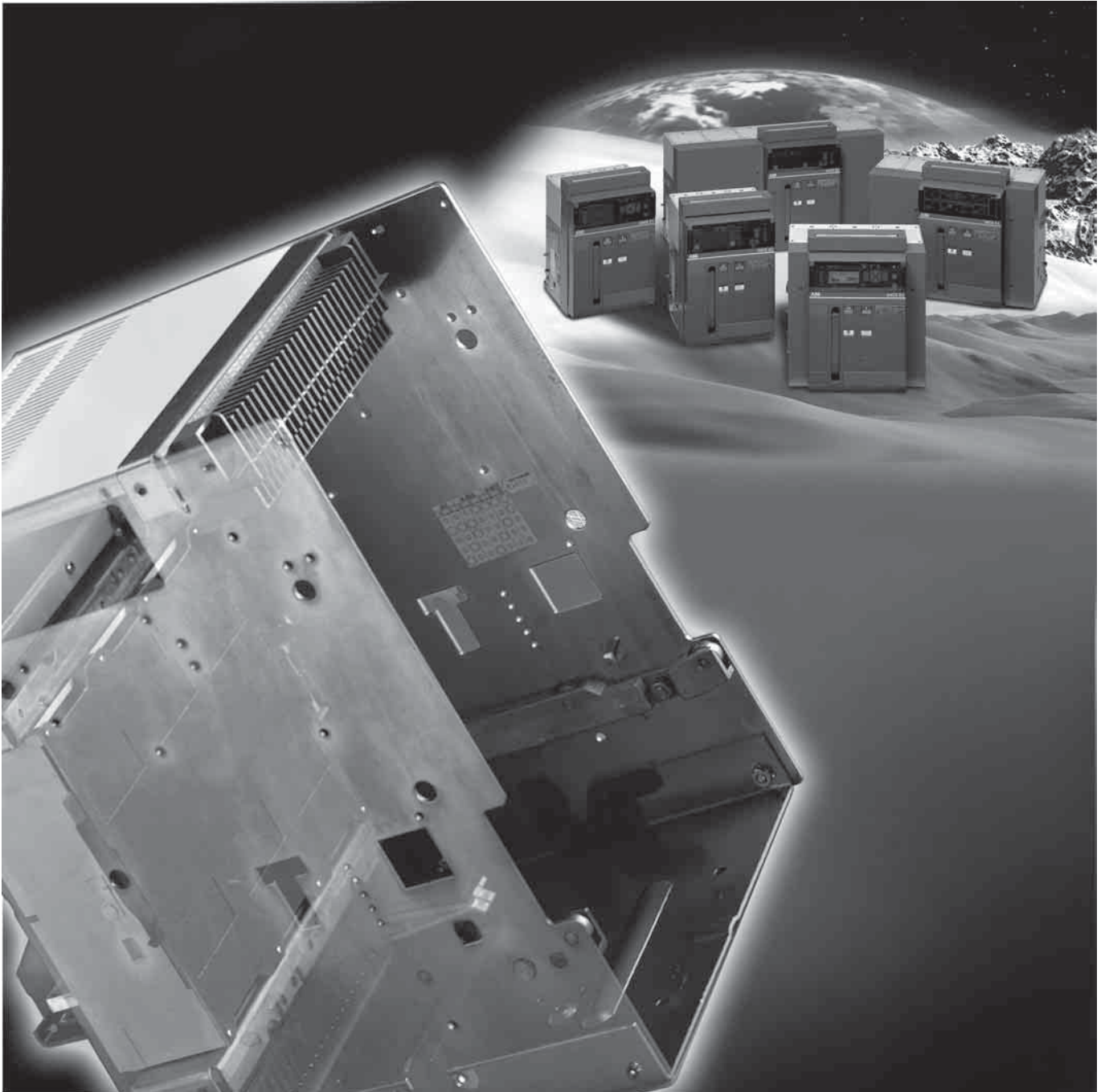


RH0287002 L0849

Emax



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Dwg.		Resp.Off.		Title Installation, service and maintenance instructions for the fixed part of withdrawable version circuit-breakers	Language
App.		Take-over Off.			en
Model	L0849			Apparatus Emax	Scale
ABB		ABB SACE		Doc. N° RH0287002	

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 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

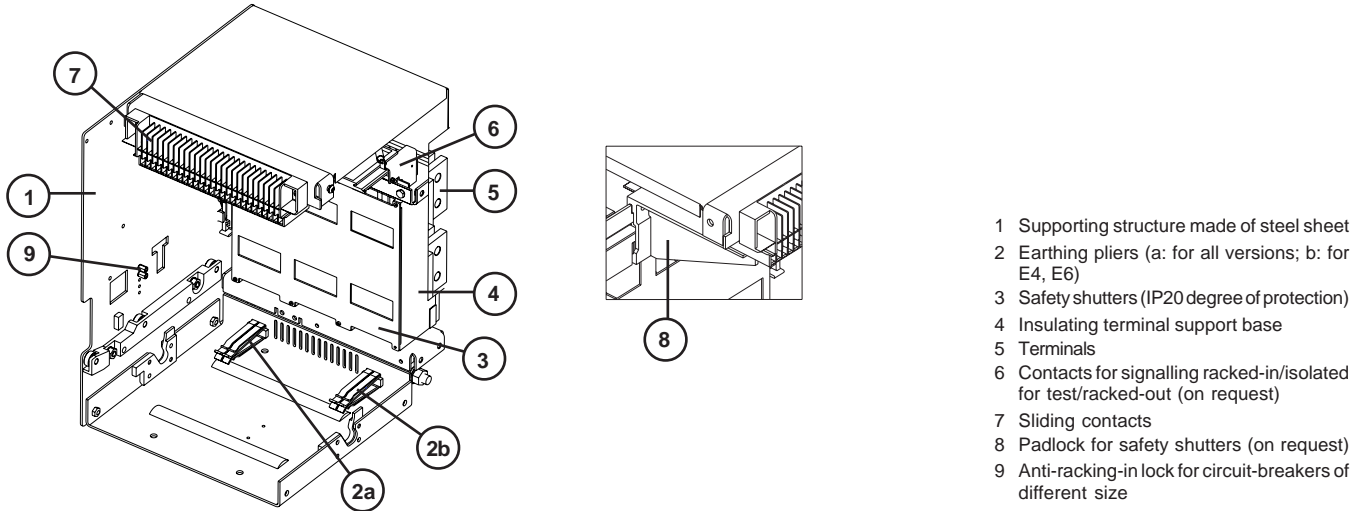


Fig. 1

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.

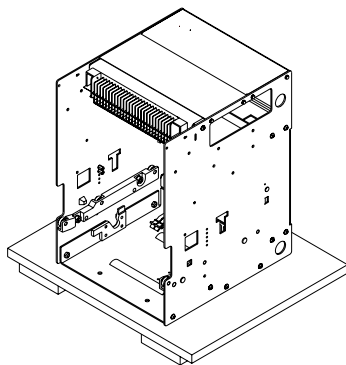


Fig. 2

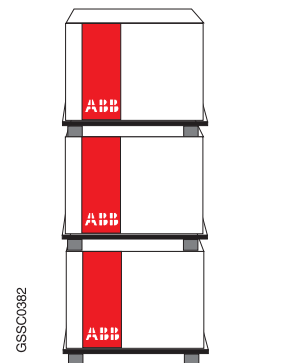


Fig. 3

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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.

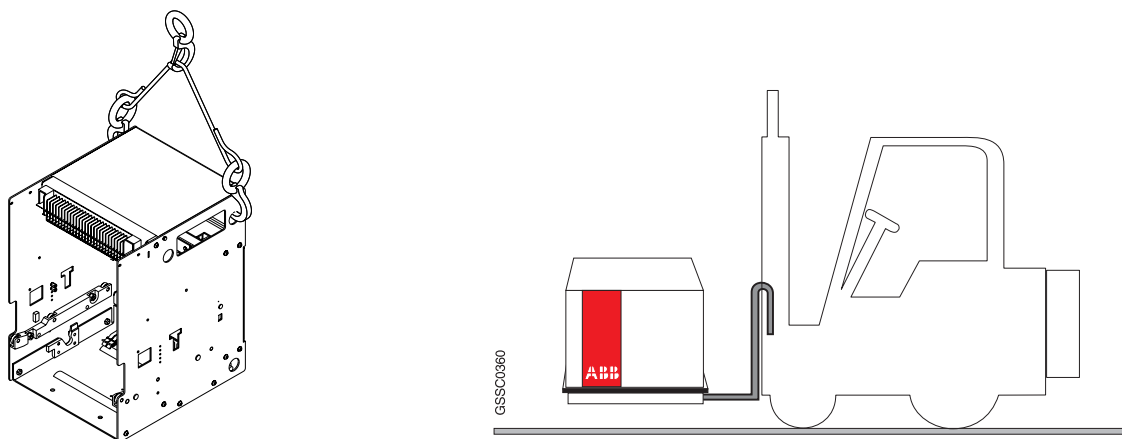


Fig. 4

Table of the weights of the fixed parts

Fixed part	Withdrawable 3 poles	Withdrawable 4 poles
	kg	kg
E1	25	28
E2	28	32
E3	38	45
E4	50	48
E4/f		50
E6	70	80
E6/f		85

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).

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Example for E1B 08 according to the plate diagram

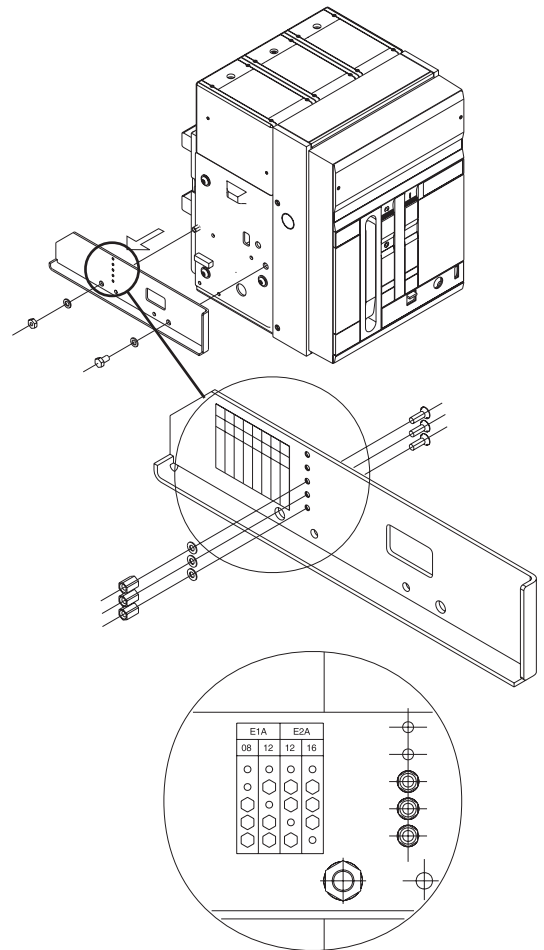
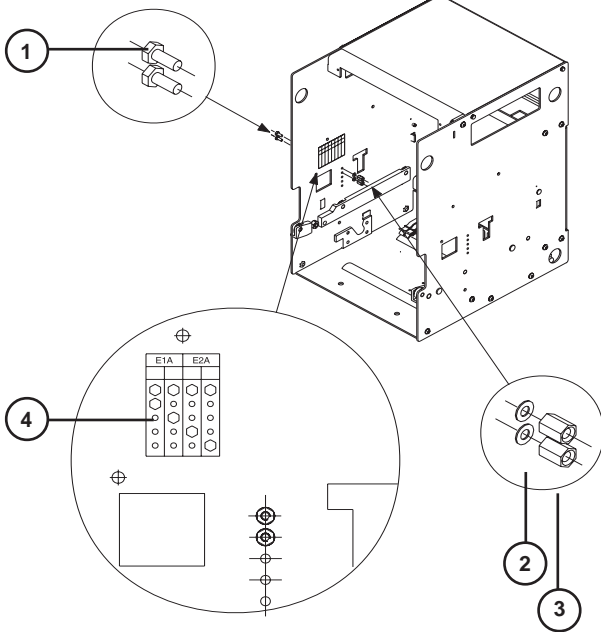
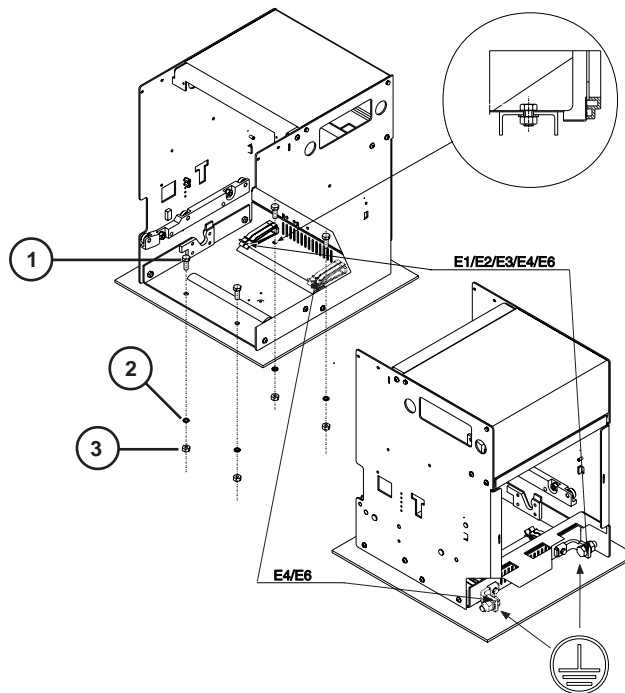


Fig. 5

Fig. 6

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.

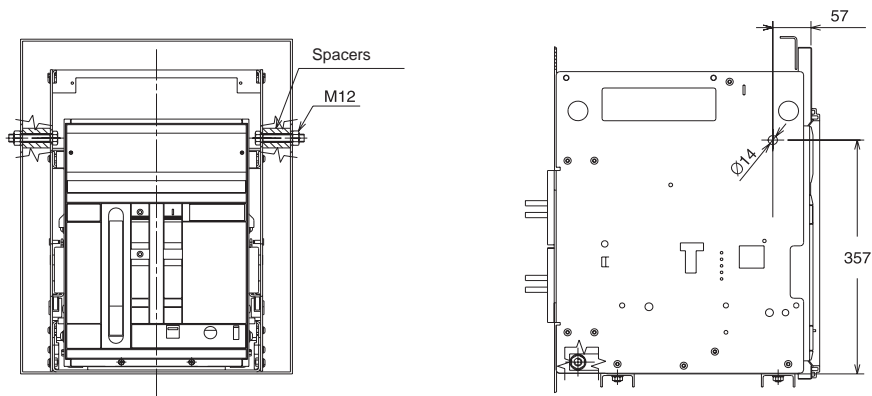
Fig. 7

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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).

E1 - E2 - E3



E4 - E6

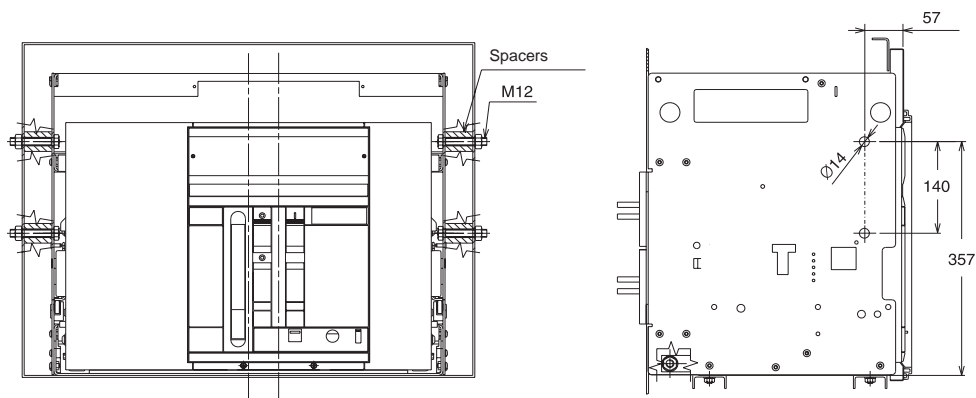


Fig. 8

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).

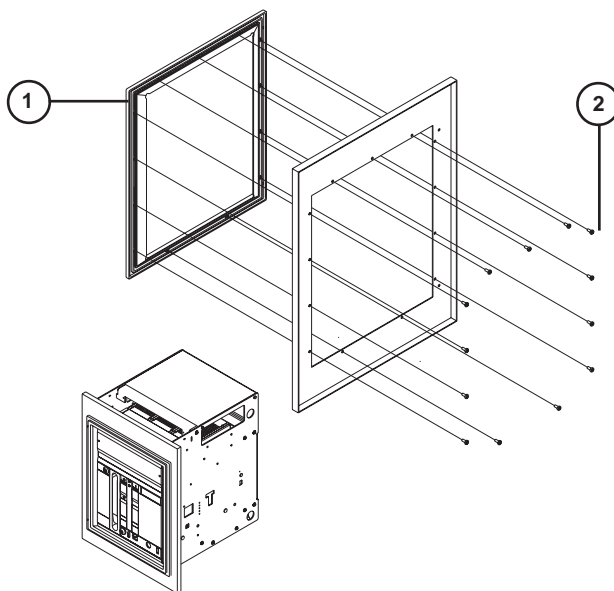


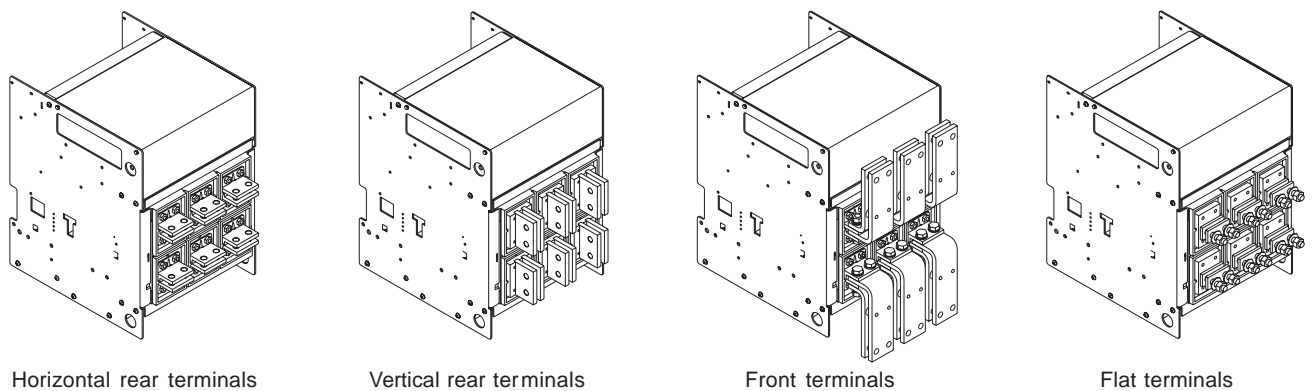
Fig. 9

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5. Electrical connections

5.1 Connections to the power circuit

5.1.1 Shapes of the 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 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.

	lu [A]	Vertical terminals				Horizontal and front terminals				
		Continuous current-carrying capacity [A]			Busbar cross-section [mm ²]	Continuous current-carrying capacity [A]			Busbar cross-section [mm ²]	
		35°C	45°C	55°C		35°C	45°C	55°C		
E1B/N 08	800	800	800	800	1x(60x10)	800	800	800	1x(60x10)	
E1B/N 12	1250	1250	1250	1250	1x(80x10)	1250	1250	1200	2x(60x8)	
E2N 12	1250	1250	1250	1250	1x(60x10)	1250	1250	1250	1x(60x10)	
E2B/N 16	1600	1600	1600	1600	2x(60x10)	1600	1600	1530	2x(60x10)	
E2B/N 20	2000	2000	2000	1800	3x(60x10)	2000	2000	1750	3x(60x10)	
E2L 12	1250	1250	1250	1250	1x(60x10)	1250	1250	1250	1x(60x10)	
E2L 16	1600	1600	1600	1500	2x(60x10)	1600	1490	1400	2x(60x10)	
E3S/H 12	1250	1250	1250	1250	1x(60x10)	1250	1250	1250	1x(60x10)	
E3S/H 16	1600	1600	1600	1600	1x(100x10)	1600	1600	1600	1x(100x10)	
E3S/H 20	2000	2000	2000	2000	2x(100x10)	2000	2000	2000	2x(100x10)	
E3N/S/H 25	2500	2500	2500	2500	2x(100x10)	2500	2490	2410	2x(100x10)	
E3N/S/H 32	3200	3200	3100	2800	3x(100x10)	3000	2880	2650	3x(100x10)	
E3L 20	2000	2000	2000	2000	2x(100x10)	2000	2000	1970	2x(100x10)	
E3L 25	2500	2500	2390	2250	2x(100x10)	2375	2270	2100	2x(100x10)	
E4H 32	3200	3200	3200	3200	3x(100x10)	3200	3200	3020	3x(100x10)	
E4S/H 40	4000	4000	3980	3500	4x(100x10)	3600	3510	3150	6x(60x10)	
E6V 32	3200	3200	3200	3200	3x(100x10)	3200	3200	3200	3x(100x10)	
E6V 40	4000	4000	4000	4000	4x(100x10)	4000	4000	4000	4x(100x10)	
E6H/V 50	5000	5000	4850	4600	6x(100x10)	4850	4510	4250	6x(100x10)	
E6H/V 63	6300	6000	5700	5250	7x(100x10)	-	-	-	-	

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

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

Anchoring to the switchgear

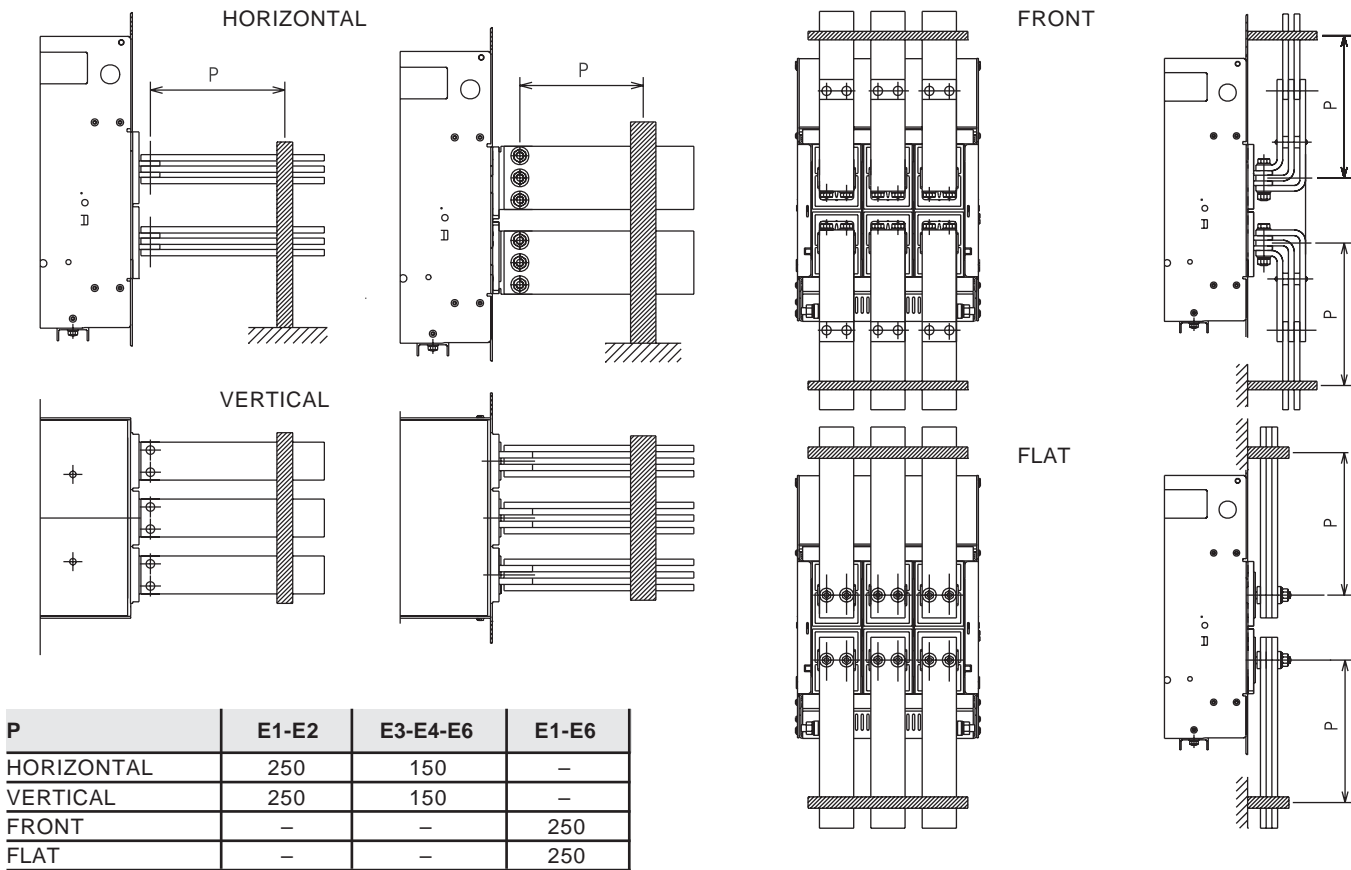


Fig. 12

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 tightening after 24 hours.

M12 high resistance screws

Tightening torque of the main terminals: 70 Nm.

Fixed part terminals	No. screws for phase	No. screws for neutral
E1/E2	2	2
E3	3	3
E4	4	2
E4/f	4	4
E6	6	3
E6/f	6	6

Fig. 13

Model	L0849		Apparatus	Emax	Scale
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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

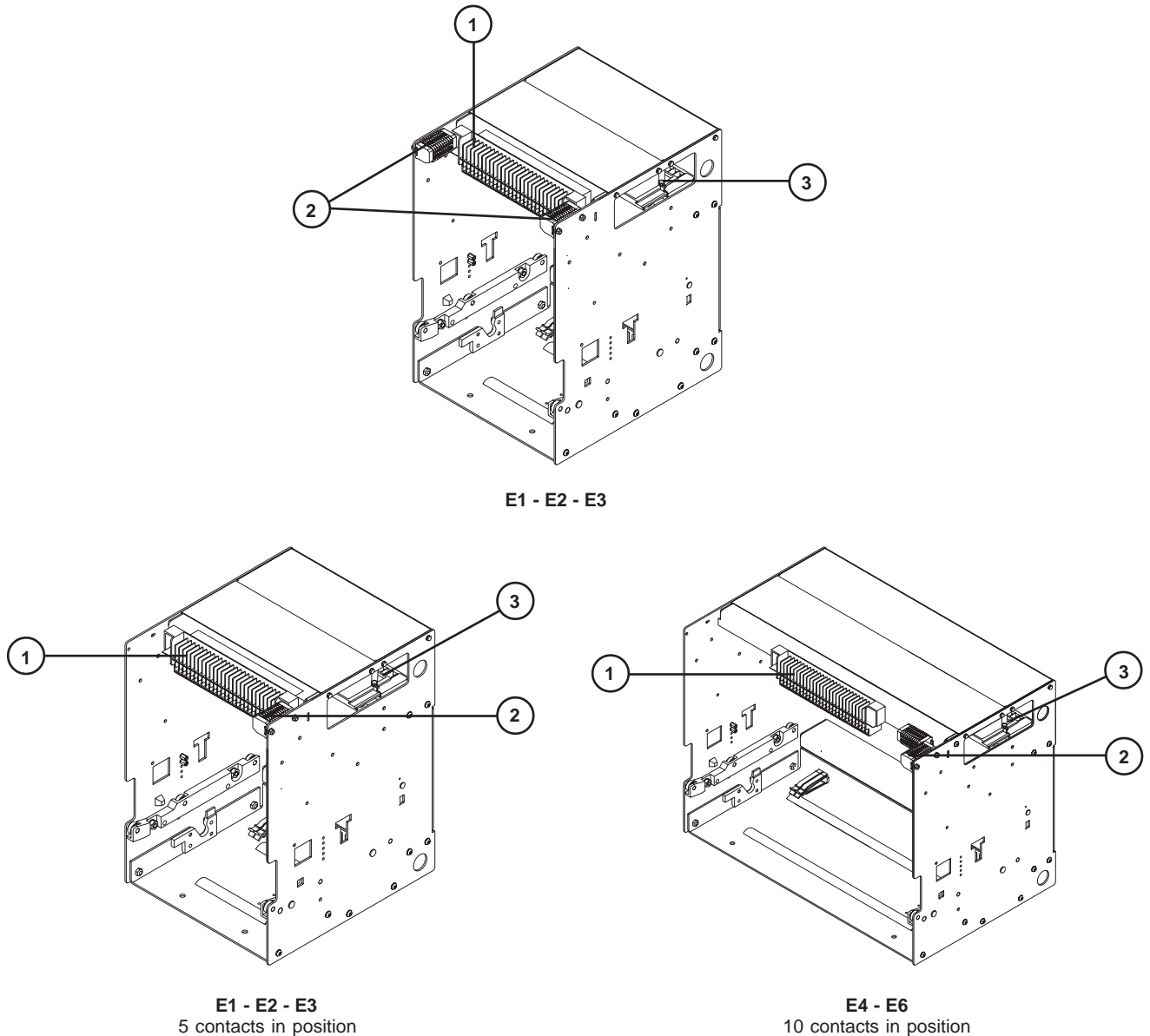
5.3.1 Withdrawable circuit-breaker

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

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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

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 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.

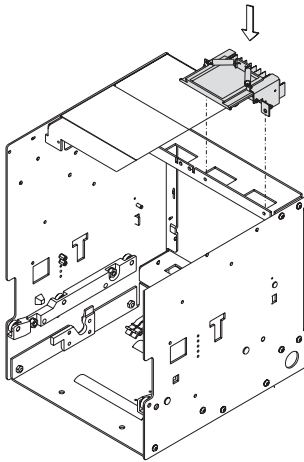


Fig. 14

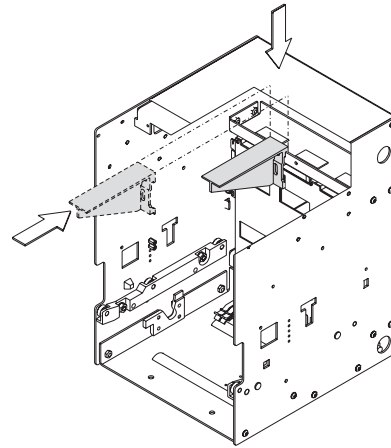


Fig. 15

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)

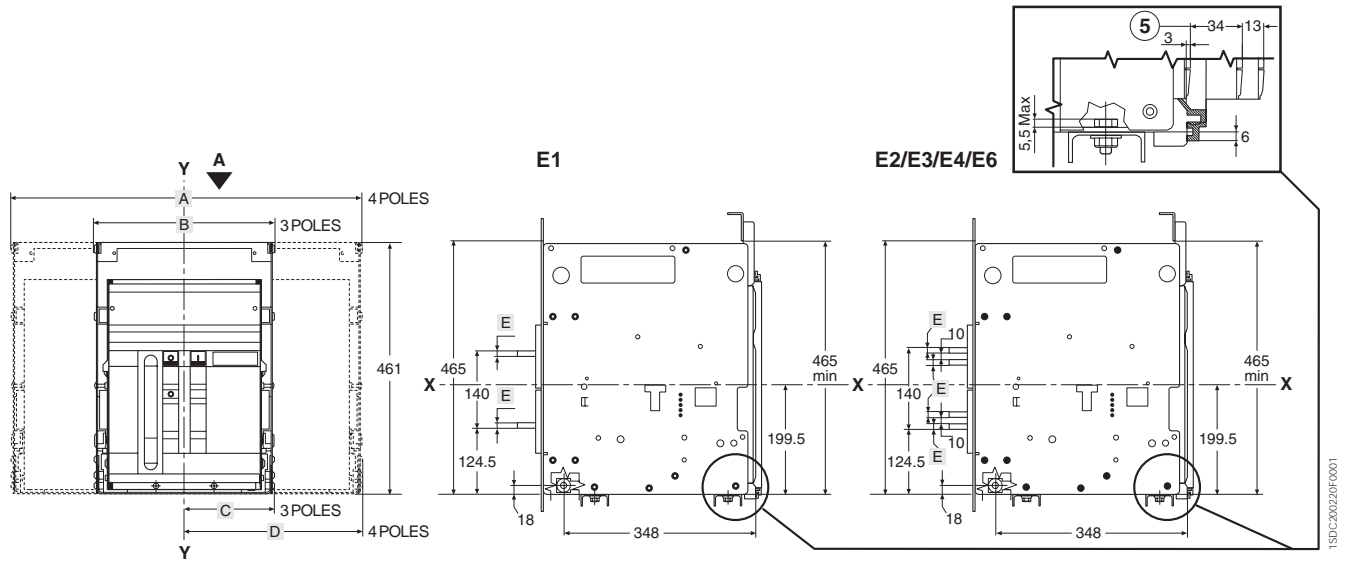
type D: between 3 circuit-breakers (group of 3 power supplies / a single circuit-breaker closed)

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7. Overall dimensions

Withdrawable circuit-breaker

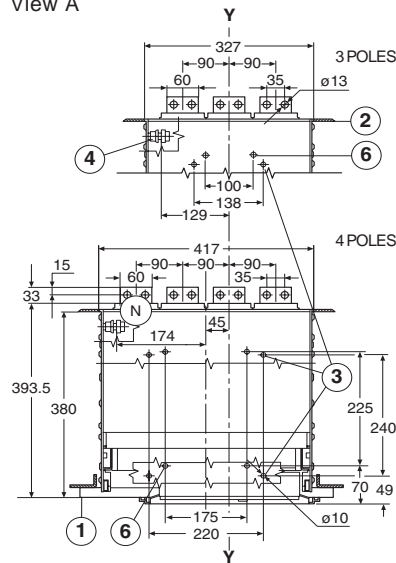
Basic version with horizontal rear terminals



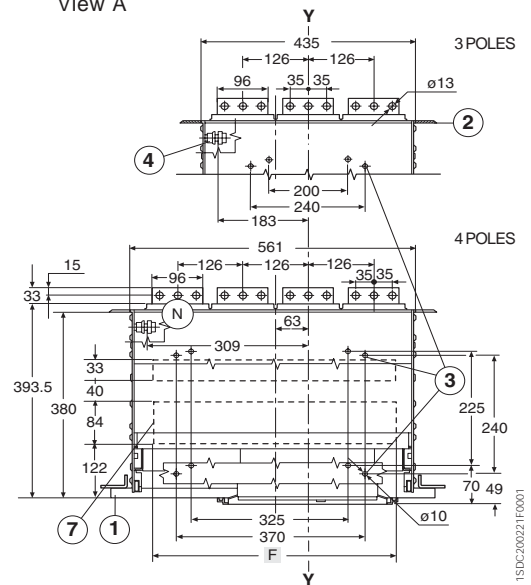
Caption

- ① Inside edge of compartment door
- ② Segregation (where foreseen)
- ③ Fixing fixed part $\varnothing 10$ 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

E1/E2
View A



E3
View A



	A	B	C	D	E	F	
						3poles	4poles
E1	414	324	162	162	10	-	-
E2	414	324	162	162	8	-	-
E3	558	432	216	216	8	370	490
E4	684	594	252	342	8	530	610
E4/f	774	-	-	342	8	-	700
E6	936	810	342	468	8	750	870
E6/f	1062	-	-	468	8	-	1000

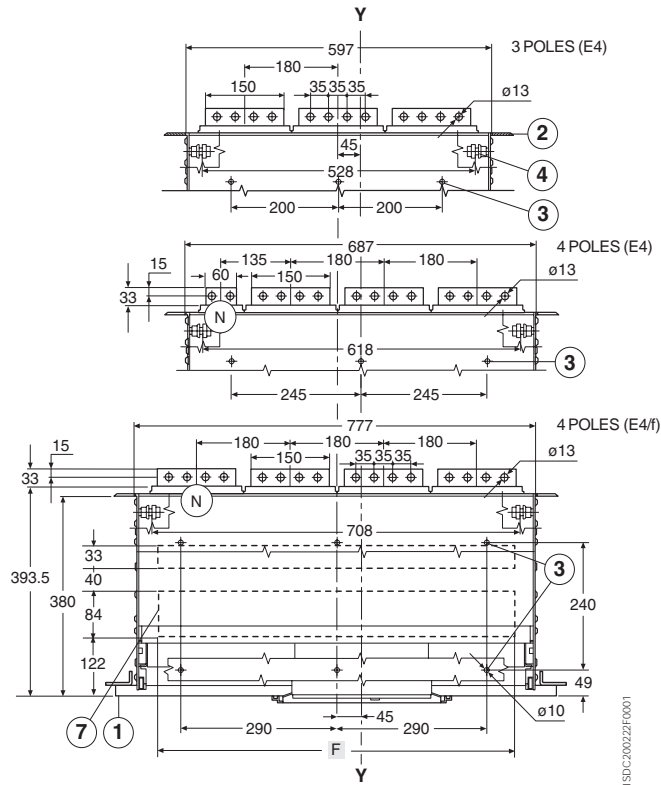
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Withdrawable circuit-breaker

Basic version with horizontal rear terminals

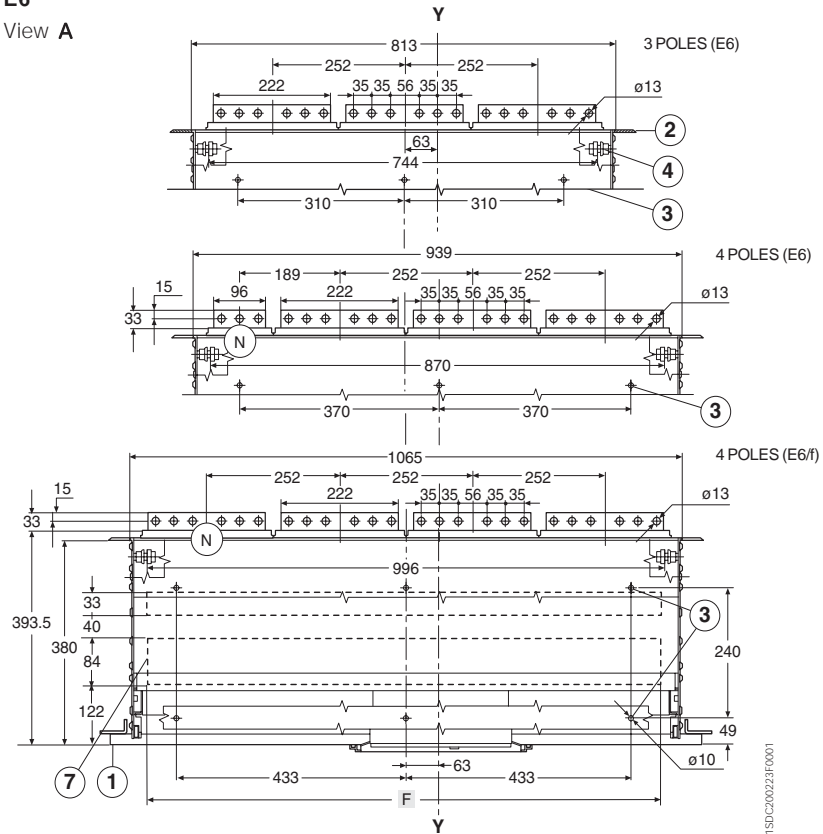
E4

View A



E6

View A

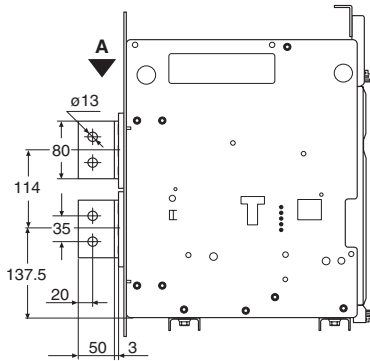


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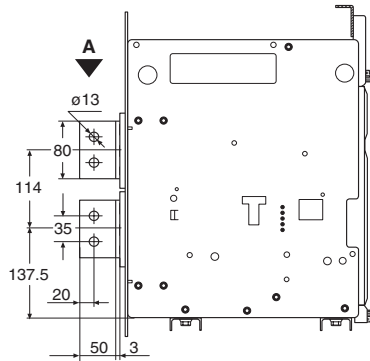
Withdrawable circuit-breaker

Version with vertical rear terminals

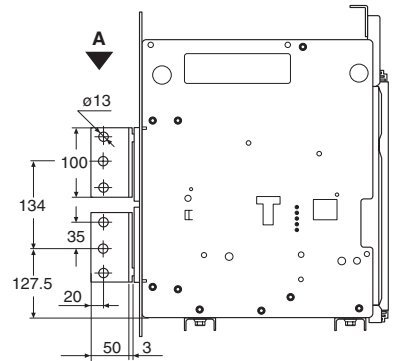
E1



E2/E4

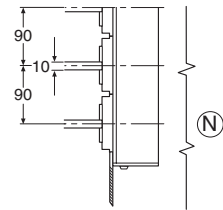


E3/E6



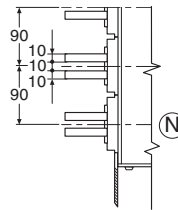
E1

View A



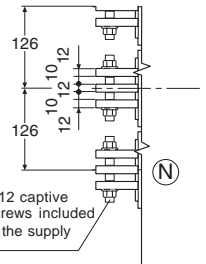
E2

View A



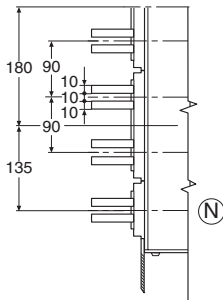
E3

View A



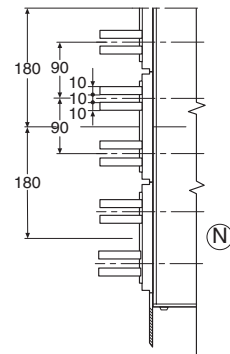
E4

View A



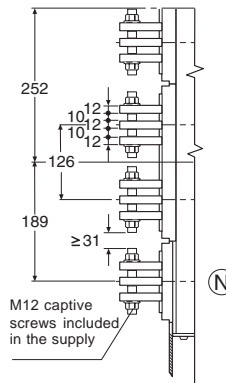
E4/f

View A



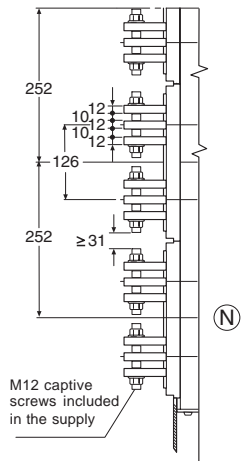
E6

View A



E6/f

View A



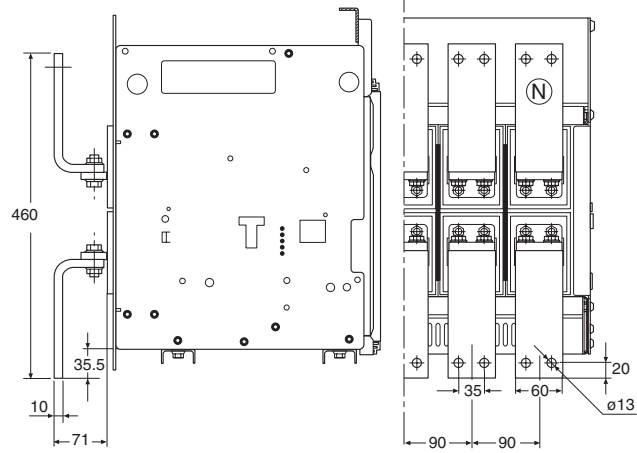
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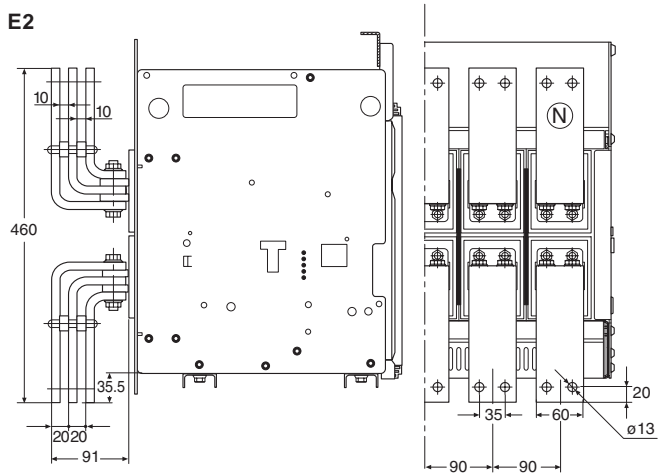
Withdrawable circuit-breaker

Basic version with front terminals

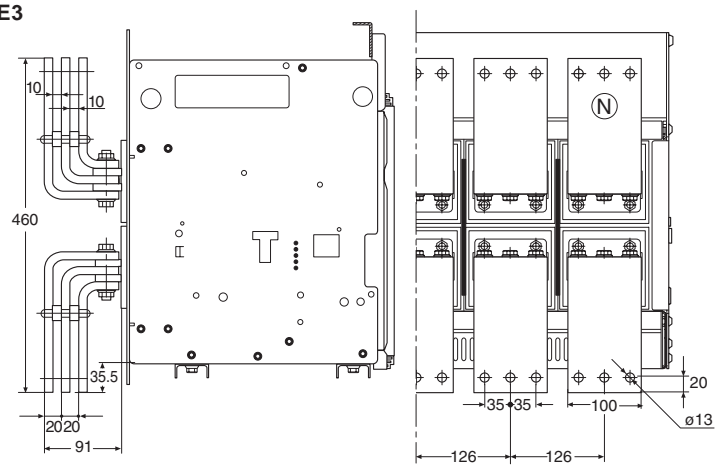
E1



E2



E3



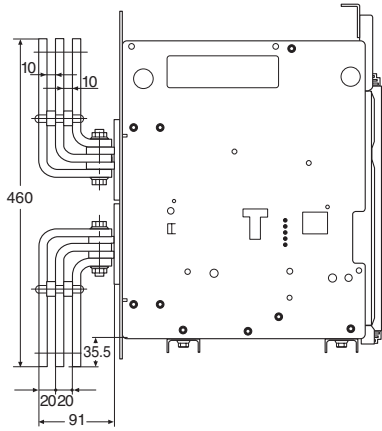
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Model	L0849			Apparatus	Emax	Scale
				Doc. N°	RH0287002	Pag. N° 12/24

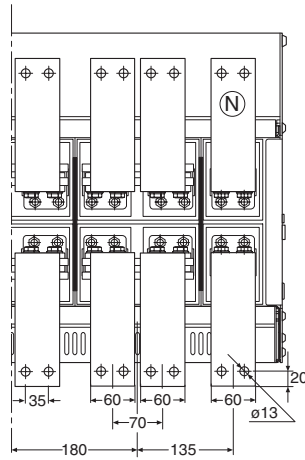
Withdrawable circuit-breaker

Basic version with front terminals

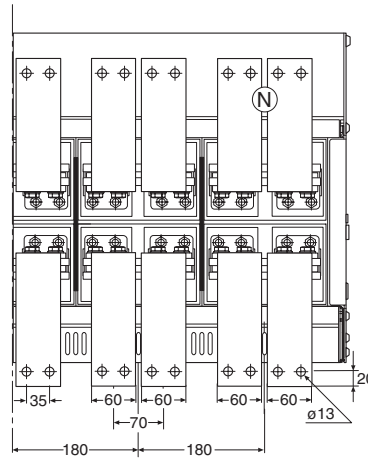
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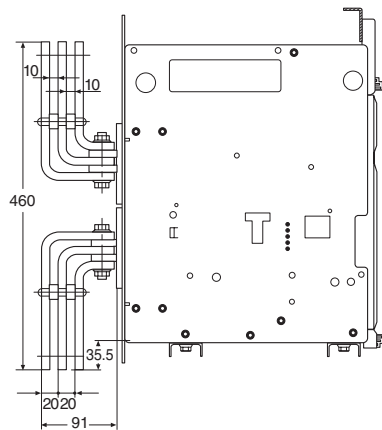
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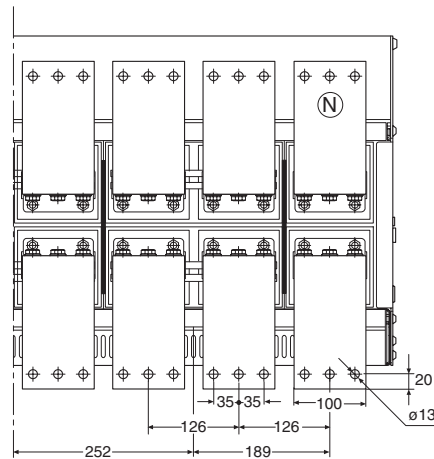
E4/f



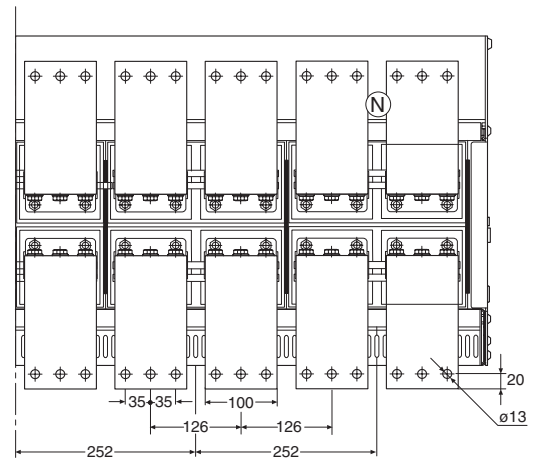
E6



E6



E6/f



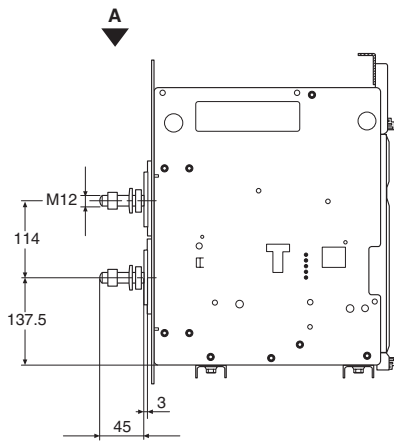
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Model	L0849		Apparatus	Emax	Scale
			Doc. N°	RH0287002	Pag. N° 13/24

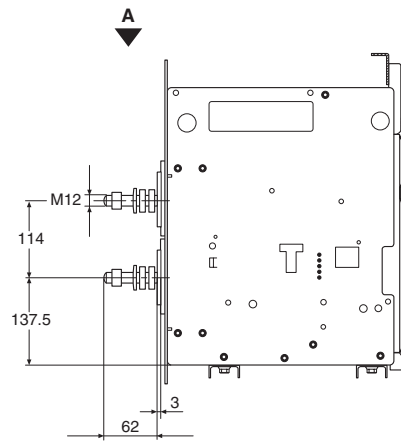
Withdrawable circuit-breaker

Version with flat terminals

E1

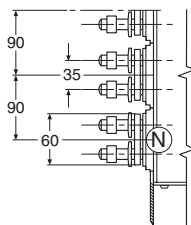


E2-E3-E4-E4/f-E6-E6/f



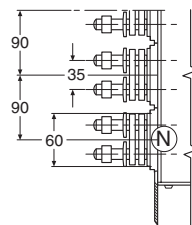
E1

View A



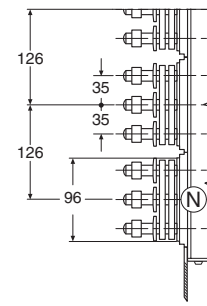
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View A



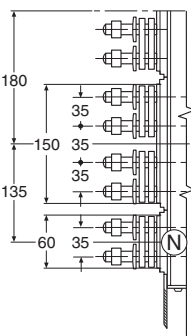
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View A



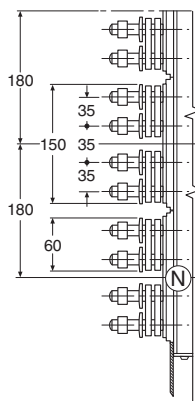
E4

View A



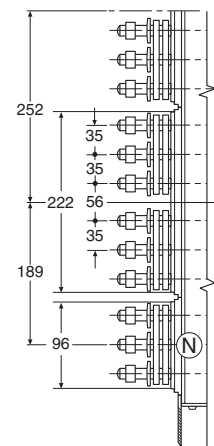
E4/f

View A



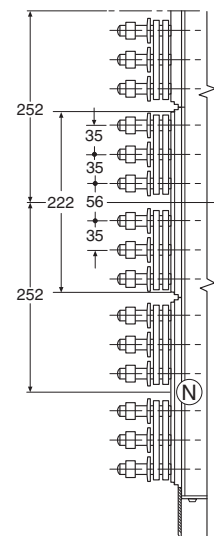
E6

View A



E6/f

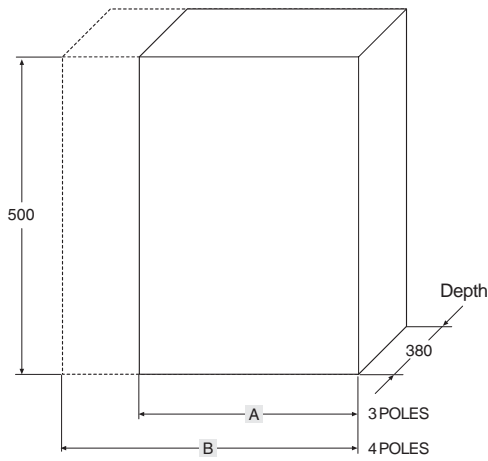
View A



1SDC20022TF0001

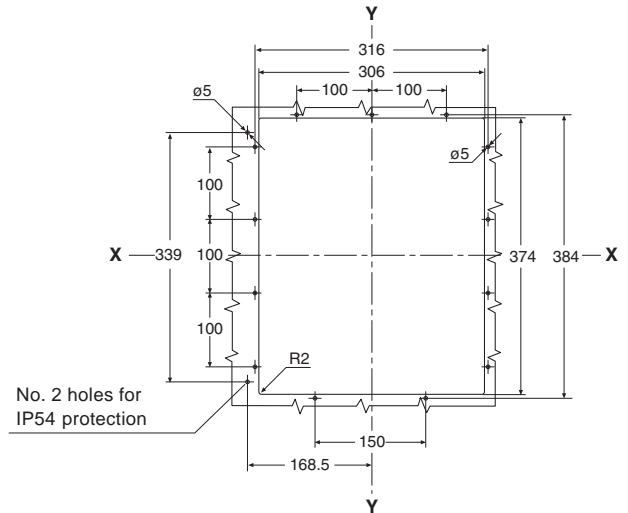
Model	L0849		Apparatus	Emax	Scale
			Doc. N°	RH0287002	Pag. N° 14/24

Compartment dimensions



	A	B
E1	400	490
E2	400	490
E3	500	630
E4	700	790
E4/f	-	880
E6	1000	1130
E6/f	-	1260

Compartment door drilling



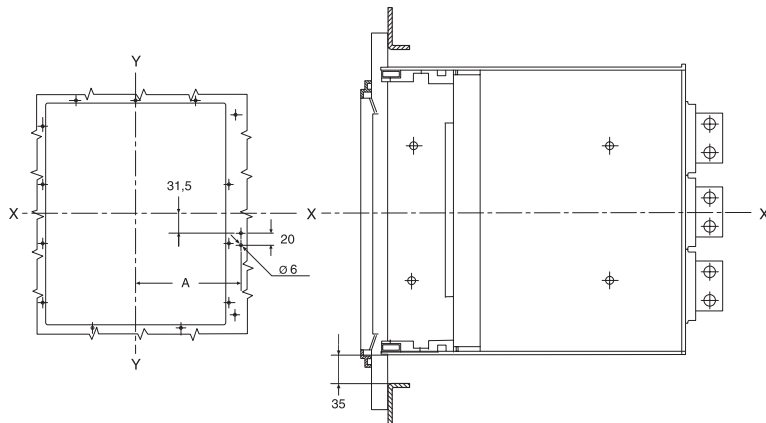
Tightening torque of the fixing screws: 20 Nm
Tightening torque of the main terminals: 70 Nm
Tightening torque of the earthing screw: 70 Nm

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

Compartment door mechanical lock

Door drillings

Minimum distance between the circuit-breaker and the side of the switchgear



	A	
	3 Poles	4 Poles
E1	180	180
E2	180	180
E3	234	234
E4	270	360
E4/f	-	360
E6	360	486
E6/f	-	486

Model	L0849		Apparatus	Emax	Scale
			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 PR111 overcurrent release 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 release

The PR112/P overcurrent release 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 release

The PR112/PD overcurrent release 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 release

The PR113/P overcurrent release 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 release

The PR113/PD overcurrent release 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 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 PR113/P or PR113/PD release)
 K51/GZout = Zone selectivity: output for protection G or output in "inverse" direction for protection D (DBout) (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/YO = Opening control from PR112/PD or PR113/PD electronic release
 K51/YO1 = Electrical alarm signalling for YO1 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
 Q/1...25 = Circuit-breaker auxiliary contacts

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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
S51	= 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)
S75T/14	= Contacts for the electrical signalling of circuit-breaker in position of test (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
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 centre to earth (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, 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 YO1 release
XV	= Delivery terminal box for fixed version circuit-breaker auxiliary circuits
YC	= Shunt closing release
YO	= Shunt opening release
YO1	= 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

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Notes

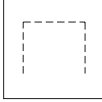
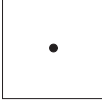
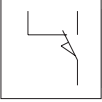
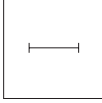
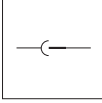
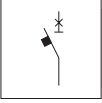

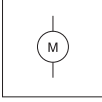
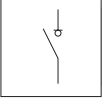

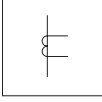
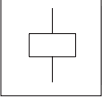
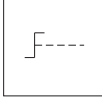
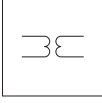
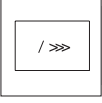
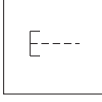
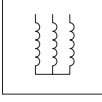
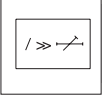
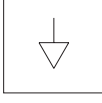
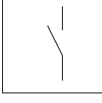
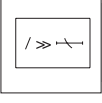
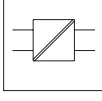
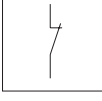
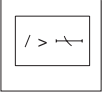
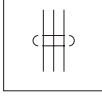
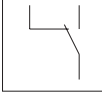
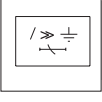
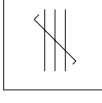
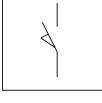
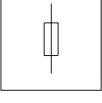
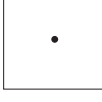
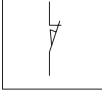
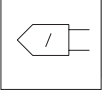
- A) The circuit-breaker is only fitted with the applications specified in the ABB order confirmation. To make out the order, please consult the apparatus catalogue.
- B) The undervoltage release is provided for power supply branched on the supply side of the circuit-breaker or from an independent source: 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 closing 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 TI/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 U_{aux} 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 60364-41 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 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 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.
In the case of fixed version circuit-breakers, connect the XV-K14 terminal directly to the XV-K16 terminal (contact S75I does not exist).
- 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 corded 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 corded two-pole cable not longer than 15 m.
The shield must be earthed on both sides (sensor and circuit-breaker).
- 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.
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, 240-250VDC and 240-250VAC for PR113/PD.
- 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 U_{aux} of the shunt opening release.
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 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.

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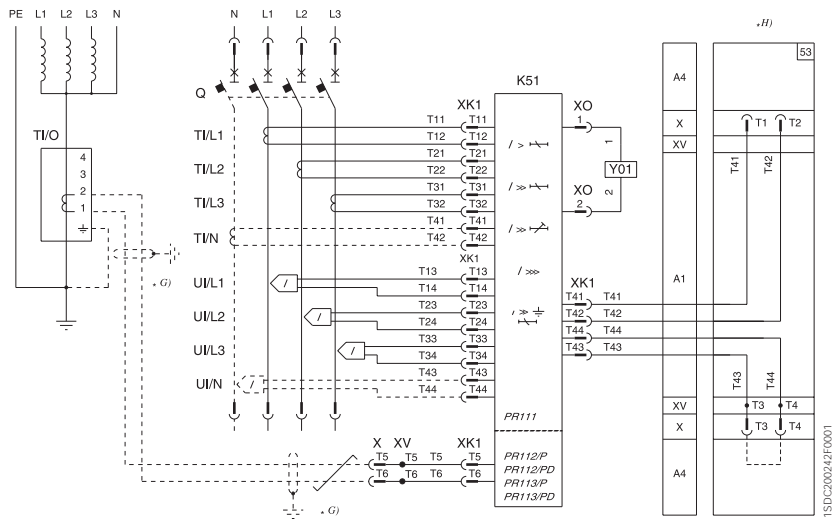
Graphic symbols for electrical circuit diagrams (IEC 60617 and CEI 3-14...3-26 Standards)

	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 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

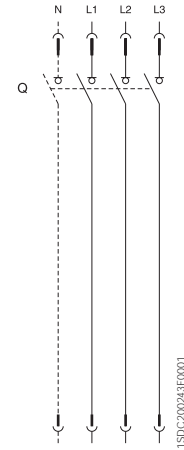
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State of operation

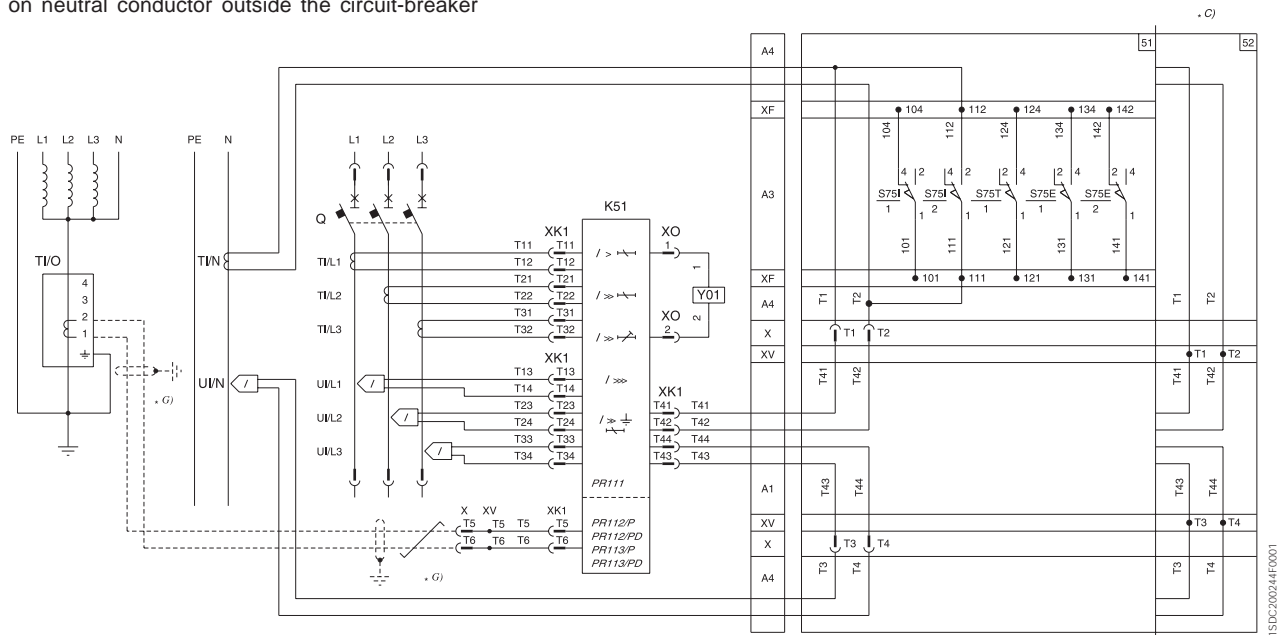
Three-pole or four-pole circuit-breaker with electronic PR111, PR112/P, PR112/PD, PR113/P and PR113/PD release



Three-pole or four-pole switch-disconnector

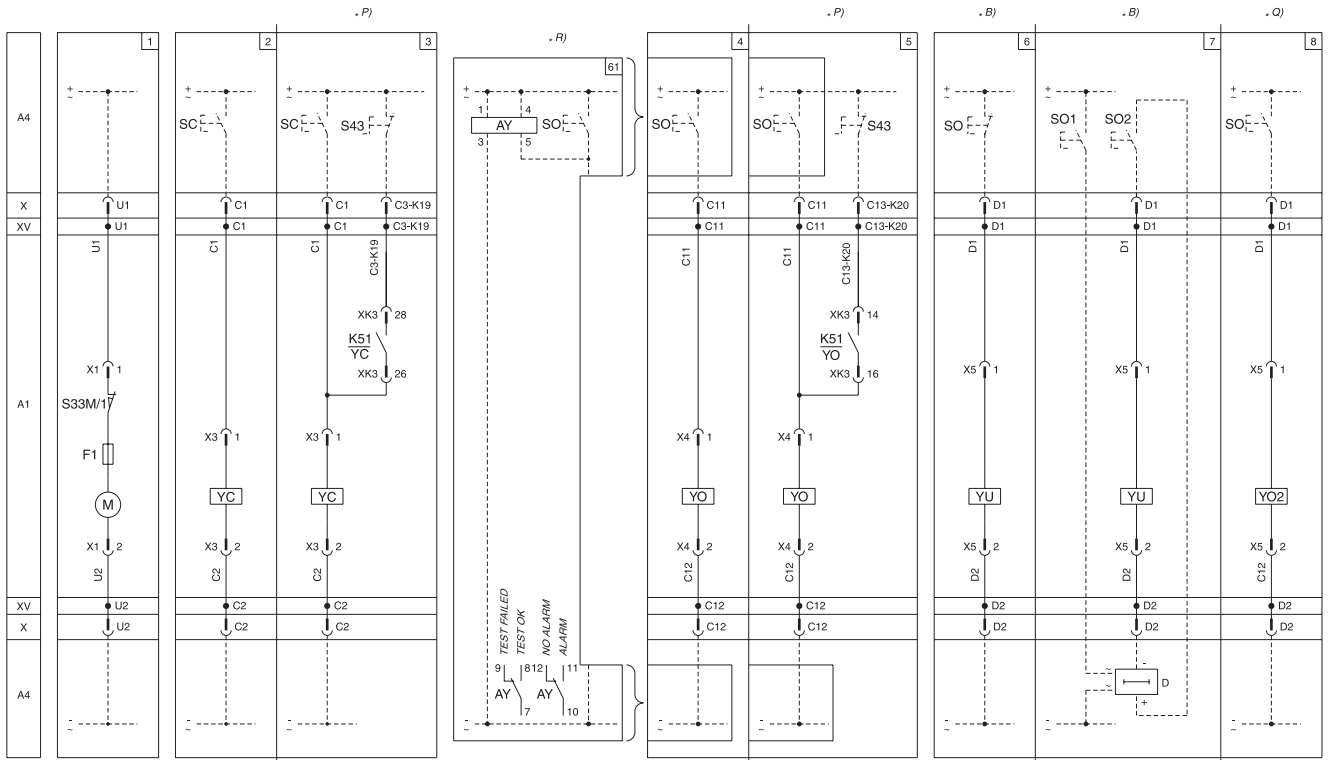


Three-pole circuit-breaker with electronic PR111, PR112/P, PR112/PD, PR113/P, PR113/PD release and current transformer on neutral conductor outside the circuit-breaker

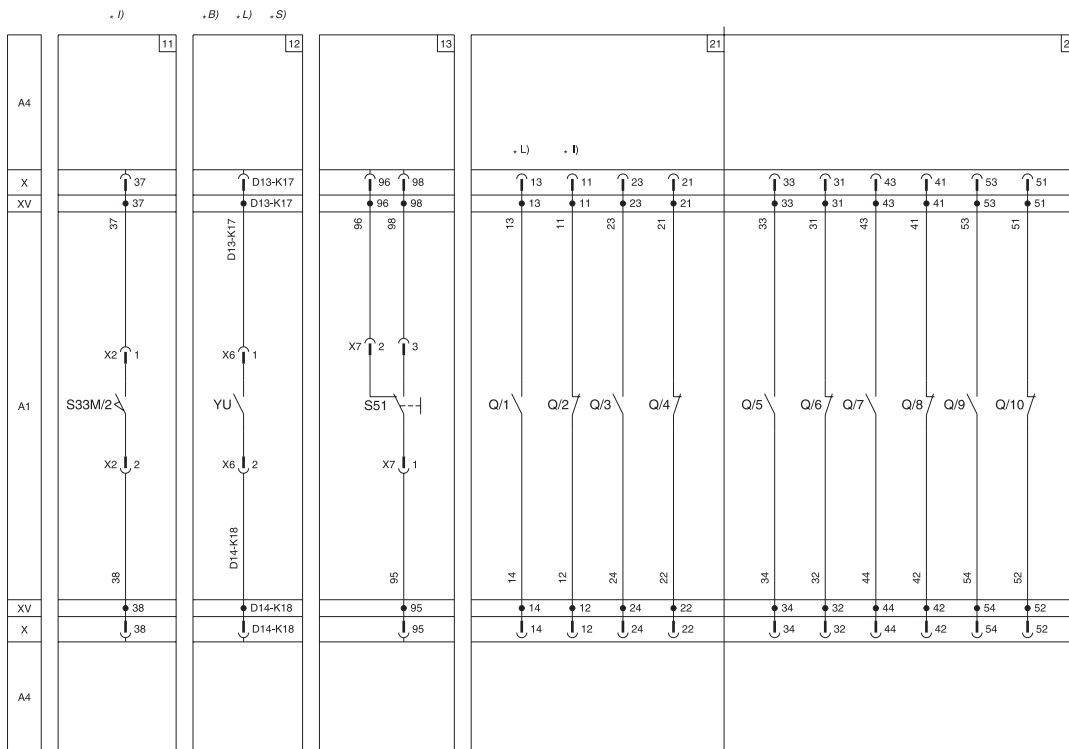


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Motor operator, shunt opening release, shunt closing release and undervoltage release

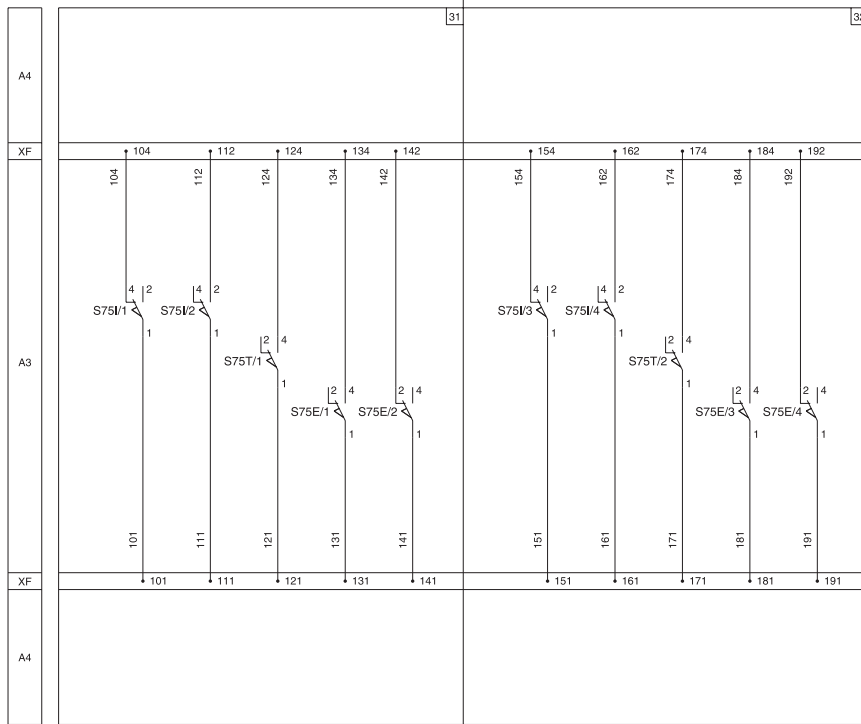
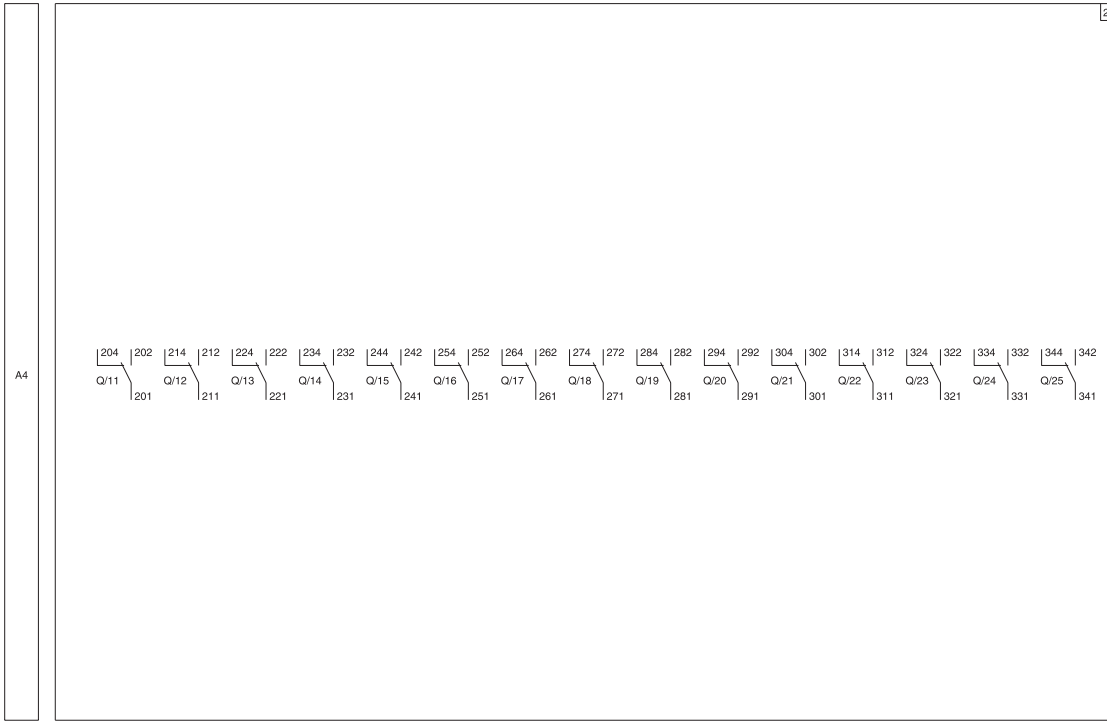


Signalling contacts



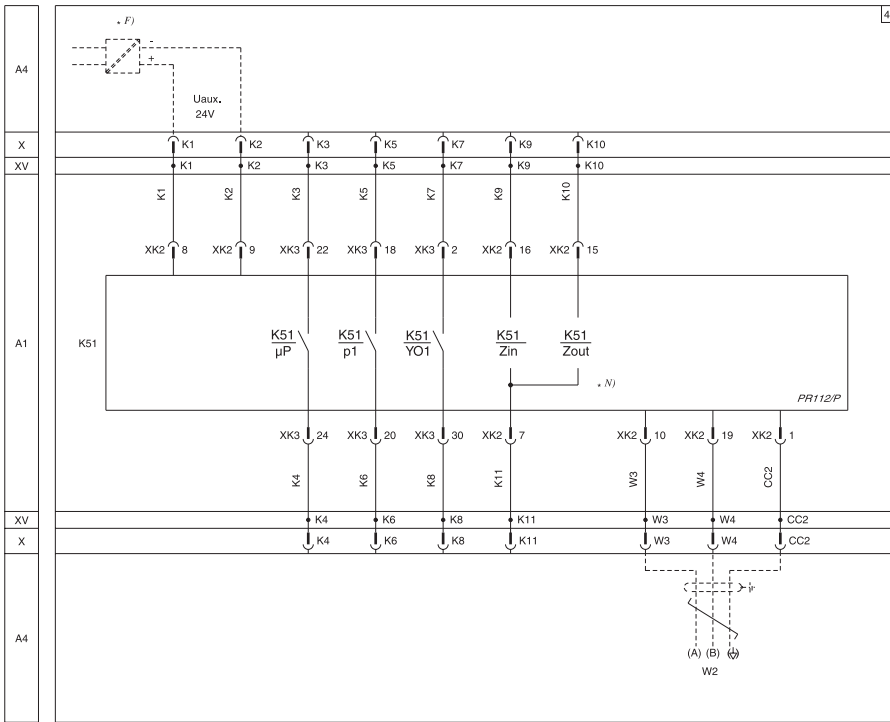
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Signalling contacts

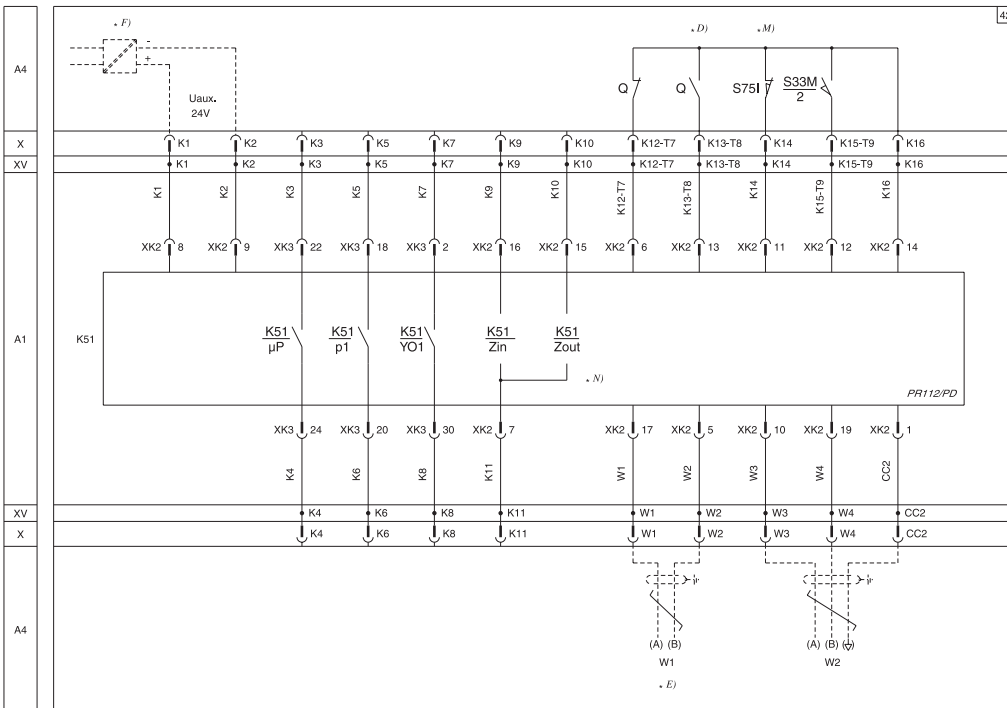


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Auxiliary circuits of the PR112/P release

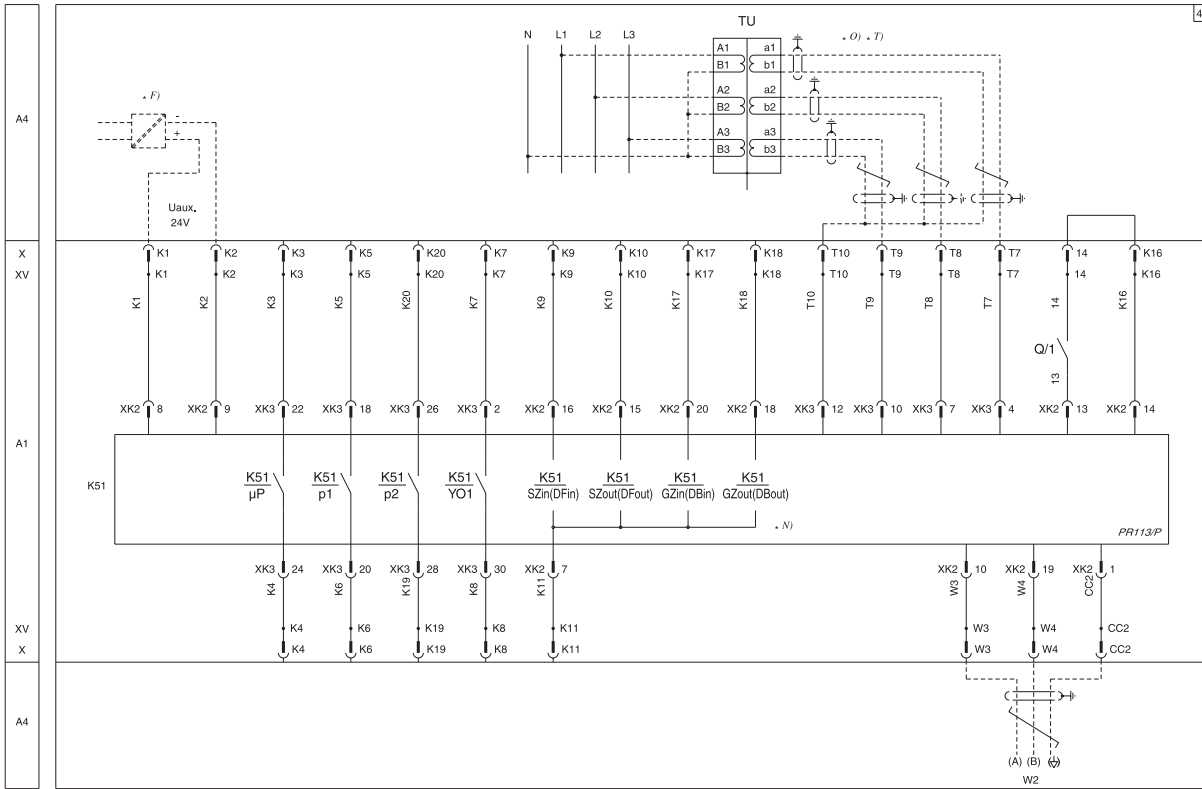


Auxiliary circuits of the PR112/PD release

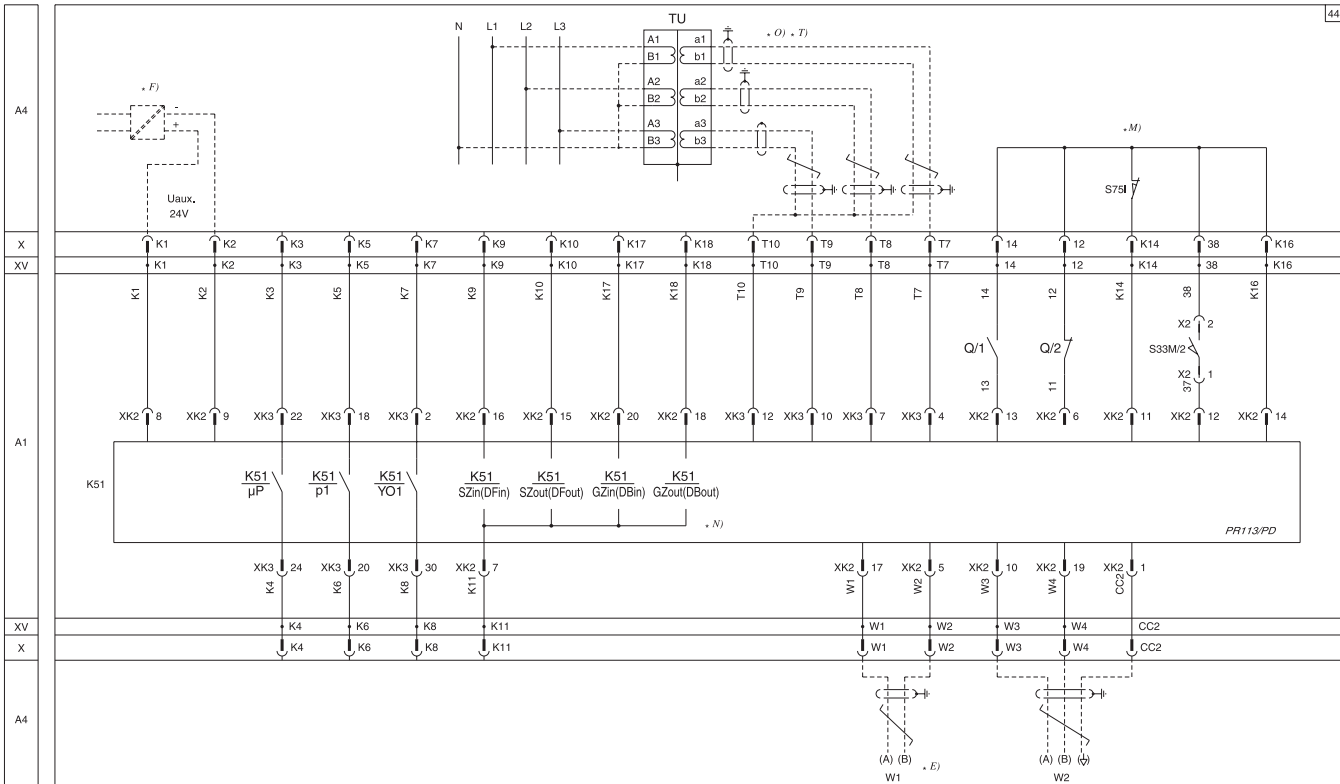


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Auxiliary circuits of the PR113/P release



Auxiliary circuits of the PR113/PD release



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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.

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