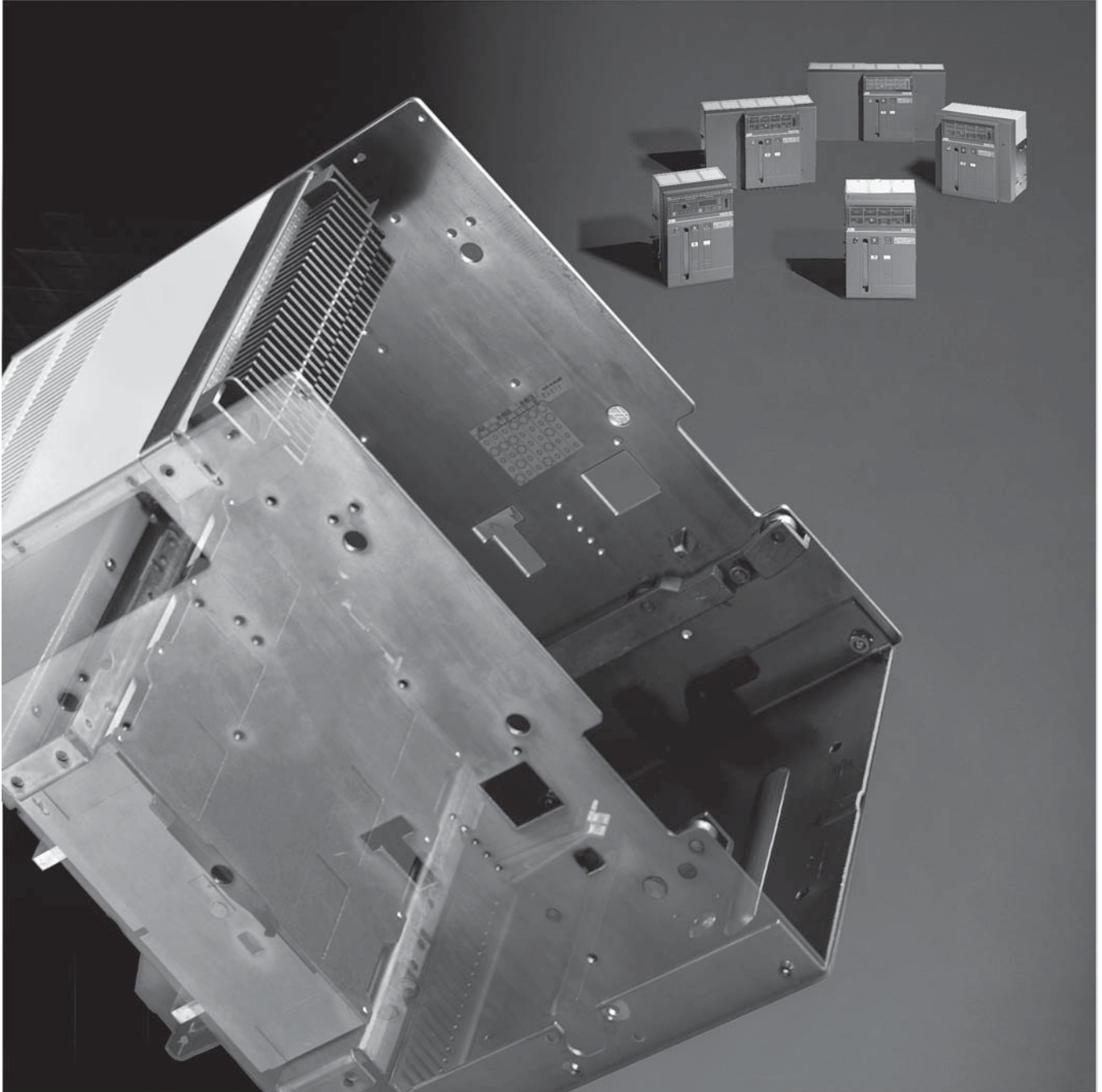


RH0299002 L2275

Emax UL Listed



| | | | | | |
|------------|-------|-----------------|--|--|--------------------|
| Dwg. | | Resp.Off. | | Title Installation, service and maintenance instructions for the cradle of draw out version power circuit breakers | Lang. en |
| App. | | Take-over Off. | | | |
| Model | L2275 | | | Apparatus Emax UL | Scale |
| ABB | | ABB SACE | | Doc. N° RH0299002 | |

Index

| | | | |
|-------|---|------|----|
| 1. | Description | page | 2 |
| 1.1 | General characteristics | « | 2 |
| 1.2 | Cradle construction characteristics | « | 2 |
| 2. | Checking on receipt | « | 2 |
| 3. | Storage, lifting and weights | « | 2 |
| 4. | Installation | « | 3 |
| 4.1 | Installation room | « | 3 |
| 4.2 | Installation of the cradle of draw out power circuit breaker | « | 3 |
| 4.2.1 | Preparation of the cradle | « | 3 |
| 4.2.2 | Installation of the cradle | « | 4 |
| 4.2.3 | Installation of the cradle on board a ship | « | 5 |
| 4.3 | Installation of the flange on the compartment door | « | 5 |
| 5. | Electrical connections | « | 6 |
| 5.1 | Connections to the power circuit | « | 6 |
| 5.1.1 | Shapes of the terminals | « | 6 |
| 5.1.2 | Examples of positioning of the connection busbars according to the types of terminals | « | 6 |
| 5.1.3 | Assembly procedures of the connection busbars | « | 7 |
| 5.2 | Grounding | « | 7 |
| 5.3 | Cabling the power circuit breaker auxiliary circuits | « | 8 |
| 5.3.1 | Draw out power circuit breaker | « | 8 |
| 6. | Cradle accessories | « | 9 |
| 6.1 | Electrical accessories | « | 9 |
| 6.1.1 | Auxiliary contacts | « | 9 |
| 6.2 | Mechanical accessories | « | 9 |
| 6.2.1 | Accessory for shutter padlock | « | 9 |
| 6.2.2 | Compartment door mechanical lock | « | 9 |
| 6.2.3 | Key lock in open position with Kirk lock | « | 9 |
| 6.2.4 | Mechanical interlock | « | 9 |
| 7. | Overall dimensions | « | 10 |
| 8. | Electrical circuit diagrams | « | 20 |

| | | | | | |
|-------|-------|--|-----------|------------------|-----------------|
| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 1/28 |

1. Description

1.1 General characteristics

The SACE Emax series of power circuit breakers are made up of a steel sheet structure which houses the operating mechanism, the poles and the auxiliary parts. Each pole, insulated from the others, contains the interrupting parts and the current transformer of the corresponding phase.

The structure of the poles differs according to whether the power circuit breaker is selective or current-limiting.

The fixed version power circuit breaker has its own terminals for connection to the power circuit. In the draw out version, the power circuit breaker makes up the moving part of the apparatus which is completed with a cradle fitted with the terminals for connection to the power circuit of the installation. Coupling between moving part and cradle takes place by means of special pliers mounted in the cradle.

1.2 Cradle construction characteristics

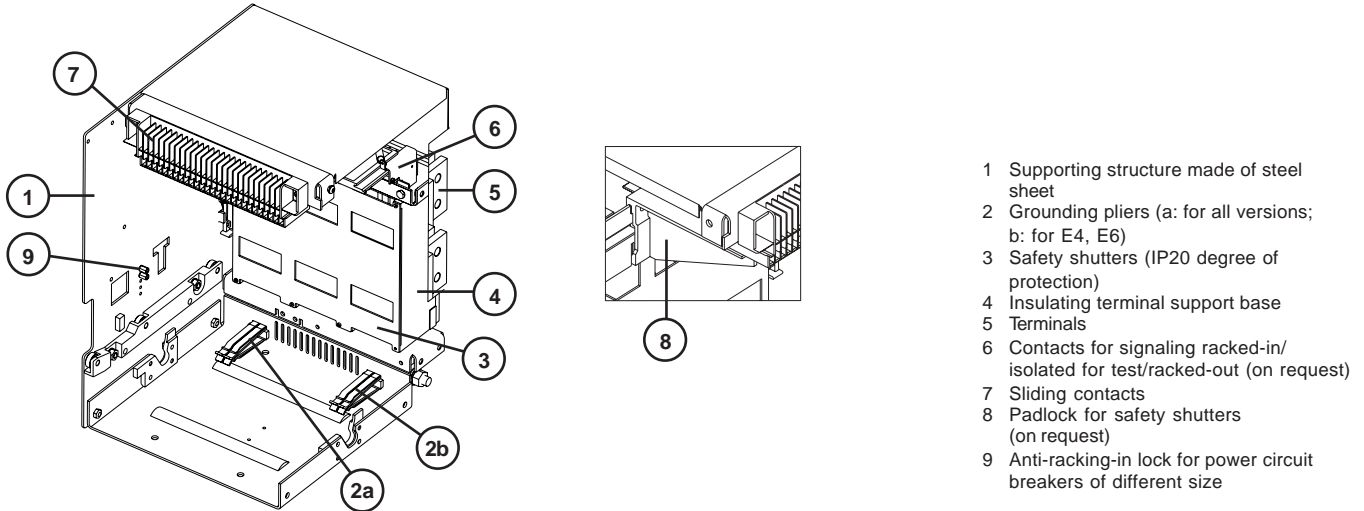


Fig. 1

2. Checking on receipt

Examine the state of the material received and its correspondence with what was foreseen at the time of ordering. Should any damage or irregularity be found on unpacking, which must be carried out carefully, make the relative notification within and not over 5 days from receipt of the material. The notification must indicate the number of the shipping note.

3. Storage, lifting and weights

The cradle, protected by an external wooden housing, is fixed by means of screws to the transport plate or to the bottom of the packing case. If the cradle has to remain in the warehouse even for a short time before being put into service, after checking it on receipt, it must be put back in its container, and covered with a waterproof sheet.

Caution

- Use a dry, dust-free room free of aggressive chemical agents as the storage room
- Position the cradle on a horizontal surface, not in direct contact with the floor, but on a suitable support surface (fig. 2)
- The maximum number of stackable packs is indicated in figure 3.

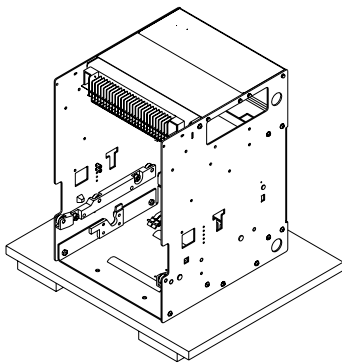


Fig. 2

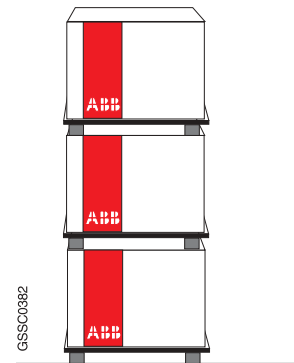


Fig. 3

| | | | | | |
|-------|-------|--|-----------|-----------|-----------------|
| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 2/28 |

With regard to lifting, follow these instructions: the cradle must be placed on a sturdy resting surface and lifted, preferably by means of a special fork-lift truck. However, the use of ropes is allowed. In this case, the lifting ropes must be hooked up as shown in the figure.

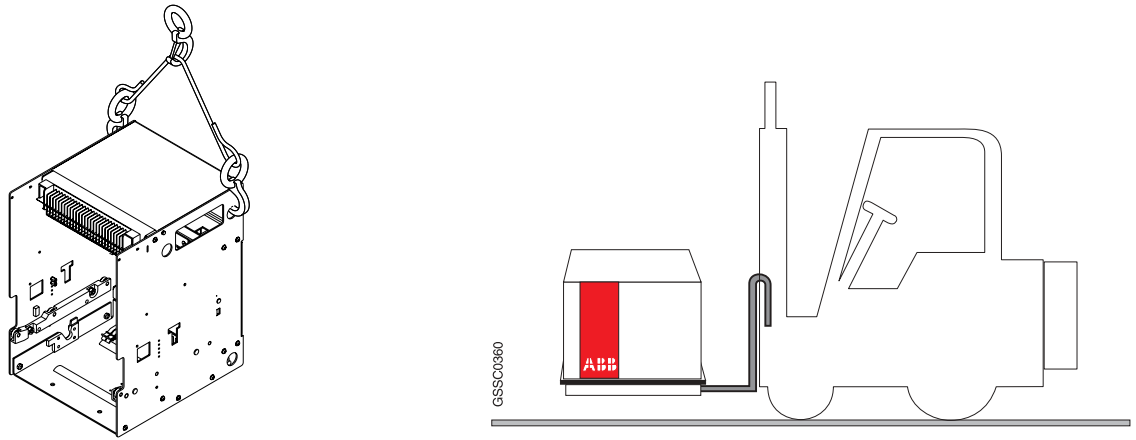


Fig. 4

Table of the weights of the cradles

| Selective power circuit breaker | draw out 3 poles | | draw out 4 poles | |
|---------------------------------|------------------|-----|------------------|-----|
| | kg | Lbs | kg | Lbs |
| E1 | 25 | 55 | 28 | 62 |
| E2 | 28 | 62 | 32 | 71 |
| E3 | 38 | 84 | 45 | 99 |
| E4 | 43 | 95 | 53 | 117 |
| E6 | 70 | 154 | 80 | 176 |

Note

The table regards cradles with horizontal rear terminals.

4. Installation

4.1 Installation room

Install the power circuit breaker in a dry, dust-free, non-corrosive room, and in such a way that it is not subject to shocks or vibrations. Where this is not possible, use assembly in switchgear with a suitable degree of protection.

For preparation of the installation room, please refer to paragraph "Overall dimensions", which gives information on the following points:

- minimum installation volumes of the power circuit breakers and derived versions
- distances to be respected for power circuit breakers in compartments
- overall dimensions of the power circuit breakers
- fixing mounting holes
- compartment door mounting holes.

The operation of installation, put in service and eventually ordinary and extraordinary maintenance have to be done by skilled personnel, that has the detailed knowledge of the apparatus.

4.2 Installation of the cradle of a draw out power circuit breaker

4.2.1 Preparation of the cradle

Assembly of the anti-racking-in lock

Before installing the cradle, it is necessary to check the presence of the anti-racking-in lock of power circuit breakers with different electrical characteristics from those of the cradle itself. Should the anti-racking-in lock have been supplied separately, proceed to assemble it as follows:

- On the self-adhesive plate (4), find the assembly position of the stop bolts in relation to the power circuit breaker which has to be housed in the cradle
- Insert the two hexagonal-head screws (1) in the holes found in the previous point as shown in figure
- Fix the two screws with the washers (2) and the hexagonal stops (3).

Check that the anti-racking-in lock corresponding to the one installed on the cradle is present on the power circuit breaker (moving part).

| | | | | | |
|-------|-------|--|-----------|------------------|-----------------|
| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 3/28 |

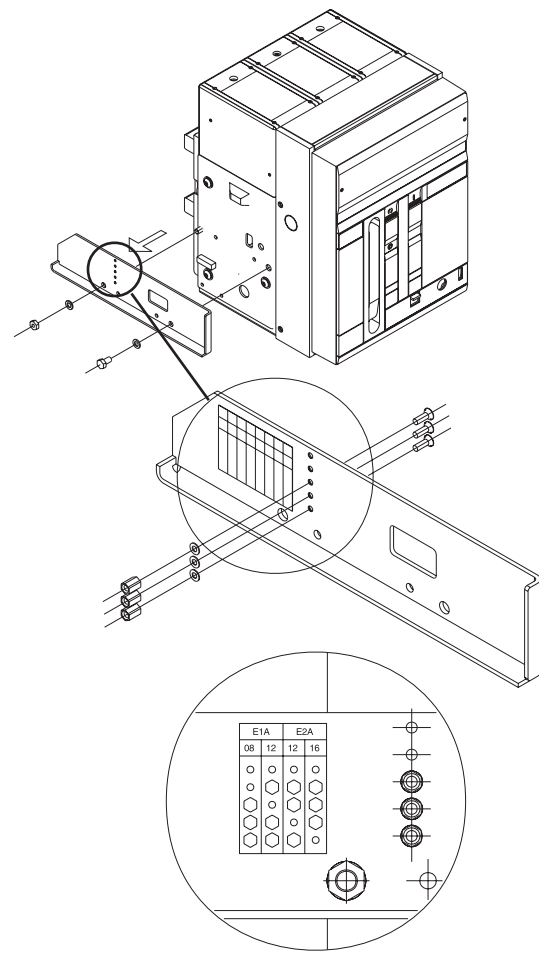
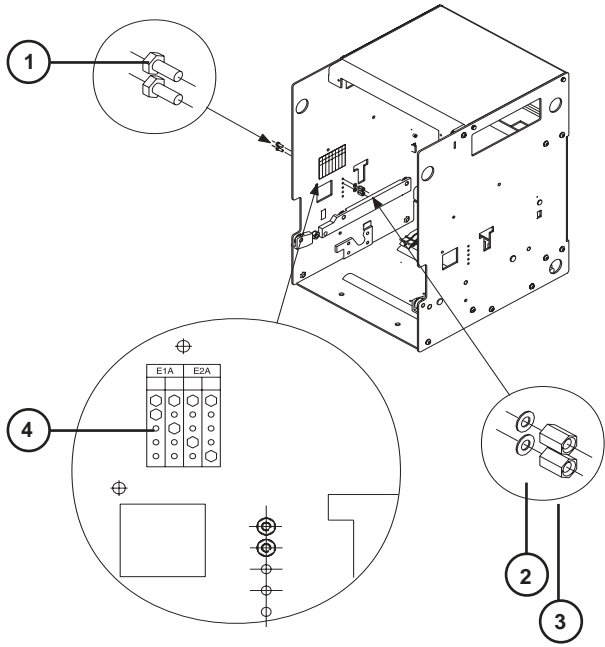
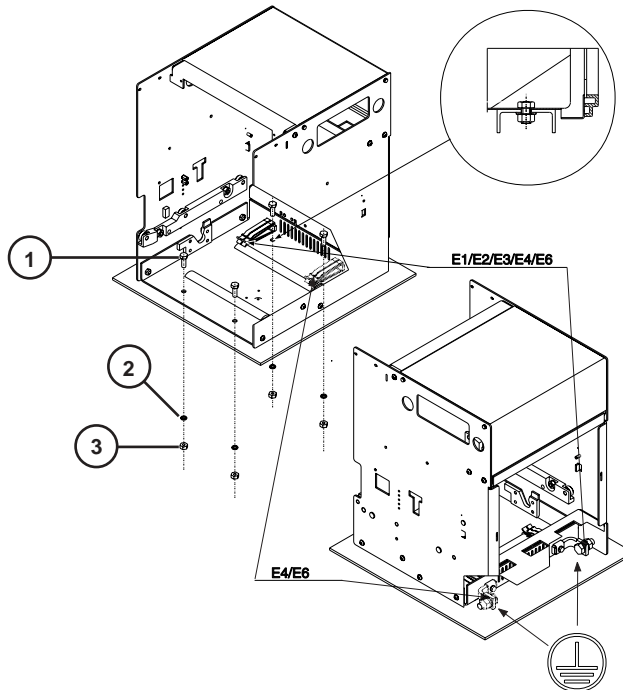


Fig. 5

Fig. 6

4.2.2 Installation of the cradle

Fix the cradle by means of the screws (1), washers (2) and nuts (3) (M8 x 16), supplied by ABB SACE. If other screws are used, check that the head of the screws does not extend more than 5.5 mm (0.22 inches) from the base of the cradle.



Note
 (*) For the E1-E2 and E3 cradles, there are four fixing points, where as there are six for E4 and E6.

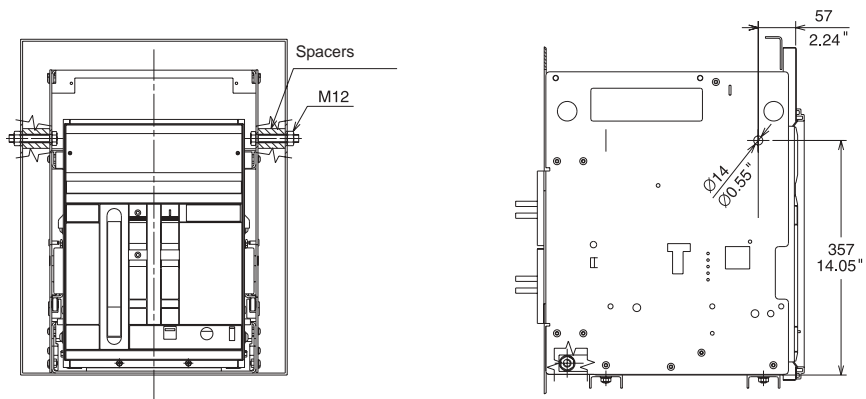
Fig. 7

| | | | | | |
|-------|-------|--|-----------|------------------|-----------------|
| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 4/28 |

4.2.3 Installation of the cradle on board a ship

Regarding the fixing points of the SACE Emax draw out version air power circuit breakers, for the applications on board a ship, additional fixing on the sides of the cradle itself is recommended (the M12 screws and the spacers are not provided in the supply).

E1 - E2 - E3



E4 - E6

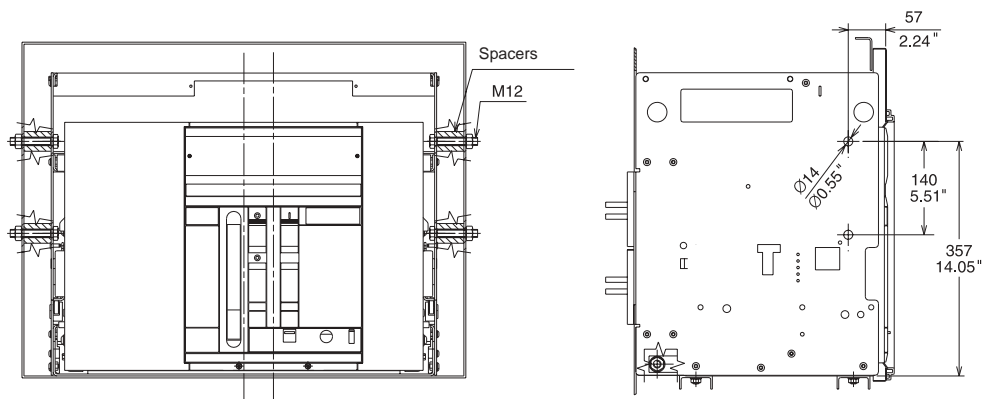


Fig. 8

4.3 Installation of the flange on the compartment door (Fig. 9)

- Make the compartment door mounting holes foreseen in the "Overall dimensions" paragraph.
- Apply the flange (1) onto the front of the compartment door, fixing it from the inside by means of the self-threading screws (2).

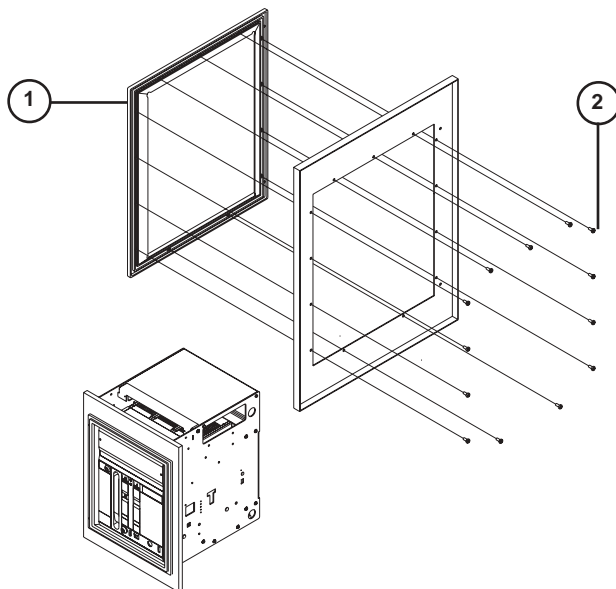


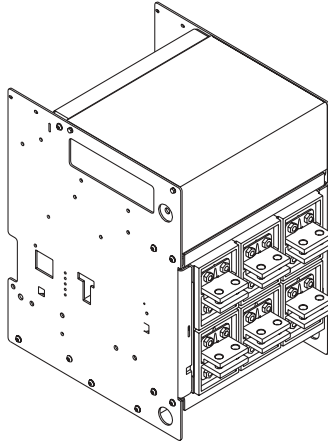
Fig. 9

| | | | | | |
|-------|-------|--|-----------|------------------|-----------------|
| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 5/28 |

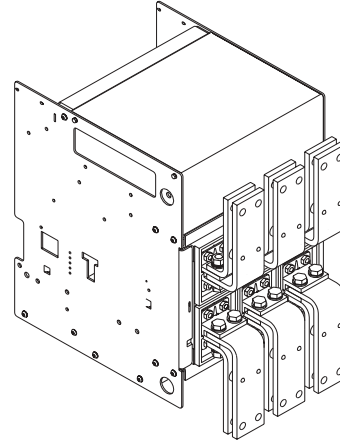
5. Electrical connections

5.1 Connections to the power circuit

5.1.1 Shapes of the terminals



Horizontal rear terminals



Vertical rear terminals

Note

The drawings are made to show the type of terminal in diagram form. The exact shape of the terminals is given in the "Overall dimensions" chapter.

Fig. 10

5.1.2 Examples of positioning the connection busbars according to the types of terminals

The connection busbars allow connection between the terminals of the cradles and the busbars of the switchgear. Their sizing must be carefully studied by the switchgear designer.

Some examples of possible constructions in relation to the shape and size of the power circuit breaker terminals are given in this paragraph.

The various types of terminals are of constant dimensions per size of power circuit breaker: it is normally advisable to exploit the whole contact surface of the terminal, so the width of the connection busbar should be the same as that of the terminal. Different capacities for the connections can be made working on the thickness and on the number of busbars in parallel. In some cases, reductions in the width of the connection in relation to that of the terminal are allowed as is shown by the following examples.

Possible widths of the connection busbars

| Connection busbars | | | | |
|--------------------|---------------|--------|------------------|------------|
| | Rated current | Number | Size mm / inches | |
| E1 | 800 A | 1 | 76,2/3" | 6,35/0,26" |
| E1 | 1200 A | 2 | 50,8/2" | 6,35/0,26" |
| E2 | 1200 A | 2 | 50,8/2" | 6,35/0,26" |
| E2 | 1600 A | 2 | 76,2/3" | 6,35/0,26" |
| E3 | 1200 A | 2 | 50,8/2" | 6,35/0,26" |
| E3 | 1600 A | 2 | 76,2/3" | 6,35/0,26" |
| E3 | 2000 A | 2 | 101,6/4" | 6,35/0,26" |
| E3 | 2500 A | 3 | 101,6/4" | 6,35/0,26" |
| E4 | 3200 A | 5 | 76,2/3" | 6,35/0,26" |
| E4 | 3600 A | 6 | 76,2/3" | 6,35/0,26" |
| E6 | 4000 A | 7 | 76,2/3" | 6,35/0,26" |
| E6 | 5000 A | 8 | 101,6/4" | 6,35/0,26" |

Fig. 11

| | | | | | |
|-------|-------|--|-----------|------------------|-----------------|
| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 6/28 |

Positioning the first anchoring baffle of the busbars according to the short circuit current

Anchoring to the switchgear

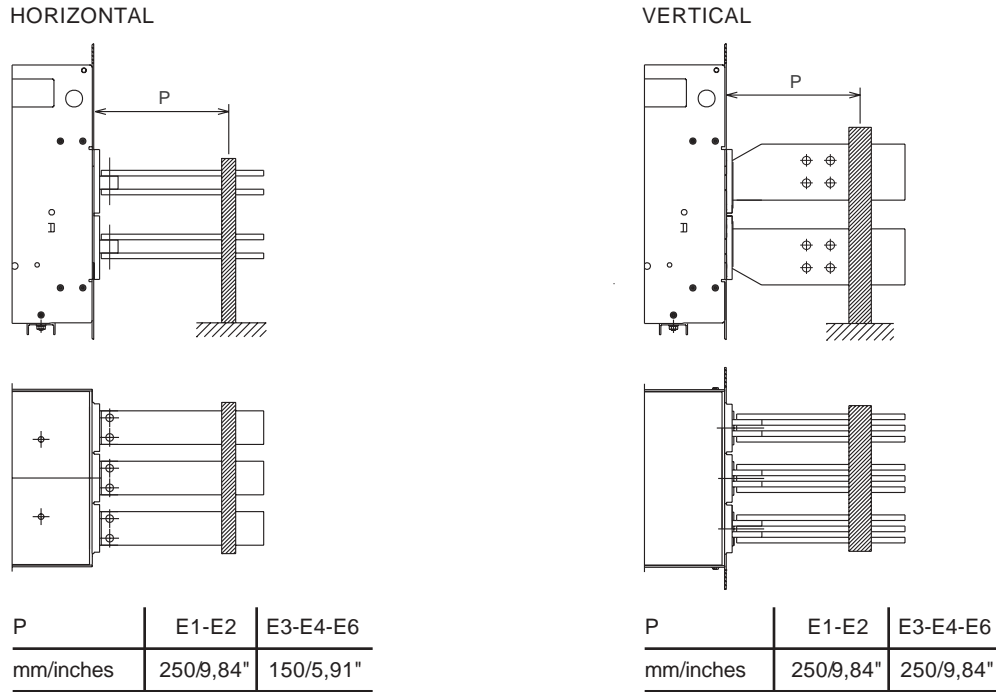


Fig. 12

5.1.3 Assembly procedures for the connection busbars

Check the state of the contact surfaces of the connections very carefully: these must be very clean and free of burrs, dents or traces of oxidation, which must be eliminated using a fine file or an emery cloth to prevent localized increases in temperature. On completion of the operation, remove all traces of grease or dust with a cloth soaked in a suitable solvent.

In the case where copper connections are used, it is advisable to tin-plate the contact surfaces. When aluminium connections are used it is advisable to apply a thin layer of Vaseline over the contact surfaces.

The connections must not exert any force in any direction on the terminals.

Always interpose a flat washer of good diameter and a spring washer between them (to spread the tightening pressure over a greater area).

Make the contact between connection and terminal and fully tighten the fixing screws.

Always use two wrenches (so as not to stress the insulating parts excessively), applying the tightening torque indicated in figure 11.

Check the tightening after 24 hours.

M12 / 1/2" high resistance screws

Tightening torque of the main terminals: 70 Nm / 584 lb. ft.

| Terminals cradle | No. screws for phase | No. screws for neutral |
|------------------|----------------------|------------------------|
| | 2 | 2 |
| | 3 | 3 |
| | 4 | 2 |
| | 6 | 3 |

Fig. 13

5.2 Grounding

The cradle of the draw out power circuit breaker has one or two terminals on the rear, marked with the special symbol, for connection to ground (fig. 9). Each terminal is complete with a bolt for fixing the connection.

A conductor with cross-section conforming with the Standards in force must be used for the connection. Before assembling the connection, clean and degrease the area around the screw. After assembly, tighten the bolt with a torque of 70 Nm / 584 lb. ft.

| | | | | |
|-------|-------|-----------|------------------|-----------------|
| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 7/28 |

5.3 Cabling the power circuit breaker auxiliary circuits

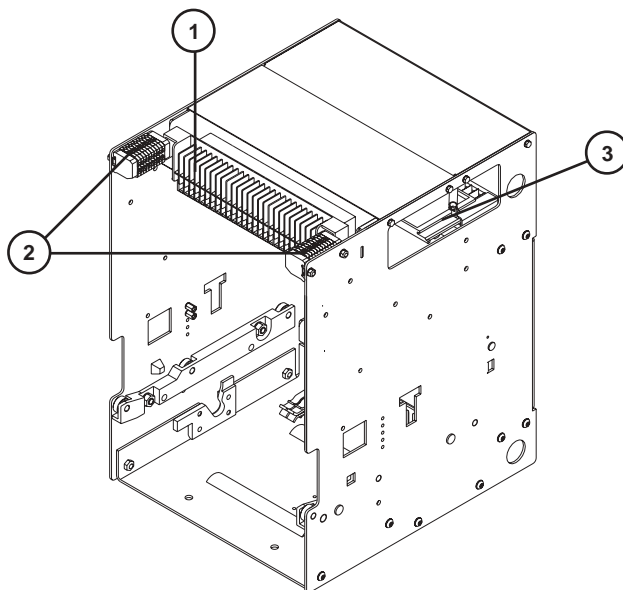
5.3.1 Draw out power circuit breaker

For connection of the moving part to the auxiliary circuits, a connector with sliding contacts is available on the cradle (see figure), identified by the code X on the electrical circuit diagram.

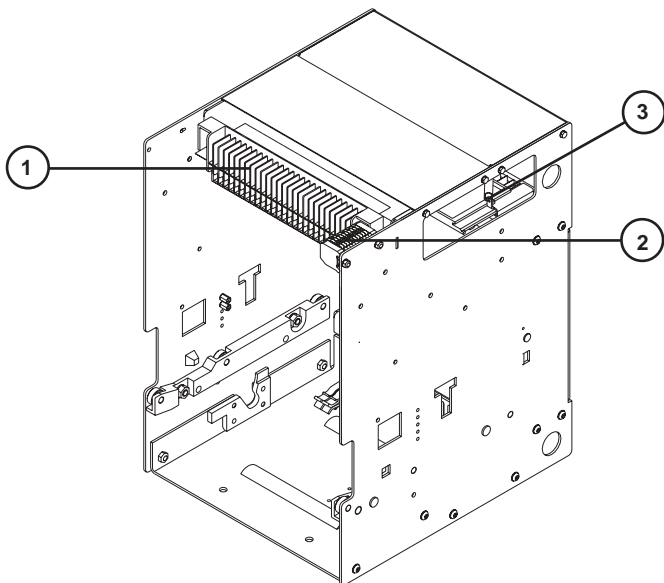
There is immediate access to the terminals of the fixed connector with the compartment door open.

Furthermore, for connection of the position contacts of the moving part in relation to the cradle, a terminal box is available, identified by the code XF.

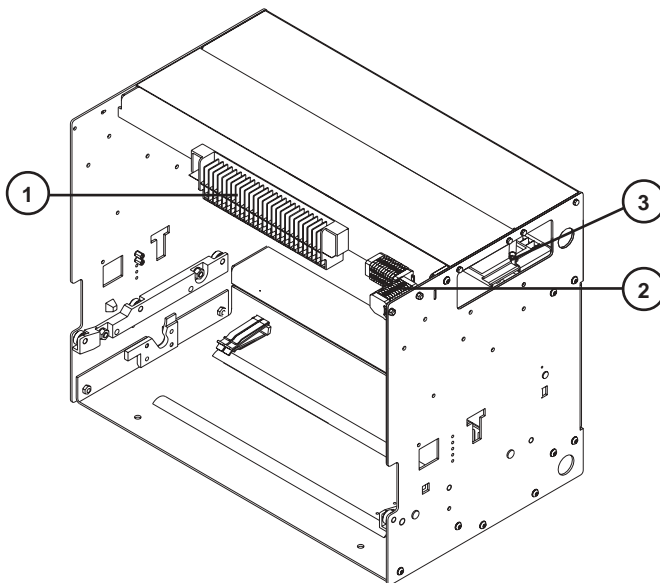
The connector and terminal box have screw terminals.



E1 - E2 - E3



E1 - E2 - E3
5 contacts in position



E4 - E6
10 contacts in position

Caption

- 1) Sliding contacts (X)
- 2) Terminal box for position contacts (XF)
- 3) Position contacts

Fig. 14

| | | | | | |
|-------|-------|--|-----------|------------------|-----------------|
| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 8/28 |

6. Cradle accessories

6.1 Electrical accessories

6.1.1 Auxiliary contacts

Auxiliary contacts installed on the power circuit breaker are available, which allow indication of the state of the power circuit breaker.

Characteristics

| U _n | I _{n max} | T |
|----------------|--------------------|-------|
| 125 V DC | 0.3 A | 10 ms |
| 250 V DC | 0.15 A | |

| U _n | I _{n max} | cosφ |
|----------------|--------------------|------|
| 250 V AC | 5 A | 0,3 |

Electrical signaling for power circuit breaker racked-in/racked-out test/racked-out (Fig. 14)

In addition to the mechanical signaling about the position of the power circuit breaker, it is possible to have electrical signaling by means of 5 or 10 auxiliary contacts which are installed on the cradle.

This is only available for power circuit breakers in the draw out version, to be installed on the cradle.

The auxiliary contacts have the following configurations:

- 5 contacts: group made up of 2 contacts for signaling racked-in, 2 contacts for signaling racked-out and 1 contact signaling the test position (main pliers isolated, but sliding contacts connected)
- 10 contacts: group made up of 4 contacts for signaling racked-in, 4 contacts for signaling racked-out and 2 contacts for signaling the test position (main pliers isolated, but sliding contacts connected).

Reference figures in the electrical circuit diagrams:
S75I (31-32) - S75T (31-32) - S75E (31-32)

6.2 Mechanical accessories

6.2.1 Accessory for shutter padlock (Fig. 15)

This allows the shutters (installed on the cradle) to be padlocked in the closed position.

It is only available for power circuit breakers in the draw out version, to be installed on the cradle.

6.2.2 Compartment door mechanical lock

This prevents compartment door opening with the power circuit breaker closed (and power circuit breaker racked-in for draw out power circuit breakers) and locks power circuit breaker closing with the compartment door open.

6.2.3 Key lock in open position with Kirk lock (inside or front door)

This allows the power circuit breaker to be locked in the open position by means of a Kirk key lock (not supplied).

For use on fixed power circuit breakers, the accessory must be requested in combination with the interlocking plate for fixed power circuit breakers.

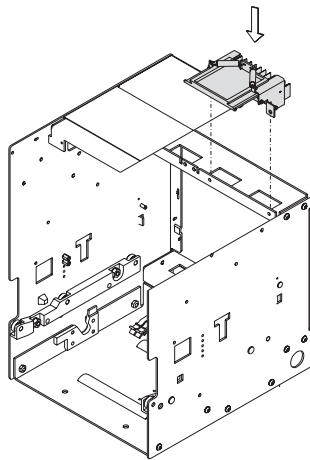


Fig. 14

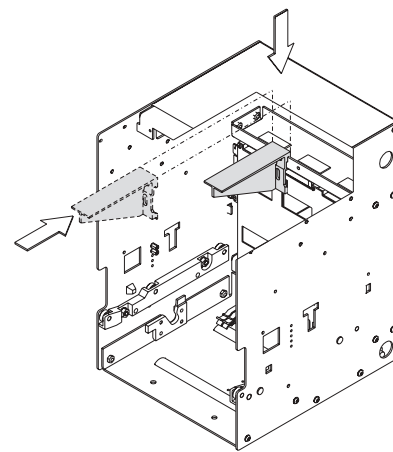


Fig. 15

6.2.4 Mechanical interlock

This mechanism carries out the mechanical interlock between two or three power circuit breakers (even of different sizes and in any fixed/draw out version) by means of a flexible cable. The electrical circuit diagram for electrical switching by means of a relay (to be provided by the customer) is supplied with the mechanical interlock. The installation of the power circuit breakers can be either vertical or horizontal. 4 types of interlocks are available:

type A: between 2 power circuit breakers (power supply group + emergency)

type B: between 3 power circuit breakers (group of 2 power supplies + emergency)

type C: between 3 power circuit breakers (group of 2 power supplies + bus-tie)

type D: between 3 power circuit breakers (group of 3 power supplies / a single power circuit breaker closed)

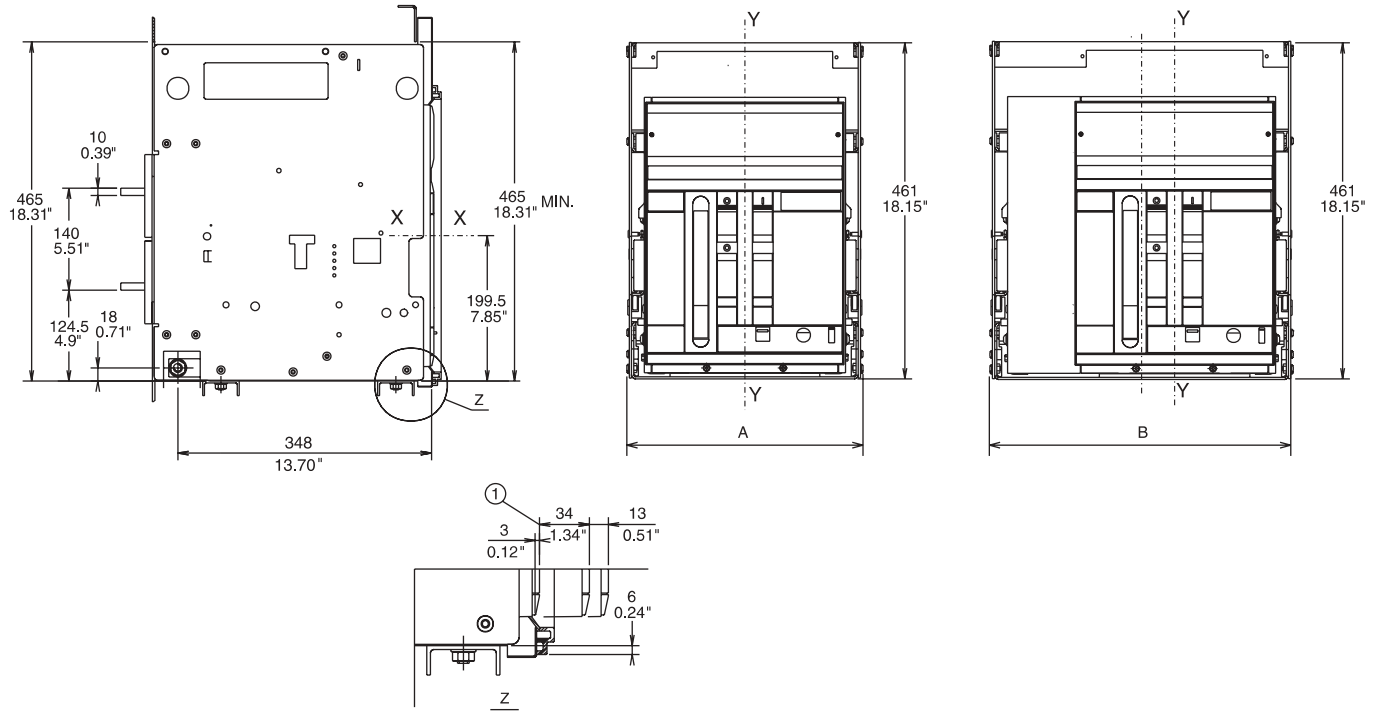
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|-------|-------|--|-----------|------------------|------------------------|
| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 9/28 |

7. Overall dimensions

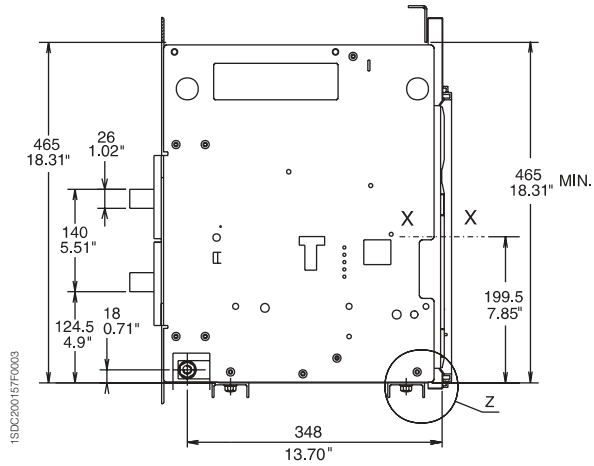
Draw out power circuit breaker

Basic version with horizontal rear terminals

E1



E2-E3-E4-E6



ISDC200157F0003

| | A 3 Poles | B 4 Poles |
|------|------------|------------|
| E1-A | 324/12.76" | 414/16.3" |
| E2-A | 324/12.76" | 414/16.3" |
| E3-A | 432/17.01" | 558/21.97" |
| E4-A | 594/23.39" | 684/26.93" |
| E6-A | 810/31.89" | 936/36.85" |

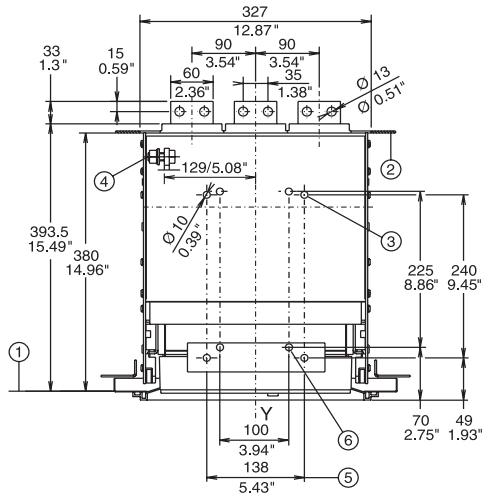
Caption

- ① Run from racked-in to test to isolated

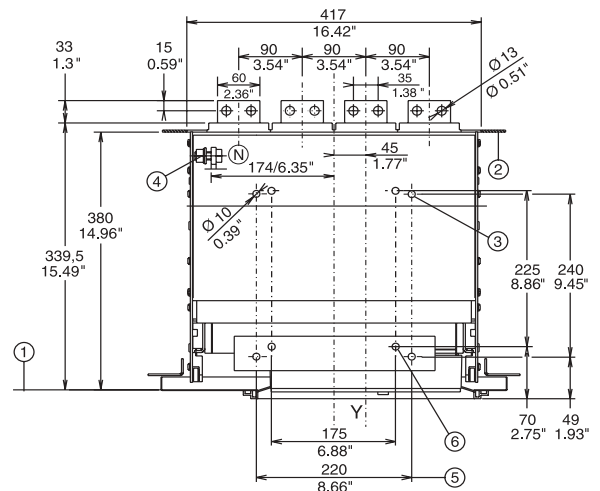
| | | | | |
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| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 10/28 |

Basic version with horizontal rear terminals

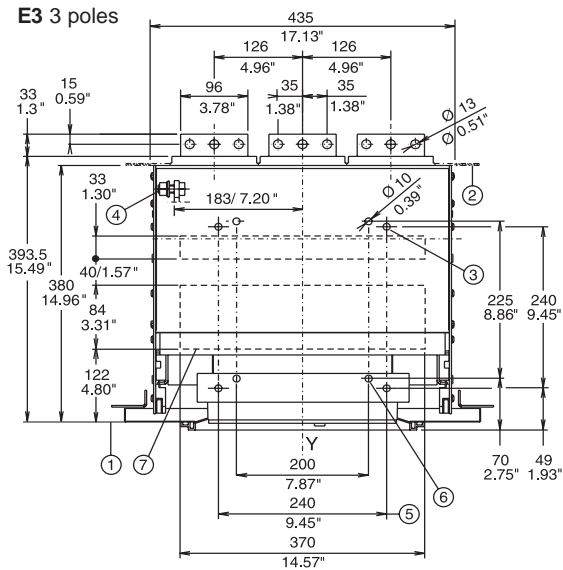
E1 3 poles / E2 3 poles



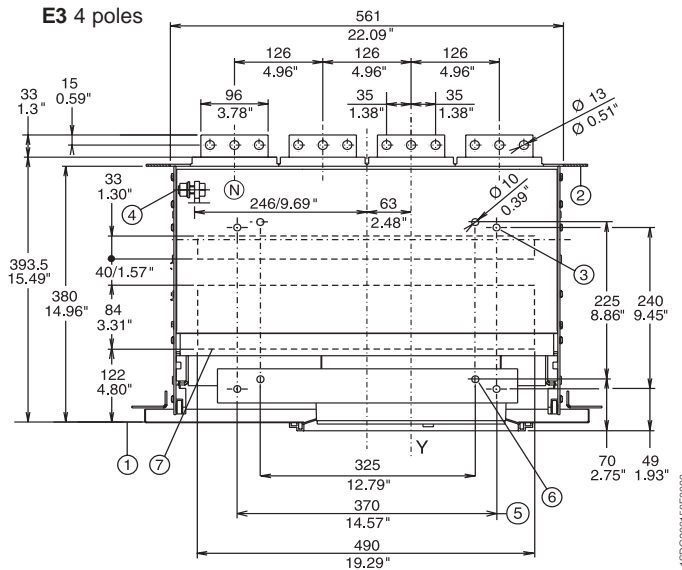
E1 4 poles / E2 4 poles



E3 3 poles



E3 4 poles



Caption

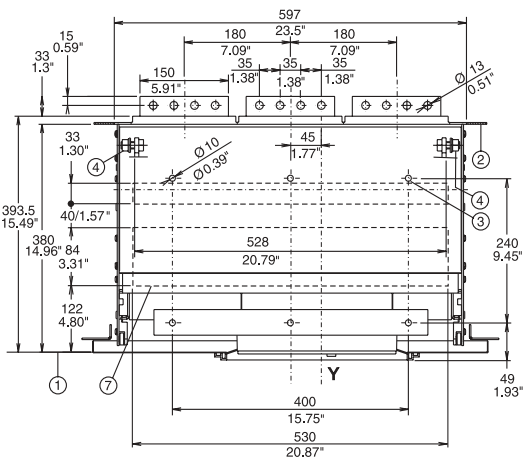
- ① Inside edge of compartment door
- ② Segregation (where foreseen)
- ③ Power circuit breaker M8 fixing mounting hole (included in the supply)
- ④ No. 1 M12 screw for grounding (included in the supply)
- ⑤ No. 4 fixed part mounting holes (standard)
- ⑥ Alternative drilling with 25 mm pitch for fixing fixed part
- ⑦ Ventilation drilling on the switchgear

| | | | | |
|-------|-------|-----------|-----------|------------------|
| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 11/28 |

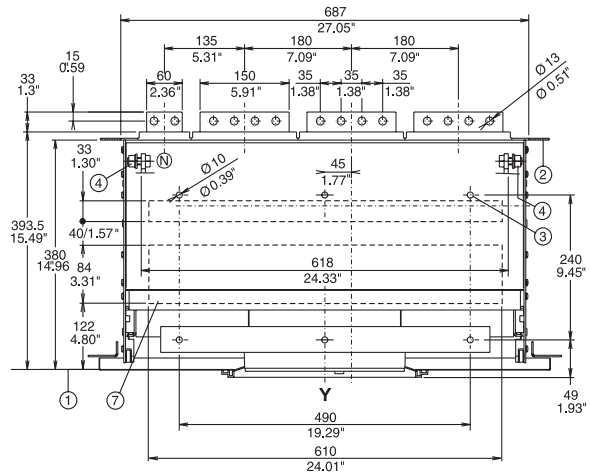
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Basic version with horizontal rear terminals

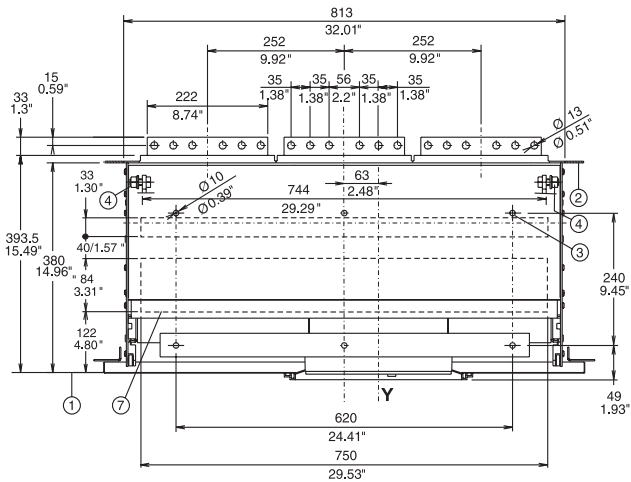
E4 3 poles



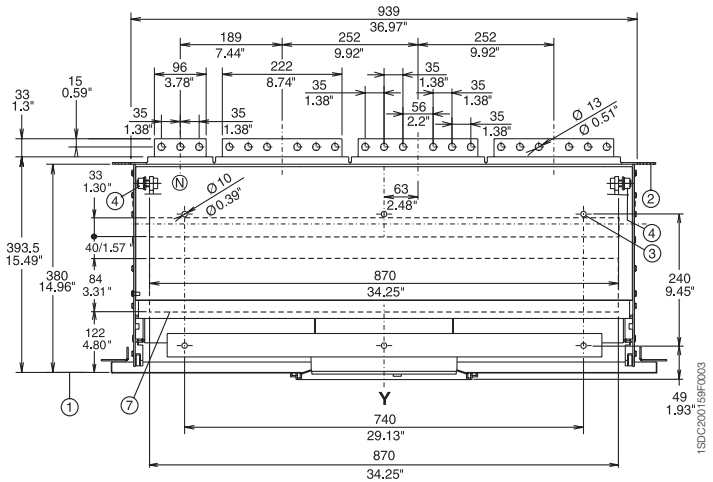
E4 4 poles



E6 3 poles



E6 4 poles



Caption

- ① Inside edge of compartment door
- ② Segregation (where foreseen)
- ③ Power circuit breaker M8 fixing mounting hole (included in the supply)
- ④ No. 1 M12 screw for grounding (included in the supply)
- ⑦ Ventilation drilling on the switchgear

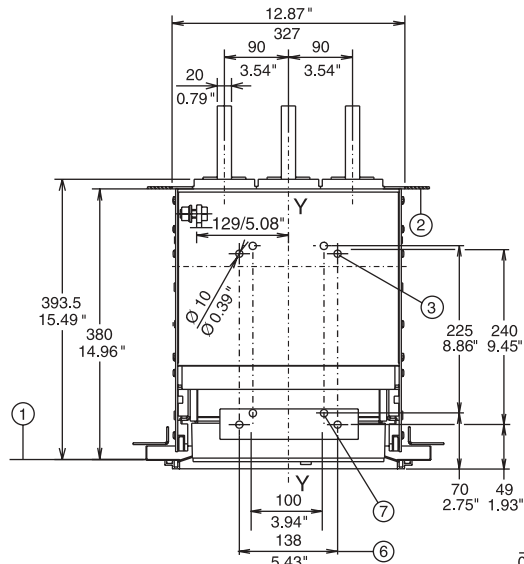
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| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 12/28 |

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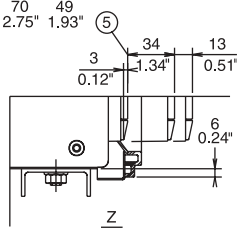
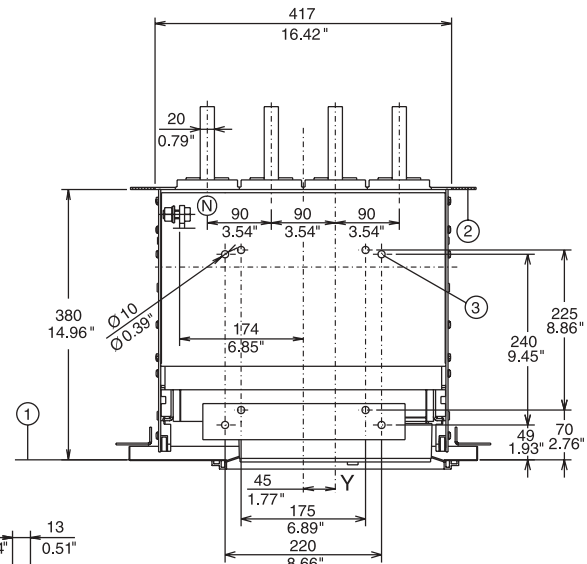
Draw out power circuit breaker

Version with vertical rear terminals

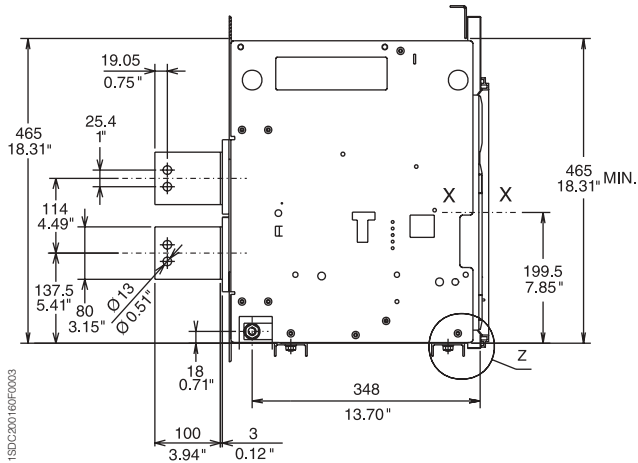
E1 3 poles / E2 3 poles



E1 4 poles / E2 4 poles



E1-E2



Legenda

- ① Inside edge of compartment door
- ② Segregation (where foreseen)
- ③ Power circuit breaker M8 fixing mounting hole (included in the supply)
- ⑤ Run from racked-in to test to isolated
- ⑥ No. 4 fixed part mounting holes (standard)
- ⑦ Alternative drilling with 25 mm pitch for fixing fixed part

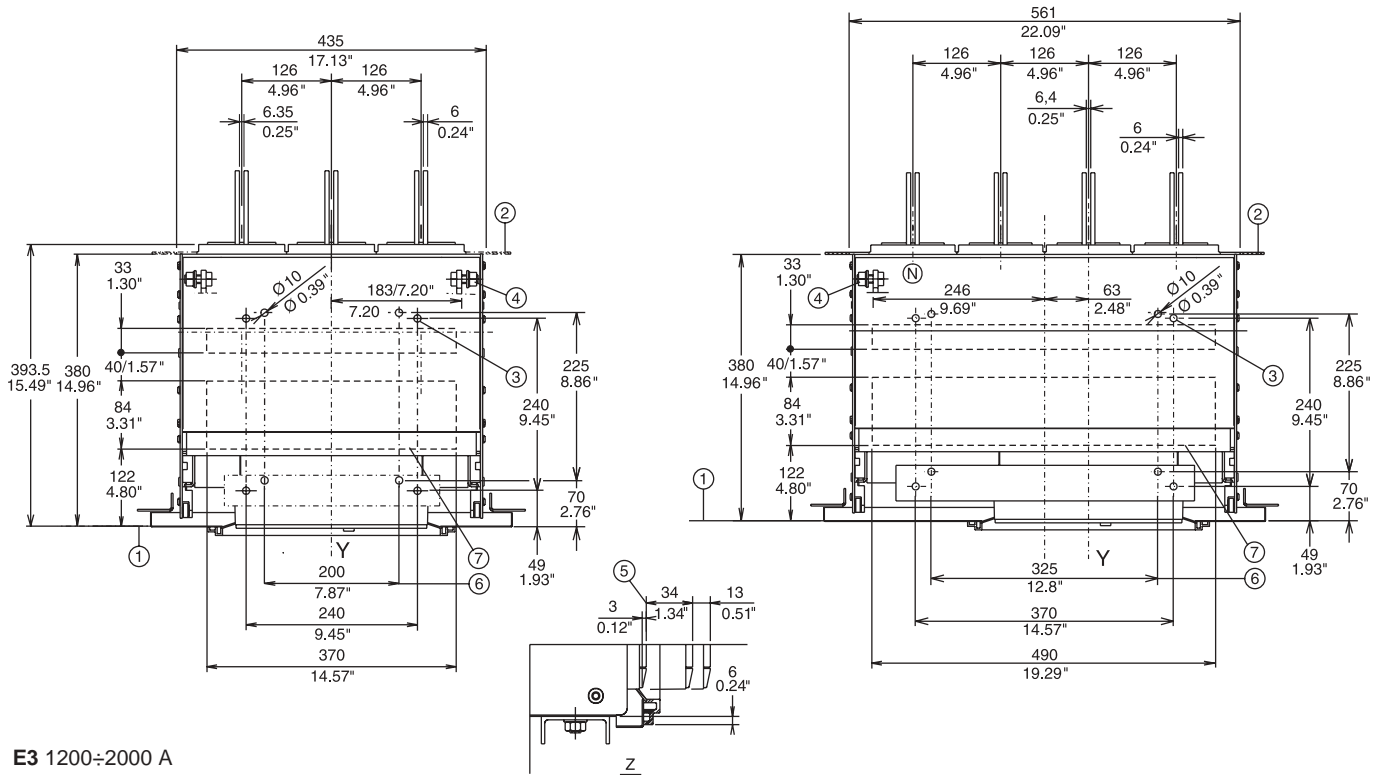
| | | | | |
|-------|-------|-----------|------------------|------------------|
| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 13/28 |

Draw out power circuit breaker

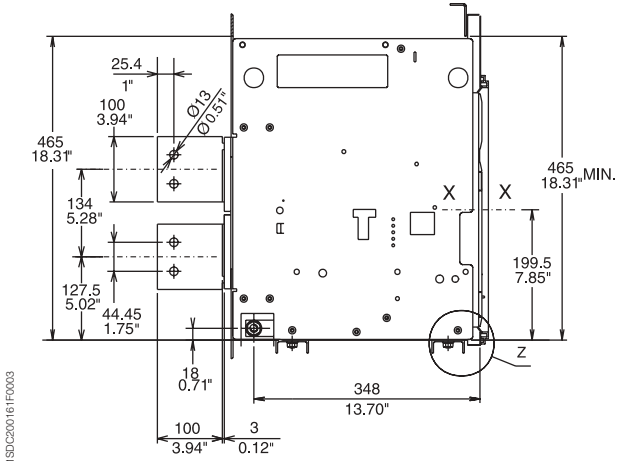
Version with vertical rear terminals

E3 3 poles 1200÷2000 A

E3 4 poles 1200÷2000 A



E3 1200÷2000 A



Caption

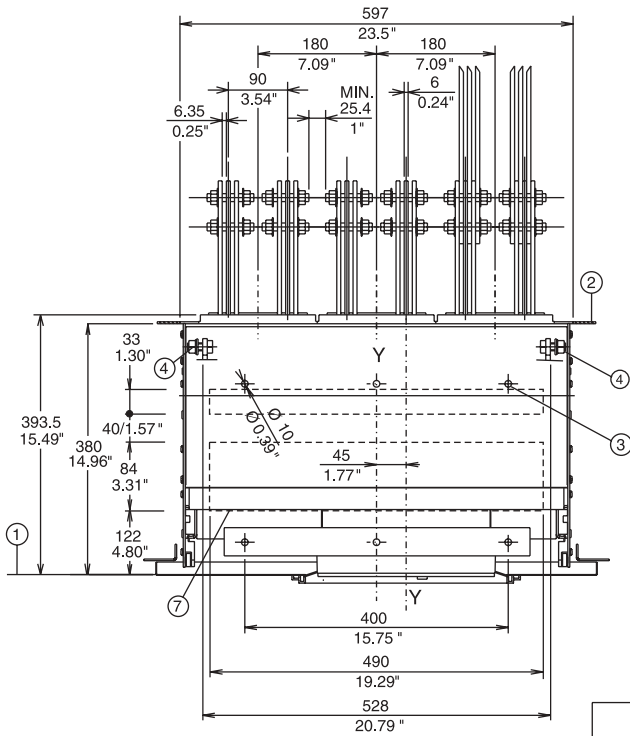
- ① Inside edge of compartment door
- ② Segregation (where foreseen)
- ③ Power circuit breaker M8 fixing mounting hole (included in the supply)
- ④ No. 2 M12 screws for grounding (included in the supply)
- ⑤ Run from racked-in to test to isolated
- ⑥ Alternative drilling with 25 mm pitch for fixing fixed part
- ⑦ Ventilation drilling on the switchgear

| | | | | |
|-------|-------|-----------|-----------|------------------|
| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 14/28 |

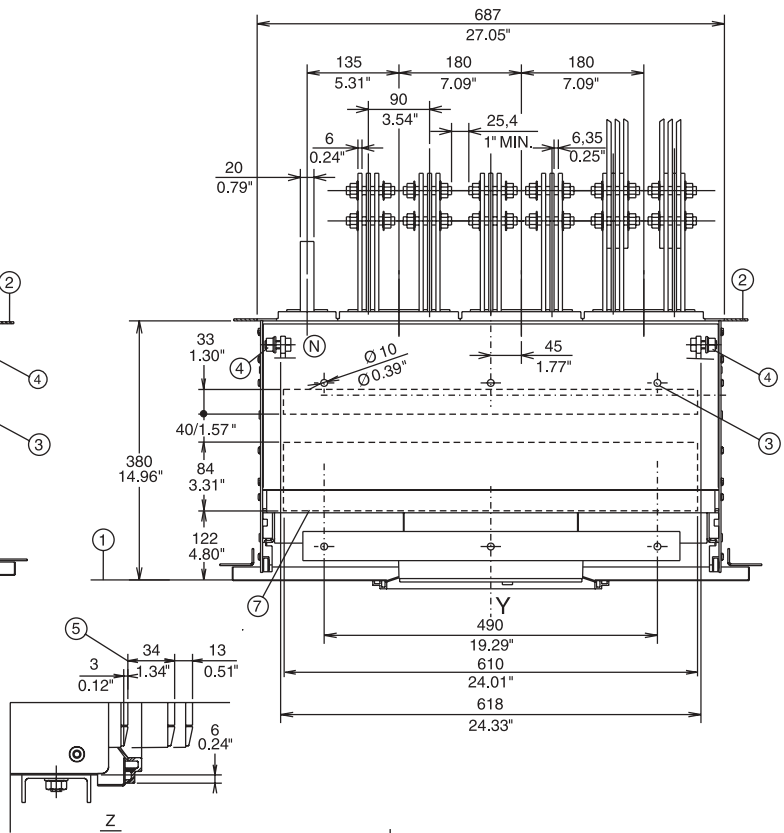
Draw out power circuit breaker

Version with vertical rear terminals

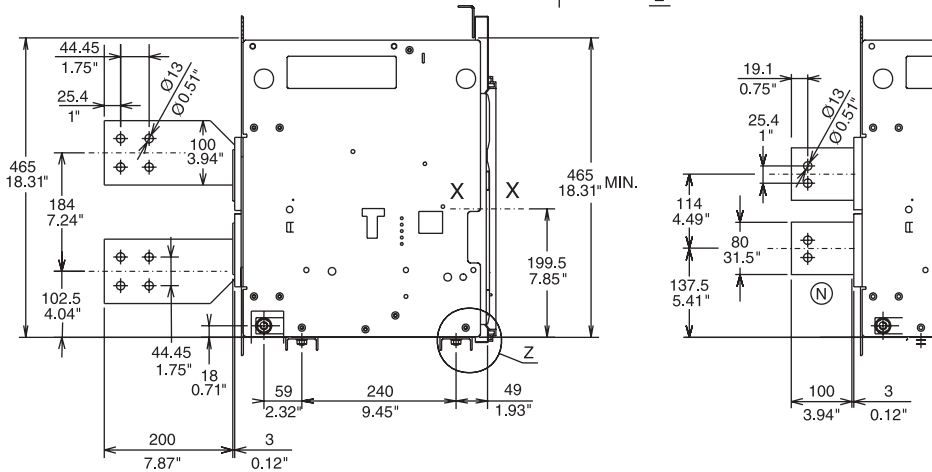
E4 3 poles



E4 4 poles



E4



Caption

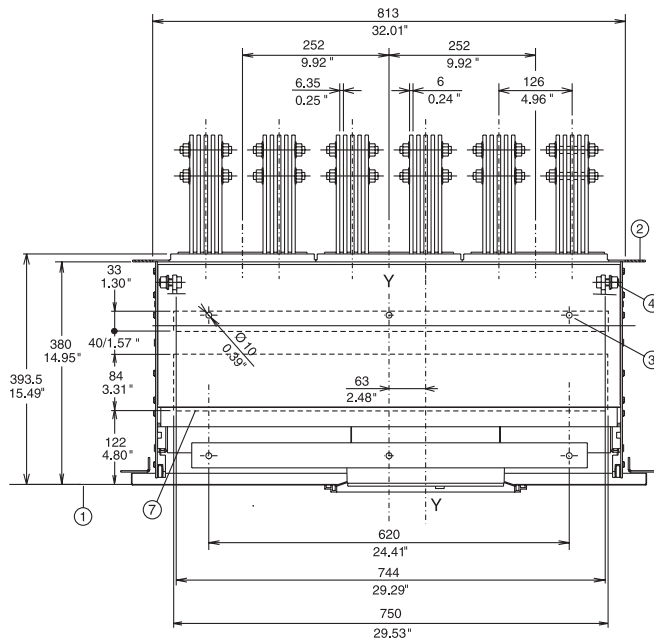
- ① Inside edge of compartment door
- ② Segregation (where foreseen)
- ③ Power circuit breaker M8 fixing mounting hole (included in the supply)
- ④ No. 2 M12 screws for grounding (included in the supply)
- ⑤ Run from racked-in to test to isolated
- ⑦ Ventilation drilling on the switchgear

| | | | | |
|-------|-------|-----------|-----------|------------------|
| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 16/28 |

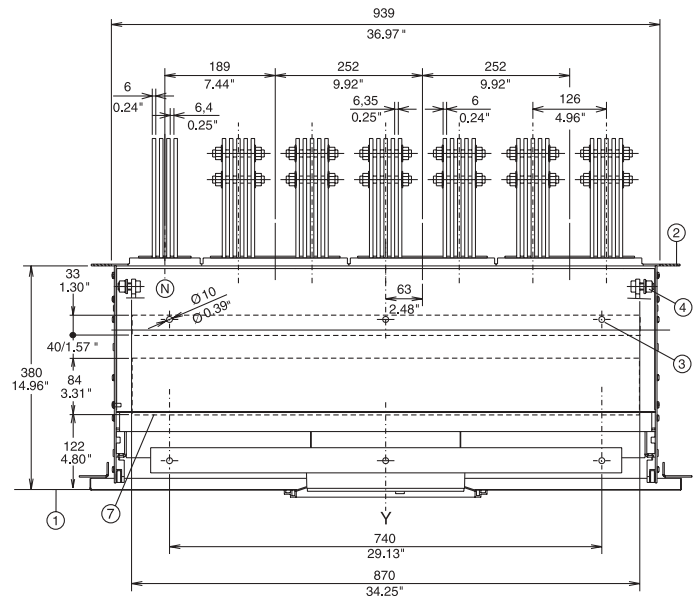
Draw out power circuit breaker

Version with vertical rear terminals

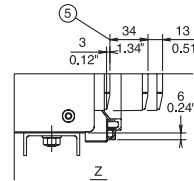
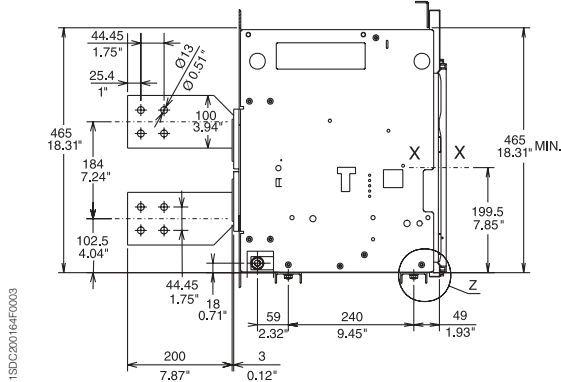
E6 3 poles



E6 4 poles



E6

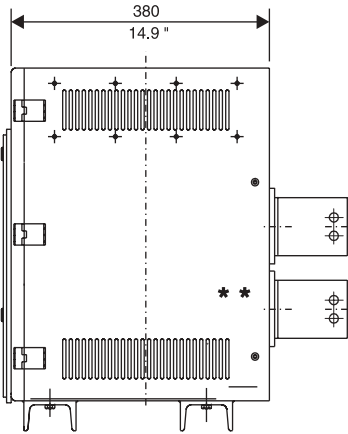


Caption

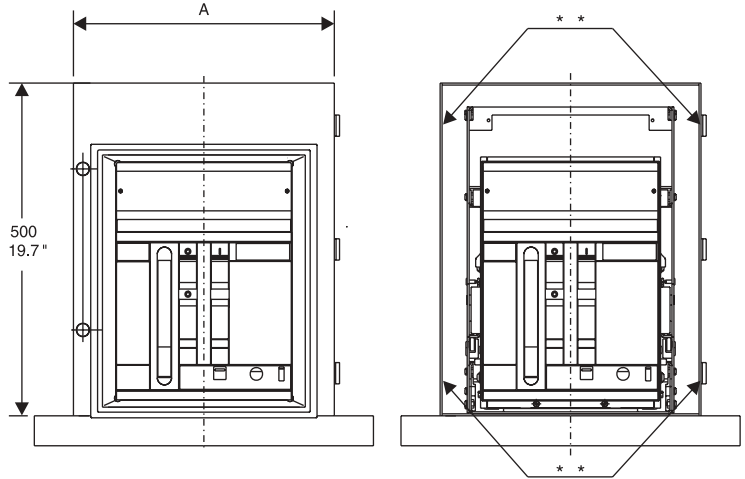
- ① Inside edge of compartment door
- ② Segregation (where foreseen)
- ③ Power circuit breaker M8 fixing mounting hole (included in the supply)
- ④ No. 2 M12 screws for grounding (included in the supply)
- ⑤ Run from racked-in to test to isolated
- ⑦ Ventilation drilling on the switchgear

| | | | | |
|-------|-------|-----------|-----------|------------------|
| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 17/28 |

Compartment dimensions



Connection bars

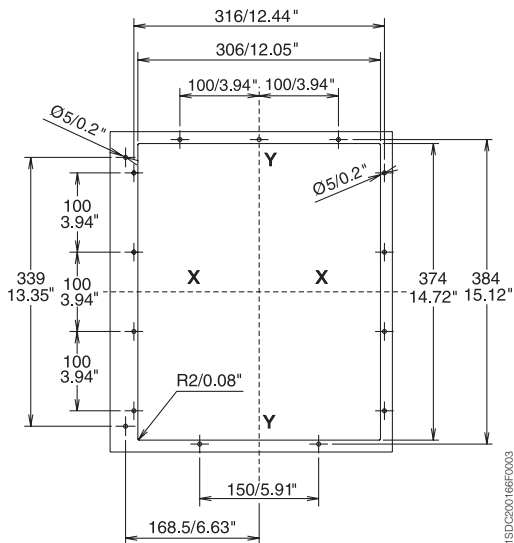


1SDC200166F0003

| | A 3 Poles | A 4 Poles |
|------|------------|-------------|
| E1-A | 400/11.65" | 490/19.30" |
| E2-A | 400/15.7" | 490/19.30" |
| E3-A | 500/19.7" | 630/24.82" |
| E4-A | 700/25.7" | 790/30.62" |
| E6-A | 1000/39.3" | 1130/44.52" |

** Suitable for operating at 100% rating in a compartment of the dimensions shown in the figure, with a ventilation of 48 square inches (12x4) in the bottom part and in the top part. Refer to the compartment drawings for verification.

Compartment door mounting holes



1SDC200166F0003

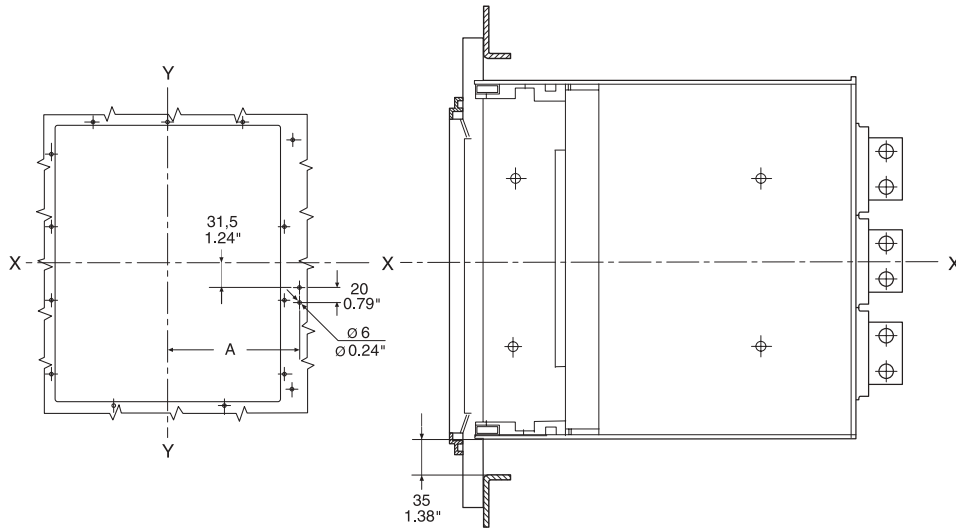
Tightening torque of the fixing screws: Nm 20 - 177 lb/in
Tightening torque of the main terminals: Nm 70 - 620 lb/in
Tightening torque of the grounding screw: Nm 70 - 620 lb/in

| | High resistance M12 screw Quantity per terminal | |
|-------|--|---------|
| | PHASE | NEUTRAL |
| E1-E2 | 2 | 2 |
| E3 | 3 | 3 |
| E4 | 4 | 2 |
| E6 | 6 | 3 |

1SDC200166F0003

| | | | | |
|-------|-------|-----------|-----------|------------------|
| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 18/28 |

Holes for passage of flexible cables for mechanical interlocks



| E1 | 180/7,08" | 180/7,08" |
|----|------------|------------|
| E2 | 180/7,08" | 180/7,08" |
| E3 | 234/9,21" | 234/9,21" |
| E4 | 270/10,63" | 360/14,17" |
| E6 | 360/14,17" | 486/19,13" |

| | | | | |
|-------|-------|-----------|-----------|------------------|
| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 19/28 |

8. Electrical circuit diagrams

State of operation shown

The diagram is shown in the following conditions:

- draw out version power circuit breaker, open and racked-in
- circuits de-energized
- trip units not tripped
- motor operator with springs discharged.

Versions

The diagram shows a draw out version power circuit breaker, but is also valid for fixed version power circuit breakers.

Fixed version

The control circuits are included between the XV terminals (the X connector is not supplied).

The applications indicated in figures 31, 32 and 51 cannot be supplied with this version.

Draw out version

The control circuits are included between the poles of the X connector (the XV terminal box is not supplied).

The application indicated in figure 52 cannot be supplied with this version.

Version without trip unit

The applications indicated in figures 3, 5, 13, 41, 42, 43, 44, 51, 52, 53 and 62 cannot be supplied with this version.

Version with PR111-A

The PR111-A trip unit is fitted only with the protection unit.

The applications indicated in the figures 3, 5, 41, 42, 43, 44, 53 and 62 cannot be supplied with this version.

Version with electronic PR112/P-A trip unit

The PR112/P-A trip unit is fitted only with the protection unit.

The applications indicated in the figures 3, 5, 22, 42, 43, 44 and 53 cannot be supplied with this version.

Version with electronic PR112/PD-A trip unit

The PR112/PD-A trip unit is fitted with the protection and dialogue unit.

The applications indicated in the figures 22, 41, 43, 44 and 53 cannot be supplied with this version.

Version with electronic PR113/P-A trip unit

The PR113/P-A trip unit is fitted only with the protection unit.

The applications indicated in the figures 3, 5, 22, 41, 42 and 44 cannot be supplied with this version.

Version with electronic PR113/PD-A trip unit

The PR113/PD-A trip unit is fitted with the protection and dialogue unit.

The applications indicated in the figures 22, 41, 42 and 43 cannot be supplied with this version.

Caption

- = Number of figure of the diagram
 * = See the note indicated by the letter
- A1 = Applications of the power circuit breaker
 A13 = PR020/K signaling unit (only provided with PR112/P-A, PR112/PD-A, PR113/P-A or PR113/PD-A trip unit)
 A3 = Applications located on the cradle of the power circuit breaker (only provided with draw out version power circuit breakers)
 A4 = Indicative apparatus and connections for control and signaling, outside the power circuit breaker
 AY = SACE SOR TEST UNIT: control/monitoring unit (see note R)
 D = Electronic time-delay device of the undervoltage release, outside the power circuit breaker
 F1 = Fuse with delayed intervention
 K51 = PR111-A, PR112/P-A, PR112/PD-A, PR113/P-A or PR113/PD-A type electronic trip unit with the following protection functions (see note G):
 - L against overload with inverse long delay trip - adjustment I1
 - S against short circuit with inverse or definite short delay trip - adjustment I2
 - I against short circuit with instantaneous trip - adjustment I3
 - G against ground fault with inverse short delay trip - adjustment I4
- K51/μP = Electrical alarm signaling for operating anomalies of the microprocessor (only provided with Uaux. and PR112/P-A, PR112/PD-A, PR113/P-A or PR113/PD-A trip unit)
 K51/1...8 = PR020/K signaling unit contacts
 K51/GZin = Zone selectivity: input for protection G or input in "inverse" direction for protection D (DBin) (only provided with Uaux. and PR113/P-A or PR113/PD-A trip unit)
 K51/GZout = Zone selectivity: output for protection G or output in "inverse" direction for protection D (DBout) (only provided with Uaux. and PR113/P-A or PR113/PD-A trip unit)
 K51/P1 = Programmable electrical signaling (only provided with Uaux. and PR112/P-A, PR112/PD-A, PR113/P-A or PR113/PD-A trip unit)
 K51/P2 = Programmable electrical signaling (only provided with Uaux. and PR113/P-A trip unit)
 K51/SZin = Zone selectivity: input for protection S or input in "direct" direction for protection D (DFin) (only provided with Uaux. and PR113/P-A or PR113/PD-A trip unit)
 K51/SZout = Zone selectivity: output for protection S or output in "direct" direction for protection D (DFout) (only provided with Uaux. and PR113/P-A or PR113/PD-A trip unit)
 K51/YC = Closing control from PR112/PD-A or PR113/PD-A electronic trip unit
 K51/Y0 = Opening control from PR112/PD-A or PR113/PD-A electronic trip unit
 K51/Y01 = Electrical alarm signaling for trip unit Y01 TRIPPED (only provided with PR112/P-A, PR112/PD-A, PR113/P-A or PR113/PD-A trip unit)
 K51/Zin = Zone selectivity: input (only provided with Uaux. and PR112/P-A or PR112/PD-A trip unit)
 K51/Zout = Zone selectivity: output (only provided with Uaux. and PR112/P-A or PR112/PD-A trip unit)
 M = Motor for closing spring charging
 Q = Power circuit breaker
 Q/1...25 = Power circuit breaker auxiliary contacts
 S33M/1 = Limit contact of spring charging motor
 S33M/2 = Contact for electrical signaling of springs charged

| | | | | | |
|-------|-------|--|-----------|------------------|------------------|
| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 20/28 |

- S43 = Changeover switch for setting remote/local control
- S51 = Contact for bell alarm of power circuit breaker open due to trip of the trip unit. Power circuit breaker closing can only take place after having pressed the reset pushbutton
- S75E/14 = Contacts for electrical signaling of power circuit breaker in position of racked-out (only provided with draw out version power circuit breakers)
- S75I/14 = Contacts for electrical signaling of power circuit breaker in position of racked-in (only provided with draw out version power circuit breakers)
- S75T/14 = Contacts for the electrical signaling of power circuit breaker in position of test (only provided with draw out version power circuit breakers)
- SC = Pushbutton or contact for power circuit breaker closing
- SO = Pushbutton or contact for power circuit breaker opening
- SO1 = Pushbutton or contact for power circuit breaker opening with delayed trip
- SO2 = Pushbutton or contact for power circuit breaker opening with instantaneous trip
- TI/L1 = Current transformer located on phase L1
- TI/L2 = Current transformer located on phase L2
- TI/L3 = Current transformer located on phase L3
- TI/N = Current transformer located on the neutral
- TI/O = Homopolar current transformer located on the conductor which connects the MV/LV transformer star center to ground (see note G)
- TU = Insulation transformer
- Uaux. = Voltage of auxiliary power supply (see note F)
- UI/L1 = Current sensor (Rogowski coil) located on phase L1
- UI/L2 = Current sensor (Rogowski coil) located on phase L2
- UI/L3 = Current sensor (Rogowski coil) located on phase L3
- UI/N = Current sensor (Rogowski coil) located on the neutral
- W1 = Serial interface with the control system (external bus): EIA RS485 interface (see note E)
- W2 = Serial interface with the accessories of the PR112/P-A, PR112/PD-A, PR113/P-A and PR113/PD-A (internal bus) trip units
- X = Delivery connector for draw out version power circuit breaker auxiliary circuits
- X1...X7 = Connectors for the power circuit breaker applications
- XF = Delivery terminal box for the draw out version power circuit breaker position contacts (located on the cradle of the power circuit breaker)
- XK1 = Connector for the power circuits of the PR111-A, PR112/P-A, PR112/PD-A, PR113/P-A and PR113/PD-A trip units
- XK2 - XK3 = Connectors for the auxiliary circuits of the PR112/P-A, PR112/PD-A, PR113/P-A and PR113/PD-A trip units
- XO = Connector for the YO1 trip unit
- XV = Delivery terminal box for fixed version power circuit breaker auxiliary circuits
- YC = Closing coil
- YO = Shunt trip
- YO1 = Shunt trip
- YO2 = Second shunt trip (see note Q)
- YU = Undervoltage release (see notes B and Q)

Description of figures

- Fig. 1 = Closing spring charging motor circuit
- Fig. 2 = Closing coil circuit
- Fig. 3 = Closing coil circuit with control from the dialogue unit of the PR112/PD-A or PR113/PD-A trip unit
- Fig. 4 = Shunt trip
- Fig. 5 = Circuit of the shunt trip circuit with control from the dialogue unit of the PR112/PD-A or PR113/PD-A trip unit
- Fig. 6 = Instantaneous undervoltage release (see notes B and Q)
- Fig. 7 = Undervoltage release with electronic time-delay device, outside the power circuit breaker (see notes B and Q)
- Fig. 8 = Second shunt trip (see note Q)
- Fig. 11 = Contact for electrical signaling of springs charged.
- Fig. 12 = Contact for electrical signaling of undervoltage release energized (see notes B, L and S)
- Fig. 13 = Contact for bell alarm of power circuit breaker open due to trip of the trip unit. Power circuit breaker closing can only take place after the reset pushbutton has been pressed.
- Fig. 21 = First pack of power circuit breaker auxiliary contacts
- Fig. 22 = Second pack of power circuit breaker auxiliary contacts (not available with the PR112/P-A, PR112/PD-A, PR113/P-A and PR113/PD-A trip units).
- Fig. 23 = Third pack of additional power circuit breaker auxiliary contacts outside the power circuit breaker
- Fig. 31 = First pack of contacts for electrical signaling of power circuit breaker in racked-in, test or racked-out position
- Fig. 32 = Second pack of contacts for electrical signaling of power circuit breaker in racked-in, test or racked-out position
- Fig. 41 = Auxiliary circuits of the PR112/P-A trip unit (see note F)
- Fig. 42 = Auxiliary circuits of the PR112/PD-A trip unit (see note D, F and M)
- Fig. 43 = Auxiliary circuits of the PR113/P-A trip unit (see note F)
- Fig. 44 = Auxiliary circuits of the PR113/PD-A trip unit (see notes F and M)
- Fig. 51 = Circuit of the current transformer on the neutral conductor outside the power circuit breaker, for draw out version power circuit breaker
- Fig. 52 = Circuit of the current transformer on the neutral conductor outside the power circuit breaker, for fixed version power circuit breaker (see note C)
- Fig. 53 = Circuit valid in the case of three-pole power circuit breaker with PR113/P-A or PR113/PD-A trip unit without current transformer on the neutral conductor outside the power circuit breaker (see note H)
- Fig. 61 = SACE SOR TEST UNIT: control/monitoring unit (see note R)
- Fig. 62 = PR020/K signaling unit (only provided with PR112/P-A, PR112/PD-A, PR113/P-A or PR113/PD-A trip unit)

Incompatibility

The circuits shown in the following figures cannot be provided on the same power circuit breaker at the same time:

- 2 - 3
- 4 - 5
- 6 - 7 - 8
- 22 - 41 - 42 - 43 - 44
- 31 - 51
- 51 - 52 - 53

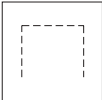
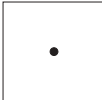
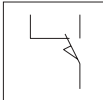
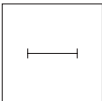
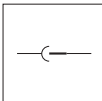
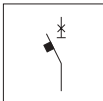
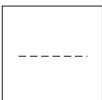
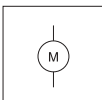
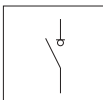
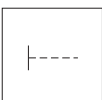
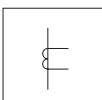
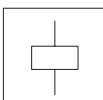
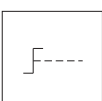
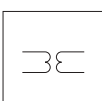
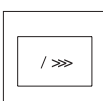
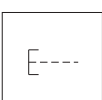
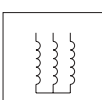
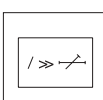
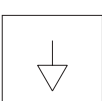
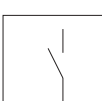
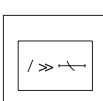
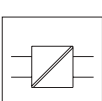
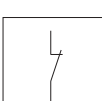
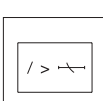
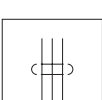
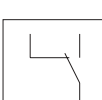
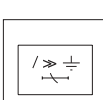
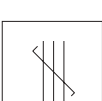
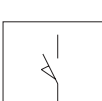
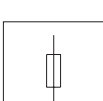
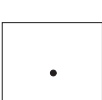
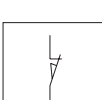
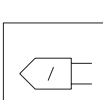
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| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 21/28 |

Notes

- A) The power circuit breaker is only fitted with the applications specified in the ABB order confirmation. To make out the order, please consult the apparatus catalogue.
- B) The undervoltage release is provided for power supply branched on the supply side of the power circuit breaker or from an independent source: power circuit breaker closing is only allowed with the release energized (the lock on closing is made mechanically).
In the case where there is the same power supply for the closing coil and undervoltage releases and automatic power circuit breaker closing is required, on return of the auxiliary voltage, it is necessary to introduce a delay of 30 milliseconds between the instant of consent of the undervoltage release and energisation of the closing coil. This can be carried out by means of a circuit outside the power circuit breaker including a permanent closing contact, the contact indicated in figure 12 and a time-delay relay.
- C) In the case of a fixed version power circuit breaker with current transformer on the neutral conductor outside the power circuit breaker, when the power circuit breaker is to be removed, it is necessary to short circuit the terminals of the TI/N transformer.
- D) Connect the S33M/2 contact indicated in fig. 11, one of the break contacts and one of the make contacts of the power circuit breaker indicated in fig. 21 in the way shown in fig. 42.
- E) For connection of the EIA RS485 serial line, see the following documentation:
- RH0298.002 for MODBUS communication
- F) The Uaux. auxiliary voltage allows activation of all the functions of the PR112/P-A, PR112/PD-A, PR113/P-A and PR113/PD-A trip units. With regard to this, please refer to the relative instruction manuals.
- G) Protection against ground fault is available with the PR112/P-A, PR112/PD-A, PR113/P-A and PR113/PD-A trip units by means of a current transformer located on the conductor which connects the MV/LV transformer star center to ground. The connection between terminals 1 and 2 of the TI/O current transformer and the T5 and T6 poles of the X (or XV) connector, must be made using a shielded and corded two-pole cable (see instruction manual) not longer than 15m/49.21ft. The shield must be grounded on the power circuit breaker side and on the current transformer side.
- H) In the case of PR113/P-A or PR113/PD-A trip units mounted on a three-pole power circuit breaker without connection to the external neutral, the T3 and T4 poles of the X (or XV) connector must be short circuited (by the customer).
- I) The contact cannot be used if the PR112/PD-A and PR113/PD-A units are present.
- L) The contact cannot be used if the PR113/P-A or PR113/PD-A units are present.
- M) Connect one of the S75I contacts indicated in fig. 31 or 51 in the way shown in figs. 42-44.
In the case of fixed version power circuit breakers, connect the XV-K14 terminal directly to the XV-K16 terminal (contact S75I does not exist).
- N) With PR112/P-A, PR112/PD-A, PR113/P-A and PR113/PD-A trip units, the connections to the zone selectivity inputs and outputs must be made using a shielded and corded two-pole (see instruction manual) not longer than 300m/984.20ft. The shield must be grounded on the selectivity input side.
- O) With PR113/P-A and PR113/PD-A trip units, the connection between the voltage sensors (TV) and the power circuit breaker must be made using a shielded and corded two-pole cable (see instruction manual) not longer than 15m/49.21ft. The shield must be grounded on both sides (sensor and power circuit breaker).
- P) With PR112/PD-A and PR113/PD-A trip units, the power supply of the YO and YC coils must not be branched from the main one. The coils can be controlled directly from the K51/YO and K51/YC contacts with maximum voltage values of 60VDC and 240-250VAC for PR112/PD-A, 240-250VDC and 240-250VAC for PR113/PD-A.
- Q) The second shunt trip must be installed as an alternative to the undervoltage release.
- R) The operation of the SACE SOR TEST UNIT system + shunt trip (YO) is guaranteed starting from 75% of the Uaux of the shunt trip. During closing of the power supply contact to YO (short circuit of terminals 4 and 5), the SACE SOR TEST UNIT is not able to determine the state of the opening coil.
For this reason:
- In the case of an opening coil supplied continuously, the TEST FAILED and ALARM signals will be activated.
- If the control of the opening coil is carried out impulsively, the TEST FAILED signal may be activated at the same moment. In this case, the TEST FAILED signal should only be considered an actual alarm signal if it remains for longer than 20s.
- S) Also available in the normally closed contact version.
- T) Configuration valid for four-pole or three-pole power circuit breaker with external neutral. For other installation configurations, please consult the manual.
Instructions to follow for replacement of the PR111-A, PR112/P-A, PR112/PD-A, PR113/P-A or PR113/PD-A trip units:
– Take special notice of the notes indicated on the electrical circuit diagrams provided
– The contact for electrical signaling of undervoltage release energized (Fig. 12 of the enclosed diagrams) must be removed from the terminal box.

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| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 22/28 |

Graphic symbols for electrical circuit diagrams (IEC 60617 and CEI 3-14...3-26 Standards)

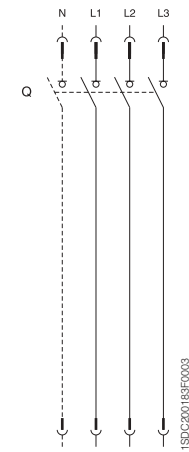
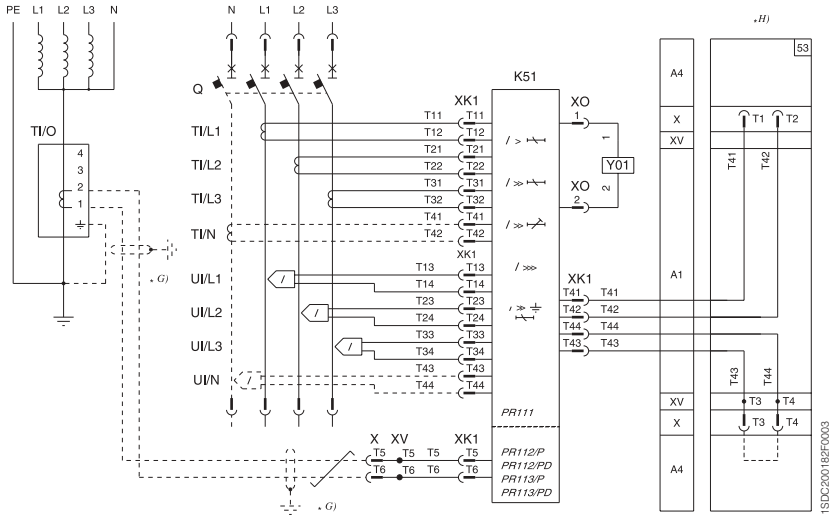
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|---|--|---|--|---|---|
|  | Shield (can be drawn in any shape) |  | Terminal or clamp |  | Changeover position contact with momentary trip (limit switch) |
|  | Timing |  | Socket and plug (female and male) |  | Power molded case switch with automatic opening |
|  | Mechanical connection |  | Motor (general symbol) |  | Molded case switch |
|  | Manual mechanical operating mechanism (general case) |  | Current transformer |  | Control coil (general symbol) |
|  | Rotary handle operating mechanism |  | Voltage transformer |  | Instantaneous trip unit |
|  | Pushbutton operating mechanism |  | Three-phase transformer winding, star connection |  | Trip unit with short adjustable time-delay characteristic |
|  | Equipotentiality |  | Make contact |  | Trip unit with inverse short time-delay characteristic |
|  | Converter separated galvanically |  | Break contact with automatic trip |  | Trip unit with inverse long time-delay characteristic |
|  | Conductors in shielded cable (e.g. three conductors) |  | Changeover contact |  | Trip unit for ground fault with inverse short time-delay characteristic |
|  | Conductors or corded cables (e.g. 3 conductors) |  | Make position contact (limit switch) |  | Fuse (general symbol) |
|  | Connection of conductors |  | Break position contact (limit switch) |  | Current sensor |

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| Model | L2275 | | | Apparatus | Emax UL | Scale |
| | | | | Doc. N° | RH0299002 | Page N° 23/28 |

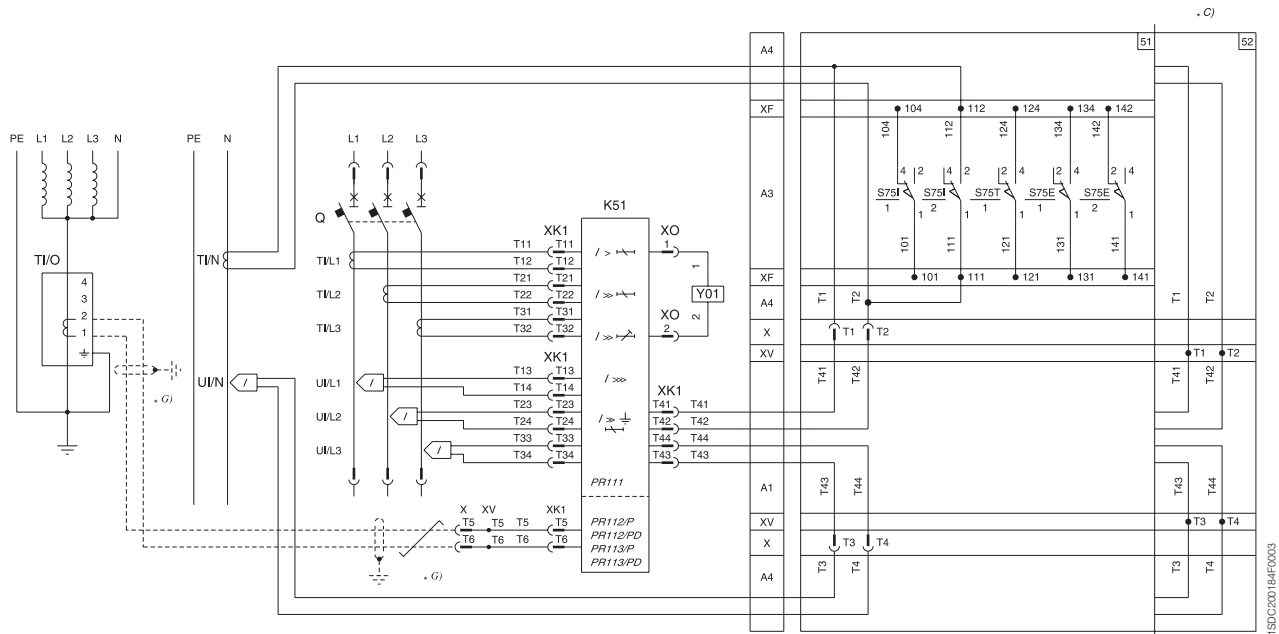
State of operation

Three-pole or four-pole power circuit breaker with PR111-A, PR112/P-A, PR112/PD-A, PR113P-A, PR113/PD-A electronic trip unit

Three-pole or four-pole molded case switch

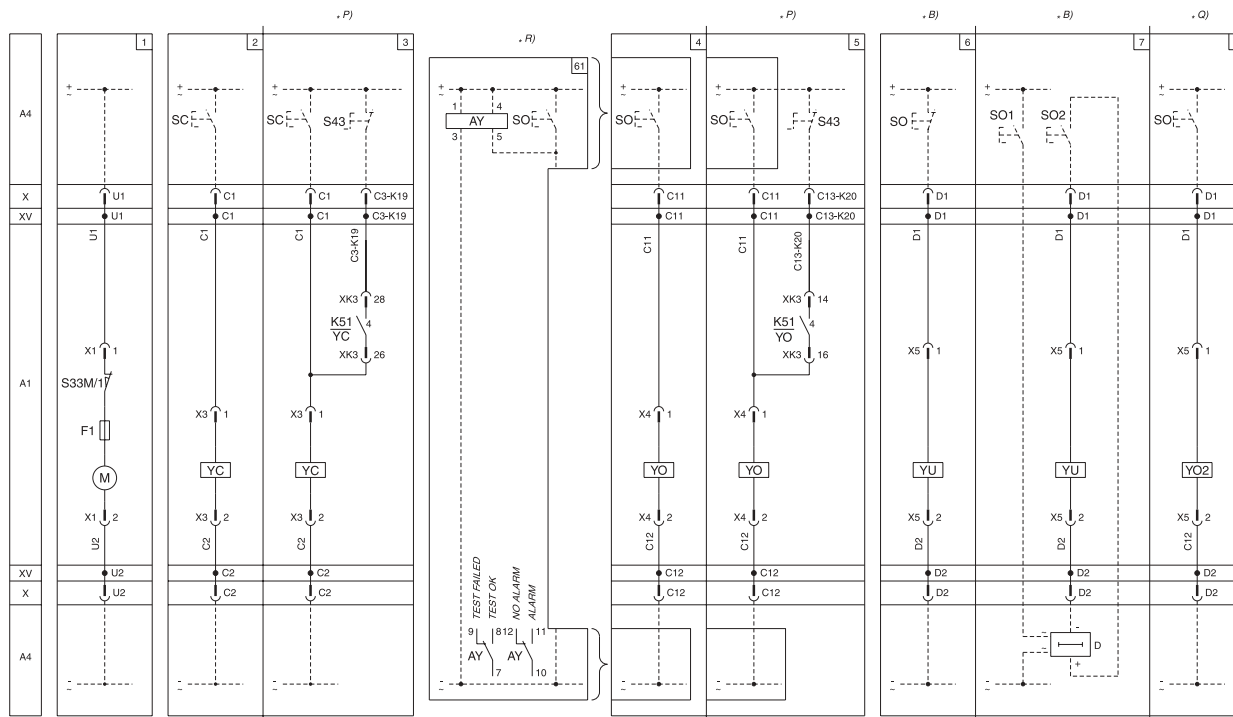


Three-pole power circuit breaker with electronic PR111-A, PR112/P-A, PR112/PD-A, PR113P-A, PR113/PD-A trip unit and current transformer on neutral conductor outside the power circuit breaker

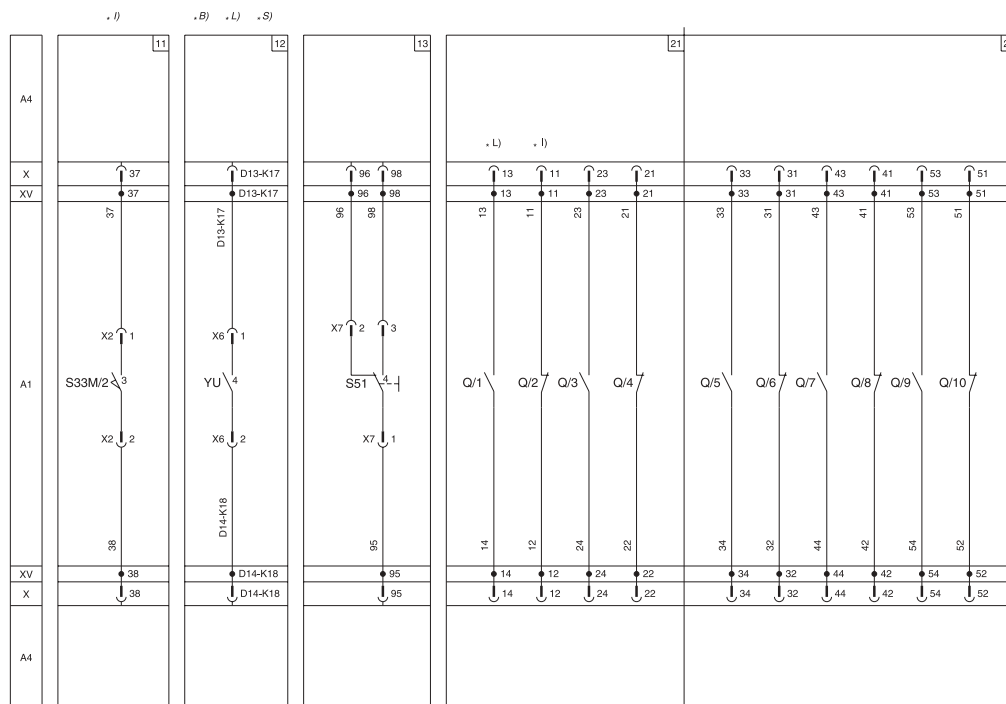


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| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 24/28 |

Motor operator, shunt trip, closing coil and undervoltage releases

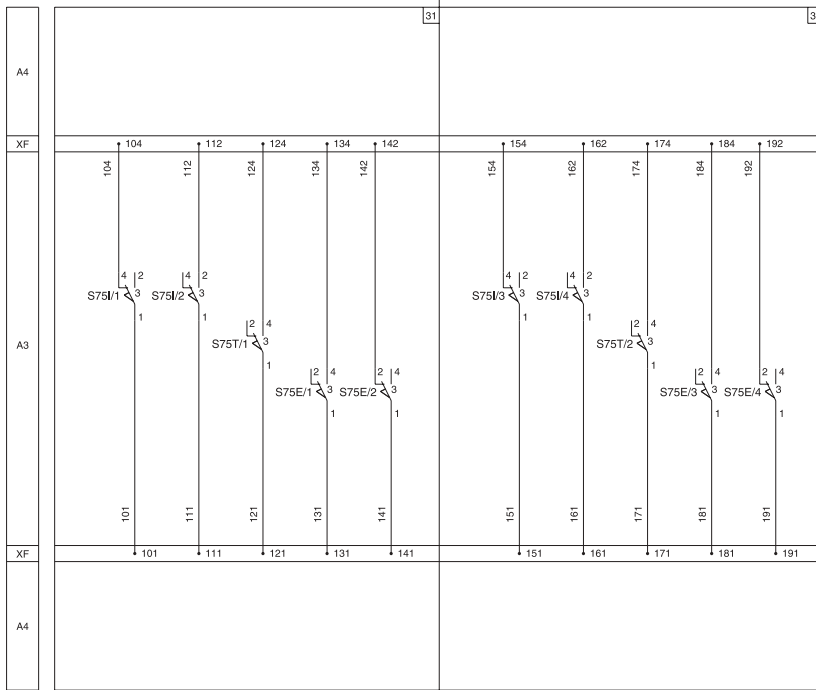
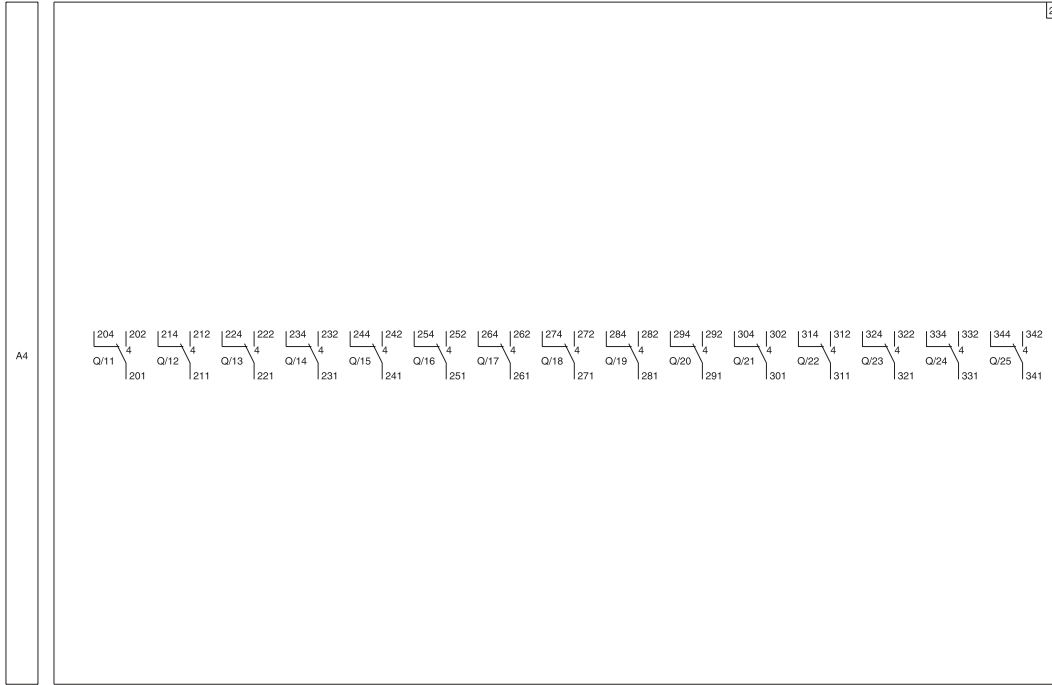


Signaling contacts



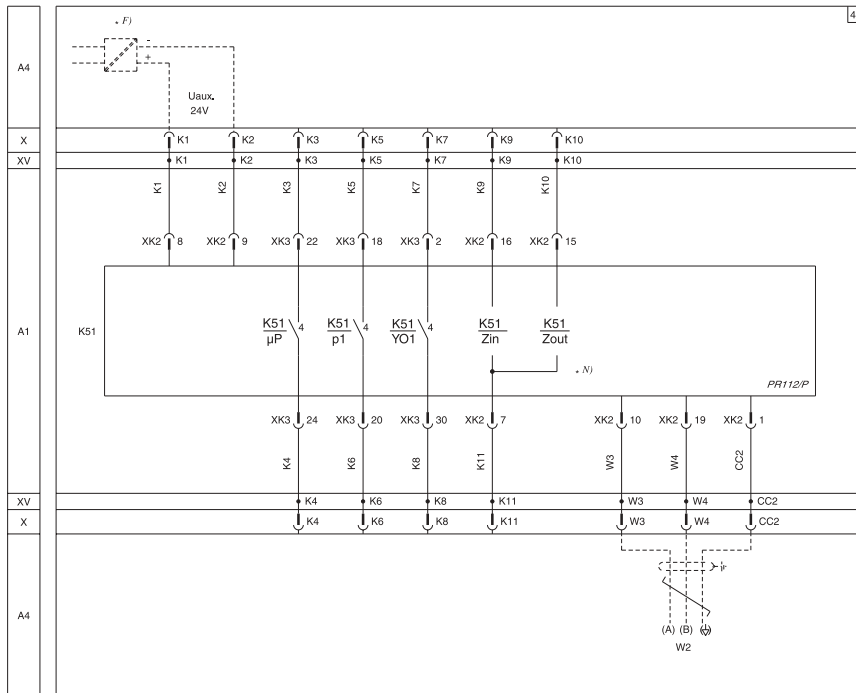
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| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 25/28 |

Signaling contacts

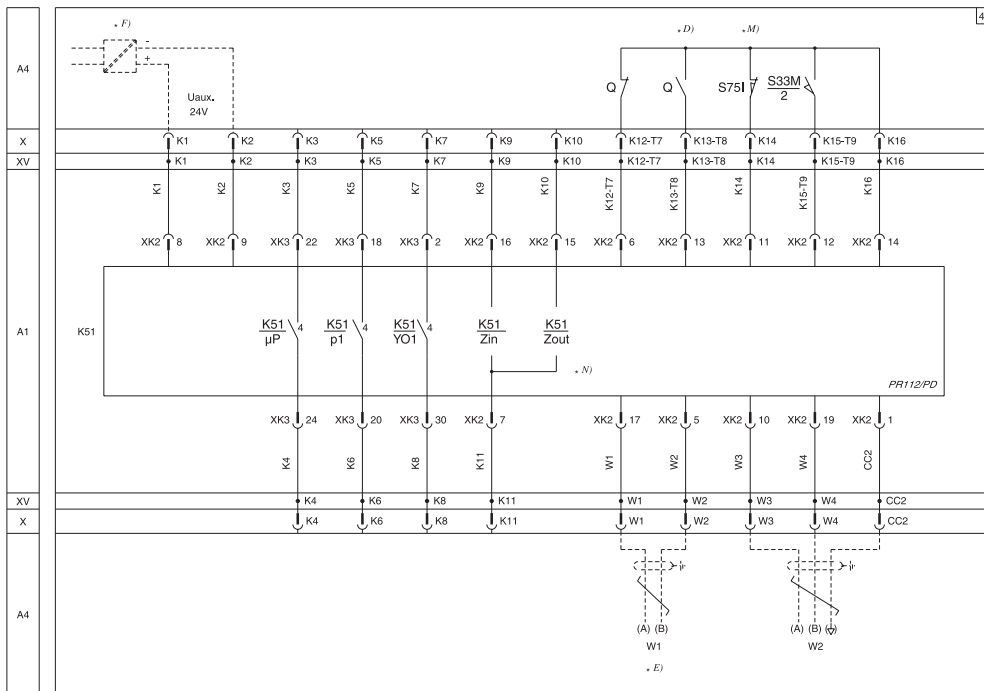


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| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 26/28 |

Auxiliary circuits of the PR112/P-A trip unit

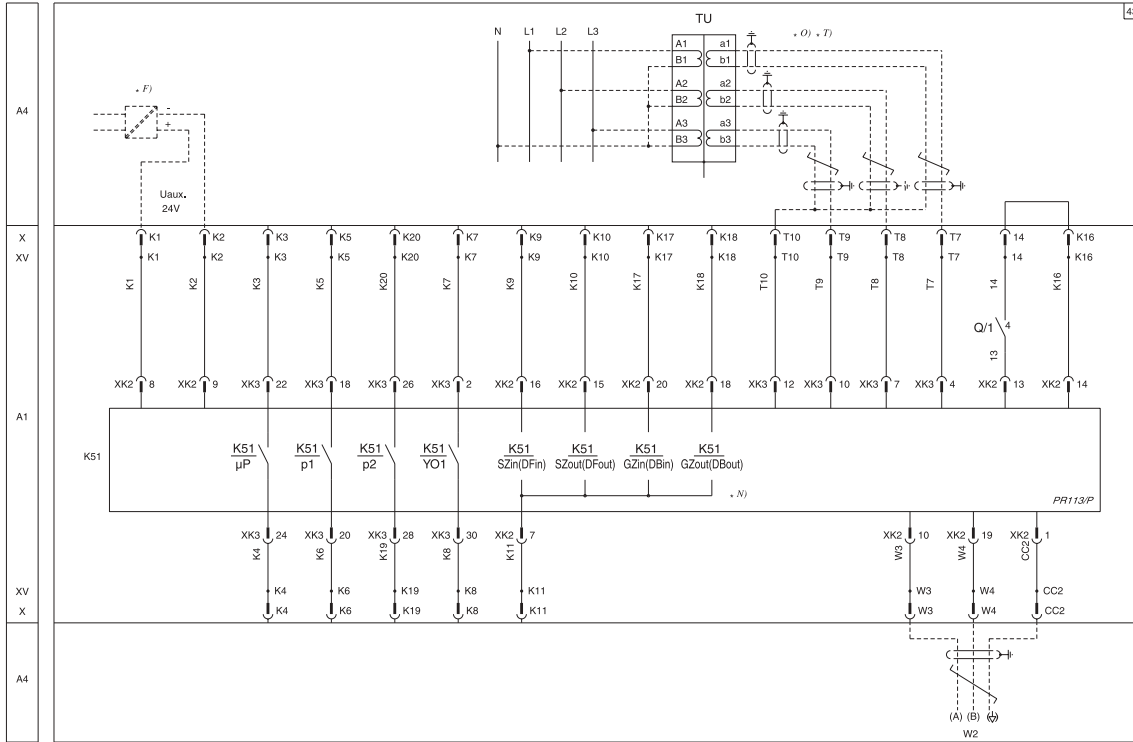


Auxiliary circuits of the PR112/PD-A trip unit

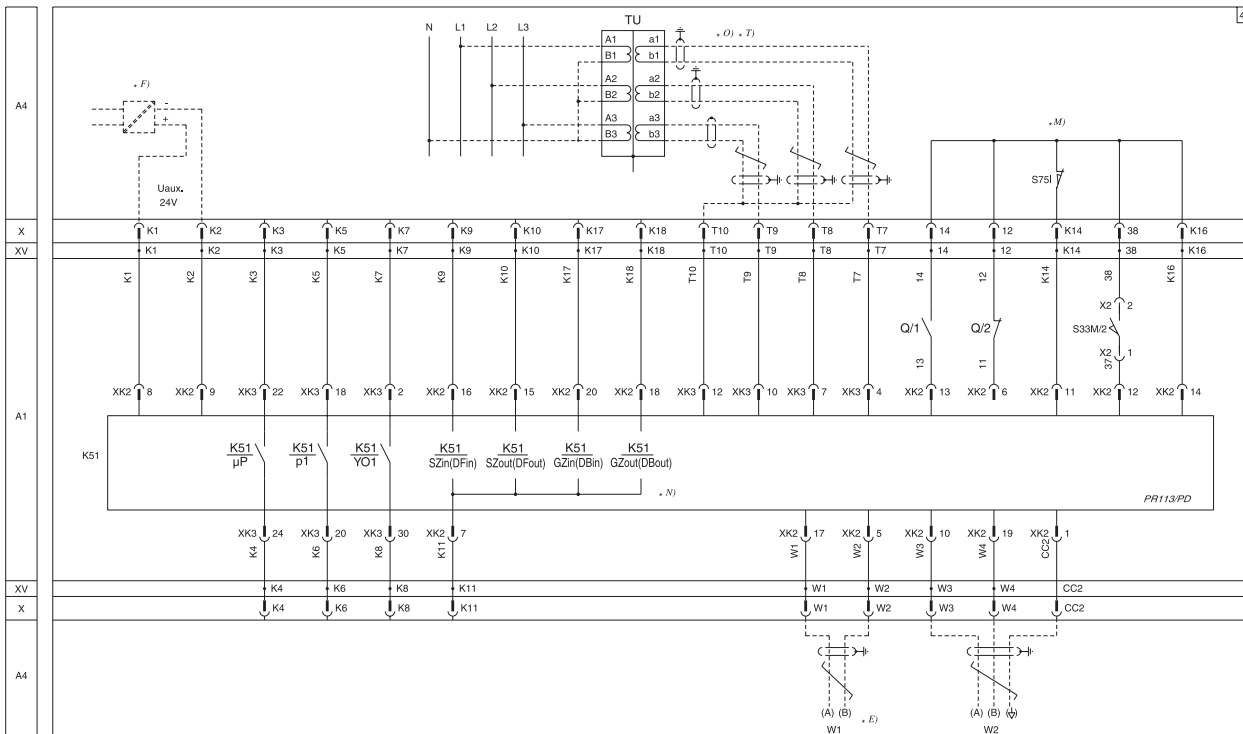


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| Model | L2275 | | Apparatus | Emax UL | Scale |
| | | | Doc. N° | RH0299002 | Page N° 27/28 |

Auxiliary circuits of the PR113/P-A trip unit



Auxiliary circuits of the PR113/PD-A trip unit



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| Model | L2275 | Apparatus | Emax UL | Scale |
| | | Doc. N° | RH0299002 | Page N° 28/28 |



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Due to possible developments of standards as well as of materials, the characteristics and dimensions specified in the present catalogue may only be considered binding after confirmation by ABB SACE.

RH0299002 L0849