Installation, service and maintenance instructions for the fixed part of withdrawable version circuit-breakers.
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<td>Take-over Off.</td>
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<table>
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<th>Emax</th>
<th>Doc. N°</th>
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<td>ABB SACE</td>
<td></td>
<td>RH0287002</td>
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1. Description

1.1 General characteristics

The SACE Emax series of 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 circuit-breaker is selective or current limiting. The fixed version circuit-breaker has its own terminals for connection to the power circuit. In the withdrawable version, the circuit-breaker makes up the moving part of the apparatus which is completed with a fixed part fitted with the terminals for connection to the power circuit of the installation. Coupling between moving part and fixed part takes place by means of special pliers mounted in the fixed part.

1.2 Fixed part construction characteristics

![Fig. 1](image1)

1 Supporting structure made of steel sheet
2 Earthing pliers (a: for all versions; b: for E4, E6)
3 Safety shutters (IP20 degree of protection)
4 Insulating terminal support base
5 Terminals
6 Contacts for signalling racked-in/isolated for test/racked-out (on request)
7 Sliding contacts
8 Padlock for safety shutters (on request)
9 Anti-racking-in lock for circuit-breakers of different size

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 fixed part, 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 fixed part 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 fixed part 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.
With regard to lifting, follow these instructions: the fixed part 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 fixed parts

<table>
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<tr>
<th>Fixed part</th>
<th>Withdrawable 3 poles</th>
<th>Withdrawable 4 poles</th>
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<tr>
<td>E1</td>
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<td>E2</td>
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<td>48 kg</td>
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<tr>
<td>E4/f</td>
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<tr>
<td>E6</td>
<td>70 kg</td>
<td>80 kg</td>
</tr>
<tr>
<td>E6/f</td>
<td></td>
<td>85 kg</td>
</tr>
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</table>

Note
The table regards fixed parts with horizontal rear terminals.

4. Installation

4.1 Installation room
Install the 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 6: “Overall dimensions”, which gives information on the following points:
– minimum installation volumes of the circuit-breakers and derived versions
– distances to be respected for circuit-breakers in compartments
– overall dimensions of the circuit-breakers
– fixing drillings
– compartment door drillings.

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 fixed part of a withdrawable circuit-breaker

4.2.1 Preparation of the fixed part

Assembly of the anti-racking-in lock

Before installing the fixed part, it is necessary to check the presence of the anti-racking-in lock of circuit-breakers with different electrical characteristics from those of the fixed part 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 circuit-breaker which is to be housed in the fixed part
– 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 fixed part is present on the circuit-breaker (moving part).
4.2.2 Installation of the fixed part

Fix the fixed part 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 from the base of the fixed part.

Note
(*) For the E1-E2 and E3 fixed parts, there are four fixing points, whereas there are six for E4 and E6.
4.2.3 Installation of the fixed part on board a ship

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

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

- Make the compartment door drillings 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).
5. Electrical connections

5.1 Connections to the power circuit

5.1.1 Shapes of the terminals

![Horizontal rear terminals](image1) ![Vertical rear terminals](image2) ![Front terminals](image3) ![Flat terminals](image4)

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 fixed parts 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 circuit-breaker terminals are given in this paragraph. The various types of terminals are of constant dimensions per size of 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 by 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 in the following examples.

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<tbody>
<tr>
<td>lu [A]</td>
<td>Continuous current-carrying Busbar cross-section [mm²]</td>
<td>Continuous current-carrying Busbar cross-section [mm²]</td>
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<td></td>
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<tr>
<td></td>
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<td>45°C</td>
<td>55°C</td>
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<td>35°C</td>
<td>45°C</td>
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<tr>
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<td>800</td>
<td>800</td>
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<td>1x(80x10)</td>
</tr>
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</table>

As an example, the table shows the continuous-current-carrying capacity values of the circuit-breakers installed in switchgear with the dimensions indicated below. These values refer to apparatus in the withdrawable version in unsegregated switchgear with degree of protection up to IP31 and the following dimensions:

- 2300x800x900 (HxWxD) for E1-E2-E3;
- 2300x1400x1500 (HxWxD) for E4-E6.

The values refer to a maximum temperature of 120°C on the terminals.

For withdrawable circuit-breakers with 6300A rated current, the use of vertical rear terminals is recommended.

Note: The tables given are and indicative reference for selection of the products. The many different possible forms of switchgear and the conditions which can affect the behaviour of the apparatus always require the solutions used to be verified.

Fig. 11
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 tightening after 24 hours.

M12 high resistance screws

Tightening torque of the main terminals: 70 Nm.
5.2 Earthing
The fixed part of the withdrawable circuit-breaker has one or two terminals on the rear, marked with the special symbol, for connection to earth (fig. 9). Each terminal is complete with a bolt for fixing the connection. A conductor with cross-section conforming to 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.

5.3 Cabling the circuit-breaker auxiliary circuits

5.3.1 Withdrawable circuit-breaker
For connection of the moving part to the auxiliary circuits, a connector with sliding contacts is available on the fixed part (see figure), identified by 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 fixed part, a terminal box is available, identified by code XF. The connector and terminal box have screw terminals.

---

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

Fig. 14
6. Fixed part accessories

6.1 Electrical accessories

6.1.1 Auxiliary contacts
Auxiliary contacts installed on the circuit-breaker are available, which allow indication of the circuit breaker status (are also available in gold plated contact version for digital signal).

Characteristics

<table>
<thead>
<tr>
<th>Uh</th>
<th>In max</th>
<th>cosϕ</th>
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<td>0.3 A</td>
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<td>250 V DC</td>
<td>0.15 A</td>
<td>-</td>
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<tr>
<td>250 V AC</td>
<td>5 A</td>
<td>0.3</td>
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Electrical signalling for circuit-breaker racked-in/racked-out test/racked-out (fig. 14)
In addition to the mechanical signalling about the position of the circuit-breaker, it is possible to have electrical signalling by means of 5 or 10 auxiliary contacts which are installed on the fixed part.

This is only available for circuit-breakers in the withdrawable version, to be installed on the fixed part.

The auxiliary contacts have the following configurations:
- 5 contacts: group made up of 2 contacts for signalling racked-in, 2 contacts for signalling racked-out and 1 contact signalling the test position (main pliers isolated, but sliding contacts connected)
- 10 contacts: group made up of 4 contacts for signalling racked-in, 4 contacts for signalling racked-out and 2 contacts for signalling 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 fixed part) to be padlocked in the closed position.

It is only available for circuit-breakers in the withdrawable version, to be installed on the fixed part.

6.2.2 Compartment door mechanical lock
This prevents compartment door opening with the circuit-breaker closed (and circuit-breaker racked-in for withdrawable circuit-breakers) and locks circuit breaker closing with the compartment door open.

Fig. 14 Fig. 15

6.2.3 Mechanical interlock
This mechanism carries out the mechanical interlock between two or three circuit-breakers (even of different sizes and in any fixed/withdrawable 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 circuit-breakers can be either vertical or horizontal.

4 types of interlocks are available:

- **type A**: between 2 circuit-breakers (power supply group + emergency)
- **type B**: between 3 circuit-breakers (group of 2 power supplies + emergency)
- **type C**: between 3 circuit-breakers (group of 2 power supplies + bus-tie)
- **type D**: between 3 circuit-breakers (group of 3 power supplies / a single circuit-breaker closed)
7. **Overall dimensions**

**Withdrawable circuit-breaker**

Basic version with horizontal rear terminals

---

**Caption**

1. Inside edge of compartment door
2. Segregation (where foreseen)
3. Fixing fixed part Ø 10 drilling (use M8 screws)
4. No. 1 M12 screw (E1, E2, E3) or no. 2 M12 screws (E4, E6) for earthing (included in the supply)
5. Run from connected for a TEST to isolated
6. Alternative drilling with 25 mm pitch for fixing fixed part
7. Ventilation drilling on the switchgear

---

### Table:

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<tr>
<th></th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>F (mm)</th>
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<td>-</td>
<td>-</td>
<td>468</td>
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**Model**  | **Emax**  |
--- | --- |
L0849 | RH0287002
Withdrawable circuit-breaker

Basic version with horizontal rear terminals

**E4**

View A

**E6**

View A
Withdrawable circuit-breaker
Version with vertical rear terminals

E1
View A

E2/E4
View A

E3/E6
View A

E4
View A

E4/f
View A

E6
View A

E6/f
View A

M12 captive screws included in the supply
Withdrawable circuit-breaker

Basic version with front terminals
Withdrawable circuit-breaker

Basic version with front terminals
Withdrawable circuit-breaker

Version with flat terminals
Compartment dimensions

Compartment door drilling

Tightening torque of the fixing screws: 20 Nm
Tightening torque of the main terminals: 70 Nm
Tightening torque of the earthing screw: 70 Nm

<table>
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<th>Compartment door mechanical lock</th>
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<tr>
<td>Door drillings</td>
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<tr>
<td>Minimum distance between the circuit-breaker and the side of the switchgear</td>
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</table>

Model | L0849 | Apparatus | Emax | Scale |
<table>
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Doc. N° | RH0287002 | Pag. N° | 15/24 |
8. Electrical circuit diagrams

State of operation shown
The diagram is shown in the following conditions:
– withdrawable version circuit-breaker, open and racked-in
– circuits de-energized
– releases not tripped
– motor operator with springs discharged.

Versions
The diagram shows a withdrawable version circuit-breaker, but is also valid for fixed version 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.

Withdrawable 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 overcurrent release
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 electronic PR111 release
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 electronic PR112/P release
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 release
The applications indicated in the figures 22, 41, 43, 44 and 53 cannot be supplied with this version.

Version with electronic PR113/P release
The applications indicated in the figures 3, 5, 22, 42, 44 and 44 cannot be supplied with this version.

Version with electronic PR113/PD release
The applications indicated in the figures 22, 41, 42 and 43 cannot be supplied with this version.

Version with electronic PR111/P release
The applications indicated in the figures 3, 5, 13, 41, 42, 43, 44, 51, 52, 53 and 62 cannot be supplied with this version.

Version with electronic PR112/P release
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 release
The applications indicated in the figures 22, 41, 43, 44 and 53 cannot be supplied with this version.

Version with electronic PR113/P release
The applications indicated in the figures 3, 5, 22, 42, 44 and 44 cannot be supplied with this version.

Version with electronic PR113/PD release
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 circuit-breaker
A13 = PR020/K signalling unit (only provided with PR112/P, PR112/PD, PR113/P or PR113/PD release)
A3 = Applications located on the fixed part of the circuit-breaker (only provided with withdrawable version circuit-breakers)
A4 = Indicative apparatus and connections for control and signalling, outside the circuit-breaker
AY = SACE SOR TEST UNIT: control/monitoring unit (see note R)
D = Electronic time-delay device of the undervoltage release, outside the circuit-breaker
F1 = Fuse with delayed intervention
K51 = PR111, PR112/P, PR112/PD, PR113/P or PR113/PD type electronic overcurrent release 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 earth fault with inverse short delay trip - adjustment I4
K51/µP = Electrical alarm signalling for operating anomalies of the microprocessor (only provided with Uaux. and PR112/P, PR112/PD, PR113/P or PR113/PD release)
K51/1...8 = PR020/K signalling unit contacts
K51/GZin = Zone selectivity: input for protection G or input in “inverse” direction for protection D
  (DBin) (only provided with Uaux. and PR112/P or PR112/PD release)
K51/GZout = Zone selectivity: output for protection G or output in “inverse” direction for protection D
  (DFout) (only provided with Uaux. and PR113/P or PR113/PD release)
K51/P1 = Programmable electrical signalling (only provided with Uaux. and PR112/P, PR112/PD, PR113/P or PR113/PD release)
K51/P2 = Programmable electrical signalling (only provided with Uaux. and PR113/P release)
K51/SZin = Zone selectivity: input for protection S or input in “direct” direction for protection D
  (DFin) (only provided with Uaux. and PR113/P or PR113/PD release)
K51/SZout = Zone selectivity: output for protection S or output in “direct” direction for protection D
  (DFout) (only provided with Uaux. and PR113/P or PR113/PD release)
K51/YC = Closing control from PR112/PD or PR113/PD electronic release
K51/Y0 = Opening control from PR112/PD or PR113/PD electronic release
K51/Y01 = Electrical alarm signalling br Y01 release TRIPPED (only provided with PR112/P, PR112/PD, PR113/P or PR113/PD release)
K51/Zin = Zone selectivity: input (only provided with Uaux. and PR112/P or PR112/PD release)
K51/Zout = Zone selectivity: output (only provided with Uaux. and PR112/P or PR112/PD release)
M = Motor for closing spring charging
Q = Circuit-breaker
Q1...25 = Circuit-breaker auxiliary contacts
S33M/1 = Limit contact of spring charging motor
S33M/2 = Contact for electrical signalling of springs charged
S43 = Changeover switch for setting remote/local control
SS1 = Contact for bell alarm of circuit-breaker open due to trip of the overcurrent release. Circuit-breaker closing can only take place after having pressed the reset pushbutton
S75E/14 = Contacts for electrical signalling of circuit-breaker in position of racked-out (only provided with withdrawable version circuit-breakers)
S75I/14 = Contacts for electrical signalling of circuit-breaker in position of racked-in (only provided with withdrawable version circuit-breakers)
SC = Pushbutton or contact for circuit-breaker closing
SO = Pushbutton or contact for circuit-breaker opening
SO1 = Pushbutton or contact for circuit-breaker opening with delayed trip
SO2 = Pushbutton or contact for circuit-breaker opening with instantaneous trip
TL/L1 = Current transformer located on phase L1
TL/L2 = Current transformer located on phase L2
TL/L3 = Current transformer located on phase L3
T/O = Current transformer located on the neutral
T/O = Homopolar current transformer located on the conductor which connects the MV/LV transformer star centre to earth (see note G)
TU = Insulation transformer
Uaux. = Voltage of auxiliary power supply (see note F)
U1/L1 = Current sensor (Rogowski coil) located on phase L1
U1/L2 = Current sensor (Rogowski coil) located on phase L2
U1/L3 = Current sensor (Rogowski coil) located on phase L3
U1/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, PR112/PD, PR113/P and PR113/PD (internal bus) releases
X = Delivery connector for withdrawable version circuit-breaker auxiliary circuits
X1...X7 = Connectors for the circuit-breaker applications
XF = Delivery terminal box for the withdrawable version circuit-breaker position contacts (located on the fixed part of the circuit-breaker)
XK1 = Connector for the power circuits of the PR111, PR112/P, PR112/PD, PR113/P and PR113/PD releases
XK2 - XK3 = Connectors for the auxiliary circuits of the PR112/P, PR112/PD, PR113/P and PR113/PD releases
XO = Connector for the XO1 release
XV = Delivery terminal box for fixed version circuit-breaker auxiliary circuits
Y = Shunt opening release
YO1 = Shunt opening release
YO2 = Overcurrent release
YO2 = Overcurrent release (see note Q)
YU = Undervoltage release (see notes B and Q)

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

Incompatibility
The circuits shown in the following figures cannot be provided on the same circuit-breaker at the same time:
2 - 3
4 - 5
6 - 7 - 8
22 - 41 - 42 - 43 - 44
31 - 51
51 - 52 - 53
Notes
A) The 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 circuit-breaker or from an independent source: circuit-breaker closing is only allowed with the trip energized (the lock on closing is made mechanically).
In the case where there is the same power supply for the shunt closing releases and undervoltage releases and automatic 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 shunt closing release. This can be carried out by means of a circuit outside the circuit-breaker including a permanent contact, the contact indicated in figure 12 and a time-delay relay.

C) In the case of a fixed version circuit-breaker with current transformer on the neutral conductor outside the circuit-breaker, when the circuit-breaker is to be removed, it is necessary to short-circuit the terminals of the T1/N transformer.

D) Connect the S33M/2 contact indicated in fig. 11, one of the closing contacts and one of the opening contacts of the 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:
- RH0297 for LON communication
- RH0298 for MODBUS communication

F) The auxiliary voltage Uaux. allows actuation of all operations of the PR112/P, PR112/PD, PR113/P and PR113/PD releases. In this regard, refer to the corresponding user manuals. Having requested a Vaux insulated from earth, one must use “galvanically separated converters” in compliance with IEC 60950 (UL 1950) or equivalent standards that ensure a common mode current or leakage current [see IEC 478/1 CEI 22/3] not greater than 3.5 mA, IEC 60364-4-1 and CEI 64-8.

G) Protection against earth fault is available with the PR112/P, PR112/PD, PR113/P and PR113/PD releases by means of a current transformer located on the conductor which connects the MV/LV transformer star centre to earth. The connection between terminals 1 and 2 of the T/I/O current transformer and the T5 and T6 poles of the X (or XV) connector, must be made using a shielded and cored two-pole cable (see instruction manual) not longer than 15 m. The shield must be earthed on the circuit-breaker side and on the current transformer side.

H) In the case of PR113/P or PR113/PD releases mounted on a three-pole circuit-breaker without connection to the neutral outside, 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 and PR113/PD unit is present.

L) The contact cannot be used if the PR113/P or PR113/PD unit is present.

M) Connect one of the S75I contacts indicated in fig. 31 or 51 in the way shown in figs. 42-44.

N) With PR112/P, PR112/PD, PR113/P and PR113/PD releases, the connections to the zone selectivity inputs and outputs must be made using a shielded and cored two-pole not longer than 300m. The shield must be earthed on the selectivity input side.

O) With PR113/P and PR113/PD releases, the connection between the voltage sensors (TV) and the circuit-breaker must be made using a shielded and cored two-pole cable not longer than 15 m.

P) With PR112/PD and PR113/PD releases, the power supply of the YO and YC coils must not be branched from the main one.

Q) The second shunt opening release must be installed as an alternative to the undervoltage trip.

R) The operation of the SACE SOR TEST UNIT system + shunt opening release (YO) is guaranteed starting from 75% of the Uaux of the shunt opening release.

1) Configuration valid for four-pole or three-pole circuit-breaker with external neutral. For other installation configurations, please see par. 15.3.2.

Instructions to follow for replacement of the PR111, PR112/P, PR112/PD, PR113/P or PR113/PD releases:
- Take special notice of the notes indicated on the electrical circuit diagrams provided
- The contact for electrical signalling of undervoltage release energized (Fig. 12 of the enclosed diagrams) must be removed from the terminal box.
Graphic symbols for electrical circuit diagrams (IEC 60617 and CEI 3-14...3-26 Standards)

- 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 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
State of operation

Three-pole or four-pole circuit-breaker with electronic PR111, PR112/P, PR112/PD, PR113/P and PR113/PD release

Three-pole or four-pole switch-disconnector

Three-pole circuit-breaker with electronic PR111, PR112/P, PR112/PD, PR113/P, PR113/PD release and current transformer on neutral conductor outside the circuit-breaker
Motor operator, shunt opening release, shunt closing release and undervoltage release

Signalling contacts
Signalling contacts

A1

A2

A3

A4

Model | L0849
Apparatus
Emax

Doc. N° | RH0287002

Scale

Page N° | 22/24
Auxiliary circuits of the PR112/P release

Auxiliary circuits of the PR112/PD release
Auxiliary circuits of the PR113/P release

Auxiliary circuits of the PR113/PD release
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.