

Applicant : Elektro Internationaal B.V.
Pompmolenlaan 17
3447 GK Woerden
The Netherlands

Application date : 2008-09-30

Order number : 2120438.00-QUA/INC

Subject: Type test of the main system of the low-voltage switch and distribution boards for a maximum rating of 540 A at a 3-phase voltage of max. 690 V (50 – 60 Hz)

Trade name : ELEKTRO INTERNATIONAAL

Type(s) : Prisma Plus system G

Arnhem, March 13, 2009

Manufacturer/factory-location:

Elektro Internationaal B.V., Pompmolenlaan 17, 3447 GK, Woerden, The Netherlands

Test requirements : IEC 60439-1:1999, EN 60439-1:1999

Conclusion: the products comply with the specified requirements for the 7 type tests that were performed on the wall mounted enclosures and floor standing enclosures Prisma Plus system G equipped with installation systems, distribution bloc systems and prefabricated connections.

Tested by : H.G.M. Kormelink

Checked by : H.L. Schendstok

Contents:

- 8 pages of description and test results
- 1 photograph
- 10 drawings

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1 SUBJECT

Subject to be tested is the low-voltage switch- and distribution boards, type Prisma Plus system G for a maximum of 540 A at a three phase a.c. voltage of max. 1000 V. The board contains the elements of the system main structure i.e. the horizontal and vertical busbar systems, the connections to the outgoing groups, as well as the installation of the equipment, all accommodated in sheet-steel enclosures.

Remark 1:

This report does not cover the examination of equipment usually mounted in the enclosure, such as switch gear, fuses, etc.

Remark 2:

The values for the current rating of the busbar systems are valid only for busbar systems loaded over the entire length with these currents and therefore they have to be considered as maxima. In a completely installed switch board reduction of the current rating due to the temperature-rise of the apparatus installed may be necessary. The reduction size shall be determined into practice by the manufacturer dependent on the number, the nature and the utilizations of the apparatus installed. Configurations with outgoing groups a temperature-rise test were carried out.

The 7 type tests were performed on the wall mounted enclosures and floor standing enclosures Prisma Plus system G equipped with installation systems, distribution bloc systems and prefabricated connections. Also with components and low voltage devices from Merlin Gerin, Square D and Telemecanique. These tests were passed with success in the representative configurations according to the specification of the IEC 60439-1:1999, EN 60439-1:1999.

Remark

The low-voltage switchgear and controlgear assemblies of the type Prisma Plus system P are Type Tested Assemblies (TTA). These low-voltage switchgear and controlgear assemblies have the right to use the KEMA-KEUR certification mark if all installed components, such as switch-disconnectors, fuseholders, circuit-breakers etc., bear the KEMA-KEUR certification mark and have been tested as part of the assembly.

The main system has the right to bear the KEMA-KEUR Certification mark.

2 DESIGN OF THE SYSTEM

2.1 General characteristics

The switch and distribution boards design is suitable for indoor mounting. The Prisma Plus system G system is a modular system.

Enclosures equipped with rear uprights with threaded holes for mounting distribution system and functional units.

The frames can be joined width wise and depth wise. The frame is complete covers with metal plates (rear, side and top plates). The front is equipped with plain or transparent door or a support frame for front plates.

The degree of protection is IP30, IP31 or IP43 and IP55.

2.2 Dimensions of the enclosures

Floor-mount enclosure dimensions

- Height: - 8 heights from 330 to 1380 mm
- Width: - enclosure: 595 mm
- cable duct: 305 mm
- Depth: - 200 mm
- 230 mm with door

Free-standing enclosure dimensions

- Height: - 3 heights from 1650 to 1800 mm
- Width: - Basic enclosure: 595 mm
- Cable duct: 305 mm
- Depth: - 200 mm
- 230 mm with door

2.3 Main distribution

Power clip insulated busbars

- Installed at the back of floor-mount or free-standing enclosures
- Supplied ready to install in 3-pole and 4-pole versions with ratings from 125 to 630 A
- Available in several lengths, the busbars can be cut to length as required in multiples of 150 mm or 200 mm depending on the rating.

Rear busbars

- Mounted directly in the rear of floor-mount or free-standing enclosures
- Available in 3-pole or 4-pole versions with ratings from 160 to 400 A
- Available in several lengths, the busbars can be cut to length as required.

Multi-stage busbars

- For installation in the duct
- Available in 3-pole or 4-pole versions with ratings from 160 to 630 A
- Available in several lengths, the busbars can be cut to length as required.

2.4 Secondary distribution

Multiclip distribution block

- Available in 3-pole or 4-pole versions for 200 A rating, 4-pole version for 80 A rating and 4-pole version for half-row 63 A rating.
- Supplied fully mounted with pre-stripped copper connections.

Polybloc distribution block

- For installation directly downstream of Compact NS circuit breakers or on modular rails.
- Available in 3-pole or 4-pole versions for 160 and 250 A ratings.
- Accessories are available for connection of 35 mm² cables.

2.5 Functional units

Device installation

- Mounting plates are used to install devices in the enclosures. Front plates provide the necessary degree of protection (IP).
- Device connection
- Optimised prefabricated connection solutions allow:
 - On-site connection of devices
 - Power supply to distribution busbars.

3 RATED VALUES OF THE SYSTEM

Low-voltage switch- and control gear assembly

Trade name	: ELEKTRO INTERNATIONAAL
Type	: Prisma Plus system G
Rated operational voltage (Ue)	: up to 690 V (depends on the used component)
Rated impulse withstand voltage (Uimp)	: 4 kV - 8 kV (depends on the used component)
Rated insulation voltage (Ui)	: 400 V - 750 V (depends on the used component)
Rated frequency	: 50/60 Hz
Rated current	: maximum 540 A
Rated short-circuit withstand	: max. 25 kA – 1,0 s
Rated conditional short-circuit current	: max. 100 kA
Degree of protection	: IP30, IP31, IP43 or IP55

The table hereafter gives a survey of the cross-sections and the current rating of the busbars, the distances between the supports and between the busbars of the phases and the values of the short-circuit strength given by the manufacturer. The values given in the tables for power handling capacities apply to 50 Hz and an ambient temperature not exceeding 40 °C and a 24h average of not higher than 35 °C.

Ratings of the multiclip

Cross section of phase bar and neutral bar is equal, the short-circuit strength of the neutral bar to the nearest phase bar is more than 60% of the value of the short circuit strength time between the phase bars.

Designation	Manufacturer	Poles	Icc kA - V
Multiclip	Schneider-Electric	3	70 - 415
Multiclip	Schneider-Electric	3	100 - 230

Ratings of the power clips

Rated current A	Short time withstand current kA	Peak withstand current kA	centre distance between busbars (mm)	Supports
125	8,5	20	18	0
160	10	30	18	0
250	13	30	18	0
400	20	52,5	18	0
630	25	52,5	18	2

4 LOCATION OF THE TESTS

The tests were carried out at the laboratories of Schneider Electric SAS, Volta, A7, 2, Rue Volta, Grenoble, France. All tests were witnessed by KEMA. The investigation of the construction was carried out at the manufacturer's workshop in Woerden. The system designs and the results of the tests are described in this report.

5 SUMMARY OF TYPE TESTS

- Verification of temperature-rise limits
- Verification of the dielectric properties
- Verification of the short-circuit withstand strength
- Verification of the effectiveness of the protective circuit
- Verification of the clearances and creepage distances
- Verification of mechanical operation
- Verification of the degree of protection
- Verification of the construction.

6 TEST RESULTS

6.1 Temperature rise

For the testing of the temperature rise of the Prisma Plus system G system reference is made to KEMA certificates no. 2030444.17-QUA/COM.

These tests were passed successfully.

6.2 Dielectric strength

The low-voltage assemblies available to be tested were subjected during 5 seconds to a high-voltage test with an a.c. voltage of 3500 V for the rear bulbar, 3000 V, power clips and outgoing units (MCCB's) and 2500 V for the multiclips and outgoing units (MCB's and MCCB's) applied in the prescribed connections.

The low-voltage assemblies available to be tested were tested for a rated impulse withstand voltage of rear bulbar, Power clips, Multiclip 200 A: 8 kV. Multiclip 63 – 80 A: 6 kV. Outgoing units (MCB's): 4 kV. The rear bulbar, power clips, multiclip 200 A and Multiclip 63 – 80 A, outgoing units (MCB's) were tested with respectively 9,6 kV 1,2/50 μ s, 7,2 kV 1,2/50 μ s and 6 kV 1,2/50 μ s. The test impulse voltage was applied three times for each polarity at intervals of 1 second in the prescribed connections. These tests were passed successfully.

6.3 Short circuit strength

For the testing of short-circuit strength of the bulbar system and incoming and outgoing units reference is made to KEMA certificate nos. 2030444.05-QUA/COM and 2030444.15-QUA/COM. The short-circuit tests carried out show that the short-circuit strength of the catalogue's various versions complies with the values stated by the manufacturer and specified under point 2 of this report.

6.4 Clearances and creepage distances

The clearances are investigated with respect to:

- impulse withstand voltage
- Rear bulbar, Power clips, Multiclip 200 A: 8 kV.
Multiclip 63 – 80 A: 6 kV.
Outgoing units (MCB's): 4 kV

The creepage distances are investigated with respect to:

- tracking index of the used insulation material.
 - pollution degree 3.
 - Rated insulation voltage
 - Rear bulbar: 1000 V
 - Power clips and incoming unit: 750 V
- Multiclip 200 A: 690 V
Multiclip 63 – 80 A: 500 V
Outgoing units (MCB's): 400 V

The clearances and creepage distances are in accordance with the requirements.

6.5 Mechanical operation

Each type of door was subjected to a mechanical operation test. The test cycle was opened and closed the door. The numbers of operating cycles were 50. Each type of doors complies for this test.

6.6 Degree of protection IP30, IP31 and IP43

The tests were made according to EN 60529.

TEST FOR FIRST NUMERAL 3

The test was made with a rigid steel wire 2,5 mm. The wire could not enter the enclosures with door and without door with a force of 3 N. The assembly with door and without door was proved to have a rating of IP3X.

TEST FOR THE SECOND NUMERAL 1

The test was made with a device which produces a uniform flow of water drops over the whole area of the cabinet, see figure 3 of IEC 60529. The water flow was 1 mm/min. The duration of the test was 10 minutes. After the test there was no harmful ingress of water in the enclosure. The test was withstood well.

TEST FOR FIRST NUMERAL 4

The test was made with a rigid steel wire 1 mm. The wire could not enter the enclosures with door and without door with a force of 1N. The assembly with door was proved to have a rating of IP4X.

TEST FOR THE SECOND NUMERAL 3

The test was made to protect against spraying water. The water sprayed at an angle up to 60° on either side of the vertical, see figure 4 of IEC 60529. The delivery rate was 10 l/min. The duration of the test was 5 minutes. After the test there was ingress of water in the enclosure. The assembly with door was proved to have a rating of IPX3.

TEST FOR FIRST NUMERAL 5

The test was made using the equipment according to figure 2 of EN 60529, consisting of a closed test chamber in which talcum powder is maintained in suspension by an air current. The talcum powder used is able to pass through a square-meshed sieve with a nominal wire diameter is 50 µm and the nominal width between wires is 75 µm. The amount of talcum powder to be used is 2 kg per cubic metre of the test chamber. The duration of the test was 8 h. After the test there was no dust in the enclosure. The test was withstood well.

TEST FOR THE SECOND NUMERAL 5

The test was made using the test device described in figure 6 of IEC 60529.

The enclosure was sprayed from all practicable directions.

The conditions were:

Delivery rate 12,5 l/min. \pm 5%.

The duration of the test was 4 min. and 40 s

Internal nozzle diameter: 6,3 mm.

The distance from nozzle to enclosure surface was between 2,5 m and 3 m.

After the test there was no water in the enclosure.

The test was withstood well.

6.7 Construction

The examination of the construction of the systems included the following points:

- earthing of accessible metal parts
- provisions for the interconnection of the earth conductors of the outgoing groups
- workmanship of the electrical connections
- marking.
- glow-wire 960 °C.

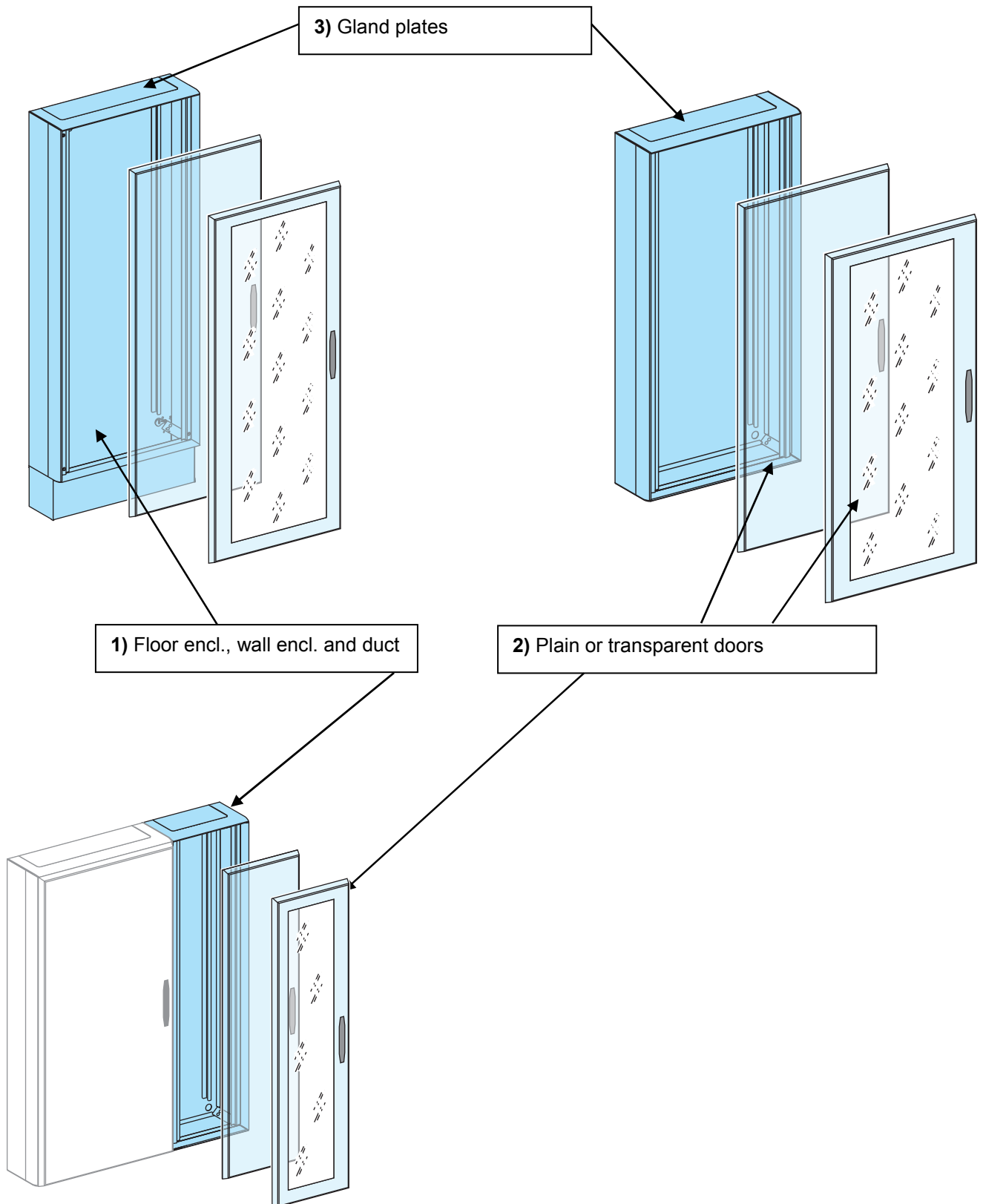
The examined switchgear and control gear assemblies met the construction requirements.

N.B. The construction of switchgear and control gear assemblies has to comply with the following points.

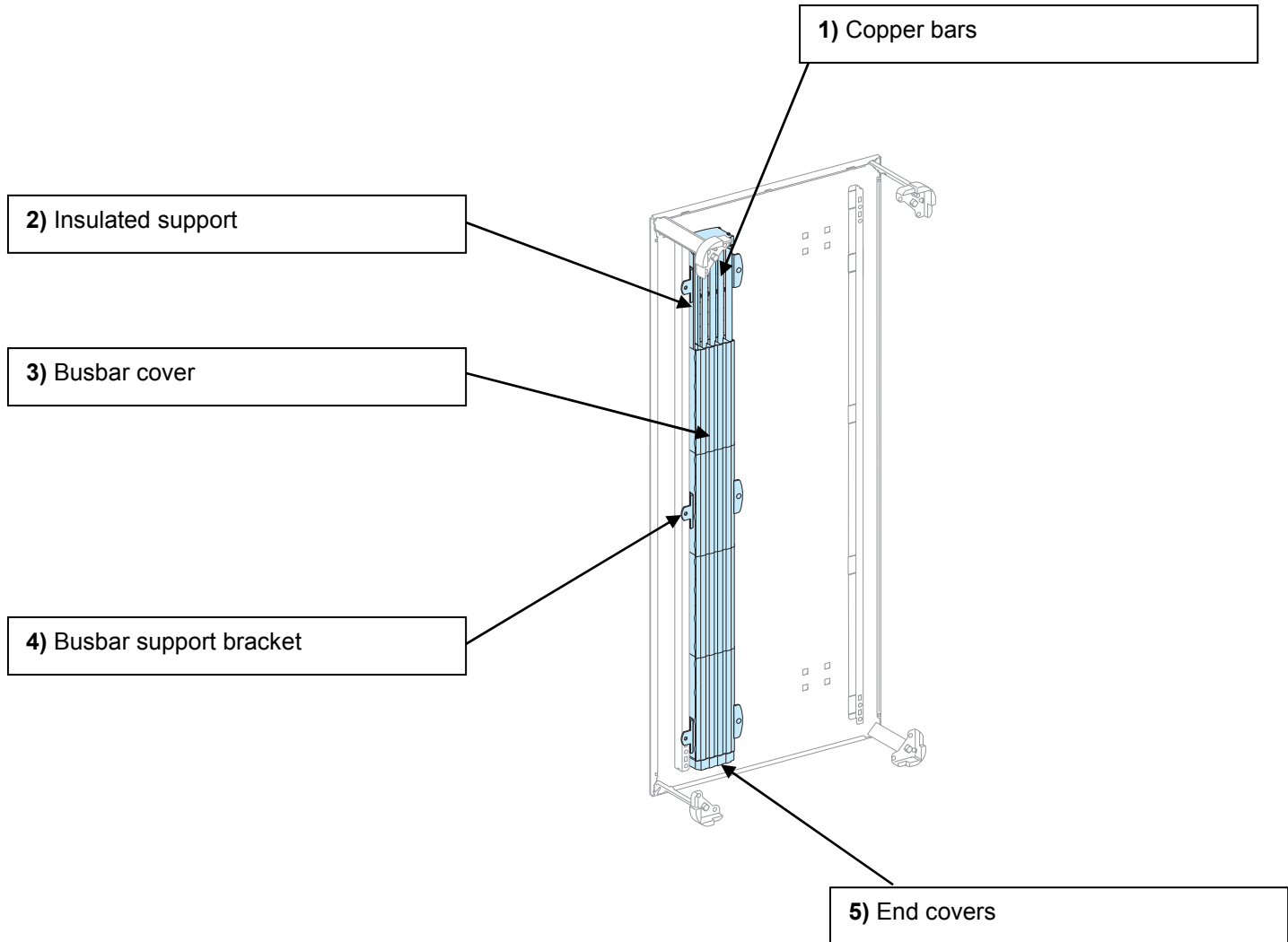
- a Doors provided with electrical parts having a working voltage between the poles or between the poles and earth of more than 50 V, have to be connected suitably to the earthed supporting structure by means of an earth conductor.
- b Opening of compartment doors may be possible only by means of tools or a special key, unless the switch and distribution boards are placed in such a way that they are only approachable for expert persons, or when the compartments have to be opened by non-expert persons for the operation of switches and D-type fuses and therefore are fixed up in such a way that live parts cannot be touched.
- c The manufacturer's name and the type designation are placed on the switch and distribution boards. In the incoming unit a fabrication number, corresponding with the number of the drawings will be places, making it possible to get relevant information about that particular switch and distribution board.
- d In consultation with the client the marking of the busbars and the terminals shall be fixed (i.e. colour coding or marking L1, L2, L3, N). The earth bulbar shall always be marked with the earth symbol or with the colour combination green/yellow.



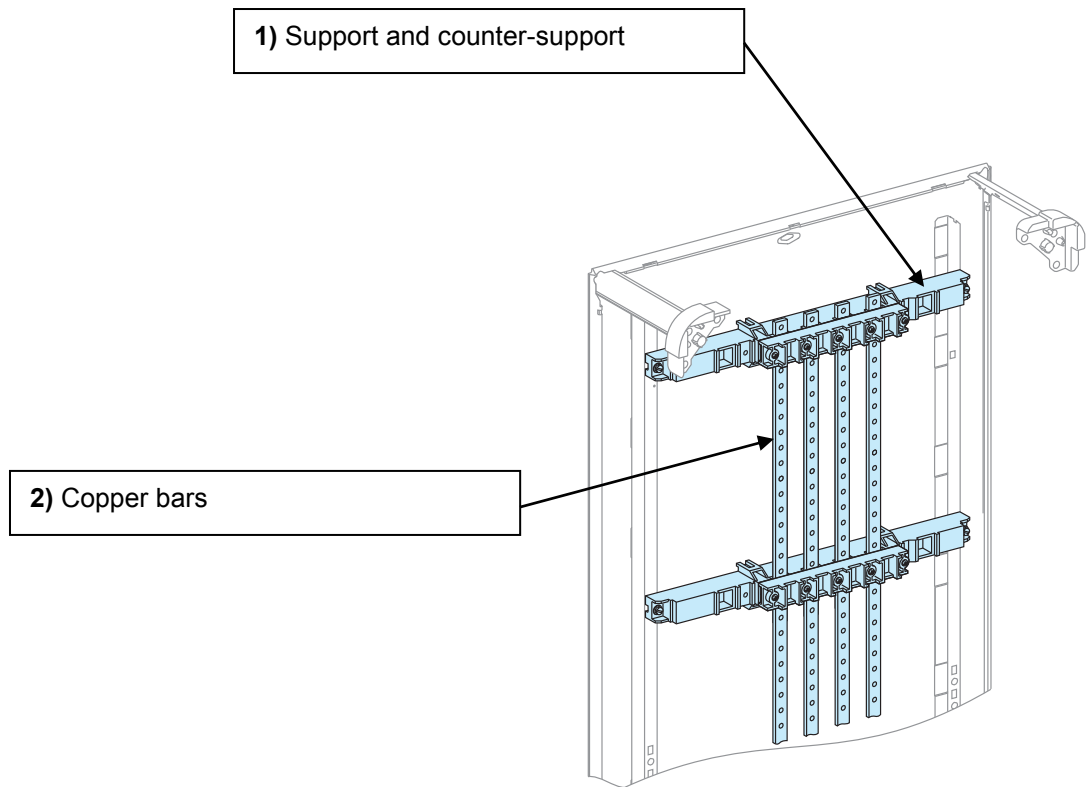
Enclosures



Power clip insulated busbars



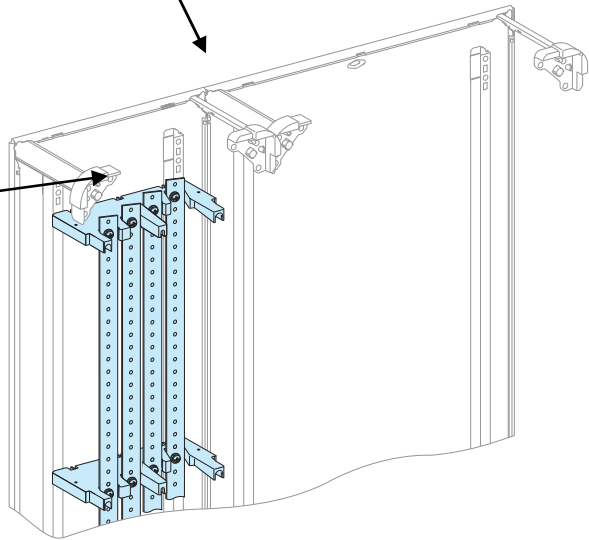
Rear busbars



Multi-stage busbars

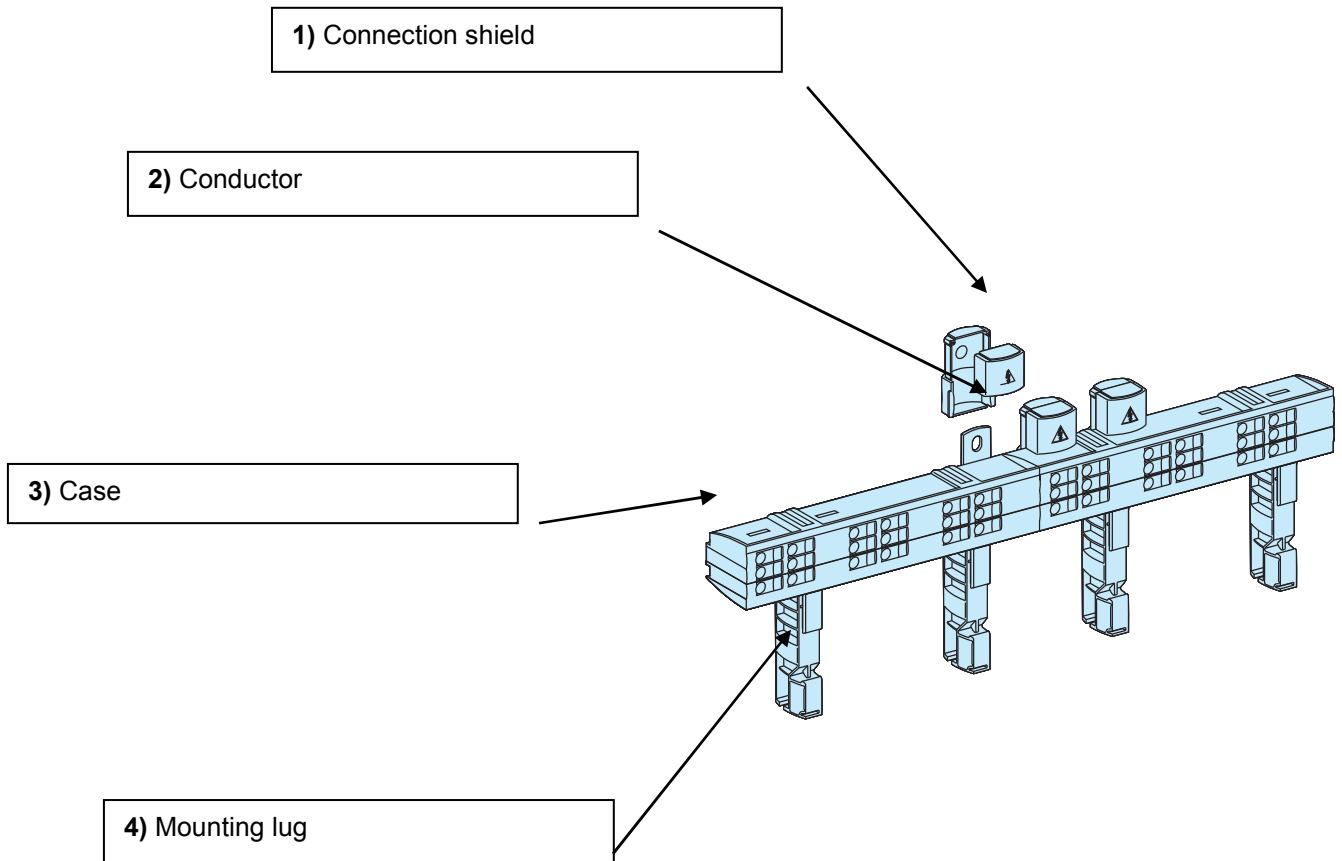
2) Insulated support

2) Copper bars



Multiclip distribution block

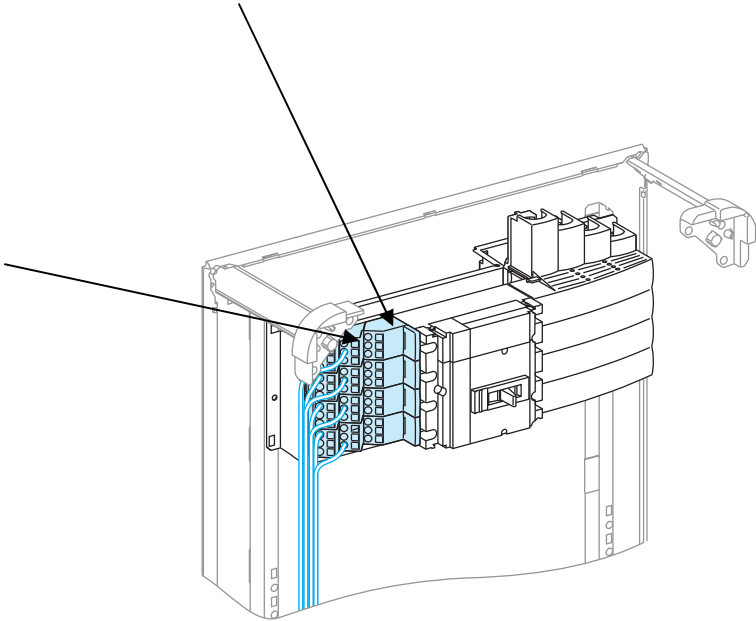
Calibre 200A : 4012 ; 4013 ; 4014 ; 4026
Calibre 160A : 4018
Calibre 80A : 4004
Calibre 63A : 4008



Polybloc distribution block

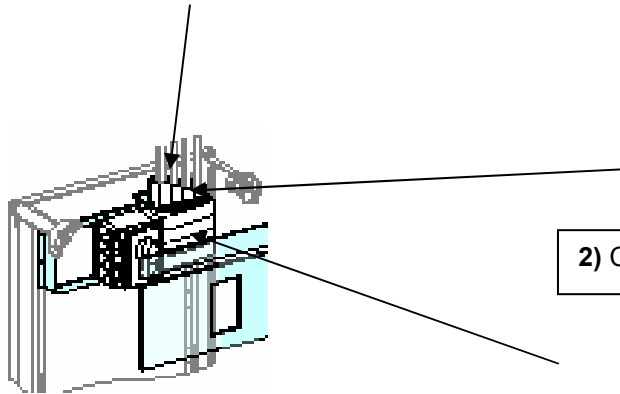
1) Case

2) Conductor



Incoming connection Block
Reference 4066, 4067

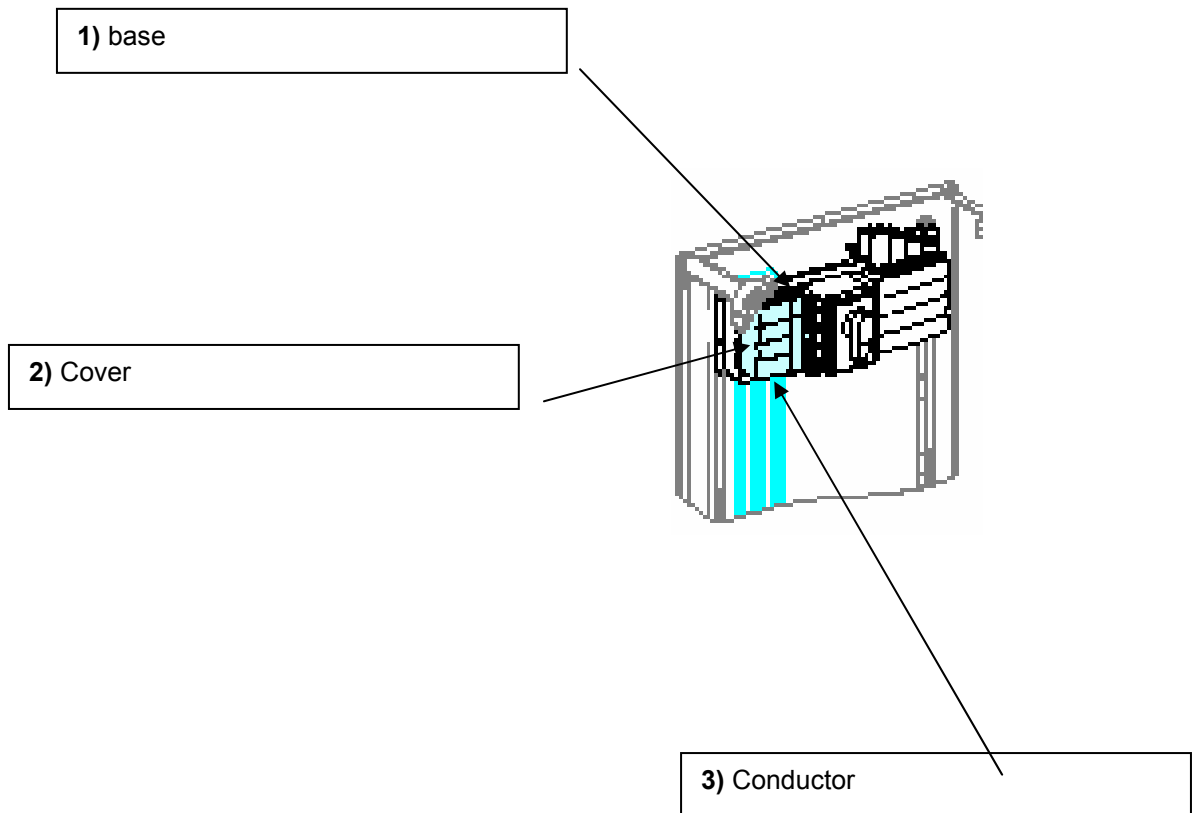
3) Conductors



1) Support

2) Cover

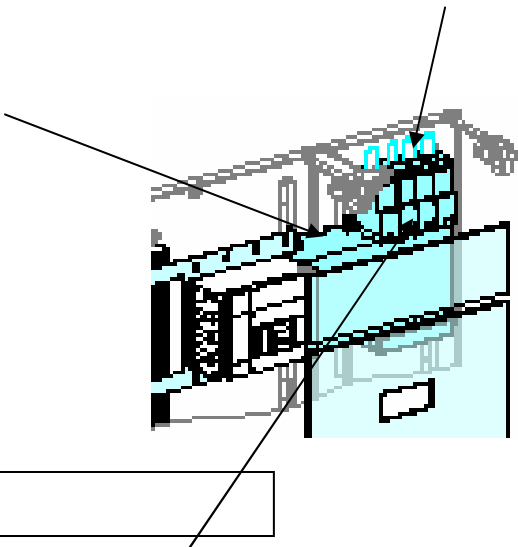
Power supply block
Reference 4060



In-duct Incoming connection block.
Reference 4076

3) Conductor

1) base

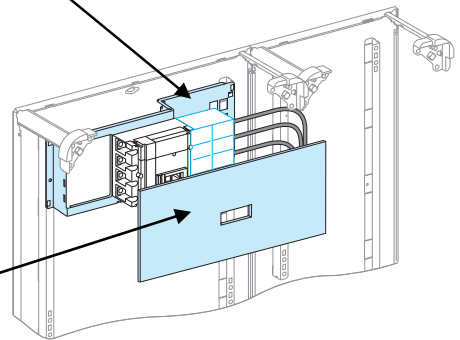


2) Cover

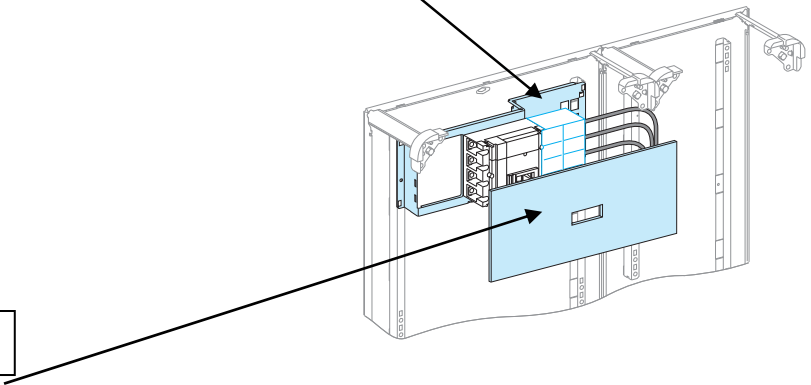
Device installation

References : 4066 ; 4067

1) Mounting plate



2) Front plate



3) Connection

