Rectimat 2

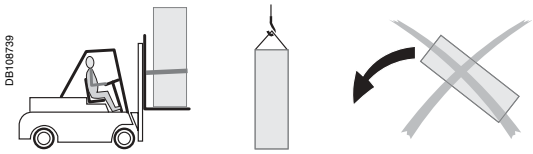
Low voltage capacitor banks
Enclosures and cubicles

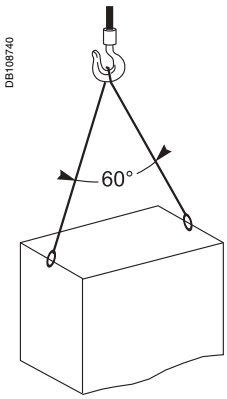
User manual

a brand of Schneider Electric

Merlin Gerin

Taking delivery





Cubicles A1, A2, A3

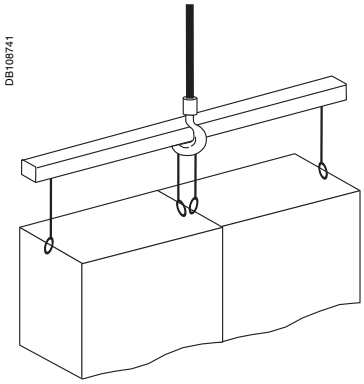


Fig. 1: cubicle A4.

Presentation

The Rectimat 2 is an automatic capacitor bank in the form of:
- enclosures C1 and C2
- cubicles A1, A2, A3 and A4.

Cubicles A2, A3 and A4 can be equipped with detuned reactors (DR).

Taking delivery of the equipment

- our goods always travel at the recipient's risk
- we cannot be held responsible for any missing parts or damage ascribable to the forwarding agent. Any claims must be sent by registered post to the forwarding agent
- make sure that no parcels are missing and that the equipment has not suffered any impacts that could affect its insulation capacity and its operation
- check that the technical data marked on the rating plates matches the data given on the order form
- in event of nonconformity, mark the reference of the dispatch note on the claim.

Handling (fig. 1)

- unpack the equipment on the installation site
- preferably use a fork-lift truck
- lift cubicles A1, A2 and A3 in the vertical position by means of the 2 lifting lugs
- lift cubicle A4 in the vertical position by means of the 4 lifting lugs (compulsory)
- avoid impacts and deformation.

Storage

- store the devices in a dry, ventilated room sheltered from rain, water splashes, chemical agents and dust
- storage temperature: -20 °C to +45 °C.

Dimensions and weights (fig. 2)

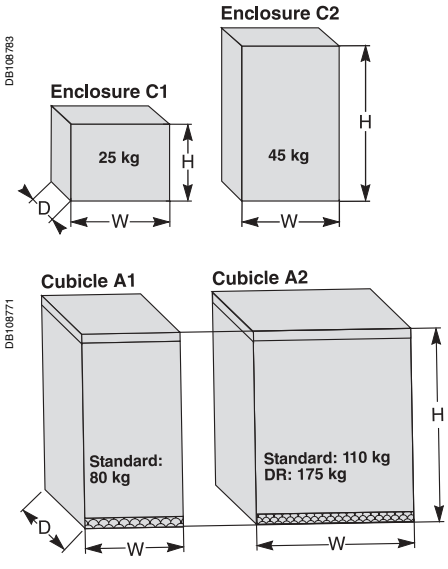
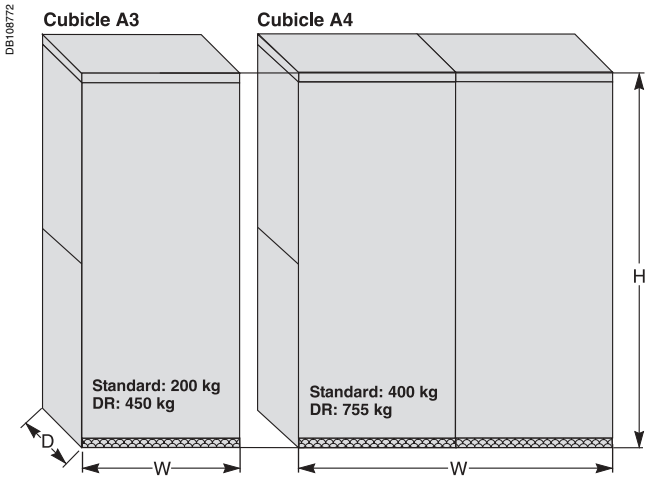


Fig. 2



Description

A: step control contactors
B: step protection HRC fuse
C: capacitors
D: current transformer connection terminal block
E: control circuit protection fuses
F: power cable connection pads
G: fan according to power
H: ventilation inlets
I: voltage transformer
J: detuned reactors according to range
K: lifting lugs
N: main busbar
R: power factor controller.

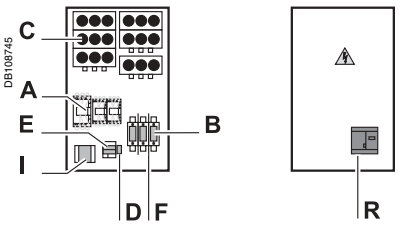
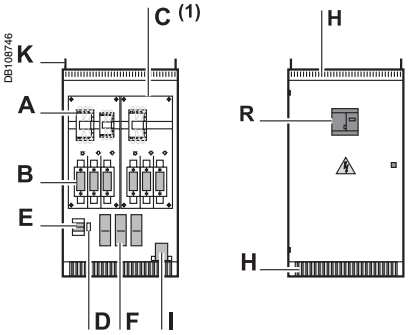


Fig. 3: enclosures C1 and C2.



***(1)** Rear of modules.*
Fig. 4: cubicles A1 and A2, standard and DR type.

Height of ground ref. F power cable connection pads (mm)			
Enclosure C1	80		
Enclosure C2	170	Cubicle A2 SAH	350
Cubicle A1	300	Cubicle A3 SAH	600
Cubicle A2	300	Cubicle A3 Bis SAH	600
Cubicle A3	1100	Cubicle A4 SAH	600
Cubicle A4	1100	Cubicle A4 Bis SAH	600

Dimension of enclosures (mm)			
	H	W	D
Enclosure C1	400	500	250
Enclosure C2	800	500	250

Dimension of cubicles (mm)			
Cubicle A1	1050	550	500
Cubicle A2	1050	800	500
Cubicle A3	2100	800	500
Cubicle A3 Bis	2100	1350	500
Cubicle A4	2100	1600	500
Cubicle A4 Bis	2100	2150	500

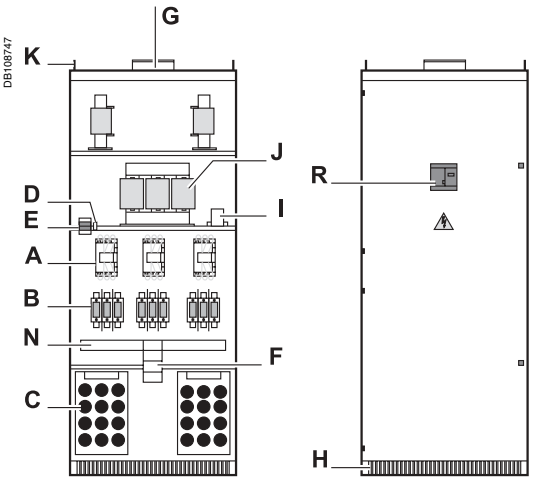


Fig. 5: cubicles A3 and A4, DR type.

Ventilation

■ place the device in a well ventilated room
■ ensure that maximum temperatures are complied with when the device is in operation (see page 6, paragraph on “technical data”)
■ ensure ventilation inlets are unobstructed
■ make sure that the device is protected from dust and humidity.

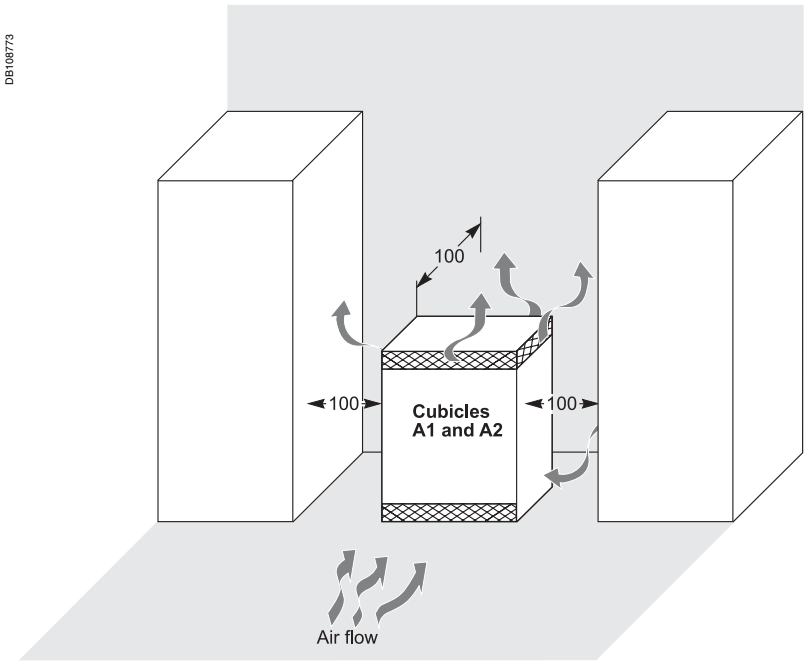


Fig. 6: cubicles A1 and A2.

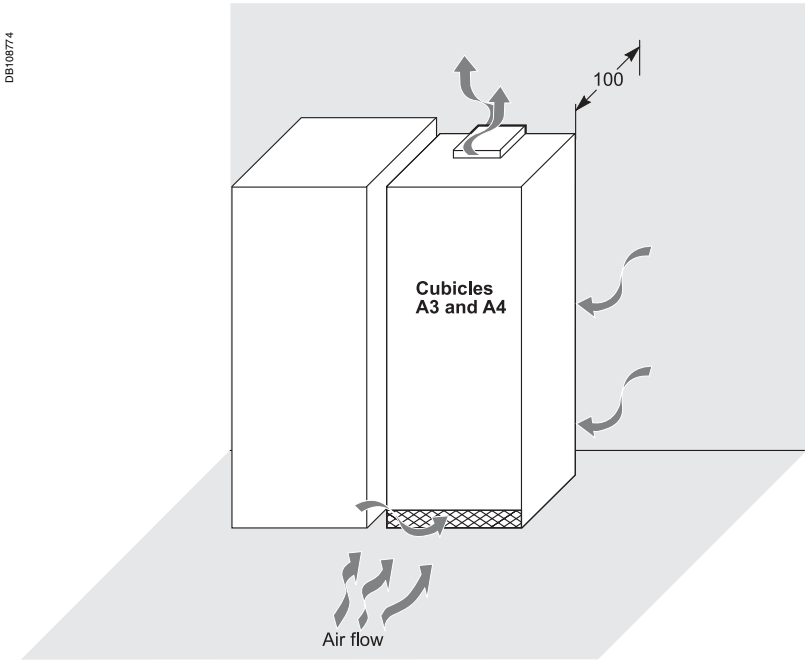


Fig. 7: cubicles A3 and A4.

Fixing

■ place the device so that the ventilation outlets are unobstructed: leave a space of 10 cm between the banks and the wall (see page 4, fig. 6 and 7)
■ fix:
□ the enclosures to a wall or to a plinth (fig. 8)
□ the cubicles to the ground, with the provided fixing points (fig. 9 and 9 bis).

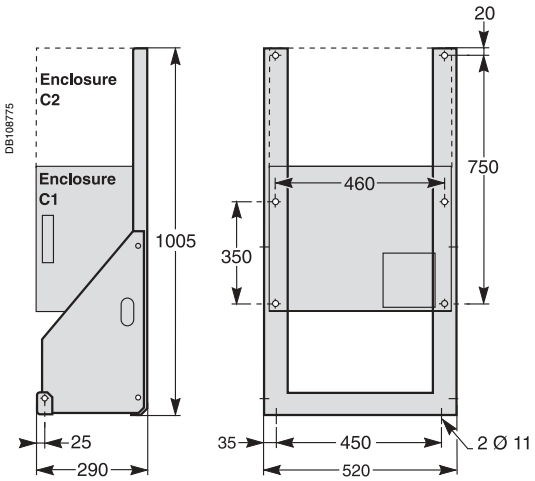


Fig. 8: freestanding plinth for enclosures, cat. no. 52671.

Centre fixing distance of enclosures (mm)

	W	H	fix.
Enclosure C1	460	350	4 Ø 7
Enclosure C2	460	750	4 Ø 7

Centre fixing distance of cubicles (mm)

	W	D	fix.
Cubicle A1	520	400	4 Ø 11
Cubicle A2	770	400	4 Ø 11
Cubicle A3	770	400	4 Ø 11
Cubicle A3 Bis	1320	400	4 Ø 11
Cubicle A4	1570	400	4 Ø 11
Cubicle A4 Bis	2120	400	4 Ø 11

Note: *the cubicles and plinths have the same ground centre fixing distances.*

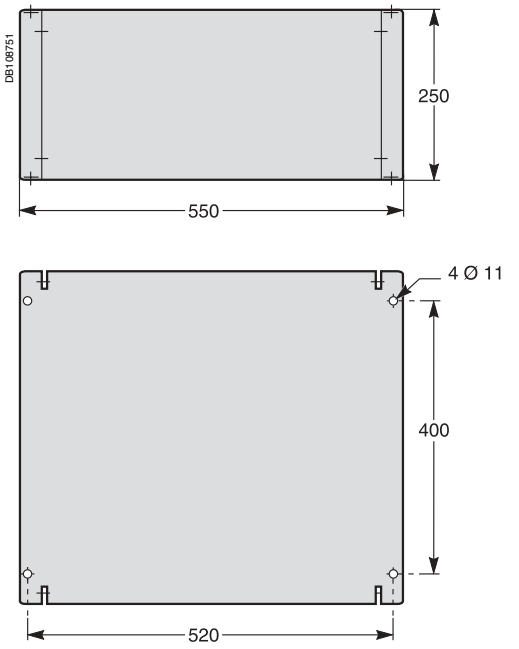


Fig. 9: plinth for cubicle A1, cat. no. 52672.

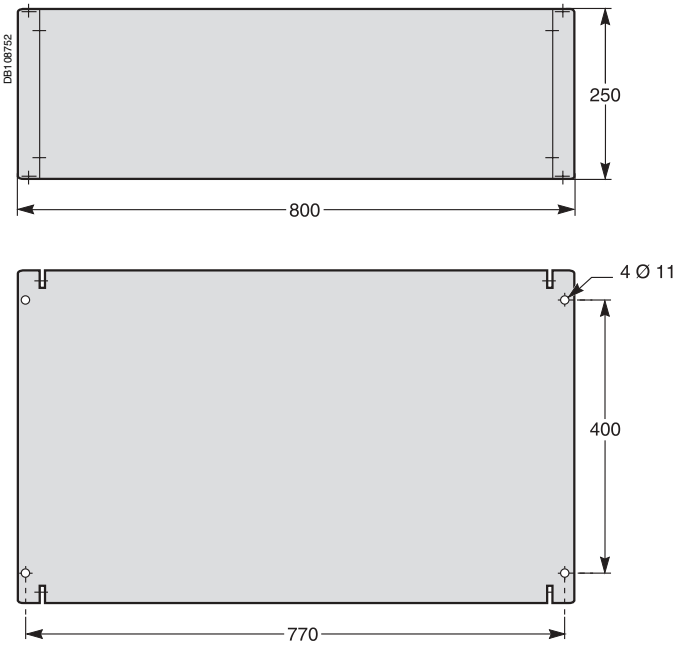


Fig. 9 bis: plinth for cubicles A2, A3, cat. no. 52673.

Technical data

■ voltage, frequency, power, as per rating plate
■ capacitance value tolerance: 0, +10 %
■ acceptable voltage overloads (8 hours over 24 hours as per IEC 831-1/2): 10 %.
■ insulation level: 660 V
□ withstand 50 Hz 1 min: 2.5 kV
■ ambient temperature class of room:
□ maximum temperature: 40 °C
□ average temperature over 24 hours: 35 °C
□ average annual temperature: 25 °C
□ minimum temperature: -5 °C
■ power loss:
□ 1.5 W/kvar, standard and overrated type
□ 6 W/kvar, DR type
■ degree of protection: IP 21D (except bottom face ground side: IP 00)
■ load shedding (main-emergency)
■ colour:
□ metal sheet: RAL 9002
□ front plate: RAL 7021
■ complies with standards IEC 439-1 and NF EN 60439.

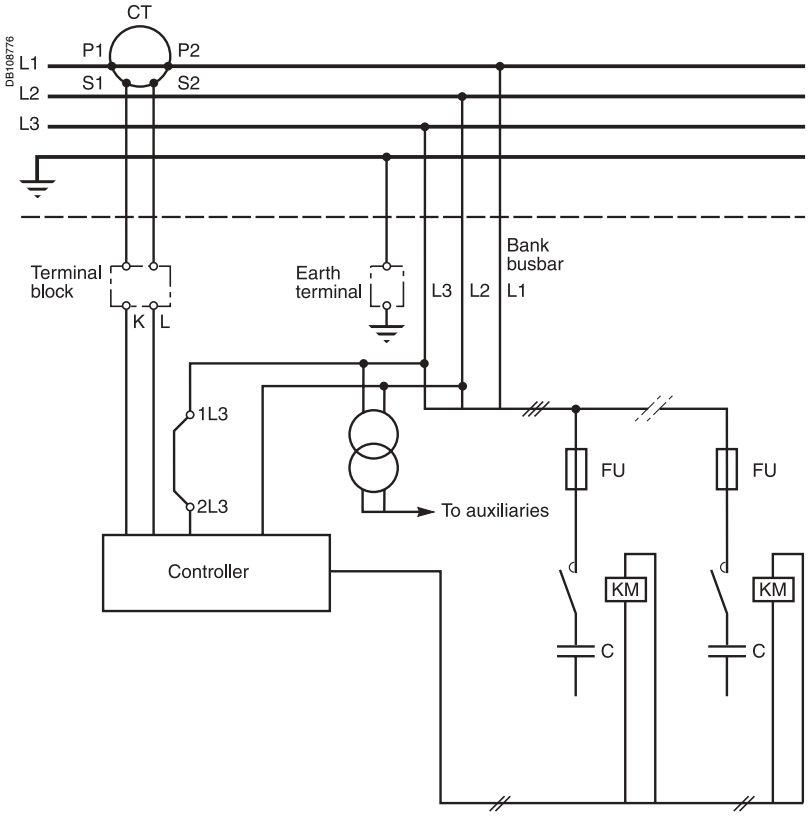


Fig. 10: schematic wiring diagram, standard type cubicles.

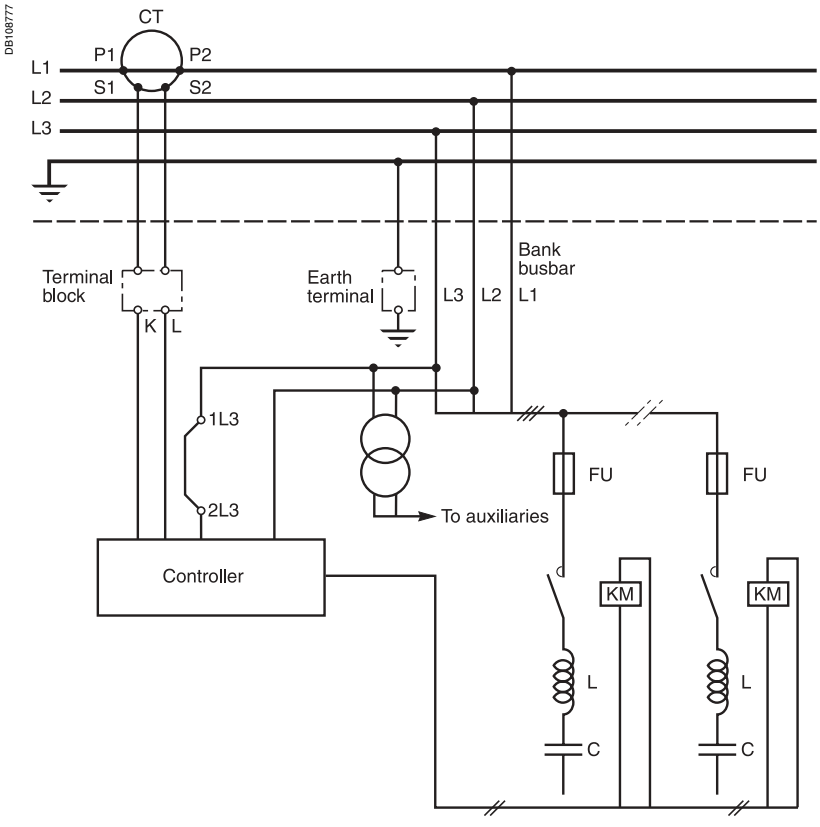


Fig. 11: schematic wiring diagram, DR type cubicles.

Electrical connection is based on the wiring diagrams (page 6, fig. 10 and 11). For power connection, a protective device must be provided in some cases.

■ cross-section of cable connecting current transformer and controller: 2.5 mm^2 minimum

■ sizing current of cables and switchgear in 400 V – 50 Hz (at 30 °C):

□ 2 A/kvar, standard and DR type

□ 2.2 A/kvar, overrated type.

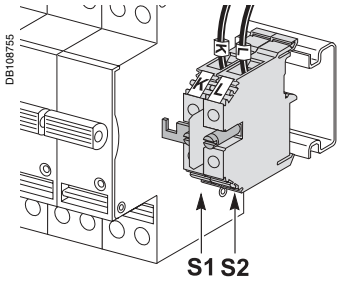


Fig. 12: connection of the current circuit.

Connection of the current circuit

For an existing CT (fig. 12):

■ ensure that it is placed upstream from the installation, including the capacitor bank

■ ensure that its secondary is 5 A

■ connect the power factor controller in series with the existing circuit.

For a CT to be installed (fig. 13 and 14):

The current transformer MUST be placed upstream from the capacitor bank and loads (motors, etc.) on an LV main board phase.
P1 transformer or source side
P2 load and capacitor bank side

Once the CT is installed:

■ identify the phase on which the CT has been placed as phase L1

■ ensure that phase L1 of the bank is connected to the busbar pad on which the CT is placed

■ connect the information from the CT, S1 on terminal **K** and S2 on terminal **L** of the terminal block (fig. 10, 11 and 12).

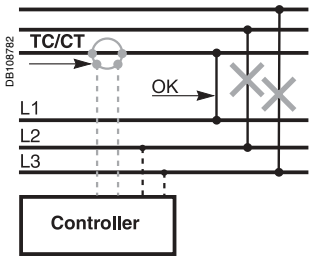


Fig. 13

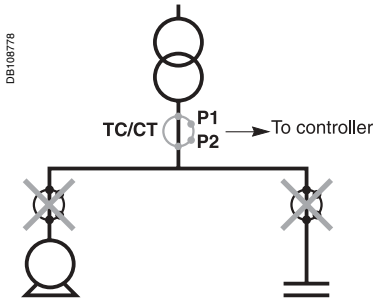


Fig. 14

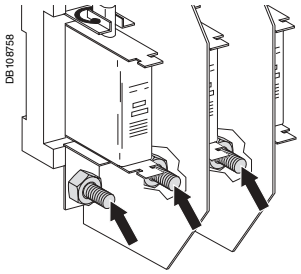


Fig. 15: power connection of enclosures C1 and C2.

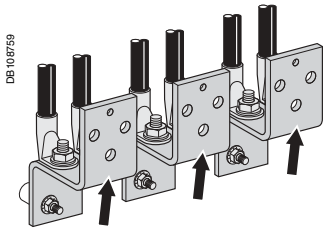


Fig. 16: power connection of cubicles A1 and A2.

Connection of the power circuit

■ connect the phases marked L1, L2, L3 on the pads marked L1, L2, L3 (fig. 15, 16, 17 and 18).

Earthing connection (fig. 20)

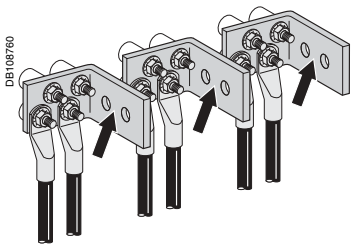


Fig. 17: power connection of cubicle A2 with DR.

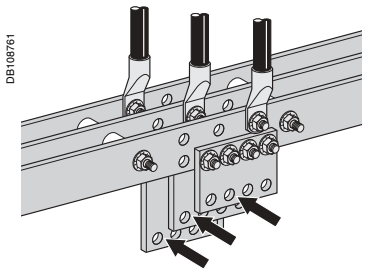


Fig. 18: power connection of cubicles A3 and A4.

Intervention on the voltage circuit

■ load shedding (main-emergency)

■ 2 terminals marked **1L3** and **2L3** are bridged using jumper **A**

□ open this circuit to insert a normally closed contact from the installation (see page 6 fig. 10 and 11).

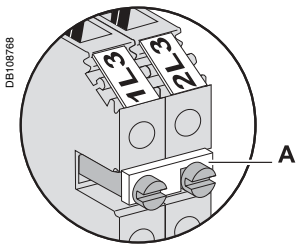


Fig. 19: intervention on the voltage circuit.

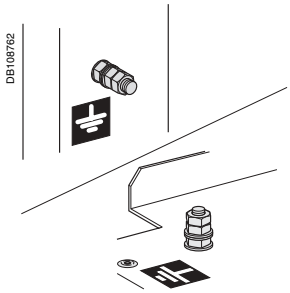
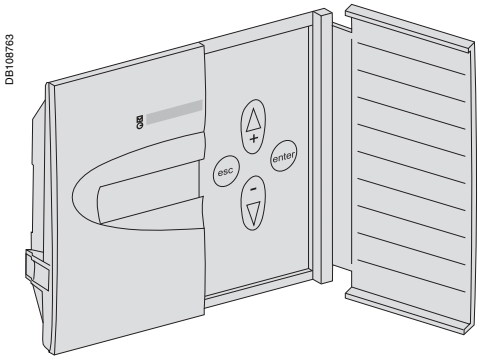


Fig. 20: horizontal or vertical earthing connection.



Commissioning the Varlogic NR6 / NR12 standard controller

Setting the controller
The power factor controller has been configured in accordance with capacitor bank characteristics.
The only operations required at commissioning are as follows:
■ if applicable, set the required cos Φ
■ configure the current transformer ratio.

Important:
■ for a supply via a summing CT (an installation with several incoming transformers), the ratio to be taken into account is the sum of the ratios of the various instrument CTs
■ for an installation with a generating set (load shedding), ensure that the capacitor bank is on before switching to the genset, by turning off the supply to the controller. See page 7 the paragraph on "Intervention on the voltage circuit".

Commissioning the capacitor bank

When the power is first switched on, the controller will immediately ask you for the language in which you want to work.

Use the **+** and **-** keys to select the required language and press Enter to confirm your choice.

The parameters required for the capacitor bank to work correctly are factory set. Some parameters depend on the installation specifications and will have to be modified on site during commissioning
■ cos Φ setting (default value = 1)
■ current transformer ratio allowing the measurements to be correctly displayed
■ response current value (C/K): it is automatically located during the verification phase.

Do not change any other parameters.

In particular the time delay must never be less than 50 s, otherwise the battery could be seriously damaged and cease to be covered by the warranty.

■ use the COMMISS menu to run the commissioning sequence.
The sequence also sets the value of cos Φ and the transformation ratio and automatically checks that the parameters entered match the existing installation parameters.

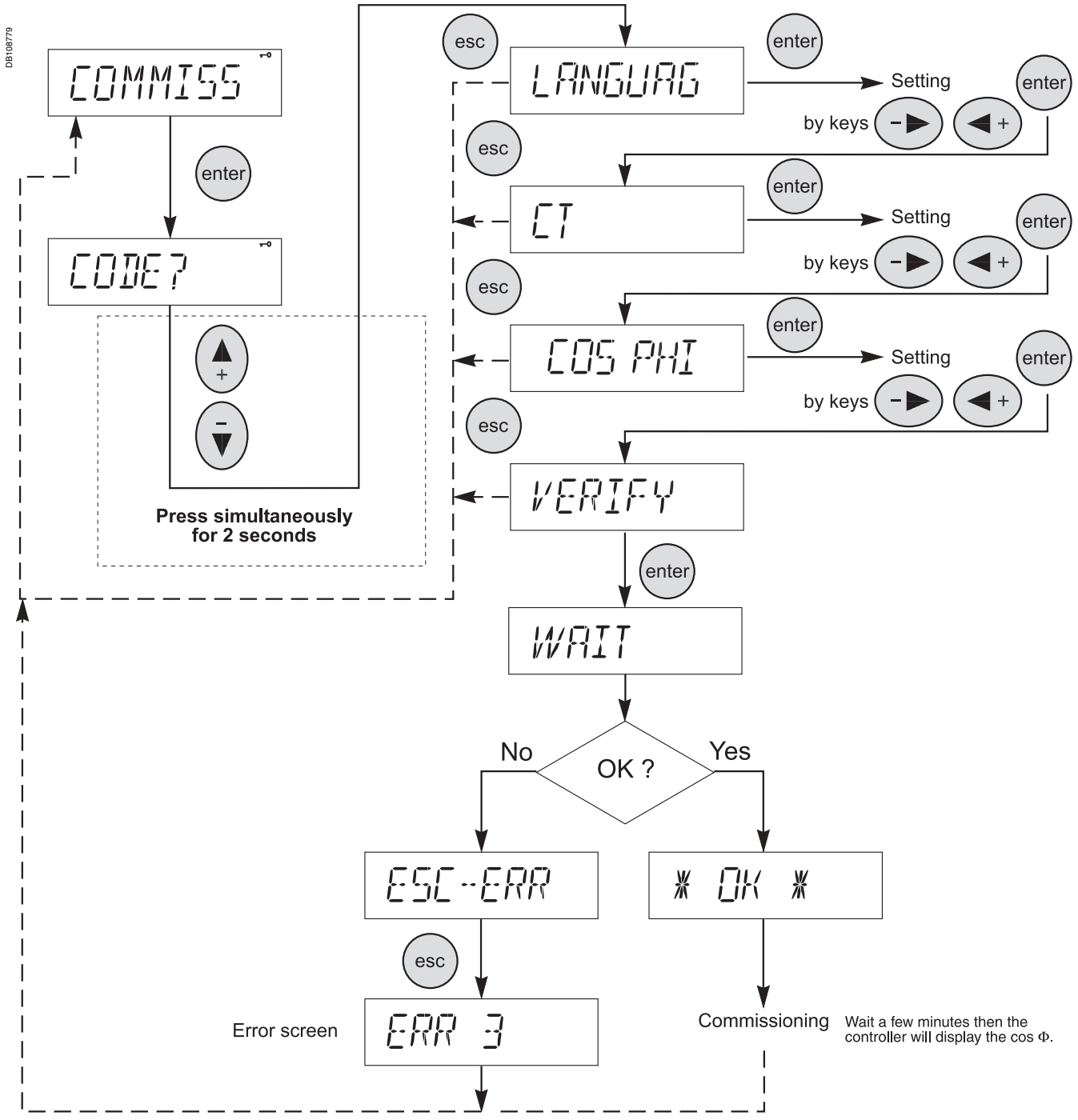
Note: *if an alarm is displayed during commissioning or the first few times the equipment is used, see "Faults and corrective actions" to identify the cause of the fault.*

Operating performance check

■ check that cos Φ is the required value
■ for full load operation, check that each step is enabled correctly
■ when the equipment has been in operation for a few hours, check the ambient room temperature.

For further information on the parameters to be defined, see the Glossary (Chapter 7) in the controller manual.

Configuration of the Varlogic N
(continued)



Commissioning a preconfigured capacitor bank.

How to proceed when an error occurs

"Error codes" are used to diagnose the cause of a problem and to provide the remedy. See the controller manual.
After checking the installation, restart the commissioning sequence "COMMISS" or the commissioning automatic parameter setting sequence "AUTOSET".

If no action is performed on the controller during the scroll-down of a menu, it may display the message "I LOW".

To return to the Commissioning menu "COMMISS" or any other menu, press esc then scroll down the menus until you find the one you want.

Maintenance

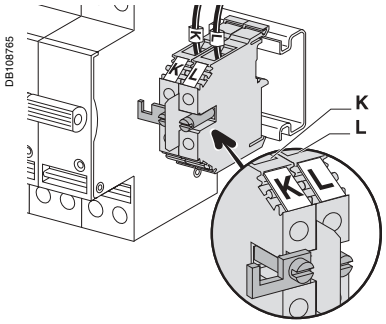


Fig. 21

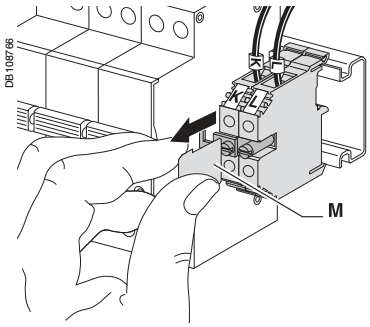


Fig. 22

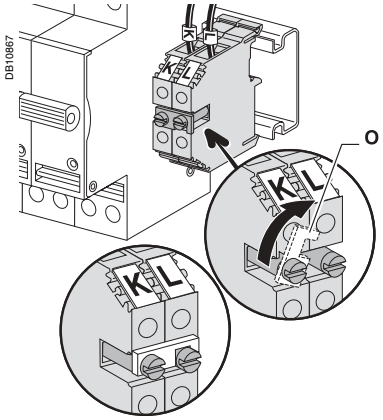


Fig. 23

The capacitors in the enclosures and cubicles are accessed via the front panel.

Maintenance on the current circuit

(fig. 21, 22 and 23)

■ first remove the circuit separator **M**, then use jumper **O** to bridge terminals S1 and S2 of the CT (terminals **K** and **L** of the terminal block)
(risk of destroying the current transformer with the secondary open)
■ once maintenance is complete, lift and disconnect jumper **O** and put back separator **M**.

Protection of people

Each capacitor is equipped with discharge resistors which reduces the voltage at the terminals to 50 V **one minute after de-energising**.

Before performing maintenance on the equipment:

■ de-energise it
■ respect the discharge period (compulsory)
■ ensure that each capacitor has fully discharged by short-circuiting and earthing the contactor terminals.

Caution:

refer to the capacitor bank wiring diagram to identify the contactor/capacitor connection mode.

Capacitor discharge

■ on line breaking (fig. 24)
To ensure that the capacitor has fully discharged, short-circuit terminals AB, AC and BC in turn.
■ breaking in the delta branches (fig. 25)
To ensure that the capacitor has fully discharged, short-circuit the following terminals in turn:
AD, AE, AF
BD, BE, BF
CD, CE, CF

Annual verifications

One month after energising, check: the contactor terminals for tightness.
Once a year, check the following:
■ overall cleanliness of the equipment
■ the filters and ventilation system
■ proper tightening of the electrical connection terminals
■ the condition of the switching and protective devices
■ room temperature
■ capacitor capacitance (please consult us in the event of a 10 % variation in capacitance).

Safety

All the operations described in this manual must be performed in accordance with current safety standards under the responsibility of a competent authority.

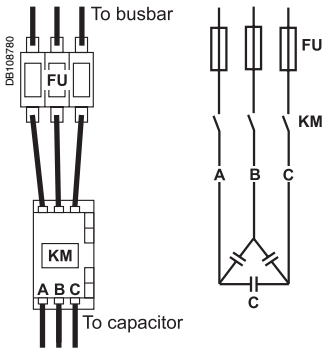


Fig. 24: on line breaking.

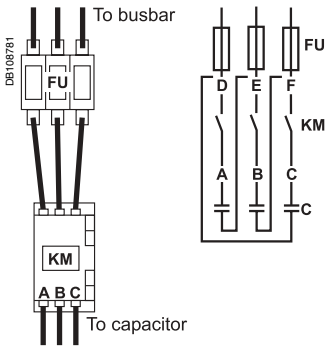


Fig. 25: breaking in the branches.

Faults and solutions

Diagnosis of an operating problem, when a capacitor bank is commissioned, can normally be performed using the information given by the controller.

Controller display	Possible causes	Solutions
No display	■ the controller is not supplied	□ check voltage presence at controller terminals □ if there is no voltage, check circuit continuity from the source: wiring, fuse, etc.
	■ overvoltage	□ the controller is failed due to an overvoltage of the auxiliary supply □ replace it
Low (low current)	■ incorrect wiring	□ check CT positioning in the installation (1) □ check that the short-circuit jumper is present on the K-L terminal block.
	■ CT oversized or load too low	□ check that the correct CT has been selected.
	■ CT faulty	□ replace the CT.
Alarm A3 or A5 (abnormal cos Φ) (capacitive cos Φ)	■ incorrect connection	□ check CT positioning in the installation (1)
	■ incorrect voltage setting	□ check voltage setting in the controller (LL display)
	■ presence of fixed bank(s) at low load	□ de-activate alarm A5
Alarm A1	■ incorrect connection	□ check CT positioning in the installation (1)
	■ no auxiliary voltage	□ check the condition of the auxiliary circuit protection
	■ incorrect C/K configuration	□ perform a new C/K automatic configuration or manually set the calculated value
	■ target cos Φ not reached occasionally	□ de-activate alarm A1
	■ cos Φ setpoint too high	□ readjust the cos Φ setpoint
	■ insufficient reactive power (bank undersized)	□ add capacitors

(1) *The CT must be installed upstream from the installation to be compensated, on phase L1.*
Ensure that phase L1 at the CT connection point corresponds to phase L1 inside the capacitor bank (for example by ensuring that voltage equals 0 between these two points).

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Printed on recycled paper.

Design: Schneider Electric
Photos: Schneider Electric
Printed: Imprimerie des Deux-Ponts

N°03652732EN-AD

04-2005