OptiMat A Range of automatic air circuit breakers for currents from 630 to 6300 A

Range of automatic air circuit breakers of OptiMat A are designed to conduct current in the normal mode, protection and infrequent operation of electric circuits with nominal current from 630 to 6300 A. owing to their design they can easily withstand high capacities. Te devices are equipped with multiple types of protection, which allow to provide requirements of selectivity in the network protected. Different lock-in equipment is designed to prevent unskilled acts and protect operational and attending personnel.

Designation

OptiMat A-630-S2-3P-85-D-MR8.0-B-C(a b c d)2200-M2-P01-S1-03

1	2	3	4	5	6	7	8	9	10		11	12	13	14

1	**Product range**	OptiMat				
2	**Configuration**	A - automatic air circuit breakers				
3	**Rated current In, A**	630; 800; 1000; 1250; 1600; 2000; 2500; 3200; 4000; 5000; 6300				
4	**Standard size**	S1 - First overall dimension (width up to 280 mm, In from 630 to 1600 A)	S2 - Second overall dimension (width up to 370 mm, In from 630 to 2000 A)	S4 - Fourth overall dimension (width up to 430 mm, In from 2500 to 4000 A)	S5 - Fifth overall dimension (width up to 820 mm, In 5000 A)	S6 - Sixth overall dimension (width up to 950 mm, In 6300 A)
5	**Number of circuit breaker poles**	3P - Triple-pole			4P - Four-pole	
6	**Limiting breaking capacity, kA with Ur = 400 V**	50; 65; 85; 100; 120				
7	**Design according to installation method**	F - Stationary version [1]			D - Withdrawable design	
8	**Type of a microprocessor trip system**	MR0 - Microprocessor trip system is not available	MR5.0 - of LSIG protection, current measurement (for S1, S5, S6)	MR7.0 - of LSIG protection (for S2, S4)	MR8.0 - of LSIG protection. With communications function via Modbus and current measurement (for S2, S4)	MR8.1 - of LSIG protection. With communications function via Modbus and current measurement. Menu in Russian (for S2, S4)
9	**Options of attachment**	B - Back attachment (horizontal or vertical)[2]	F - Front attachment (for S2, S4 for currents from 630 to 2500 A)	C - Combined attachment (upper – front, lower – back), for S2, S4 for currents from 630 to 2500 A		
10	**Type of control coils**	**Cabcd - symbol of the control coil unit**				
		a - Actuating coil: - 0 - not installed; - 1 - installed 110 V AC/DC; - 2 - installed 230 V AC/220 V DC; - 3 - installed 24 V DC	**b - Shunt trip:** - 0 – not installed; - 1 – installed 110 V AC/DC; - 2 – installed 230 V AC/220 V DC; - 3 – installed 24 V DC	**c - Second shunt trip:** - 0 – not installed; - 1 – installed 110 V AC/DC; - 2 – installed 230 V AC/220 V DC; - 3 – installed 24 V DC	**d - Undervoltage release:** - 0 – not installed; - 2 – installed 230 V AC/220 V DC	
11	**Type of motor drive**	M0 - Motor drive is not available	M1 - Motor drive 110 V AC/DC	M2 - Motor drive 230 V AC/220 V DC		
12	**Вид систем защиты**	P00 - protection systems are not available	P01 - isolating shutters are installed	P02 - embeddable cut-in button lock is installed	P03 - isolating shutters and embeddable cut-in button lock are installed	
13	**Вид вспомогательных контактов сигнализации**	S1 - Signal contacts 6a+6b (for S2, S4, S5, S6)	S2 - Signal contacts 6c (for S1)			
14	**Вид систем дополнительной сигнализации**	00 – Signal systems are not installed; 01 – Indication of the circuit breaker position in basket is installed; 02 – Contact of the circuit breaker main contacts closure readiness signaling is installed; 03 – Mechanical cycle counter is installed; 04 – Indication of the circuit breaker position in basket and contact of the circuit breaker main contacts closure readiness signaling are installed; 05 – Indication of the circuit breaker position in basket and mechanical cycle counter are installed; 06 – Contact of the circuit breaker main contacts closure readiness signaling mechanical cycle counter are installed; 07 – Indication of the circuit breaker position in basket, contact of the circuit breaker main contacts closure readiness signaling and mechanical cycle counter are installed.				

[1] Stationary version is available in all sizes except for S5, S6.
[2] Rear vertical, front and combined connections are available for stationary and retractable versions of 2000 A circuit-breakers. Only rear vertical busbar connection is available for stationary and retractable versions of 4000 A circuit breakers. Only rear horizontal busbar connection is available for 5000 and 6300 A circuit breakers.

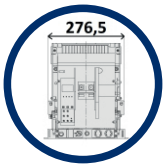
Batch effectiveness

The presence in the overall design of S2, S4, S5, S6 of twelve (6a + 6b) galvanically isolated contacts allows for the implementation of a large number of signaling circuits.

The block with screw clamps in overall design of S1, S5, S6 allows for quick installation of control circuits, without using additional crimps and soldering connections.

Conductive elements are made of pure electrical copper, which allows to obtain high conductivity, efficiency, as well as durable operation.

The availability of various interlocks (blocking the status of the switch in the chassis, blocking the closing, isolating shutters, etc.) ensure the safety of the maintenance personnel.

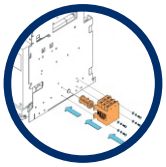


Compact dimensions of the circuit breakers of the S1 overall design make it possible to complete standard boards with larger amount of equipment, or, alternatively, use boards of a smaller size.

The possibility of changing the position of the terminals from horizontal to vertical in the overall design of S1, S2, S4 that enables the client to use the switches in the circuits with both vertical application of busbars, as well as horizontal.

Application of special alloys based on silver for creation of a contact group, enabled to achieve high wear resistance and provide for over ten thousand cycles of electrical switching.

Data transfer support via Modbus protocol in the releases MR8.0 and MR8.1 allows for the application of the dispatch system.



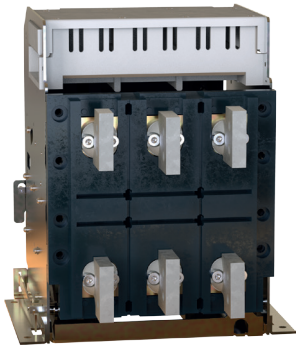
Modular design provides simple and quick mounting.

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

Various delivery and main output mounting options

Rear horizontal busbar
S1 connection type

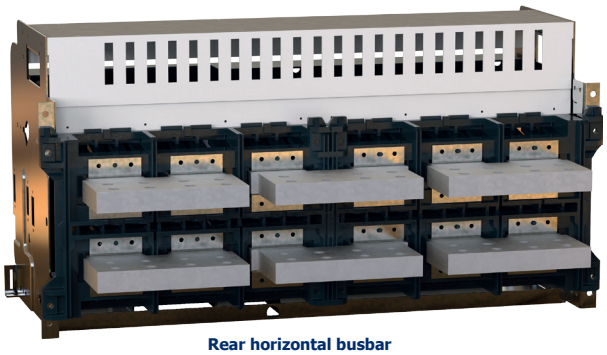
Front busbar S2 connection type



Rear vertical busbar
S1 connection type

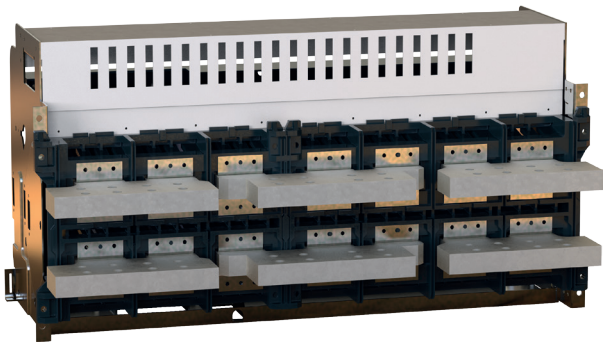
Rear vertical busbar S4
connection type

Rear horizontal busbar
S4 connection type



Rear horizontal busbar
S5 connection type

Rear combined busbar
S4 connection type[1)]



Rear horizontal busbar
S6 connection type

Note: See Technical data sheet for detailed options of attachment types delivery.
[1)] Combined attachment of busbars is individually performed by user on circuit breakers, which have capability of their terminals rotation.

Selection guide

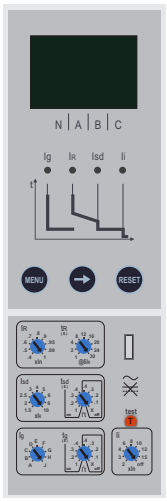
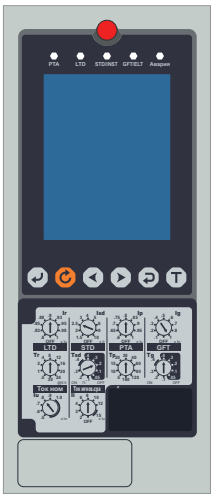
| Automatic circuit breakers of OptiMat A series | | |

Technical specifications

Series of circuit breakers				OptiMat A-S1					OptiMat A-S2						OptiMat A-S4			OptiMat A-S5,S6	
General characteristics																			
Rated operational voltage Ue, V				690					690									400	
Rated insulation voltage Ui, V				690					1000										
Rated impulse withstand voltage Uimp, kV				8					12									12	
Application category				B					B										
Suitability for isolation				available					available										
Number of poles				3					3,4									3	
Control																			
Manual		Operation buttons		+					+										
Electrical		Motor drive		+					+										
Version				630	800	1000	1250	1600	630	800	1000	1250	1600	2000	2500	3200	4000	5000	6300
Fixed	Rear	vertical		+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		horizontal		+	+	+	+	+	+	+	+	+	+	-	+	+	-	-	-
	Front			-	-	-	-	-	+	+	+	+	+	+	+	+	-	-	-
	Combined			-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	-
Withdrawable	Rear	vertical		+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		horizontal		+	+	+	+	+	+	+	+	+	+	-	+	+	-	+	+
	Front			-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	-
	Combined			-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	-
Rated and limiting parameters of the main circuit of switches																			
Rated current In, A				630	800	1000	1250	1600	630	800	1000	1250	1600	2000	2500	3200	4000	5000	6300
Rated frequency, Hz				50					50 / 60									50	
Rated ultimate breaking capacity (Icu), kA		Ue 400 V		50					65/85					85	100			120	
		Ue 690 V		25					50/65					65	85			-	
Rated service capacity (Ics), kA		Ue 400 V		40					65/85					85	100			100	
		Ue 690 V		20					50/65					65	85			-	
Short-time withstand current (Icw) within 1 s, kA		Ue 400 V		40					65						85			100	
		Ue 690 V		20					-						-			-	
Rated short-circuit making capacity		Ue 400 V		-					143/187					187	220			-	
		Ue 690 V		-					105/143					143	220			-	
General wear resistance, cycles		with maintenance		-					50000									-	
		without maintenance		15000					30000									5000	
Electrical life, cycles		with maintenance		-					20000									-	
		without maintenance		5000					10000									500	
Trip time		Break-time (opening), ms		50±10					15									50±10	
		Make-time (closing), ms		50±10					30									50±10	
Protection, indication and measurement devices																			
Microprocessor-based release				MR5.0					MR7.0 / MR8.0 / MR8.1									MR5.0	
Overload protection				+					+/+/+									+	
Short-circuit protection		with time-delay		+					+/+/+									+	
		non-time-delay		+					+/+/+									+	
Earth fault protection				+					+/+/+									+	
Changed current indication				+					-/+/+									+	
Device status indication				-					+/+/+									-	
Additional devices (control and signaling systems) [1]																			
Auxiliary contacts				6c					6a+6b									6a+6b	
Voltage releases		shunt trip		230 V AC / 220 V DC					230 V AC/220 V DC ; 110 V AC/DC ; 24 V DC									230 V AC / 220 V DC	
		actuating coil		230 V AC / 220 V DC					230 V AC/220 V DC ; 110 V AC/DC ; 24 V DC									230 V AC / 220 V DC	
		second shunt trip [2]		-					230 V AC/220 V DC ; 110 V AC/DC ; 24 V DC									-	
		undervoltage release [2]		-					230 V AC/220 V DC									-	
Indication of the circuit breaker position in basket				-					-/+									-	
Contact of the circuit breaker main contacts closure readiness signaling				-					-/+									-	
Additional devices [1] (locking, protection, indication)																			
Internal installation lock				-					-/+									-	
Protective shutters				+					-/+									+	
Interpole partitions				+					+									+	
Mechanical cycle counter				+					-/+									+	
Mechanical interlock [3]				-					-/+									-	
Overall dimensions and weight																			
Overall dimensions (WxDxH), mm	Stationary with front attachment		3P	-					361x462x332						421x482x332		-	-	-
	Withdrawable with front attachment		3P	-					353x499x431						413x512x433		-	-	-
	Stationary with back attachment		3P	370×340×490					361x310x335						421x310x335		421x335x 391	-	-
	Withdrawable with back attachment		3P	450×360×530					353x432x435						413x432x435		413x432x 492	970×600× 660	1070×600× 660
Weight, kg	Stationary with front attachment		3P	-					52	52	52	54	54	55	65	76	-	-	-
	Withdrawable with front attachment		3P	-					75	75	75	78	78	79	92	107	-	-	-
	Stationary with back attachment		3P	33					41	41	41	43	43	45	48	59	65	-	-
	Withdrawable with back attachment		3P	53					65	65	65	68	68	70	75	90	98	240	260

[1] See p. 191 for detailed description of accessories.
[2] They are mutually exclusive items in S2, S4 dimension versions.
[3] Mechanical interlock to be only installed on circuit breakers of withdrawable version.

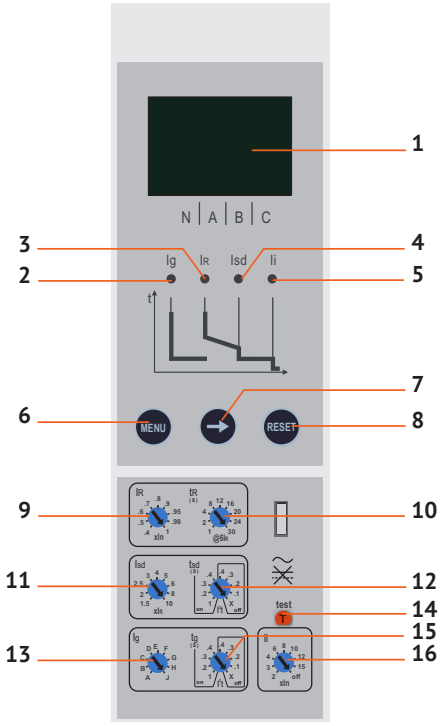
Microprocessor trip system

All the types of microprocessing releases				
	MR5.0	**MR7.0**	**MR8.0**	**MR8.1**
Appearance				
Current protection	1) From overload 2) From short circuit with time delay 3) From short circuit, instantaneous	1) From overload 2) From short circuit with time delay 3) From short circuit, instantaneous		
Measurement	current	absent	current	
Power supply	External supply equipment: - 230 V AC	Power supply from current transducers* installed in protected network (at least 20% of the nominal current) External supply equipment: - AC/DC 110/220 V - DC 48 V	Power supply from current transducers* installed in protected network (at least 20% of the nominal current) To provide data exchange external supply equipment is required: - AC/DC 110/220 V - DC 48 V	
LED tripping indicators	Alarm indication of the function of earth short circuit protection/ alarm indication the function of overload protection/ alarm indication of the function of short circuit protection with short-time delay tripping/ alarm indication of the function of short circuit protection.	warning of overload	Indication of overload/Indication of overload tripping and short circuit/ indication of break without time delay/indication of currents in phases	
Control buttons	Reset, menu, right	Reset	Reset, menu, right, right, enter, self-testing	Enter, reset, left, right, return, self-testing
Registration of protective trippings	1 last tripping (current, time)	Absent	the last 10 records (reason, current, phase, time)	the last 300 records (reason, current, phase, time)
Communication protocol	Absent	Absent	Modbus / RS-485	

* Power supply from current transducers is backup power supply system. When only using power supply from current transducers the release does not provide protection at closure on short circuit, due to the fact that it needs 3 seconds for uploading, and for normal information display and the release operation it is necessary that power circuits current to be at least 20% of the circuit breaker nominal current.

For functional operation and full protection of electric networks, according to specifications stated, the release power supply is recommended to perform from an external supply equipment.

MR5.0 type



All required types of protection

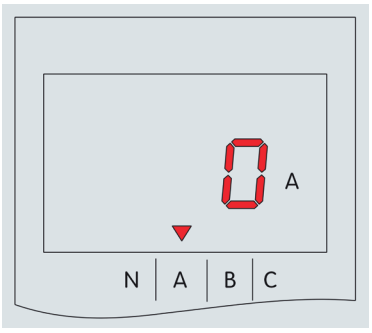
OVERLOAD PROTECTION:
• with long-time delay.

PROTECTION AGAINST SHORT CIRCUIT:
• instantaneous with independent time delay;
• additional protection function I2t on / off (for protection with short -time delay).

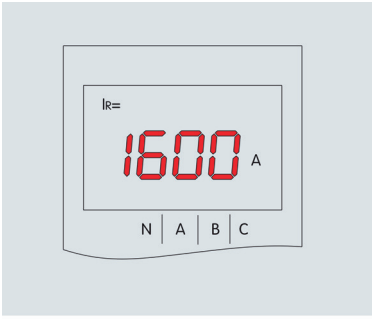
PROTECTION AGAINST GROUND SHORT CIRCUIT:
• additional protection function I^2t on / off

1 LED display;
2 Ig alarm indicator of the function of protection against earth short circuit;
3 IR alarm indicator of the functions of protection against overload;
4 Isd alarm indicator of the functions of protection against short circuit with short tripping delay;
5 Ii alarm indicator of the functions of protection against short circuit;
6 «MENU» button for access to different submenu;
7 «→» button of movement around the menu;
8 «RESET» button of parameters setting;
9 «IR» adjustment of the current setpoint value for overload protection;
10 «tR» adjustment of the overload protection tripping delay;
11 «Isd» adjustment of current setpoint value for short circuit protection;
12 «tsd» setting for a short delay;
13 «Ig» setting of the value of the ground fault current setting;
14 «test» testing of instantaneous short circuit protection;
15 «tg» setting of the response delay of the earth fault protection;
16 «Ii» adjustment of the current setting value for instantaneous short circuit protection.

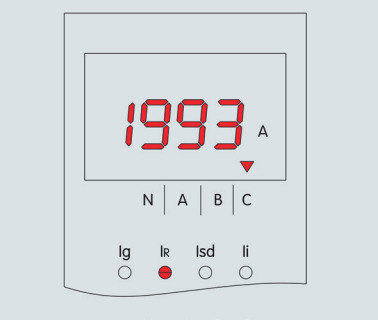
MR5.0 Liquid Crystal Display



To move to the request status with parameters, you need to press the «menu» button once, being on the main screen of the release.



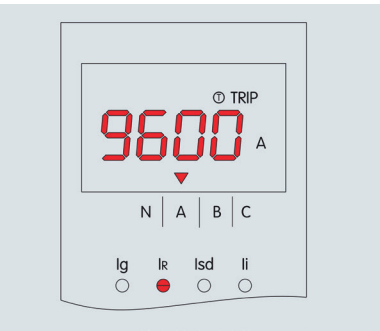
To move to the query which parameter is set for protection against overcurrent, you need to press the «→» button.

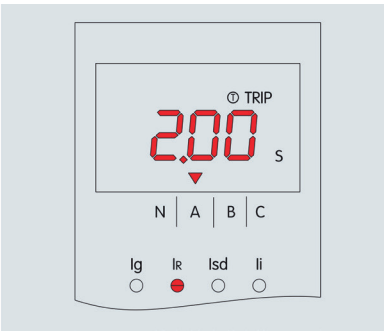


a) operating (trip) current

b) response time

Press the «menu» button twice to move to the response request status (displays information about the last response).





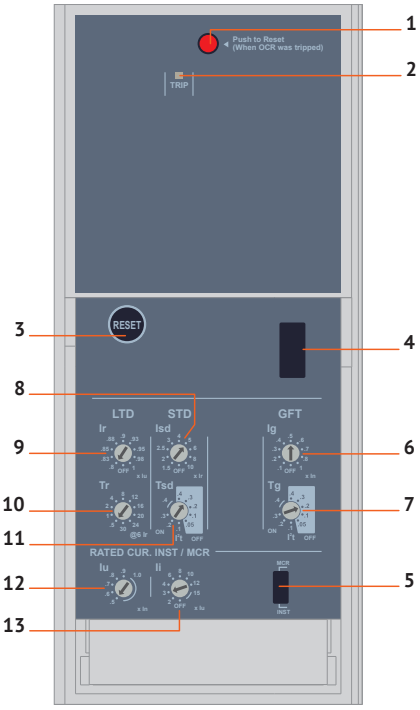
To move to the response simulation status at 6IR, press the «test» button. After actuation, you can see the following data.

To return to the default interface from any status, press the "RESET" button.

Protection settings for microprocessor-based trip unit MR5.0

Parameter name	Parameter value	Accuracy
Setpoint of operating (service) current (I_R) in multiples of the switch rated current	0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 0,95; 0,98; 1	10%
Setpoints by the response time at current $6I_R$, s	1; 2; 4; 8; 12; 16; 20; 24; 30	15%
Setpoints by the response current in the zone of short circuit I_{sd} in multiples of the operating (service) current (I_{sd} / I_u)	1,5; 2; 2,5; 3; 4; 5; 6; 8; 10	15%
Setpoints by the response time in the zone of short circuit, s	0,1; 0,2; 0,3; 0,4; X (I^2t off) 0,1; 0,2; 0,3; 0,4 (I^2t on)	15%
Instantaneous current setpoints (I_i), A	2; 3; 4; 6; 8; 10; 12; 15; off	15%
Trip current setpoints at single-phase short circuit to earth in multiples of the rated current (I_g), A	A; B; C; D; E; F; G; H; J*	10%
Response time settings at the single-phase short circuit to earth (T_g), s	0,1; 0,2; 0,3; 0,4; X (I^2t off) 0,1; 0,2; 0,3; 0,4 (I^2t on)	15%

MR7.0 type



All required types of protection

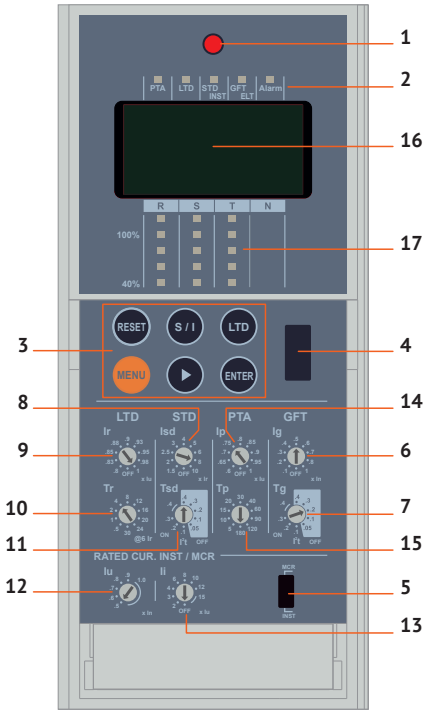
OVERLOAD PROTECTION:
• with long-time delay.

PROTECTION AGAINST SHORT CIRCUIT:
• instantaneous with independent time delay;
• additional protection function I^2t on / off (for protection with short -time delay).

PROTECTION AGAINST GROUND SHORT CIRCUIT:
• additional protection function I^2t on / off

1 Return button after fault tripping
2 Indication of tripping:
PTI – overload. LED flickers when the current reaches the value 1,13 IR
3 Reset button
4 Testing device jack
5 Selection of I2t protection characteristic (set by the manufacturer)
6 The Ig switch sets the tripping current at single-phase short circuit to earth in multiples to the rated current (from 0,1 to 1,0 In)
7 Tg switch sets independent or inverse-time delay in the event of single-phase short circuit to earth (from 0,05 to 0,4 s)
8 The Isd switch is used to set the tripping current in the zone of short circuit in multiples to the operating current (from 1,5 to 10 Iu)
9, 12 Ir and Iu switches set the operating current of the switch in multiples to the rated current from 0,4 to 1,0 In (IR = Ir x Iu)
10 The Tr switch is used to set the time delay in the zone of overload (from 0.5 to 30 s with a load of 6 IR)
11 With the Tsd switch, a short-time delay is set in the zone of short circuit (from 0,05 to 0,4 s)
13 Ii switch sets the reflex tripping current in the zone of short circuit in multiples to the rated current (from 2 to 15 In).

MR8.0 type



All required types of protection

OVERLOAD PROTECTION:
• with long-time delay.

PROTECTION AGAINST SHORT CIRCUIT:
• instantaneous with independent time delay;
• additional protection function I^2t on / off (for protection with short -time delay).

PROTECTION AGAINST GROUND SHORT CIRCUIT:
• additional protection function I^2t on / off.

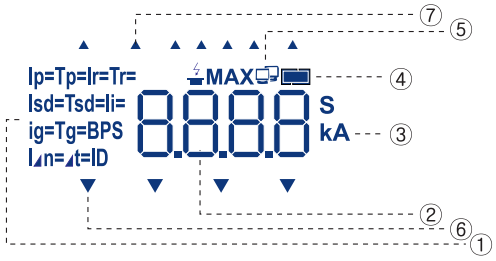
OVERLOAD SIGNALING.

PROTECTIVE ACTUATION RECORDING:
• record of the last 10 events (the cause of actuation, the value of the operating current, a phase and actuation time).

DATA EXCHANGE INTERFACE:
Modbus/RS485.

1 Return button after fault tripping
2 Actuation indication:
PTA - alarm indication in the event of overload
LTD - overload protection
STD/INST - short circuit tripping
GFT/ELT - tripping by short circuit to ground
Alarm - microprocessor trip operation
3 Button to navigate the menu and self-test operation
4 Testing device jack
5 Selection of I2t protection characteristic (set by the manufacturer)
6 The Ig switch sets the tripping current at single-phase short circuit to earth in multiples to the rated current (from 0,1 to 1,0 In)
7 Tg switch sets independent or inverse-time delay in the event of single-phase short circuit to earth (from 0,05 to 0,4 s)
8 The Isd switch is used to set the tripping current in the zone of short circuit in multiples to the operating current (from 1,5 to 10 IR)
9, 12 Ir and Iu switches set the operating current of the switch in multiples to the rated current from 0,4 to 1,0 In (IR = Ir x Iu)
10 The Tr switch is used to set the time delay in the zone of overload (from 0,5 to 30 s with a load of 6 IR)
11 With the Tsd switch, a short-time delay is set in the zone of short circuit (from 0,05 to 0,4 s)
13 Ii switch sets the reflex tripping current in the zone of short circuit in multiples to the rated current (from 2 to 15 In)
14 The Ip switch sets the overload alarm making current in multiples to the Iu current
15 The Tp switch sets the make time for the overload alarm from the moment when it occurs
16 Liquid crystal display
17 LED three-phase current indication scales

MR8.0 Liquid Crystal Display



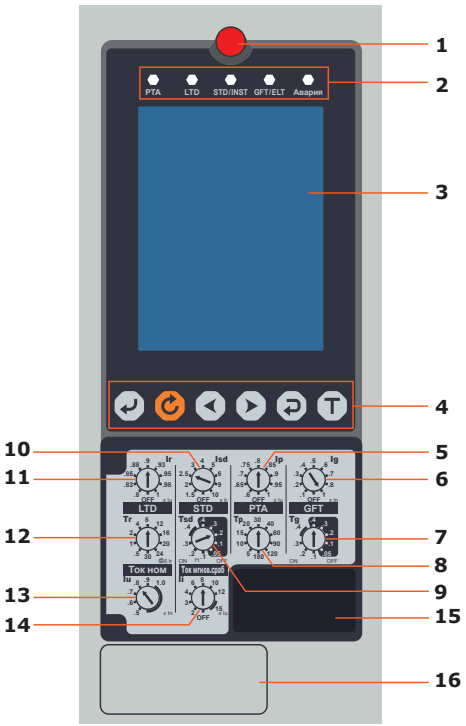
1. Displays current and time settings. Displays setting values and events.
2. Display numbers or symbols. Displays current, time and simple symbols.
3. Displays units, time and current values.
4. Battery charge control. A 3,6 V battery is installed in a microprocessor-based release (lithium). Indication of battery status. Flicker with a frequency of 0,5 s means that the battery is low, replacement is necessary.
5. Indication of connection. Displays connection speed, address and screen settings.
6. Displays the measured current, phase and load level.
7. Displays information about alarms and commutations.

It is displayed for 1 s after supplying power to the microprocessor release, and then returns to the measurement screen.

Image	Button	Description
2000 A		1. On the screen, current in R / S / T / N phases is displayed within 3-second intervals. 2. The current of each phase is displayed. (▶) The form moves from left → to right. 3. LED bar graph shows the load level of each phase by 40 ~ 110%.
▶	▶	1. Pressing the button (▶) is used to move to the next step. • Measurement screen: moving to the next phase current reading. • Adjustment of settings: View the description of the next setting. • Viewing time: year, month → day, hour → minute, seconds. 2. When pressed for about 3 ~ 4 seconds on the measurement screen, the current of the displayed phase can be measured. (Press and hold for a short time, then release).
MENU	MENU	Used to check parameter values, view the alarm / event log, time and communication parameters.
S / I	S/I	1. Used for protection with short-time delay response / instant protection, SELF-TESTING. 2. Priority of the shutdown without time delay. 3. Instant shutdown in the event when time delay is not set for protection with a short-time delay / instantaneous protection.
LTD	LTD	1. Used for protection with long time delay, SELF TEST. 2. Unavailable if long-time delay is not set.
ENTER	ENTER	1. Used to view the description of the event / fault and change the date / time. 2. After proceeding to the description, you must check or change the use of the MENU button, press the ENTER button to move to the next step.
RESET	RESET	1. Return to the initial state after actuation, resetting event and alarm reports. 2. The set of displayed LCD elements and the actuation information shown by the LEDs will be turned on for about 0,5 seconds. 3. When displaying disconnection data using power from the backup battery, the LED indication will be turned off.

		Screen indication	Button	Description
LTD	current	Ir= 2000 A	M ▶	1. Being in the "Measurements" menu, press the Menu (M) button once to move to the "Settings" menu. 2. The first screen displays the current setting for protection with long-time delay, press the tab button to view the values of other settings. 3. Top of the screen: "I_r =" is displayed.
	time	Tr= 4.00 S	M ▶x1 times	1. Press the tab button once in the settings preview menu to check the time setting for protection with long-time delay. 2. Top of the screen: "T_r =" is displayed.
STD	current	Isd= 16.00 kA	M ▶x2 times	1. Press the tab button 2 times in the settings preview menu to check the current setting for protection with short-time delay. 2. Top of the screen: "Isd =" is displayed.
	time	Tsd= 0.400 S	M ▶x3 times	1. Press the tab button 3 times in the settings preview menu to check the time setting for protection with short-time delay. If the inverse response delay of I2t was chosen, then the displayed value will be greater than the specified value by 1 in the last digit. Example: With I2t on, the delay set 0.400 s. is displayed as 0.401 s. 2. Top of the screen: "T_{sd} =" is displayed.
INST	current	Ii= 24.00 kA	M ▶x4 times	1. Press the tab button 4 times in the settings preview menu to check the current setting for instantaneous protection. 2. Top of the screen: "I_i =" is displayed.
PTA	current	Ip= 1800 A	M ▶x5 times	1. Press the tab button 5 times in the settings preview menu to check the current setting for overload alarm (PTA). 2. Top of the screen: "I_p =" is displayed.
	time	Tp= 20 S	M ▶x6 times	1. Press the tab button 6 times in the settings preview menu to check the time setting for overload alarm (PTA). 2. Top of the screen: "T_p =" is displayed.
GFT	current	Ig= 800 A	M ▶x7 times	1. Press the tab button 7 times in the settings preview menu to check the current setting for earth fault protection. 2. Top of the screen: "Ig =" is displayed.
	time	Tg= 0.400 S	M ▶x8 times	1. Press the tab button 8 times in the settings preview menu to check the time setting for earth fault protection. If an inverse response delay I2t was selected, then the displayed value will be greater than the specified value by 1 in the last digit. Example: With I2t on, the set delay 0.400 s. is displayed as 0.401 s. 2. Top of the screen: "T_g =" is displayed.

MR8.1 type



All required types of protection

OVERLOAD PROTECTION:
• with long-time delay.

PROTECTION AGAINST SHORT CIRCUIT:
• instantaneous with independent time delay;
• additional protection function I2t on / off (for protection with short – time delay).

PROTECTION AGAINST GROUND SHORT CIRCUIT:
• additional protection function I2t on / off.

OVERLOAD SIGNALING.

PROTECTIVE ACTUATION RECORDING:
• record of the last 300 events (the cause of actuation, the value of the operating current, a phase and actuation time).

CONTACT PROGRAMMING FUNCTION.

RUSSIAN LANGUAGE MENU

DATA EXCHANGE INTERFACE:
Modbus RTU/RS485.

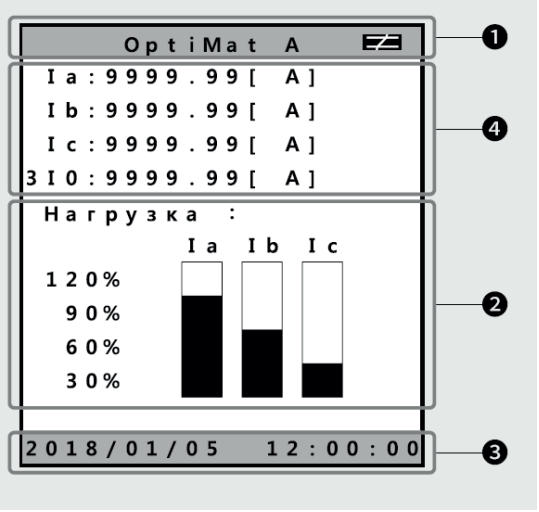
1 Reset button
2 Alarm indications
3 LCD display
4 Control buttons and adjustment block
5 Adjustment of the current setting for overload indication
6 Adjustment of the current setting for earth fault
7 Adjustment of the time setting for earth fault
8 Adjustment of the time setting for overload indication
9 Adjustment of the time setting for single phase short circuit
10 Adjustment of the current setting for single phase short circuit
11 Adjustment of the current setting for overload
12 Adjustment of the time setting for overload
13 Adjustment of the operating current setting in multiples of nominal
14 Adjustment of the instantaneous current setting (no time delay)
15 Multifunctional connector
16 Battery cell

LCD-display MR8.1

Button	Designation	Description
	Input, menu selection (ENTER)	- Used to select the menu; - Used to save changed settings.
	Error reset (RESET)	- Used to update the screen; - Used to update the error indication; - When the trip information is displayed using the backup battery, by pressing the RESET button, the main screen can be turned off
	Move left (LEFT)	- Used to navigate the menu or change parameters and select values.
	Move right (RIGHT)	- Used to navigate the menu or change parameters and select values.
	Reset (RESET)	- Used to navigate through the main menu; - Moves to the «Save» screen if there are changes on the settings display.
	Testing (TEST)	- Run the test using the specified test condition.

The microprocessor-based trip unit MR8.1 includes the following main menus:
- **Measurements** - In this tab, you can see the current values of current and current readings in each phase.
- **System** - In this tab, you can change rated current, rated frequency, system settings, system time, password, language, assignment of digital outputs and self-test settings.
- **Settings** - In this tab, you can change the settings.
- **Data log** - In this tab, you can see information about the operations and faults.

The main screen displays the following information:



1 Display of the status of the internal battery and the menu titles.
2 Display of the load indication of each phase.
3 Display of the date and time.
4 Display of the exact current value in each phase.

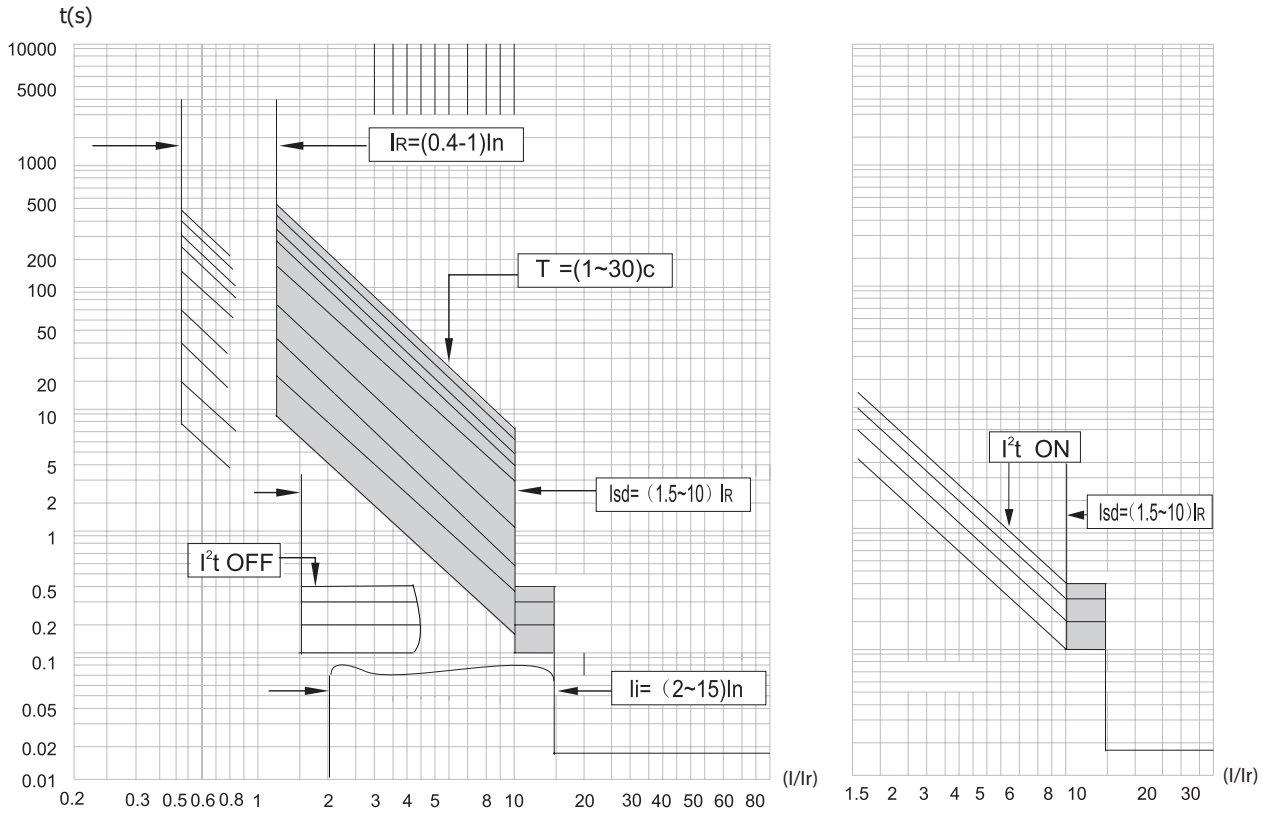
Protection settings for microprocessor-based releases MR7.0, MR8.0, MR8.1

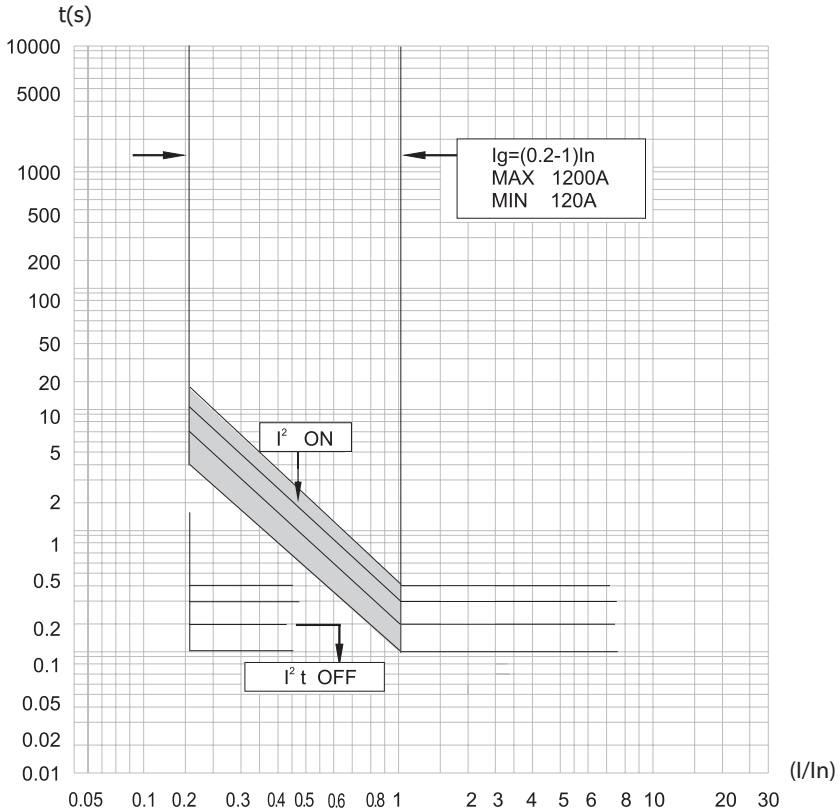
Parameter name	Parameter value	Accuracy
Setpoint of operating current (IR) in multiples of the rated current of the switch (IR / I_n) IR = I_r x I_u	I_r = 0,8; 0,83; 0,85; 0,88; 0,9; 0,93; 0,95; 0,98; 1,0 I_u = 0,5; 0,6; 0,7; 0,8; 0,9; 1	
Settings by the response time at a current of 6 IR, s (T_r)	0,5; 1; 2; 4; 8; 12; 16; 20; 24; 30	+15%
Settings by the trip current in the zone of short circuit Isd in multiples of the operating current (I_{sd} / IR)	1,5; 2; 2,5; 3; 4; 5; 6; 8; 10	+15%
Settings by the response time in the zone of short circuit, s (T_{sd})	0,05; 0,1; 0,2; 0,3; 0,4 (I^2t off) 0,1; 0,2; 0,3; 0,4 (I^2t on)	+0,03 s
Settings by the instantaneous tripping current (I_i), A (T_i not more than 0.05 s)	2; 4; 6; 8; 10; 12; 15	+15%
Overload alarm current settings (I_p / I_u)	0,6; 0,65; 0,7; 0.75; 0,8; 0,85; 0,9; 0,95; 1,0	+15%
Settings by the time of the alarm signaling actuation (T_p), s	5; 10; 15; 20; 30; 40; 60; 90; 120; 180	+15%
Tripping current settings at single-phase earth fault in multiples to the rated current (I_g / I_n)	0,1; 0,2; 0,3; 0,4; 0,5; 0,6; 0,7; 0,8; 1	+20%
Settings by the response time at single-phase short circuit to earth (T_g), s	0,05; 0,1; 0,2; 0,3; 0,4 (I^2t off) 0,1; 0,2; 0,3; 0,4 (I^2t on)	+0,03 s

Information transmitted by the microprocessor-based release MR8.0, MR8.1

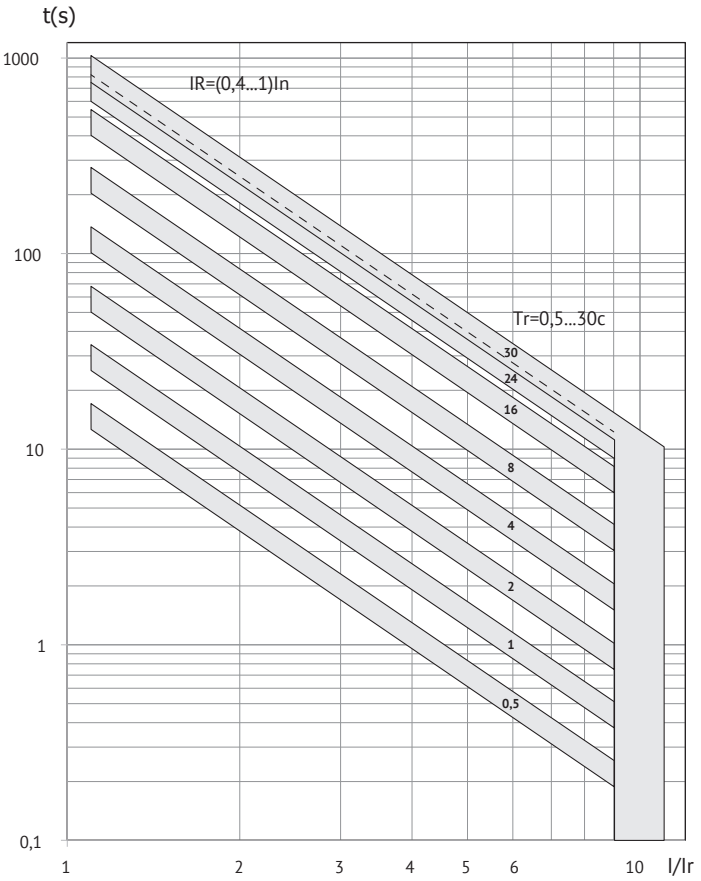
Supported protocol	Modbus RTU
Physical level	RS485
Maximum data transfer rate	19200 bps
Maximum number of devices in parallel operation	100
Settings information	
Ir	Operating current of the switch (set by the switches Ir and Iu in multiples of the rated current from 0.4 In to 1,0In (IR= Ir*Iu))
Tr	Protective characteristic depending on the response time in the overload zone (from 0.5 to 30 s with a load of 6IR)
Isd	Tripping current in the short circuit zone (from 1.5IR to 10IR)
Tsd	Short-time delay in the zone of short circuit (from 0.05 to 0.4 s)
Ii	Instantaneous operating current in the zone of short circuit in multiples of the rated current (from 2In to 15In)
Ip	Overload alarm switching current in multiples of current Iu
Tp	Overload alarm actuation time since the moment of its occurrence
Ig	Tripping current at single-phase short-circuit to earth in multiples of the rated current (from 0.1In to 1.0In)
Tg	Short-time delay at single-phase short circuit to earth (0.05 to 0.4 s)
Data on circuit breaker actuation	
Current in phases in the event of the switch actuation	
Tripping current in the event of single-phase short circuit to earth	
Year, month, date, time (minutes and seconds) of the circuit breaker actuation	
Cause of the circuit breaker actuation and the phase with the maximum current value when the circuit breaker trips	
Maximum current in one of the phases when the circuit breaker trips	
Measured parameters	
Measured current value in phases	

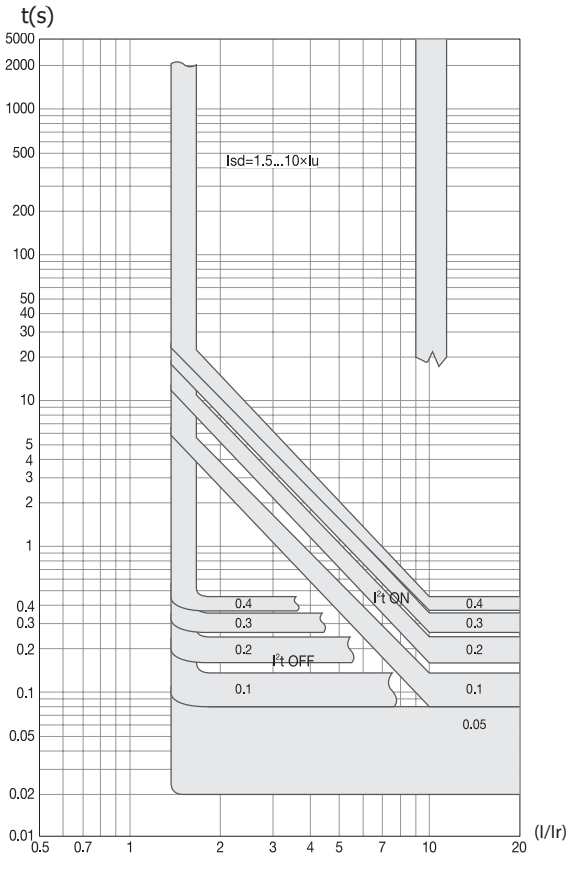
Time – current characteristics of switches with a microprocessor-based release MR5.0

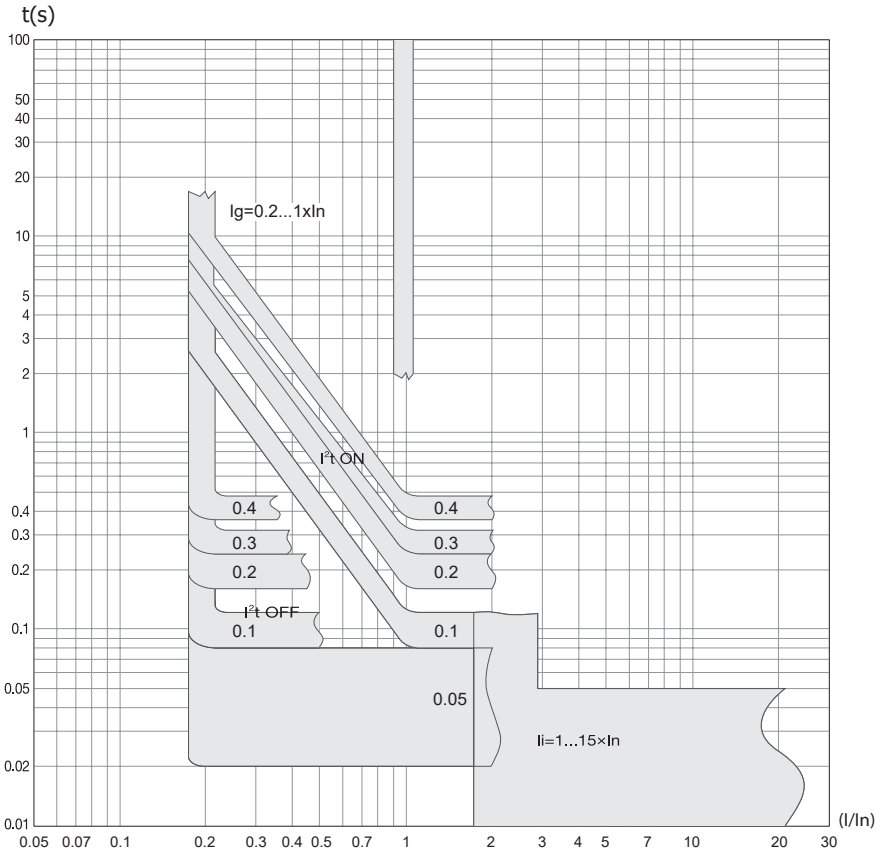




Time - current characteristics of switches with a microprocessor-based release MR7.0, MR8.0, MR8.1







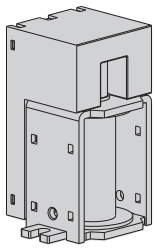
Mounting accessories OptiMat A of overall designs S2, S4

Shunt trip

Shunt trip is designed for circuit breaker remote opening. Shunt trip causes circuit breaker opening in any operating conditions, when supply voltage remains within the range from 0.75 Ue to 1.0 Ue. It is unified for OptiMat A circuit breakers of S2, S4 dimension version. It is installed under the circuit breaker face panel in its own cell.

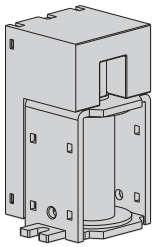
Second shunt trip

Second shunt trip is designed for circuit breaker remote opening and it is a backup system of the shunt trip. Performance specifications conform to characteristics of shunt trip. It is installed, if there imposed additional requirements for reliability of the systems, which the air circuit breaker included in. It mutually exclusive item with undervoltage release.



Title	Independent trip device OptiMat A-230AC/DC-UHL3 (TC3)	Independent trip device OptiMat A-110AC/DC-UHL3 (TC3)	Independent trip device Opti-Mat A-24DC-UHL3 (TC3)
Reference	217987	217986	272026
Operating voltage, V	230 AC/DC	110 AC/DC	24 DC
Range of operating voltages	(0,75-1,1) Ue		
Power consumption, VA, W	200		
Operation mode	Short-time (impulse)		
Break – time, ms	not more than 50		

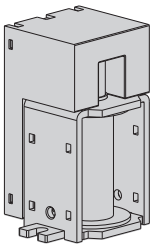
Closing coil



The closing coil is designed for circuit breaker remote closure. It is unified for OptiMat A circuit breakers of S2, S4 dimension version. It is installed under the circuit breaker face panel in its own cell.

Title	Closing coil OptiMat A-230AC/DC-UHL3 (TC3)	Closing coil OptiMat A-110AC/DC-UHL3 (TC3)	Closing coil OptiMat A-24DC-UHL3 (TC3)
Reference	217989	217988	272020
Operating voltage, V	230 AC/DC	110 AC/DC	24 DC
Range of operating voltages	(0,75-1,1) Ue		
Power consumption, VA, W	200		
Operation mode	Short-time (impulse)		
Break – time, ms	not more than 50		

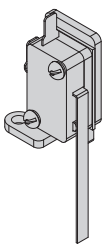
Undervoltage release



Undervoltage release is designed for circuit breaker opening when voltage drops below established parameters. When there is no supply voltage on shunt trip automated or manual closure is impossible. Undervoltage release causes circuit breaker opening in any operating conditions, when supply voltage varies in the range from 0.75 to 1.1 Ur. The circuit breaker closure becomes possible at 0.75 through 1.1 Ur voltage supply to undervoltage release. The instrument is unified for OptiMat A circuit breakers of S2, S4 dimension version. It is installed under the circuit breaker face panel in its own cell. It mutually exclusive item with the second shunt trip.

Title	Undervoltage release OptiMat A-230AC/DC-UHL3 (TC3)
Reference	217994
Operating voltage, V	230 AC/DC
Range of operating voltages	(0,75-1,1) Ue
Power consumption, VA	200
Operation mode	Short-time (impulse)
Break – time, ms	not more than 50

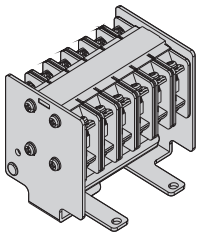
Signaling contact of the switch availability for closing the main contacts



Signaling contact of the circuit breaker main contacts closure readiness signaling is designed to inform of the spring condition (winded up/ not winded up), which turns the circuit breaker on. It is unified for OptiMat A circuit breakers of S2, S4 dimension version. It is installed under the circuit breaker's face panel in its own cell.

Title	Signaling contact of the switch availability for closing the main contacts of OptiMat A630-4000-UHL3(TC3)	
	Voltage, V	Active load, A
Alternating current, VA	250	8
	125	16
Direct current, W	250	0,3
	125	0,6

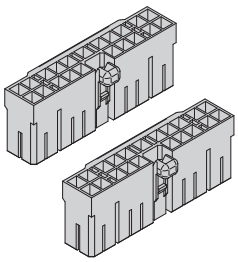
Auxiliary contacts



Auxiliary contacts are designed for signaling of the circuit breaker condition. The devices are unified for OptiMat A circuit breakers of S2, S4 dimension version. They are installed under the circuit breaker face panel in its own cell.

Title	Inductive load	
Alternating current	250 V	5 A
Direct current	30 V	3 A
Number of used contacts	6a+6b	

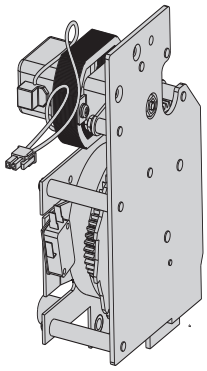
Set of connectors for control circuits



A set of connectors for control circuits serves for electric connection of the air circuit breaker systems with the main control body. It is mounted to external electric wiring and connected to circuit breaker. It is the part of basic configuration of the circuit breakers of withdrawable (roll-out) version of S2, S4 dimension version.

Title		OptiMat A-UHL3 (TC3) set of connectors for control circuits
Reference		234555
Delivery quantity	Plastic terminal block	2
	Female contact	15

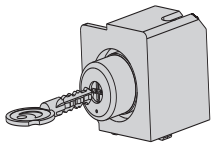
Motor drive



Motor drive is designed to windup circuit breaker's actuating spring. In the absence of power supply for the motor drive actuating spring windup to be performed manually. The device is unified for OptiMat A circuit breakers of S2, S4 dimension version. It is installed under the circuit breaker's face panel in its own cell.

Title	Motor drive OptiMat A630-4000-230AC / DC-UHL3 (TC3)
Reference	235993
Operating voltage, V	230AC / 220DC
Maximum current consumption, A	0,5
Motor rotational speed, rpm	16000-19000
Maximum starting current	5In
Arming time, s	not more than 5
Insulation strength	2 kV within 1 min
Operating temperature range, °C	-25...+60
Operating frequency	no more than 2 times / min
Mechanical life	20,000 cycles

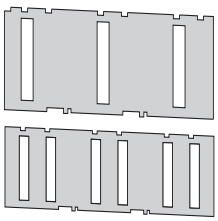
Connection lock



Built-in connection lock is designed for interlock of closure (it locks circuit breaker in opened position). It is impossible to unlock circuit breaker without a suitable key. The device is unified for OptiMat A circuit breakers of S2, S4 dimension version. It is installed under the circuit breaker face panel in its own cell.

Title	OptiMat A built-in connection lock
Reference	217999
Number of keys in the set, pcs	1

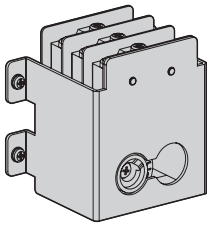
Isolating shutters



Isolating shutters are designed to exclude access to plug-in contacts when circuit breaker is in position «rolled out» or «test» (protection class IP20). They are installed in basket of circuit breaker.

Dimension of circuit breaker	Title	Reference
Dimension I up to 2000 A	Isolating shutters OptiMat A630-2000-UHL3 (TC3)	242118
Dimension II up to 4000 A	Isolating shutters OptiMat A2500-4000-UHL3 (TC3)	242119

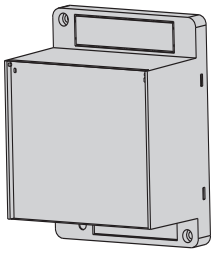
Indication of the circuit breaker position in basket



Position indication shows condition of the circuit breaker: ROLLED IN/TEST/ROLLED OUT. It is installed on the left and on the right from circuit breaker on its basket. It is unified for S2, S4 dimension version.

Title	Indication of the circuit breaker position in the basket OptiMat A-UHL3 (TC3)		
Reference	267249		
Voltage, V		Active load	Inductive load
Alternating current, VA	250	5	2,5
	125	10	10
Direct current, W	250	3	1,5
	125	10	10

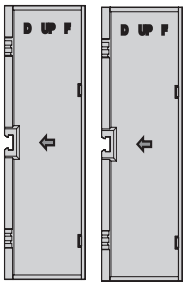
Controller of the undervoltage release tripping delay



Controller is designed to prevent undervoltage release tripping in case of short-time outages or voltage slumps of supply equipment. For connection as the part of the circuit breaker an undervoltage release is necessary. To be installed on DIN-rail or side wall of circuit breaker.

Title	Controller of OptiMat A-UHL3 (TC3) undervoltage release tripping delay
Reference	236607
Delay time, s	0,5; 1,0; 1,5; 3

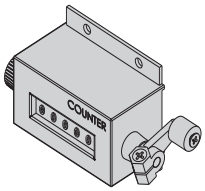
Interpole partitions



Interpole partitions are designed to prevent interphase short circuit formation. The devices are unified for OptiMat A circuit breakers of S2, S4 dimension version. The respective slots are installed between the circuit breaker's main terminals. They are the part of basic configuration.

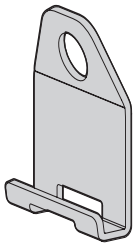
Title	Interpole partitions OptiMat A630-4000-UHL3(TC3)-2 pcs
Reference	269618
Number of barriers in the set	2

Mechanical cycle counter



Mechanical cycle counter is designed to indicate number of cycles of closure/opening. It is unified for OptiMat A circuit breakers of S2, S4 dimension version. It is installed under the circuit breaker's face panel in its own cell.

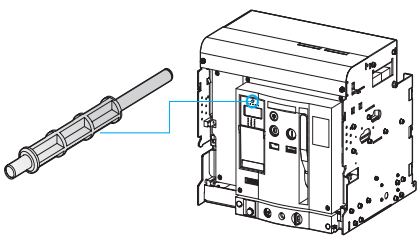
Lifting clamps



Lifting clamps are designed to facilitate lifting and movement of circuit breaker.

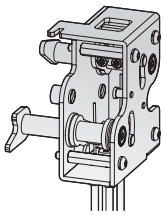
Title	Lifting clamps OptiMat A-UHL3(TC3)-2pcs
Reference	240745

Microprocessing release reset mechanism



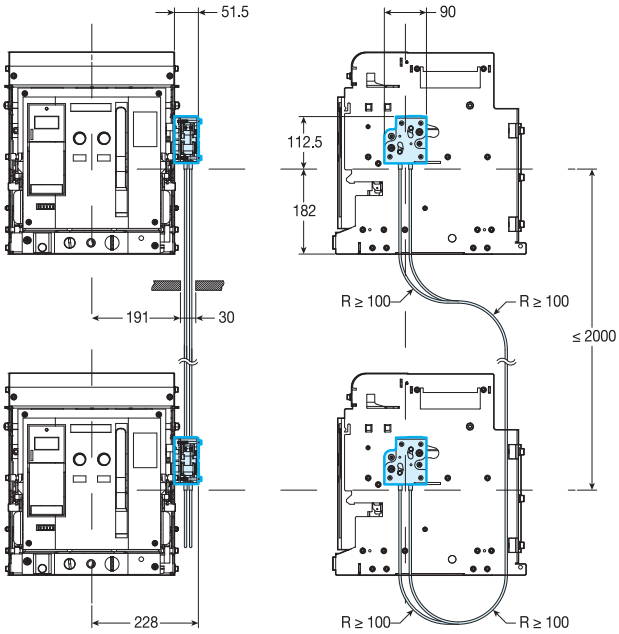
Module at the baseline of microprocessor trip system is equipped with button for manual reset after tripping from the microprocessor trip system. At tripping of circuit breaker the button being moved forward. For circuit breaker closing, press the button. It is unified for OptiMat A circuit breakers of S2, S4 dimension version. It is installed under the circuit breaker face panel in its own cell. It is the part of basic configuration.

Mechanical interlocking

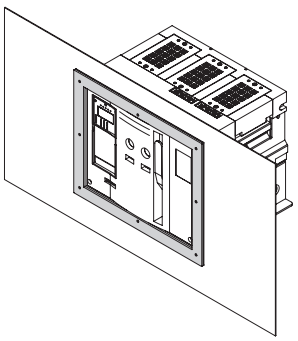


Mechanical interlocking is designed to interlock the on/off operations of two or three automatic circuit breakers. It is unified for size versions S2, S4. Only retractable versions of circuit breakers are equipped with mechanical interlock.

Title	Reference
Mechanical interlock kit for 2 OptiMat A630-4000-UHL3 (TC3)	242120
Mechanical interlock kit for 3 OptiMat A630-4000-UHL3 (TC3)	248580



Front panel frame [1)]



Front panel frame is designed to prevent touching sharp edge of cutout. In addition, it protects front prominent part of circuit breaker. It is installed on the front panel of distributing gear.

Title	Reference
Front panel frame of the fixed OptiMat A 630-2000A-UHL3 (TC3)	246228
Front panel frame of the fixed OptiMat A 2500-4000A-UHL3 (TC3)	246232
Front panel frame of the withdrawable OptiMat A 630-2000A-UHL3 (TC3)	246233
Front panel frame of the withdrawable OptiMat A 2500-4000A-UHL3 (TC3)	249399

[1)] For circuit breakers of S2, S4 dimension version, frames are delivered separately, for circuit breakers of SI, S5, S6 dimension version, frames are delivered as one set.

OptiMat A Mounting accessories of S1, S5, S6 dimension versions

Actuating coil and shunt trip

Actuating coil is designed for circuit breaker remote closure, and shunt trip is designed for the circuit breaker remote opening. They are designed for operation alternating and direct current circuit.

Operating voltage Ue, V	230AC/220DC
Operating voltage range, V	(0,7 ~ 1,1)Ue
Power consumption V / A or W	200
Break-time	50±10 ms

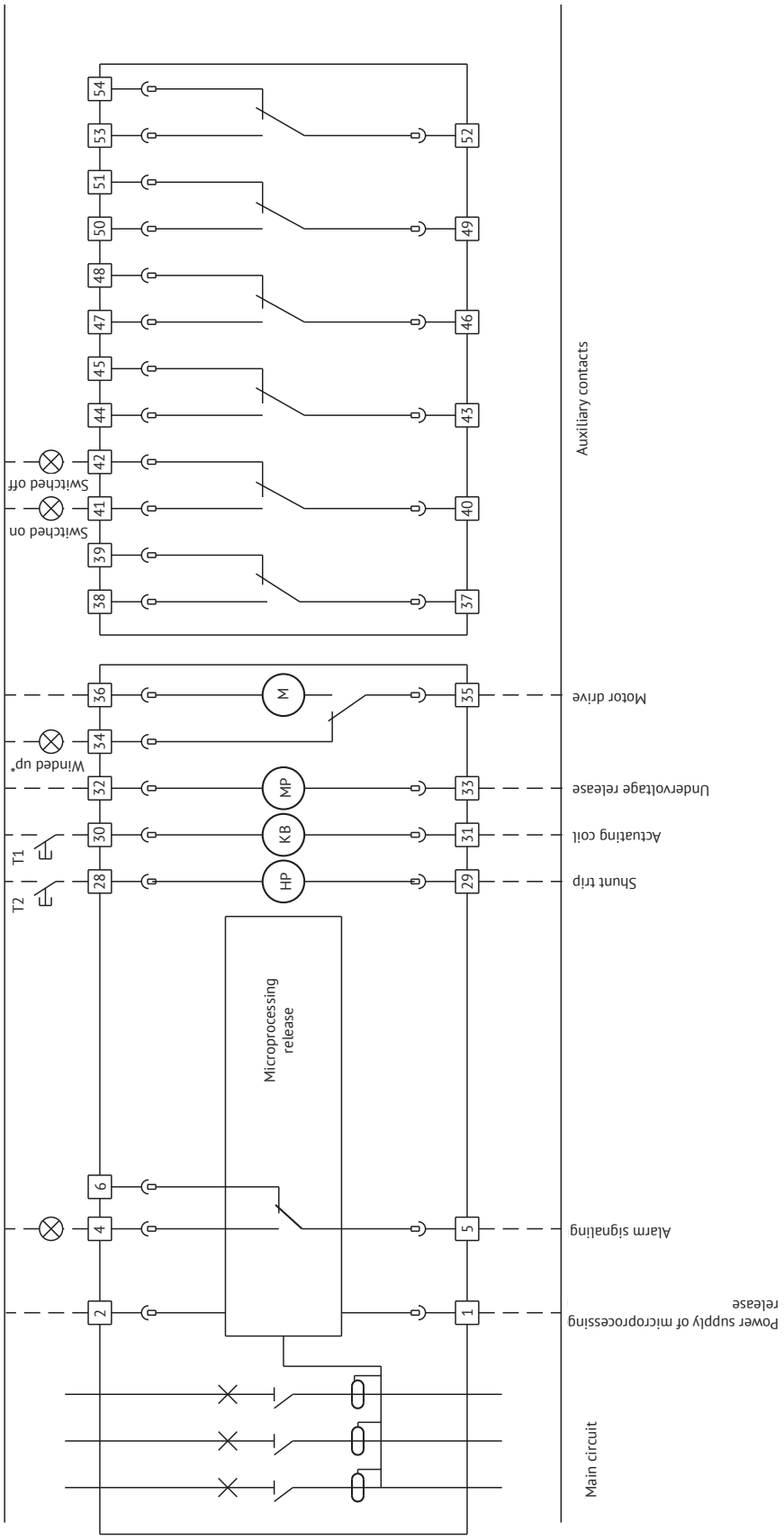
Motor drive

Motor drive is designed for remote windup of circuit breaker's mechanism, preliminary pressing of actuating spring, i.e. preparation of the circuit breaker for closure. Nominal mode of the motor drive operation is short-time mode. The motor drive is designed for operation alternating and direct current circuit.

Operating voltage Ue, V	230AC/220DC
Operating voltage range, V	(0,85 ~ 1,1)Ue
Power consumption V / A or W	150
Arming (retraction) time, s	<8
Frequency of arming	up to three cycles per minute

Wiring diagrams of OptiMat A

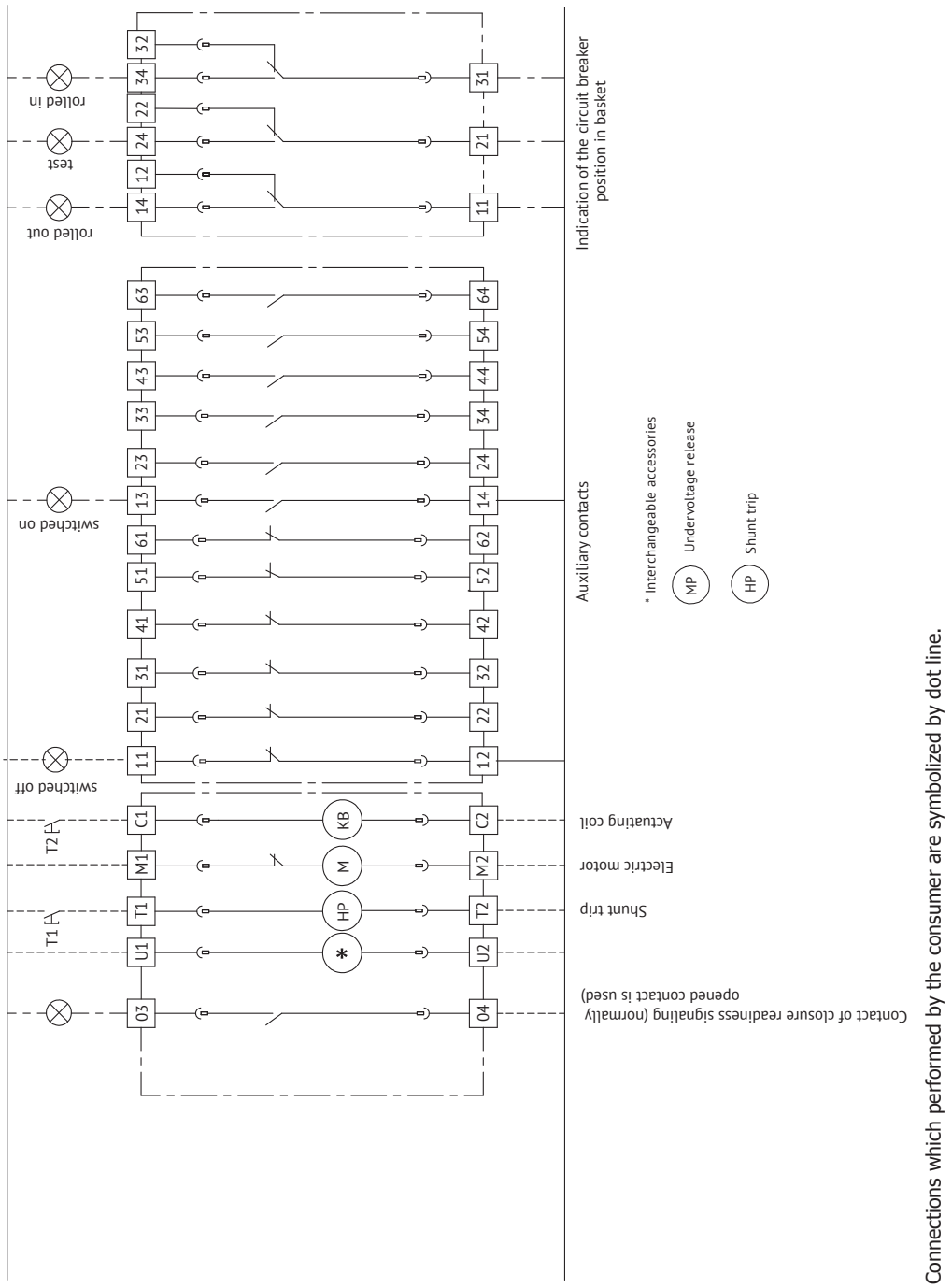
Electric circuit diagram of circuit breaker with semiconductor release of MR5.0 type of S1 dimension version



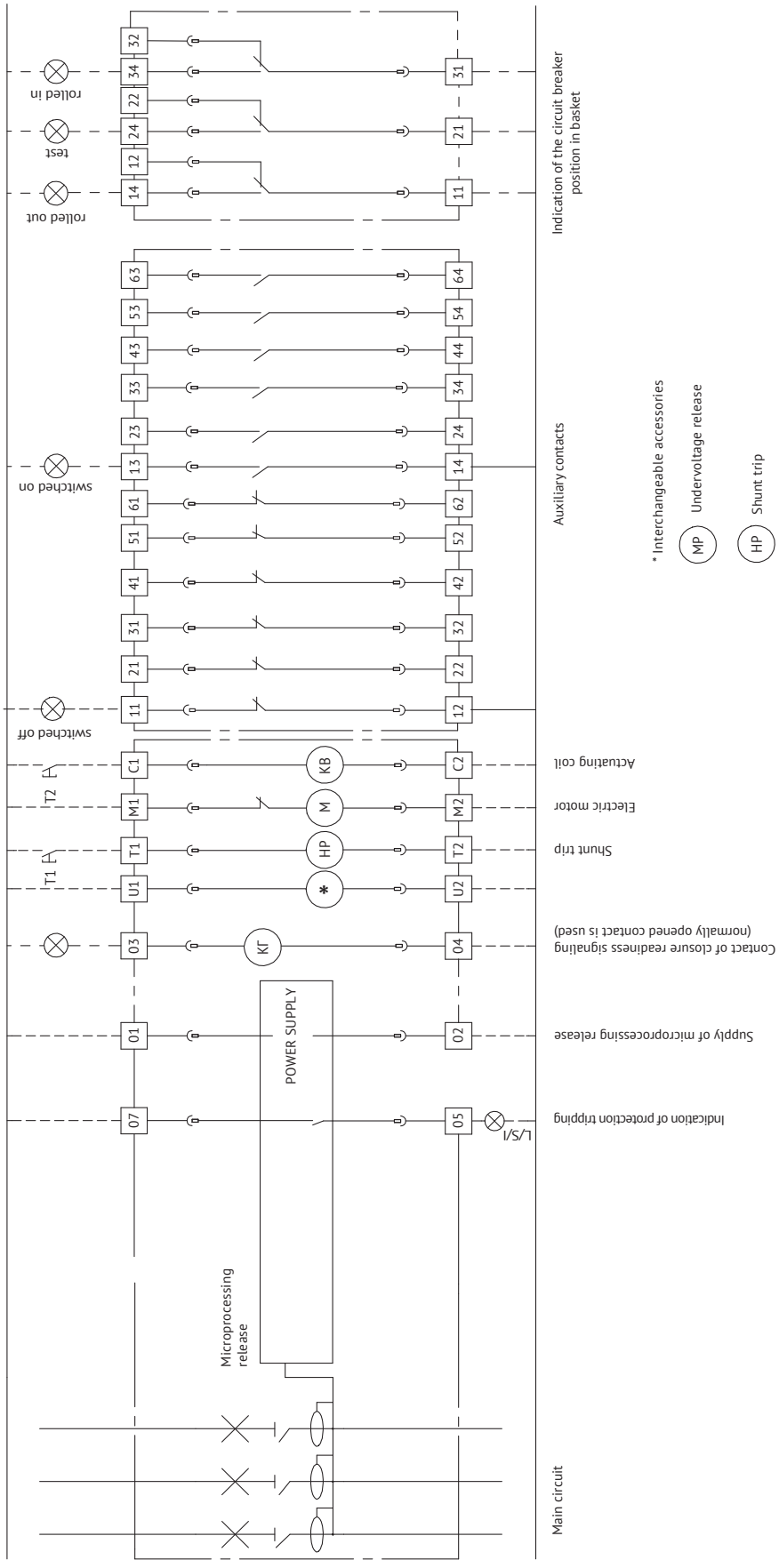
* Terminal «34» (winded up) galvanically not isolated from terminal «36»

Пунктирной линией обозначены соединения, осуществляемые потребителем.

Electric circuit diagram of circuit breaker without semiconductor release of S2, S4 dimension version

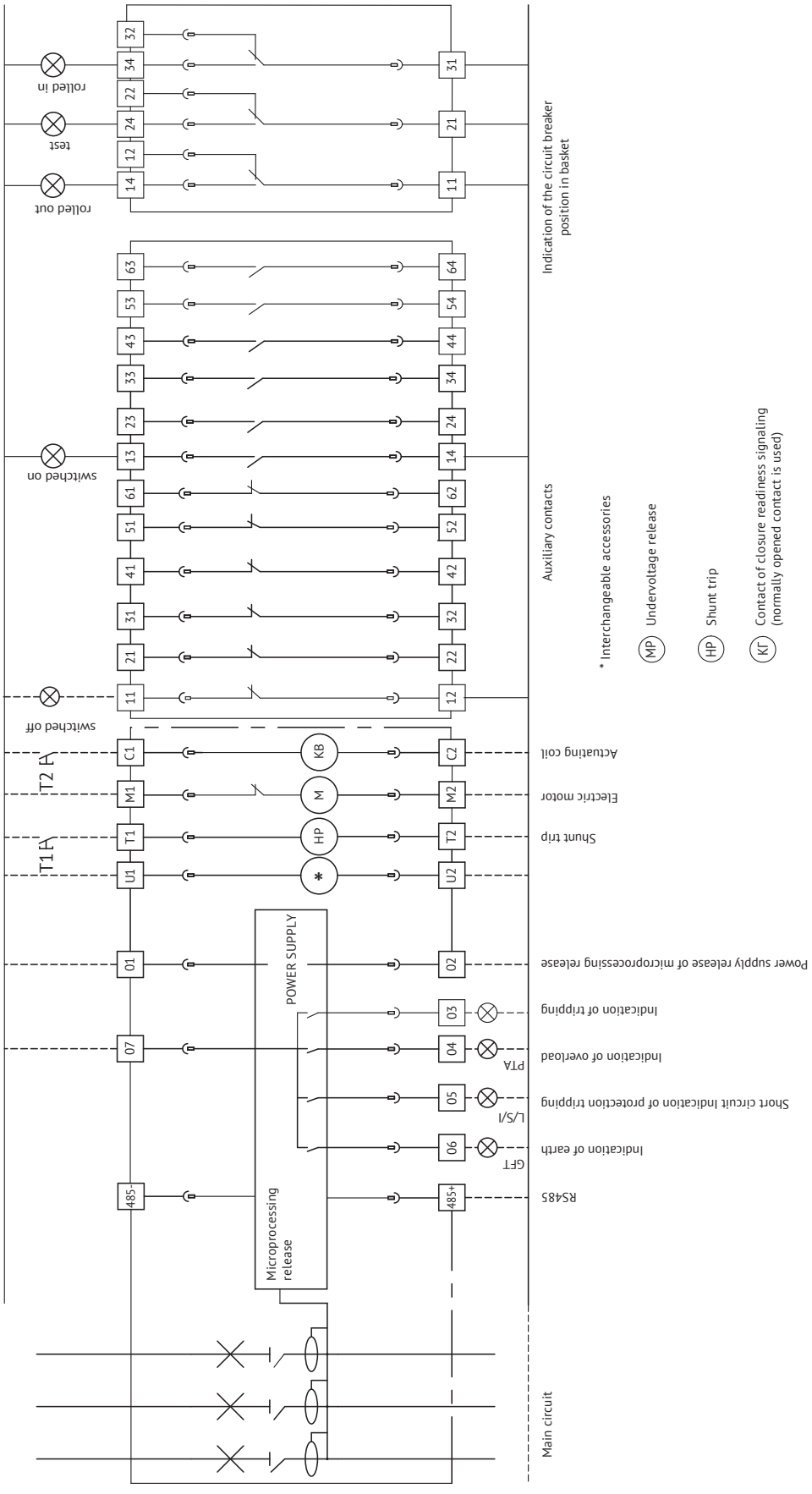


Electric circuit diagram of circuit breaker with semiconductor release of MR8.0 type of S2, S4 dimension version

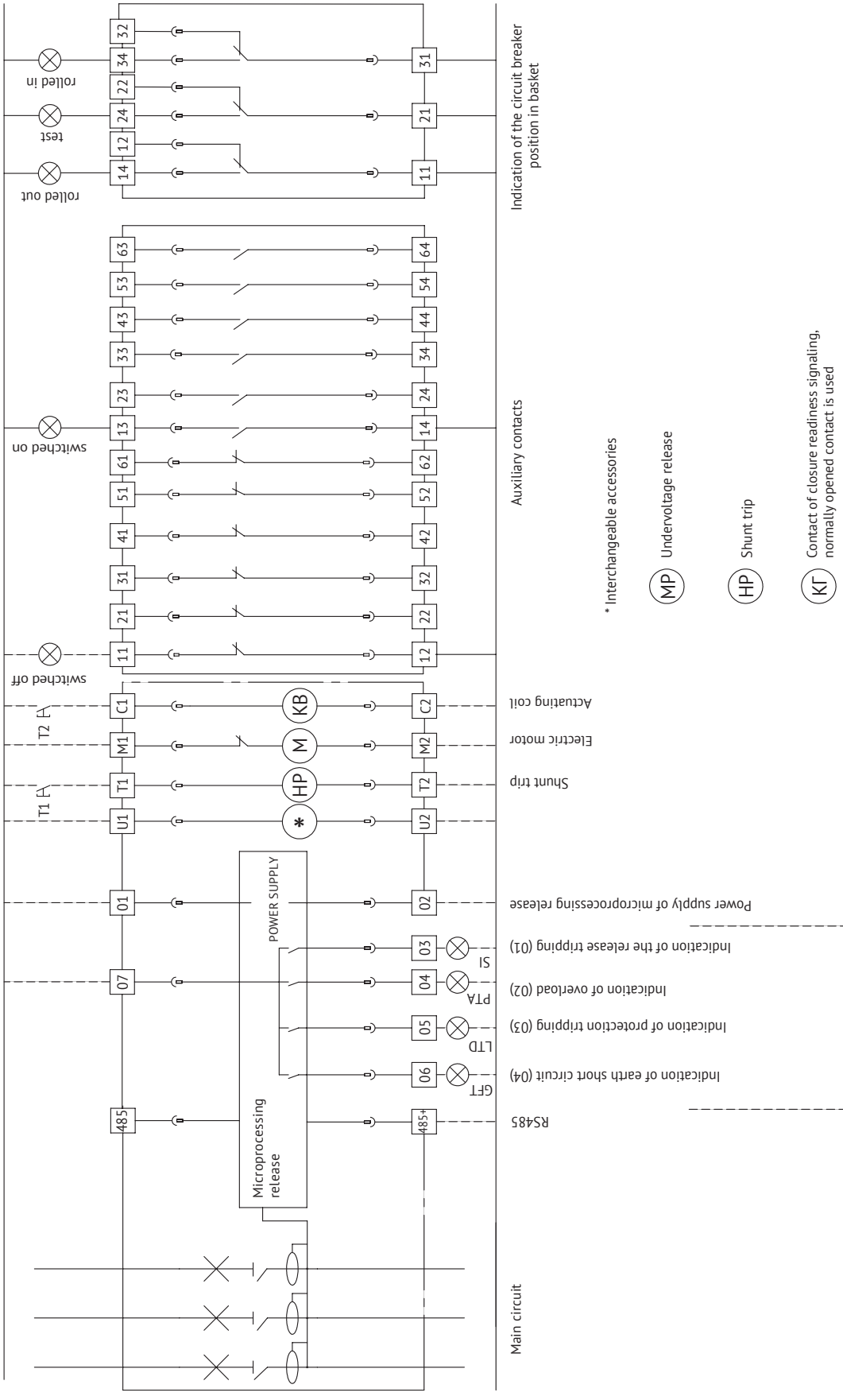


Connections which performed by the consumer are symbolized by dot line.

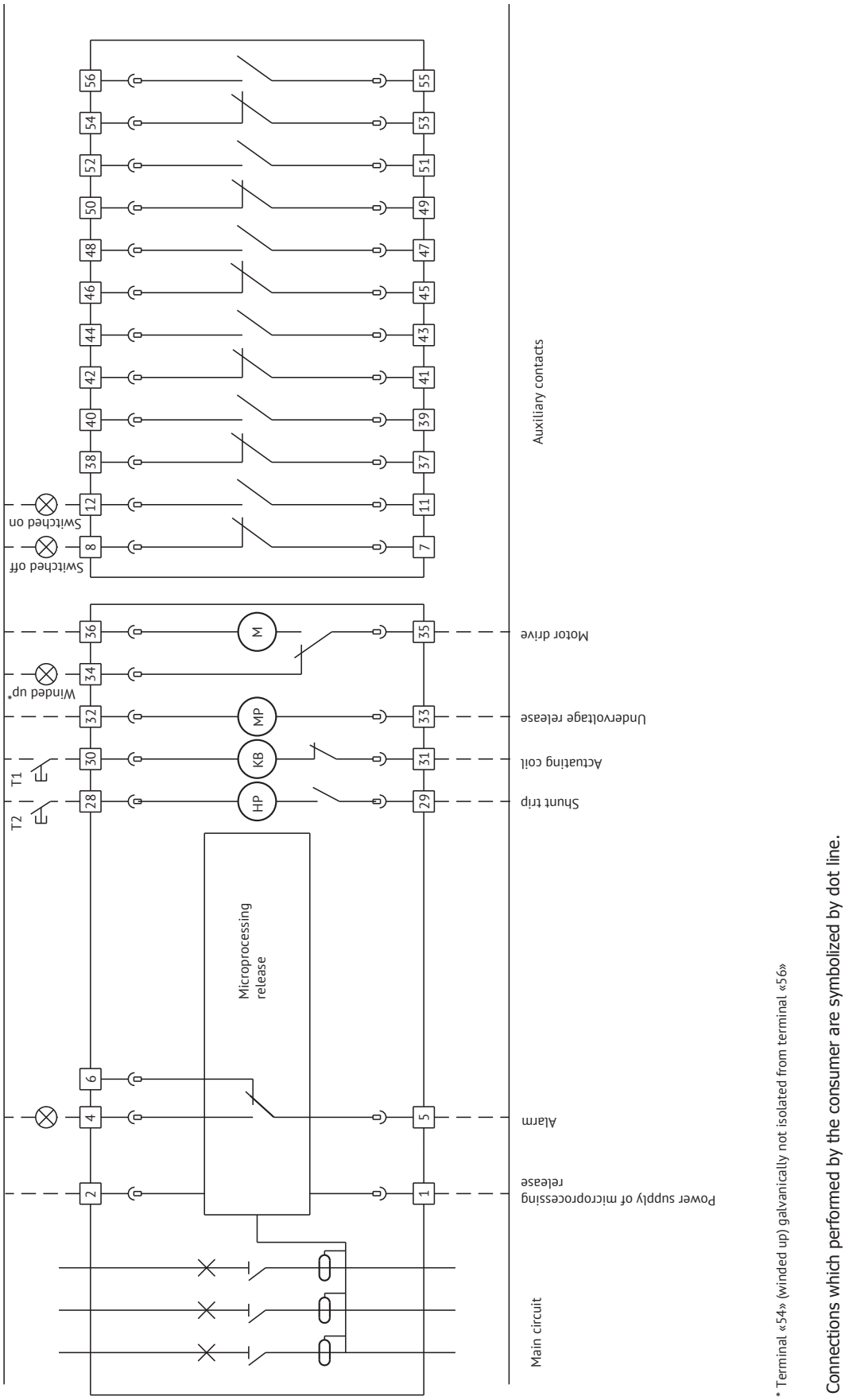
Electric circuit diagram of circuit breaker with semiconductor release of MR7.0 type of S2, S4 dimension version



Electric circuit diagram of circuit breaker with semiconductor release of MR8.1 type of S2, S4 dimension version



Electric circuit diagram of circuit breaker with semiconductor release of MR5.0 type of S5, S6 dimension version

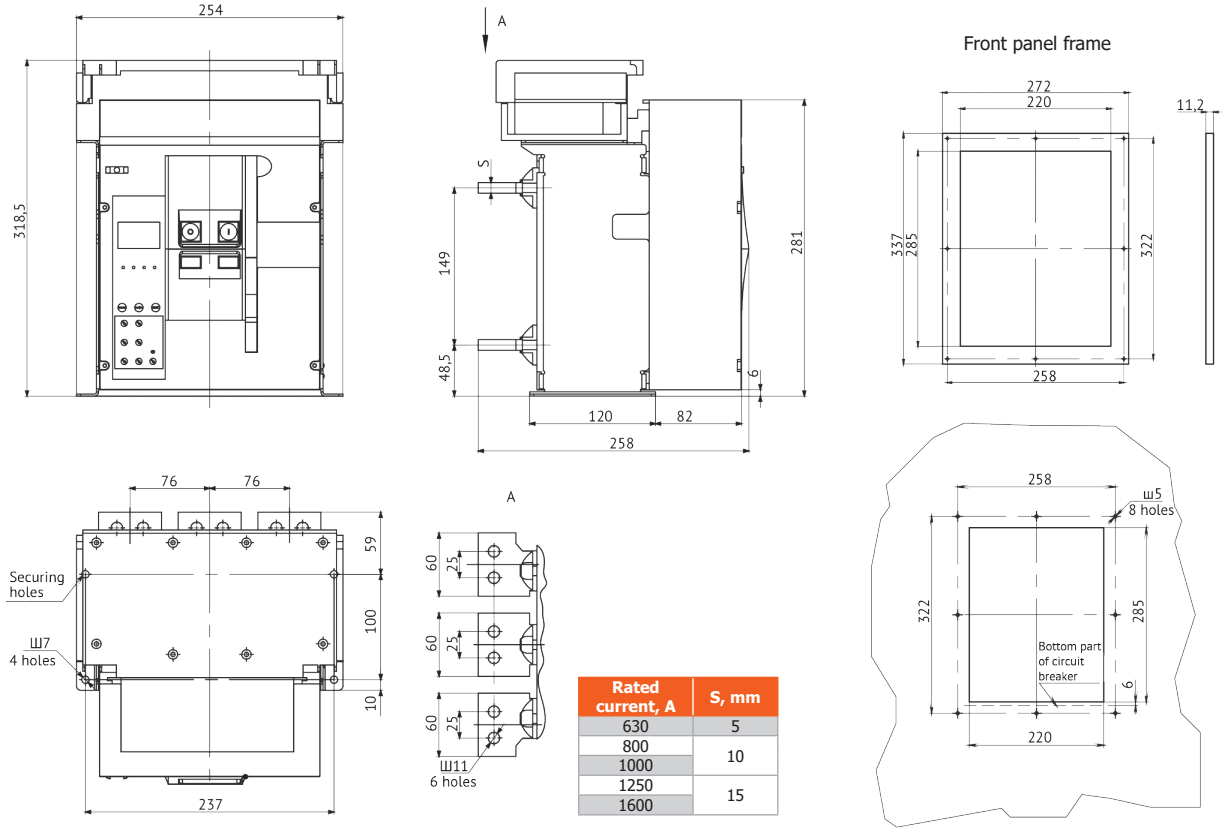


* Terminal «54» (winded up) galvanically not isolated from terminal «56»

Connections which performed by the consumer are symbolized by dot line.

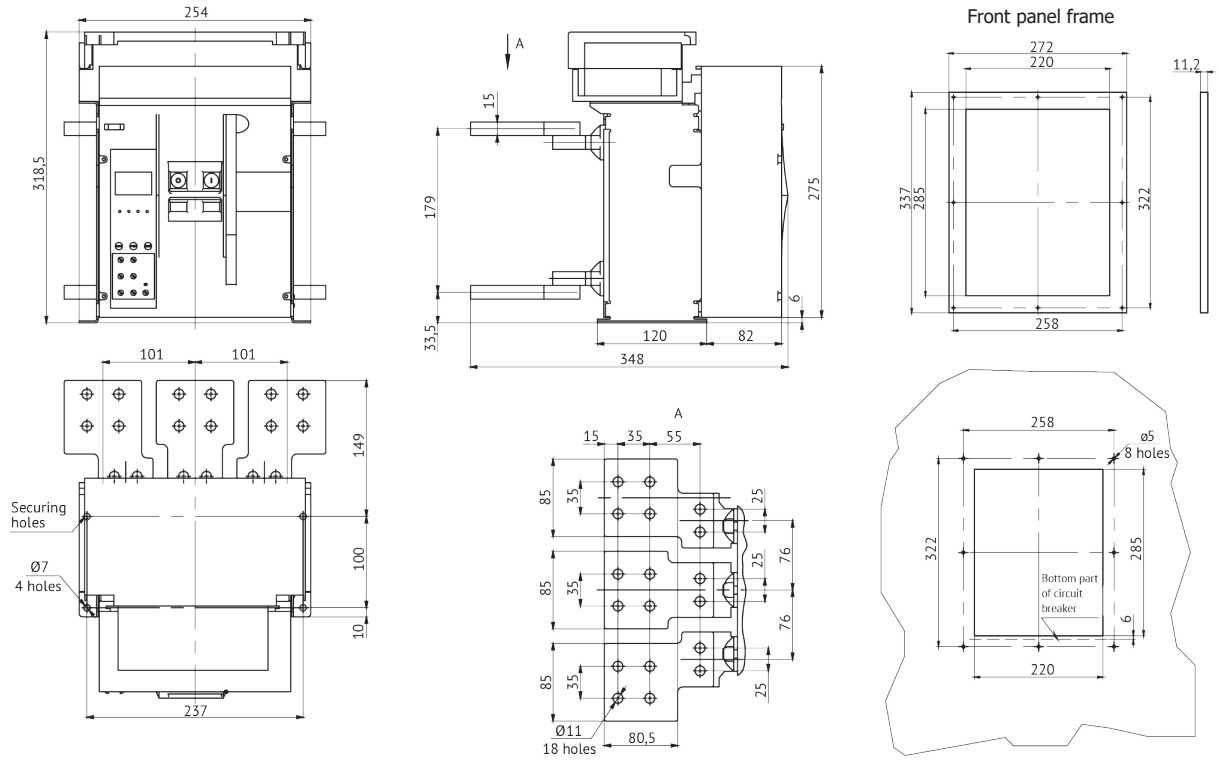
Overall, mounting and connection dimensions (mm)

OptiMat A-630-1600-S1-3P circuit breaker of stationary version for nominal currents of 630 – 1600 A with rear horizontal terminal location

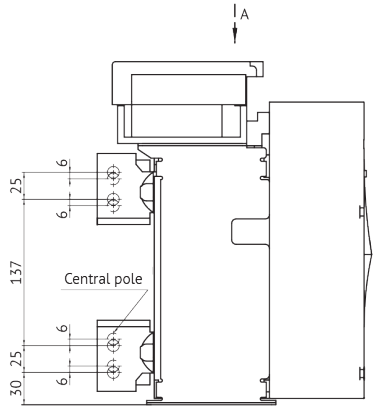


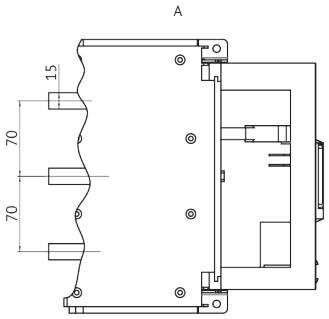
Rated current, A	S, mm
630	5
800	10
1000	
1250	15
1600	

OptiMat A-1600-S1-3P circuit breaker of stationary version for nominal current 1600 A with rear horizontal terminal location with poles expanders installed

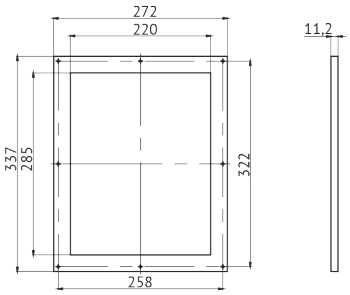


OptiMat A-630-1600-S1-3P circuit breaker of stationary version for nominal currents of 630 – 1600 A with rear vertical terminal location

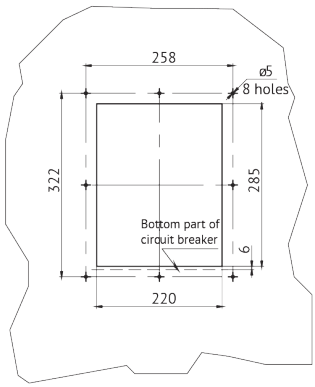




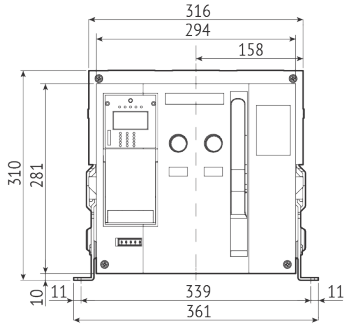
Front panel frame

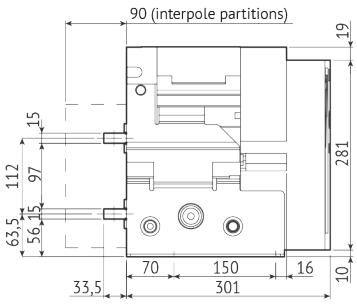


Rated current, A	S, mm
630	5
800	10
1000	
1250	15
1600	

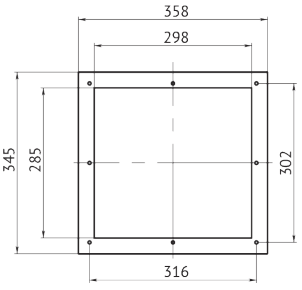


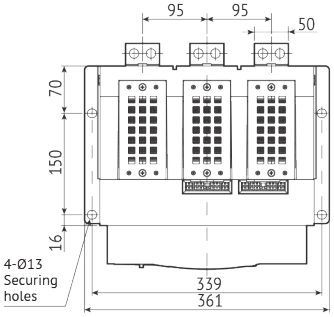
OptiMat A-630-1600-S2-3P circuit breaker of stationary version for nominal currents of 630-1600 – 1600 A with rear vertical and horizontal terminal location

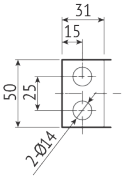


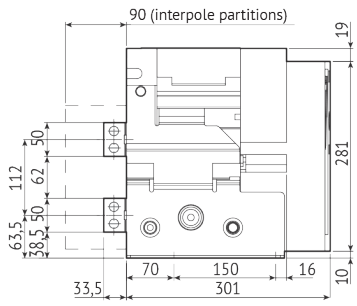


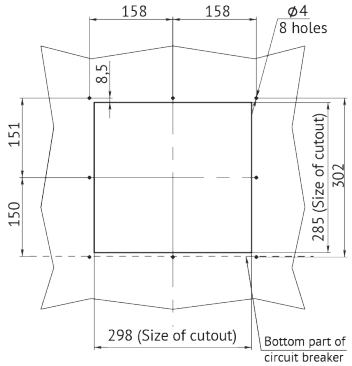
Front panel frame



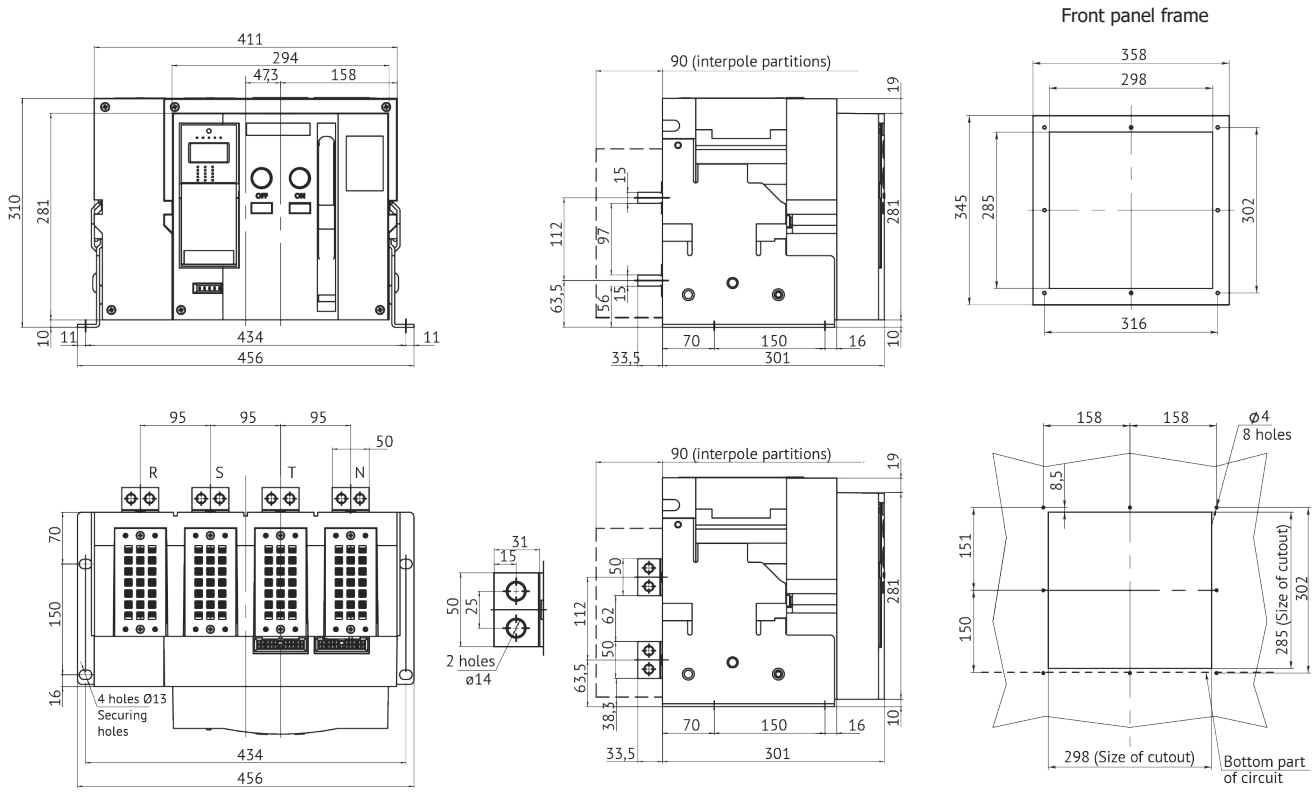




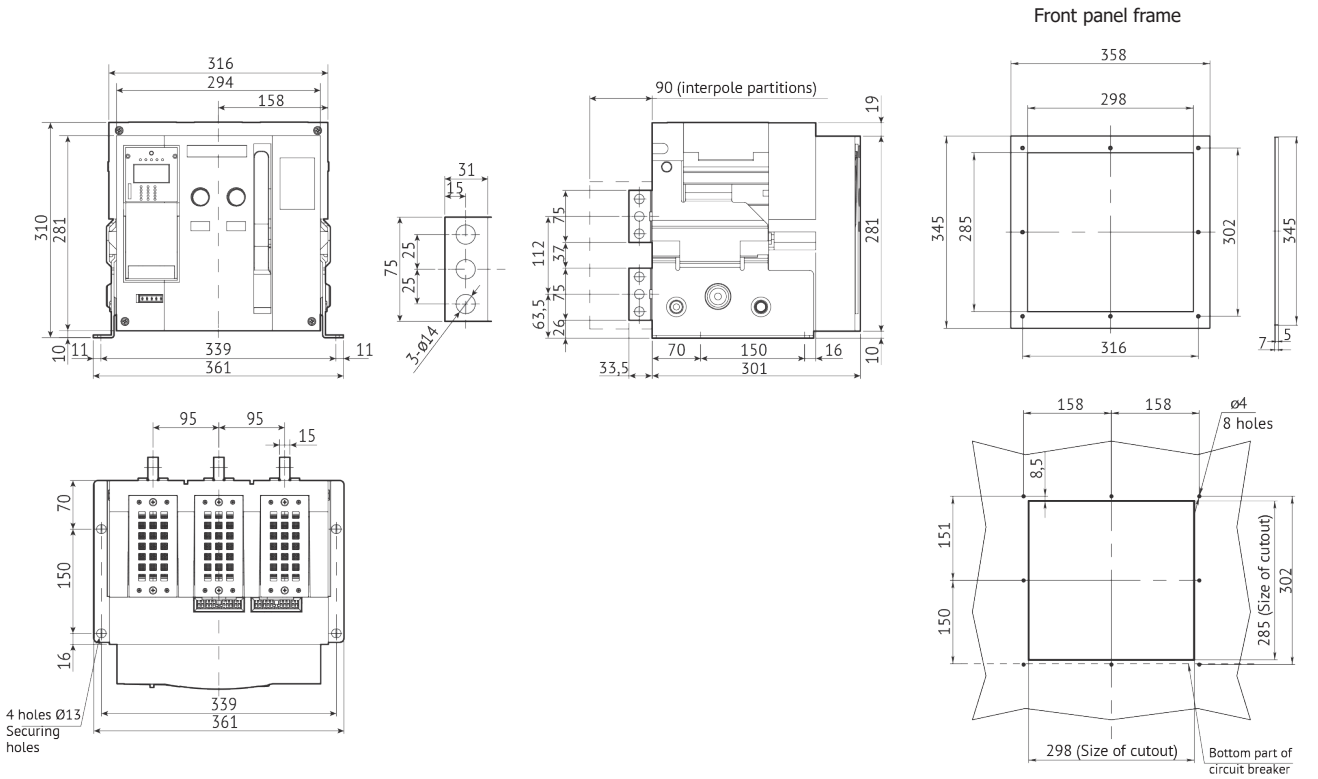




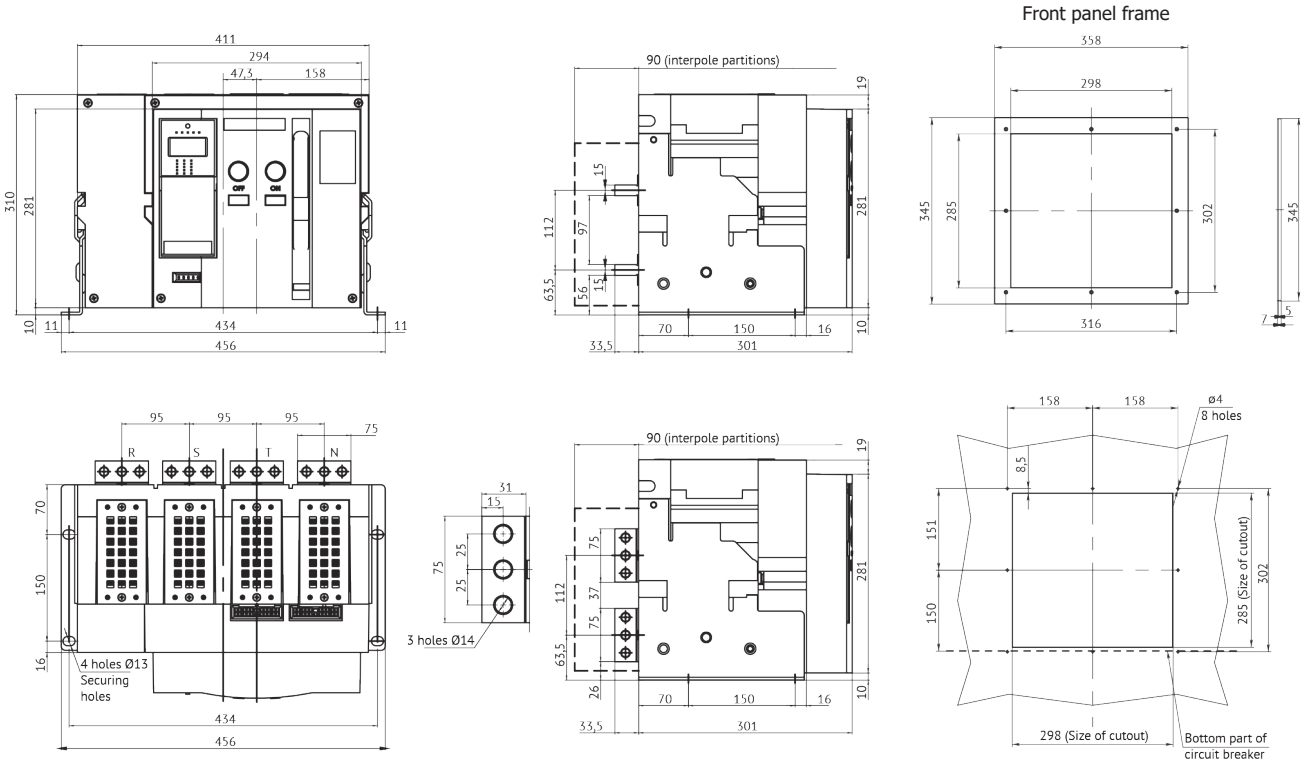
OptiMat A-630-1600-S2-4P circuit breaker of stationary version for nominal currents of 630-1600 A with rear vertical and horizontal terminal location



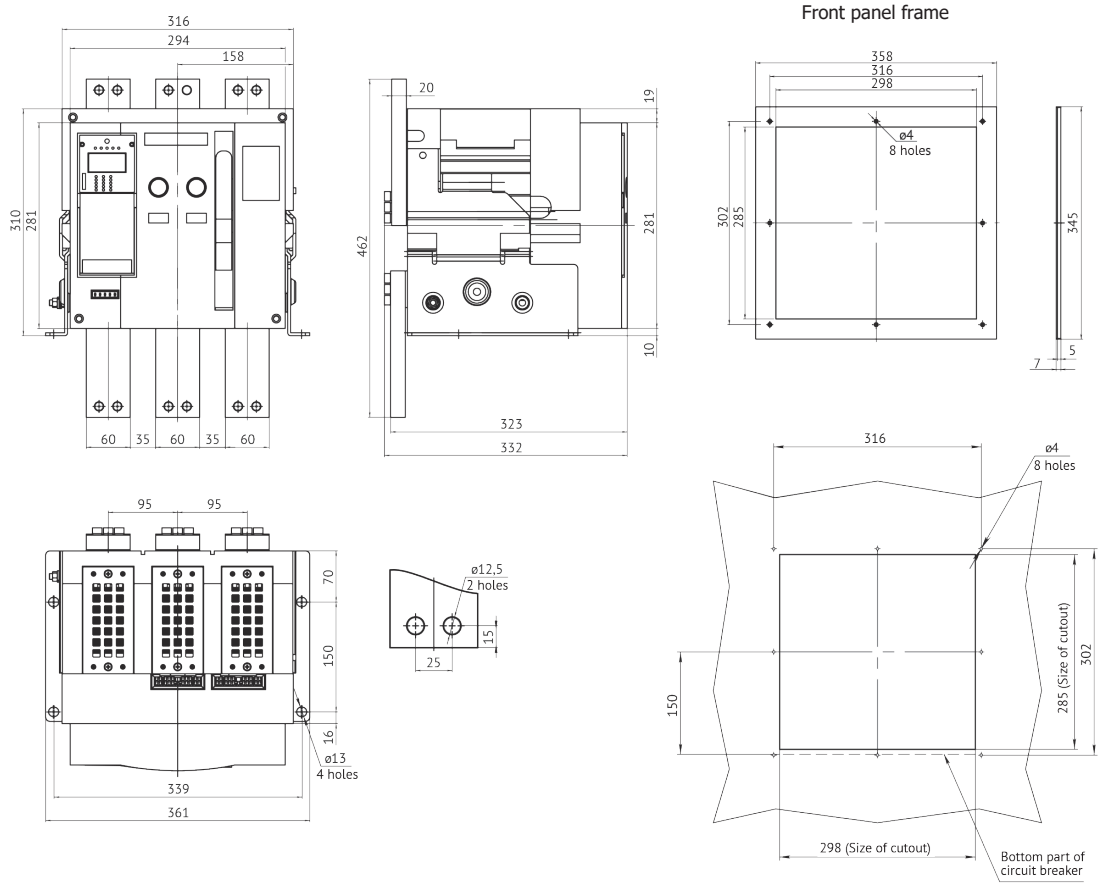
OptiMat A-2000-S2-3P circuit breaker of stationary version for nominal current of 2000 A with rear vertical terminal location



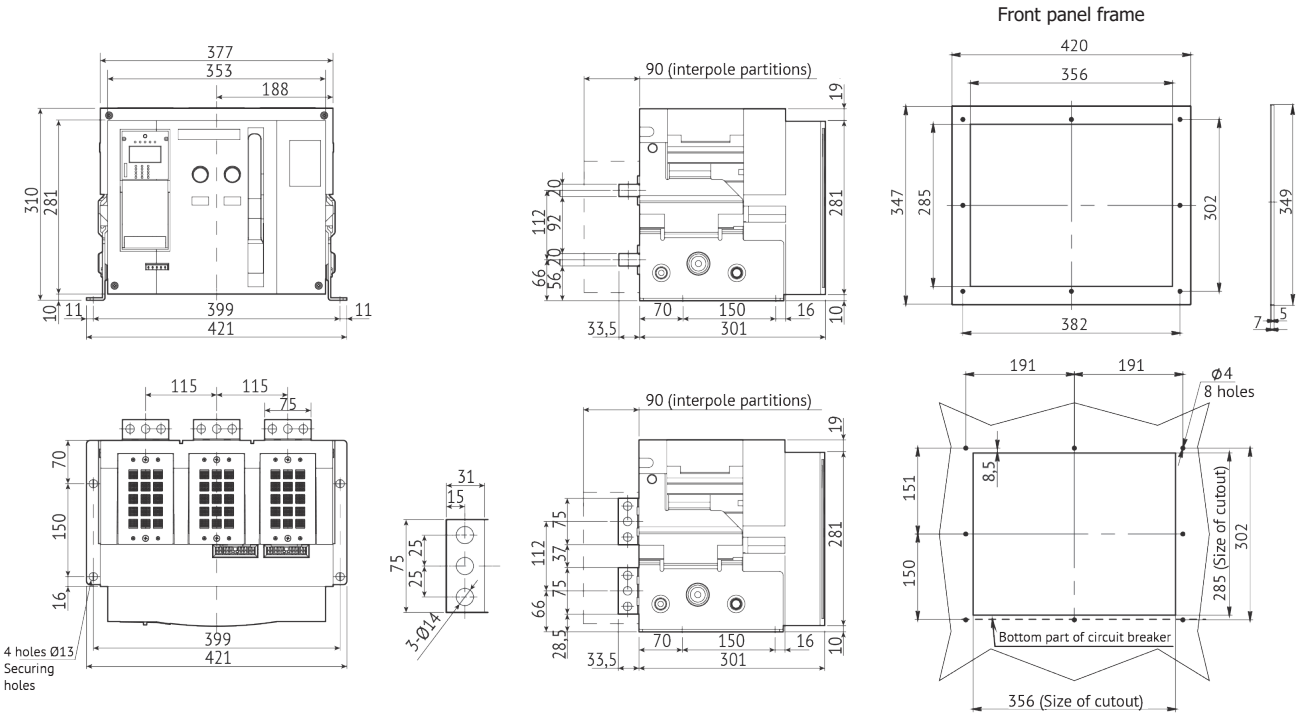
OptiMat A-2000-S2-4P circuit breaker of stationary version for nominal current of 2000 A with rear vertical and horizontal terminal location



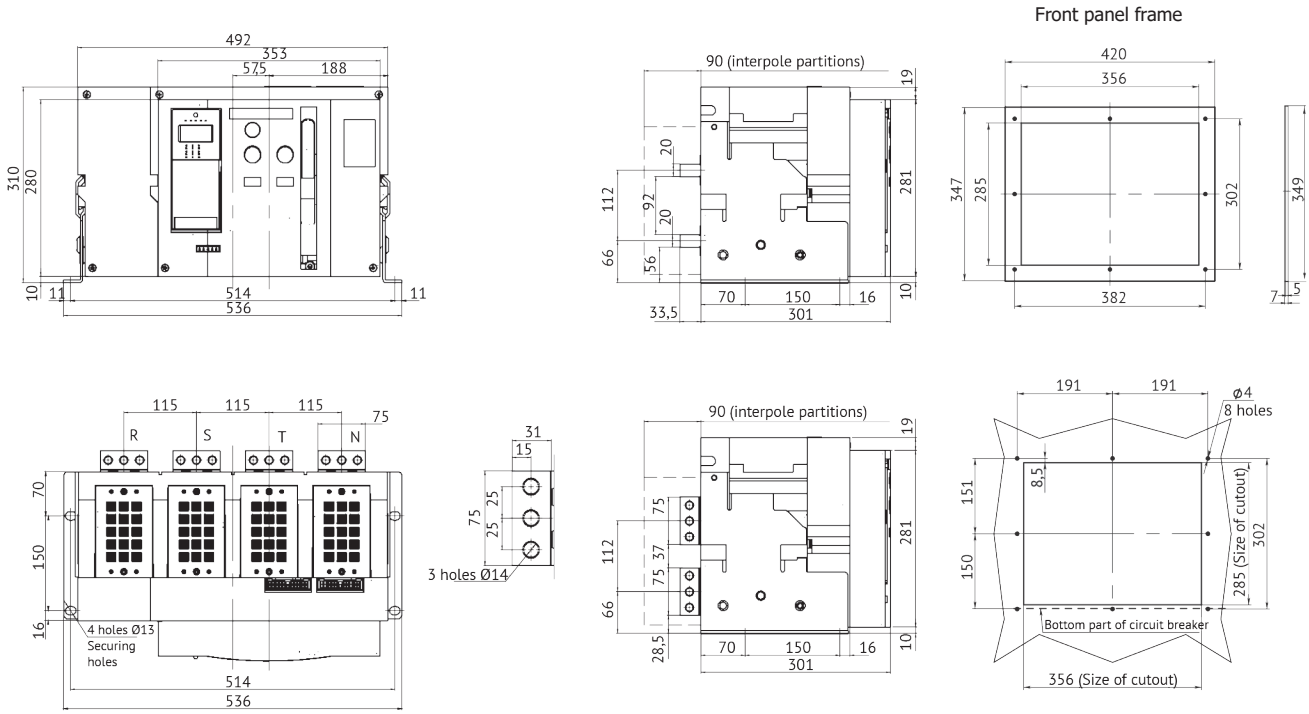
OptiMat A-630-2000-S2-3P circuit breaker of stationary version for nominal currents of 630-2000 A with front terminal location



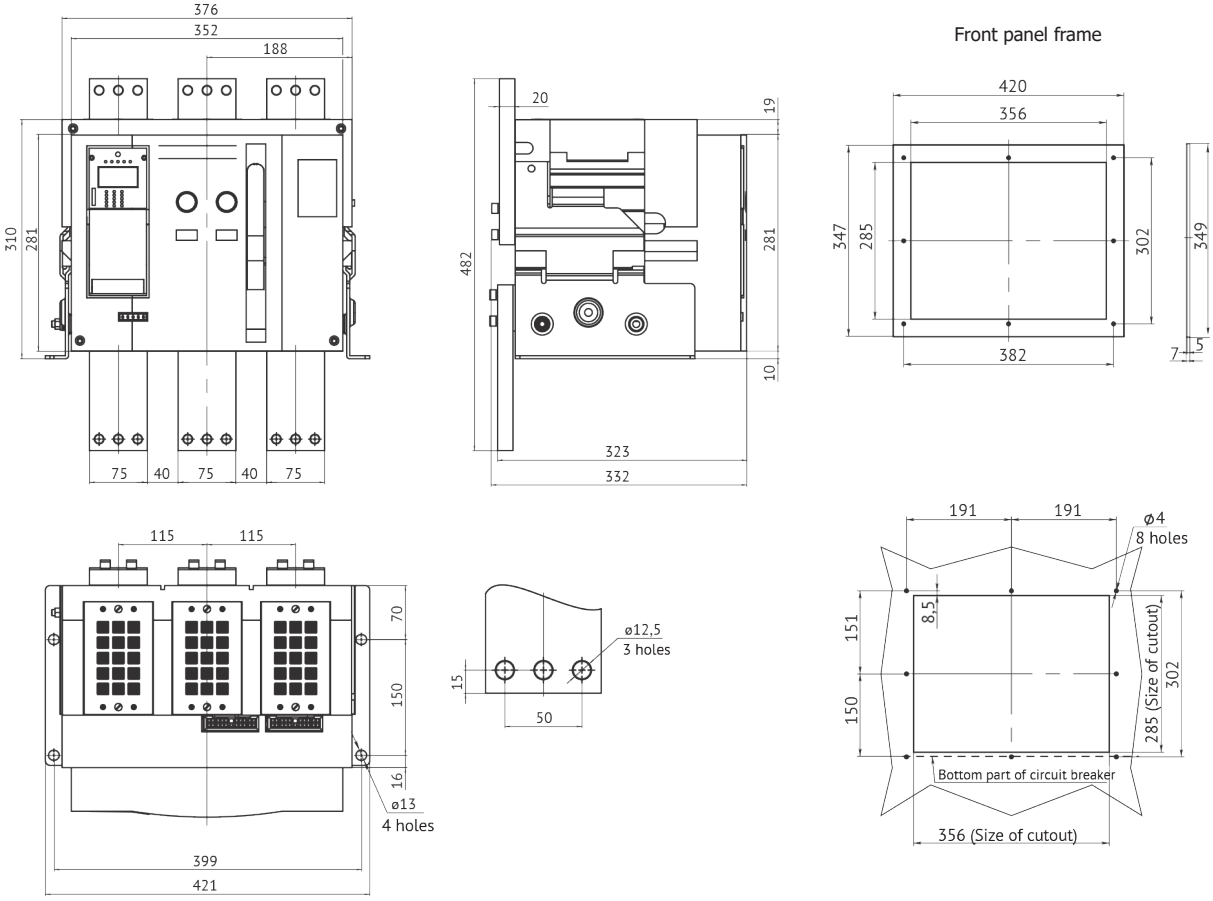
OptiMat A-2500-3200-S4-3P circuit breaker of stationary version for nominal currents of 2500-3200 A with rear horizontal and vertical terminal location



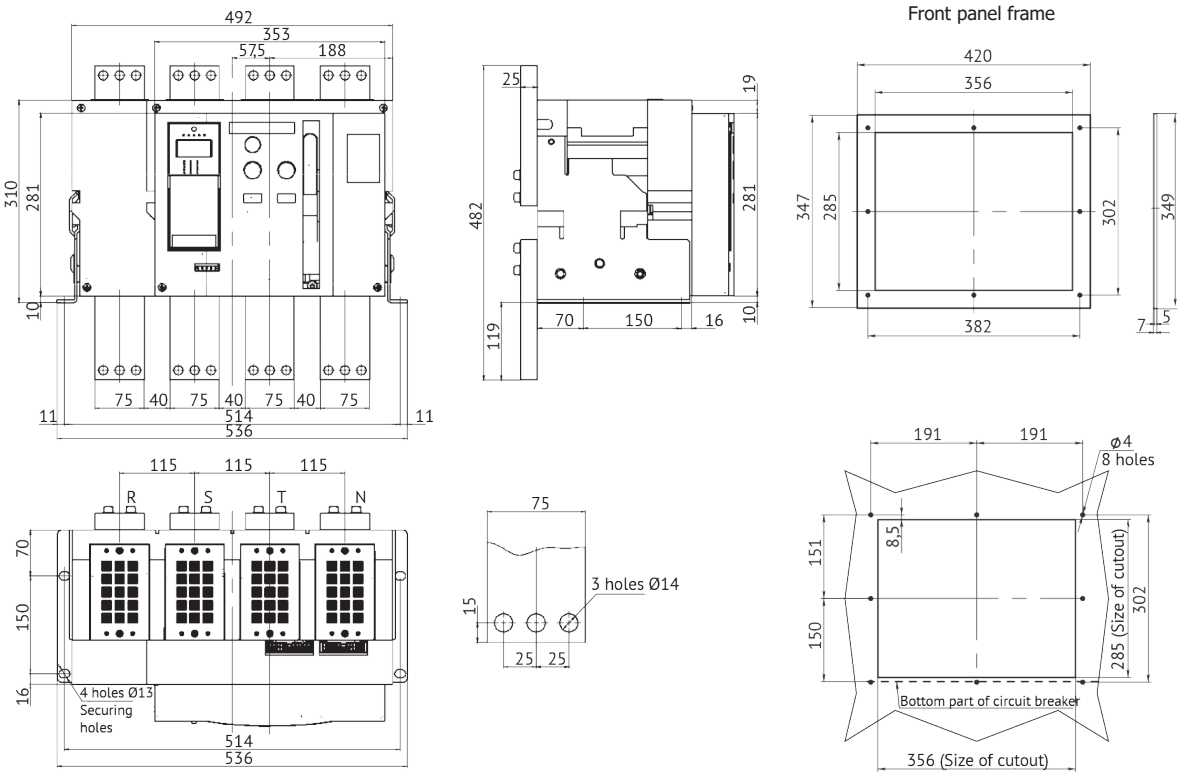
OptiMat A-2500-3200-S4-4P circuit breaker of stationary version for nominal currents of 2500-3200 A with rear horizontal and vertical terminal location



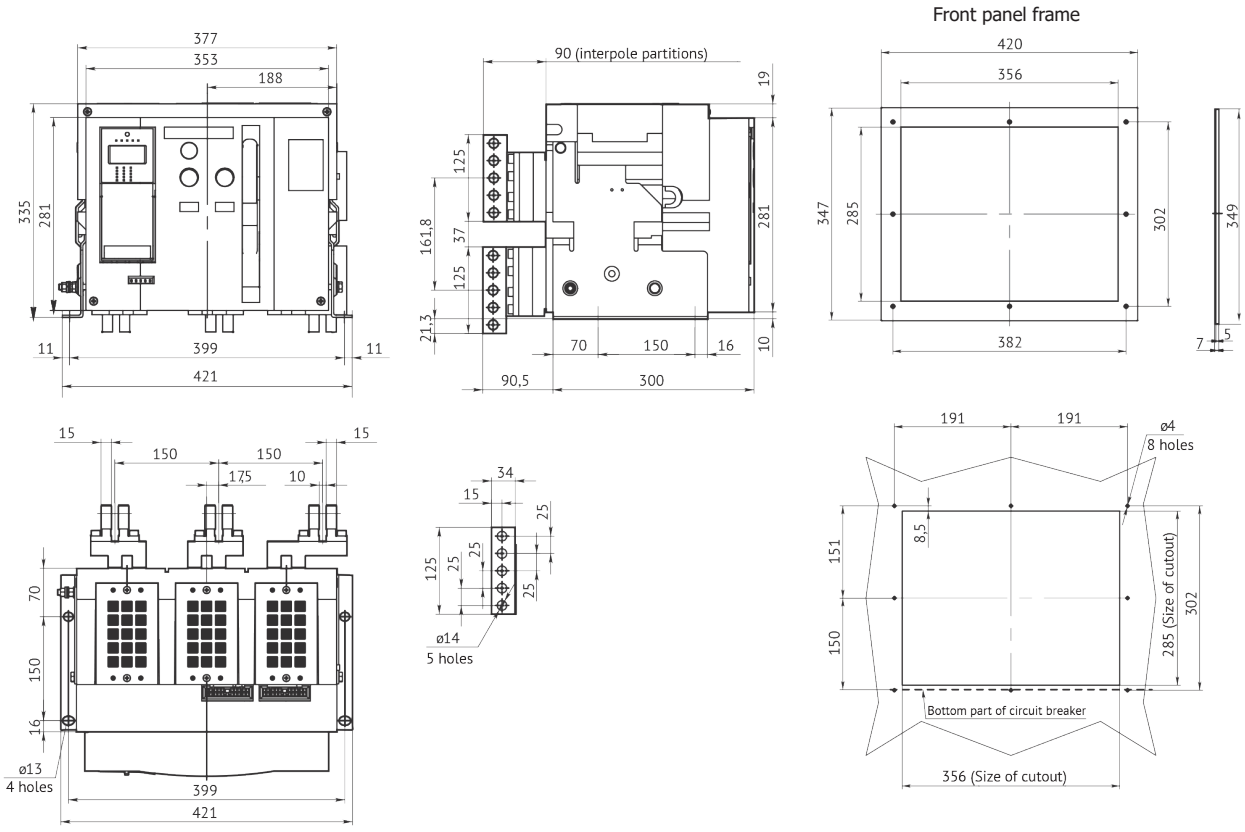
OptiMat A-2500-S4-3P circuit breaker of stationary version for nominal current of 2500 A with front terminal location



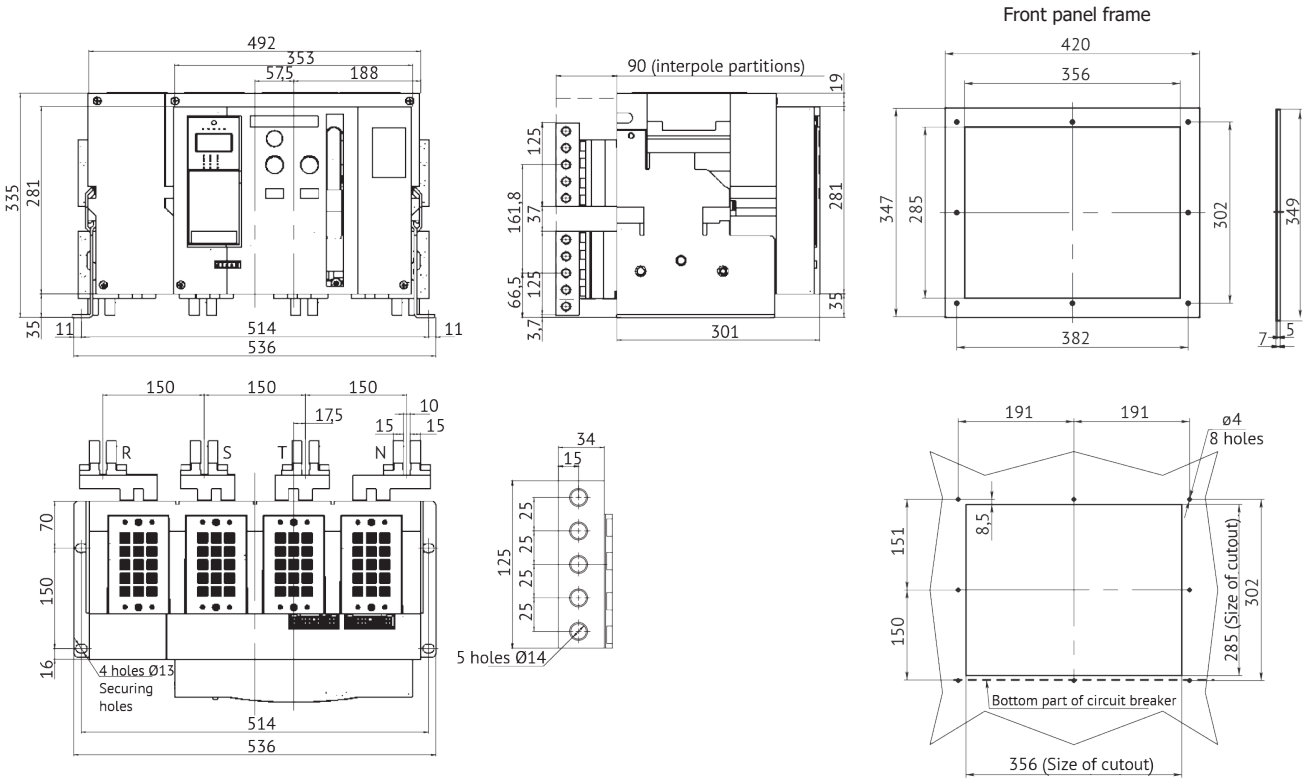
OptiMat A-2500-S4-4P circuit breaker of stationary version for nominal current of 2500 A with front terminal location



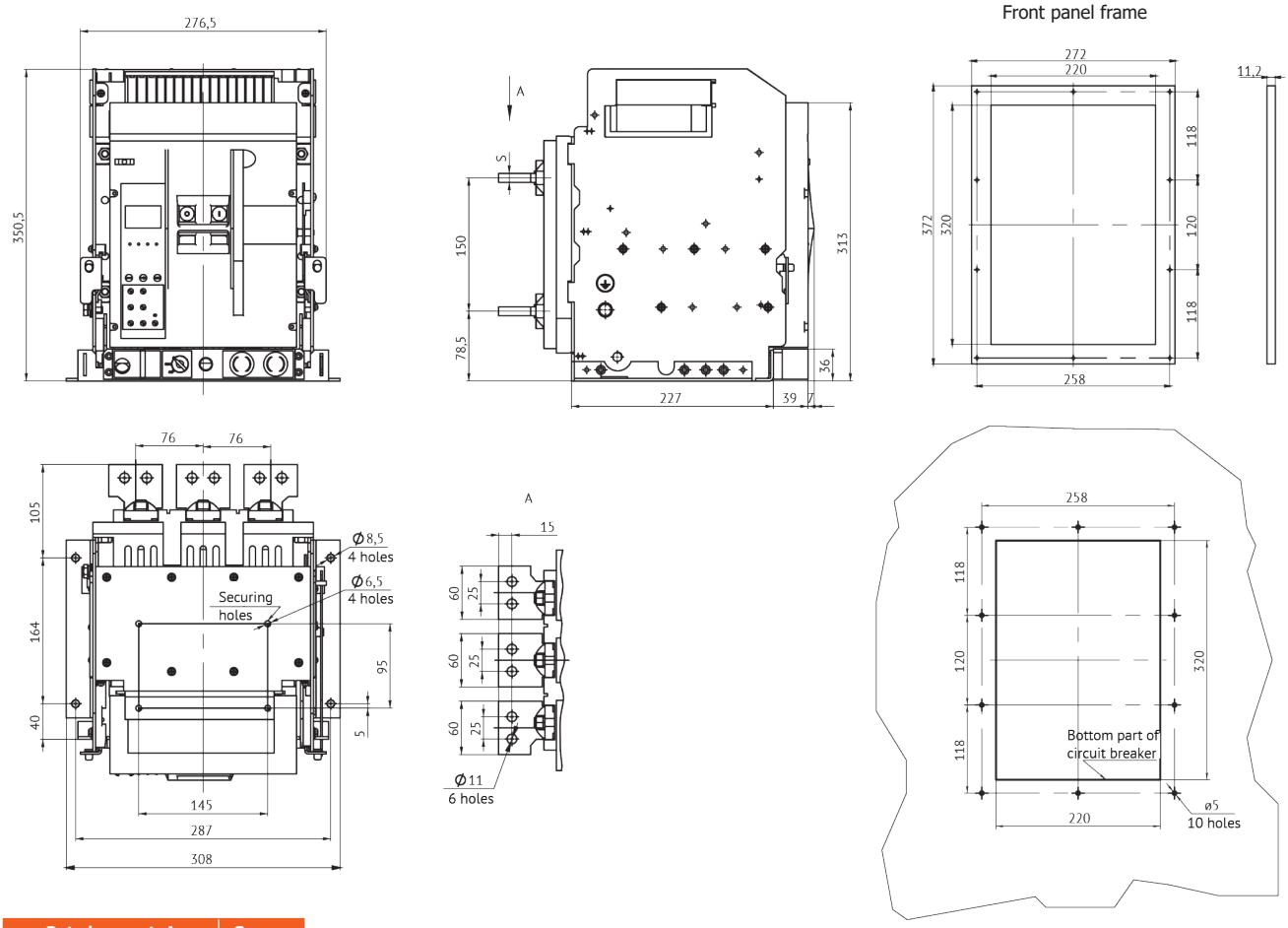
OptiMat A-4000-S4-3P circuit breaker of stationary version for nominal current of 4000 A with with rear vertical terminal location



OptiMat A-4000-S4-4P circuit breaker of stationary version for nominal current of 4000 A with rear vertical terminal location

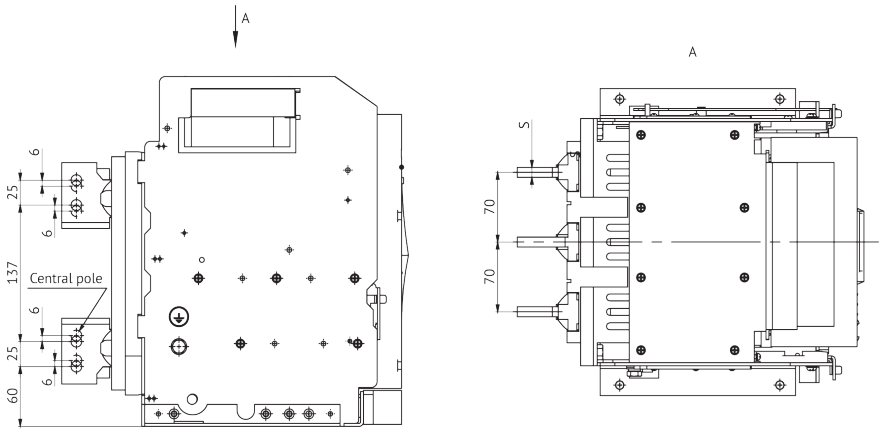


OptiMat A-630-1600-S1-3P circuit breaker of withdrawable version for nominal currents of 630-1600 A with rear horizontal terminal location

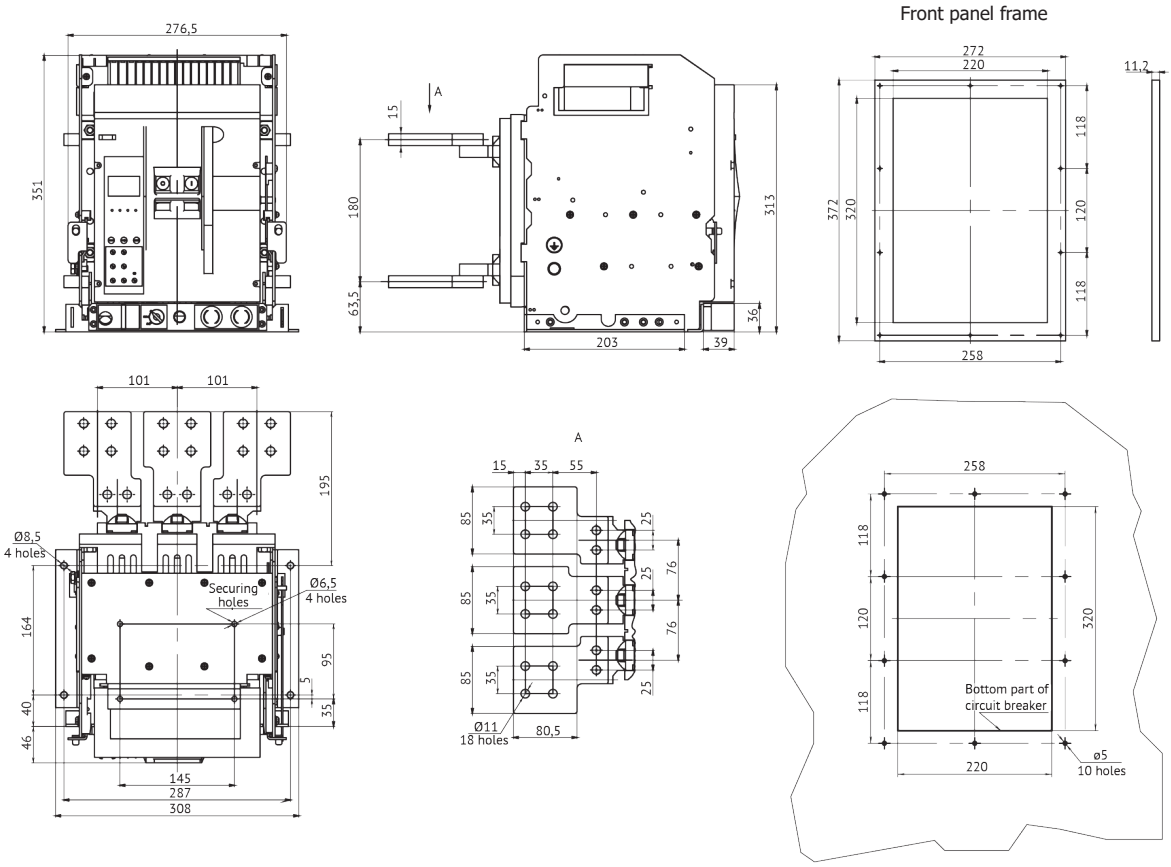


Rated current, A	S, mm
630	5
800	10
1000	
1250	15
1600	

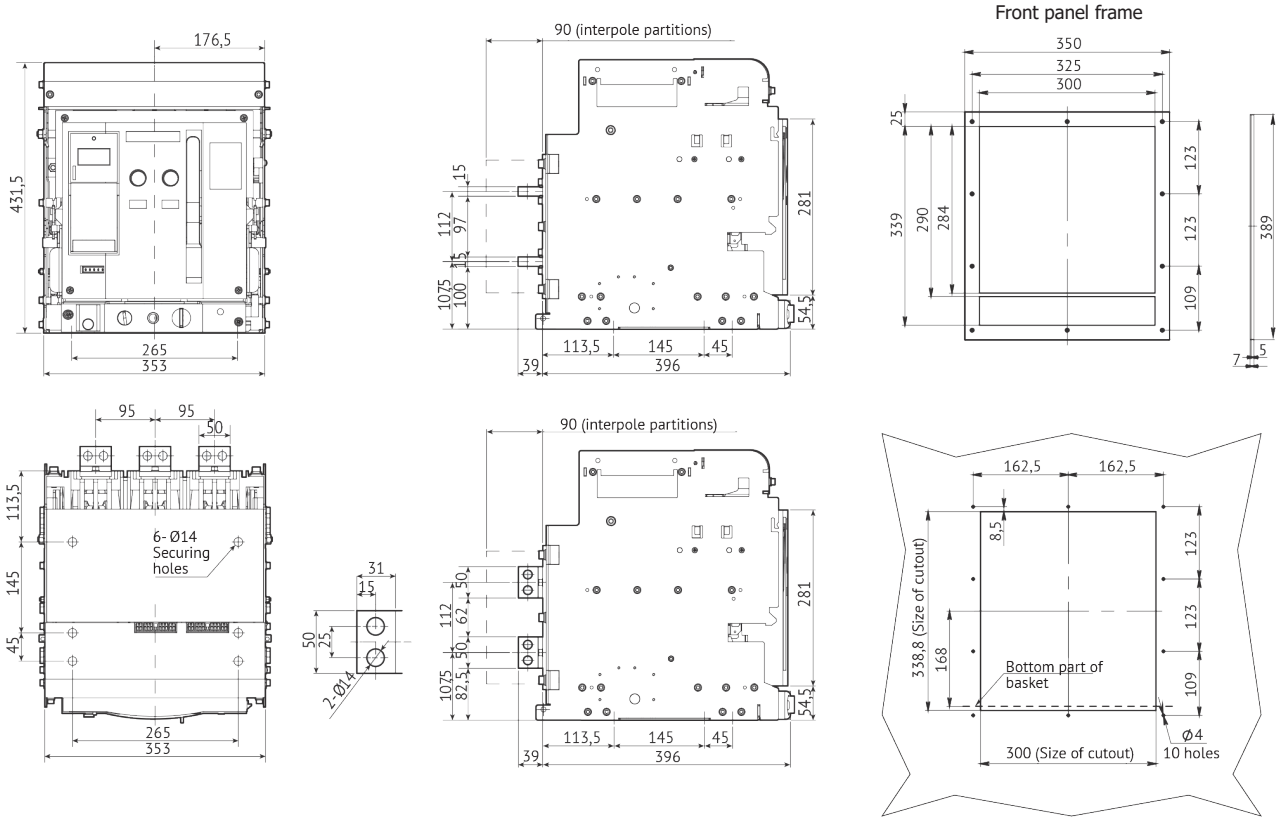
With rear vertical terminal location



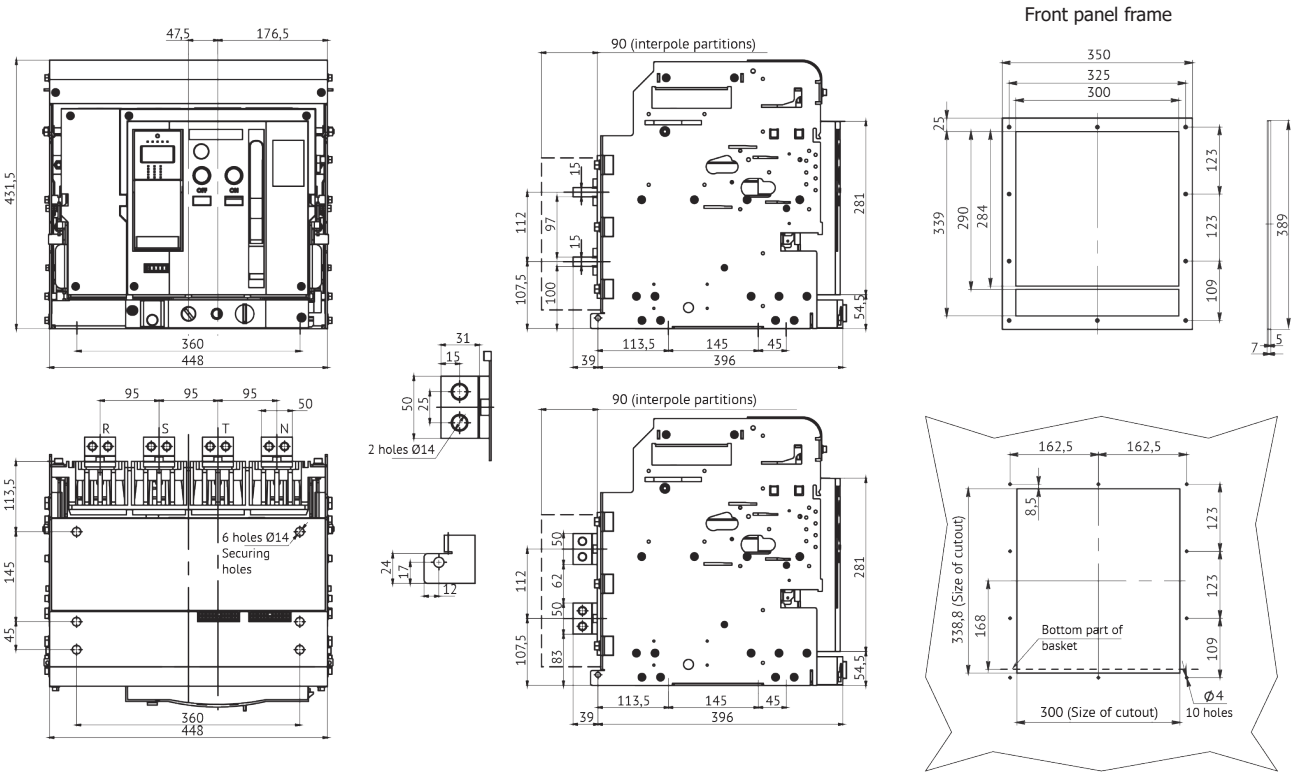
OptiMat A-1600-S1-3P circuit breaker of withdrawable version for nominal current 1600 A with rear horizontal terminal location with poles expanders installed



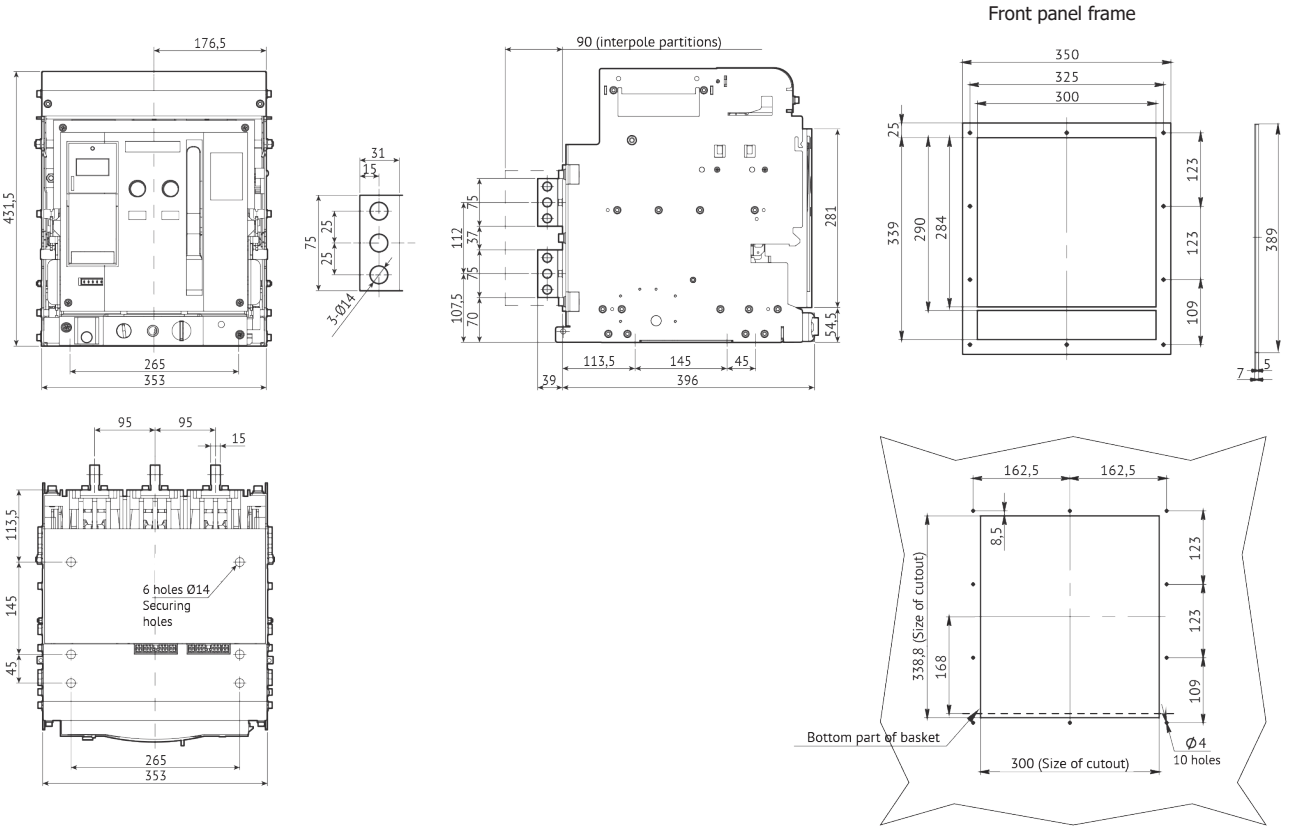
OptiMat A-630-1600-S2-3P circuit breaker of withdrawable version for nominal currents of 630-1600 A with rear vertical and horizontal terminal location



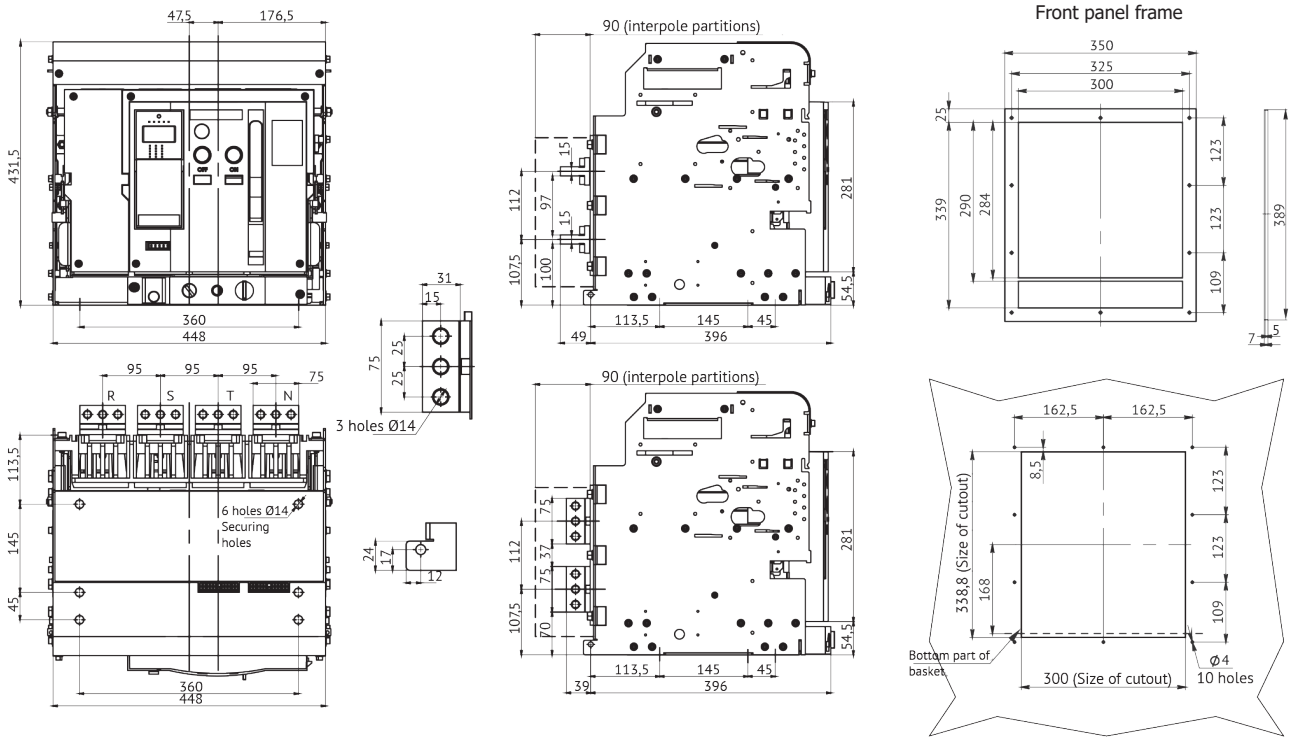
OptiMat A-630-1600-S2-4P circuit breaker of withdrawable version for nominal currents of 630-1600 A with rear vertical and horizontal terminal location



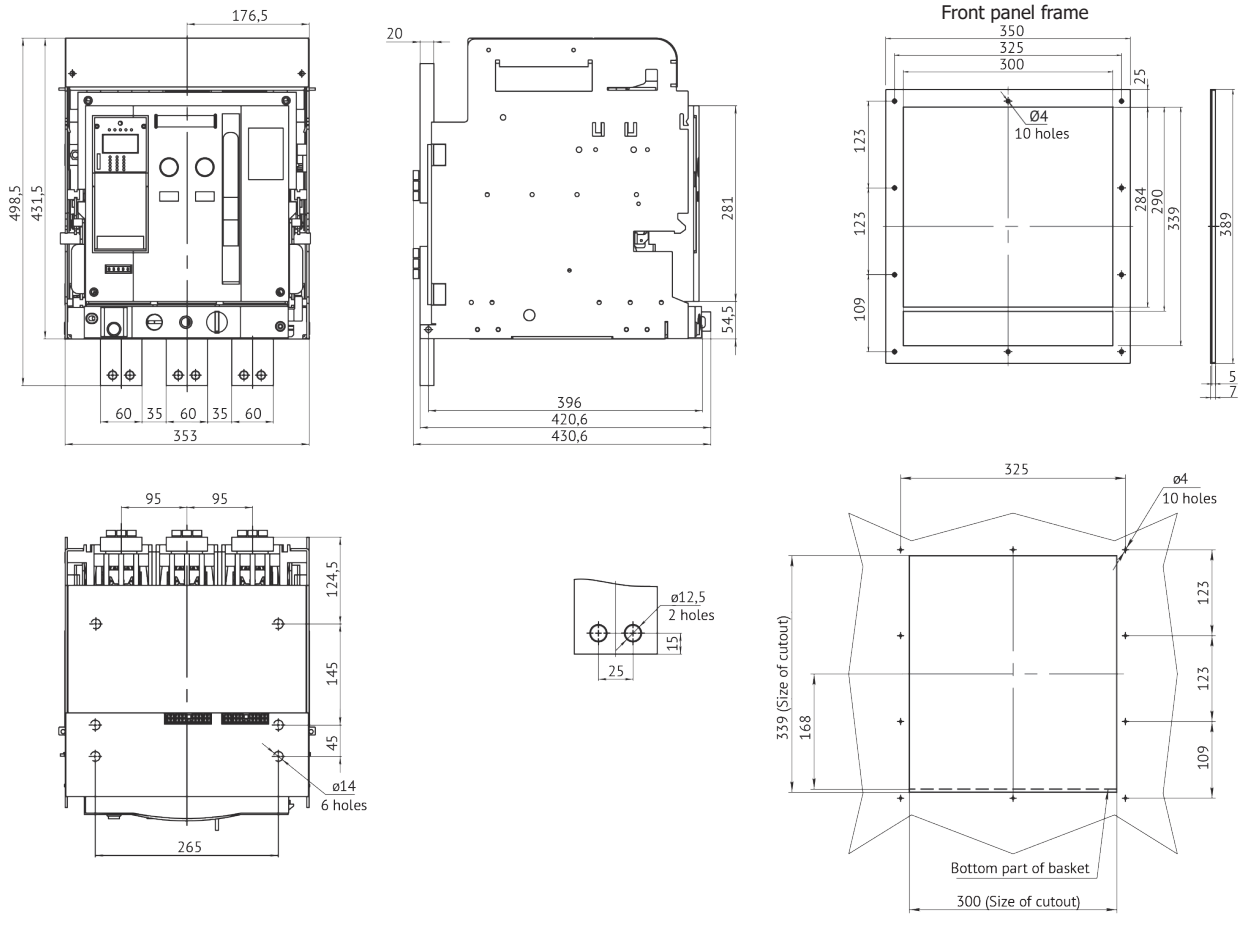
OptiMat A-2000-S2-3P circuit breaker of withdrawable version for nominal current of 2000 A with rear vertical terminal location



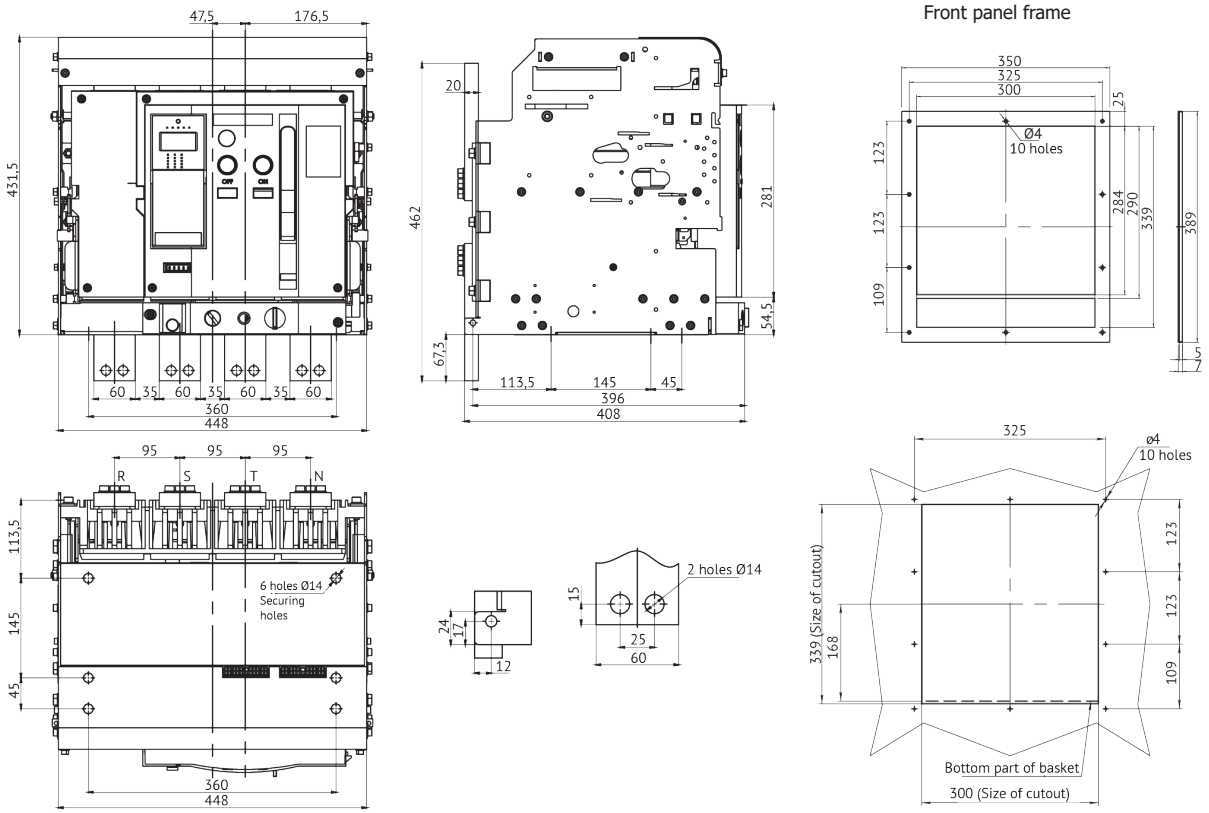
OptiMat A-2000-S2-4P circuit breaker of withdrawable version for nominal current of 2000 A with rear vertical terminal location



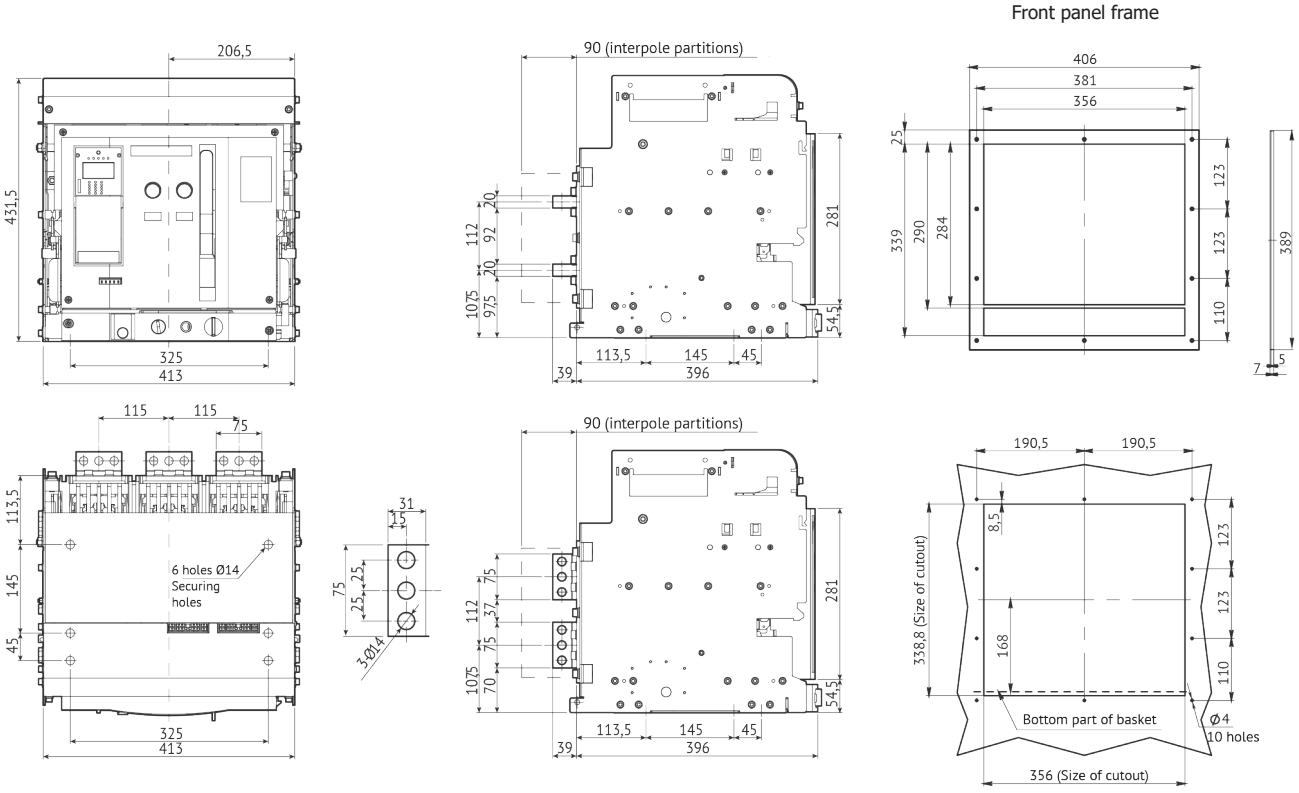
OptiMat A-630-2000-S2-3P circuit breaker of withdrawable version for nominal currents of 630-2000 A with front terminal location



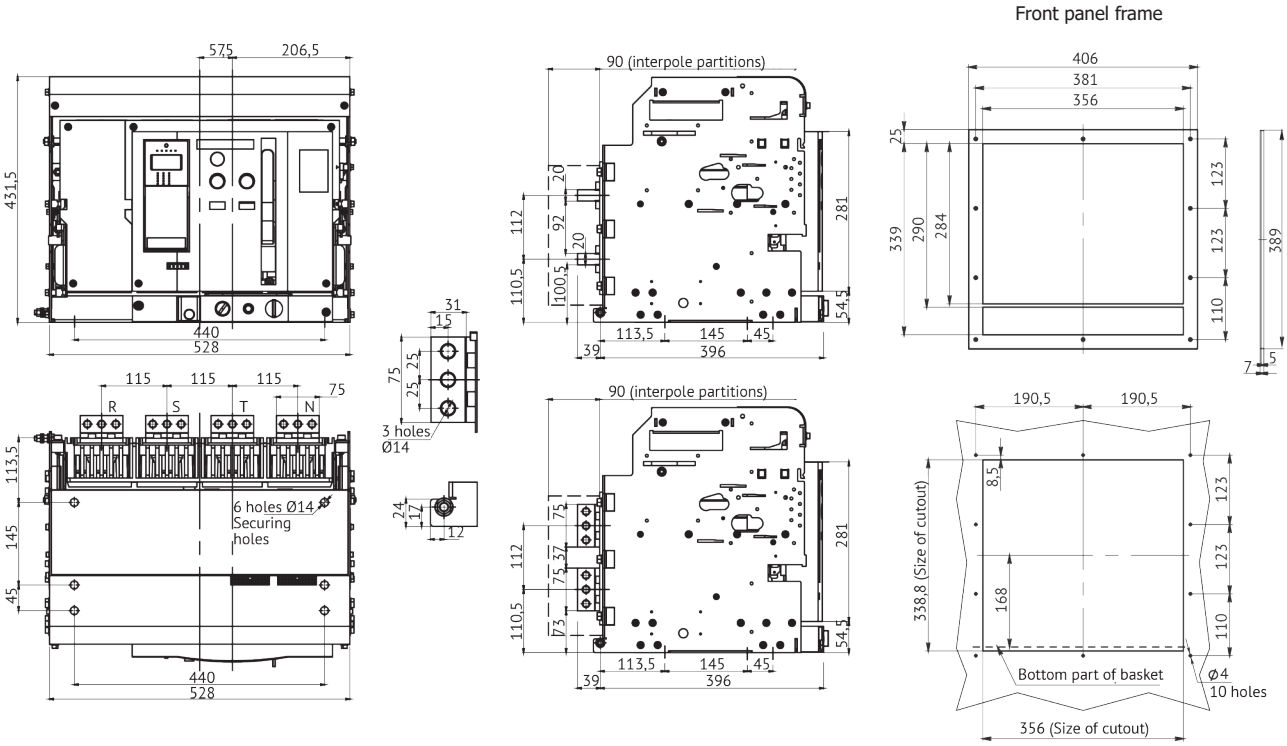
OptiMat A-630-2000-S2-4P circuit breaker of withdrawable version for nominal currents of 630-2000 A with front terminal location



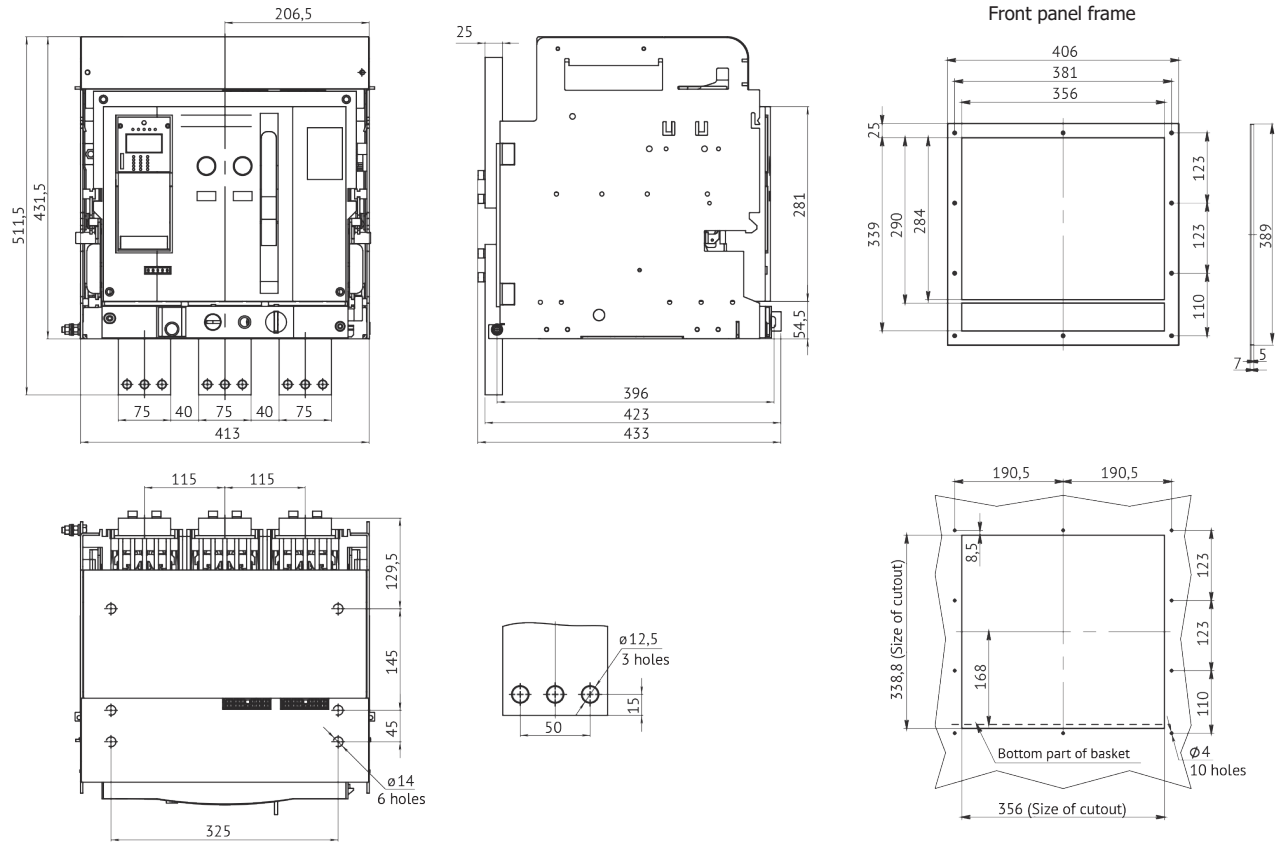
OptiMat A-2500-3200-S4-3P circuit breaker of withdrawable version for nominal currents of 2500-3200 A with rear horizontal and vertical terminal location



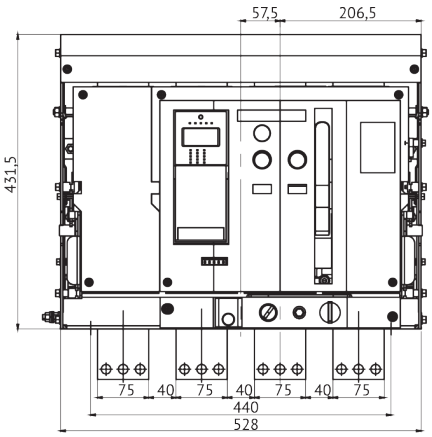
OptiMat A-2500-3200-S4-4P circuit breaker of withdrawable version for nominal currents of 2500-3200 A with rear horizontal and vertical terminal location

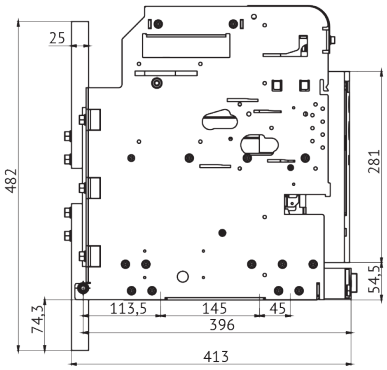


OptiMat A-2500-S4-3P circuit breaker of withdrawable version for nominal current of 2500 A with front terminal location

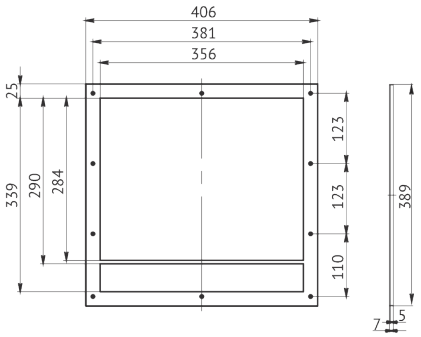


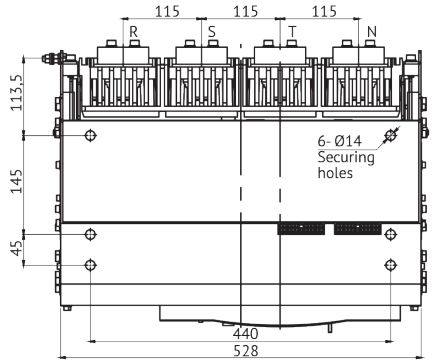
OptiMat A-2500-S4-4P circuit breaker of withdrawable version for nominal current of 2500 A with front terminal location

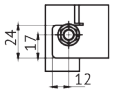


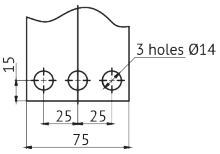


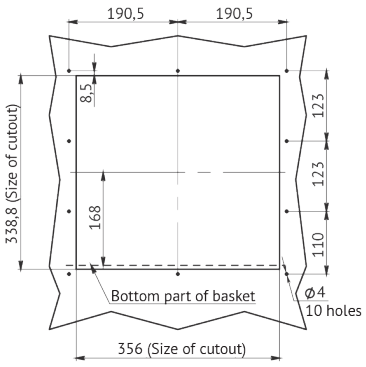
Front panel frame



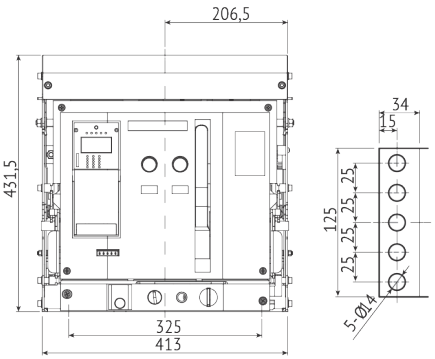


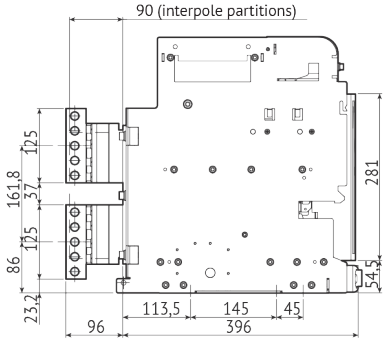




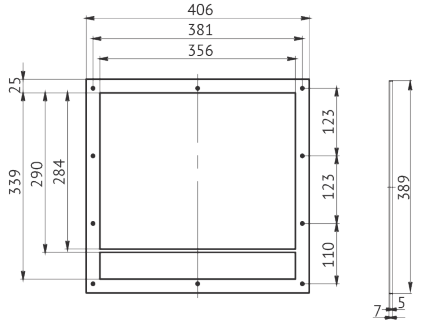


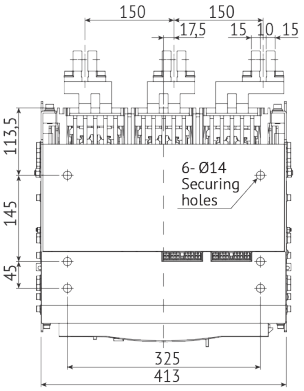
OptiMat A-4000-S4-3P circuit breaker of withdrawable version for nominal current of 4000 A with rear vertical terminal location

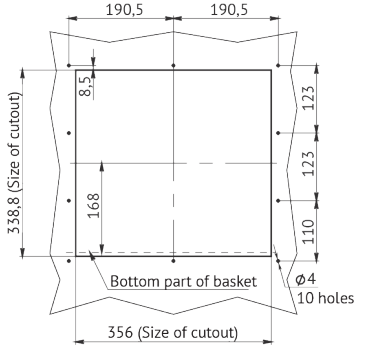




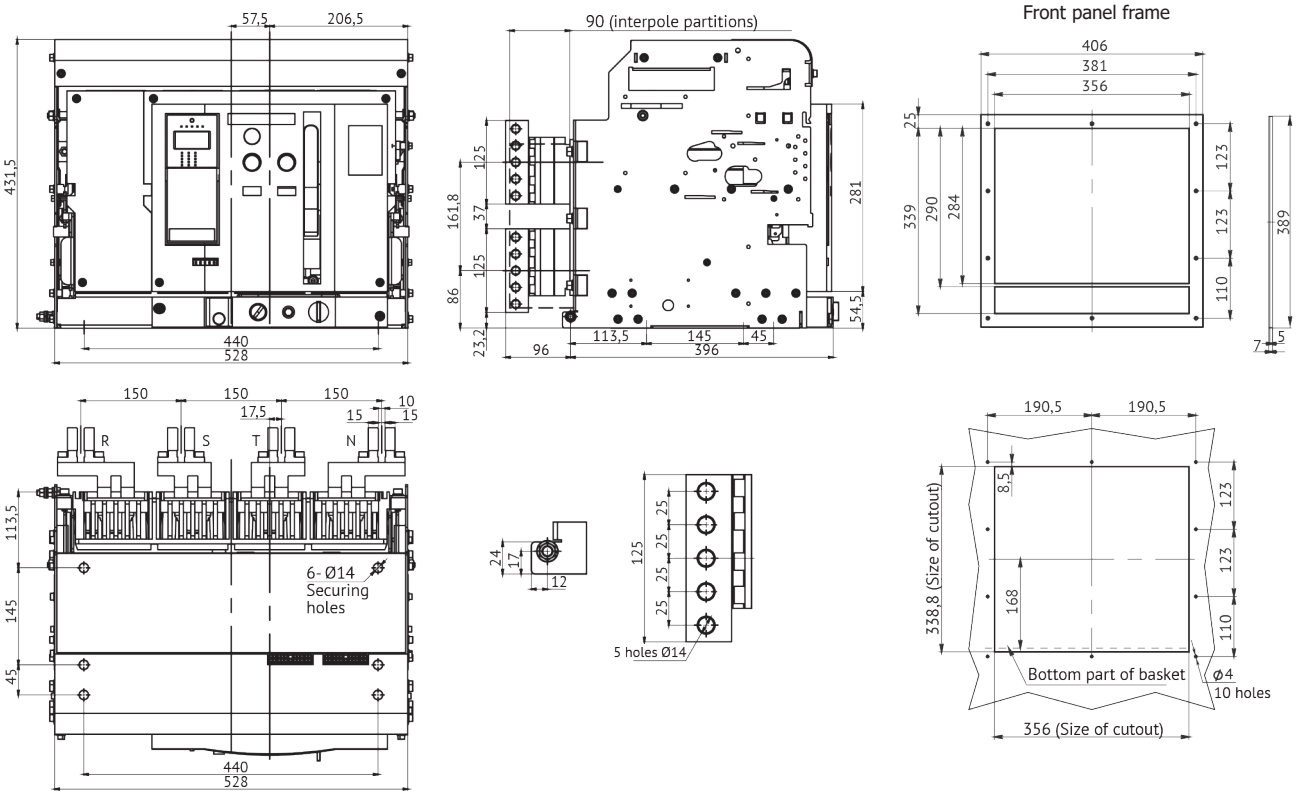
Front panel frame



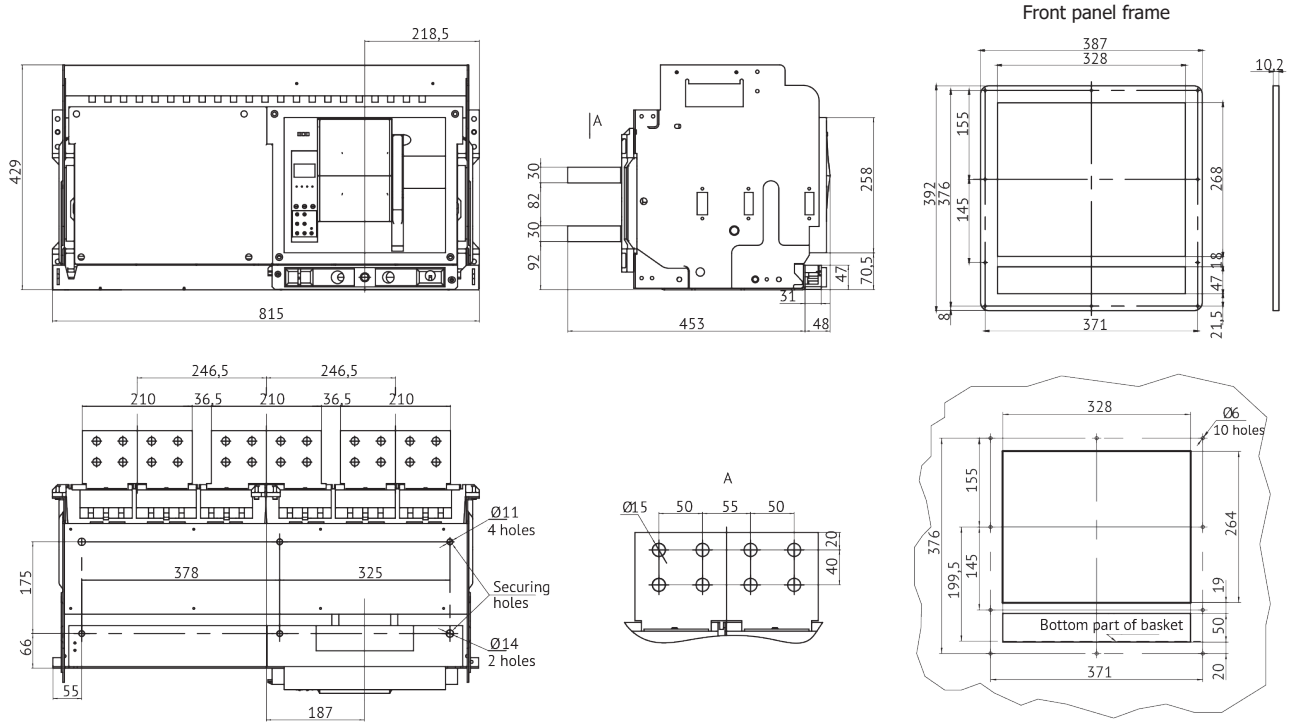




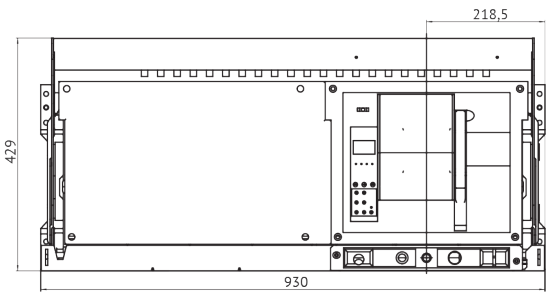
OptiMat A-4000-S4-4P circuit breaker of withdrawable version for nominal current of 4000 A with rear vertical terminal location

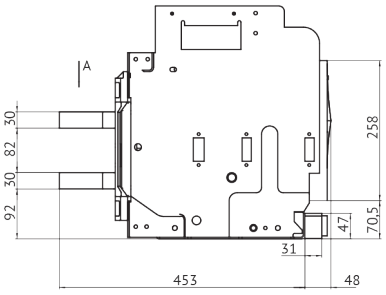


OptiMat A-5000-S5-3P circuit breaker of withdrawable version for nominal current of 5000 A with rear horizontal terminal location

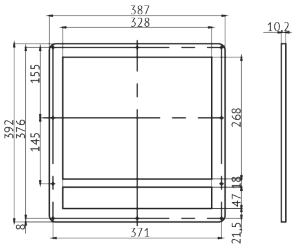


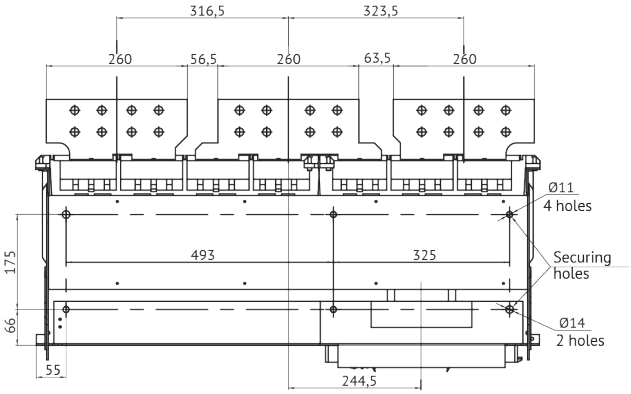
OptiMat A-6300-S6-3P circuit breaker of withdrawable version for nominal current of 6300 A with rear horizontal terminal location

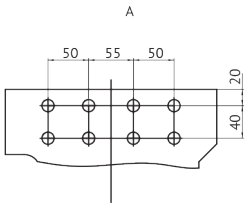


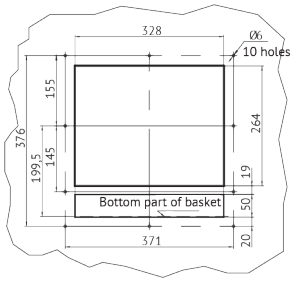


Front panel frame









Power cables connection

When connecting power cables, weight of the cable and its mechanical pressure on circuit breaker's terminal should be considered:

- Elongated terminals shall have isolated support, and the cable shall be fastened on hard surface (Fig. 1).
- When connecting several cables they should be secured to each other and fastened on the frame of fixed construction (Fig. 2).

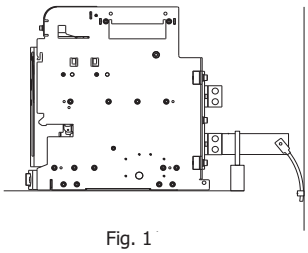


Fig. 1

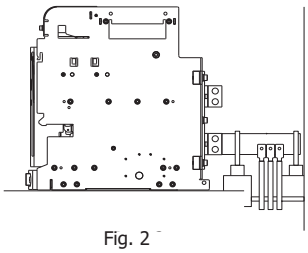


Fig. 2

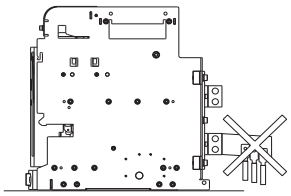
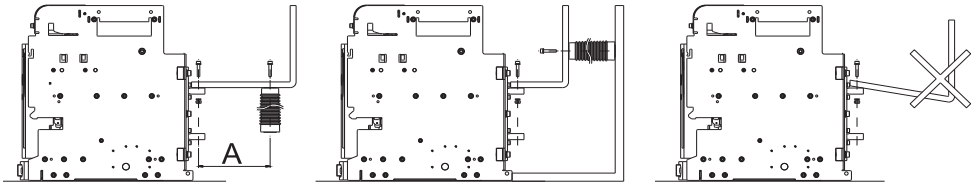


Fig. 3

Attachment of busbars

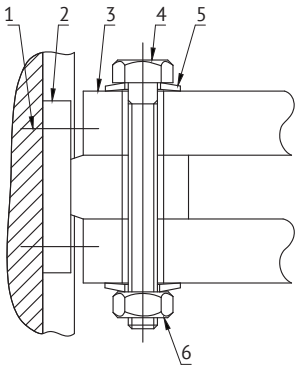
When installing busbars securing holes shall be placed such that they will be precisely aligned with the holes on circuit breaker terminals and not create breaking stress when being secured with bolts.
To prevent busbars camber and increased mechanical effect on circuit breaker terminals, the busbars shall be fastened with support isolators.



To provide bus system's resistance to the current electrodynamic effect, distance A shall not be more than:

For design current of short circuit, kA	Distance A, mm
30	350
50	300
65	250
80-100	150

Busbars attachment to the apparatus



1 – apparatus fastening screw;
2 – connector of circuit breaker;
3 – busbars:
4 – bolt;
5 – plate washers;
6 – nut.

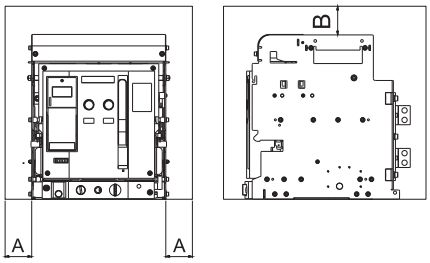
Sizing of busbars

Overall dimension	Rated current, A	Copper busbars		Алюминиевые шины		Fasteners	Tightening torque, Nm	
		Quantity, pcs.	Section, mm²	Quantity, pcs.	Section, mm²		Spring washer GOST 6402	Cup washer GOST 3057
S1	630	2	5x40	2	8x50	Bolt M10-6gx50.88.016 GOST 7798	37,5	50
	800		5x50		10x50			
	1000		5x60		10x60			
	1250		6x60					
	1600		10x60	4	10x50			
S2	630	2	5x40	2	8x50	Bolt M12-6gx65.88.016 GOST 7798		
	800		5x50		10x50			
	1000		5x60		10x60			
	1250		5x80					
	1600		5x100	4	10x50			
	2000	3			10x60			
S4	2500	4	5x100	5	10x80	Bolt M12-6gx75.88.016 GOST 7798		
	3200	2	10x100	-	-			
	4000	3	10x125	-	-	Bolt M12-6gx120.88.016 GOST 7798		
		4	10x100	-	-			
S5	5000	7	10x100	-	-			
S6	6300	8	10x100	-	-			

Recommendations for installation of distributing gear

The table shows minimal distance between the air circuit breaker and metallic parts of distributing gear.

Version of the circuit breaker	A, mm	B, mm
Stationary	70	150
Withdrawable	70	0

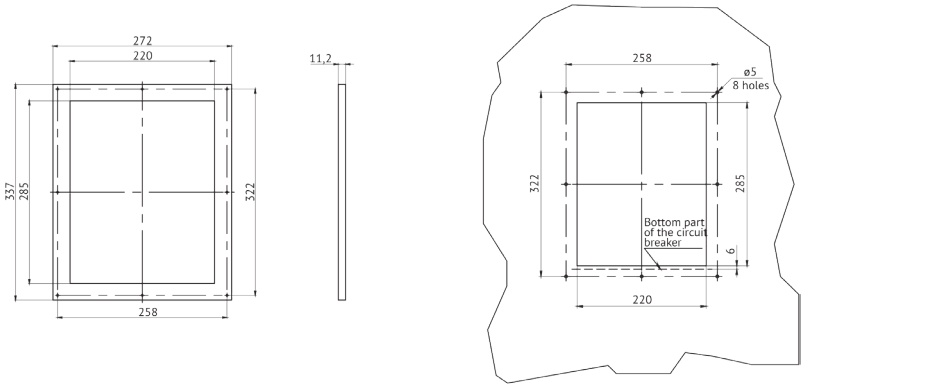


Circuit breaker mounting into the switchboard with installation of the air circuit breaker frame

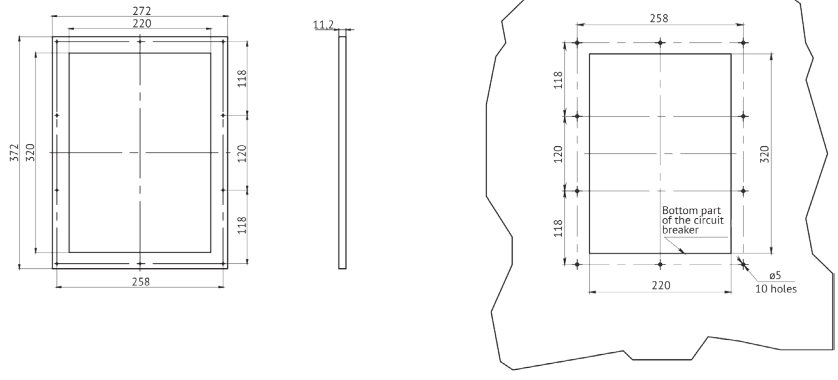
Frame of OptiMat A air circuit breaker is designed to provide access to the circuit breaker's operating controls and information, being displayed in the windows of the condition of circuit breaker mechanisms, when electrical cabinet door is closed. To provide correct installation and further operation it is necessary to perform the circuit breaker and its frame mounting according to the instructions given in the figures below.

Overall and mounting dimensions of the frame of OptiMat A circuit breaker of withdrawable and stationary version

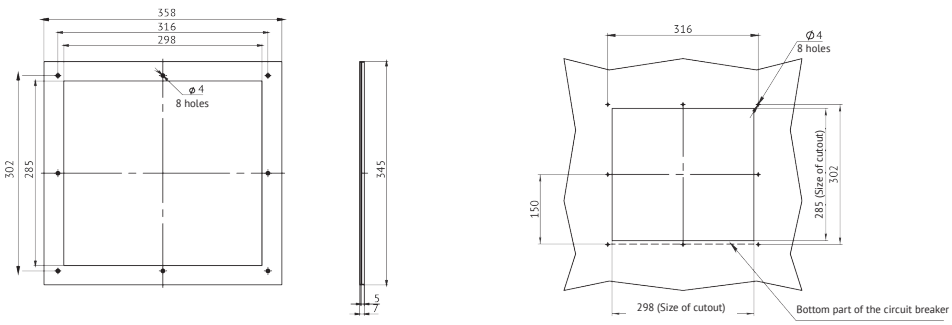
Front panel frame of stationary OptiMat A of S1 overall dimension for currents from 630 to 1600 A



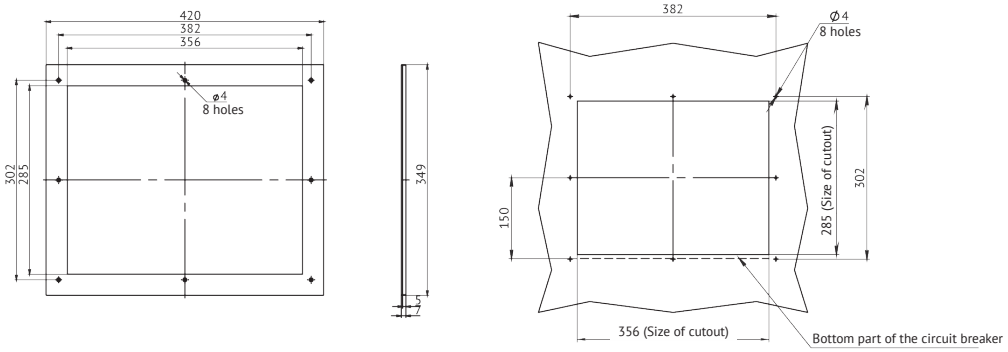
Front panel frame of roll-out OptiMat A of S1 overall dimension for currents from 630 to 1600 A



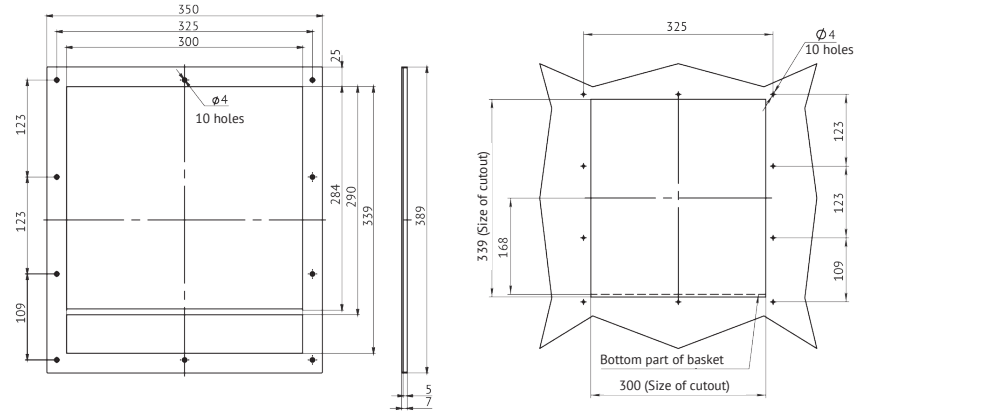
Front panel frame of stationary OptiMat A of S2 overall dimension for currents from 630 to 2000 A



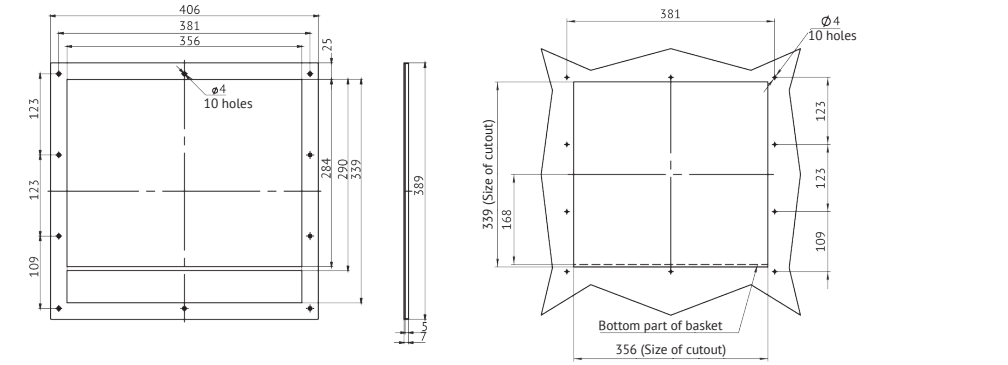
Front panel frame of stationary OptiMat A of S4 overall dimension for currents from 2500 to 4000 A



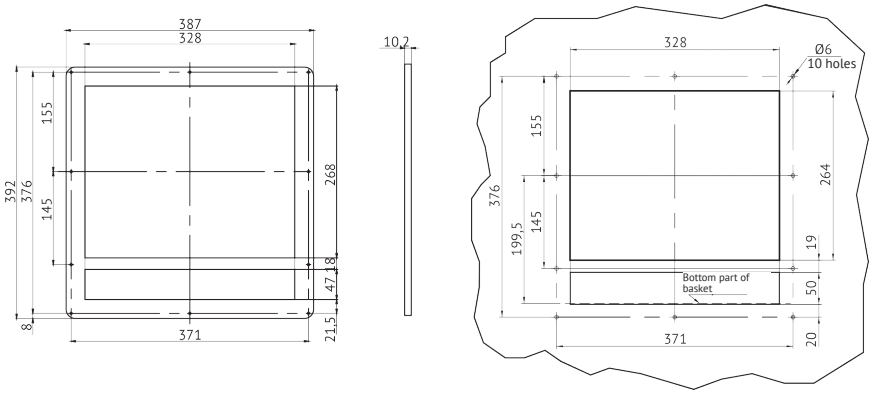
Front panel frame of stationary OptiMat A of S2 overall dimension for currents from 630 to 2000 A



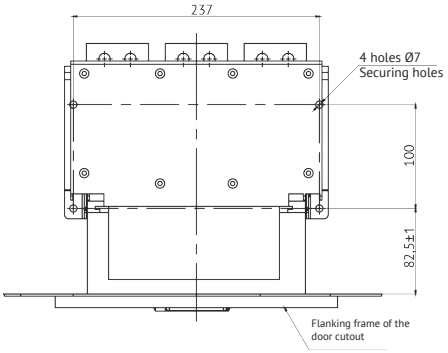
Front panel frame of stationary OptiMat A of S4 overall dimension for currents from 2500 to 4000 A



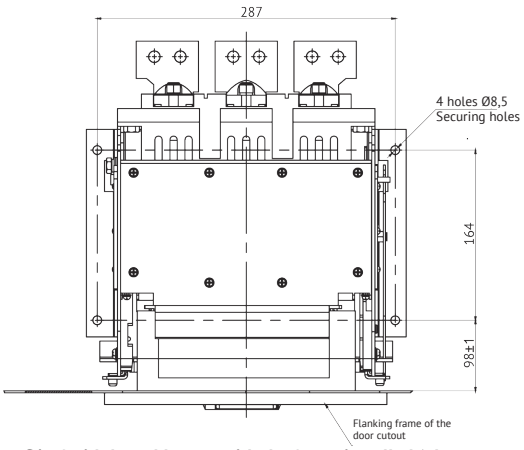
Front panel frame of stationary OptiMat A of S5, S6 overall dimension for currents from 5000 to 6000 A



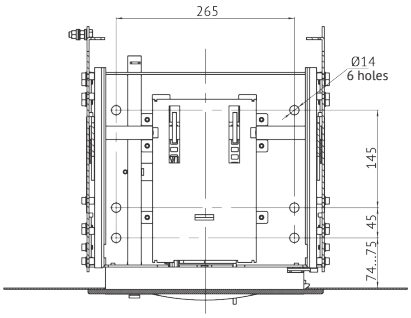
Mounting dimensions of the circuit breakers baskets with reference to the cells face panels



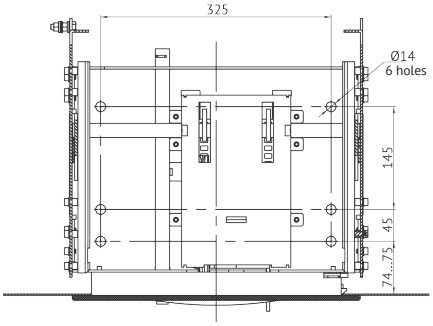
S1 of withdrawable type with the frame installed (plan view)



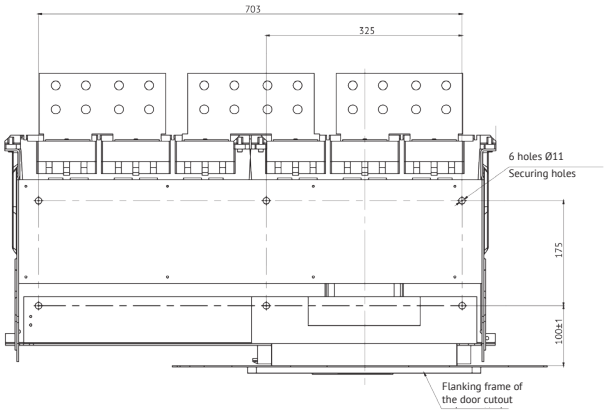
S1 of withdrawable type with the frame installed (plan view)



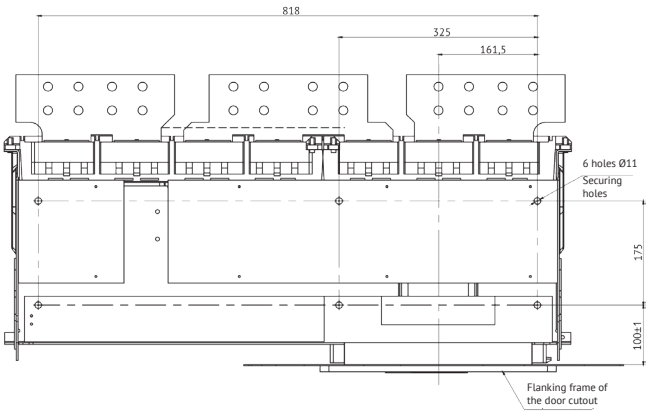
S2 of withdrawable type with the frame installed (plan view)



S4 of withdrawable type with the frame installed (plan view)



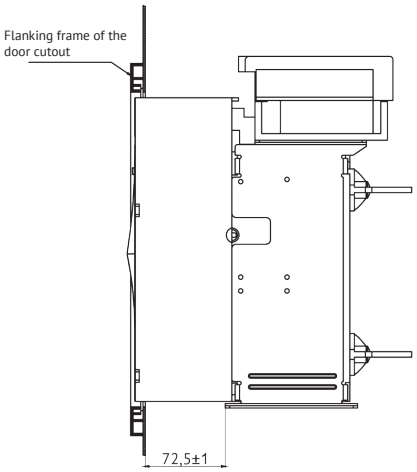
S5 of withdrawable type with frame installed (plan view)



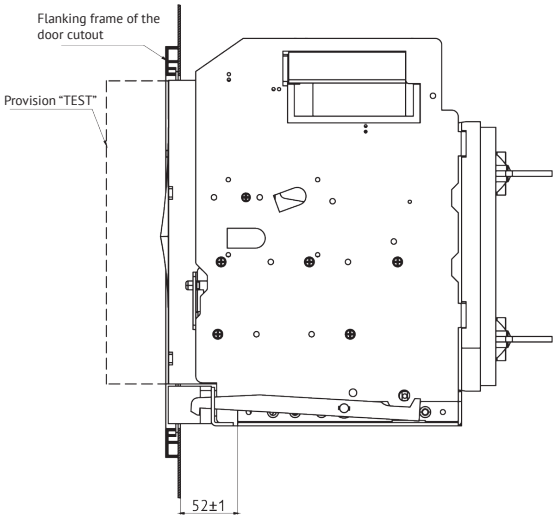
S6 of withdrawable type with frame installed (plan view)

The installed switch and its frame allow operation with the circuit breaker in position of "Rolled in", as well as to change it and operate in position of "Test" (for circuit breakers of withdrawable version).
Rolling of the circuit breaker out into "rolled out" position with the cabinet door closed is not provided by the design and prohibited due to technical problems.
The following offers figures with illustrate correct installation of circuit breakers of stationary and roll-out versions with reference to the cell face panel.

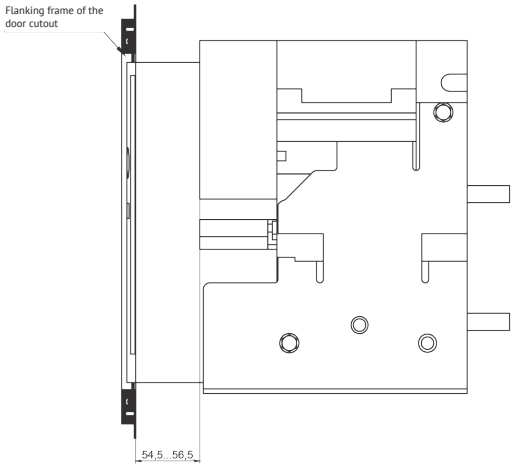
Side view of OptiMat A circuit breakers of stationary and roll-out versions after mounting into the cell with installation of frame



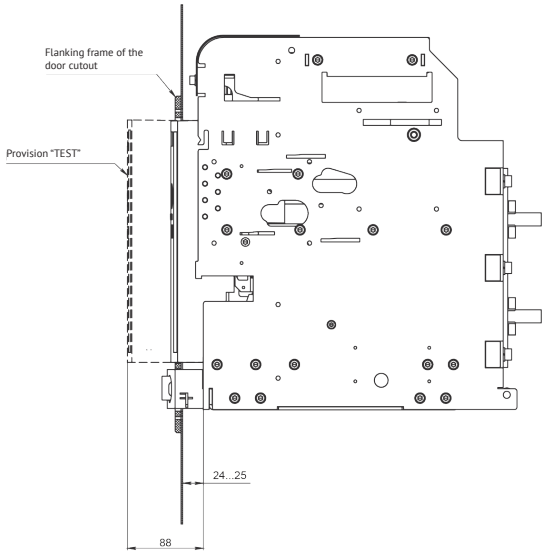
S1 of stationary type with the frame installed (side view)



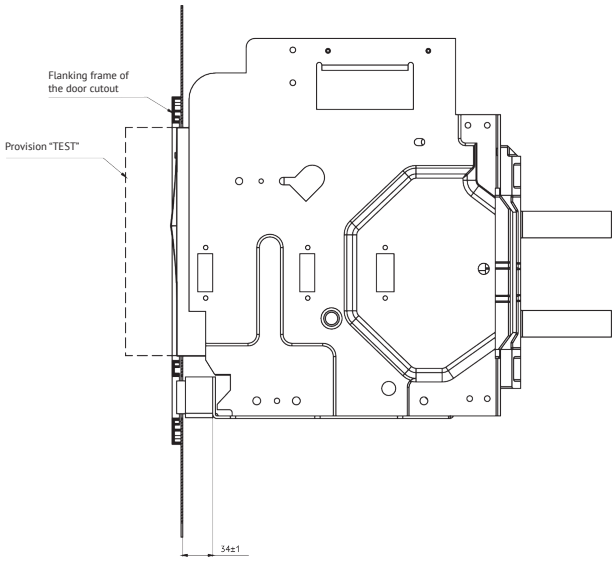
S1 of withdrawable type with the frame installed (side view)



S2 S4 of stationary type with the frame installed (side view)



S2, S4 of withdrawable type with the frame installed (side view)



S5, S6 of withdrawable type with frame installed (side view)

Correctly installed circuit breaker and its frame allow to open cabinet's doors at the circuit breaker position of "Rolled in" and "Test".