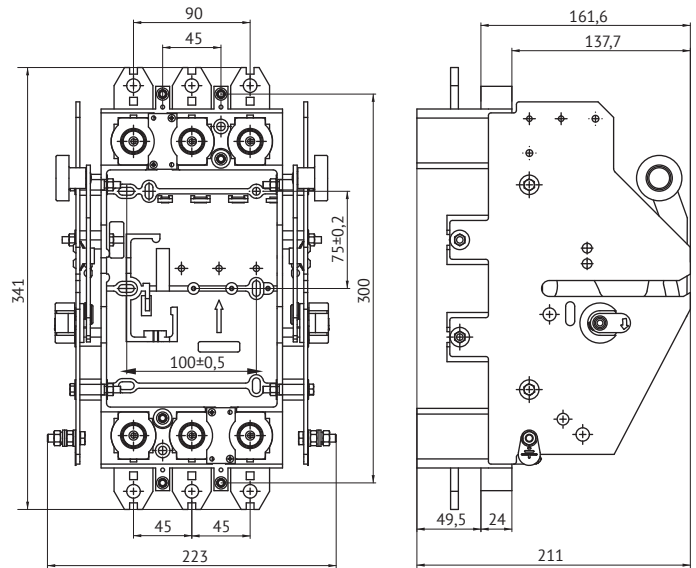
Blocking mechanisms to prevent installation and extraction of the breaker in switching position «on».

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

Base for plug-in attachment of the circuit breaker

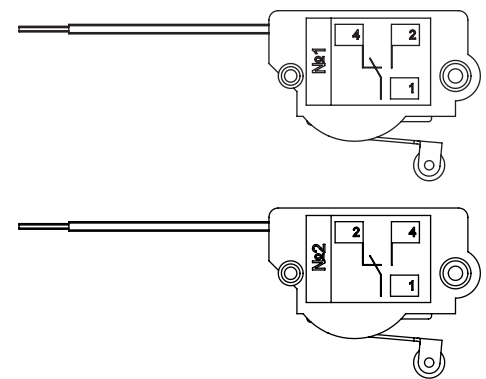


Circuit breaker basket



- 1 – Base for plug-in attachment;
- 2 – Right stand;
- 3 – Left stand;
- 4 – Limiting sleeve – 8 pcs;
- 5 – Buckle pin – 2 pcs;
- 6 – M5x35 bolt – 8 pcs;
- 7 – M5 nut – 12 pcs;
- 8 – Washer – 16 pcs;
- 9 – Spring washer - 8 pcs;
- 10 - Contact for signaling the position of the circuit breaker in the basket - 4 pcs.

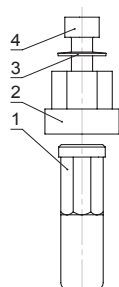
Alarm contact of circuit breaker's position in its basket



- 1. Alarm contact – 1 pcs;
- 2. Self-tapping screw – 1 pcs.

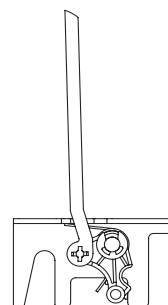
Rated operating current at a voltage, A					
AC, 125-250 V (50 Hz)	DC, V				
	30	50	75	125	220
5	5	1	0,75	0,5	0,25

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



- Output for circuit breaker:
- 1 – output,
 - 2 – in-between piece,
 - 3 – disk spring,
 - 4 – M6x16 screw.

Output of pos. 1 is installed into the switch using an in-between piece pos. 2 with a screw pos. 4 and a spring pos. 3.

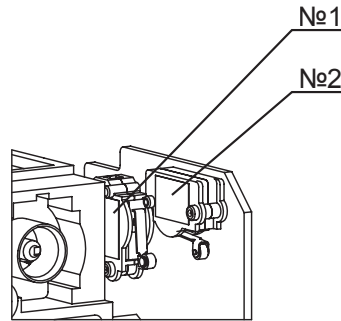
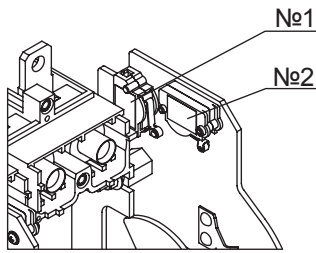


Blocking mechanisms to prevent installation and extraction of the breaker in switching position «on».

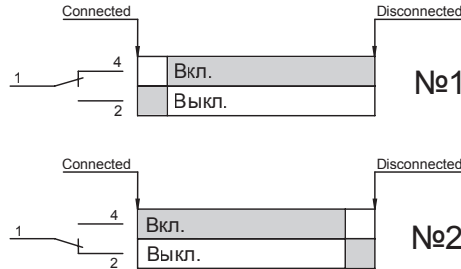
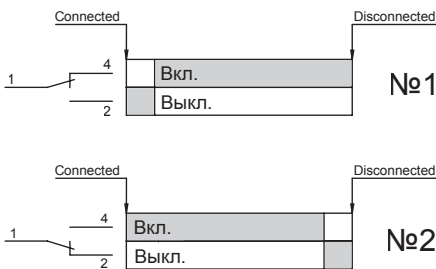
Alarm contacts work within the retractable design of OptiMat D

OptiMat D100, D160 and D250

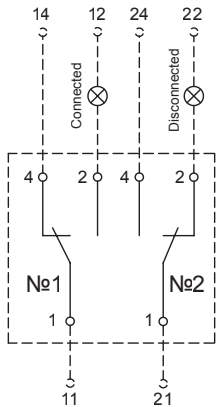
OptiMat D400 and D630



These alarm installed in the bucket are designed to indicate the circuit breaker position.
1 – «Disconnection»
2 – «Connection»



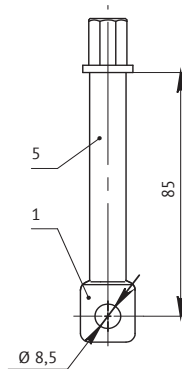
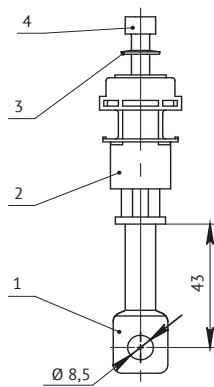
Alarm contact layout of OptiMat D100, D160, D250 and D630



Insert terminal for rear attachment of breakers

OptiMat D100, D160 and D250

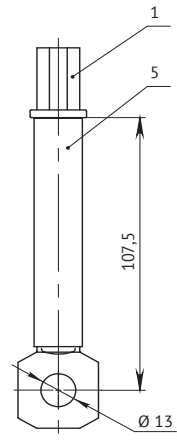
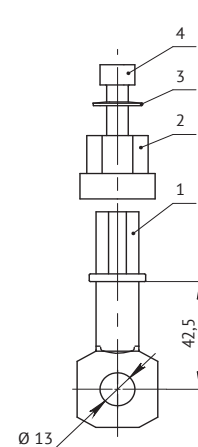
OptiMat D400 and D630



a)

b)

- a) short b) long
1 – output,
2 – in-between piece,
3 – disk spring,
4 – M6x16 screw,
5 – isolation tube.



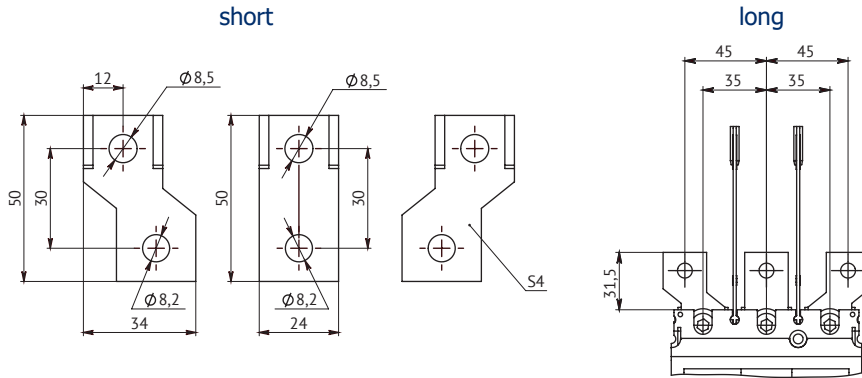
a)

b)

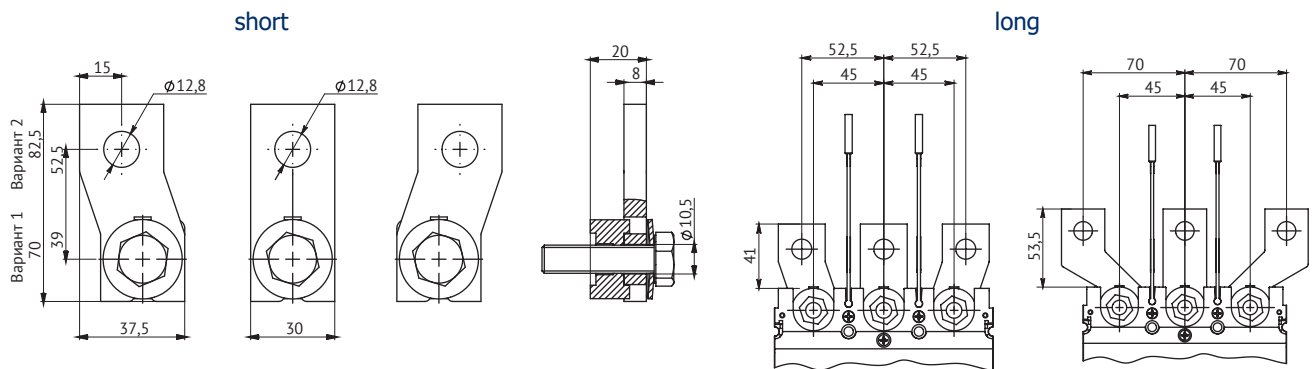
- a) short b) long
1 – output,
2 – in-between piece,
3 – disk spring,
4 – screw M8x20;
5 – isolation tube.

Dimensions of pole spreaders

OptiMat D100, D160 and D250



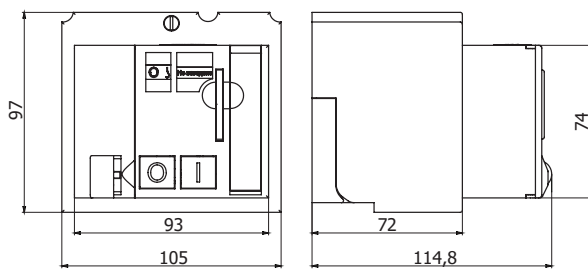
OptiMat D400 and D630



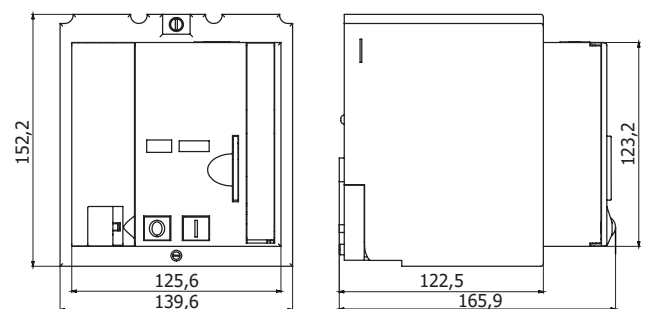
Designation	Reference
Option 1 OptiMat D400..630-UHL3-short	252558
Option 2 OptiMat D400..630-UHL3-long	258210

Dimensions of the motor drive

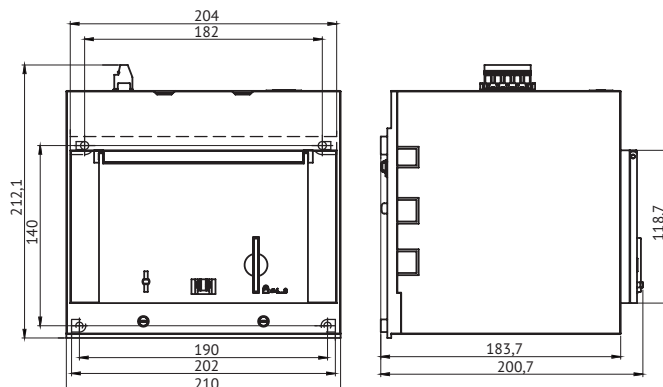
OptiMat D100, D160 and D250



OptiMat D400 and D630

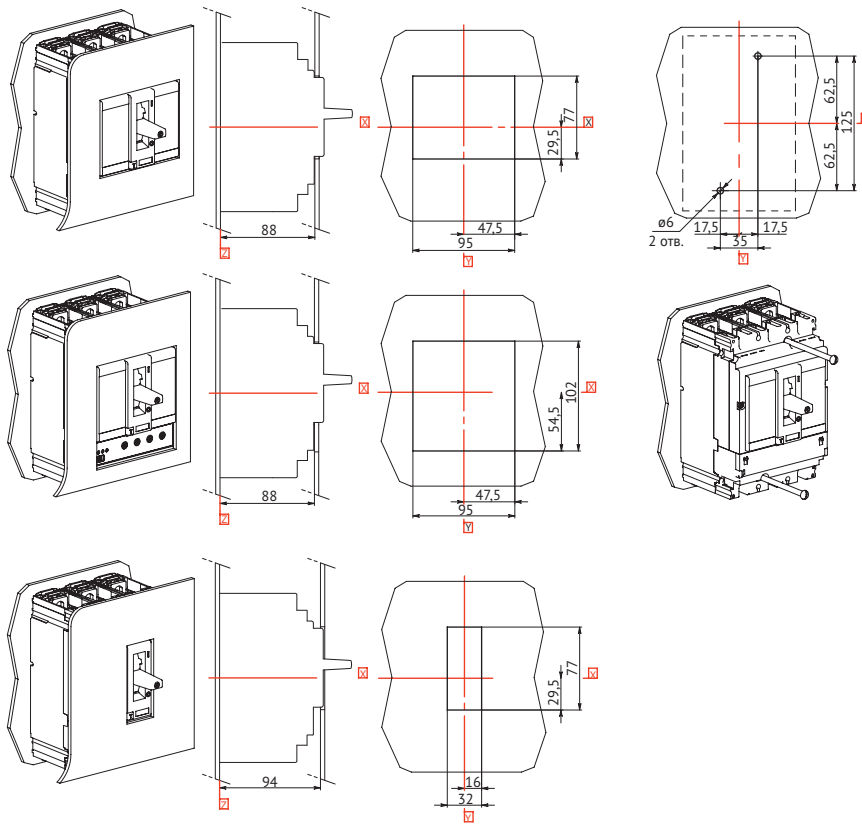


OptiMat D1000 and D1600

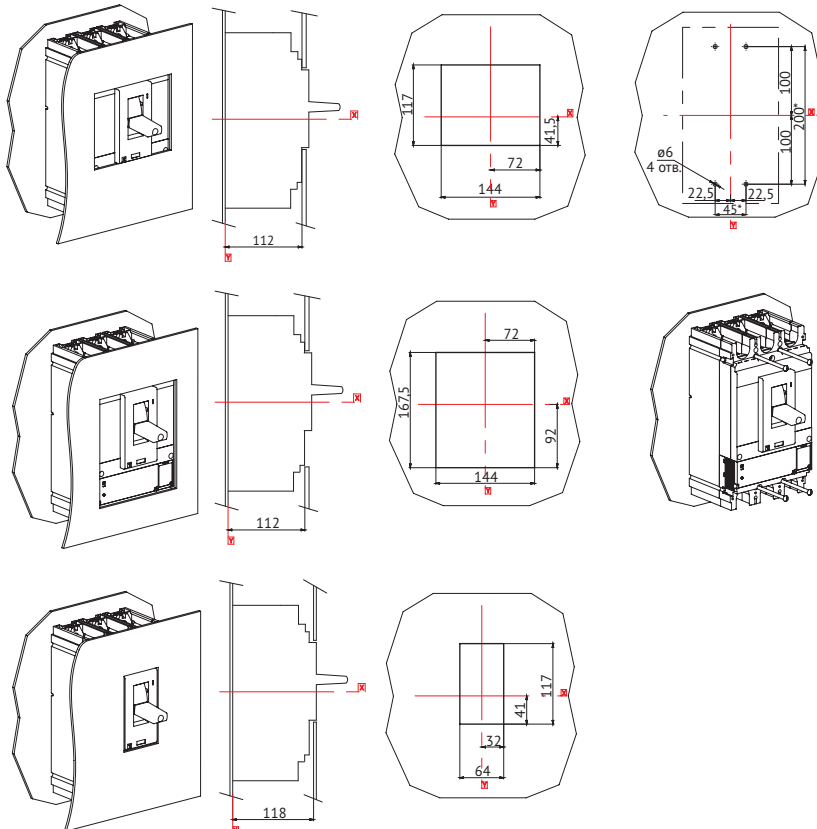


Models for box marking and drilling

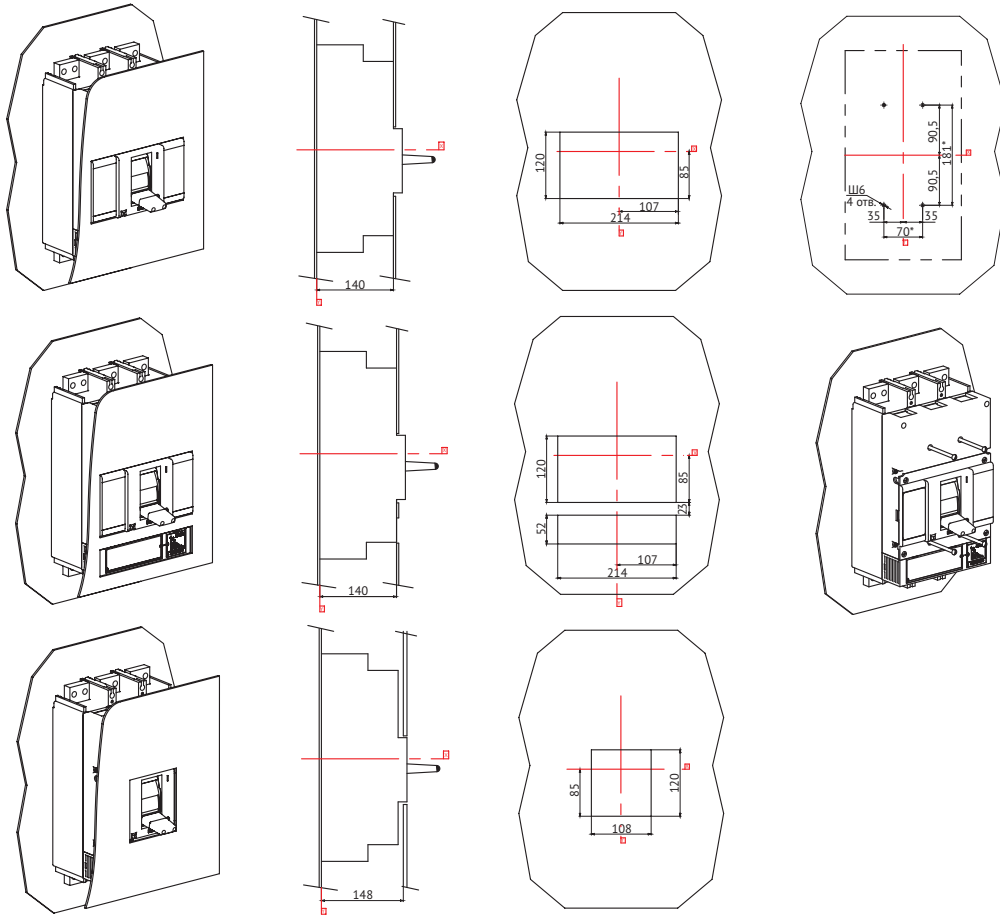
OptiMat D100, D160 and D250



OptiMat D400 and D630

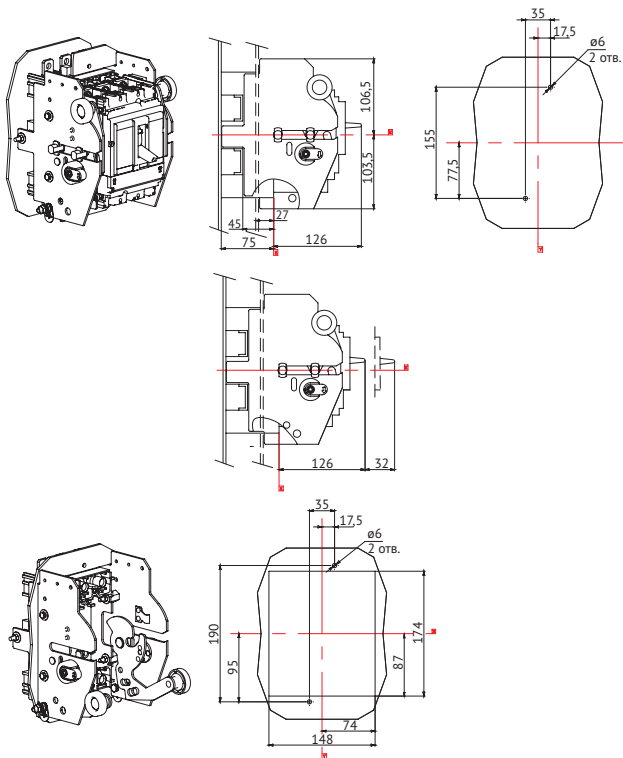


OptiMat D1000 and D1600

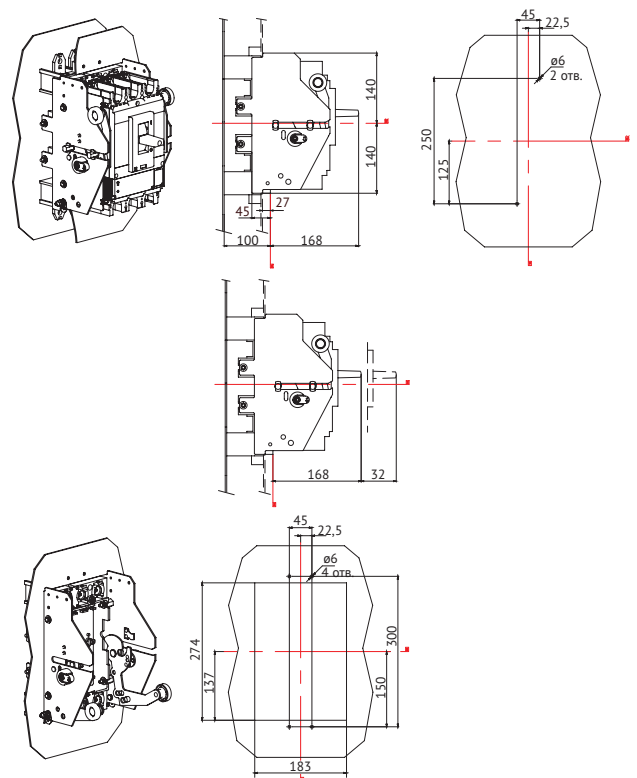


Plug-in attachment and drawout design

OptiMat D100, D160 and D250



OptiMat D400 and D630



Circuit schematics

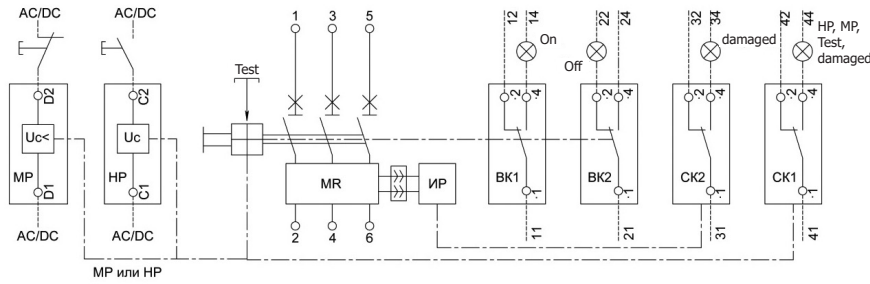
Conventional signs
 Q: automatic breaker
 MR: semiconducting trip unit
 MP: minimum circuit tripping unit
 HP: shunt trip
 IP: control trip
 BK1...BK4 auxiliary contacts, showing switching breaker position (close \ open)
 CK1 : breaker signalling contacts in work mode and emergency switching-off by semiconducting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

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

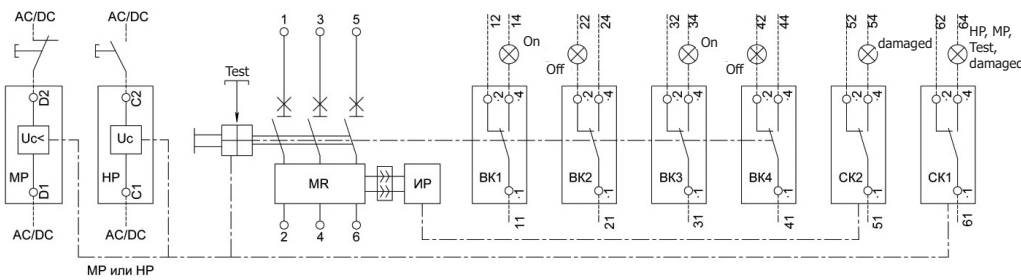
Dashed line indicates the connections made by the user.

Diagrams are shown with the switches in «off» position. They provide for the maximum number of auxiliary contacts and voltage releases (contact states are shown after installing into the relevant ports of the circuit breaker).

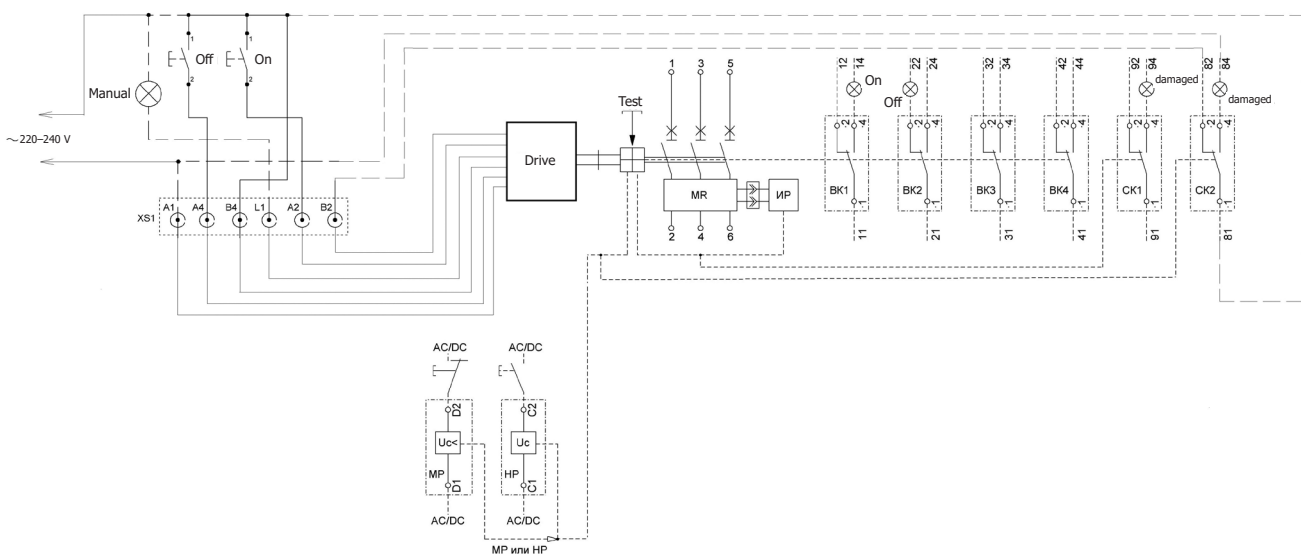
Circuit schematics for breakers OptiMat D100, OptiMat D160 and OptiMat D250



Circuit schematics for breakers OptiMat D400, D630, D1000 and D1600



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



Possible motor drive connection diagrams

On the shown diagrams: the circuits are de-energized, all the switches are switched off, retrieved and raised. After switching off, the switch can be returned to the initial position automatically, remotely or manually. On the diagrams, CK2 position is shown for the switch in «off» position.

If CK2 is used, when the switch trips in case of short circuit or overload (when the actuating release is triggered), switching drive spring will be not be raised automatically. The drive shall be raised manually using a manual raising lever.

OptiMat D250 and OptiMat D630 motor drive connection diagrams

On the shown diagrams: the circuits are de-energized, all the switches are switched off, retrieved and raised. After switching off, the switch can be returned to the initial position automatically, remotely or manually.

Diagram for drive connection with automatic switching spring raising

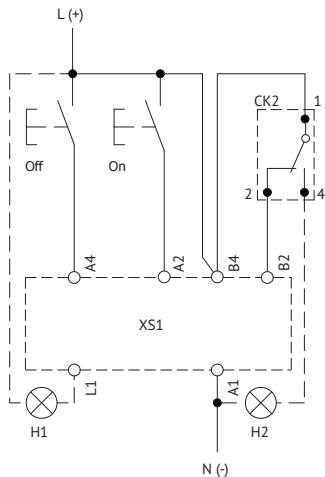


Diagram for drive connection with remote switching spring raising

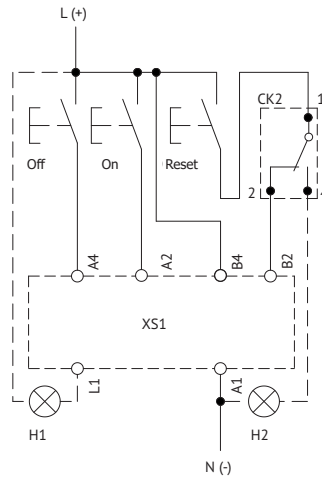
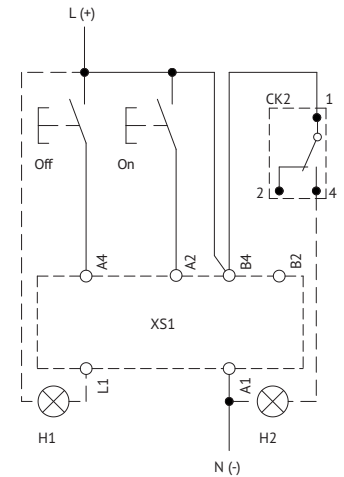


Diagram for drive connection with manual switching spring raising

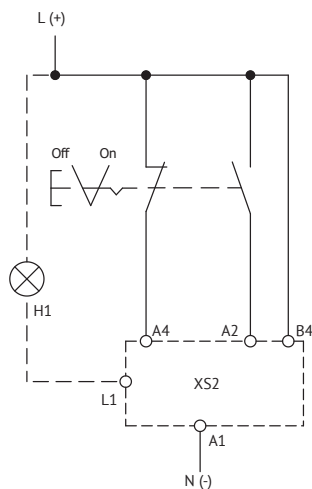


XS1 – connection slot (socket in the drive with six terminals for semiconductor connection);
 A4 – off command;
 A2 – on command;
 B4, A1 – motor drive power;
 L1 – manual mode;

B2 – mutual block (mandatory for correct work of the remote and automatic raise);
 CK2 – emergency shutdown signal contact (short circuit, overload)
 H1 – manual control mode alarm;
 H2 – switch signal contact tripping alarm;
 CK2 (short circuit, overload).

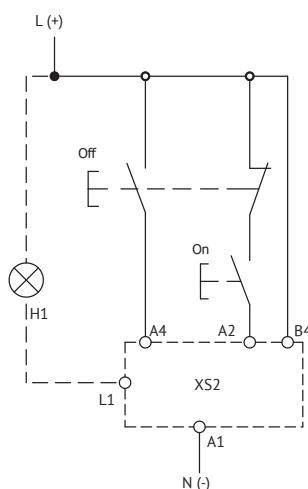
OptiMat D1000 and OptiMat D1600 motor drive connection diagrams

Drive connection diagram with continuous control commands

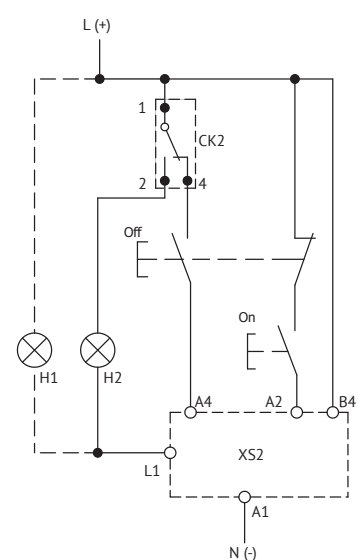


XS2 – slot for conductors;
 A4 – off command;
 A2 – on command;
 B4, A1 – motor drive power;
 L1 – manual mode;
 H1 – automatic work mode alarm.

Drive connection diagram with pulse control commands



Drive connection diagram with pulse control commands without automatic raise of the switching spring after CK2 tripping

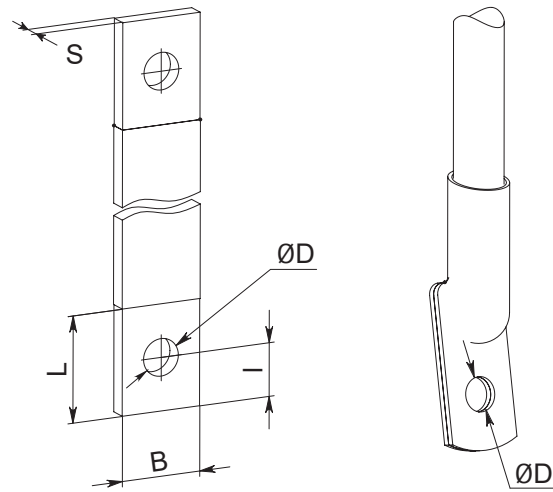


CK2 – emergency shutdown signal contact (short circuit, overload);
 H2 – switch signal contact tripping alarm CK2 (short circuit, overload).

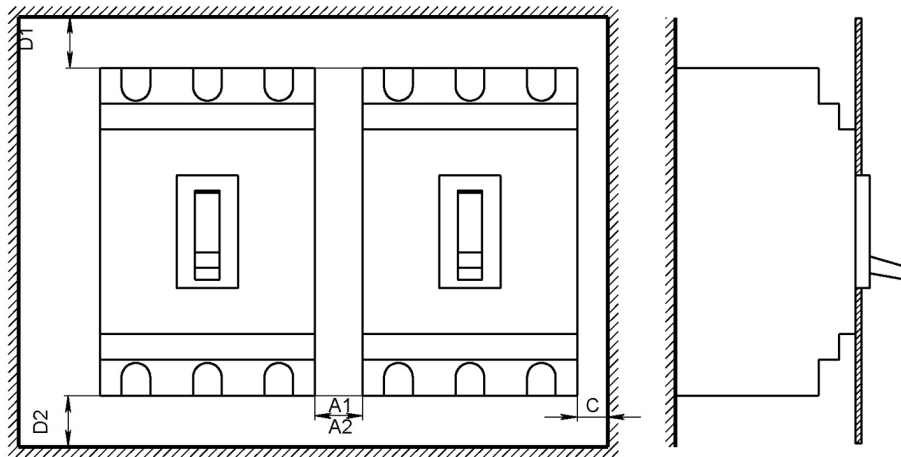
Size and type of busbar attachment OptiMat D

Main circuit terminal allow connecting busbars and wires with cable ends. Size and section of the connected busbars and wires with cable ends are shown on the picture and in the table below:

Connection methods	Dimentions		
Bolt connection	Bolt	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
Cable ends pursuant to GOST 7386	B (mm)	≤24	≤31
	D (mm)	8,4-10,5	10,4÷12,5
	section (mm ²)	10-70	25-120



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



OptiMat D circuit breaker		Dimentions, mm				
		C	D1	D2	A1 ¹	A2 ²
100, 160 and 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
1000, 1600 A	400-690 V	15	100	35	0	15

1 – if there are terminal covers;
2 – if there are no terminal covers.