

SIRCO MOT DC
SIRCO MOT DC ESS



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1. GENERAL SAFETY INSTRUCTIONS

- This instruction manual must be made accessible so as to be easily available to anyone who may need to read in relation with SIRCO MOT DC or SIRCO MOT DC ESS.
- This equipment must be installed, commissioned and serviced only by qualified and experienced electrical personnel, in line with the manufacturers recommendations, following good engineering practices and after having read and understood the details in the latest release of the relative product instruction manual

The following pictos will be used in this publication for the safety warning:

 DANGER	 WARNING	 CAUTION
RISK: Electric shock, burns, death	RISK: Possible personal injury	RISK: Equipment damage

Failure to follow these instructions will result in death or serious injury.

HAZARDOUS VOLTAGE

- Turn off all power supplying this equipment before working on or inside equipment and always used a properly rated voltage sensing device to confirm power is off.
- Maintain electrical clearances between cable and live parts.
- Do not handle any control or power cables when voltage may be present on the product directly through the main supply or prior to carrying out indirectly through external circuits.
- Prior to carry out any maintenance or other work on live parts or other parts in the vicinity of exposed live parts, ensure that the switch including all control and associated circuits are de-energized.
- Replace all accessories, doors and covers before turning on power to this equipment.

Presence of magnet

- Keep the device at a minimum distance (> 8 in / 20 cm) from any medical equipment, including pacemakers and any other medical implants.
- Pregnant women must keep a minimum distance (> 8 in / 20 cm) from the device.

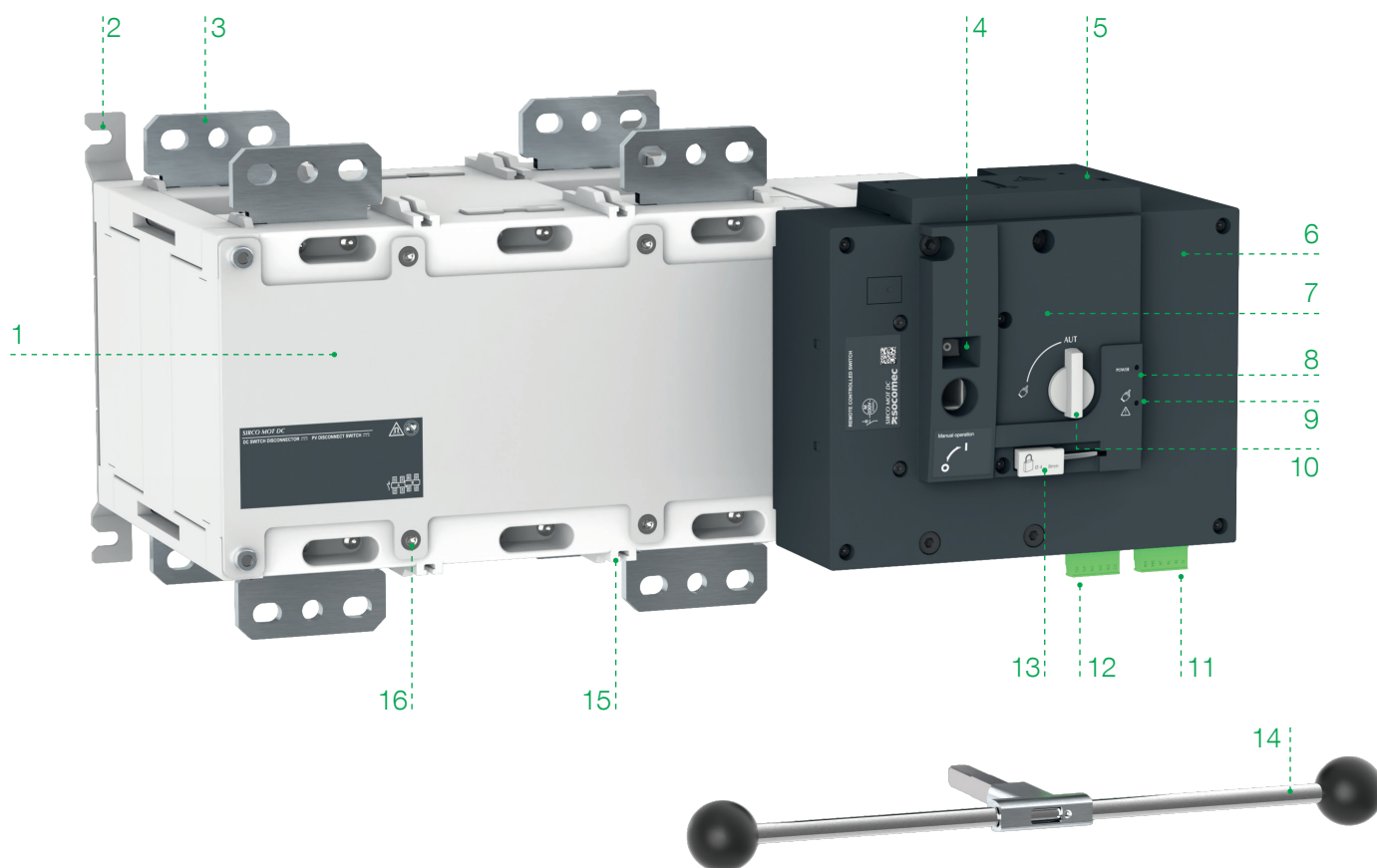


- Low voltage safety rules apply, especially with regards to insulation safety. This includes the general rule that position auxiliary contacts are not to be considered as safety devices. When used to report the position of the main contacts, additional measures such as padlocking or checking that the installation is proven dead, must be taken. Failure to follow these instructions will result in death or serious injury.
- Maintenance on the product and any other associated equipment including but not limited to servicing operations must be performed by adequately trained and qualified personnel with adequate PPE (personal protective equipment).
- Each product is shipped with a label or other form of marking including rating and other important specific product information. One must also refer to and respect markings on the product prior to installation and commissioning for values and limits specific to that product.
- Unless otherwise stated, use the screws and nuts provided.
- Using the product outside the intended scope, outside SOCOMEC recommendations or outside the specified ratings and limits can cause personal injury and/or damage to equipment.

The information provided in this instruction manual is subject to change without notice, remains for general information only and is non-contractual.

2. GENERAL OVERVIEW

2.1. Product introduction



1. Power Section : multipolar load break switch
2. Back-plate mounting SIRCO MOT DC fixing lugs
3. Load break switch terminals
4. Switch position indication window :- I (On) – O (Off)
5. Auxiliary power supply : 230 Vac (208 – 277 Vac $\pm$ 20%)
6. Motor housing
7. Motorized Control Unit
8. Green LED Indication : Power (SIRCO MOT DC control voltage input within specified range).
9. Red LED Indication : Product Unavailable / Manual Mode / Fault Condition
10. Auto / Manual mode selector switch
11. Output contacts x 3 (Position indication I-O and product availability outputs)
12. Input contacts x 4 : Position order I-O - Remote control enable - Override controls and force to Off position
13. Padlocking facility (Up to 3 padlocks of dia. 4 ... 8mm)
14. Emergency manual operation "Direct Handle"
15. Sliders for Terminal Shields
16. Fixing holes for terminal Shields

2.2. Product identification



1. Main motorised switch identification label :
 - > Electrical characteristics
 - > Applicable standards
 - > Terminal incoming and outgoing wiring details.
2. Complete SIRCO MOT DC product current rating and reference number label (serial number, barcode and CE marking)
3. Emergency manual operation direction of rotation indication label
4. Auxiliary power supply contacts identification label
5. Motor barcode and serial number
6. Output contacts identification label
7. Input contacts identification label

Electrical performances

Device part Nr.		18DC4250	18DC4320	18DC4360	19DC4200
		18ES4250	18ES4320	18ES4360	19ES4200
IEC electrical characteristics					
Qualification and certification	IEC 60947-3	•	•	•	•
	GB/T 14048.3	•	•	•	•
Rated current In		2500 A	3200 A	3600 A	3200 A
Rated voltage Un for power circuit		1500 Vdc			
Impulse voltage Uimp for power circuit		12 kV			
Rated voltage Un for operation circuit		300V AC			
Impulse voltage Uimp for operation circuit		4kV			
Electrical performance	single circuit	Ie 2500 A	Ie 3200 A	Ie 3600 A	Ie 3200 A
		Ue 1500 Vdc	Ue 1500 Vdc	Ue 1500 Vdc	Ue 1500 Vdc
		DC-21B	DC-21B	DC-21B	DC-21B
	double circuit (data for each circuit)	-	Ie 1600 A	-	Ie 1600 A
			Ue 1500 Vdc		Ue 1500 Vdc
			DC-21B		DC-21B
Short circuit capacity ⁽¹⁾	Rated short time withstand current Icw 1s (kA rms)	Single circuit Icw = 45 kA Double circuit Icw = 20 kA			
	Rated short-circuit making capacity Icm (kA peak)	Single circuit Icm = 45 kA Double circuit Icm = 20 kA			
UL Electrical characteristics					
Certification	UL98B	-	-	-	•
Rated current					2000 A
Rated voltage					1500 Vdc
Short circuit capacity ⁽¹⁾	Prospective short-circuit current (kA rms DC)				10 kA

(1) device without any protection

Mode detail available in our commercial documentation (catalog and/or website).

2.3. Environmental

SIRCO MOT DC & SIRCO MOT DC ESS product meets the following environmental requirements:

2.3.1. Storage conditions

2.3.1.1. Temperature

- From -20°C to +70°C (0°F to +160°F).

2.3.1.2. Humidity

- Max 80% humidity without condensation at 55°C (130°F).

2.3.1.3. Storage duration period

- Maximum storage up to a period of 12 months, with storage in dry, non-corrosive and non-saline atmospheric conditions.

2.3.2. Shipping information

Device weight		Packing dimension
Without packing	With packing	WxLxD
34 Kg	48,2 Kg	800 x 600 x 600

2.3.3. Operating conditions

The SIRCO MOT DC & SIRCO MOT DC ESS are rated for permanent duty with the below mentioned environmental conditions.

2.3.3.1. Temperature

- UL devices : from -20°C to +50°C (0°F to +120°F), without derating
- IEC devices :
 - from -20°C to +40°C (0°F to +100°F), without derating
 - from +40°C to +70°C (+100°F to +160°F) derating may apply, please consult us

2.3.3.2. Hygrometry / Humidity

- 80% humidity without condensation at 55°C / 130°F
- 95% humidity without condensation at 40°C / 100°F

Tested as per IEC 60947-1, Annex Q, Level C (environment subject to temperature, humidity and salt mist).

This means the following tests has been successfully passed:

→ CC2: -25 °C to +70 °C (dry heat test at +70 °C / damp heat test at +55 °C / cold test at -25 °C)

→ SC2: salt mist (test according to IEC 60068-2-52)

Permanent usage in environment with high humidity and temperature can affect device lifetime. It is recommended to use specific mean within the installation or cabinet to reduce the humidity level and temperature in the vicinity of the device.

2.3.3.3. Altitude

- Up to 2000m at normal operating conditions
- Higher altitude possible with derating (U/I please consult us)

2.3.4. FCC compliance

This device complies with part 15 of the FCC Rules.

2.3.5. ROHS

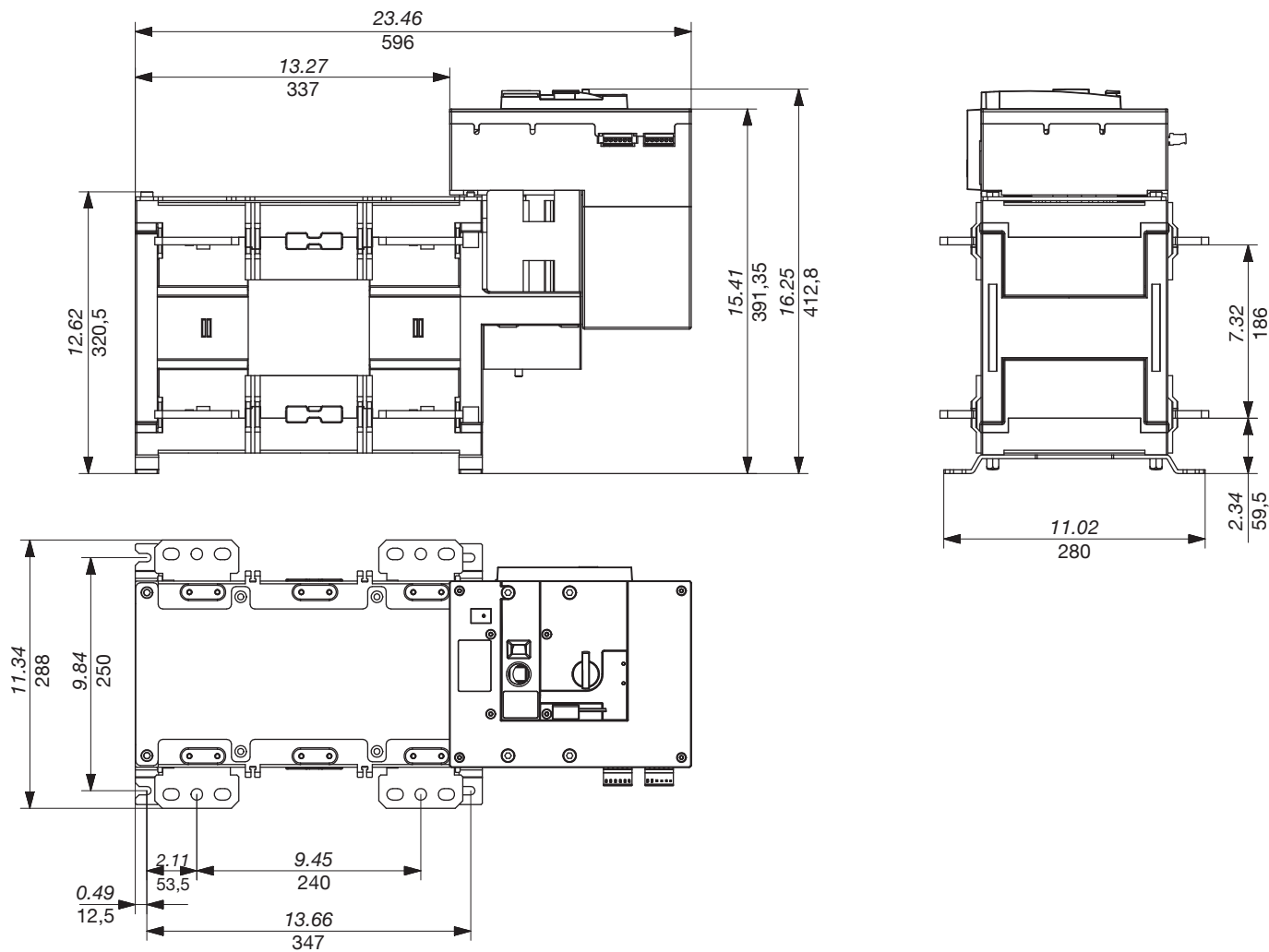
The SIRCO MOT DC complies with the European directive for RoHS.



3. DIMENSIONS & WIRING

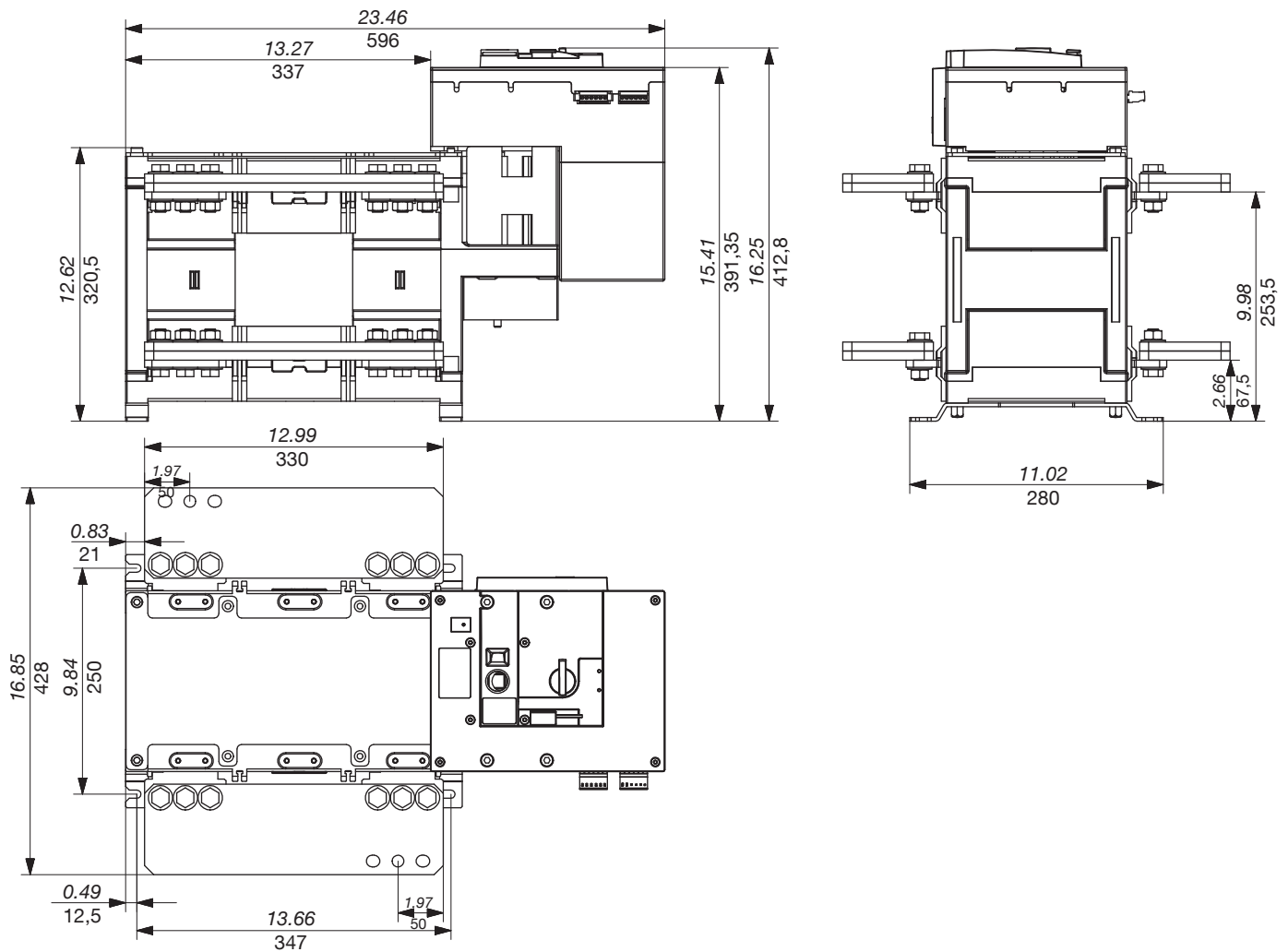
3.1. Loose device (without terminal bar)

Dimension in./mm.



3.2. Device with terminal bar / Connecting accessory for parallel connection

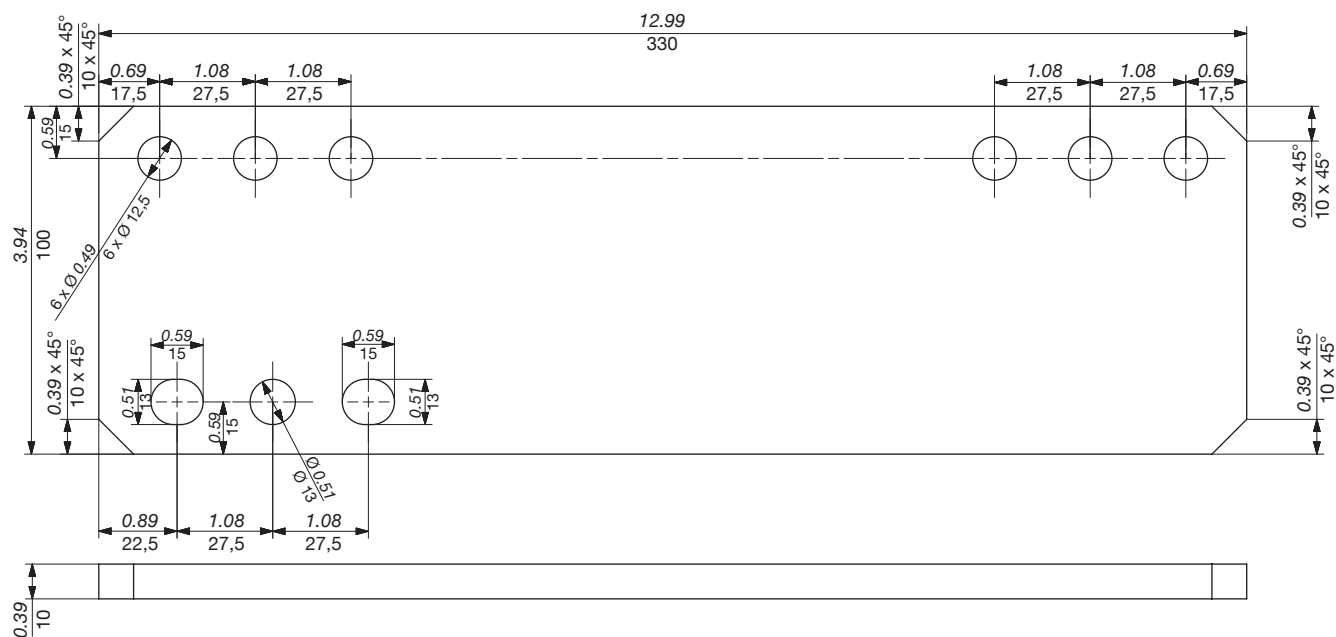
Dimension in./mm.



For Terminal reference & quantity, please refer to chapter 4.3.1, page 16.

For mounting and installation details, please refer to chapter 4.3.3, page 17.

3.3. Terminal bars / Connecting accessory

Dimension *in./mm.*

For Terminal reference & quantity, please refer to chapter 4.3.1, page 16.

For mounting and installation details, please refer to chapter 4.3.3, page 17.

4. INSTALLATION

4.1. General

For correct product installation, the following steps shall be realized

- **STEP 1** - Cabinet / Back Plate Installation, see chapter 4.2, page 13
- **STEP 2** - Connecting the POWER section, see chapter 4.3, page 16
- **STEP 3** - COMMAND / CONTROL terminal connections, see chapter 4.4, page 20
- **STEP 4** - Power SUPPLY terminal connections, see chapter 4.5, page 21
- **STEP 5** - CHECK, see chapter 4.6, page 22

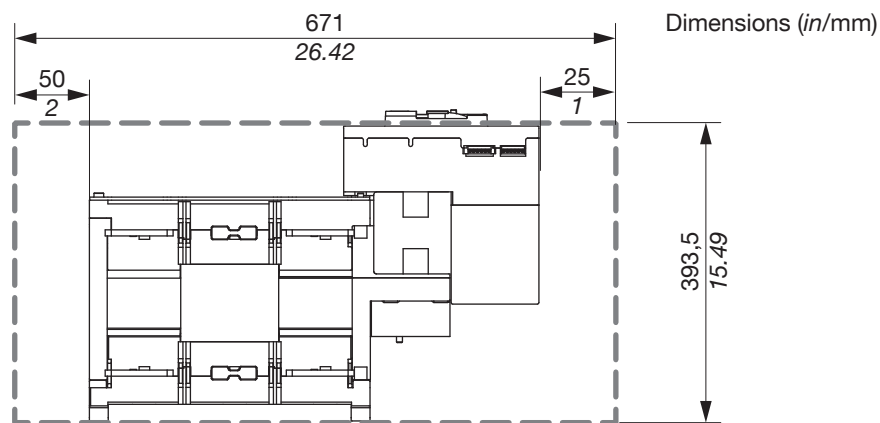
4.2. Installation inside the cabinet

4.2.1. Spacing around product

Minimum dimension shall be kept between the device and any other component (active or passive) within the installation :

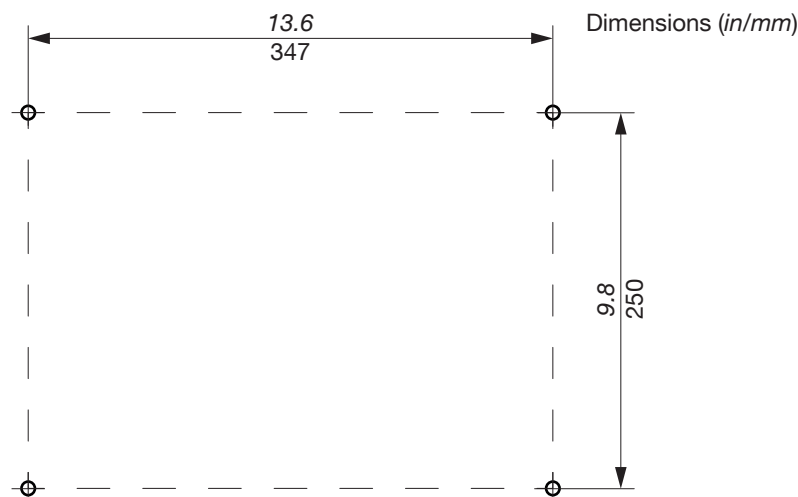
>50mm / 2in on the terminal side

>25mm / 1in on the motor side

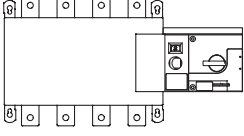
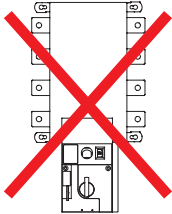
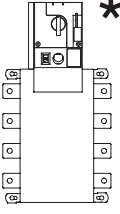
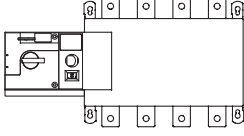


4.2.2. Mounting of the device on backplate

Devices shall be mounted on back plate, using M8 screws and washer.

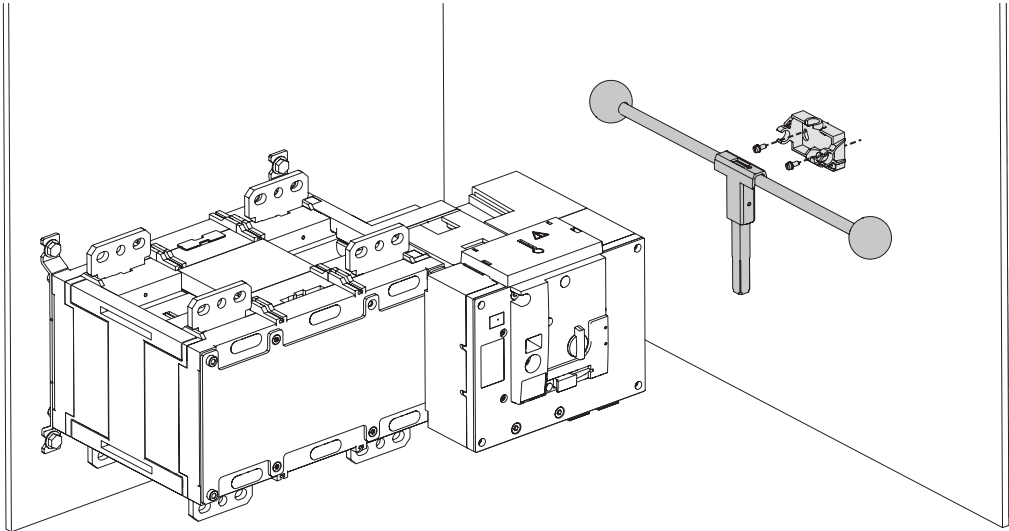


4.2.3. Mounting orientation

			
Recommended	Not Allowed	OK	OK

* This position is not allowed for rating IEC 3600 A.

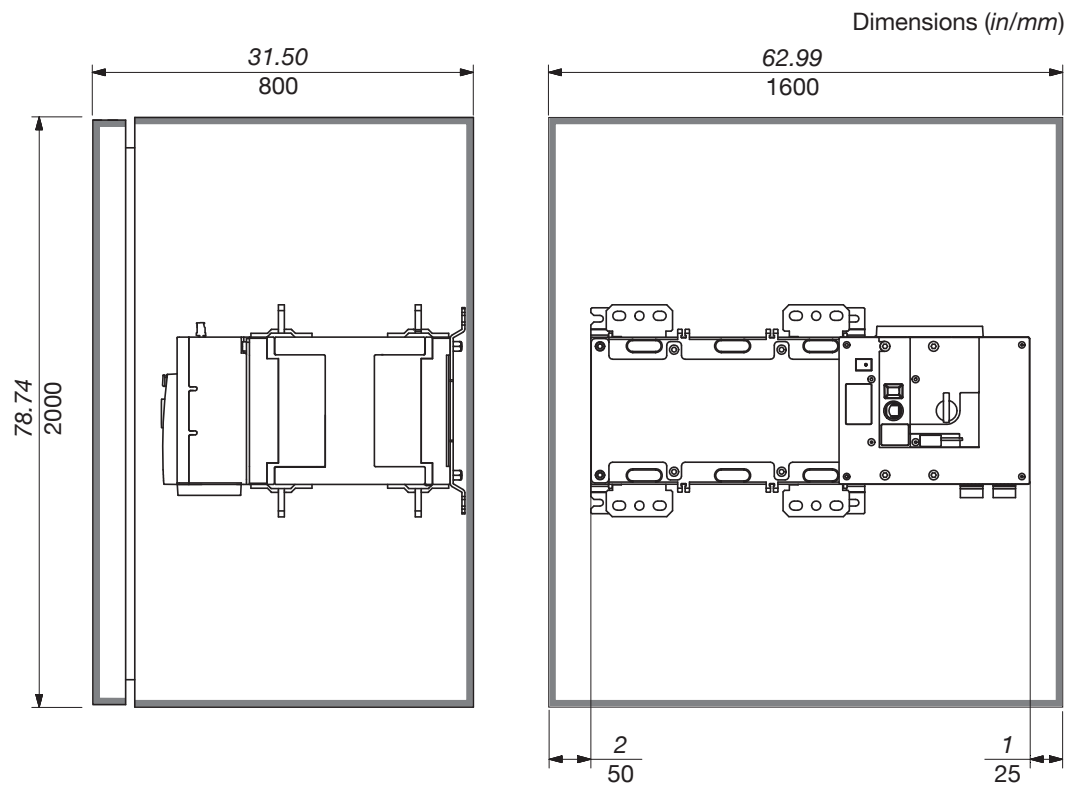
4.2.4. Emergency handle mounting





DANGER !
Emergency handle should not be mounted on the product for storage purpose.
Emergency handle is delivered with a mounting clip, that shall not be mounted on the device.

4.2.5. UL specific installation – minimum enclosure size



4.3. Electrical connection

4.3.1. Terminal reference & quantity

Some configuration requires mounting terminal bars on the product, see below the correct part Nr. and necessary quantity for each configuration.

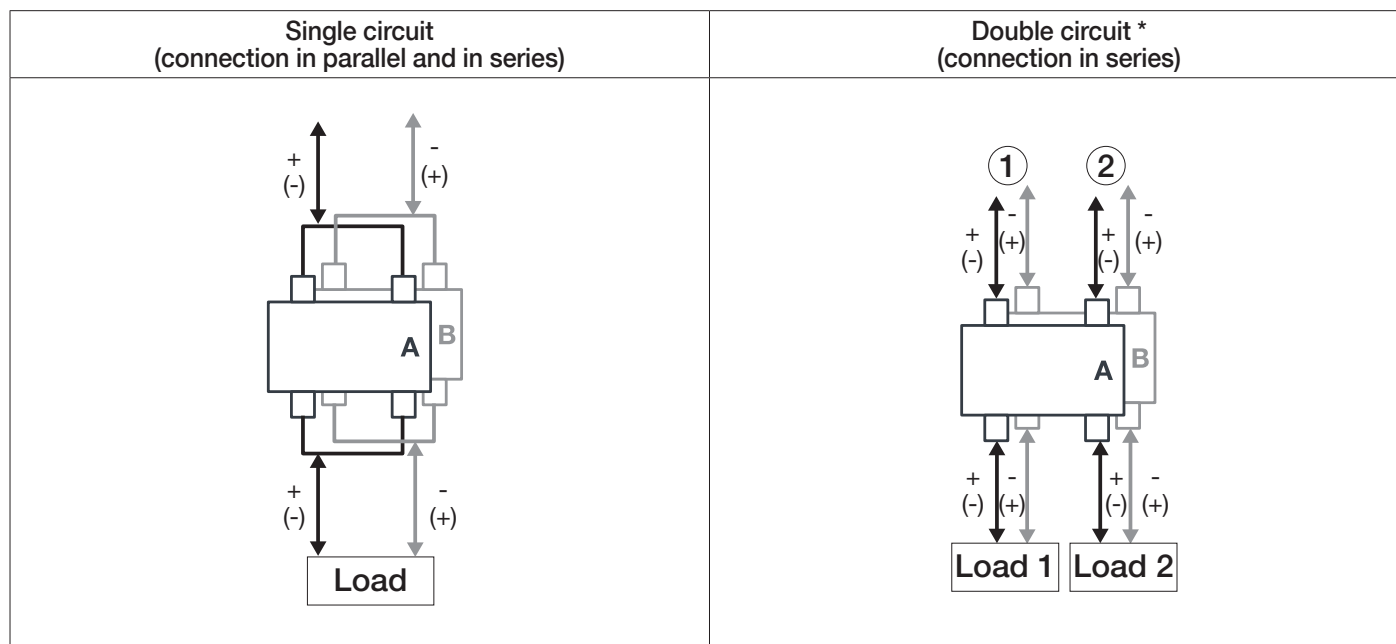
	Rating	Terminal bar / connecting accessory		
		Qty (for complete configuration)	Reference	Screws length
IEC GB/T	2 x 1600 A	-	-	-
	2500 A / 3200 A / 3600 A	8	19090001	M12x45 class 8.8
UL98B	2000 A	4	19090001	M12x45 class 8.8

The terminal bar is made of tin plated copper, to allow both copper and Aluminum connection.

Detailed drawing of connecting bar are available at chapter 3.2, page 11 and chapter 3.3, page 12.

4.3.2. Connection to the main power circuit

4.3.2.1. Overview of connection possibilities



* Double circuit not UL Certified.

4.3.2.2. Recommended connection dimension

Recommended connection to main power circuit as per IEC, GB/T and UL98B

	Busbar dimensions (copper)				screws length
	Rating	Qty	mm	inch	inch / mm
IEC GB/T	2 x 1600 A	2	5 x 100	0.20 x 3.94	1.77 / 45
	2500 A	4	5 x 100	0.20 x 3.94	2.36 / 60
	3200 A	3	10 x 100	0.39 x 3.94	2.76 / 70
	3600 A	4	10 x 100	0.39 x 3.94	3.15 / 80
UL98B	2000 A	2	8 x 80	0.31 x 3.15	1.77 / 45

The table should be used solely as a general guideline for selecting products. Due to the extensive variety of switchgear construction shapes and conditions that can affect the behavior of the apparatus, the solution used must always be verified in its final installation, with but not limited to temperature rise testing.

4.3.3. Mounting details per configuration

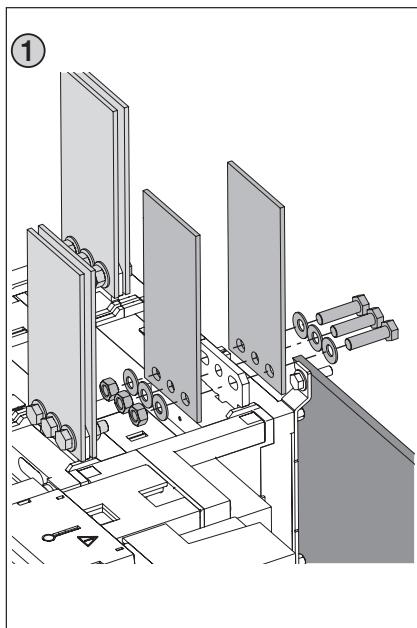
4.3.3.1. General requirements

Device terminal connection shall be made using M12 screws class 8.8 with recommended length (see chapter above) equipped with spring washers. Tightening torque : 40Nm / 354lb-in

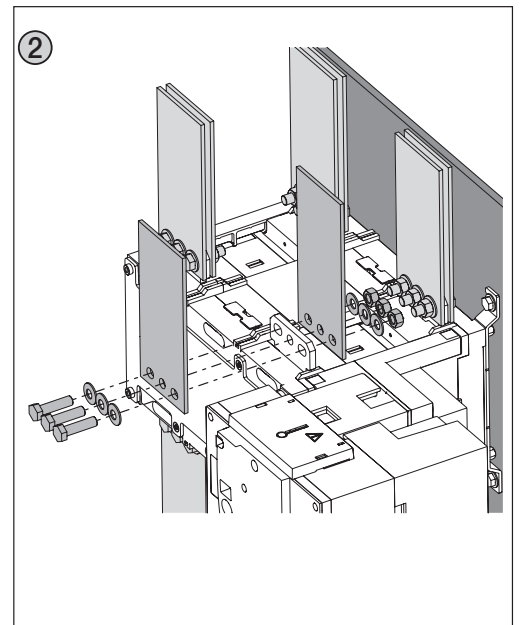
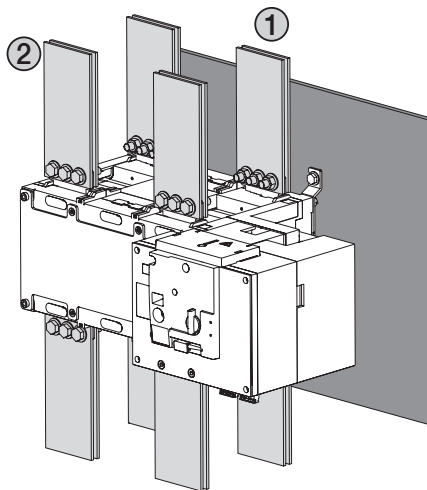
4.3.3.2. Without terminal bar

18DC4320 – 2 x 1600 A

Direct connection of busbar to the terminal of the switch



2 x 1600 A



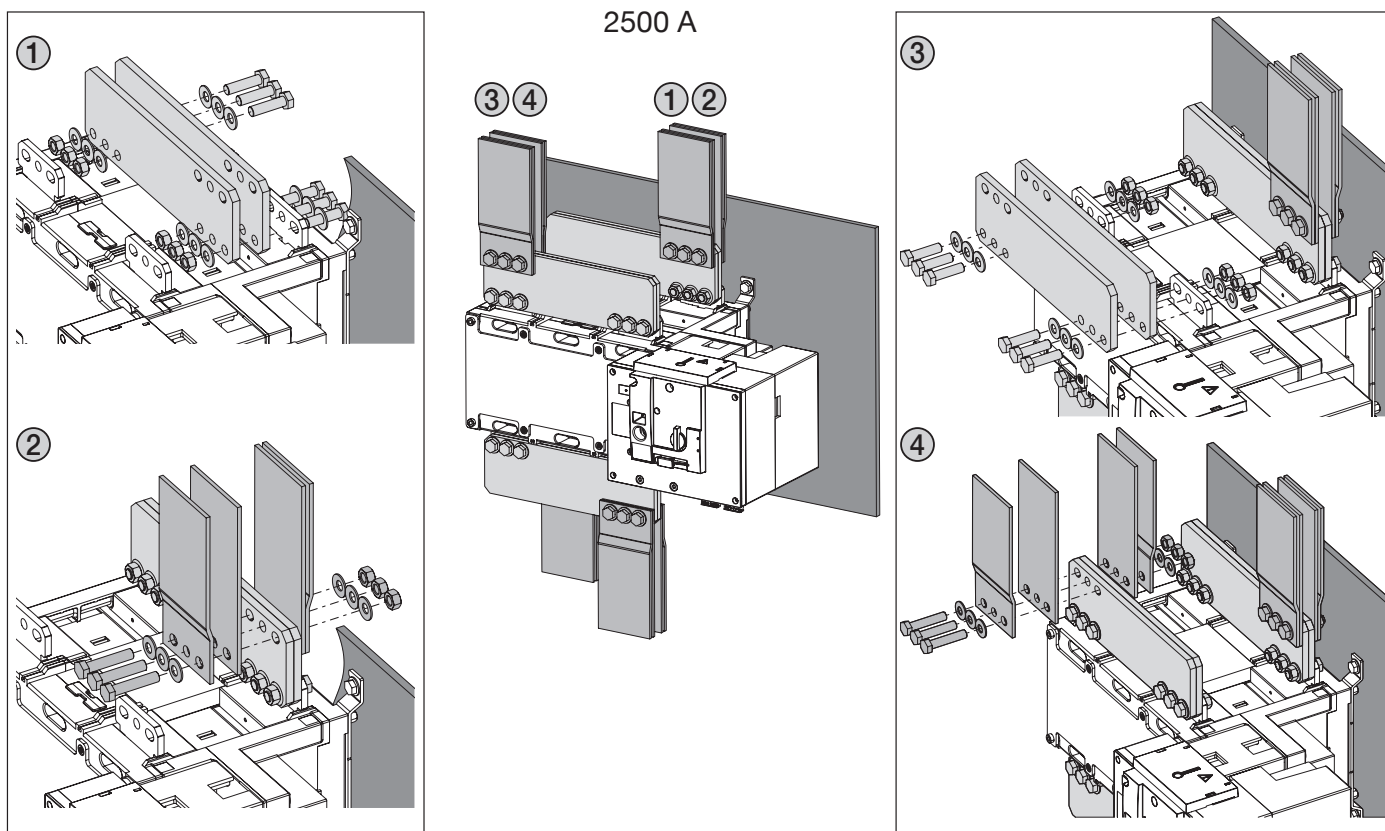
M12 screws - tightening torque : 40Nm / 354lb-in

4.3.3.3. With terminal bar

Any other terminal connection shall be validated by customer inside its installation, especially but not limited to temperature rise limits and short circuit behavior.

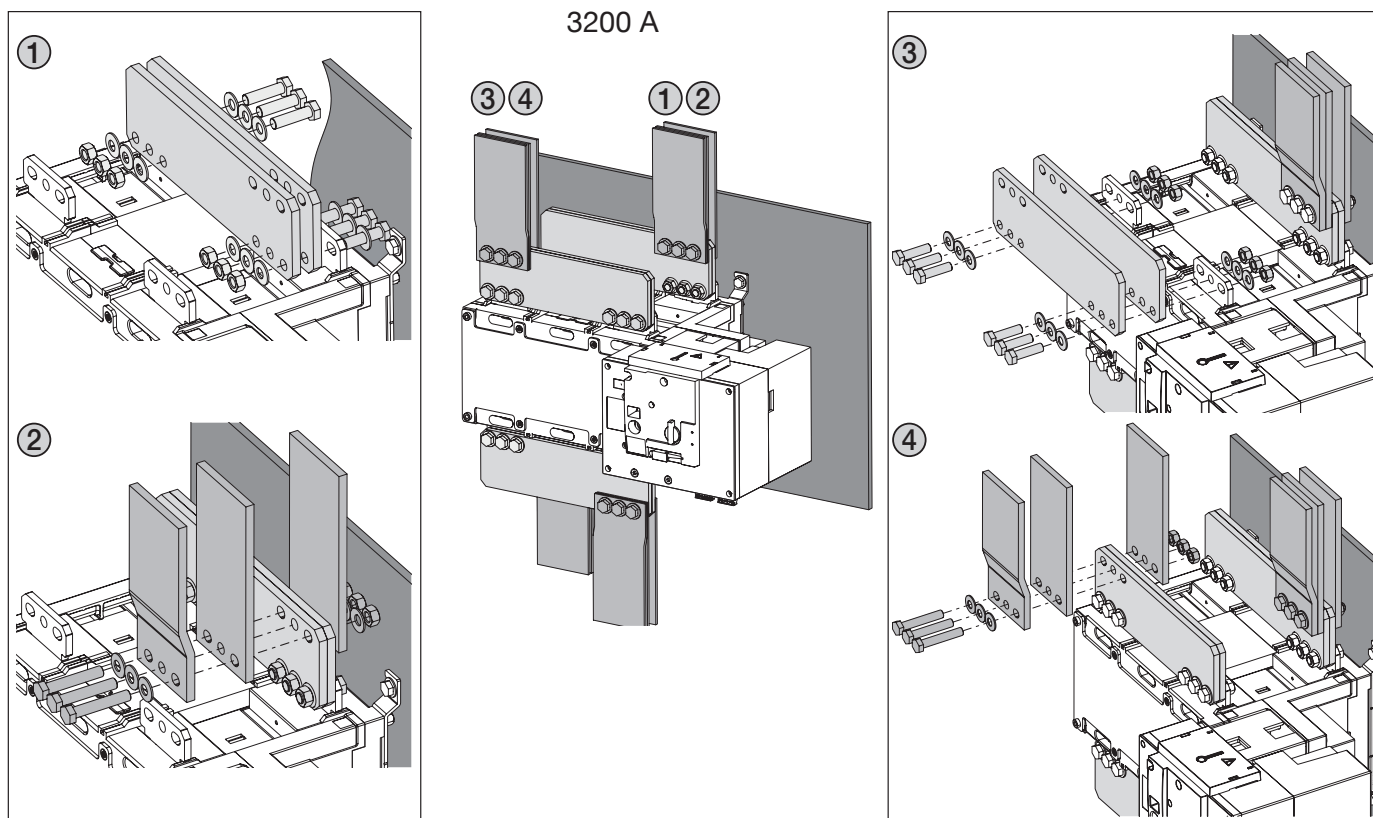
18DC4250 / 18ES4250

8 terminal bars are mandatory for the following connection (2 for each terminal connection):



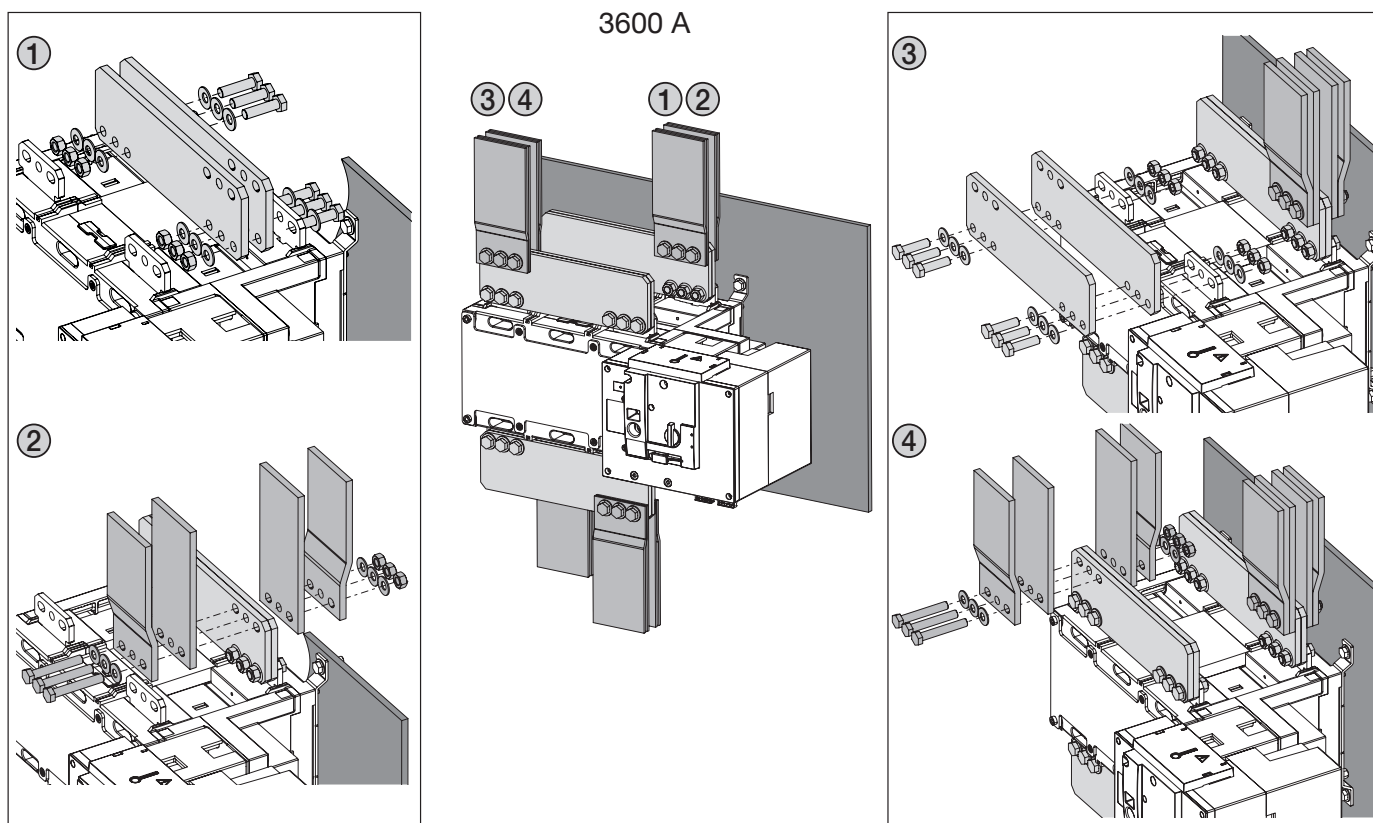
18DC4320 / 18ES4320

8 terminal bars are mandatory for the following connection (2 for each terminal connection):



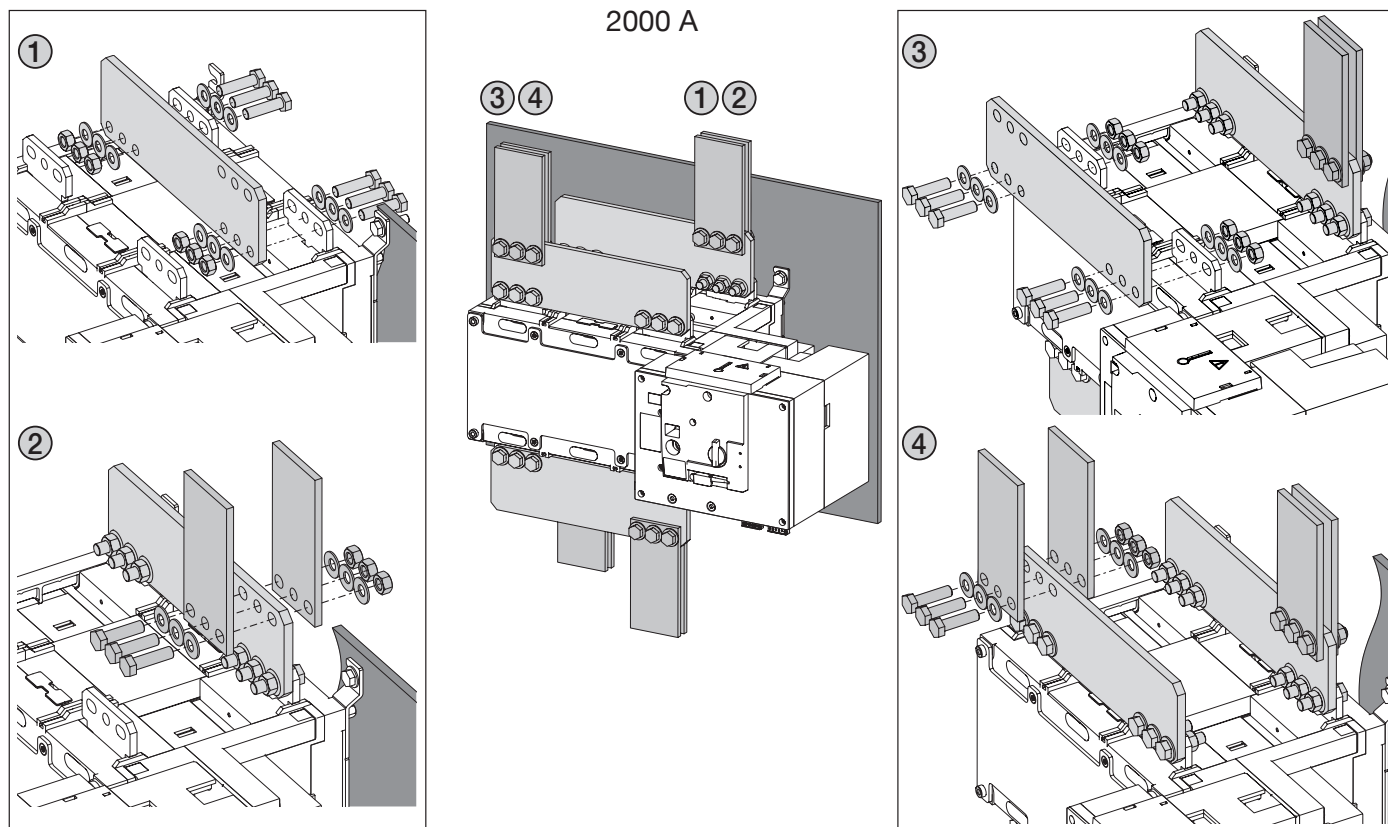
18DC4360 / 18ES4360

8 terminal bars are mandatory for the following connection (2 for each terminal connection):



19DC4200 / 19ES4200

4 terminal bars are mandatory for the following connection (1 for each terminal connection):

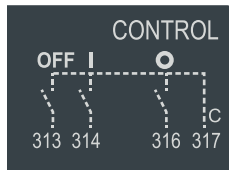
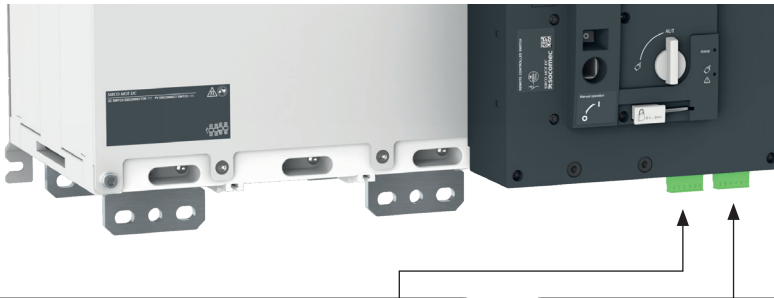


4.4. Device control / Command circuit

The SIRCO MOT DC includes for 4 off fixed inputs through a 6 pin connector installed on the motorisation module. No additional power supply should be used on these contacts as the inputs **MUST** be used with the common supply taken from terminal 317.

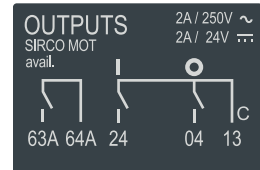


Excessive pressure on the connector pins is to be avoided during wiring of the auxiliary cables



Override to OFF : 313
Switch to Pos I : 314
Switch to Pos O : 316
Common : 317

Prod Avail Common 63 A
Prod Avail O/P: 64 A
Pos I Aux Contact: 24
Pos O Aux Contact: 04
Common: 13



Denomination	Terminal	Description	Characteristics	Recommended Cable Section
Signalisation Outputs	13	Common I - O for Aux Contacts	Dry Contacts 2A AC1 / 250 V	1,5 mm²
	04	Aux Contact Position O - Normally Open Contact		
	24	Aux Contact position I : Normally Open Contact		
	63A	Product Available : Normally Open Contact. Closed when the SIRCO MOT DC is in Auto mode and motorisation is operational. (No Fault powered and ready to changeover)		
	64A			
Control Inputs	313	Position O order if closed with 317. (Priority order input forcing the product to remote control mode and 0 position)	Attn: Do not connect to any Power supply Max cable length 100 m	1,5 mm²
	314	Position I order if closed with 317		
	316	Position O order if closed with 317		
	317	Common control terminal for 312 - 316 SIRCO MOT DC (Specific Voltage Supply)		

4.4.1. Technical data

Auxiliary Contact Quantity	2
Configuration	NO
Mechanical Endurance	100 000 cycles
Response Time	5 – 10 ms
Startup duration	200 ms
Rated Voltage / Switching Voltage	250 VAC
Rated Current	5 A
Surge protection Vin_sg	4.8 kV (1.2/50 µs surge)
Tightening torque (Auxiliary contact)	0.5 - 0.6 Nm

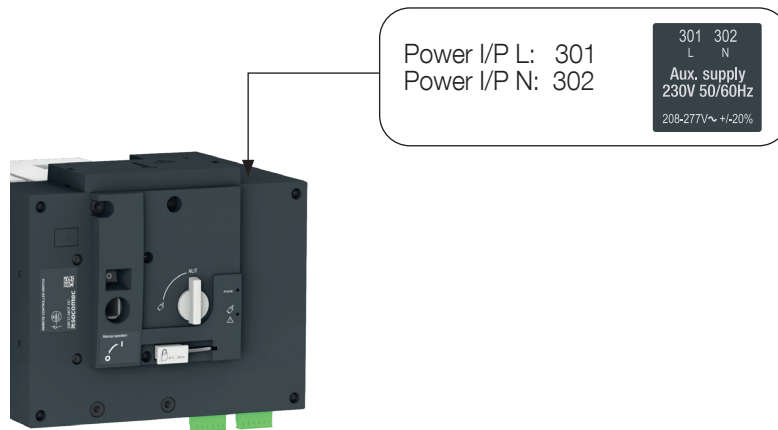
4.4.2. Wiring for impulse logic or contactor logic

Depending on the wiring configuration there are two types of logic that may be applied to the SIRCO MOT DC.

- Impulse logic or
- Contactor logic.

In remote control, the SIRCO MOT DC inputs give priority to order I over 0 therefore contactor logic can be implemented by simply bridging terminals 316 and 317.

4.5. Device power supply



It is recommended to secure the power supply cable from vibration using a non-conductive fixing device like plastic clamps (e.g. Rilsan strap) or adhesive tape.

4.5.1. Power supply characteristics

SIRCO MOT DC is to be powered between terminals 301 and 302 with a supply within the limits of:

Voltage & Frequency:

- 208-277 Vac +/-20% (166 – 332 Vac)
- 50/60 Hz +/- 10%

Current input:

- 10 mA (Standby mode)
- 2 A (Nominal operating current)

Terminal connection:

- Minimum 1.5 mm²
- Maximum 2.5 mm²

4.5.2. Power supply protection

Overcurrent/Short-circuit protection for power supply:

- Fuses 4A type gG
- Fuses 5A type CC

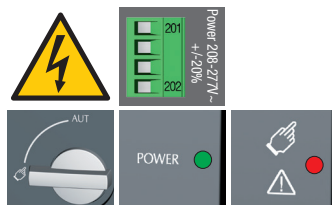
4.6. Verification of wiring and installation

4.6.1. Power supply

Whilst in manual mode, check the wiring and if correct power up the product.

LED "Power" Green: ON

LED Manuel/Fault Red: ON



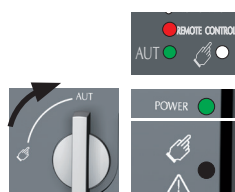
4.6.2. Control

Ensure that the emergency handle is not inserted in the product and turn the mode selector to the AUT position.

LED "Power" Green: ON

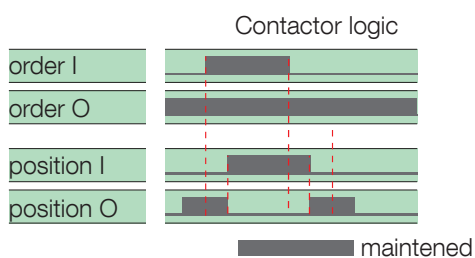
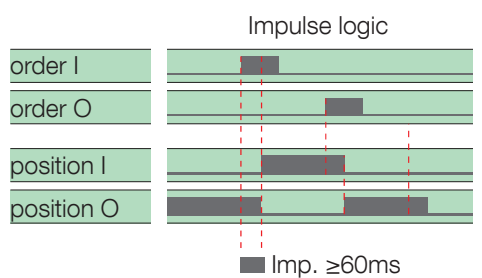
LED Manuel/Default: OFF

LED Remote control : ON



For contactor logic bridge contact 316 with 317.

To operate: close the contact corresponding to the desired position (315 for I-ON or 316 for O-OFF to be connected to 317)



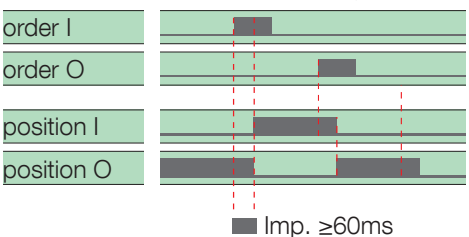
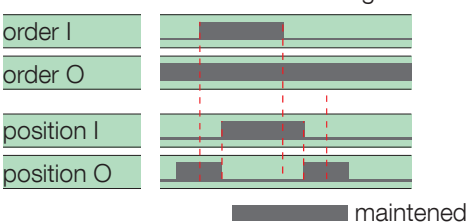
See chapter 5.2, page 24 for more information on the control operation.

5.2. Automatic mode

5.2.1. Remote control

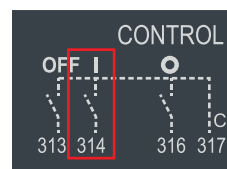
Power supply must be available to operate in automatic mode.

Depending on wiring configuration, system will operate in impulse logic mode or contactor mode. In case of impulse logic mode, duration of activation of inputs should be equal or superior 60ms.

Impulse logic (standard configuration) : The SIRCO MOT DC is driven to a stable position (I – O) after receiving an impulse order. • A switching command of at least 60 ms is necessary to initiate the switching operation • When switching command disappears, the product remains in its position • The switching command (pulse) can be of infinite duration without causing any product dysfunction • Order I have priority over order O.	Impulse logic  ■ Imp. ≥60ms (Note : Excludes position switching delays)
Contactor Logic : The SIRCO MOT DC is driven to the position I for as long as the order is maintained. • Order O is maintained. (Bridge 316 – 317) • Orders I have priority over order O. • If order I disappears, the device returns to zero position. (With the power supply available).	Contactor logic  ■ maintained (Note : Excludes position switching delays)

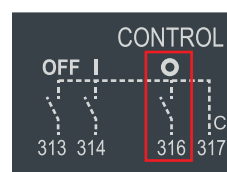
5.2.1.1. Position I order

Order to go to position I (closed position) is done by closing input 314.



5.2.1.2. Position O order

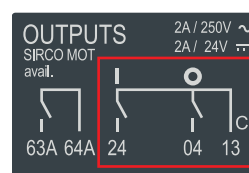
Order to go to position O (open position) is done by closing input 316.



5.2.2. Position indication

SIRCO MOT DC is equipped with integrated normally open (NO) position contact output.

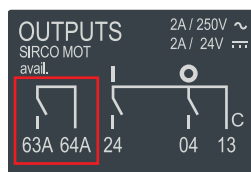
Output	Function
13	Common
04	Open position indication
24	Closed position indication



6. MAINTENANCE

6.1. Product availability status

SIRCO MOT DC provides a constant feedback about the product's availability and its capacity to operate



The SIRCO MOT DC performs a self diagnostics test on the motorisation module at startup, when put from Manual -> Auto and then every 5 minutes. This test ensures that the SIRCO MOT DC is operational in terms of control inputs. Should one of the tests fail, a second test is performed to reconfirm the error state. Should the SIRCO MOT DC motorisation module become unavailable, contact 63A – 64A are opened, the power/ready LED's are switched off, and the fault LED is activated. The fault LED will remain active for as long as sufficient power is available and the fault condition is not reset. The fault is reset when the product is switched from AUT -> Manual -> Auto mode.

SIRCO MOT DC (Motorisation) Product Available / Unavailable Watchdog relay will open for any of the following reasons below: For added security, "Product Availability" is informative and does not necessarily inhibit motor operation.

Product Unavailable + Warning LED Condition:	Inhibition
Product in manual mode	Yes
Motor not detected (Autotest)	No
Control voltage out of range	Yes
Operating factor fault active (N° of operations / min)	Yes
Powerfail active	Yes
Customer input autotest failed	No
Invalid product customisation	No
Abnormal switching when not in manual mode	Yes
Requested position not reached	Yes
Locked mode active when not in manual mode	Yes
External Fault → User input	No
Unexpected current flowing through the motor when idle	Yes

Sampling rate for the above is every 10 ms.

Exception: motor detection sampling rate is every 5 min.

6.2. Troubleshooting guide

The SIRCO MOT DC does not operate electrically	• Verify the power supply on terminals 301-302: 208 - 277 Vac ± 20 % • Verify that the front selector switch is in position (AUT) • Verify that the power LED (Green) is On whilst the fault LED (RED) is off. • Verify that the product is available with contacts 63A and 64A closed.
It is not possible to manually operate the switch	• Verify that the front selector switch position is on the Manual position. • Make sure that the product is not padlocked • Verify the rotation direction of the handle • Apply a sufficient progressive action in the direction as indicated on the handle
Electrical operation does not correspond to external order I, O	• Verify the selected control logic wiring (impulse or contactor) • Verify the connector connections.
The fault/manual LED is ON	• The FAULT / MANUAL LED is on when in manual mode (this is normal) and in AUT Mode when there is an internal fault in the SIRCO MOT DC To reset a fault condition switch the SIRCO MOT DC from AUT to Manu and back to AUT. Should the fault LED remain on you will need to localize and clear the fault prior to reset. • The FAULT / Manual LED will also be on when contact 313 is closed with 317. (Force the SIRCO MOT DC to off position). This is a normal condition. • Should the Fault LED remain on abnormally, contact SOCOMEC.
Impossible to padlock	• Verify that the front selector switch is in manual position • Verify that the emergency handle for manual operation is not inserted into the SIRCO MOT DC manual slot. • Verify that the SIRCO MOT DC is in O position (Padlocking is only possible in O position for standard products)

6.3. Spare parts

The following components are available as spare parts:

- motor module

Please consult us for ordering details.

The instruction to correctly replace these modules are provided with the spare components in dedicated instruction manual.

6.4. Recommended maintenance



DANGER ! Turn off all power supplying this equipment before working on or inside equipment and always used a properly rated voltage sensing device to confirm power is off.

Minimum 1 operation per year.

Inspection and cleaning of external parts.

Unplug/clean/replug all wiring (power supply, aux contact, ...).

CORPORATE HQ CONTACT:
SOCOMEC SAS
1-4 RUE DE WESTHOUSE
67235 BENFELD, FRANCE

www.socomec.com

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