# OptiMat A Air circuit breakers for currents from 630 to 6300 A

Air circuit breakers of OptiMat A series are designed to conduct current in the normal mode, ensure protection and infrequent operation of electric circuits with rated current from 630 to 6300 A. Owing to their design they can easily withstand high capacities. The devices are equipped with multiple types of protection to meet the requirements of protection coordination and selectivity in the network to be protected.

Different lock-in equipment is designed to prevent unskilled actions and protect operational and attending personnel.

## Selection guide

| | | | OptiMat A-S1 | OptiMat A-S5, S6 | OptiMat A-S2, S4 | OptiMat A-S6 |
|---|---|---|---|---|---|---|
| Appearance | | |  |  |  |  |
| Standards | | | ГОСТ 50030.2 | | | |
| Number of poles | | | 3 | | 3,4 | |
| **Electric specifications** | | | | | | |
| Rated current In, A | | | 630 / 800 / 1000 / 1250 / 1600 | 5000 / 6300 | 630 / 800 / 1000 / 1250 / 1600 / 2000 / 2500 / 3200 / 4000 | 5000 / 6300 |
| Rated frequency, Hz | | | 50 | | 50 / 60 | |
| Application category | | | B | | | |
| Current type | | | AC | | | |
| Rated operating voltage Ue, V | | | 690 / 400 | 400 | 690/400 | |
| Auxiliary (free) contacts | | | 6c | 6a+6b | | |
| Manual | Control buttons | | Yes | | | |
| Electrical | Motor drive | | Yes | | Yes/No | |
| Limiting switching capacity of alternating current Icu (kA) | | | 50 (400 V)<br>25 (690 V) | 120 (400 V) | 65/85 (400 V)<br>50/65 (690 V) | 100 (400 V)<br>85 (690 V) / 150(400 V)<br>100 (690 V) |
| Release type | | | Electronic | | Without releases/Electronic | |
| Release version | | | MR5.0 | | MR7.0 / MR8.0 / MR8.1 | |
| **Mounting characteristics** | | | | | | |
| Fixed design | Rear connection | vertical type of terminal | Yes | No | Yes | |
| | | horizontal type of terminal | Yes | | No | Yes |
| | Front connection | | No | | Yes | No |
| | Combined | | | | Yes | No |
| Withdrawable design | Rear connection | vertical type of terminal | Yes | No | Yes | |
| | | horizontal type of terminal | Yes | | No / Yes / No | Yes |
| | Front connection | | No | | Yes | No |
| | Combined | | | | | |
| **Operating characteristics** | | | | | | |
| IP rating (IP) | | | IP20 | | | |
| Climatic and placement category | | | U3 | | | |
| Utilization category in terms of selectivity | | | Selective | | Nonselective / Selective | |
| **Additional features** | | | | | | |
| Circuit breaker basket position indication | | | No | | Yes / No | |
| Undervoltage release [1] | | | No | | Yes / No | |
| Second shunt trip [1] | | | No | | Yes / No | |
| Contact of the circuit breaker main contacts closure readiness signaling [2] | | | No | | Yes / No | |
| Internal installation lock | | | No | | Yes / No | |
| Locking the ON/OFF buttons with a padlock | | | No | | Yes / No | |
| Protective shutters | | | Yes | | | |
| Inter-pole partitions | | | Yes | | | |
| Front panel frame | | | Yes | | | |

[1] They are mutually exclusive in circuit breakers of sizes S2, S4 (installed into the same cubicle);
[2] It is mutually exclusive in circuit breakers of sizes S2, S4 with undervoltage release or the second shunt trip in the circuit breaker versions with MR8.0 and MR8.1 (to be connected to the terminal block into the same connectors U1 and U2).

## Designation

### Air circuit breaker

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 | Series | OptiMat | | | | |
| 2 | Configuration | A — 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 at Ur = 400 V | 50; 65; 85; 100; 120; 150 | | | | |
| 7 | Design according to installation method | F — Fixed version [1] | D — Withdrawable design. Fixed part included | | | |
| 8 | Type of microprocessor trip unit | MR0 — Microprocessor trip unit is not available | MR5.0 — LSIG protections, current measurement (for S1, S5, S6) | MR7.0 — LSIG protections (for S2, S4) | MR8.0 — LSIG protections. With communications function via Modbus and current measurement (for S2, S4) | MR8.1 — LSIG protection. Bl communications function via Modbus and current measurement. Menu in Russian (for S2, S4) |
| 9 | Connection options | B — Rear connection (horizontal or vertical) [2] | F — Front connection (for S2, S4 for currents from 630 to 2500 A) | C — Combined connection (upper — front, lower — rear), for S2, S4 for currents from 630 to 2500 A | | |
| 10 | Type of control coils | **Cabcd — control coils unit designation** | | | | |
| | | **a — Closing coil:**<br>0 — not installed;<br>1 — installed 110 V AC/DC;<br>2 — installed 230 V AC/ 220 V DC<br>3 — installed 24 V DC | **b — Shunt trip:**<br>0 — not installed;<br>1 — installed 110 V AC/DC;<br>2 — installed 230 V AC/ 220 V DC;<br>3 — installed 24 V DC | **c — Second shunt trip:**<br>0 — not installed;<br>1 — installed 110 V AC/DC;<br>2 — installed 230 V AC/ 220 V DC;<br>3 — installed 24 V DC | **d — Undervoltage release:**<br>0 — not installed;<br>2 — installed<br>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 | Type of protection systems | P00 — protection systems are not available<br>P01 — isolating shutters are installed<br>P02 — built-in power button lock is installed<br>P03 — isolating shutters and built-in power button lock are installed<br>P04 — locking the ON/OFF buttons with a padlock<br>P05 — insulating shutters and blocking of the on/off buttons with a padlock are installed<br>P06 — insulating shutters installed, on/off buttons locked with a padlock, built-in lock for power buttons | | | | |
| 13 | Type of auxiliary signal contacts | S1 — Signal contacts 6a+6b | S2 — Signal contacts 6c | | | |
| 14 | Type of additional signal systems | 03 — Mechanical cycle counter is installed;<br>06 — Contact of the circuit breaker main contacts closure readiness signaling and mechanical cycle counter are installed. | | | | |

[1] Fixed version available in all sizes except S5 (120 kA), S6 (120 kA).
[2] For 2000 A withdrawable circuit breakers, only rear vertical, front and combined connections are available. For 4000 A fixed and withdrawable circuit breakers, only rear vertical, front and combined connections are available. For 5000 and 6300 A circuit breakers (120 kA) , only rear horizontal busbar connection is available.

### Moving part

**OptiMat A-630-S2-3P-65-MP-MR8.1-C2200-M2-P04-S1-06**

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

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | Series | OptiMat | | | | |
| 2 | Configuration | A — air circuit breakers | | | | |
| 3 | Rated current In, A | 630; 800; 1000; 1250; 1600; 2000; 2500; 3200; 4000 | | | | |
| 4 | Standard size | 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) | | | |
| 5 | Number of circuit breaker poles | 3P — Triple-pole | 4P — Four-pole | | | |
| 6 | Limiting breaking capacity, kA at Ur = 400 V | 50; 65; 85; 100 | | | | |
| 7 | Design according to installation method | MP — Moving part. The fixed part must be ordered separately.<br>MPH — Moving part with an increased distance between the terminals of one pole by 25mm. The fixed part must be ordered separately. | | | | |
| 8 | Type of microprocessor trip unit | MR0 — Microprocessor trip unit is not available | MR5.0 — LSIG protections, current measurement (for S1, S5, S6) | MR7.0 — LSIG protections (for S2, S4) | MR8.0 — LSIG protections. With communications function via Modbus and current measurement (for S2, S4) | MR8.1 — LSIG protection. Bl communications function via Modbus and current measurement. Menu in Russian (for S2, S4) |
| 9 | Type of control coils | **Cabcd — обозначение блока катушек управления** | | | | |
| | | **a — Closing coil:**<br>0 — not installed;<br>1 — installed 110 V AC/DC;<br>2 — installed 230 V AC/ 220 V DC;<br>3 — installed 24 V DC | **b — Shunt trip:**<br>0 — not installed;<br>1 — installed 110 V AC/DC;<br>2 — installed 230 V AC/ 220 V DC;<br>3 — installed 24 V DC | **c — Second shunt trip:**<br>0 — not installed;<br>1 — installed 110 V AC/DC;<br>2 — installed 230 V AC/ 220 V DC;<br>3 — installed 24 V DC | **d — Undervoltage release:**<br>0 — not installed;<br>2 — installed 230 V AC/220 V DC | |
| 10 | 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 | | |
| 11 | Type of protection systems | P00 — protection systems are not available | P02 — built-in power button lock is installed | P04 — blocking of the on/off buttons with a padlock is installed | | |
| 12 | Type of auxiliary signal contacts | S1 — Signal contacts 6a+6b | | | | |
| 13 | Type of additional signal systems | 03 — Mechanical cycle counter is installed;<br>06 — Contact of the circuit breaker main contacts closure readiness signaling and mechanical cycle counter are installed. | | | | |

### Fixed part

**OptiMat A FP - S2 - 630-1600 - 3P - B - P01**

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| | | | |
|---|---|---|---|
| 1 | Series | OptiMat | |
| 2 | Configuration | A FP — Fixed part of the circuit breaker | |
| 3 | Standard size | 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) |
| 4 | Rated current In, A | 630; 800; 1000; 1250; 1600; 2000; 2500; 3200; 4000 | |
| 5 | Number of poles | 3P — Triple-pole | 4P — Four-pole |
| 6 | Connection options | B — Rear connection (horizontal or vertical)<br>BH — Rear connection (horizontal or vertical) with an increased distance between the terminals of one pole by 25 mm<br>F — Front connection<br>FH — Front connection with an increased distance between the terminals of one pole by 25 mm<br>C — Combined connection (upper - front, lower - rear)<br>CH — Combined connection with an increased distance between the terminals of one pole by 25 mm (upper - front, lower - rear) | |
| 7 | Type of protection systems | P01 — isolating shutters are installed | |

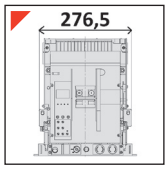
## Series advantages

Twelve NO/NC (6a+6b) for sizes S2, S4, S5, S6, and six switching (6c) galvanically isolated contacts for size S1 allow for the implementation of a large number of signaling circuits.

The terminal block with screw terminals in sizes S1, S5, S6 allows for quick installation of control circuits, without the use of additional crimps and solder joints.

Elements are made of pure electrical copper, which allow to reach high efficiency, as well as long-life operation.

Availability of different locks (lock of circuit breaker position in basket, lock of closure, isolating shutter etc.) allows to provide attending personnel safety.

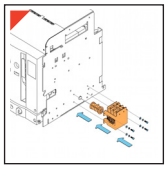



The compact dimensions of the circuit breakers of size S1 make it possible to complete standard circuit switchboards with a large number of equipment, or to use smaller circuit switchboards.

The possibility of changing the position of the terminals from horizontal to vertical in the sizes S1, S2, S4, S6 allows the circuit breakers to be used in circuits with both vertical and horizontal current-carrying busbars.

Using special silver-based alloys to create the contact group made it possible to achieve high wear resistance and provide over ten thousand electrical switching cycles.

Support of data transmission via Modbus RTU in MR8.0 and MR8.1 releases allows to use dispatch system.



Modular design provides easy and quick installation.


5 years warranty. Each unit undergoes multistage quality control from assembling to the finished goods warehouse.

Tester for microprocessor trip units of circuit breakers of the OptiMat A series is designed for testing microprocessor trip units of the MR7.0, MR8.0, MR8.1 series.

The OptiMat A air circuit breaker can be purchased either assembled or supplied separately (fixed and moving parts of OptiMat A must be ordered as separate items).

# Technical specification

| Circuit breaker series | | | | OptiMat A-S1 | | | | | OptiMat A-S5, S6 | | OptiMat A-S6 | OptiMat A-S2 | | | | | | OptiMat A-S4 | | | OptiMat A-S6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Main characteristics** | | | | | | | | | | | | | | | | | | | | | | |
| Rated operating voltage Ue, V | | | | 690 | | | | | | | | | | | | | | | | | | |
| Rated insulation voltage Ui, V | | | | 690 | | | | | 400 | | | 1000 | | | | | | | | | | |
| Rated impulse withstand voltage Uimp, kV | | | | 8 | | | | | 12 | | | | | | | | | | | | | |
| Application category | | | | B | | | | | | | | | | | | | | | | | | |
| Suitability for disconnection | | | | yes | | | | | | | | | | | | | | | | | | |
| Number of poles | | | | 3 | | | | | | | | 3,4 | | | | | | | | | | |
| **Control** | | | | | | | | | | | | | | | | | | | | | | |
| Manual | Control buttons | | | + | | | | | | | | | | | | | | | | | | |
| Electrical | Motor drive | | | + | | | | | | | | | | | | | | | | | | |
| | | | | + | | | | | | | | | | | | | | | | | | |
| Design option | | | | 630 | 800 | 1000 | 1250 | 1600 | 5000 | | 6300 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3200 | 4000 | 5000 | 6300 |
| Fixed | Rear mounting | vertical | | + | + | + | + | + | - | | - | + | + | + | + | + | + | + | + | + | + | + |
| | | horizontal | | + | + | + | + | + | - | | - | + | + | + | + | + | - | + | + | - | + | + |
| | Front mounting | | | - | - | - | - | - | - | | - | + | + | + | + | + | + | + | + | - | - | - |
| | Combined | | | - | - | - | - | - | - | | - | + | + | + | + | + | + | + | - | - | - | - |
| Withdrawable | Rear mounting | vertical | | + | + | + | + | + | - | | - | + | + | + | + | + | + | + | + | + | + | + |
| | | horizontal | | + | + | + | + | + | + | | + | + | + | + | + | + | - | + | + | - | + | + |
| | Front mounting | | | - | - | - | - | - | - | | - | + | + | + | + | + | + | + | - | - | - | - |
| | Combined | | | - | - | - | - | - | - | | - | + | + | + | + | + | + | + | - | - | - | - |
| **Rated and limiting parameters of the main circuit of circuit breakers** | | | | | | | | | | | | | | | | | | | | | | |
| Rated current In, A | | | | 630 | 800 | 1000 | 1250 | 1600 | 5000 | | 6300 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3200 | 4000 | 5000 | 6300 |
| Rated frequency, Hz | | | | 50 | | | | | | | | 50 / 60 | | | | | | | | | | |
| Rated limiting breaking capacity (Icu), kA | | | Ue 400 V | 50 | | | | | 120 | | | 65/85 | | | | | 85 | 100 | | | 150 | |
| | | | Ue 690 V | 25 | | | | | - | | | 50/65 | | | | | 65 | 85 | | | 100 | |
| Rated service capacity (Ics), kA | | | Ue 400 V | 40 | | | | | 100 | | | 65/85 | | | | | 85 | 100 | | | | |
| | | | Ue 690 V | 20 | | | | | - | | | 50/65 | | | | | 65 | 85 | | | - | |
| Short-time withstand current (Icw) for 1 sec, kA | | | Ue 400 V | 40 | | | | | 100 | | | 65 | | | | | | 85 | | | | |
| | | | Ue 690 V | 20 | | | | | - | | | 50 | | | | | | 85 | | | | |
| Rated short-circuit making capacity | | | Ue 400 V | - | | | | | - | | | 143/187 | | | | | 187 | 220 | | | 330 | |
| | | | Ue 690 V | - | | | | | - | | | 105/143 | | | | | 143 | 220 | | | | |
| General wear resistance, cycles | with maintenance | | | - | | | | | - | | | 50000 | | | | | | | | | | |
| | without maintenance | | | 15000 | | | | | 5000 | | | 30000 | | | | | | | | | | |
| Electrical wear resistance, cycles | with maintenance | | | - | | | | | - | | | 20000 | | | | | | | | | | |
| | without maintenance | | | 5000 | | | | | 500 | | | 10000 | | | | | | | | | | |
| Trip time | Break time, ms | | | 50±10 | | | | | | | | 15 | | | | | | | | | | |
| | Make time, ms | | | 50±10 | | | | | | | | 40 | | | | | | | | | | |
| **Protection, indication and measurement devices** | | | | | | | | | | | | | | | | | | | | | | |
| Microprocessor trip unit | | | | MR5.0 | | | | | MR5.0 | | | MR7.0 / MR8.0 / MR8.1 | | | | | | | | | | |
| Overload protection | | | | + | | | | | + | | | +/+/+ | | | | | | | | | | |
| Short-circuit protection | with time delay | | | + | | | | | + | | | +/+/+ | | | | | | | | | | |
| | instantaneous | | | + | | | | | + | | | +/+/+ | | | | | | | | | | |
| Ground fault protection | | | | + | | | | | + | | | +/+/+ | | | | | | | | | | |
| Indication of modified current | | | | + | | | | | + | | | -/+/+ | | | | | | | | | | |
| Indication of unit condition | | | | - | | | | | - | | | +/+/+ | | | | | | | | | | |
| **Supplementary devices (control and signaling)** [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 | | | | | | | | | | |
| | closing coil | | | 230 V AC / 220 V DC | | | | | | | | 230 V AC/220 V DC ; 110 V AC/DC ; 24 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 | | | | | | | | | | |
| Circuit breaker basket position indication | | | | - | | | | | | | | To be delivered as a separate item | | | | | | | | | | |
| Contact of the circuit breaker main contacts closure readiness signaling | | | | - | | | | | | | | -/+ | | | | | | | | | | |
| **Auxiliary devices** [1] **(locking, protection, indication)** | | | | | | | | | | | | | | | | | | | | | | |
| Protective shutters | | | | + | | | | | | | | | | | | | | | | | | |
| Inter-pole partitions | | | | + | | | | | | | | | | | | | | | | | | |
| Mechanical cycle counter | | | | + | | | | | | | | | | | | | | | | | | |
| Mechanical interlock [3] | | | | - | | | | | | | | -/+ | | | | | | | | | | |
| Internal installation lock | | | | - | | | | | | | | -/+ | | | | | | | | | | |
| **Overall dimensions and weight** | | | | | | | | | | | | | | | | | | | | | | |
| Overall dimensions W×H×D, mm | fixed with rear connection | | 3P | 254x319x258 | | | | | - | | | 361x310x335 | | | | | | 421x311x335 | 421x333x391 | | 792x372x363 | |
| | extended with rear connection | | 3P | 277x351x273 | | | | | 815x429x501 | | 930x429x501 | 353x432x435 | | | | | | 413x434x435 | 413x432x492 | | 784x4473x463 | |
| Weight, kg | fixed with rear connection | | 3P | 33 | | | | | - | | - | 41 | 41 | 41 | 43 | 43 | 45 | 48 | 59 | 65 | 116 | |
| | extended with rear connection | | 3P | 53 | | | | | 240 | | 260 | 65 | 65 | 65 | 68 | 68 | 70 | 75 | 90 | 98 | 210 | 235 |

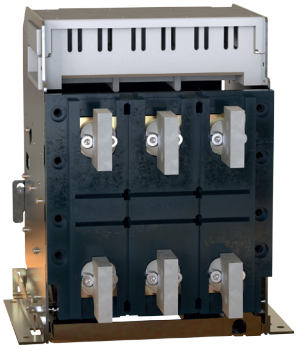
[1] for detailed description of accessories, see p. 213
[2] are mutually exclusive positions in size versions S2, S4, S6 (150 kA)
[3] mechanical interlock is installed only on withdrawable circuit breakers

## Different options of the main terminals delivery and installation

Rear horizontal connection of S1 busbars

Front attachment of S2 busbars

Back vertical attachment of S1 busbars



Back vertical attachment of S4 busbars

Back horizontal attachment of S4 busbars

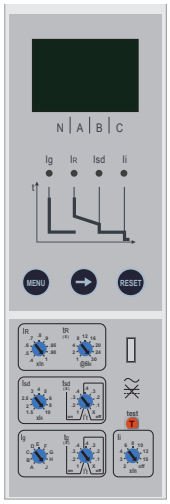
Rear horizontal connection of S5 buses (120 kA)

Rear combined connection of S4 busbars [1)]

Rear horizontal connection of S6 buses (120 kA)

Note: See technical data sheet for detailed options of connection types delivery.
[1)] For circuit breakers S1, S2, S4, the rear terminals are oriented, i.e. can be installed horizontally or vertically by the customer (for those ratings where possible).

# Microprocessor trip unit

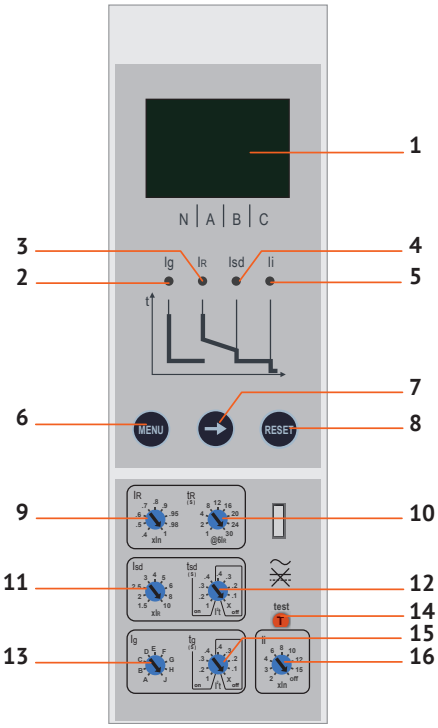
| Types of microprocessor trip units | | | | |
|---|---|---|---|---|
| | MR5.0 | MR7.0 | MR8.0 | MR8.1 |
| Appearance |  |  |  |  |
| Current protection | 1) From overcurrent<br>2) From short circuit with time delay<br>3) From short circuit, instantaneous<br>4) From earth fault | 1) From overcurrent<br>2) From short circuit with time delay<br>3) From short circuit, instantaneous<br>4) From earth fault | | |
| Measurement | current | not available | current | |
| Power supply | Power supply from current transducers* installed in protected network (at least 30% of the rated current)<br>External power supply:<br>- 230 V AC | Power supply from current transducers* installed in protected network (at least 30% of the rated current)<br>External power supply:<br>- AC/DC 110/220 V<br>- DC 48 V | Power supply from current transducers* installed in protected network (at least MR8.0 — 30%, MR8.1 — 50% of the rated current)<br>An external power supply is required for data exchange:<br>- AC/DC 110/220 V<br>- DC 48 V | |
| LED triggering indicators | Alarm indication of the function of earth short circuit protection/ alarm indication of 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 overcurrent | Indication of overcurrent/Indication of overcurrent and short circuit tripping/indication by tripping without time delay/indication of currents in phases | |
| Control buttons | Reset, menu, right | Reset | Reset, menu, right, enter, self-testing | Enter, reset, left, right, return, self-testing |
| Record of protection tripping | 1 last tripping (current, time) | Not available | 10 latest entries (cause, current, phase, time) | 300 latest entries (cause, current, phase, time) |
| Data transfer protocol | Not available | Not available | Modbus / RS-485 | |

* Power supply from current transducers is backup power supply system. With an unstable current load below the level of the autonomous power supply current of the microprocessor trip unit or when switching on to a short circuit, the response time of the circuit breaker may be delayed, therefore it is recommended to power the microprocessor trip unit from an external source (terminals 1 and 2).

An external power supply is required to use the Modbus communication function.

For the microprocessor trip unit MR8.1, power supply to terminals 1 and 2 is required.

## Type MR5.0




## All necessary protection types

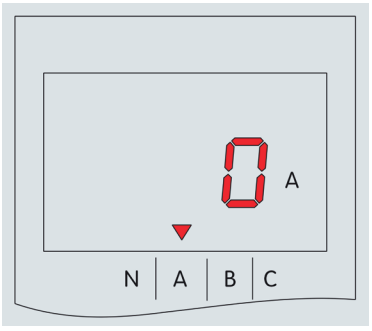
**OVERCURRENT PROTECTION:**
• with long-time delay.

**SHORT-CIRCUIT PROTECTION:**
• with independent time delay, instantaneous;
• type of protection function curve $I^2t$ on/off (for short-time protection).

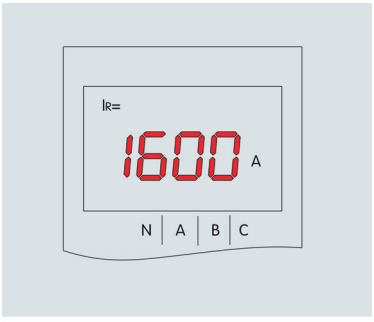
**GROUND FAULT PROTECTION:**
• type of protection function curve $I^2t$ on/off.

**1 LCD display;**
**2** Ig alarm indicator of ground fault protection functions;
**3** IR alarm indicator of overcurrent protection functions;
**4** Isd alarm indicator for short-circuit protection functions with a short-time delay;
**5** Ii alarm indicator of short-circuit protection functions;
**6** «MENU» button for accessing various submenus;
**7** «→» button for menu navigation;
**8** «RESET» button for parameter setting;
**9** «IR» setting of current setpoint value for overcurrent protection;
**10** «tR» setting of overcurrent protection delay;
**11** «Isd» setting of current setpoint value for short circuit protection;
**12** «tsd» setting of short-time delay;
**13** «Ig» setting of ground fault current setpoint value;
**14** «test» testing of instantaneous short-circuit protection;
**15** «tg» setting of ground fault protection tripping delay;
**16** «Ii» setting of current setpoint value for instantaneous short circuit protection.

## MR5.0 LCD display




To go to the query state with parameters, press the «menu» button once, being on the main screen of the release.

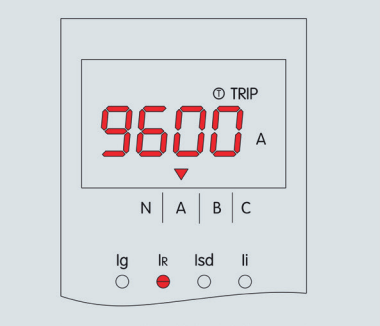


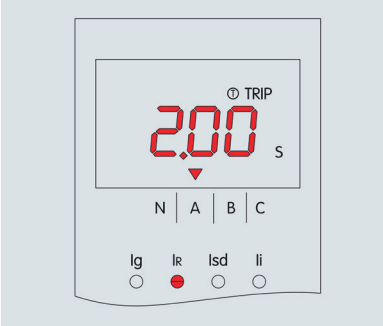

To go to the query of what parameter is set for overcurrent protection, press the «→» button.


а) ток срабатывания


б) время срабатывания

Press the «menu» button twice to enter the triggering request state (display details of the last actuation).




To go to the 6IR simulated triggering state, press the «test» button. The following data can be viewed after actuating.

To return to default interface from any condition, press «RESET» button.

## MR5.0 microprocessor trip unit protection setpoints

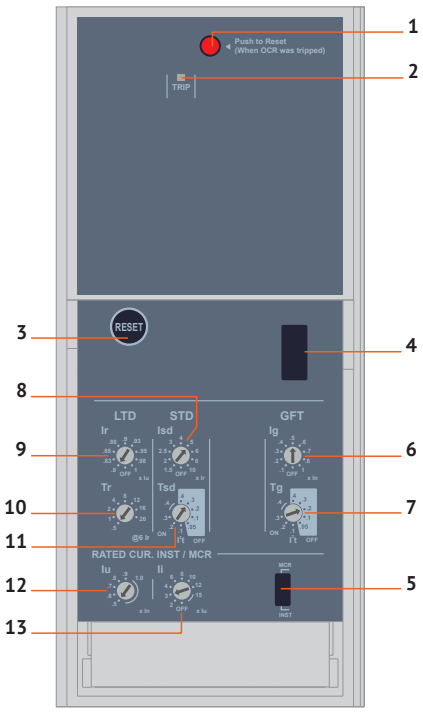
| Parameter | Value | Accuracy |
|---|---|---|
| Overload protection current setpoint ($I_R$) as a multiple of the circuit breaker rated current | 0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 0,95; 0,98; 1 | tripping at (1,05...1,2) Ir |
| Setpoints for response time of overload protection at current 6$I_R$, s | 1; 2; 4; 8; 12; 16; 20; 24; 30 | 15 % |
| Current setpoints for short-circuit protection with time delay $I_{sd}$ as a multiple of the operating current ($I_{sd}/I_u$) | 1,5; 2; 2,5; 3; 4; 5; 6; 8; 10 | 15 % |
| Trip time setpoints in the short circuit zone, s | 0,1; 0,2; 0,3; 0,4; X ($I^2t$ off)<br>0,1; 0,2; 0,3; 0,4 ($I^2t$ on) | 15 % |
| Current setpoints for short-circuit protection with instantaneous operation as a multiple of the rated current ($I_i$), A | 2; 3; 4; 6; 8; 10; 12; 15; off | 15 % |
| Current setpoints for ground fault protection current as a multiple of the rated current ($I_g$), A | A; B; C; D; E; F; G; H; J* | 10 % |
| Trip time setpoints for single-phase ground fault ($T_g$), s | 0,1; 0,2; 0,3; 0,4; X ($I^2t$ off)<br>0,1; 0,2; 0,3; 0,4 ($I^2t$ on) | 15 % |

Accuracy is specified subject to the following conditions:
- power supply of the release from current transducers at full power;
- two-phase or three-phase power supply;
- time setpoint is set ≥ 100 ms;
- availability of additional power supply.

Under other conditions, the response time may be 5 % longer.

| Rated current range (Ig), A | Current (I), A | Trip time (tg), c | | | |
|---|---|---|---|---|---|
| (A ~ J) x In +OFF (power off) | <0,9Ig | Does not trip | | | |
| | 1,1Ig | Trips with delay | | | |
| | $I^2T$ OFF | 0,1 | 0,2 | 0,3 | 0,4 |
| | $I^2T$ ON | 0,1 | 0,2 | 0,3 | 0,4 |
| | I > J | | | | |
| | $I^2T$ ON | Independent time delay: $I^2Tg = (J)^2tg$ | | | |
| | I | | | | |
| | ≤ J | | | | |

## Type MR7.0




### All necessary protection types

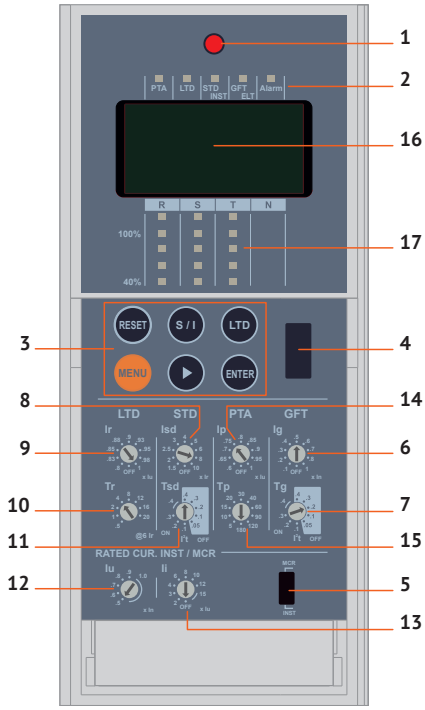
**OVERCURRENT PROTECTION:**
• with long-time delay.

**SHORT-CIRCUIT PROTECTION:**
• with independent time delay, instantaneous;
• type of protection function curve $I^2t$ on/off (for short-time protection).

**GROUND FAULT PROTECTION:**
• type of protection function curve $I^2t$ on/off.

**1** Button for reset after emergency actuation
**2** Tripping indication:
PTI — overcurrent. The LED flashes when the current reaches 1.13 IR
**3** Reset button
**4** Test device connection socket
**5** Selection of $I^2t$ protective characteristic(set by manufacturer)
**6** The Ig switch sets the trip current for a single-phase ground fault as a multiple of the rated current (from 0.1 to 1.0 In)
**7** The Tg switch sets an independent or inverse time delay for a single-phase ground fault (from 0.05 to 0.4 sec)
**8** The Isd switch sets the trip current in the short circuit zone as a multiple of the operating current (from 1.5 to 10 Iu)
**9, 12** The Ir and Iu switches set the operating current of the circuit breaker as a multiple of the rated current from 0.4 to 1.0 In (IR = Ir x Iu)
**10** The Tr switch sets the time delay in the overcurrent zone (from 0.5 to 20 s with a load current of 6 IR)
**11** The Tsd switch sets a short-time delay in the short circuit zone (from 0.05 to 0.4 sec)
**13** The Ii switch sets the instantaneous trip current in the short circuit zone as a multiple of Iu (from 2 to 15 In).

## Type MR8.0




### All necessary protection types

**OVERCURRENT PROTECTION:**
• with long-time delay.

**SHORT-CIRCUIT PROTECTION:**
• with independent time delay, instantaneous;
• type of protection function curve $I^2t$ on/off (for short-time protection).

**GROUND FAULT PROTECTION:**
• type of protection function curve $I^2t$ on/off.

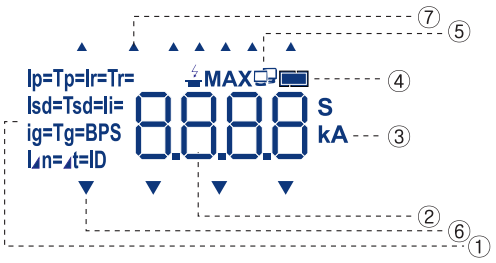
**OVERCURRENT SIGNALING.**

**RECORD OF PROTECTION TRIPS:**
• recording of the 10 latest events (trip cause, trip current value, trip phase and time).

**DATA EXCHANGE INTERFACE:**
Modbus/RS485.

**1** Button for reset after emergency actuation
**2** Tripping indication:
PTA — overload alarm indication
LTD — overload trip
STD/INST — short circuit tripping
GFT/ELT — ground fault tripping
Alarm — microprocessor trip unit actuation
**3** Menu navigation and self-test button
**4** Test device connection socket
**5** Selection of $I^2t$ protective characteristic(set by manufacturer)
**6** The Ig switch sets the trip current for a single-phase ground fault as a multiple of the rated current (from 0.1 to 1.0 In)
**7** The Tg switch sets an independent or inverse time delay for a single-phase ground fault (from 0.05 to 0.4 sec)
**8** The Isd switch sets the trip current in the short circuit zone as a multiple of the operating current (from 1,5 to 10 IR)
**9, 12** The Ir and Iu switches set the operating current of the circuit breaker as a multiple of Iu from 0,4 to 1,0 In (IR = Ir x Iu)
**10** The Tr switch sets the time delay in the overcurrent zone (from 0.5 to 20 s with a load current of 6 IR)
**11** The Tsd switch sets a short-time delay in the short circuit zone (from 0,05 to 0,4 s)
**13** The Ii switch sets the instantaneous trip current in the short circuit zone as a multiple of the rated current (from 2 to 15 In)
**14** The Ip switch sets the current for circuit switching on the overcurrent alarm as a multiple of the current Iu
**15** The Tp switch sets the time for circuit switching on the alarm about overcurrent from the moment it occurs
**16** LCD display
**17** LED scales for indicating currents of three phases

## MR8.0 LCD display

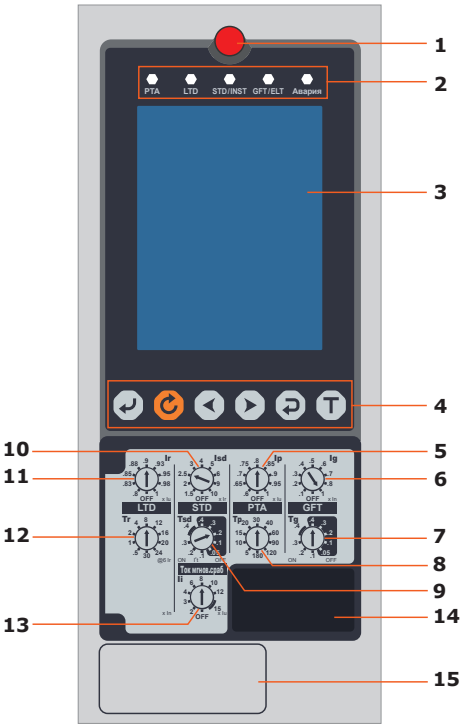



1. Shows current and time setpoints. Displays setpoint values and events.
2. Display of numeric characters and symbols. Displays current, time and simple symbols.
3. Displays units, values of time and current.
4. Battery charge control. A 3.6 V battery is installed in the microprocessor trip unit (lithium). Battery status indication. Blinking at a frequency of 0.5 sec means that the battery is low and needs to be replaced.
5. Connection indication. Displays connection speed, address and screen settings.
6. Displays measured current, phase and load level.
7. Displays information about emergencies and commutations. It is displayed within 1 sec after the microprocessor trip unit has been energized, and then returns to screen of measurements.

| Picture | Button | Description |
|---|---|---|
| 2000 A | | 1. The current in R / S / T / N phases is displayed on the screen at 3-second intervals.<br>2. The current of each phase is displayed. ( ▶) The form moves from left → to right.<br>3. The LED bar graph shows the load level of each phase at 40 ~ 110 %. |
| ▶ | ▶ | 1. Pressing the ( ▶) button is used to go to the next step.<br>· Measurement screen: go to next phase current reading.<br>· Setpoint setting: view a description of the next setting.<br>· Time view: year, month → day, hour → minutes, seconds.<br>2. By pressing for about 3 ~ 4 seconds on the measurement screen, the current of the displayed phase can be measured. (Hold down for a short time, then release). |
| MENU | MENU | Used to check parameter values, view emergency/event log, time and communication parameters. |
| S / I | S/I | 1. Used for short-time delay/instantaneous protection, SELF-TESTING.<br>2. Priority of tripping without time delay.<br>3. Instantaneous trip when no time delay is set for the short-time delay protection/instantaneous protection. |
| LTD | LTD | 1. Used for long tripping delay protection, SELF-TESTING.<br>2. Not available unless a long tripping delay has been set. |
| ENTER | ENTER | 1. Used to view event/fault description and change date/time.<br>2. After going to the description, check or change the use of the MENU button, press the ENTER button to go to the next step. |
| RESET | RESET | 1. Return to the initial state after trip, reset of messages about events and emergencies.<br>2. The combination of LCD display elements and tripping information shown by LEDs will be on for about 0.5 second.<br>3. When the tripping information is displayed using backup battery power, the LED indication will be turned off. |

| | | Screen readings | Button | Description |
|---|---|---|---|---|
| LTD | curren | Ir= 2000 A | M ▶ | 1. Press the Menu (M) button once, while in the Measurements menu, to access the Settings menu.<br>2. The first screen displays the current setpoint for the long-time delay protection, press the tab key to view values of other settings.<br>3. Screen top: «$I_r$ =» is displayed. |
| | time | Tr= 4.00 S | M ▶x1 times | 1. Press the tab key once in the settings view menu to check the time setpoint for long-time delay protection.<br>2. Screen top: «$T_r$ =» is displayed. |
| STD | curren | Isd= 16.00 kA | M ▶x2 times | 1. Press the tab key 2 times in the settings view menu to check the current setpoint for short-time delay protection.<br>2. Screen top: «$I_{sd}$ =» is displayed. |
| | time | Tsd= 0.400 S | M ▶x3 times | 1. Press the tab key 3 times in the settings view menu to check the time setpoint for short-time delay protection. If an inverse time delay $I^2t$ has been selected, the displayed value will be greater than the set value by 1 in the last digit. Example: At $I^2t$ specified delay 0.400 s. is ON: displayed as 0.401 s.<br>2. Screen top: «$T_{sd}$ =» is displayed. |
| INST | curren | Ii= 24.00 kA | M ▶x4 times | 1. Press the tab key 4 times in the settings view menu to check the instantaneous protection current setpoint.<br>2. Screen top: «$I_i$ =» is displayed. |
| PTA | curren | Ip= 1800 A | M ▶x5 times | 1. Press the tab key 5 times in the settings view menu to check the current setpoint for overcurrent warning (PTA).<br>2. Screen top: «$I_p$ =» is displayed. |
| | time | Tp= 20 S | M ▶x6 times | 1. Press the tab key 6 times in the settings view menu to check the time setpoint for overcurrent warning (PTA).<br>2. Screen top: «$T_p$ =» is displayed. |
| GFT | ток | Ig= 800 A | M ▶x7 times | 1. Press the tab key 7 times in the settings view menu to check the current setpoint for ground fault protection.<br>2. Screen top: «$I_g$ =» is displayed. |
| | время | Tg= 0.400 S | M ▶x8 times | 1. Press the tab key 8 times in the settings view menu to check the time setpoint for ground fault protection. If an inverse time delay $I^2t$ has been selected, the displayed value will be greater than the set value by 1 in the last digit. Example: With $I^2t$ on, set delay 0.400 s.: is displayed as 0.401 s.<br>2. Screen top: «$T_g$ =» is displayed. |

# Type MR8.1




## All necessary protection types

**OVERCURRENT PROTECTION:**
- with long-time delay.

**SHORT-CIRCUIT PROTECTION:**
- with independent time delay, instantaneous;
- type of protection function curve $I^2t$ on/off (for short-time protection).

**GROUND FAULT PROTECTION:**
- type of protection function curve $I^2t$ on/off.

**OVERCURRENT SIGNALING.**

**RECORD OF PROTECTION TRIPS:**
- recording of the 300 latest events (trip cause, trip current value, trip phase and time).

**CONTACT PROGRAMMING FUNCTION.**

**MENU IN RUSSIAN**

**DATA EXCHANGE INTERFACE:**
Modbus RTU/RS485.

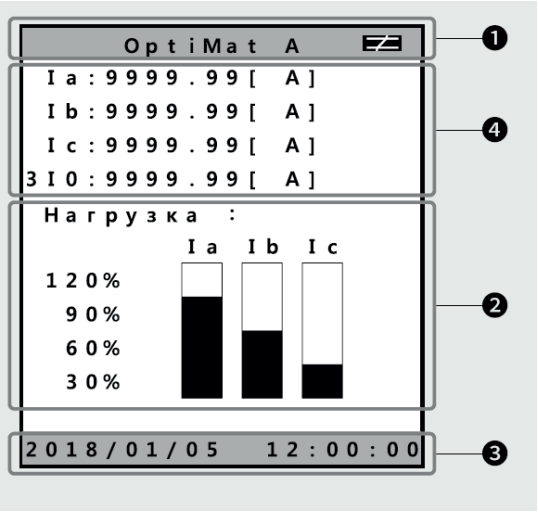
**1 Reset button**
**2 Emergency indication**
**3** LCD display
**4 Control and setting button box**
**5.** «Ip» setting the value of the overload alarm circuit switching current as a multiple of the current Ir.
**6.** «Ig» setting of ground fault current setpoint value.
**7.** «Tg» setting of ground fault protection operation delay.
**8.** «Tp» setting the time for enabling the overload alarm from the moment it occurs.
**9.** «Tsd» setting of short-time delay.
**10.** «Isd» setting of current setpoint value for short circuit protection.
**11.** «Ir» setting of current setpoint value for overcurrent protection.
**12.** «Tr» setting of overcurrent protection delay.
**13.** «Ii» setting of current setpoint value for instantaneous short circuit protection.
**14. Multifunctional connectors.**
**15. Battery cubicle.**

## LCD display MR8.1

| Button | Purpose | Description |
|---|---|---|
|  | Enter, menu selection (ENTER) | • Used for menu selection;<br>• Used to save changed settings. |
|  | Error reset (RESET) | • Used for screen update;<br>• Used for error indication update;<br>• When the tripping information is displayed using backup battery, pressing the RESET button may turn off the main screen. |
|  | Move left (LEFT) | • Used to navigate menu or change parameters and select values. |
|  | Move right (RIGHT) | • Used to navigate menu or change parameters and select values. |
|  | Return (RETURN) | • Used to navigate the main menu;<br>• Navigates to the «Save» screen if there are changes in the settings screen. |
|  | Testing (TEST) | • Run a test using the given test condition. |

The MR8.1 microprocessor trip unit includes the following main menus:
**«Measurements»** — to view the actual values of current and current readings in each phase.
**«System»** — to change the rated current, rated frequency, system settings, system time, password, language, assignment of digital outputs and self-test settings.
**«Setpoints»** — to change the setpoints.
**«Data log»** — to view information about trips and emergencies.

The main screen displays the following information:




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

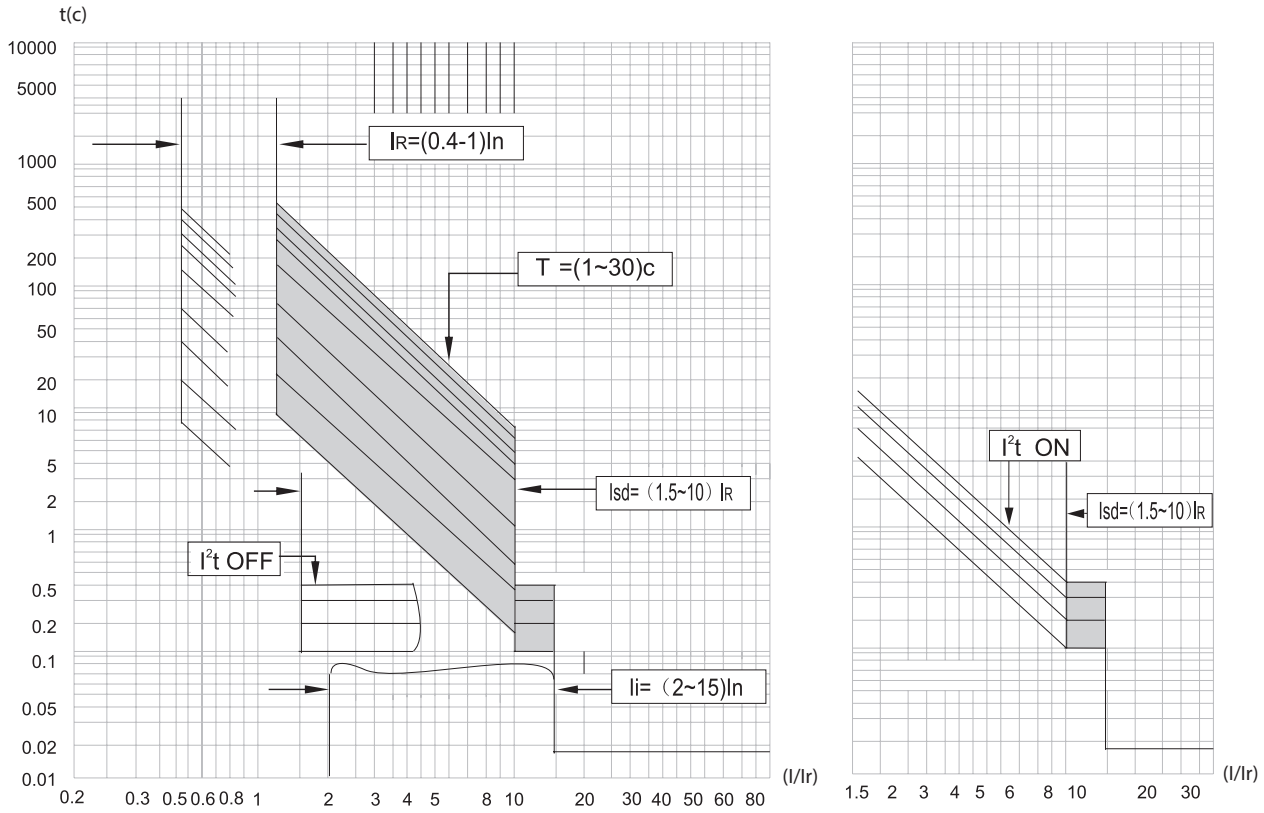
## Protection setpoints for microprocessor trip units MR7.0, MR8.0, MR8.1

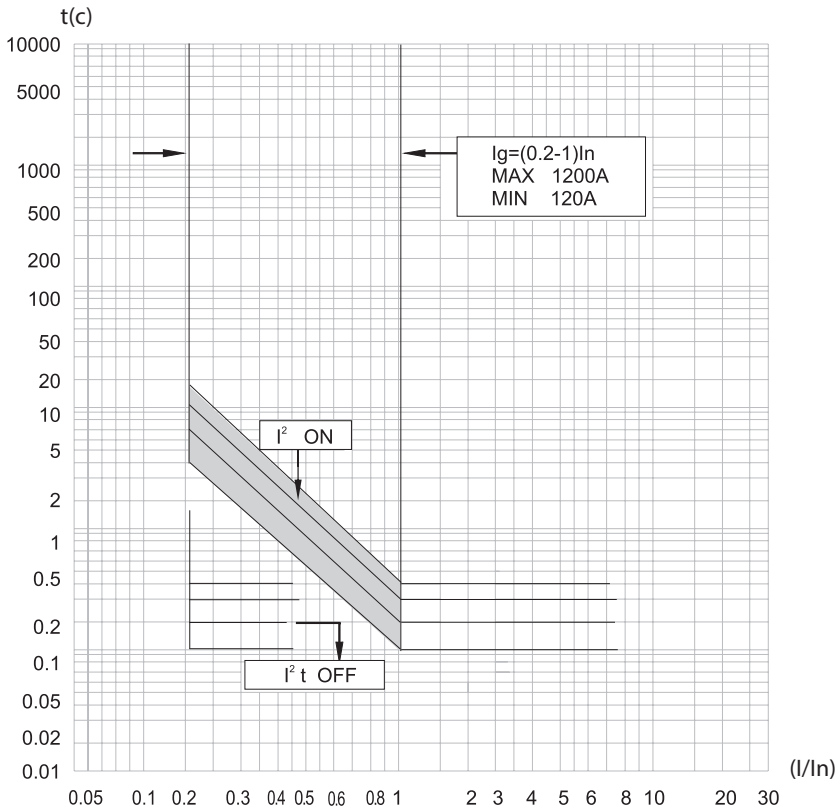
| Parameter | Value | Accuracy |
|---|---|---|
| Overload protection setpoint (IR) as a multiple of the circuit breaker operating current IR= $I_r$ x $I_u$ | $I_r$ = 0,8; 0,83; 0,85; 0,88; 0,9; 0,93; 0,95; 0,98; 1,0<br>$I_u$ = 0,5; 0,6; 0,7; 0,8; 0,9; 1 | tripping at (1,05..1,2) Ir |
| Trip time setpoints at current of 6 IR, s ($T_r$) | 0,5; 1; 2; 4; 8; 12; 16; 20 | +15 % |
| Current settings for short-circuit protection with short-time delay Isd as a multiple of the operating current ($I_{sd}$/IR) | 1,5; 2; 2,5; 3; 4; 5; 6; 8; 10 | +15 % |
| Trip time setpoints in the short circuit zone, s ($T_{sd}$) | 0,05; 0,1; 0,2; 0,3; 0,4 ($I^2t$ OFF)<br>0,1; 0,2; 0,3; 0,4 ($I^2t$ ON) | +0,03 s |
| Setpoints for instantaneous operation current ($I_i$) as a multiple of current Iu, A ($T_i$ no more than 0,05 s) | 2; 4; 6; 8; 10; 12; 15 | +15 % |
| Overcurrent alarm current setpoints ($I_p$/$I_u$) | 0,6; 0,65; 0,7; 0.75; 0,8; 0,85; 0,9; 0,95; 1,0 | +15 % |
| Setpoints for the activation time of the overcurrent alarm ($T_p$), s | 5; 10; 15; 20; 30; 40; 60; 90; 120; 180 | +15 % |
| Current settings for ground fault protection as a multiple of 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 % |
| Setpoints for response time of earth fault protection ($T_g$), s | 0,05; 0,1; 0,2; 0,3; 0,4 ($I^2t$ OFF)<br>0,1; 0,2; 0,3; 0,4 ($I^2t$ ON) | +0,03 s |

## Information transmitted by microprocessor trip unit MR8.0, MR8.1

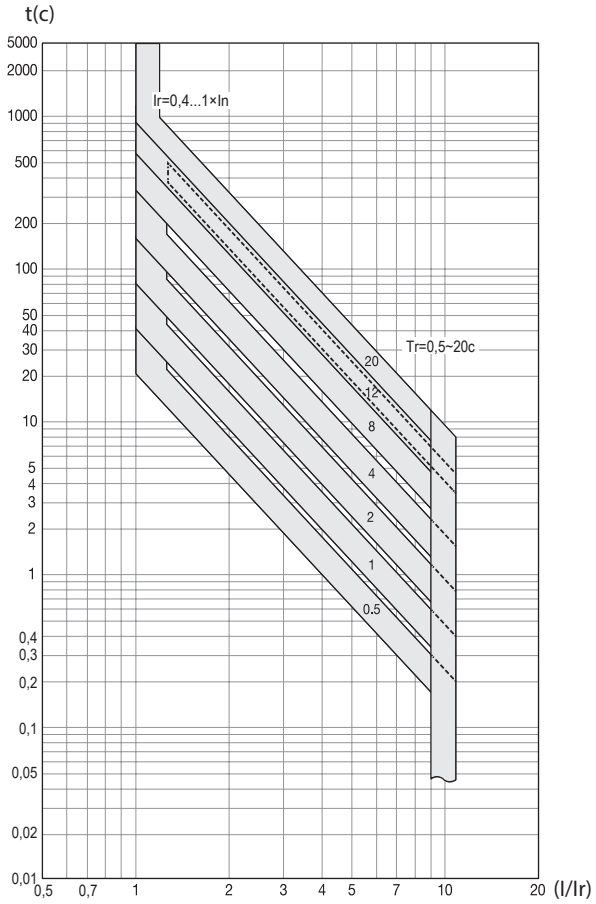
| | |
|---|---|
| **Supported protocol** | Modbus RTU |
| Physical layer | RS485 |
| Maximum data transfer rate | 38400 bit/sec |
| Maximum number of devices in parallel operation | 100 |
| **Settings information** | |
| Ir | Overload protection setting (set by circuit breakers Ir and Iu as a multiple of the rated current from 0.4In to 1.0In (IR = Ir*Iu)) |
| Tr | Overload protection response time setpoint (from 0.5 to 30 s at 6IR current load) |
| Isd | Trip current in the short circuit zone (from 1.5 to 10 IR) |
| Tsd | Short-time delay in the short circuit zone (from 0.05 to 0.4 sec) |
| Ii | Instantaneous trip current in the short circuit zone as a multiple of the operating current (from 2 to 15 In) |
| Ip | Overcurrent alarm current as a multiple of current Iu |
| Tp | Activation time for overcurrent alarm from the moment of its occurrence |
| Ig | Ground fault protection trip current as a multiple of the rated current (from 0.1 to 1.0 In) |
| Tg | Short-time delay of earth fault protection (from 0.05 to 0.4 s) |
| **Circuit breaker tripping information** | |
| Current in phases during the circuit breaker trip | |
| Trip current at ground fault | |
| Year, month, date, time (minutes and seconds) of circuit breaker trip | |
| Cause for the circuit breaker trip and the phase with the maximum current value when the circuit breaker is tripped | |
| Maximum current in one of the phases during the circuit breaker trip | |
| **Measured parameters** | |
| Measured value of the current in phases | |

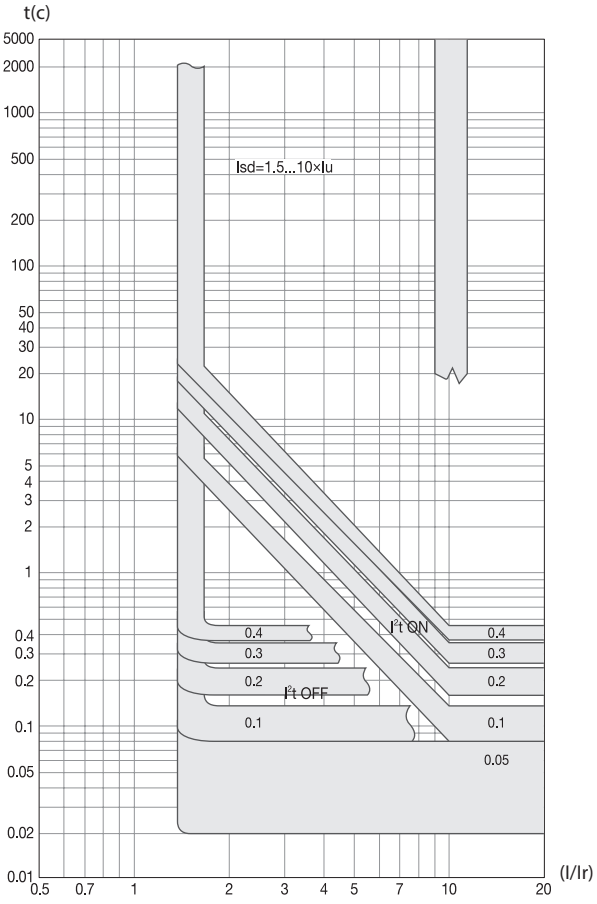
## Time-current characteristics of switches with a microprocessor trip unit MR5.0

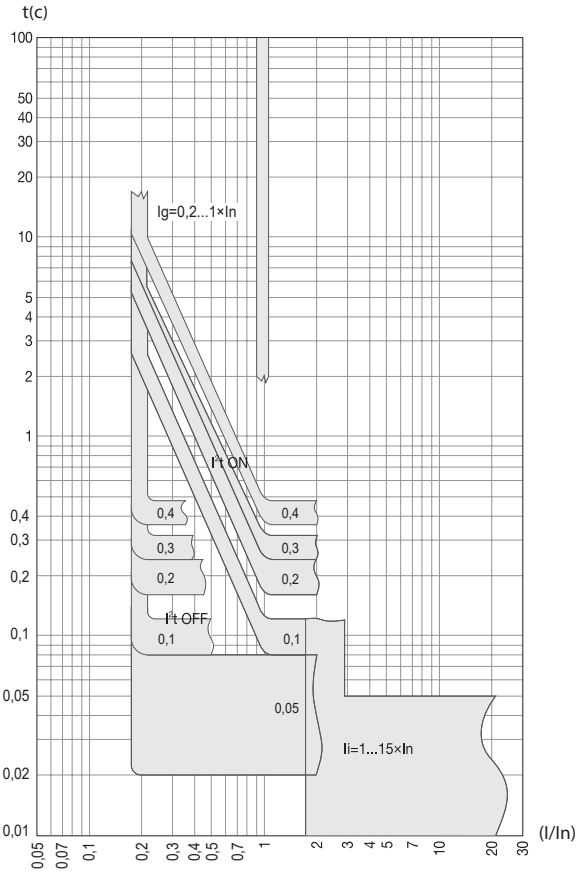


## Time-current characteristics of switches with a microprocessor trip unit MR7.0, MR8.0, MR8.1



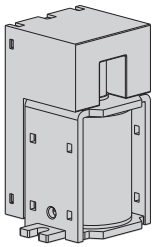
# Accessories OptiMat A for sizes S2, S4, S6 (150 kA)

## Shunt trip

Shunt trip is designed for circuit breaker remote opening. The shunt trip causes the circuit breaker to trip under any operating conditions when the supply voltage remains between 0.75 and 1.1 Ue. Unified for OptiMat A circuit breakers of sizes S2, S4, S6 (150 kA). Installed under the front panel of the circuit breaker in its own cubicle.

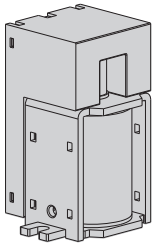
## Second shunt trip

Second shunt trip is designed for circuit breaker remote opening and it is a backup system of the shunt trip. The technical specifications correspond to those of the shunt trip. It is installed if there are additional requirements for the reliability of systems that include an air circuit breaker. It mutually exclusive item with undervoltage release.



| Product name | Shunt trip OptiMat A-230AC/DC-UHL3 | Shunt trip OptiMat A-110AC/ DC-UHL3 | Shunt trip OptiMat A-24DC-UHL3 |
|---|---|---|---|
| Code | 217987 | 217986 | 272026 |
| Operating voltage, V | 230AC / 220DC | 110 AC/DC | 24 DC |
| Operating voltage range | (0,75–1,1) Ue | | |
| Power consumption, VA, W | 200 | | |
| Operating mode | Short-time (pulse) | | |
| Break time, ms | max. 50 | | |

## Closing coil

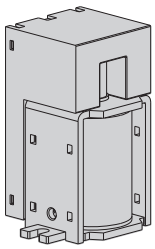


Actuating coil is designed for circuit breaker remote closure. Unified for OptiMat A circuit breakers of sizes S2, S4, S6 (150 kA). Installed under the front panel of the circuit breaker in its own cubicle.

| Product name | Closing coil OptiMat A-230AC/DC-UHL3 | Closing coil OptiMat A-110AC/DC-UHL3 | Closing coil OptiMat A-24DC-UHL3 |
|---|---|---|---|
| Code | 217989 | 217988 | 272020 |
| Operating voltage, V | 230AC / 220DC | 110 AC/DC | 24 DC |
| Operating voltage range | (0,75–1,1) Ue | | |
| Power consumption, VA, W | 200 | | |
| Operating mode | Short-time (pulse) | | |
| Break time, ms | max. 50 | | |

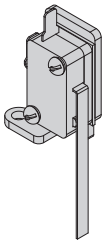
## Undervoltage release

The undervoltage release is designed to open the circuit breaker when the voltage drops below the established standards. If there is no supply voltage at the undervoltage release, automatic or manual closing is not possible. The undervoltage release causes the circuit breaker to open under any operating conditions when the supply voltage varies between 0.75 and 1.1 Ue. Closing of the circuit breaker becomes possible when the undervoltage release is supplied with voltage from 0.75 to 1.1 Ue. It is unified for OptiMat A circuit breakers of sizes S2, S4, S6 (150 kA). Installed under the front panel of the circuit breaker in its own cubicle. It is mutually exclusive with the second shunt trip.



| Product name | Undervoltage release OptiMat A-230AC/DC-UHL3 |
|---|---|
| Code | 217994 |
| Operating voltage, V | 230AC / 220DC |
| Circuit breaker-on voltage range | (0,85–1,1) Ue |
| Circuit breaker-off voltage range | (0,35-0,7) Ue |
| Power consumption, VA | 200 |
| Operating mode | Short-time (pulse) |
| Break time, ms | max. 50 |

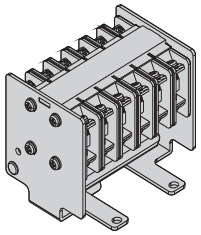
## Signaling contact of the circuit breaker main contacts closure readiness



Contact of the circuit breaker main contacts closure readiness signaling is designed to inform of the spring condition (charged/not charged), which closes the circuit breaker. Unified for OptiMat A circuit breakers of sizes S2, S4, S6 (150 kA). Installed under the front panel of the circuit breaker in its own cubicle.

| Product name | Contact of the circuit breaker main contacts closure readiness signaling OptiMat A630-4000-UHL3 | |
|---|---|---|
| | Voltage, V | Active load, A |
| Alternating current, VA | 250 | 8 |
| | 125 | 16 |
| Direct current, W | 250 | 0,3 |
| | 125 | 0,6 |

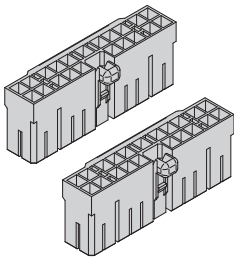
## Auxiliary contacts



Auxiliary contacts are designed for signaling of the circuit breaker state. The devices are unified for OptiMat A circuit breakers of sizes S2, S4, S6 (150 kA). Installed under the front panel of the circuit breaker in its own cubicle.

| Product name | Auxiliary contacts | |
|---|---|---|
| | Voltage, V | Inductive load, A |
| Alternating current | 250 | 5 |
| Direct current, W | 30 | 3 |
| Configuration of contacts | 6a+6b | |

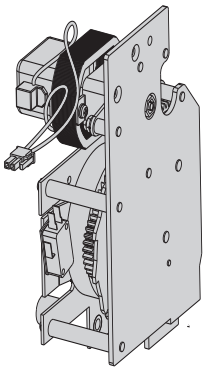
## Control circuit connector set



The control circuit connector set is used to connect external secondary circuits of the user for signaling and control. It is mounted to the external wiring and connected to the circuit breaker. It is included in the basic package of oversized circuit breakers S2, S4, S6 (150 kA).

| Product name | | Control circuit connector kit OptiMat A-UHL3 |
|---|---|---|
| Code | | 234555 |
| Quantity of delivery | Plastic terminal block | 2 |
| | Female pin contact | 15 |

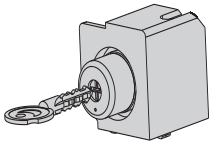
## Motor drive for charging the actuating springs



Motor drive is designed to charge circuit breaker's actuating spring. If the motor drive is not powered, the actuating spring is charged manually. The device is unified for OptiMat A circuit breakers of sizes S2, S4, S6 (150 kA). Installed under the front panel of the circuit breaker in its own cubicle.

| Product name | Motor drive OptiMat A630-4000-230AC/DC-UHL3 | Motor drive OptiMat A630-4000-110AC/DC-UHL3 |
|---|---|---|
| Code | 235993 | 217990 |
| Operating voltage, V | 230AC / 220DC | 110AC/DC |
| Maximum current consumption, A | 0,5 | |
| Motor speed, rpm | 16000–19000 | |
| Maximum start current | 5In | |
| Charge time, sec | max. 5 | |
| Insulation strength | 2 kV for 1 min | |
| Operating temperature range, °C | -25...+60 | |
| Operating frequency max. 2 times/min | max. 2 times/min | |
| Mechanical wear resistance, cycles | 20000 | |

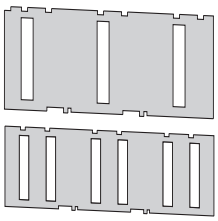
## Lock 3



The built-in closure lock is designed to prevent closing (locks the circuit breaker in the open state). The circuit breaker lock cannot be released without the appropriate key. The device is unified for OptiMat A circuit breakers of sizes S2, S4, S6 (150 kA). Installed under the front panel of the circuit breaker in its own cubicle.

| Product name | built-in connection lock OptiMat A |
|---|---|
| Code | 217999 |
| Number of keys in the set, pcs | 1 |

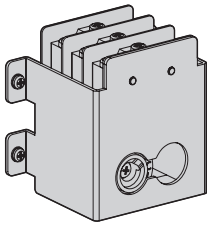
## Isolating shutters



Isolating shutters are designed to prevent access to the current-carrying contacts of the fixed part when the circuit breaker is in the «drawn out» or «test» position (IP20 rating). They are installed in the circuit breaker basket.

Insulating shutters are included in all versions of withdrawable circuit breakers and fixed parts.

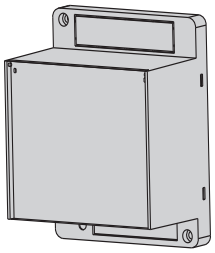
## Indicator of switch position in basket



Position indication shows the circuit breaker state: DRAWN IN/TEST/DRAWN OUT. It is installed to the left or right of the circuit breaker on the basket. Unified for sizes S2, S4, S6 (150 kA).

| Product name | Indicator of switch position in OptiMat A-UHL3 basket | | |
|---|---|---|---|
| Code | 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 |

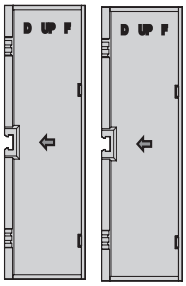
## Undervoltage release tripping delay controller



Controller is designed to prevent undervoltage release tripping in case of short-time outages or voltage slumps of supply equipment. An undervoltage release is required for connection as part of the circuit breaker. It is installed on a din-rail or the side wall of the circuit breaker.

| Product name | Undervoltage release tripping delay controller OptiMat A-UHL3 |
|---|---|
| Code | 236607 |
| Time delay, sec | 0,5; 1,0; 1,5; 3 |

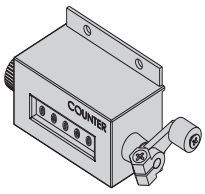
## Inter-pole partitions



Inter-pole partitions are designed to prevent interphase short circuit formation. The devices are unified for OptiMat A circuit breakers of sizes S2, S4, S6 (150 kA). They are installed in the corresponding slots between the main terminals of the circuit breaker. They are the part of basic configuration.

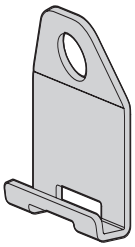
| Product name | Inter-pole partitions OptiMat A630-4000-UHL3-2 pcs |
|---|---|
| Code | 269618 |
| Number of partitions in the set | 2 |

## Mechanical cycle counter




The mechanical cycle counter is designed to indicate the number of on/off cycles. Unified for OptiMat A circuit breakers of sizes S2, S4, S6 (150 kA). Installed under the front panel of the circuit breaker in its own cubicle.

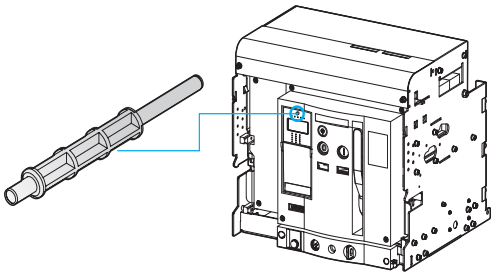
## Lifting lugs



The lifting lugs are designed to facilitate lifting and movement of the circuit breaker.

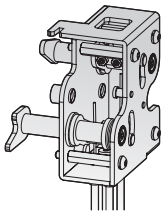
| Product name | Lifting lugs OptiMat A-UHL3-2 pcs |
|---|---|
| Code | 240745 |

## Microprocessor trip unit reset mechanism



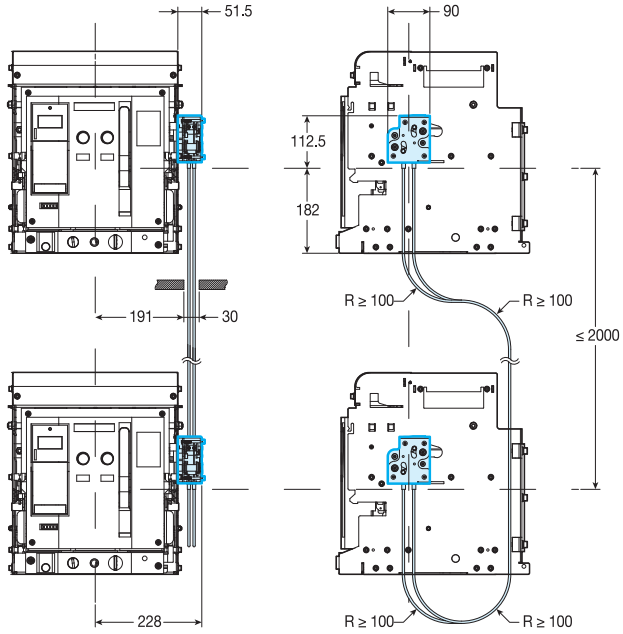
The module at the base of the microprocessor trip unit is equipped with a button for manual reset after tripping from the microprocessor trip unit. When the circuit breaker is triggered, the button slides forward.
To close the circuit breaker, press the button. Unified for OptiMat A circuit breakers of sizes S2, S4, S6 (150 kA). Installed under the front panel of the circuit breaker in its own cubicle. It is part of the basic configuration.

## Mechanical interlock



The mechanical interlock is designed for mutual interlocking of closing/opening operations of two or three circuit breakers. Unified for sizes S2, S4, S6 (150 kA). They are installed only on withdrawable circuit breakers.

| Product name | Code |
|---|---|
| Mechanical interlock kit for 2 OptiMat A630-4000-UHL3 | 242120 |
| Mechanical interlock kit for 3 OptiMat A630-4000-UHL3 | 248580 |




**Type A. Two devices**
One regular power supply and one redundant power supply.

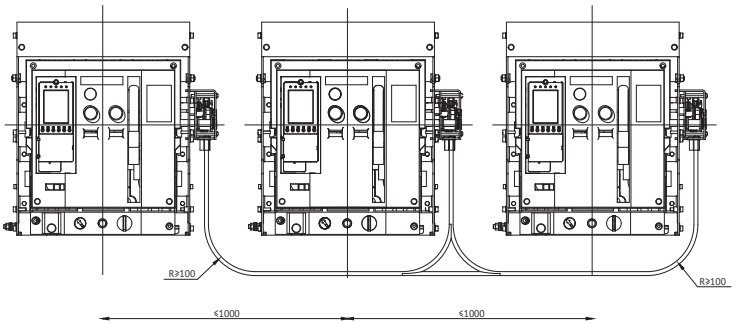
| A | B |
|---|---|
| 0 | 0 |
| 0 | 1 |
| 1 | 0 |

This type of interlock prevents two circuit breakers from being switched on at the same time.

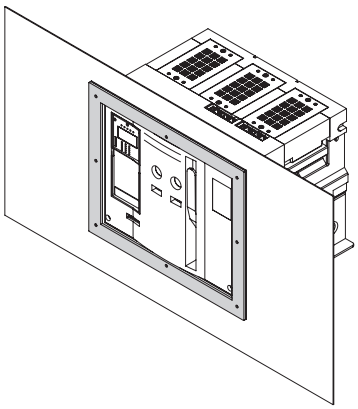
**Three devices**
Connection via one source, sectional circuit breaker is closed. Each one is powered by its own transformer, the sectional circuit breaker is open.

| A | B | C |
|---|---|---|
| 0 | 0 | 0 |
| 1 | 0 | 0 |
| 0 | 1 | 0 |
| 0 | 0 | 1 |
| 1 | 1 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |

This type of interlock allows the simultaneous closing of two of the three circuit breakers.

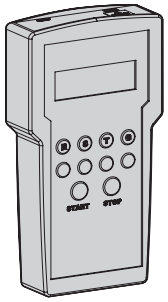



## Front panel frame



The front panel frame is designed to increase protection against touching the sharp edge of the cutout. In addition, it protects the protruding front part of the circuit breaker. It is installed on the switchgear front panel. Front panel frames are included as standard.

## Microprocessor trip unit tester



Tester for microprocessor trip units of circuit breakers of the OptiMat A series is designed for testing microprocessor trip units of the MR7.0, MR8.0, MR8.1 series. Testing is done by connecting to the trip unit connectors and allows you to check the operation of the device in emergency modes and the integrity of the internal electrical circuit.

| Parameter | | Value |
|---|---|---|
| Rated frequency, Hz | | 50/60 |
| AC supply voltage, V | | 100-240 |
| Battery | Standard size | LR6 (AA) |
| | Rated voltage, V | 1,5 |
| | Quantity, pcs. | 6 |
| Power consumption, max, W: | | |
| - in settings mode; | | 10 |
| - in testing mode. | | 20 |

| Product name | Code |
|---|---|
| OptiMat A microprocessor trip unit tester | 236610 |

# Mounting accessories OptiMat A of sizes S1, S5, S6 (120 кА)

## Closing coil and shunt trip

The closing coil is designed for remote closing of the circuit breaker, and the shunt trip is designed for remote opening of the circuit breaker. They are designed for operation in AC and DC circuits.

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

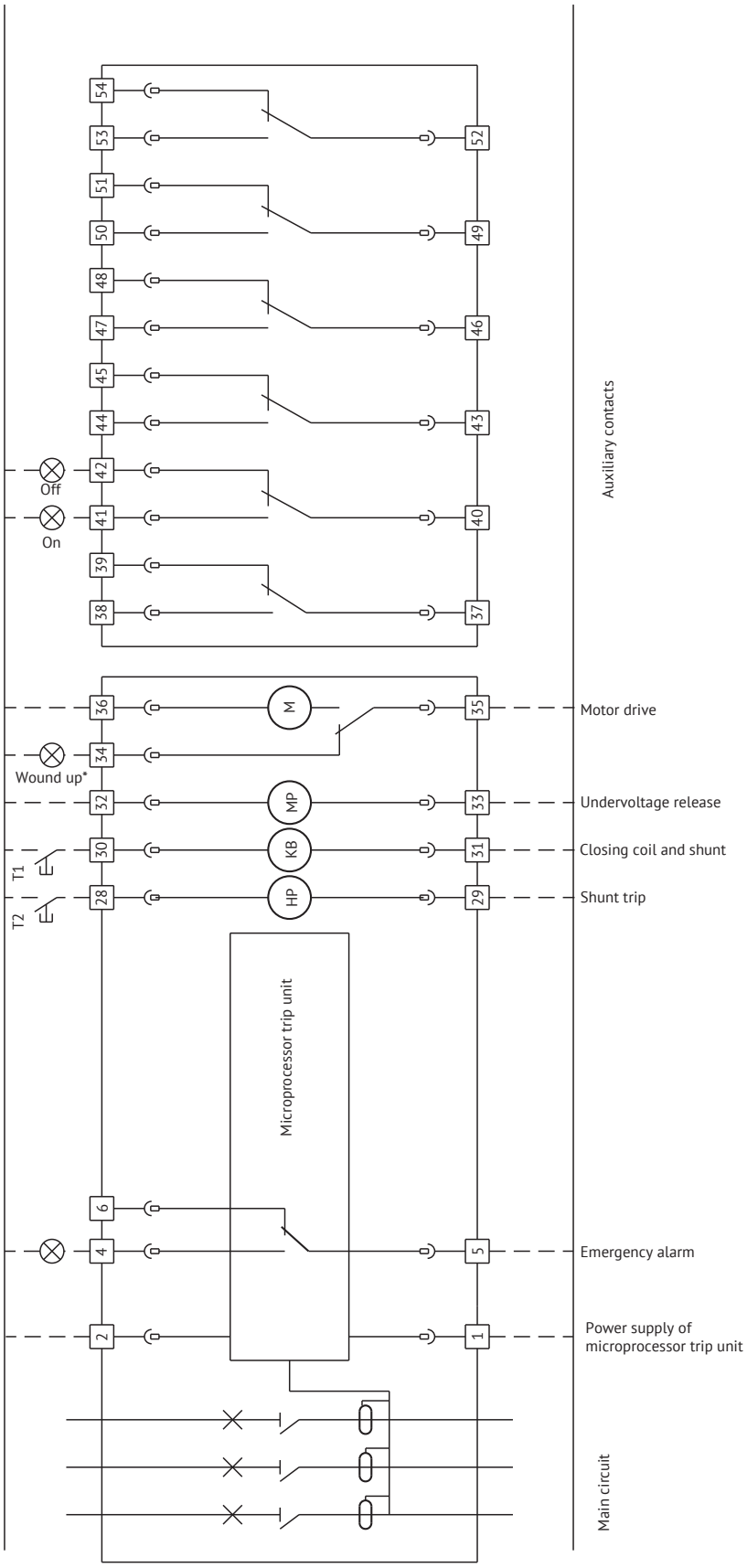
## Motor drive

The motor drive is designed for remote charging of the circuit breaker mechanism, pre-compression of the actuating spring, i.e. preparing the circuit breaker for closing. The rated duty of the motor drive is short-term. The motor drive is designed for operation in an AC or DC circuit.

| | |
|---|---|
| Operating voltage Ue, V | 230AC/220DC |
| Trip voltage range, V | (0,85 ~ 1,1)Ue |
| Power consumption, VA or W | 150 |
| Charge time, sec | <8 |
| Charging frequency | up to three cycles per minute |

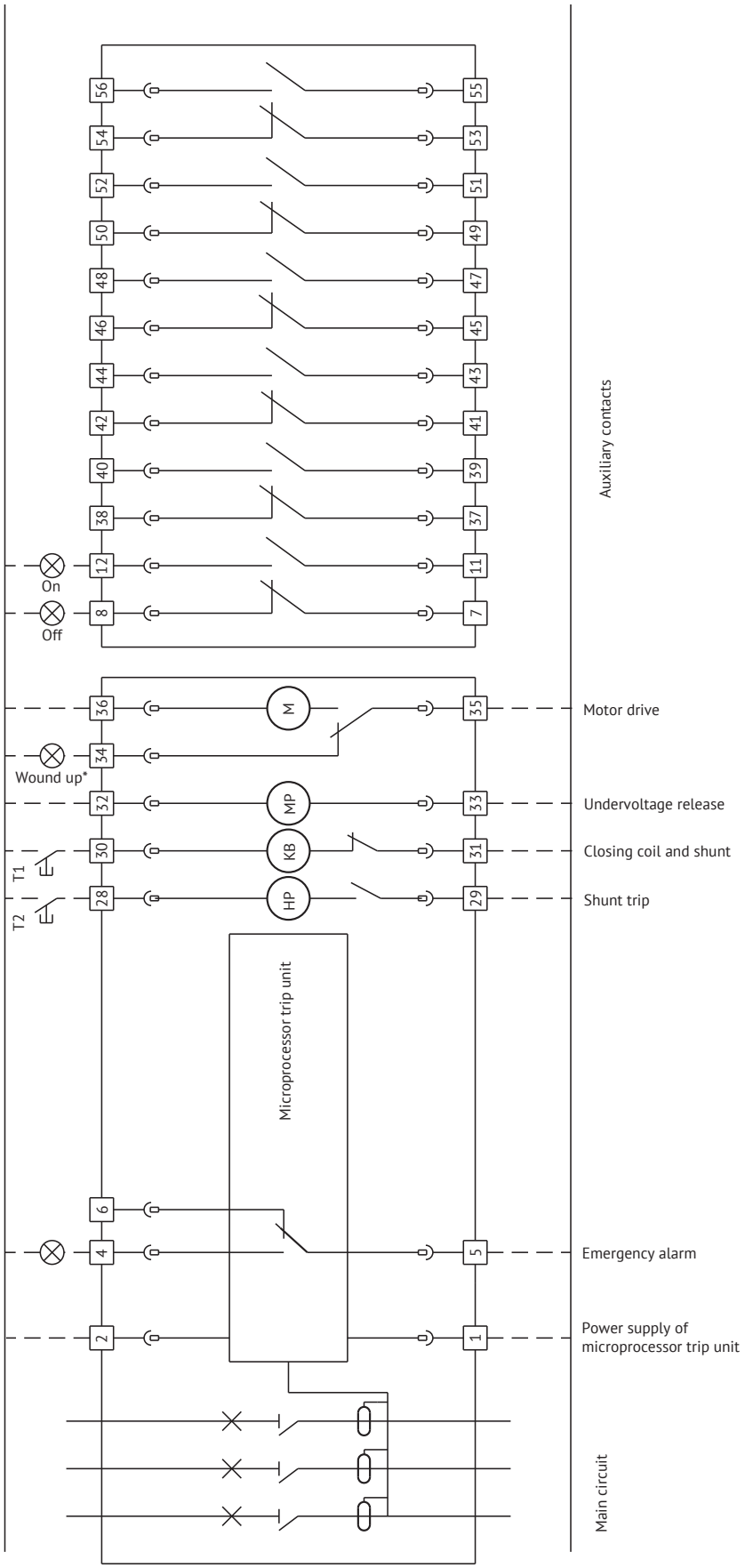
## Circuit diagrams OptiMat A

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




* Terminal 34 (charged) is not galvanically separated from terminal 36
The dotted line indicates the connections made by the consumer.

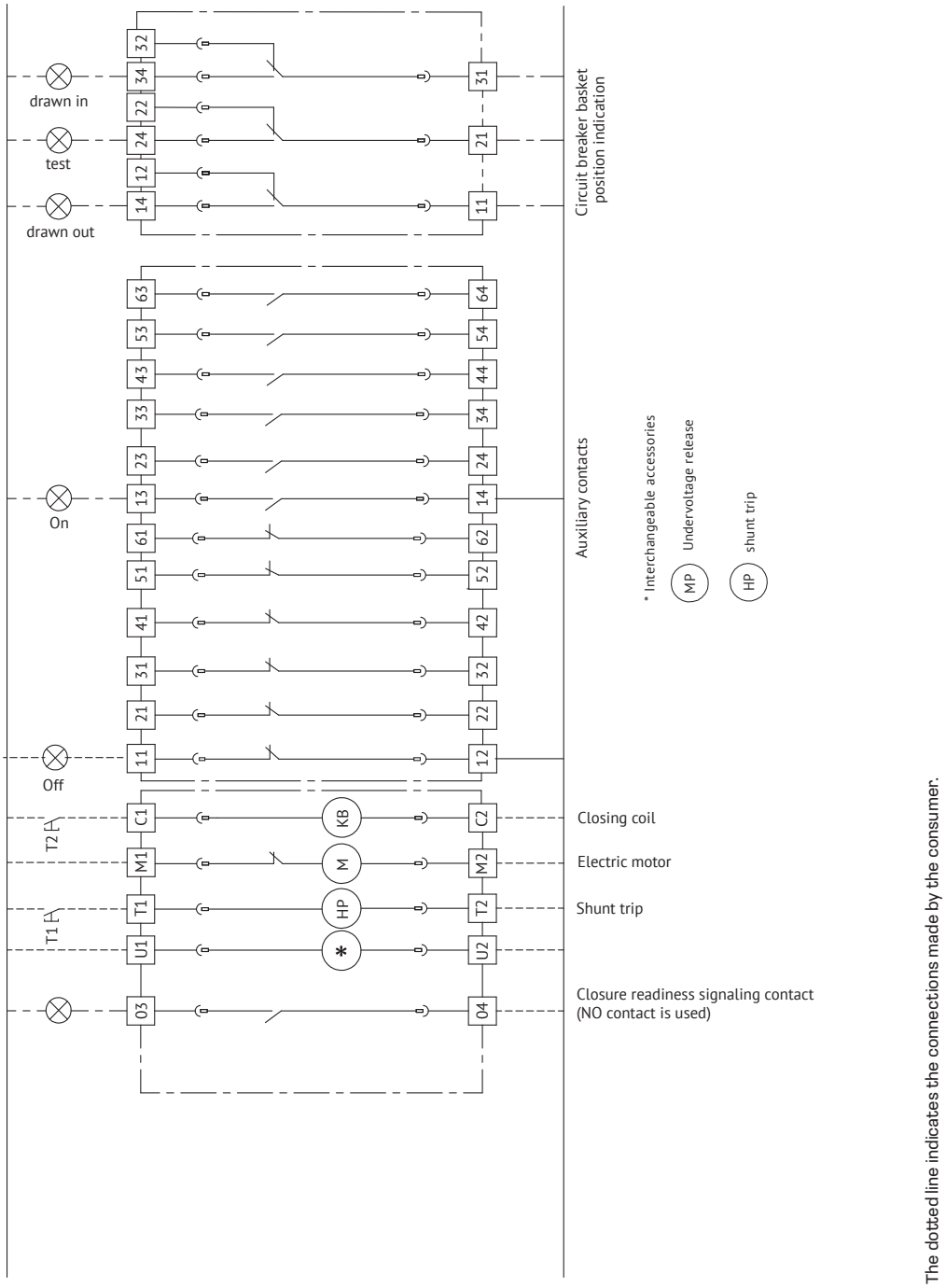
**Electrical schematic diagram of circuit breaker with semiconductor release MR5.0 type of S5, S6 dimension version**




* Terminal 34 (charged) is not galvanically separated from terminal 36

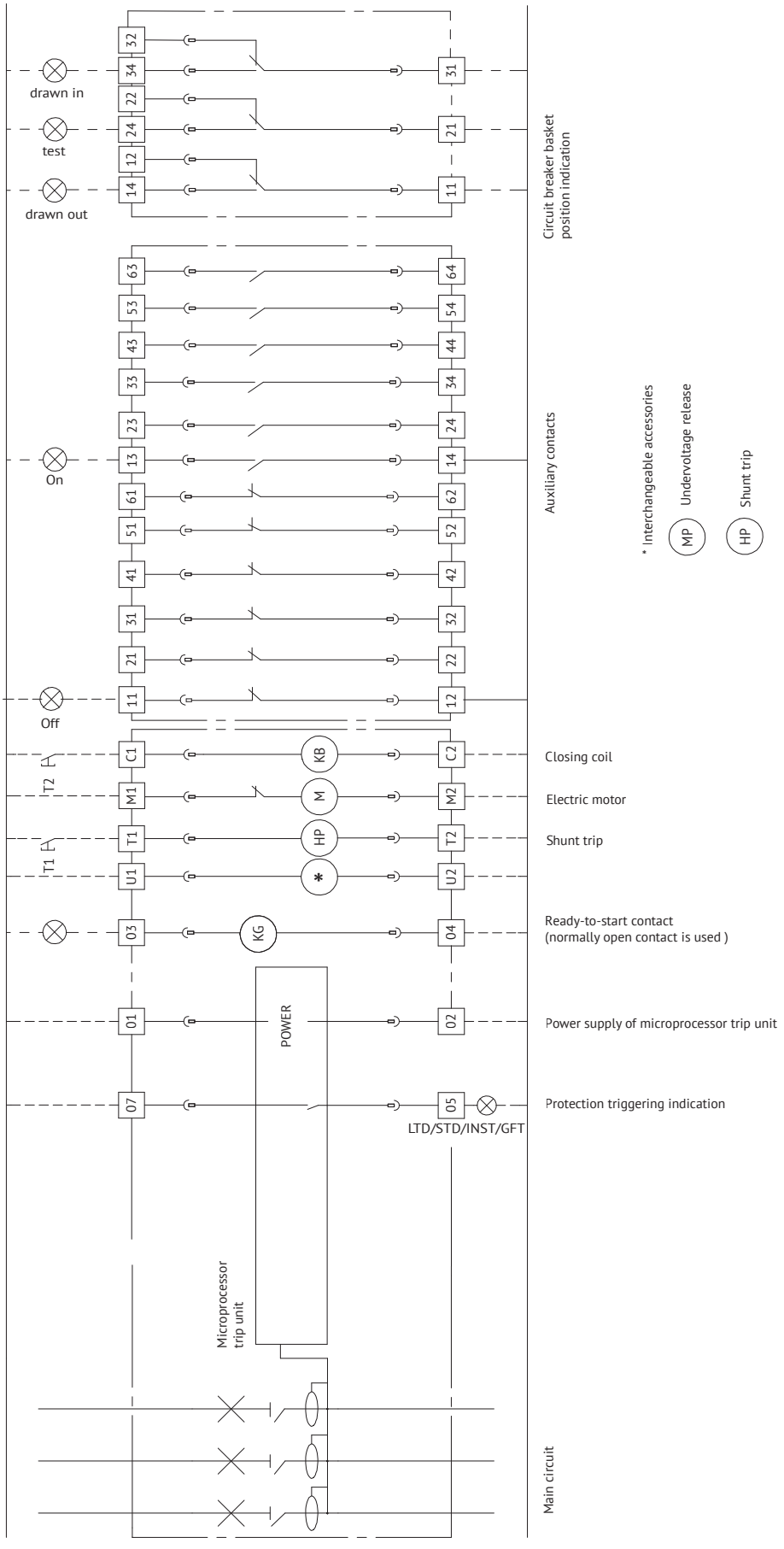
The dotted line indicates the connections made by the consumer.

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

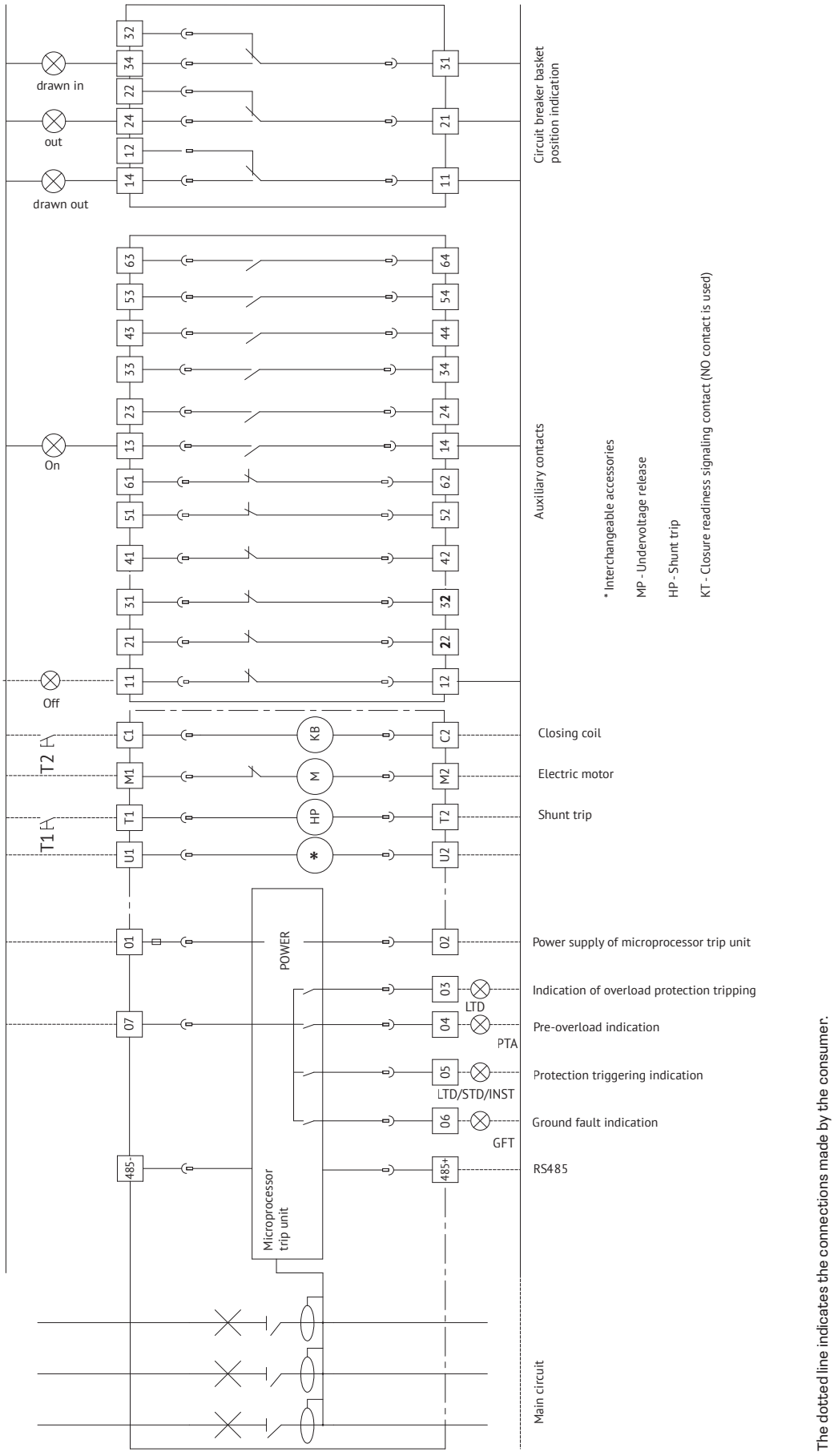



The dotted line indicates the connections made by the consumer.

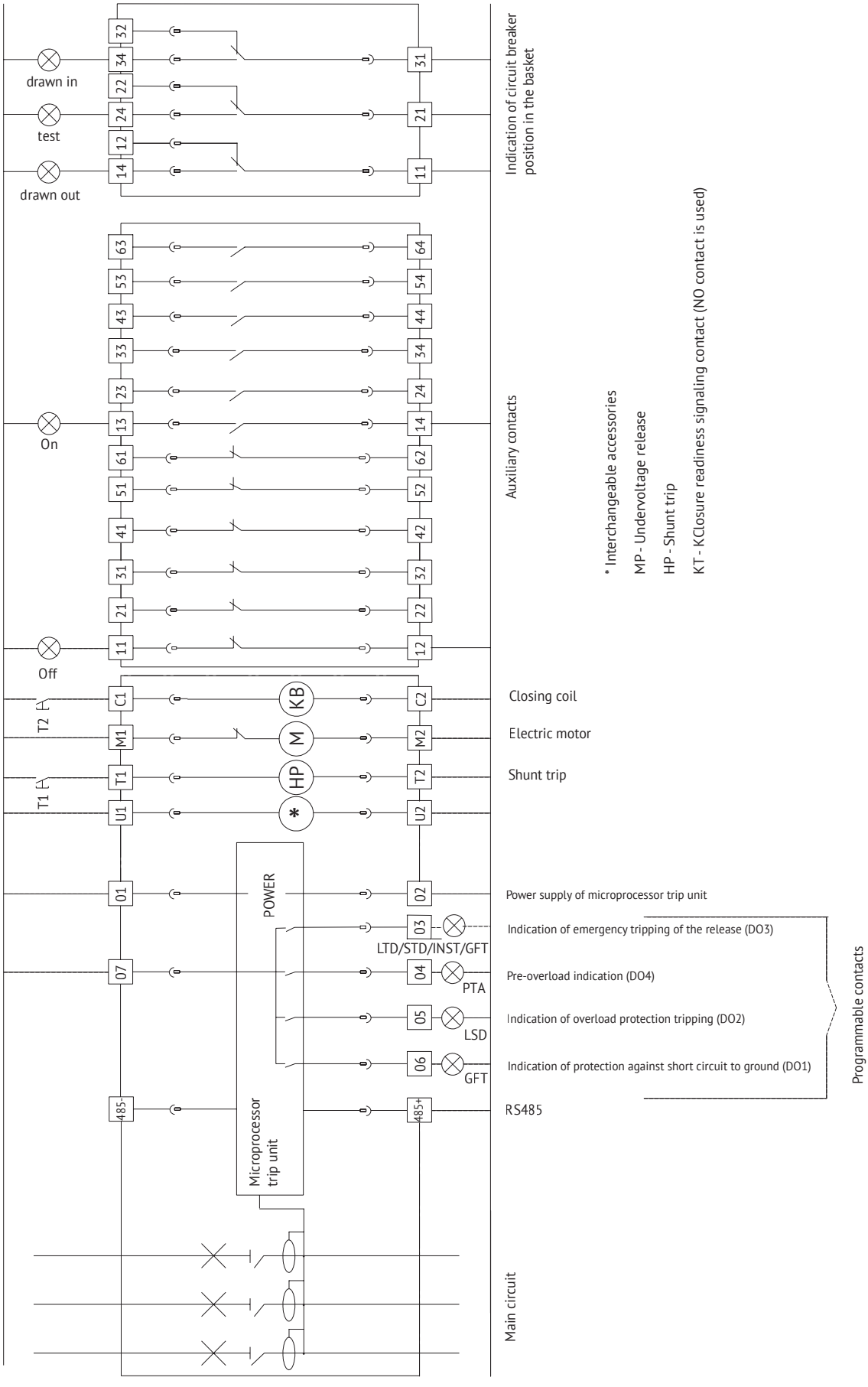
## Electrical schematic diagram of circuit breaker with semiconductor release MR7.0 type of S2, S4, S6 dimension version



**Electrical schematic diagram of circuit breaker with semiconductor release MR8.0 type of S2, S4, S6 dimension version**

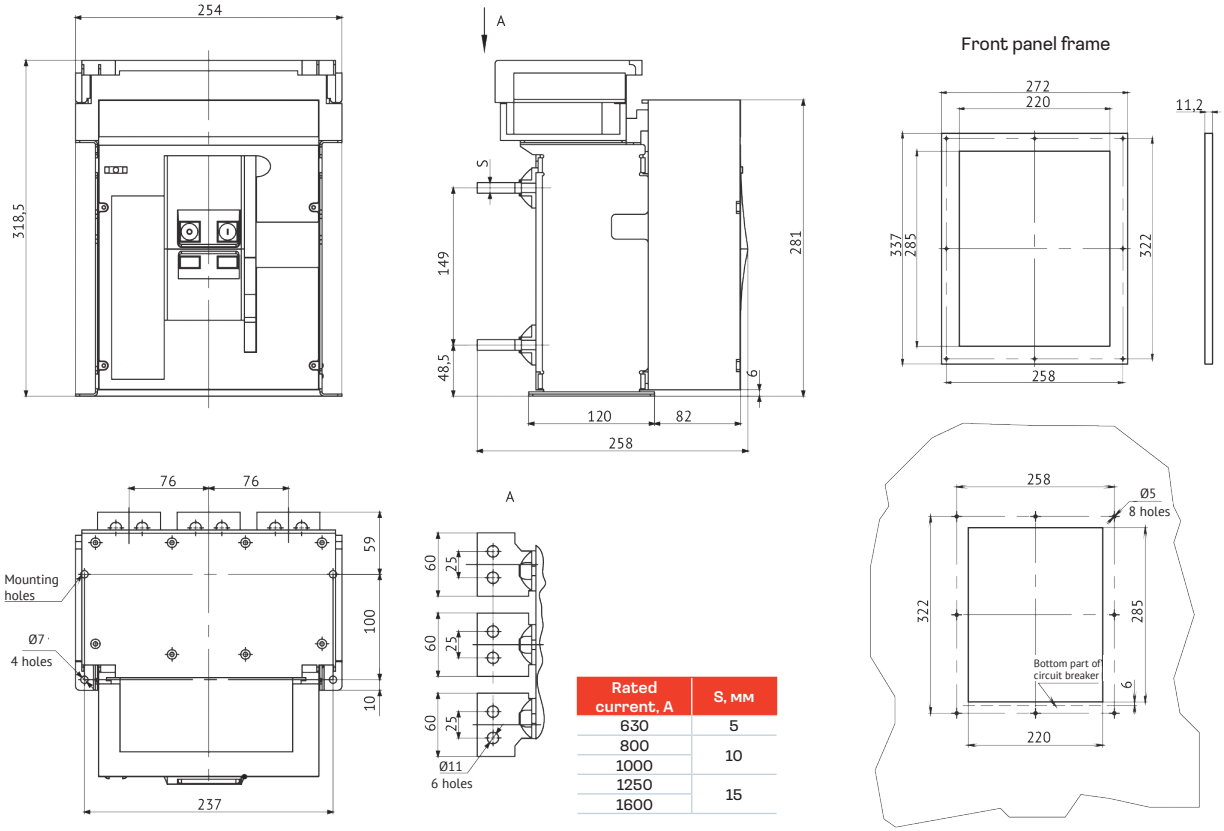


**Electrical schematic diagram of circuit breaker with semiconductor release MR8.1 type of S2, S4, S6 dimension version**



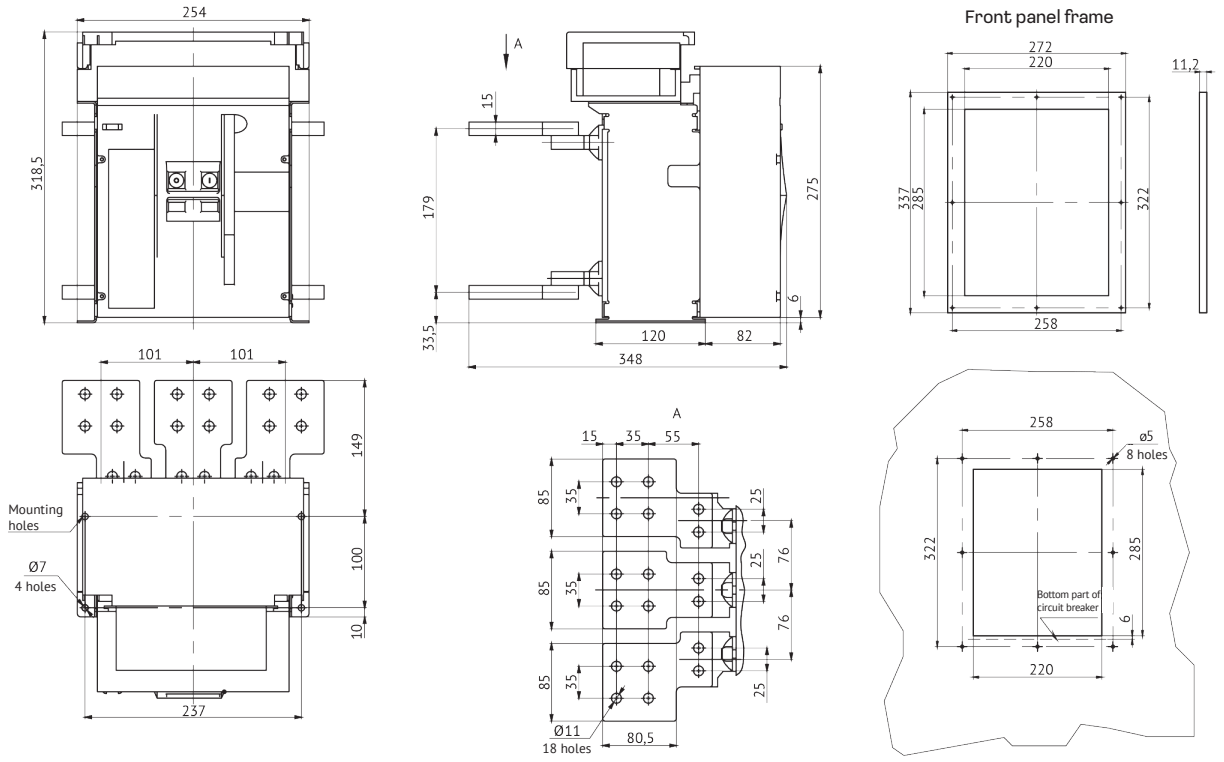
# Overall, mounting and connection dimensions (mm)

**Fixed OptiMat A-630-1600-S1-3P circuit breaker for rated currents of 630 – 1600 A with rear horizontal terminal location**

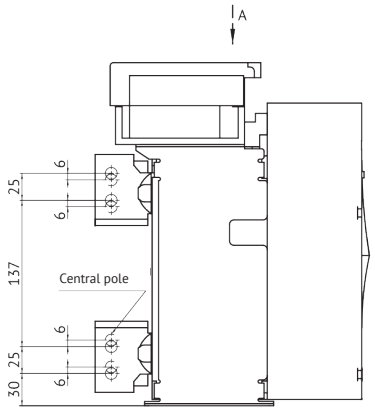


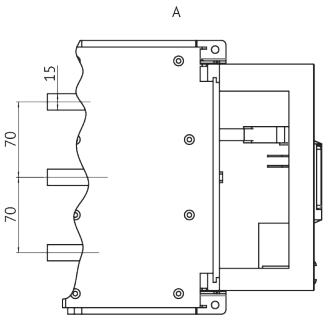

| Rated current, A | S, мм |
|---|---|
| 630 | 5 |
| 800 | 10 |
| 1000 | |
| 1250 | 15 |
| 1600 | |

**Fixed OptiMat A-1600-S1-3P circuit breaker for rated current of 1600 A with rear horizontal terminal location with pole expanders installed**

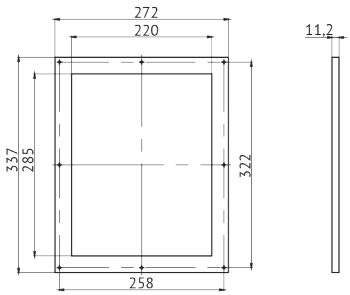


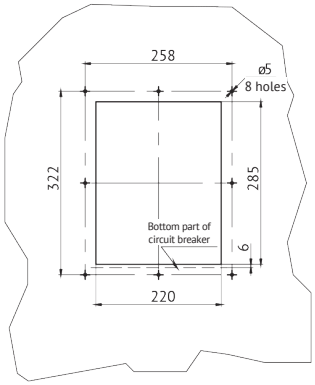
## Fixed OptiMat A-630-1600-S1-3P circuit breaker for rated currents of 630 – 1600 A with rear vertical terminal location




Front panel frame

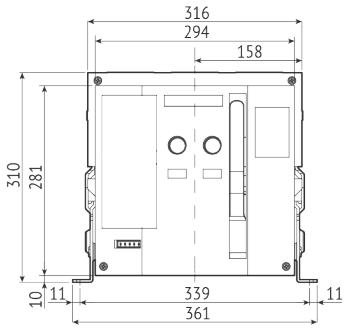


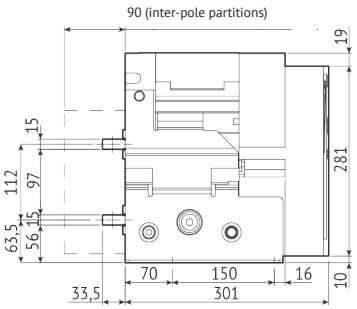



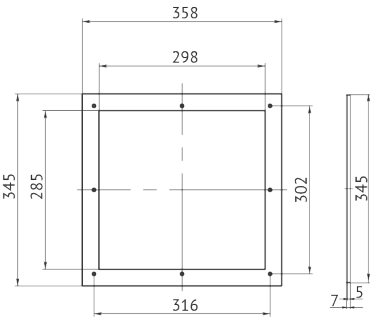

| Rated current, A | S, мм |
|---|---|
| 630 | 5 |
| 800 | 10 |
| 1000 | |
| 1250 | 15 |
| 1600 | |

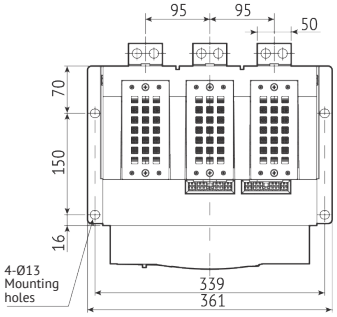
## Fixed OptiMat A-630-1600-S2-3P circuit breaker for rated currents of 630–1600 A with rear vertical and horizontal terminal location

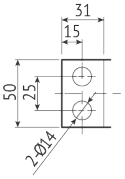
Front panel frame

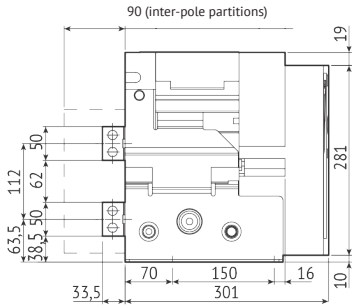


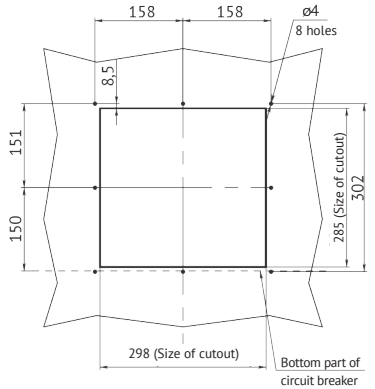



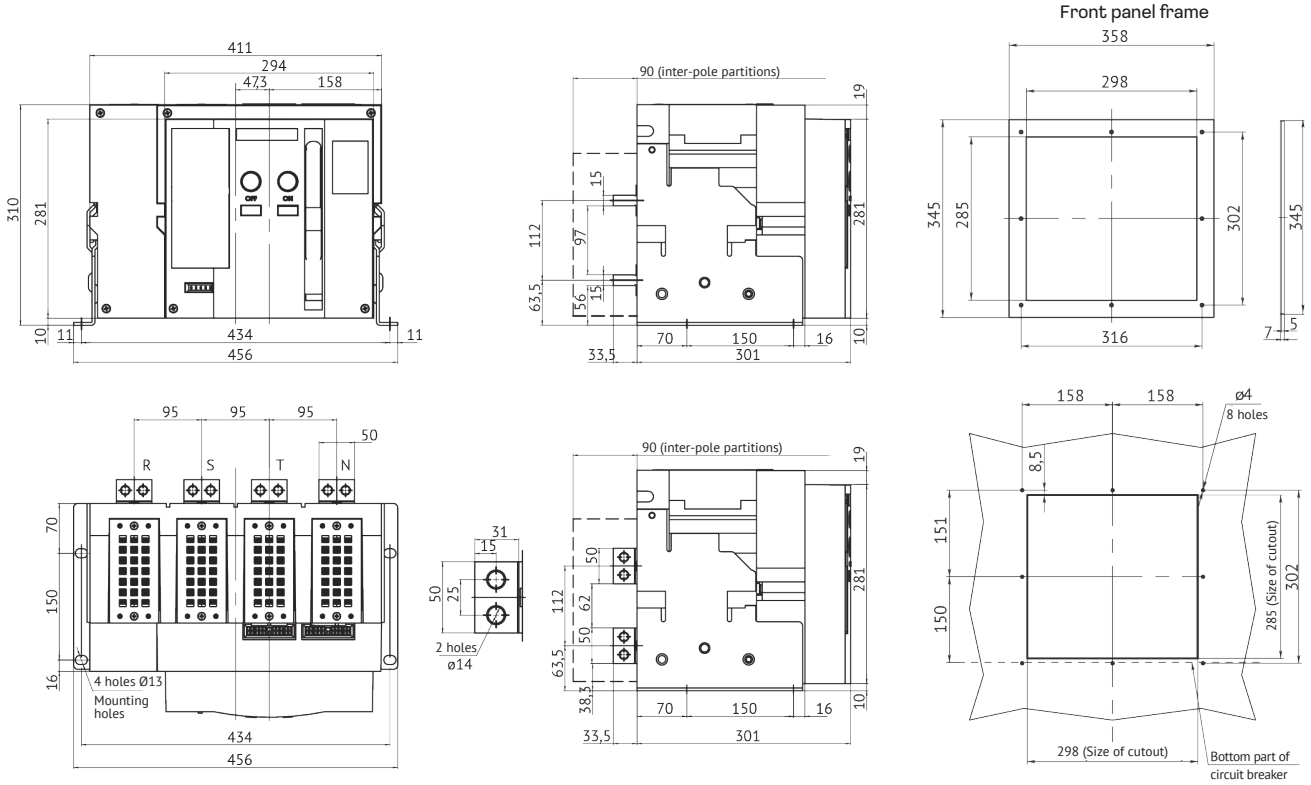



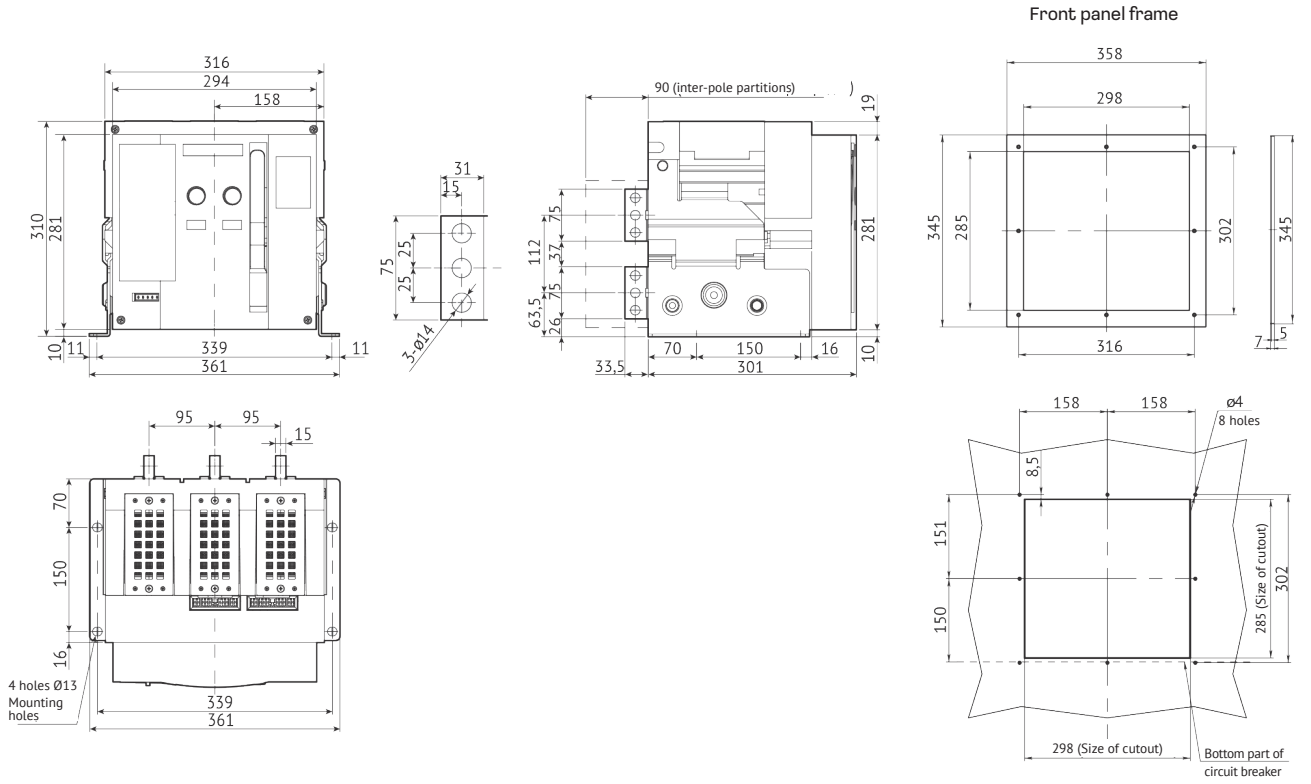



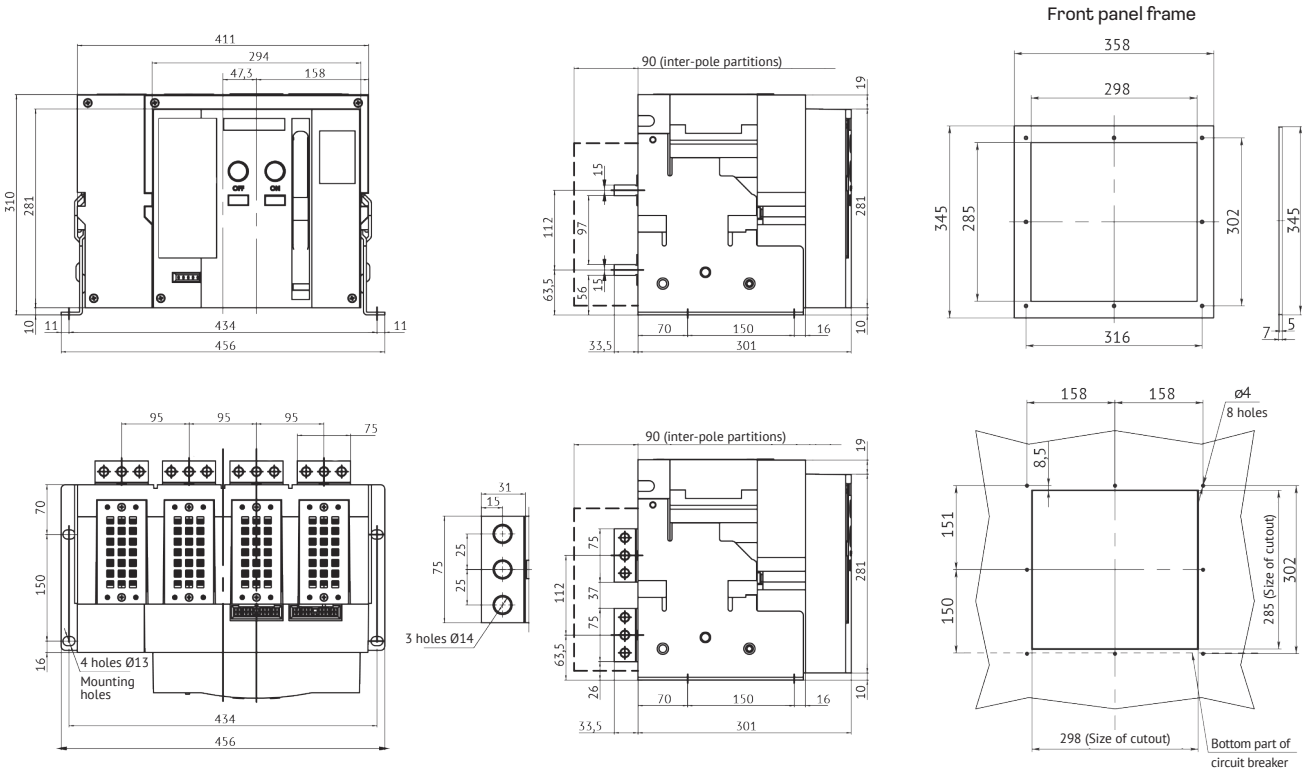
**OptiMat A-630-1600-S2-4P circuit breaker of fixed version for rated currents of 630-1600 A with rear vertical and horizontal terminal location**



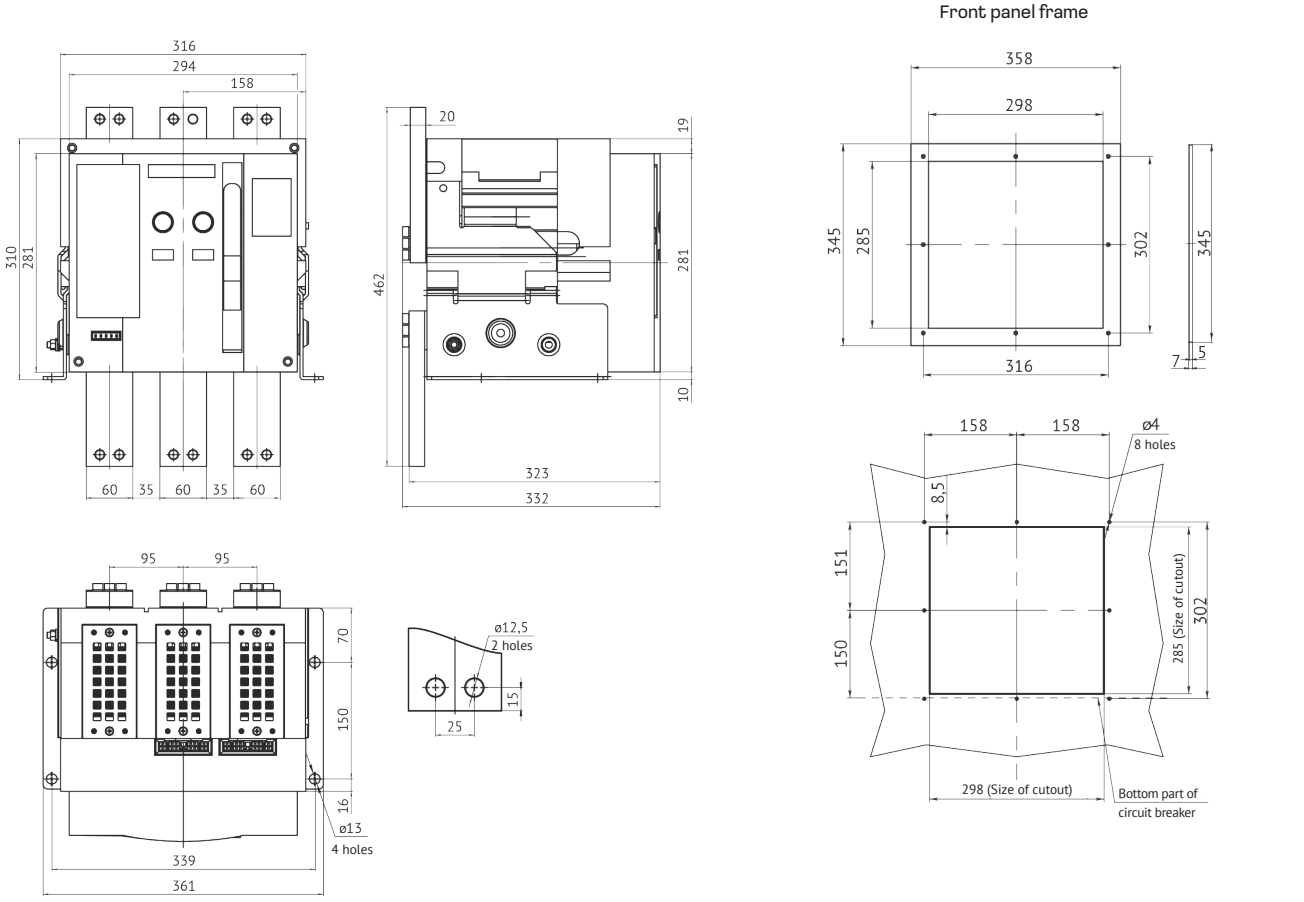

**Fixed OptiMat A-2000-S2-3P circuit breaker for rated current of 2000 A with rear vertical terminal location**



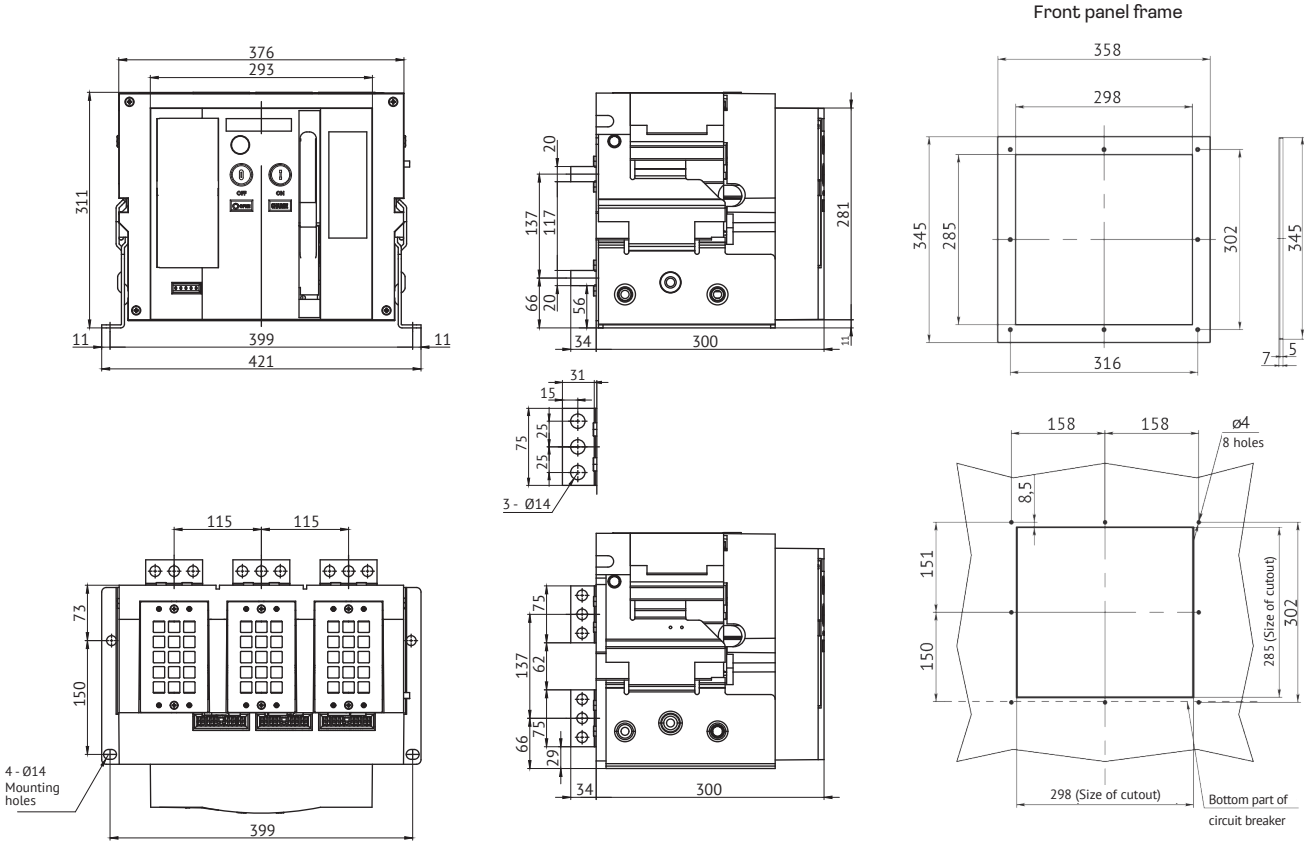
## OptiMat A-2000-S2-4P circuit breaker of fixed version for rated current of 2000 A with rear vertical and horizontal terminal location



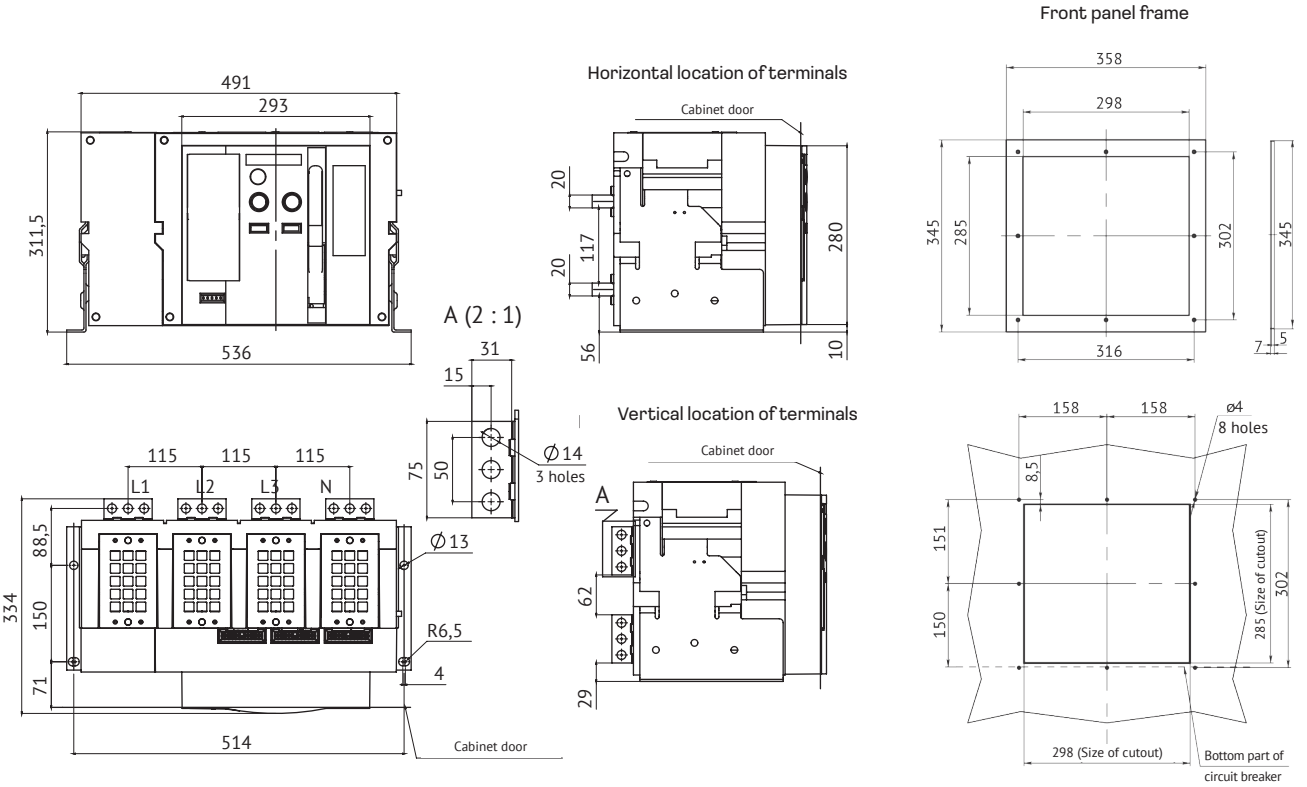

## Fixed OptiMat A-630-2000-S2-3P circuit breaker for rated currents of 630–2000 A with front terminal location



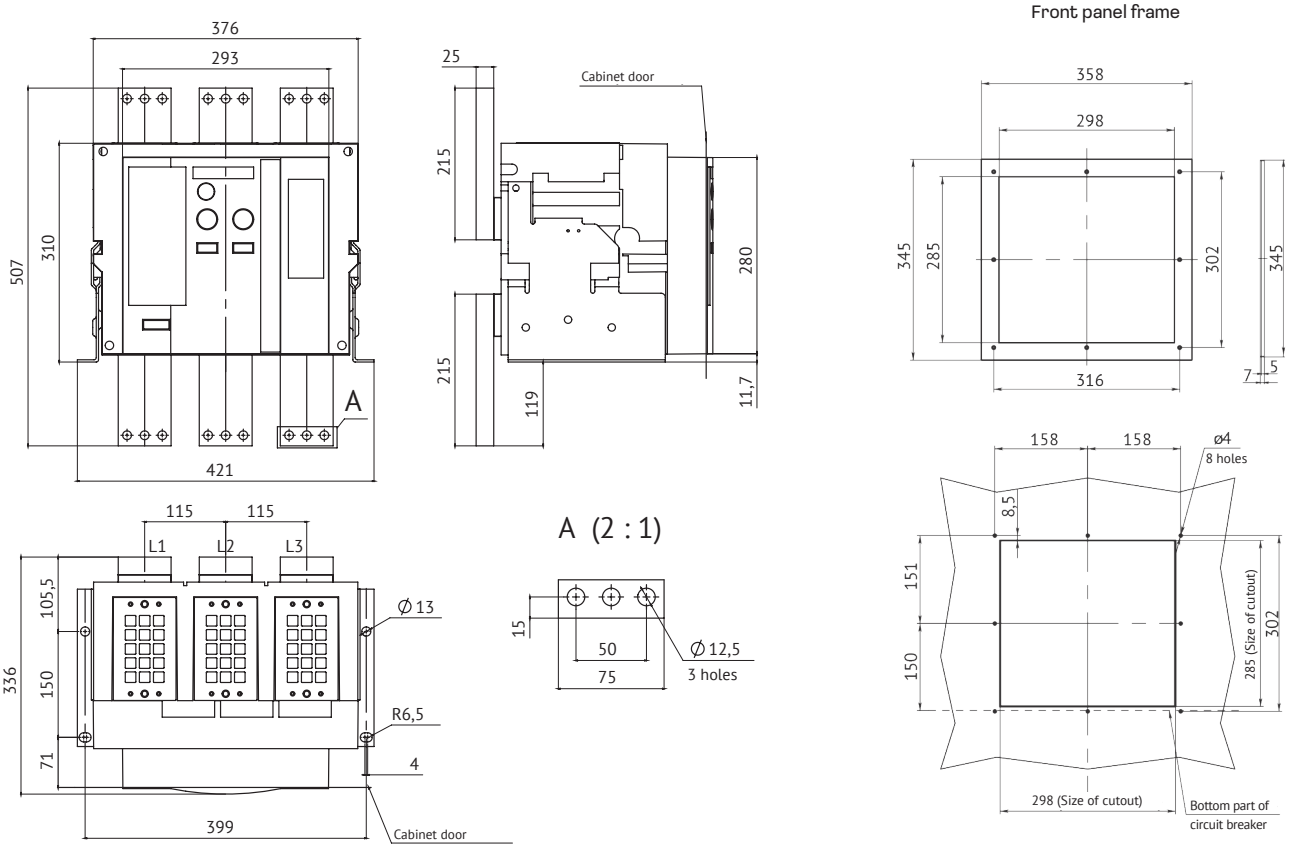
**Fixed OptiMat A-2500-3200-S4-3P circuit breaker for rated currents of 2500-3200 A with rear horizontal and vertical terminal location**



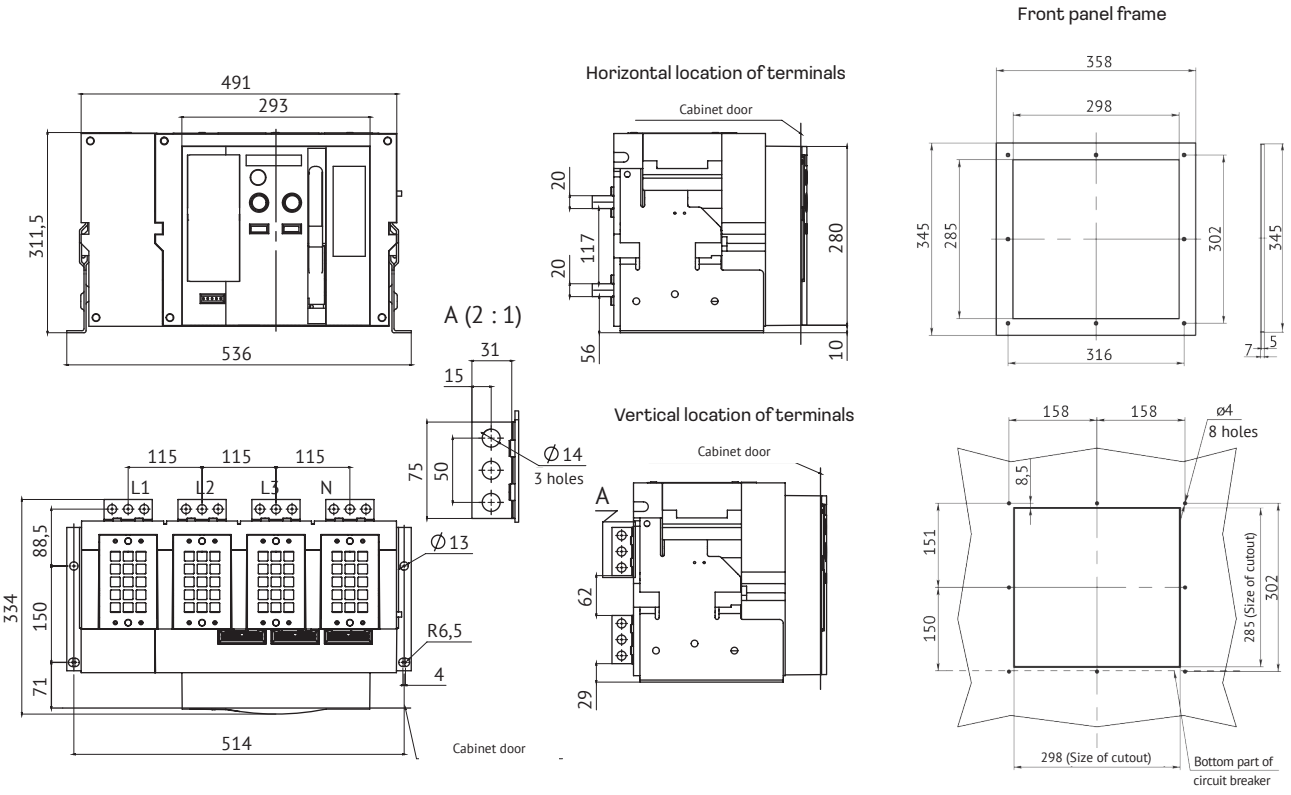

**Fixed OptiMat A-2500-3200-S4-4P circuit breaker for rated currents of 2500-3200 A with rear horizontal and vertical terminal location**



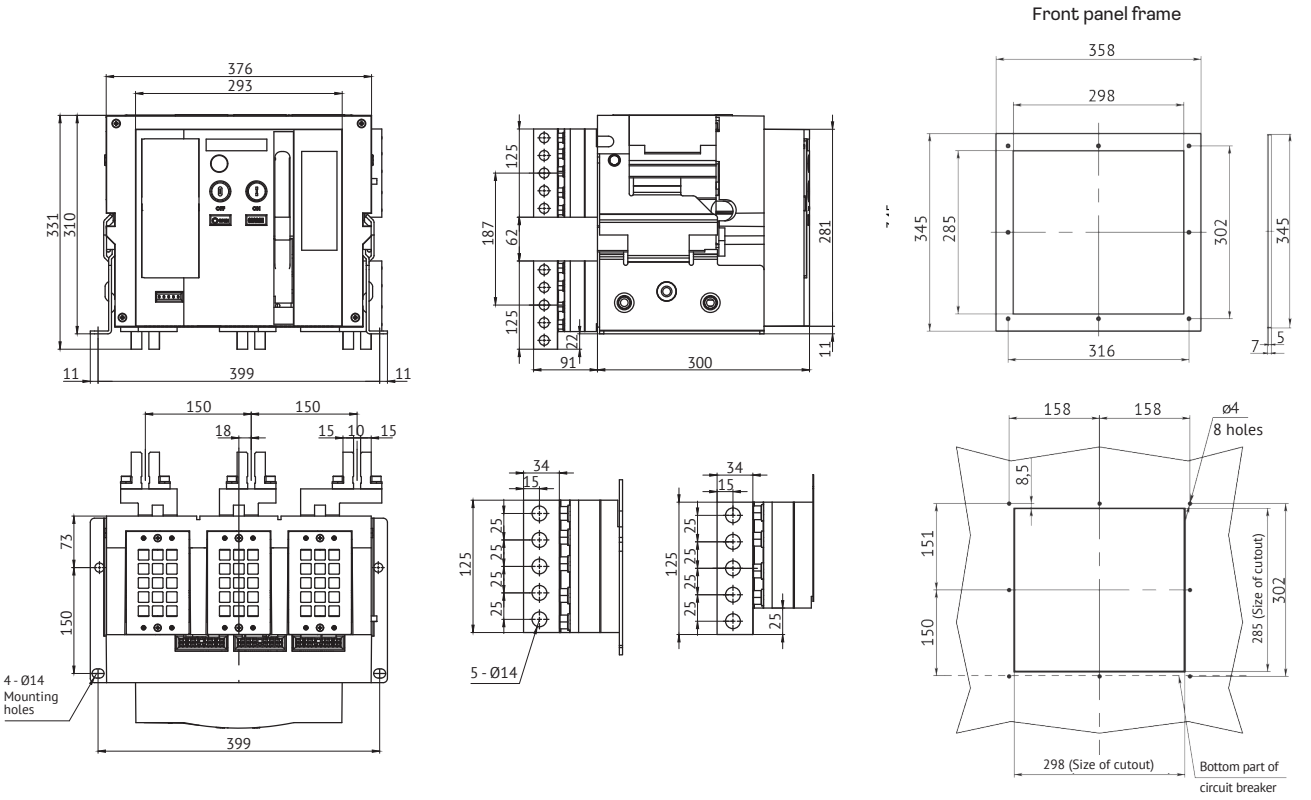
## Fixed OptiMat A-2500-S4-3P circuit breaker for rated current of 2500 A with front terminal location



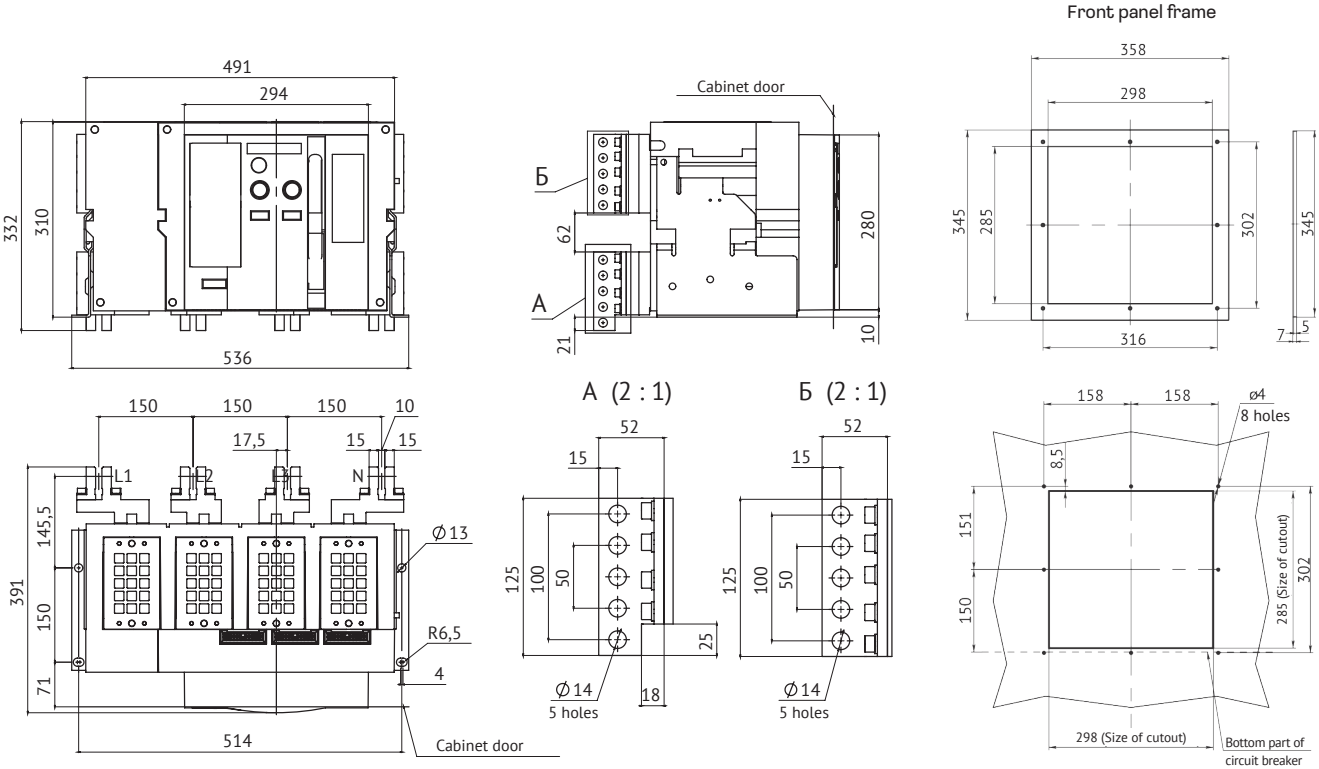

## Fixed OptiMat A-2500-S4-4P circuit breaker for rated current of 2500 A with front terminal location



**Fixed OptiMat A-4000-S4-3P circuit breaker for rated current of 4000 A with rear vertical terminal location**

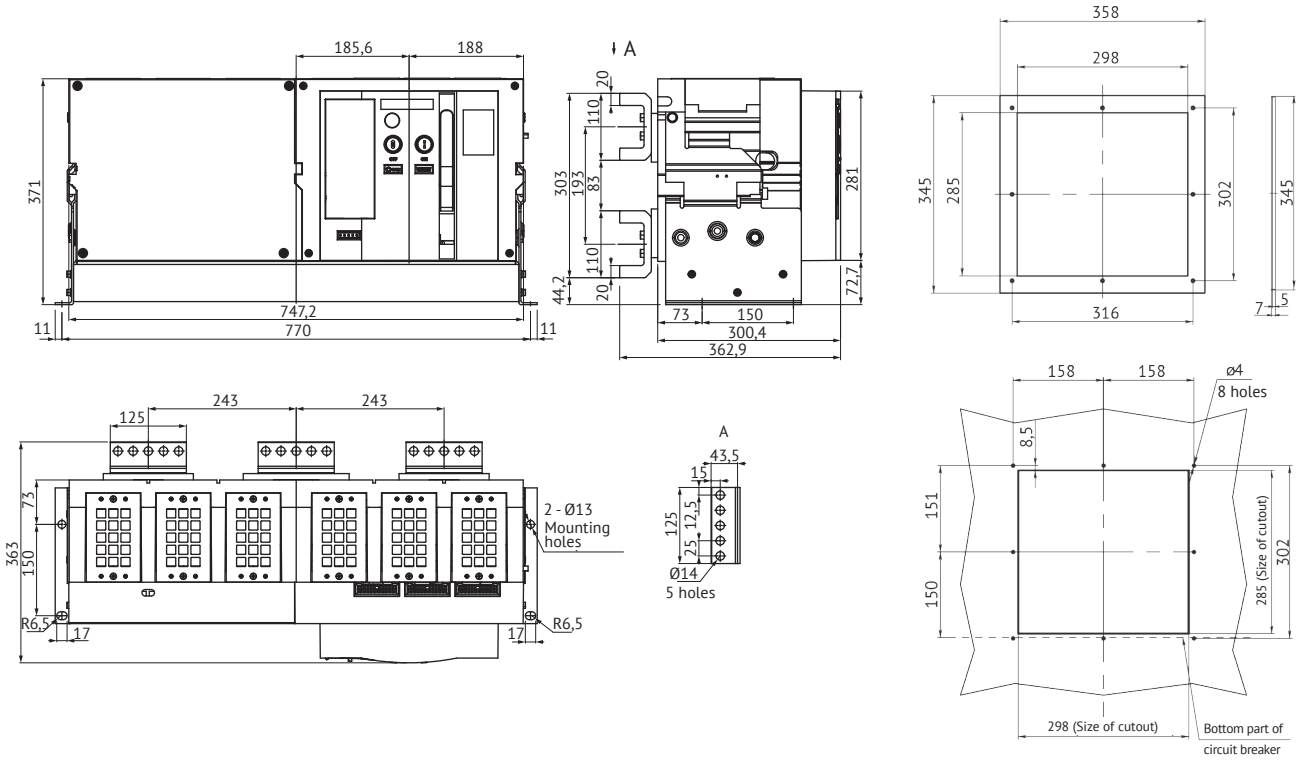



**Fixed OptiMat A-4000-S4-3P circuit breaker for rated current of 4000 A with rear vertical terminal location**

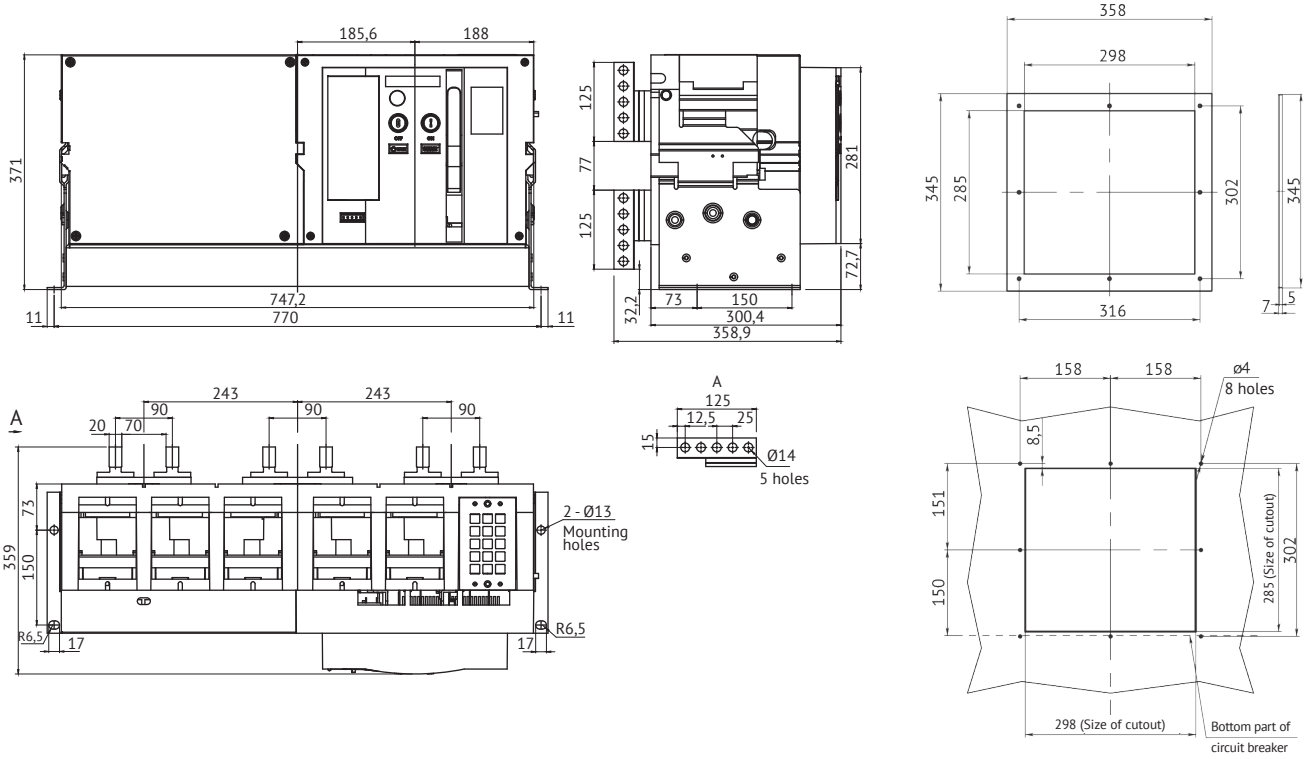


**Fixed OptiMat A-5000-S6-3P-150kA circuit breaker for rated current of 5000 A, LSC 150 kA with rear vertical and horizontal terminal location**

Front panel frame

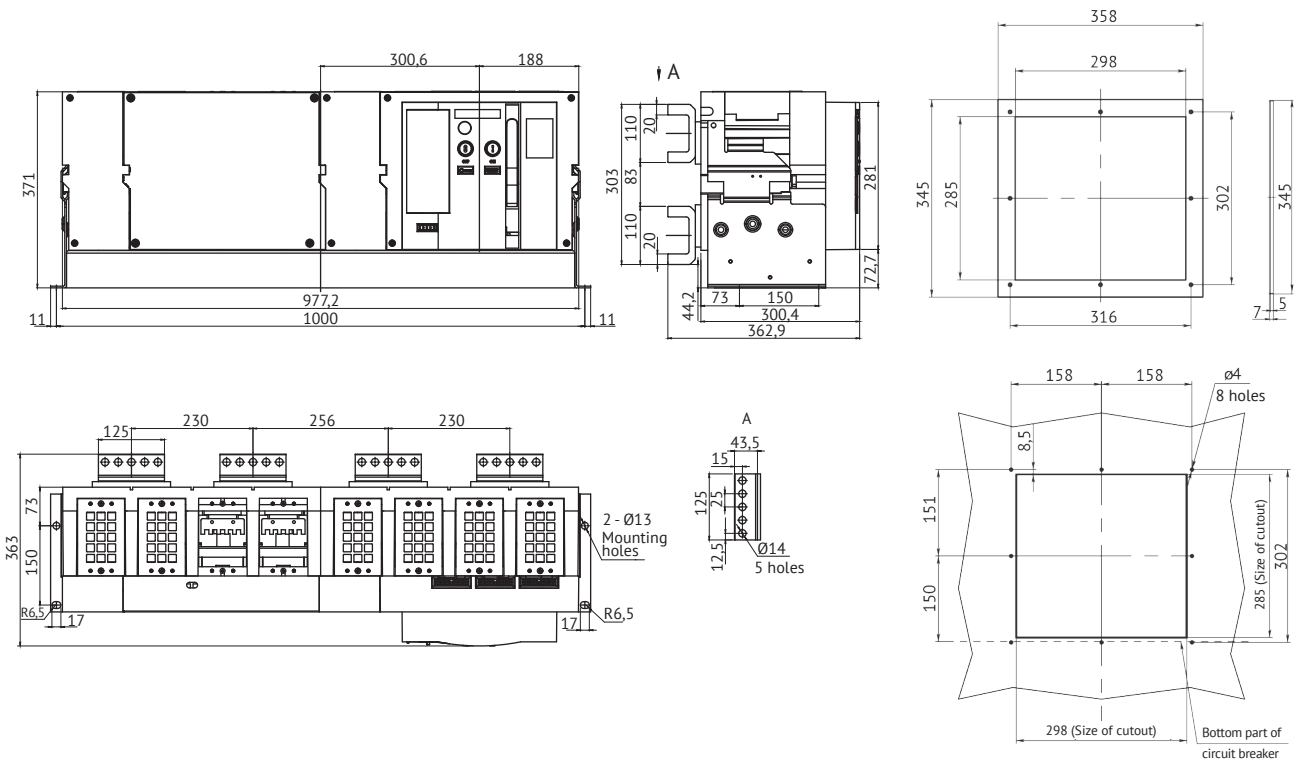



Front panel frame

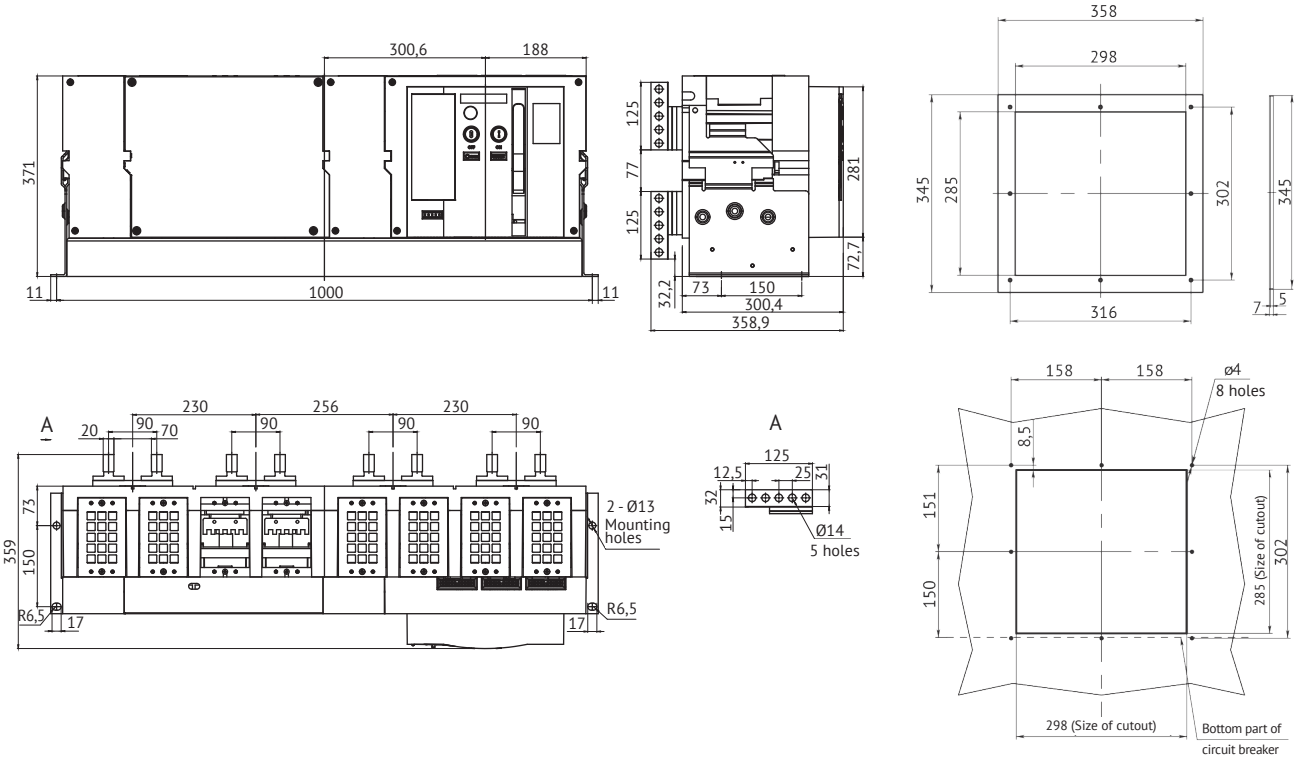


**Fixed OptiMat A-5000-S6-4P-150kA circuit breaker for rated current of 5000 A, LSC 150 kA with rear vertical and horizontal terminal location**

Front panel frame

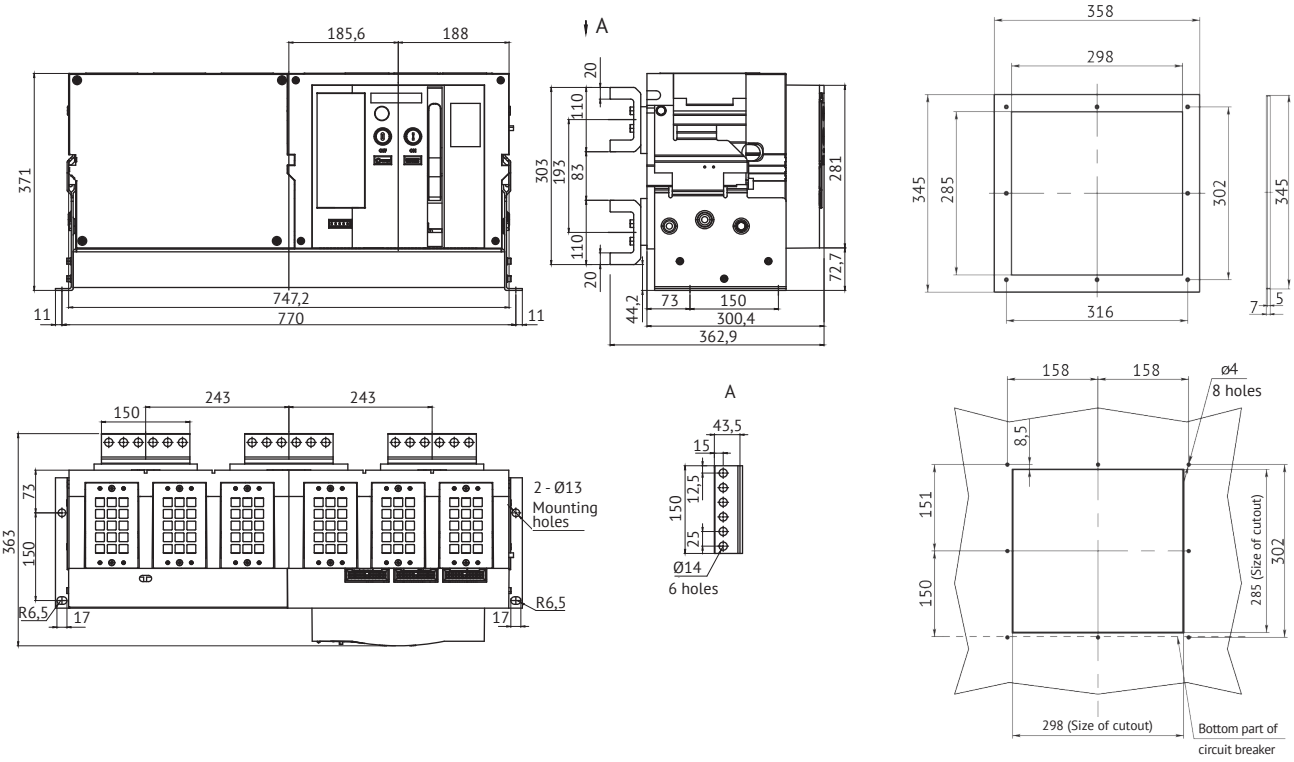



Front panel frame

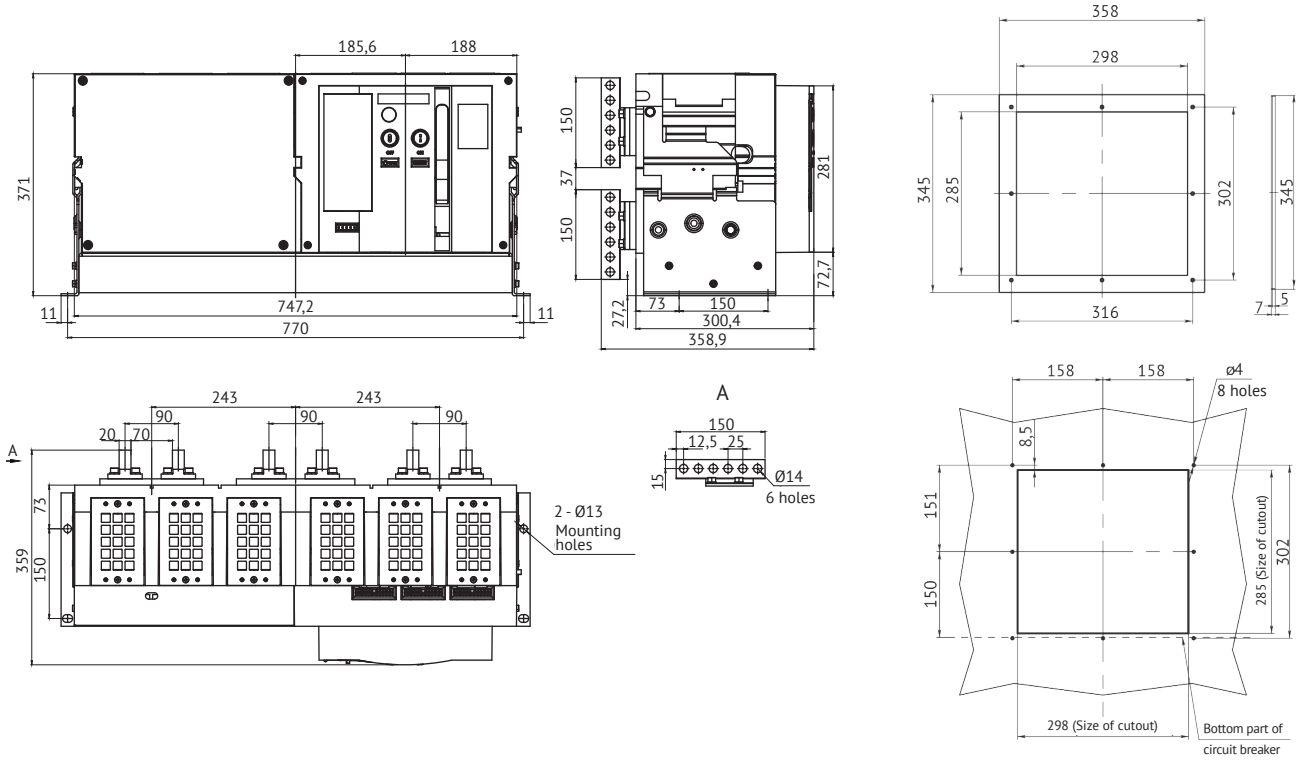


**OptiMat A-6300-S6-3P-150kA circuit breaker of fixed version for rated current of 6300 A, LSC 150 kA with rear vertical and horizontal terminal location**

Front panel frame

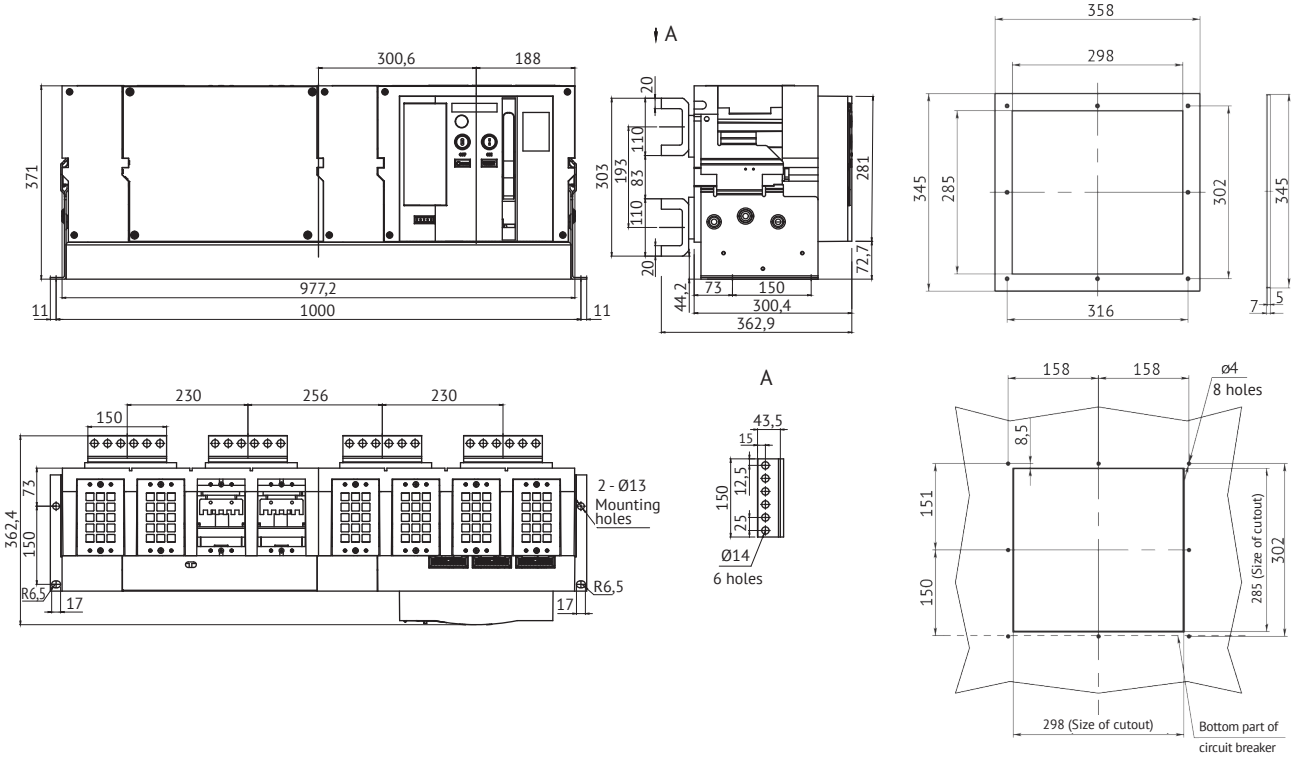



Front panel frame

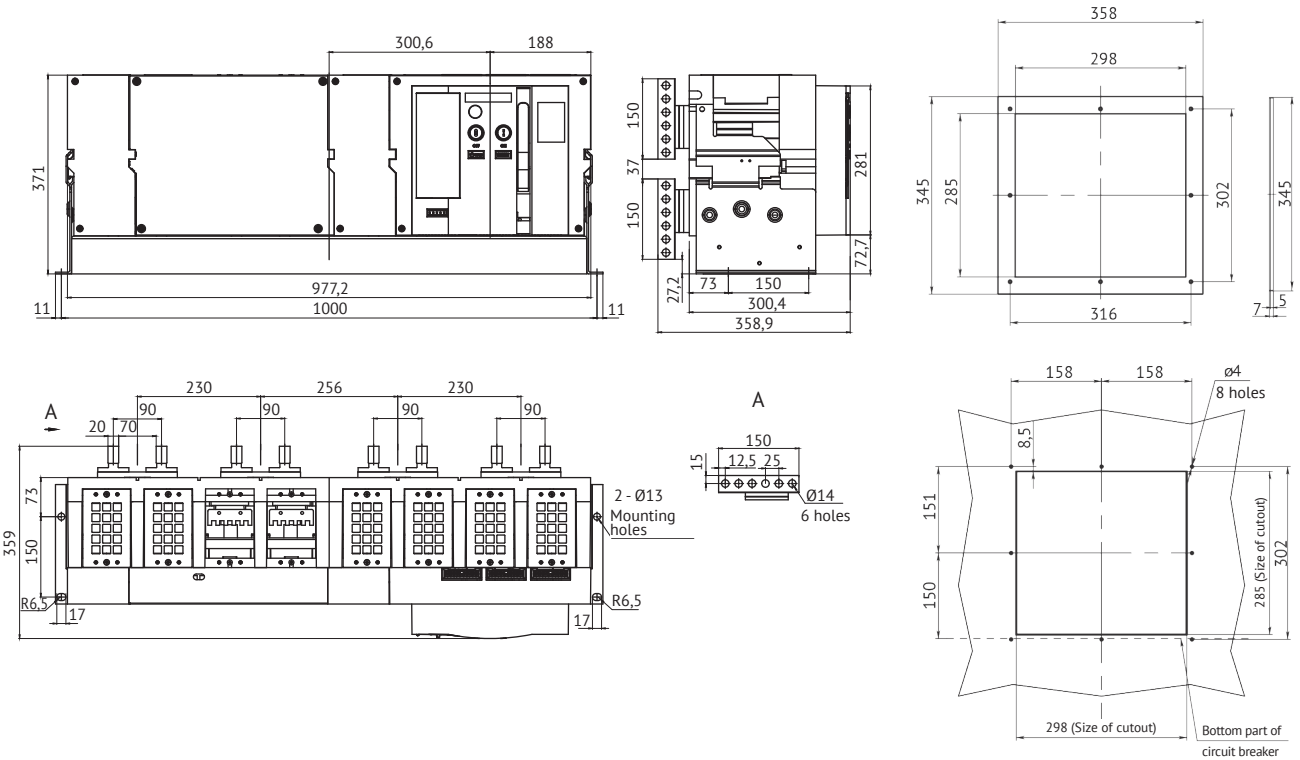


**OptiMat A-6300-S6-4P-150kA circuit breaker of fixed version for rated current of 6300 A, LSC 150 kA with rear vertical and horizontal terminal location**

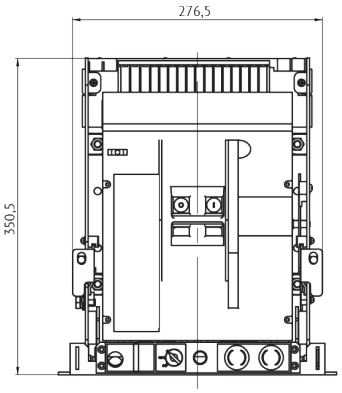
Front panel frame

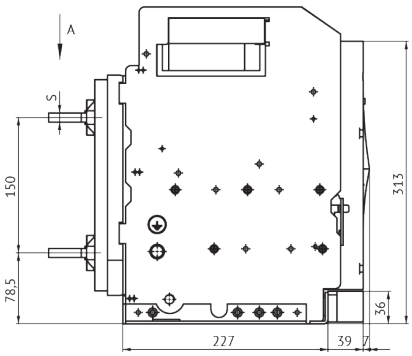



Front panel frame

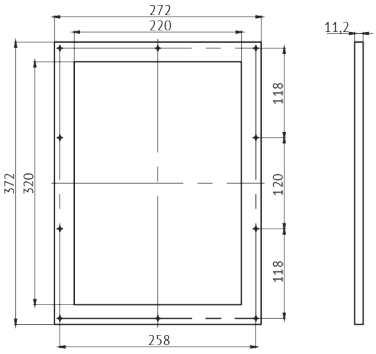


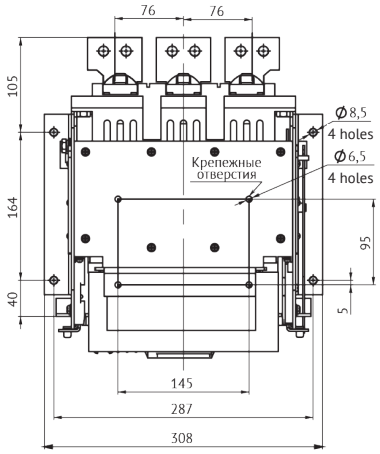
## OptiMat A-630-1600-S1-3P circuit breaker of withdrawable design for rated currents of 630-1600 A with rear horizontal terminal location

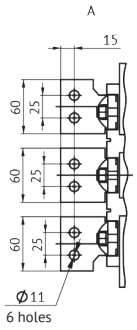


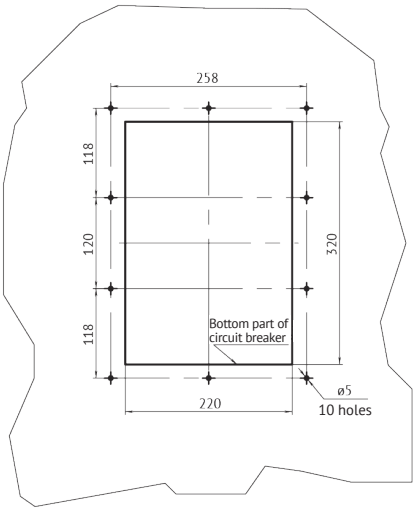




Front panel frame



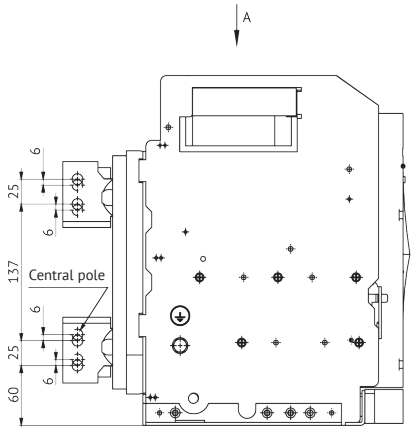



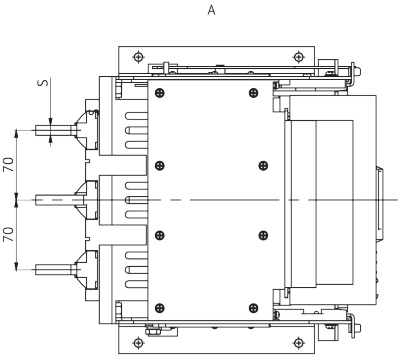



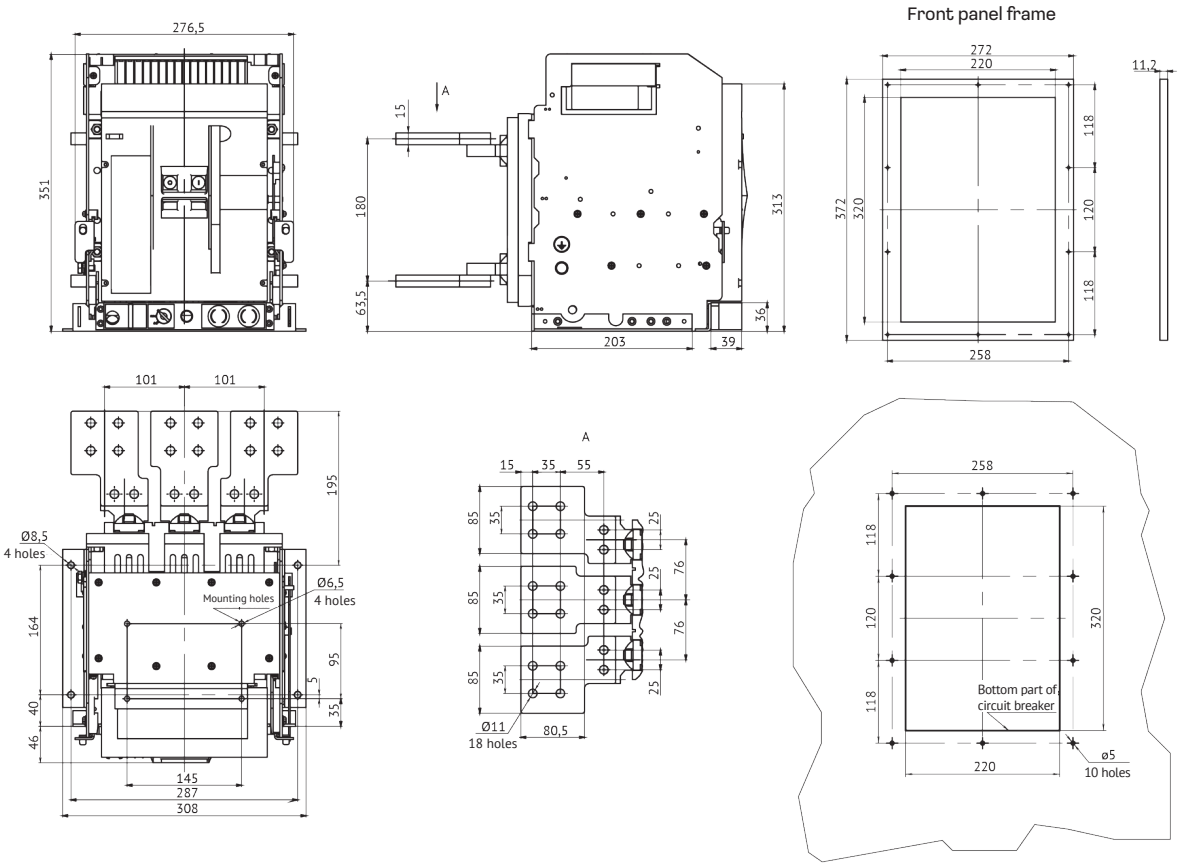

| Rated current, A | S, мм |
|---|---|
| 630 | 5 |
| 800 | 10 |
| 1000 | |
| 1250 | 15 |
| 1600 | |

## with rear vertical terminal location

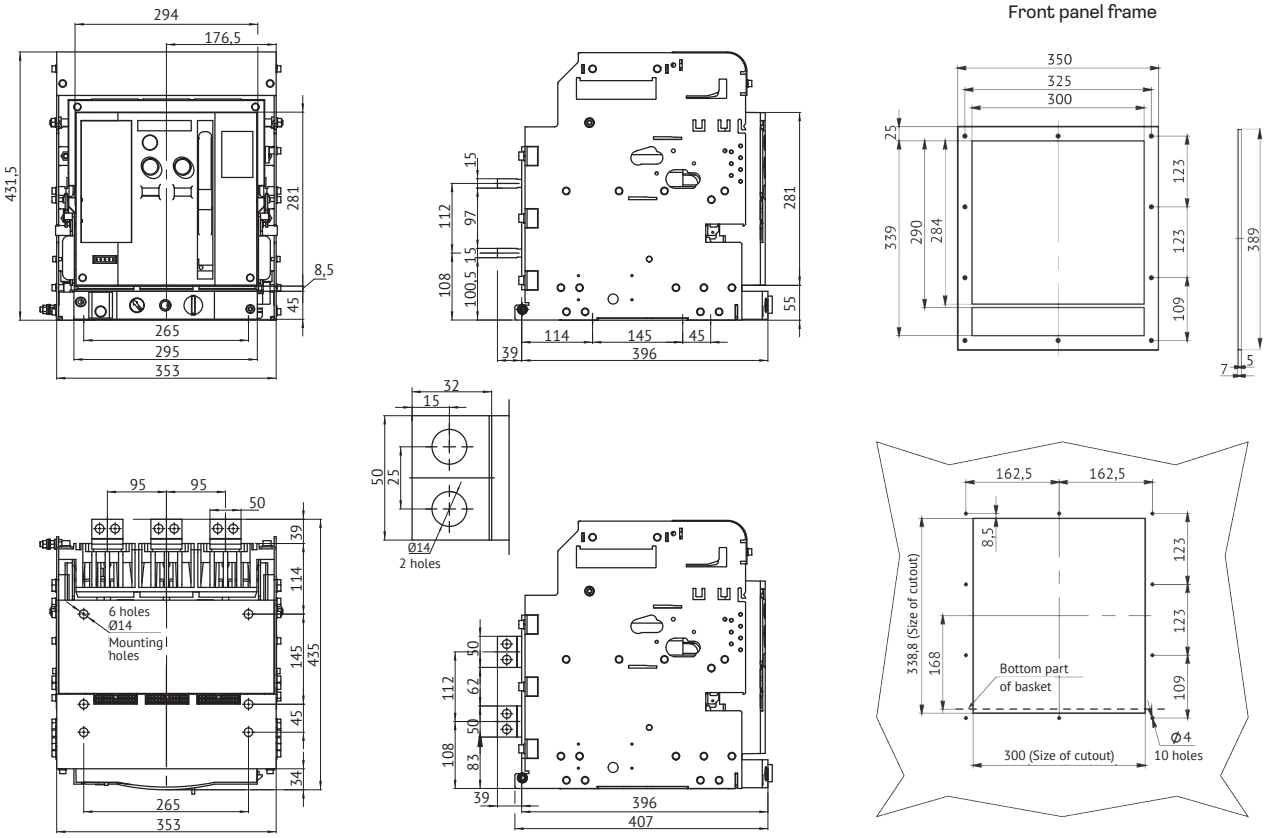


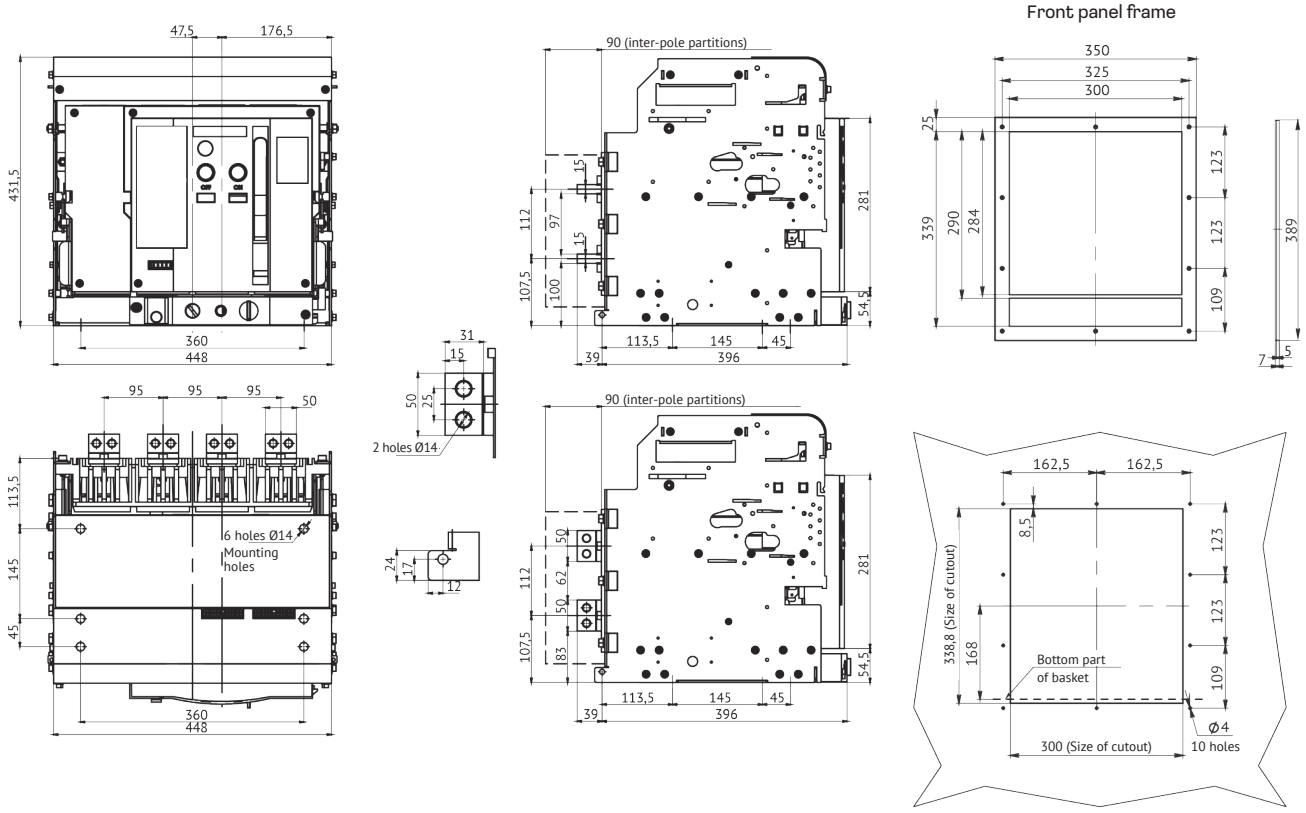
**OptiMat A-1600-S1-3P circuit breaker of withdrawable design for rated current 1600 A with rear horizontal terminal location with poles expanders installed**



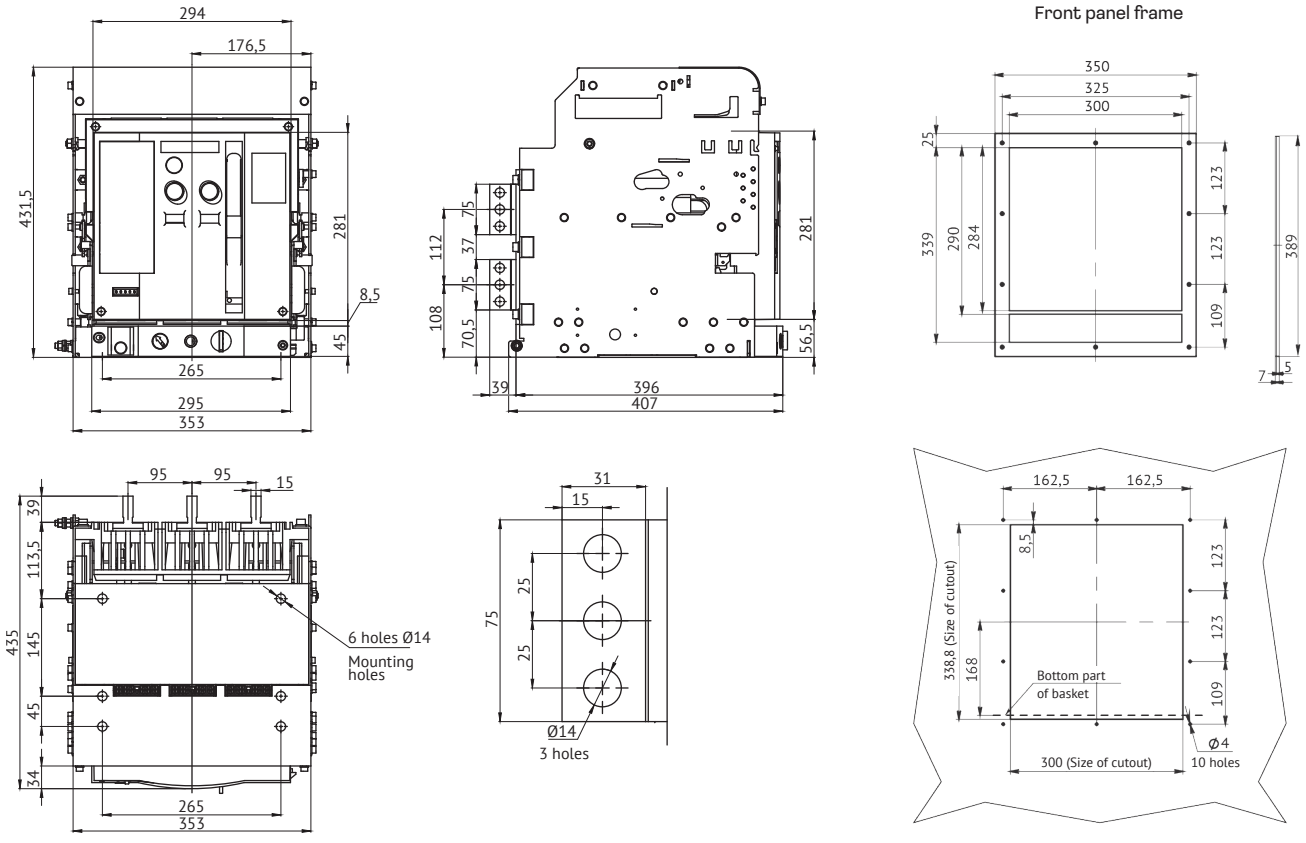

**Withdrawable OptiMat A-630-1600-S2-3P circuit breaker for rated currents of 630–1600 A with rear vertical and horizontal terminal location**



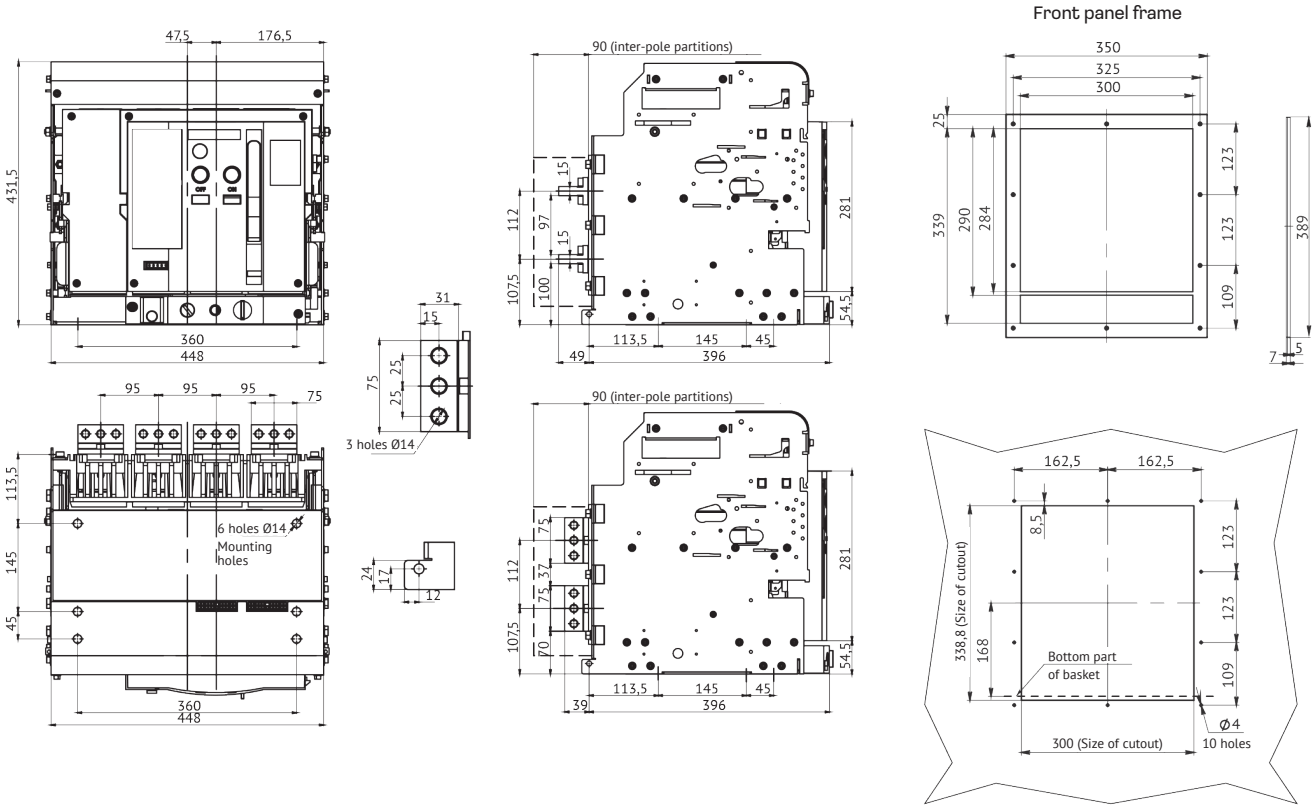
## OptiMat A-630-1600-S2-4P circuit breaker of withdrawable design for rated currents of 630-1600 A with rear vertical and horizontal terminal location



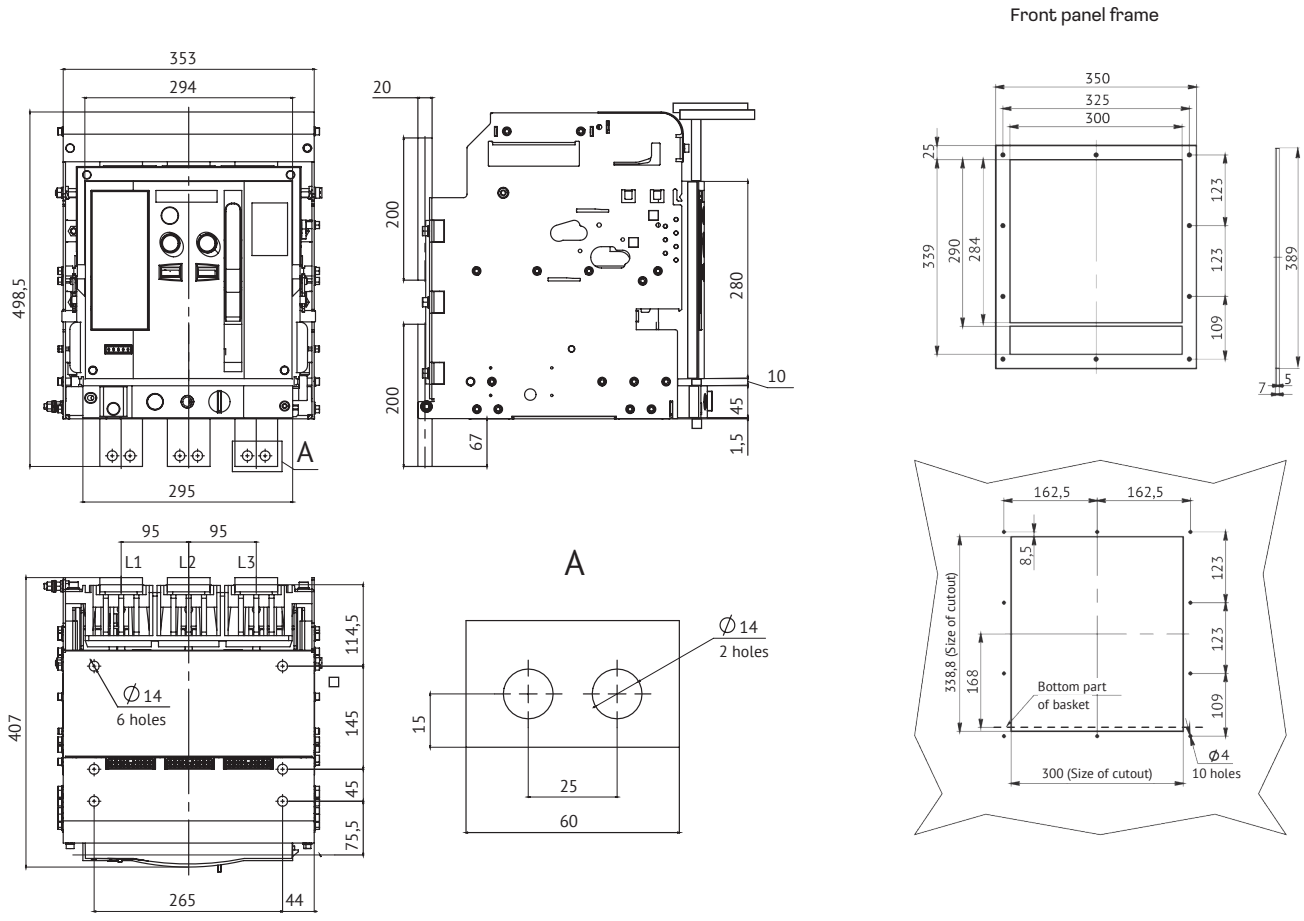

## Withdrawable OptiMat A-2000-S2-3P circuit breaker for rated current of 2000 A with rear vertical terminal location



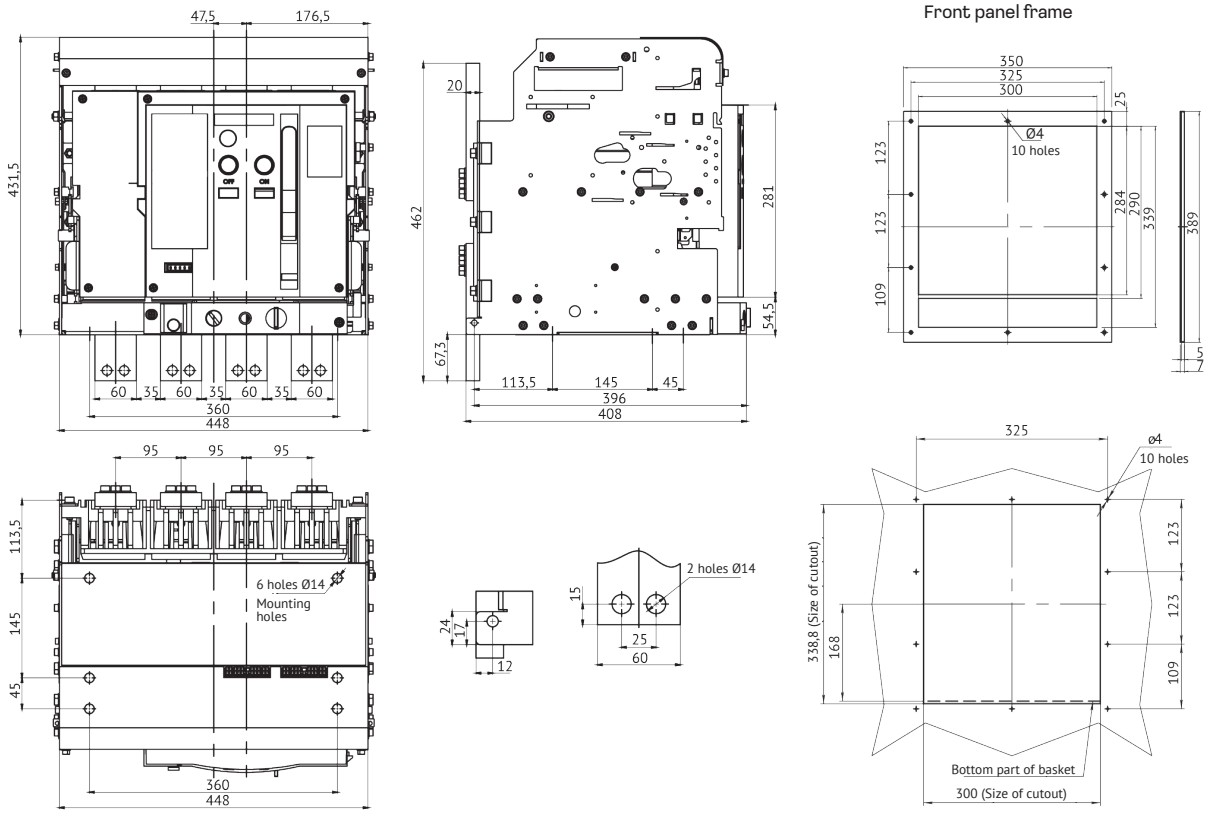
**Withdrawable OptiMat A-2000-S2-4P circuit breaker for rated current of 2000 A with rear vertical terminal location**



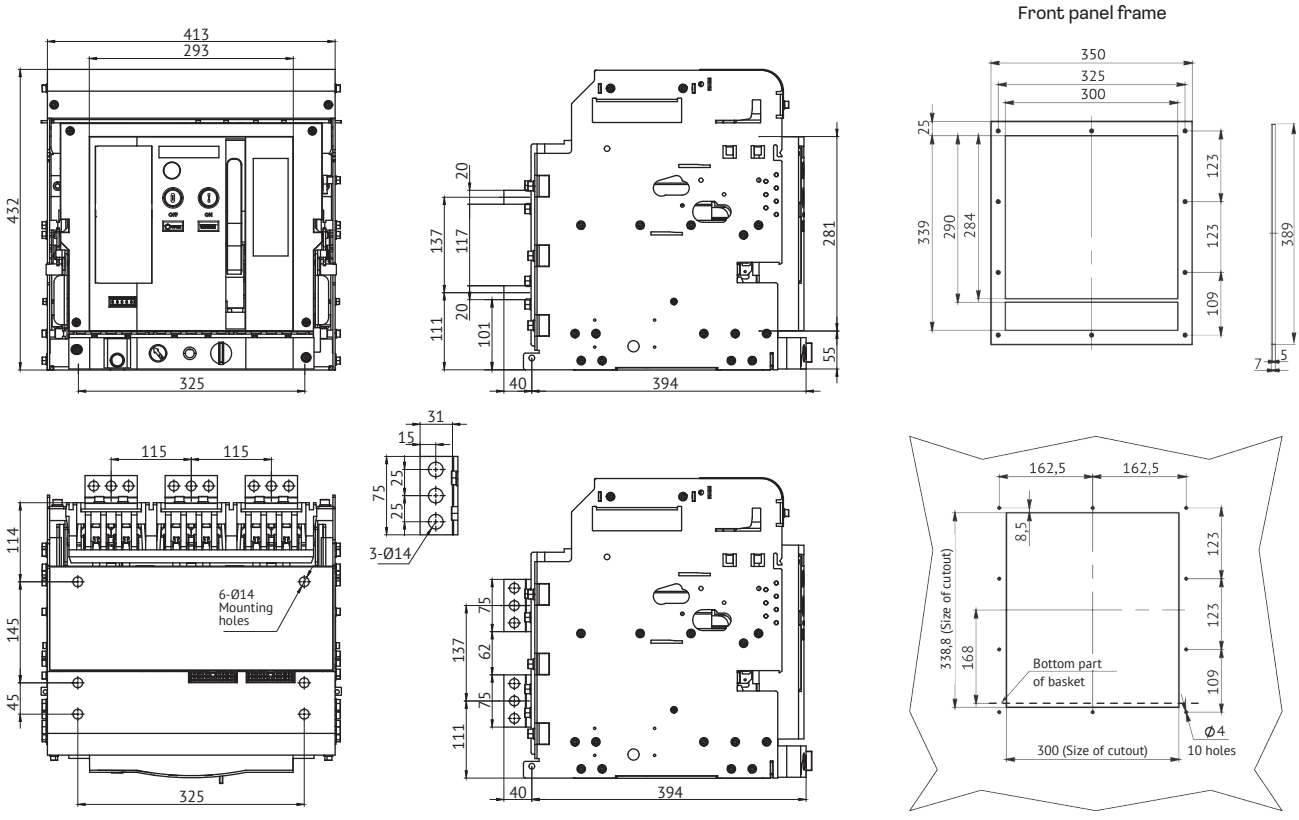

**Withdrawable OptiMat A-630-2000-S2-3P circuit breaker for rated currents of 630–2000 A with front terminal location**



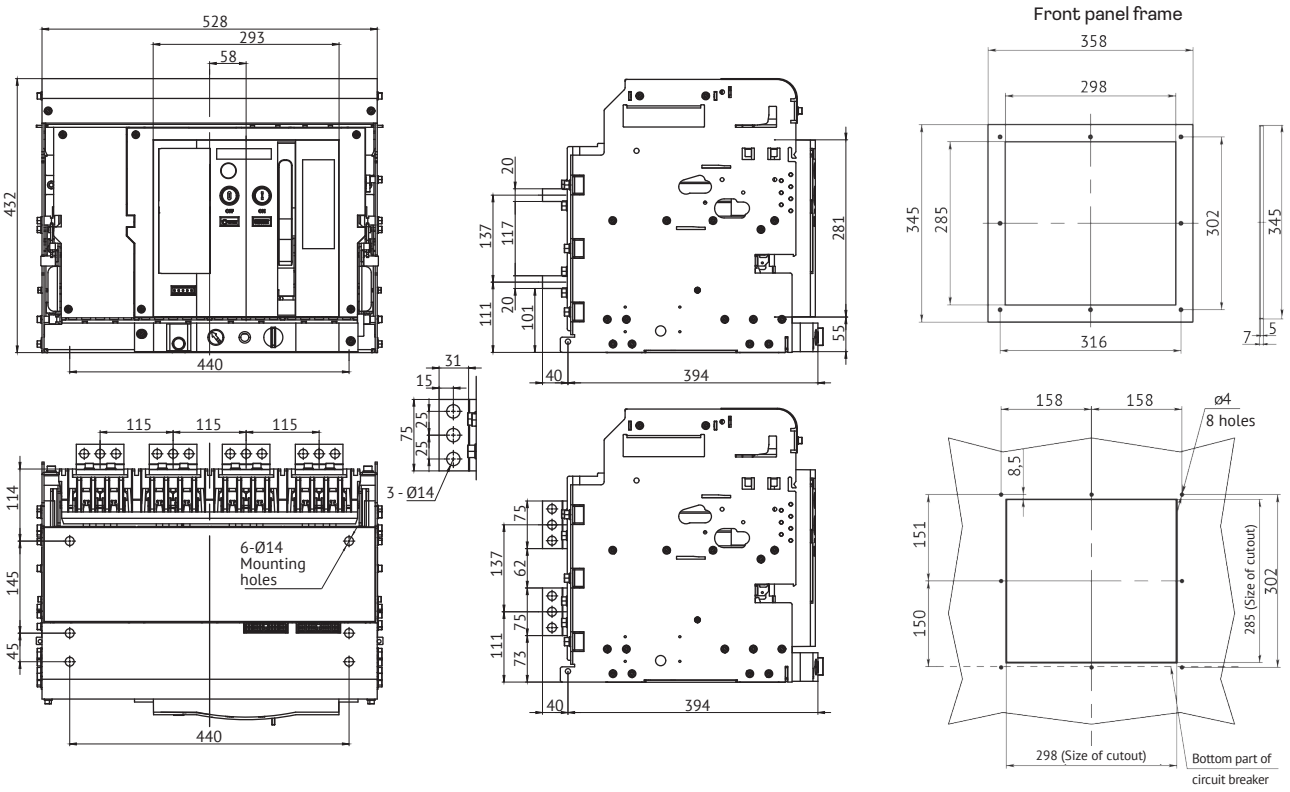
## Withdrawable OptiMat A-630-2000-S2-4P circuit breaker for rated currents of 630–2000 A with front terminal location



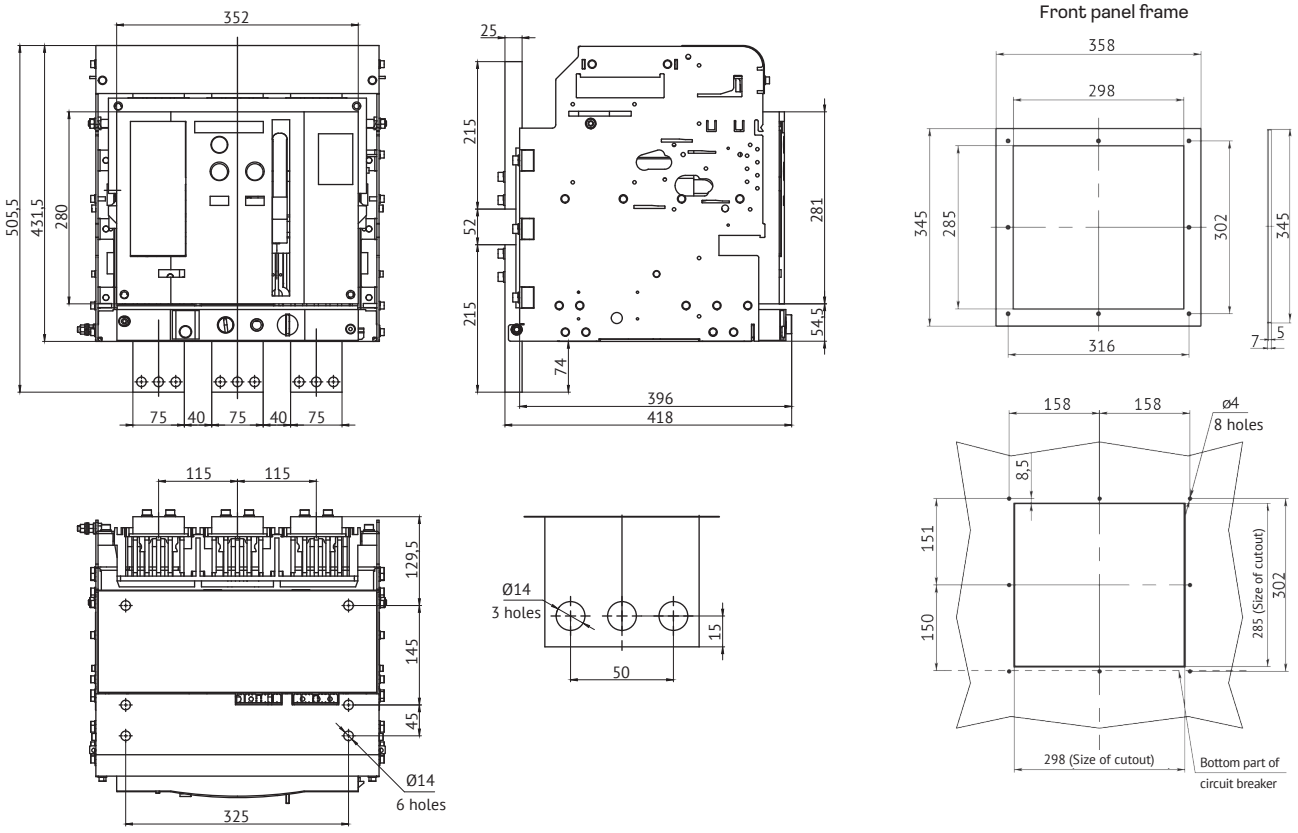

## Withdrawable OptiMat A-2500-3200-S4-3P circuit breaker for rated currents of 2500-3200 A with rear horizontal and vertical terminal location



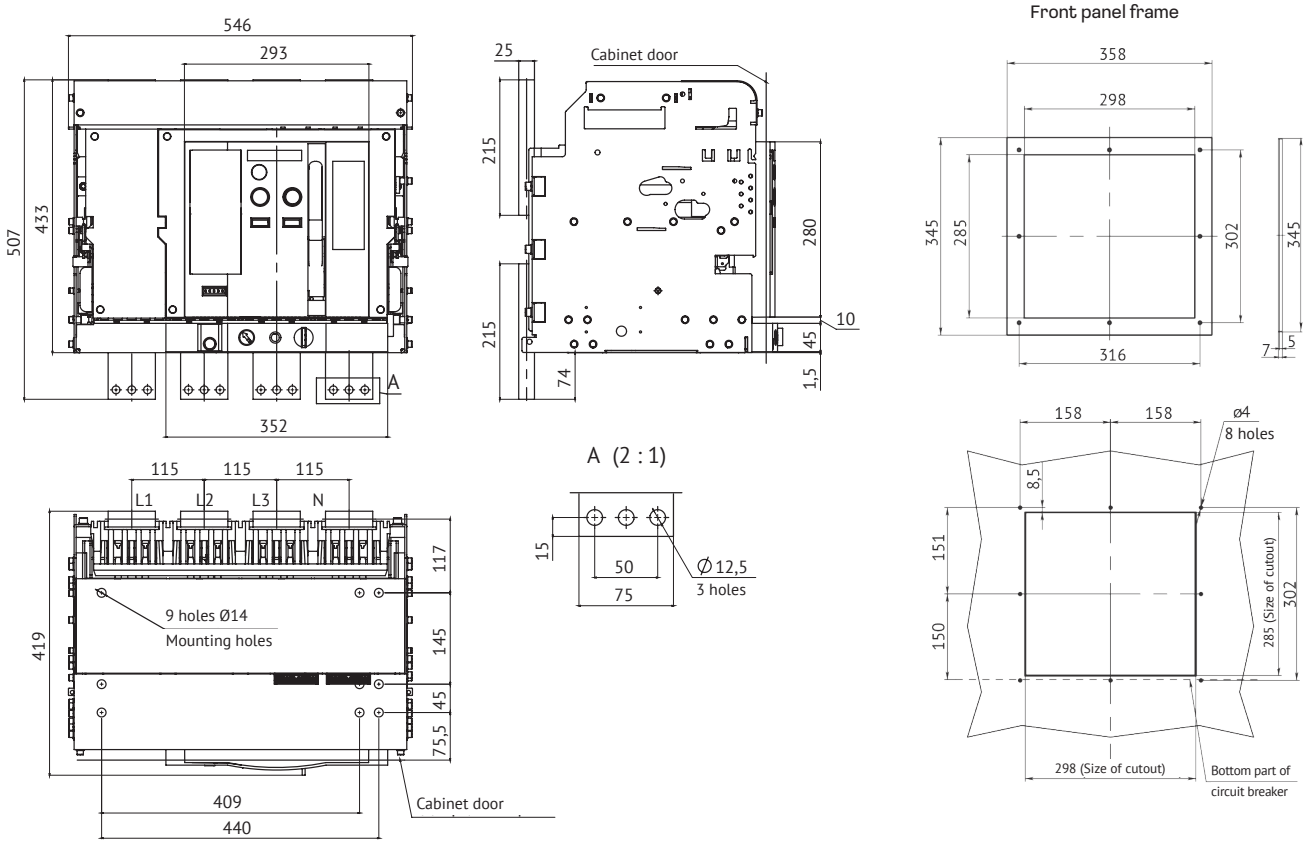
**Withdrawable OptiMat A-2500-3200-S4-4P circuit breaker for rated currents of 2500-3200 A with rear horizontal and vertical terminal location**



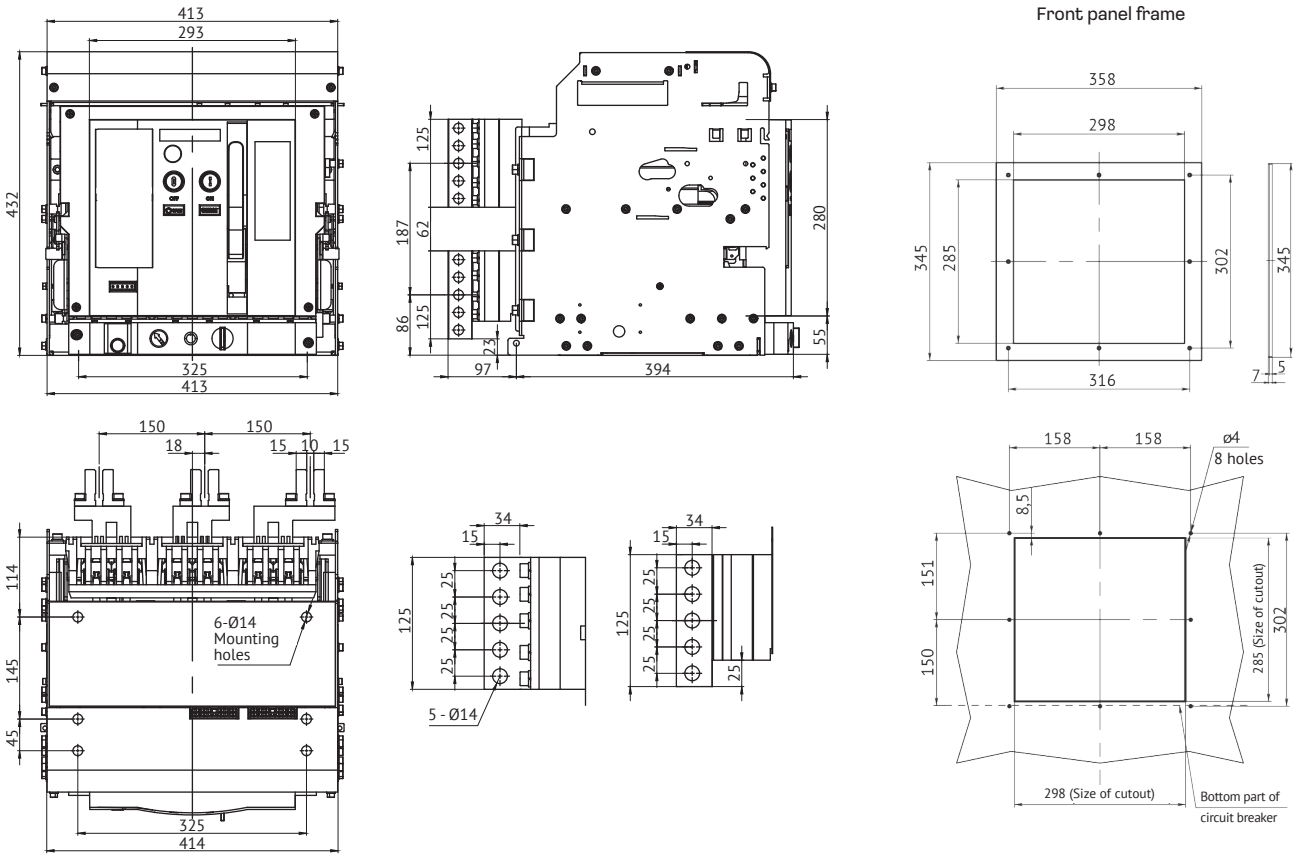

**Withdrawable OptiMat A-2500-S4-3P circuit breaker for rated current of 2500 A with front terminal location**



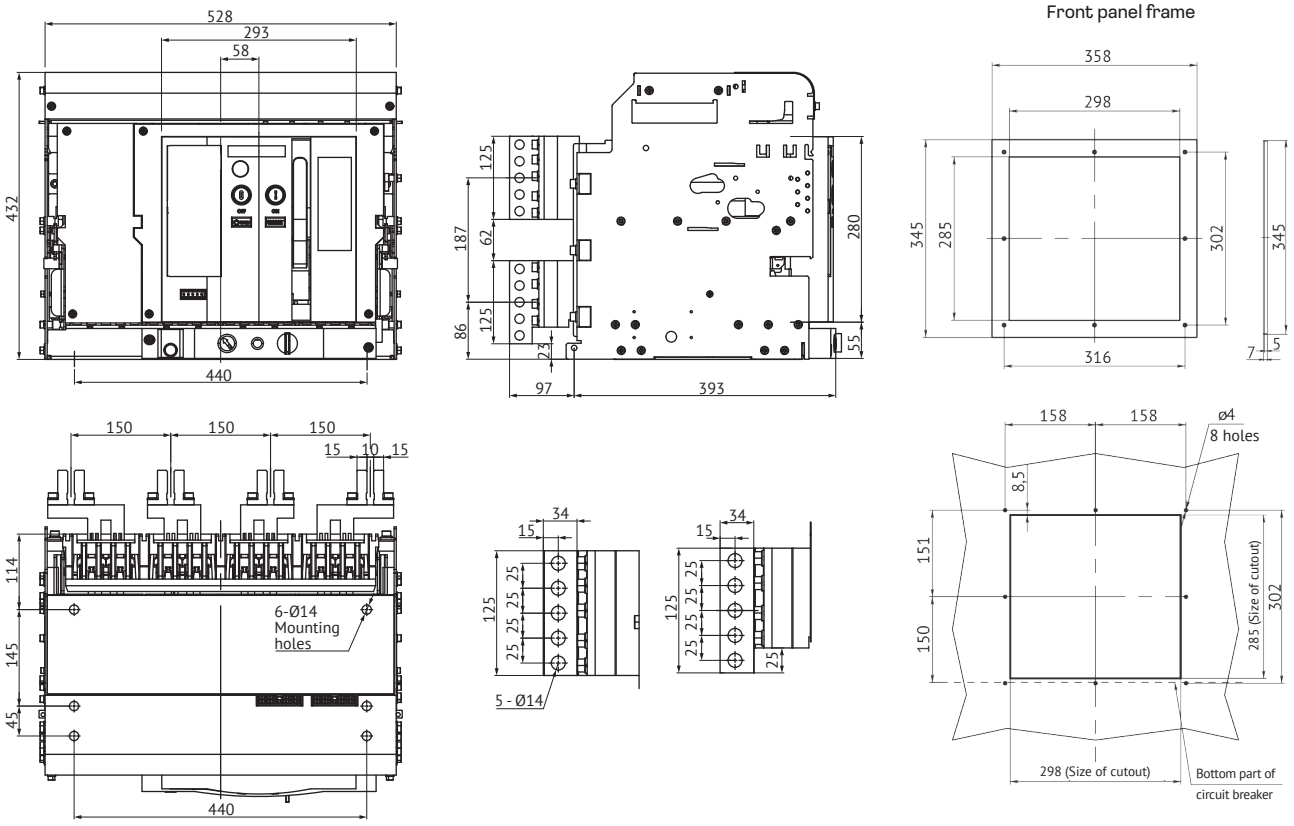
## Withdrawable OptiMat A-2500-S4-4P circuit breaker for rated current of 2500 A with front terminal location



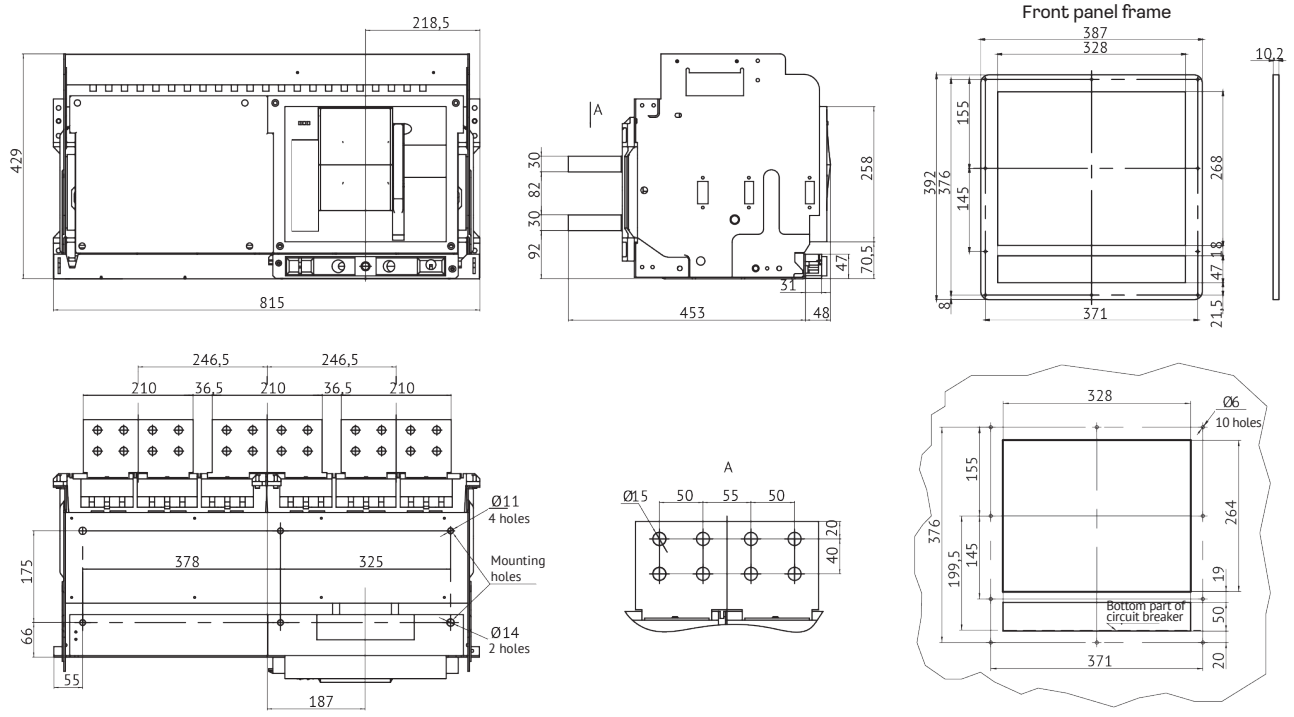

## Withdrawable OptiMat A-4000-S4-3P circuit breaker for rated current of 4000 A with rear vertical terminal location



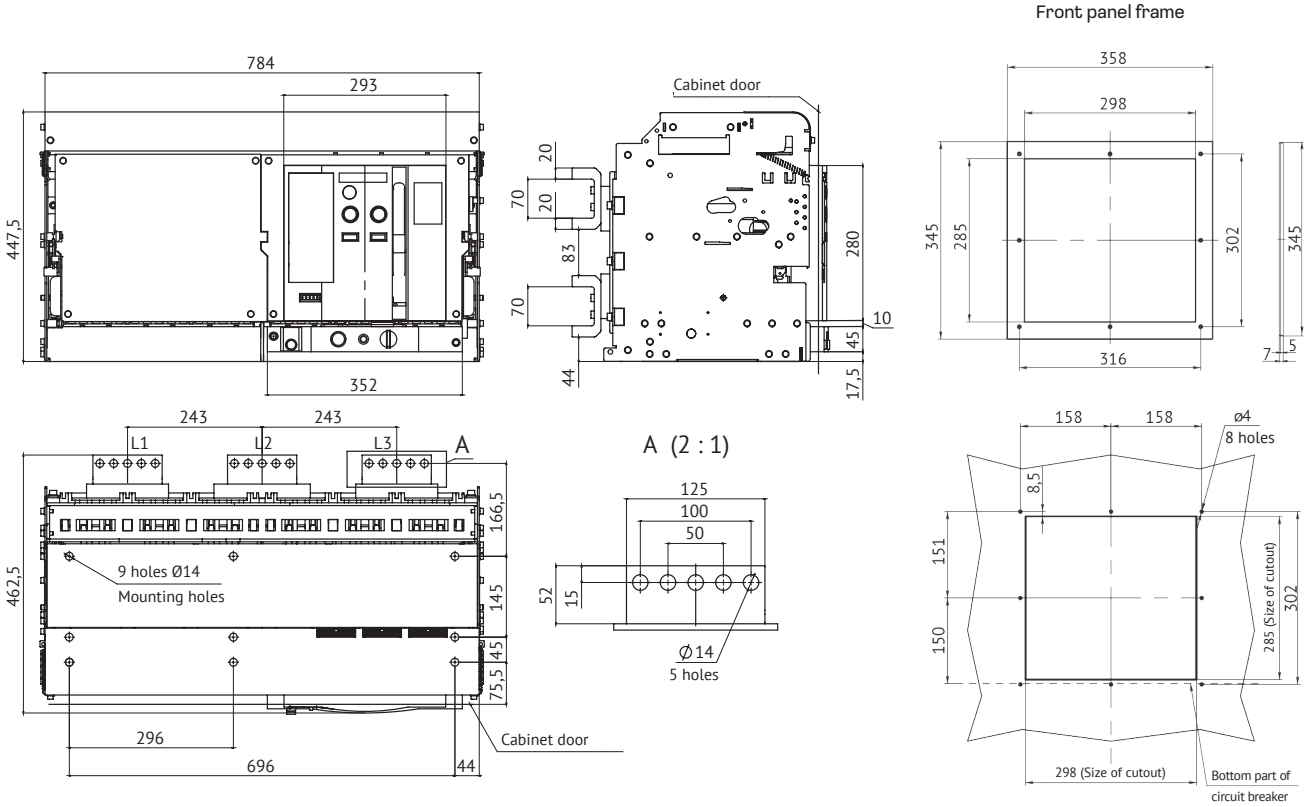
**Withdrawable OptiMat A-4000-S4-4P circuit breaker for rated current of 4000 A with rear vertical terminal location**

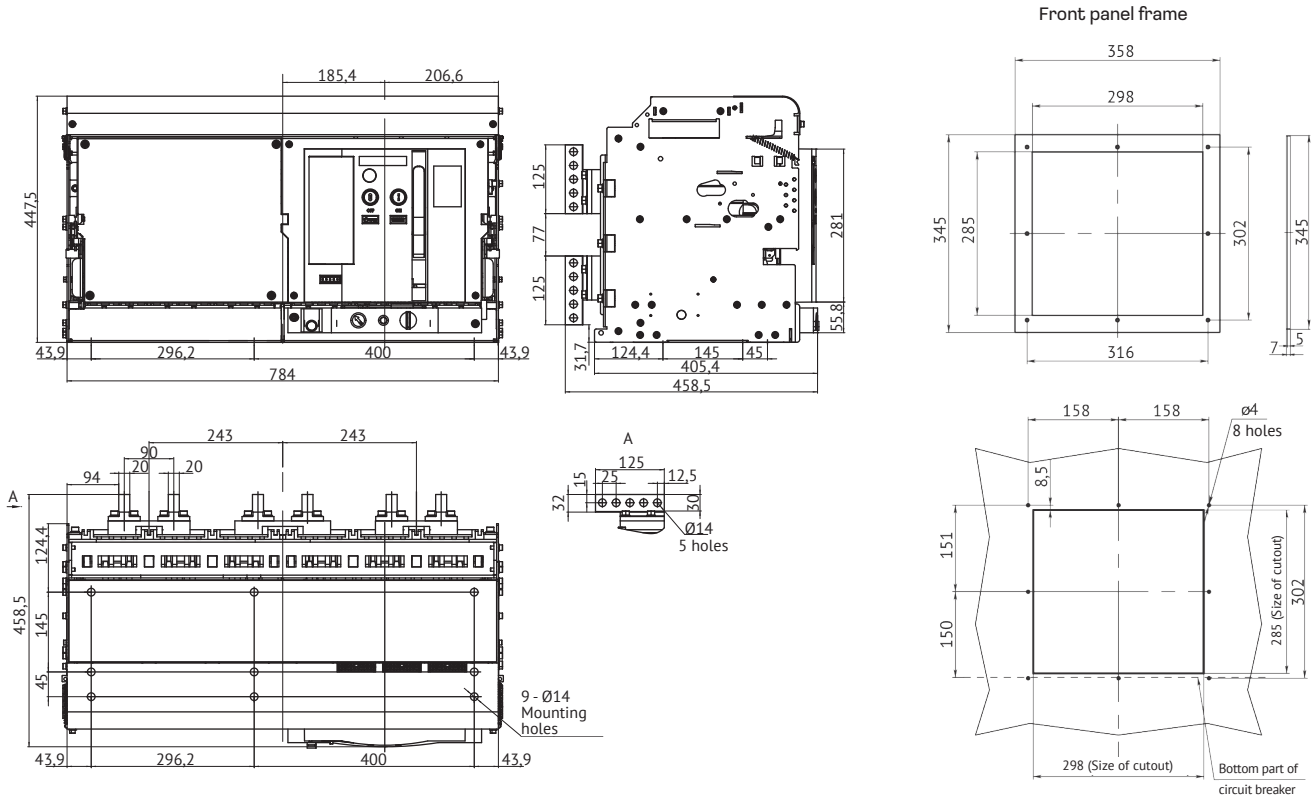



**Withdrawable OptiMat A-5000-S5-3P circuit breaker for rated current of 5000 A with rear horizontal terminal location**

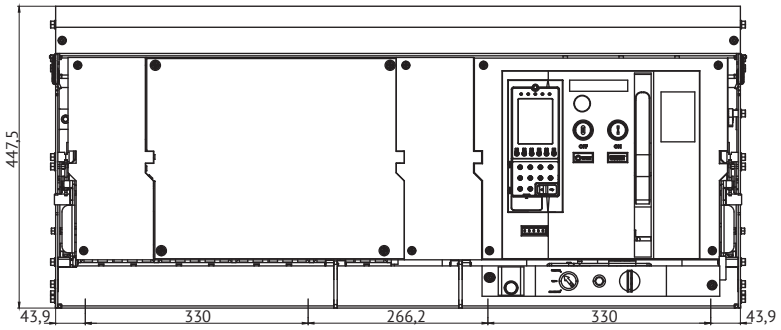


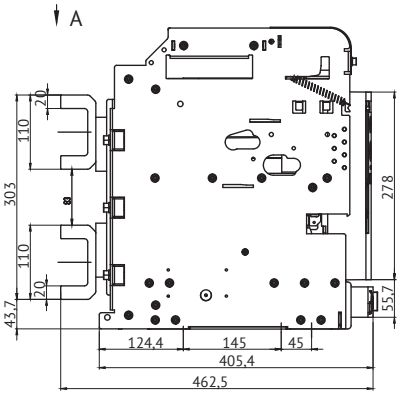
**OptiMat A-5000-S6-3P-150kA circuit breaker of withdrawable design for rated current of 5000 A, LSC 150 kA with rear vertical and horizontal terminal location**

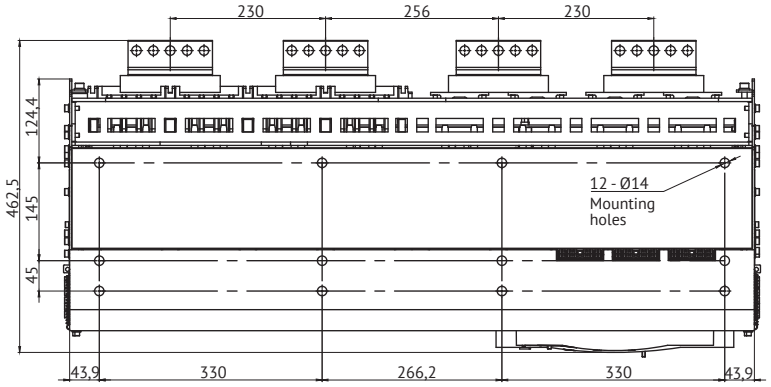


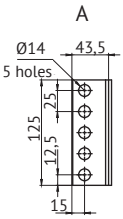



**OptiMat A-5000-S6-4P-150kA circuit breaker of withdrawable design for rated current of 5000 A, LSC 150 kA with rear vertical and horizontal terminal location**

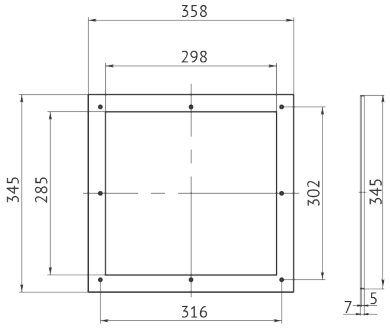


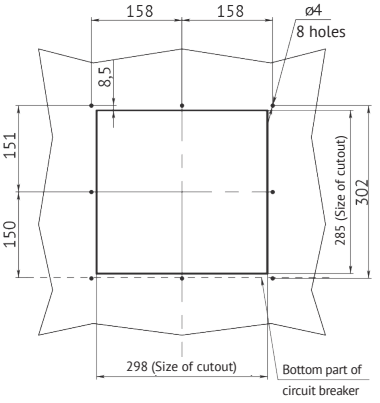



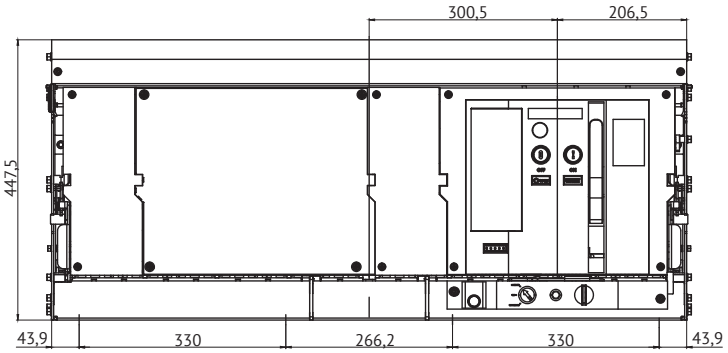



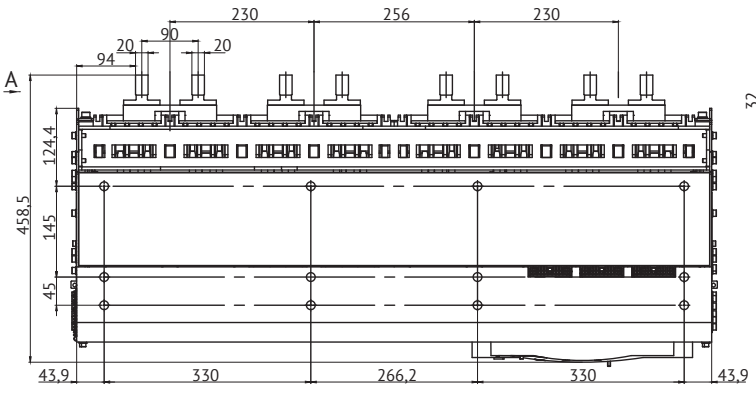



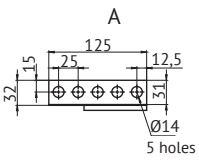

Front panel frame

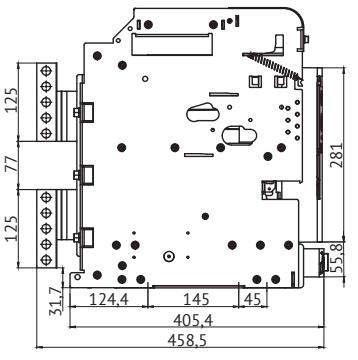


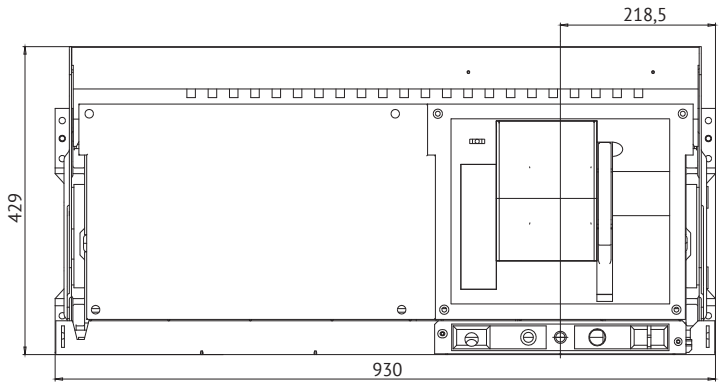



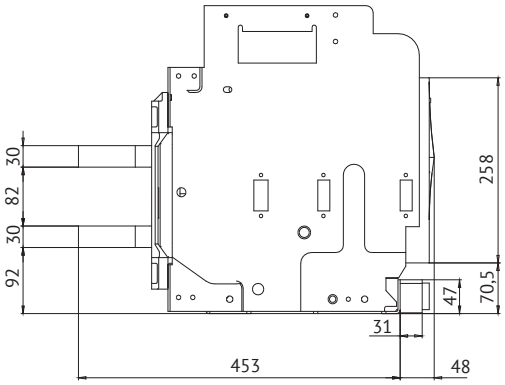



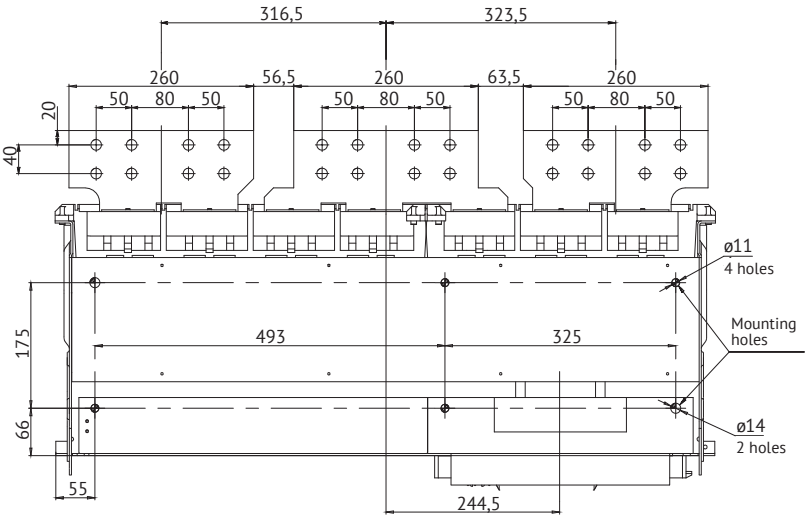



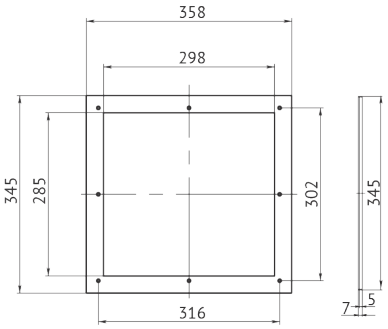
**Withdrawable OptiMat A-6300-S6-3P circuit breaker for rated current of 6300 A with rear horizontal terminal location**

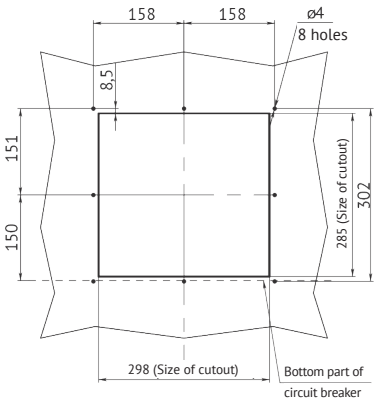


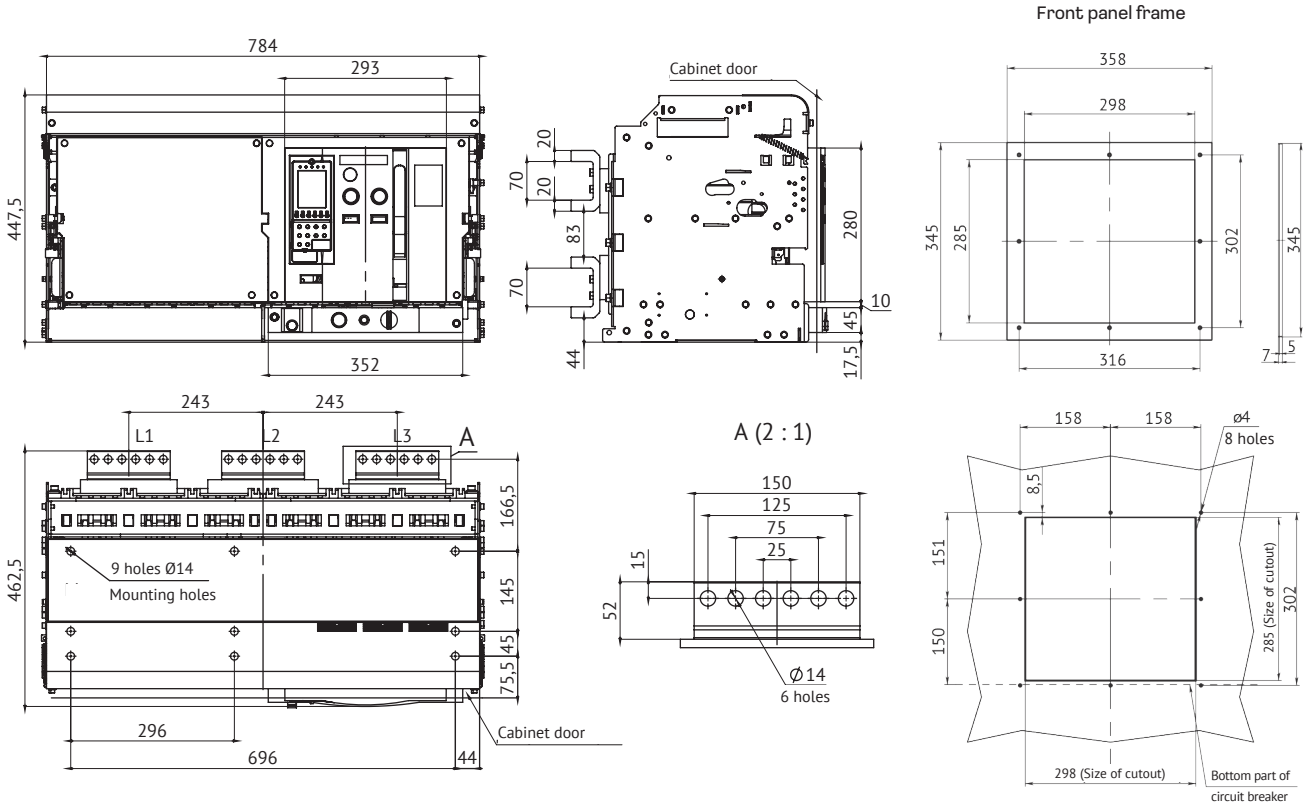



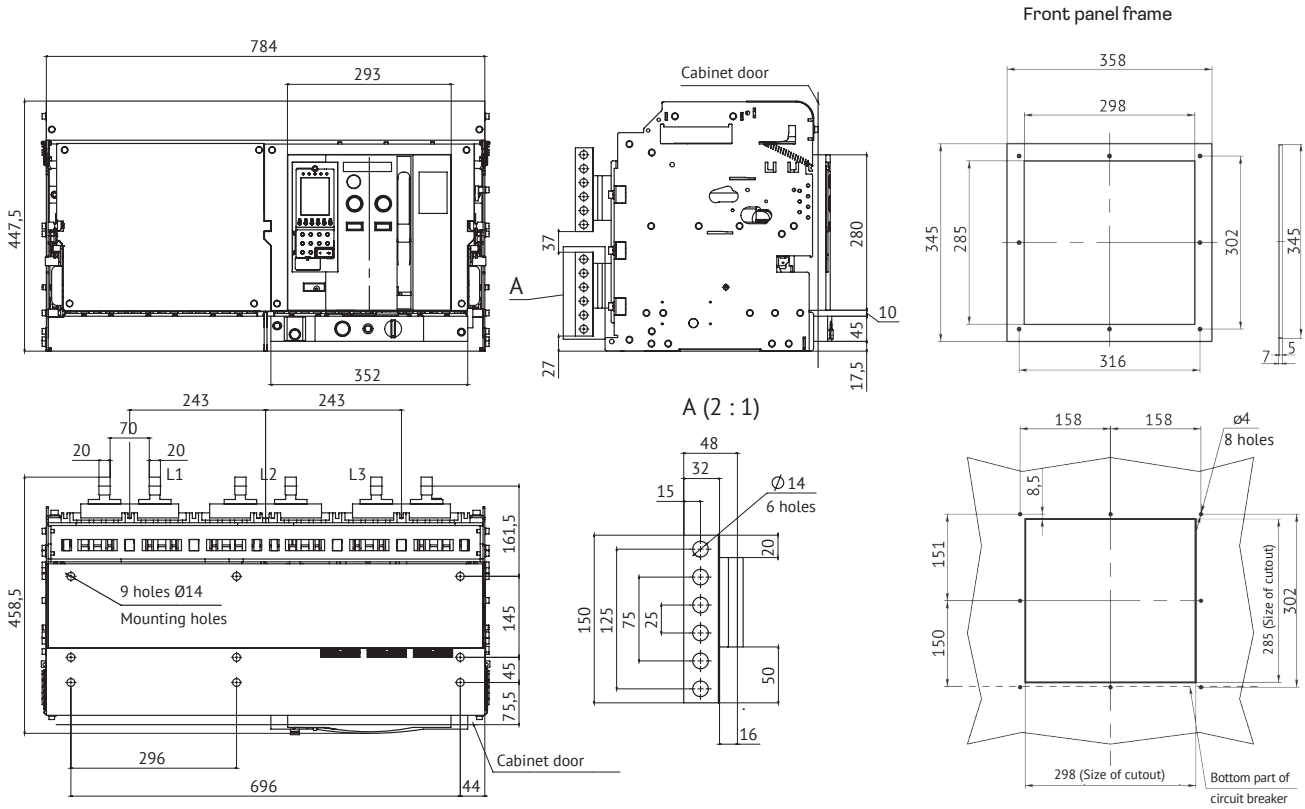

Front panel frame



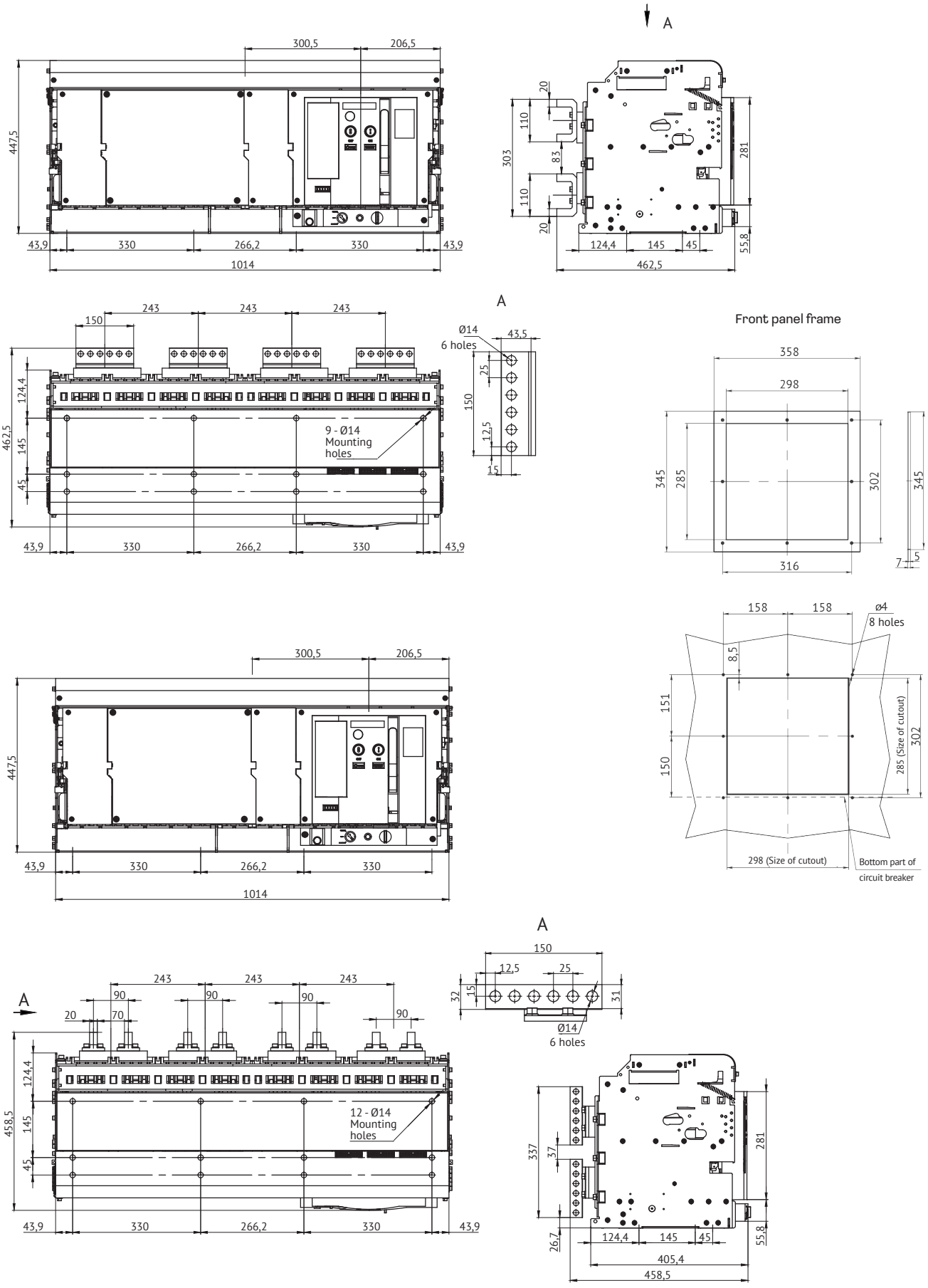



**OptiMat A-6300-S6-3P-150kA circuit breaker of withdrawable design for rated current of 6300 A, LSC 150 kA with rear vertical and horizontal terminal location**



**OptiMat A-6300-S6-4P-150kA circuit breaker of withdrawable design for rated current of 6300 A, LSC 150 kA with rear vertical and horizontal terminal location**



## Power cables connection

When connecting power cables, weight of a cable and its mechanical pressure on circuit breaker's terminal should be considered:
- The extended terminals must have an insulated support and the cable must be fixed to a solid surface (Fig. 1).
- When connecting several cables they should be fastened together and fixed on the frame of fixed structure (Fig. 2).

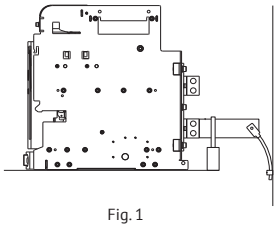


Fig. 1

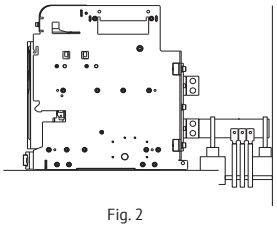


Fig. 2

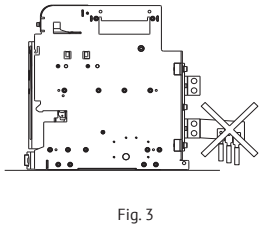
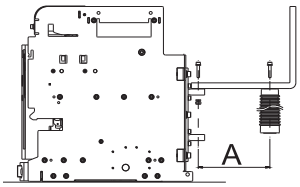
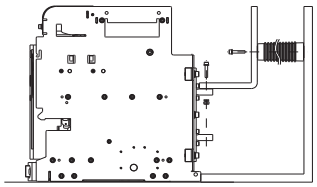


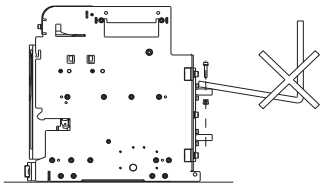
Fig. 3

## Busbars connection

When mounting the busbars, the mounting holes should be positioned in such a way as to clearly coincide with the holes on the circuit breaker terminals and not to create breaking pressure when bolted.
To prevent busbars sagging and increased mechanical effect on circuit breaker terminals, the busbars shall be fastened with support isolators.



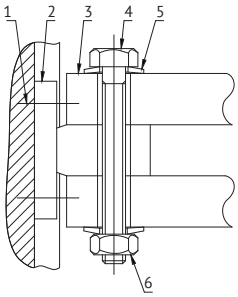





To ensure the busbar system resistance to electrodynamic currents, the distance A must be no more than:

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

### Busbars connection to the apparatus




1 — unit fastening screw;
2 — circuit breaker connector;
3 — busbars;
4 — bolt;
5 — plate washers;
6 — nut.

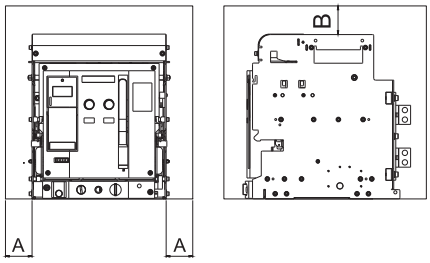
## Sizing of busbars

| Overall dimension | Rated current, A | Copper busbars | | Aluminum busbars | | Fasteners | Tightening torque, N·m | |
|---|---|---|---|---|---|---|---|---|
| | | Quantity, pcs. | Cross-section, mm² | Quantity, pcs. | Cross-section, mm² | | Spring washer GOST 6402 | Disk spring 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 | 3 | 5x100 | 4 | 10x50 | | | |
| | 2000 | | | | 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 | - | - | | | |

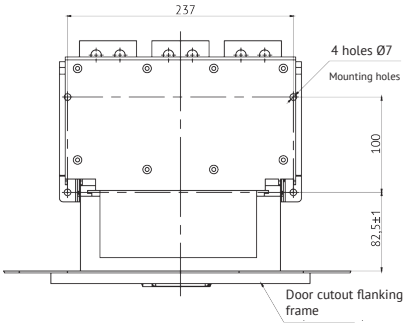
# Recommendations for installation of a switchgear

The table shows the minimum allowed distance between the air circuit breaker and the metal parts of the switchgear.

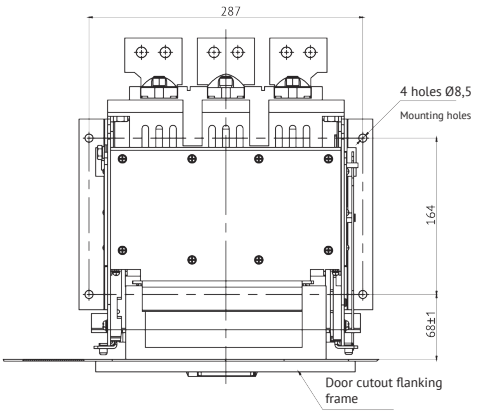
| Circuit breaker design version | A, mm | B, mm |
|---|---|---|
| Stationary | 70 | 150 |
| Withdrawable | 70 | 0 |



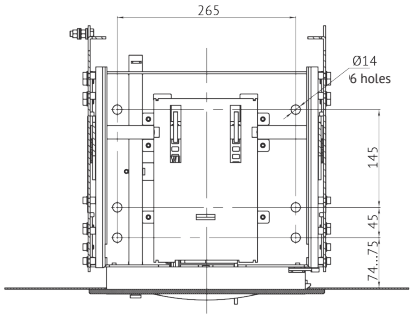

## Mounting dimensions of circuit breaker baskets relative to cubicle front panels



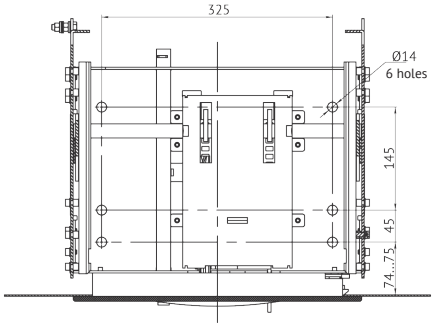

S1 of fixed type with frame installed (top view)



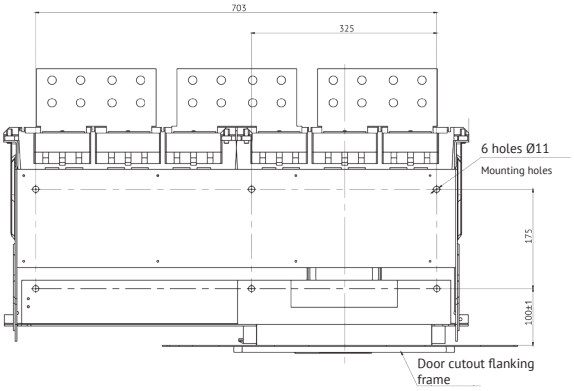

S1 of extended type with frame installed (top view)



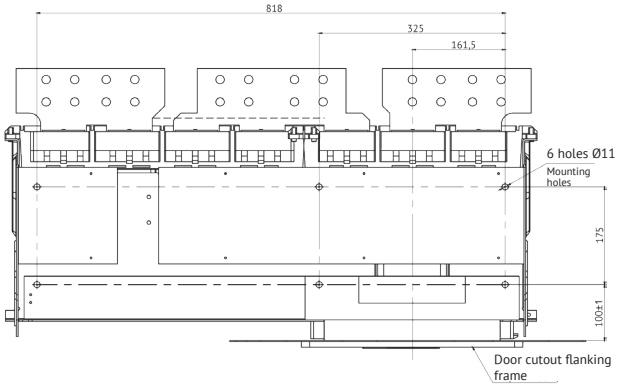

S2 of extended type with the frame installed (plan view)




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



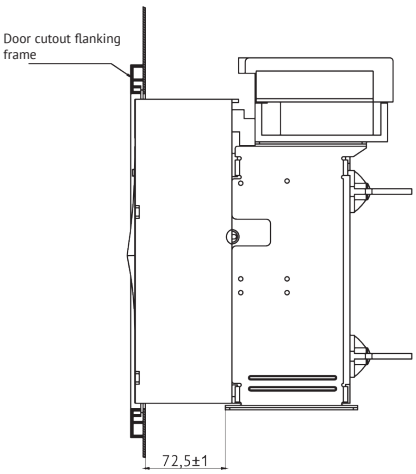

S5 of extended type with the frame installed (plan view)



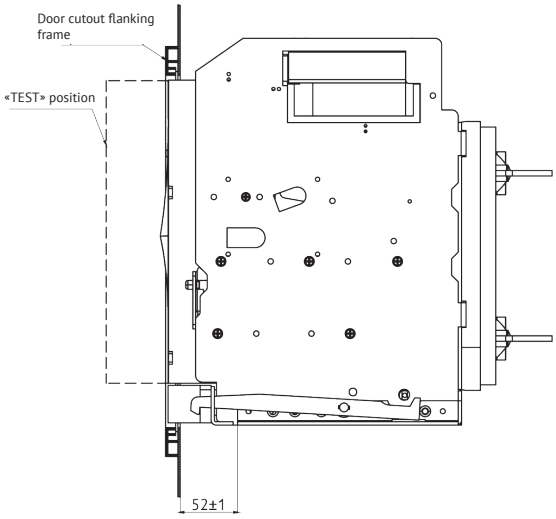

S6 of extended type with the frame installed (plan view)

The installed circuit breaker and the frame to it allows to work with the circuit breaker in the «Drawn in» position, as well as switch it and work with it in the «Test» position (for withdrawable circuit breakers). Drawing out the circuit breaker to the «Drawn out» position with the cabinet door closed is not provided for by the design and is prohibited for technical reasons.

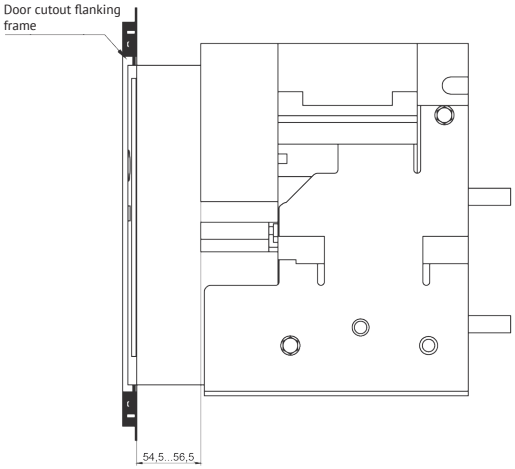
**Side view of fixed and withdrawable OptiMat A circuit breakers after mounting into cubicle with frame installation**



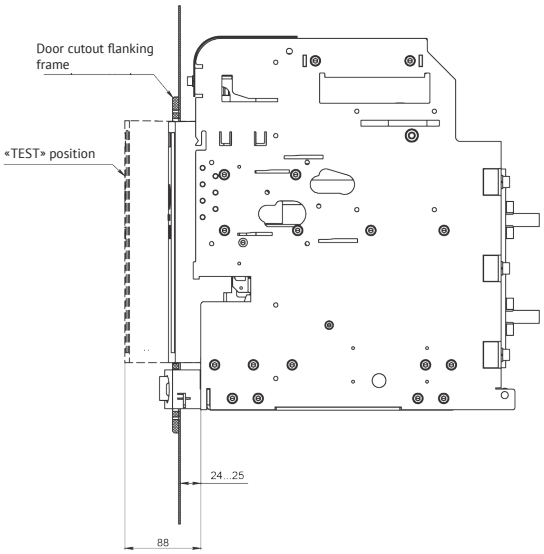

S1 of fixed type with frame installed (side view)



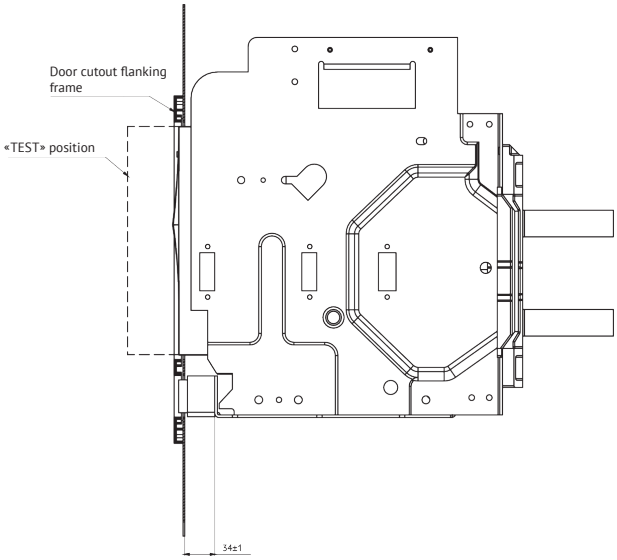

S1 of withdrawable type with the frame installed (side view)




S2, S4 of fixed type with 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)

A correctly installed circuit breaker and a frame to it allow to open the cabinet doors with the circuit breaker in the «Drawn in» and «Test» positions.