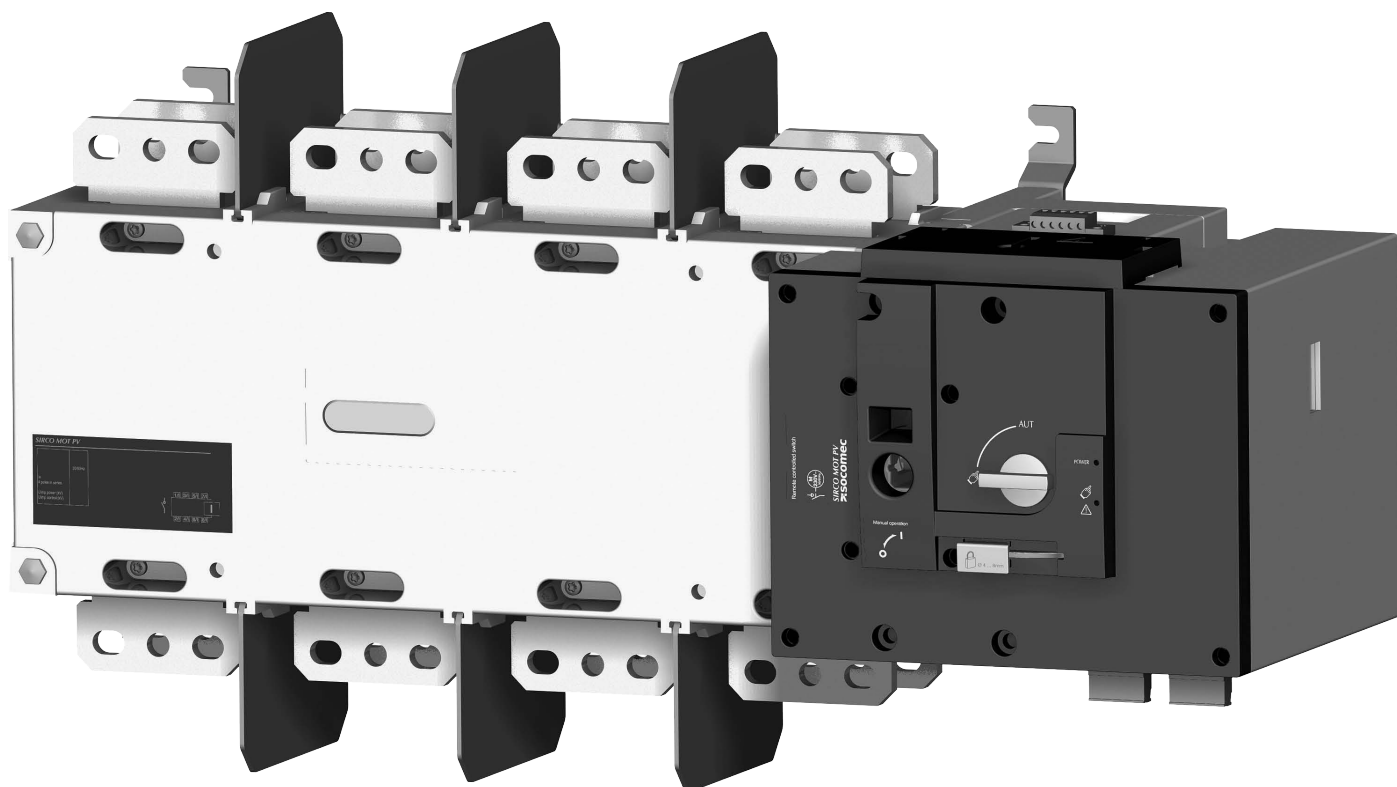


**INSTRUCTION
MANUAL**

SIRCO MOT PV UL

Motorised photovoltaic switches



EN



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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 it in relation with the SIRCO MOT PV.
- No covers on the SIRCO MOT PV should be opened (with or without voltage) as there may still be dangerous voltages inside the product such as those from external circuits.
- **Do not handle any control or power cables connected to the SIRCO MOT PV when voltage may be present on the product directly through the mains or indirectly through external circuits.**
- Voltages associated with this product may cause injury, electric shock, burns or death. 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.

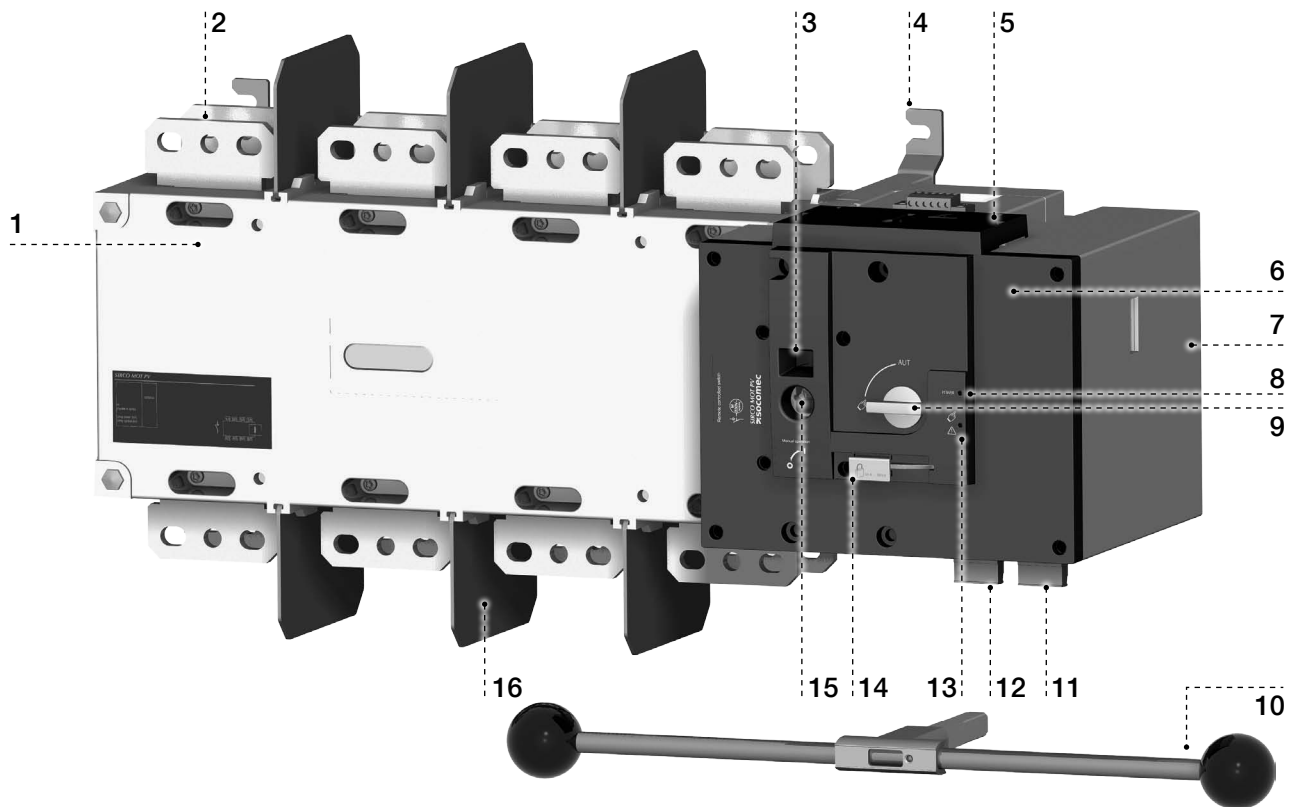
 DANGER	 WARNING	 CAUTION
RISK: Electric shock, burns, death	RISK: Possible personal injury	RISK: Equipment damage

- As a minimum the SIRCO MOT PV comply with the following international standard:
- UL98B

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

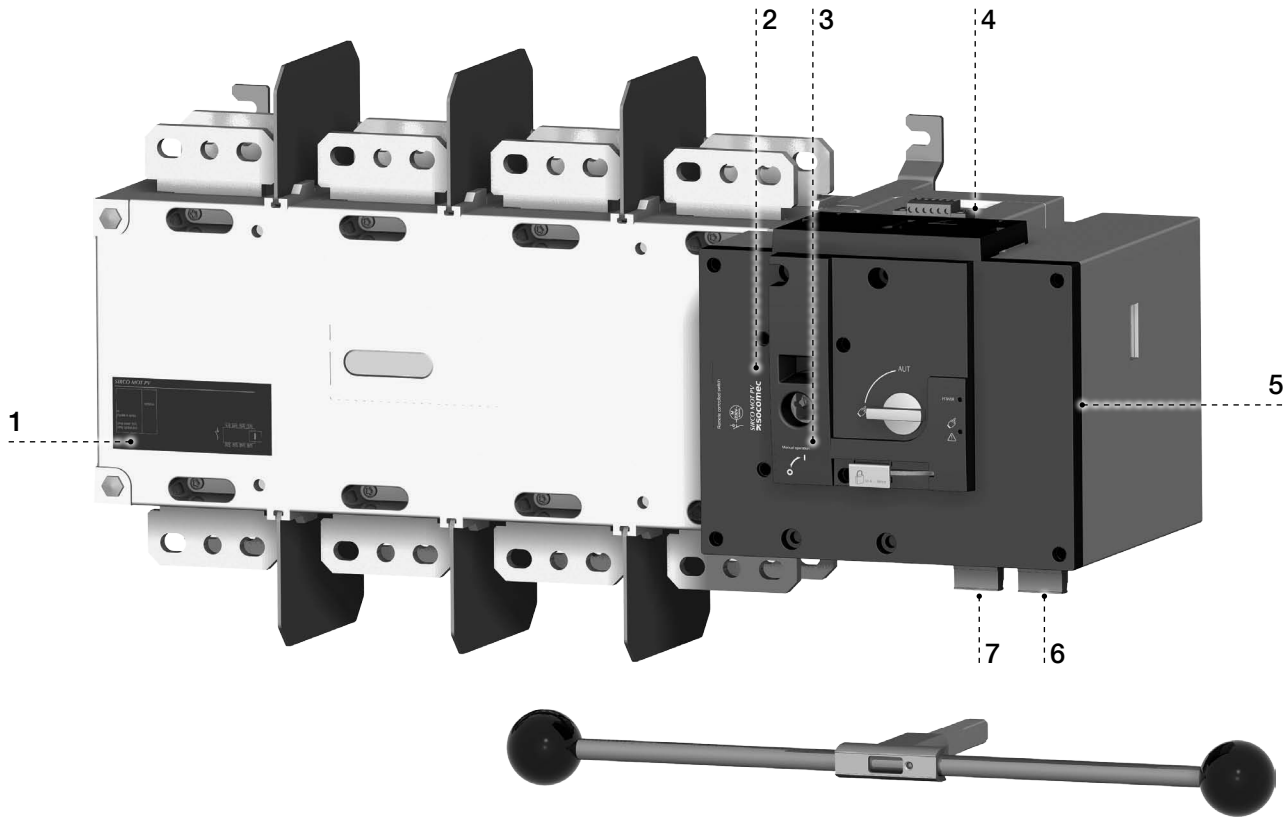
2. GENERAL OVERVIEW

2.1. Product introduction



1. Power Section: multipolar load break switch (4 poles)
2. Load break switch terminals
3. Switch position indication window:- I (On) – O (Off)
4. Back-plate mounting SIRCO MOT PV fixing lugs
5. Auxiliary power supply: 230Vac (208 – 277Vac ± 20%)
6. Motorized Control Unit
7. Motor housing
8. Green LED Indication: Power (SIRCO MOT PV control voltage input within specified range).
9. Auto / Manual mode selector switch
10. Emergency manual operation “Direct Handle”
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. Red LED Indication: Product Unavailable / Manual Mode / Fault Condition
14. Padlocking facility (Up to 3 padlocks of dia. 4 – 8mm)
15. Emergency manual operation shaft location (Accessible only in manual mode)
16. Terminal Shields

2.2. Product identification



1. Main motorised switch identification label:
Electrical characteristics
Applicable standards and
Terminal incoming and outgoing wiring details.
2. Complete SIRCO MOT PV product current rating and reference number label (serial number, barcode and UL 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

2.3. Environmental

The SIRCO MOT PV product meets the following environmental requirements:

2.3.1. IP Rating

- IP2X against direct contact for the SIRCO MOT PV motorization control unit.
- IP 0 for the bare power section without terminal shields in place.

2.3.2. Operating Conditions

2.3.2.1. Temperature

- From -20 to +40 °C (-4 °F to +104 °F) without derating
- From -20 to +70 °C (-4 °F to +158 °F) when applying a Kt derating correction factor

Kt: Correction Factor	Temperature	
0.9	40 °C ... 50 °C	104 °F ... 122 °F
0.8	50 °C ... 60 °C	122 °F ... 140 °F
0.7	60 °C ... 70 °C	140 °F ... 158 °F

2.3.2.2. Hygrometry

- 80% humidity without condensation at 55°C / 131 °F
- 95% humidity without condensation at 40°C / 104 °F

2.3.2.3. Altitude

- Up to 2000m in altitude without derating
- For higher altitude the Ka correction factors below apply

Ka: Correction Factor	2000 m < A ≤ 3000 m	3000 m < A ≤ 4000 m
Ue	0.95	0.8
Ie	0.85	0.85

2.3.3. Storage Conditions

2.3.3.1. Temperature

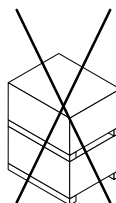
- From -40 to +70°C (-40 °F to +158 °F)

2.3.3.2. Storage duration period

- Maximum storage up to a period of 12 months (Recommendation: to be stored in dry, non corrosive and non saline atmospheric conditions)

2.3.3.3. Storage position

A maximum of **1 box** may be stocked vertically



2.3.4. Shipping weights by reference SIRCO MOT PV

Frame Size	Rating	N° of Poles	Reference Number	Weight (kg)
B8 (UL)	2000 A	4	19PV 4320	61.5

2.3.5. UL marking

The SIRCO MOT PV complies the with the directive for:



2.3.6. Lead free process

- The SIRCO MOT PV complies with the European directive for RoHS.



2.4. SIRCO MOT PV ACCESSORIES AVAILABLE

2.4.1. Customer fitted accessory

DOOR ESCUTCHEON PLATE

An accessory to be fixed onto a cabinet door to frame the motor part of flush mounted SIRCO MOT PV switches.

CONTROL VOLTAGE TRANSFORMER

Allows a standard 230 V AC device to be supplied with 400 Vac.

Others:

Refer to the end of this instruction manual or the latest SOCOMEC product catalogue.
(Downloadable from www.socomec.com)

2.4.2. Factory fitted accessory

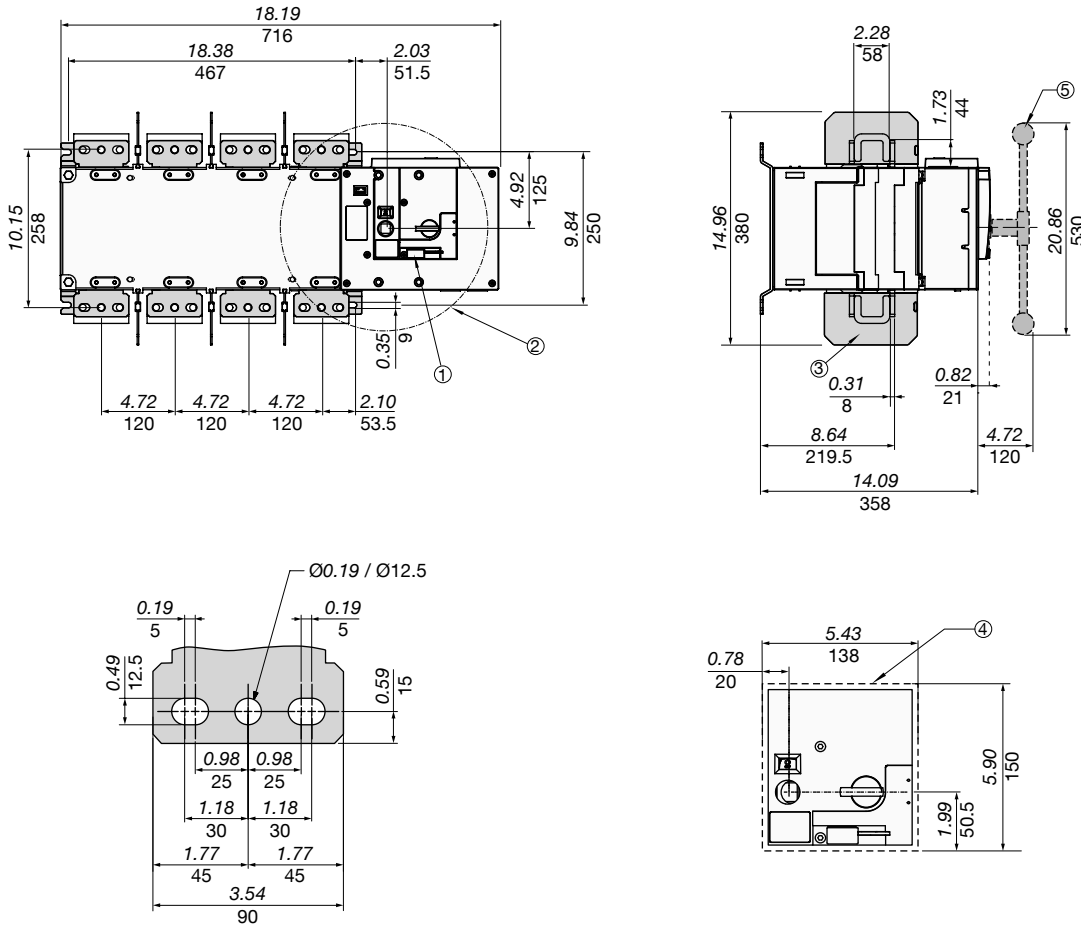
SUPPLEMENTARY AUXILIARY CONTACT (AC)

Pre-breaking and signaling of positions 0 and I: 2 additional auxiliary contacts NO / NC are included. As standard for rating 2000 A (UL). For Low level AC: please consult SOCOMEC.

3. INSTALLATION

3.1. Product dimensions Frame B8 UL (2000 A)

Dual dimensions: in/mm



1. Padlocking Facility: Locking bracket for up to 3 padlocks (min: $\text{Ø } 0.16 \text{ in} / \text{Ø } 4 \text{ mm}$ - max: $\text{Ø } 0.31 \text{ in} / \text{Ø } 8 \text{ mm}$)
2. Emergency manual operation: Maximum operating radius with an operating angle of 90°
3. Phase Barriers
4. Flush mounting cutout dimensions for front door
5. Emergency removable handle

3.2. Mounting orientation


2000 A	Recommended	Not Allowed	OK	OK






CAUTION

Always install the product on a flat and rigid surface.

3.3. Assembly of customer mounted accessories

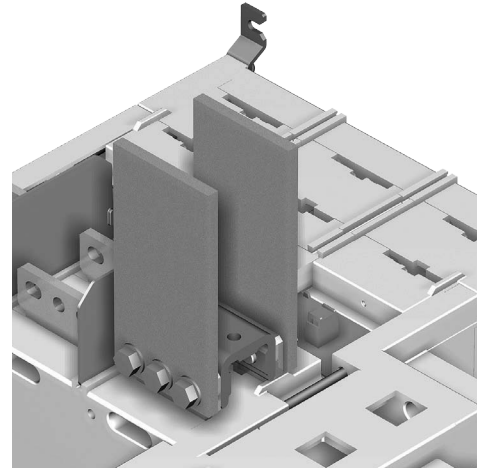
	DANGER	Never handle any customer mounted accessories while there may be the risk of voltage being or becoming present.
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3.3.1. Connection kit for SIRCO MOT PV 2000 A

Maximal current without downgrading ⁽¹⁾	Minimum Cu bar section ⁽¹⁾	 included with product as standard ref. 2619 1200	 H M12-65 6.8	 Washer MOY.M M12 NFE 25 511
2000 A	0.08 x 3.15 x 0.31 in 2 x 80 x 8 mm	✓	6 x	6 x

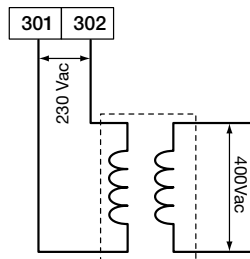
Note: Max Cu bar width - 3.94 in / 100 mm. Reference numbers and quantity given above are for one connection and per pole. For a full set multiply the quantity indicated by the number of poles (4 poles)

(1) Conditions of use of these products may lead to a derating.



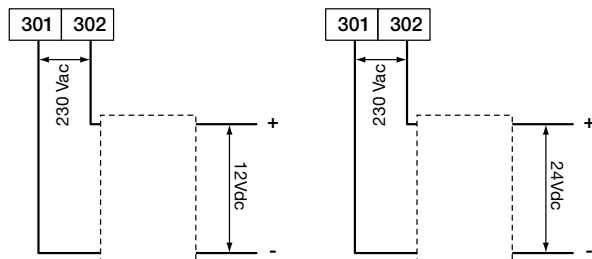
3.3.2. External Power supply (400 Vac - 230 Vac)

Power Transformer intended for 400Vac, Phase to Phase voltage applications that do not provide the availability of a neutral conductor. Transformer data: 400Vac – 230Vac: 200VA.



DC power supply available in 12Vdc as well as 24Vdc intended to allow a standard SIRCO MOT PV (250-1600A) to be powered from an appropriate DC supply. (Usually the battery of the backup generator source).

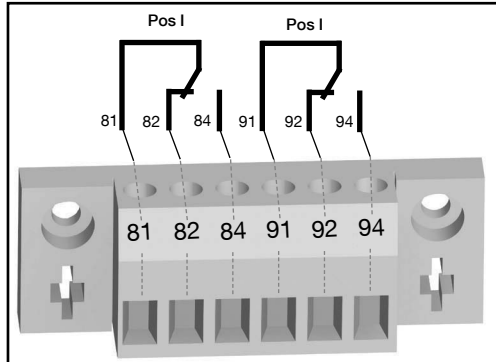
This converter is to be positioned as close as possible to the DC power source.



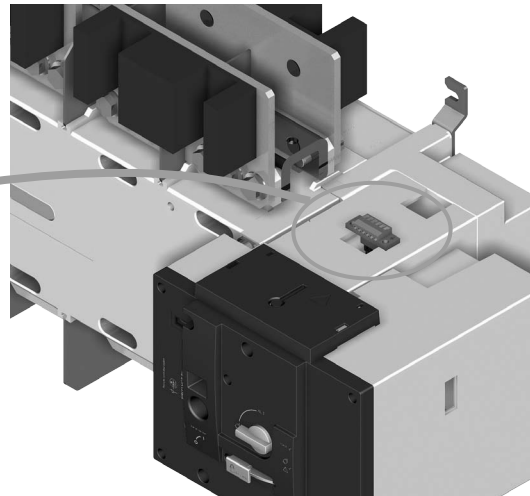
3.4. Factory fitted accessory

3.4.1. Additional auxiliary contacts

Intended for pre breaking and signaling of positions 0 and I. Up to 2 additional NO/NC auxiliary contacts can be fitted.



2000 A (Standard)



Denomination	Terminal	Description	Characteristics	Recommended Cable Section
Additional Aux Contact	81 / 91	Common	Dry Contacts 2A AC1 / 250V	1,5 – 2,5 mm ²
	82 / 92	Normally Closed Contact		
	84 / 94	Normally Open Contact		
<i>Included</i>				

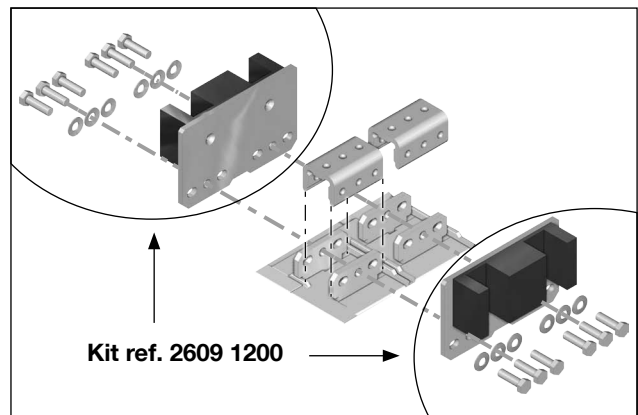
4. CONNECTIONS

4.1. Power circuits

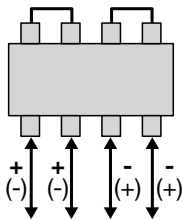
Take into account the connection cable lengths and/or others environmental specific operating conditions.

	2000 A
Frame size	B8 (UL)
Maximum bars width Cu	3.94 in 100 mm
Tightening torque min./max	354/398 lb.in 40/45 Nm

4.2. Connection configuration



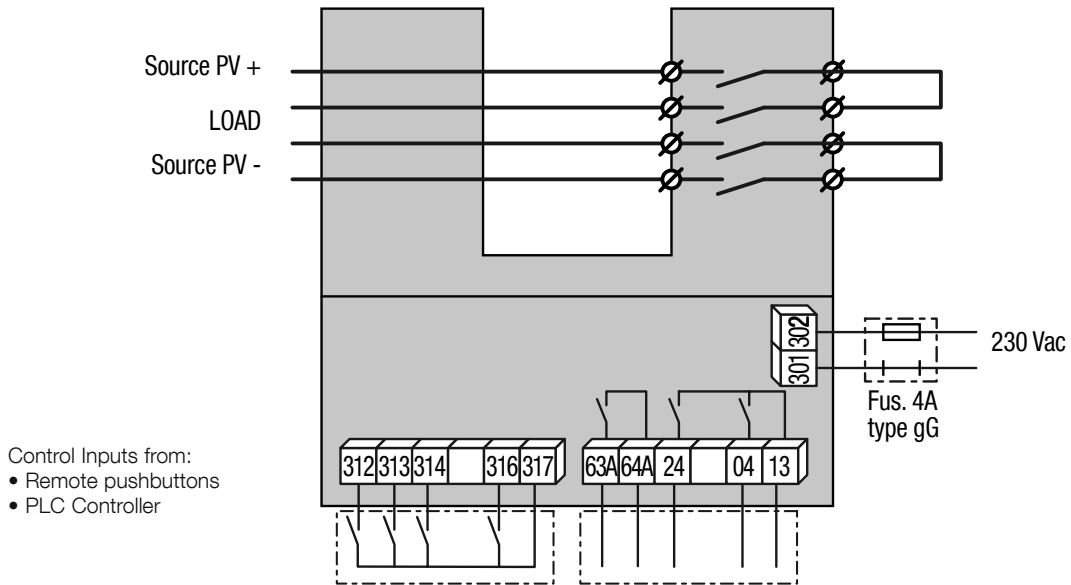
2P +(-) / 2P -(+)



4.3. Control circuits

4.3.1. Typical SIRCO MOT PV wiring

Example: Control wiring for photovoltaic application



CAUTION

Verify that the Auxiliary power supply feeding terminals 301 and 302 are within the limits of 208Vac -> 277Vac \pm 20% (166-332Vac).

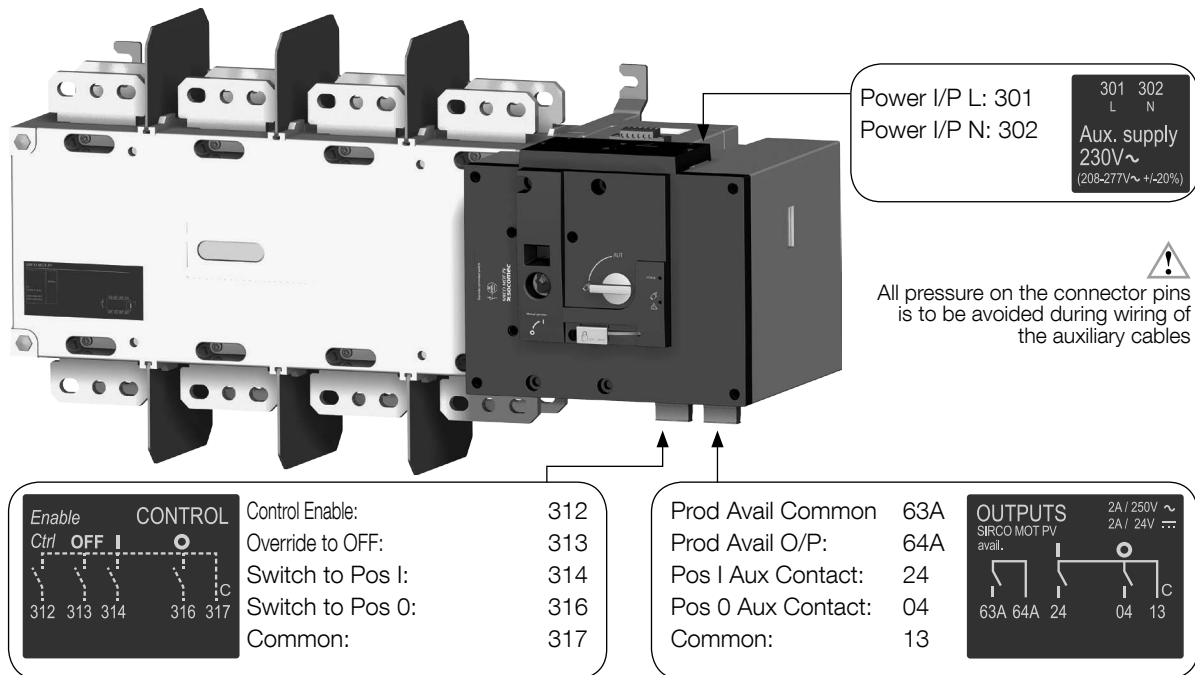


DANGER


Do not handle any control or power cables connected to the SIRCO MOT PV when voltage may be present.

4.3.2. SIRCO MOT PV input and output contacts

4.3.2.1. Terminal denomination, description and characteristics.



Denomination	Terminal	Description	Characteristics	Recommended Cable Section
Signalisation Outputs	13	Common I - 0 for Aux Contacts	Dry Contacts 2A AC1 / 250V	1,5 mm ²
	04	Aux Contact Position 0 - Normally Open Contact		
	24	Aux Contact position I: Normally Open Contact		
	63A	Product Available: Normally Open Contact. Closed when the SIRCO MOT PV is in Auto mode and motorisation is operational. <i>(No Fault powered and ready to changeover)</i>		
	64A			
Power supply Input	301	Power supply – L	208 - 277Vac ± 20%: 50/60Hz	1,5 mm ²
	302	Power supply – N		
Control Inputs	312	Remote Control Mode Enable when closed with 317	Attn: Do not connect to any Power supply Max cable length 100m	1,5 mm ²
	313	Position 0 order if closed with 317. (Priority order input forcing the product to remote control mode and 0 position)		
	314	Position I order if closed with 317		
	316	Position 0 order if closed with 317		
	317	Common control terminal for 312 - 316 SIRCO MOT PV (Specific Voltage Supply)		

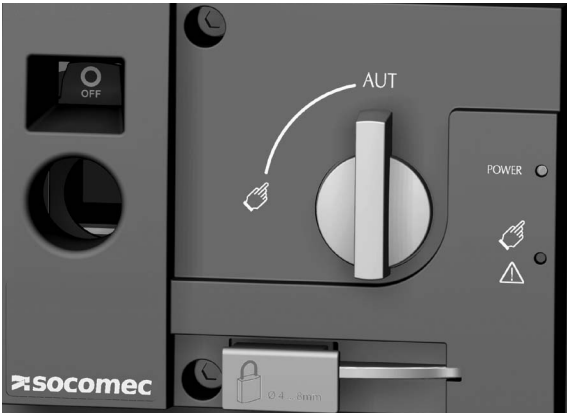

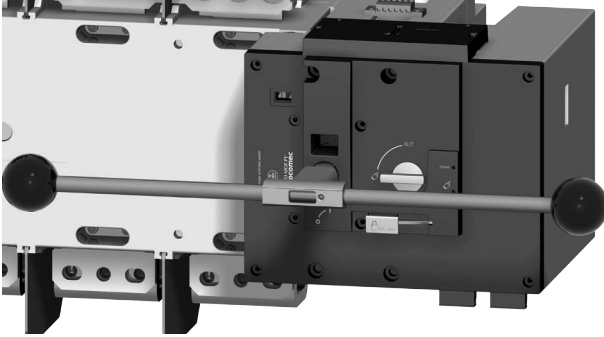

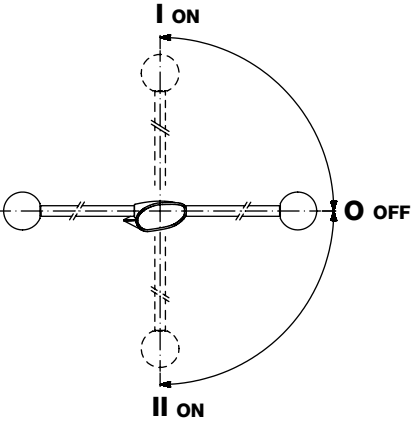

	ATTENTION	Do not connect terminals 312 to 317 to any power supply. These order inputs are powered through terminal 317 and external dry contacts ONLY.
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5. OPERATING MODES

The SIRCO MOT PV includes 2 safe and distinct operating modes through a selector switch located on the front of the product.

The modes of operation are as follows:

- Remotely operated transfer switching ①
- Local emergency manual operation ②

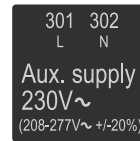
<p>AUT MODE</p>		<p>AUT AUTO MODE ①</p> <ul style="list-style-type: none"> • Activates the remote control inputs. • Inhibits the padlocking facility • Inhibits the insertion of the manual operation handle when in AUT Mode <p>AUTO Mode position is inhibited when padlocked or when the handle for manual operation is inserted into the SIRCO MOT PV.</p>
<p> MODE</p>		<p>AUT MANUAL MODE ② (Not Padlocked)</p> <ul style="list-style-type: none"> • Inhibits the control inputs. • Allows to insert the handle for emergency manual operation. • Allows padlocking in O Position. <i>(With the handle for manual operation removed)</i> <p>Turning the selector switch to  from AUT and back to AUT resets a fault state.</p>
<p>Emergency manual operation</p> <p>The SIRCO MOT PV can be manually operated whilst retaining the electrical characteristics and performance of the power switching function. This function is usually used in case of emergencies or during maintenance.</p> <p>To operate the SIRCO MOT PV manually ensure that no live parts are accessible, turn the front selector switch into the manual position and insert the handle into the emergency handle shaft location hole provided.</p> <p>Turn the handle 90° clockwise or anti-clockwise (depending on the position to be reached) for each consecutive change in position. I -> O -> I.</p> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="border: 1px solid black; padding: 5px; width: 150px;"> <p> CAUTION</p> <p>Ensure to verify the product position and direction of rotation before effecting manual operation.</p> <p>Ensure to remove the handle from the product before changing the selector switch back to AUT position.</p> </div> </div>		

5.1. Electrical operation

5.1.1. Power supply

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

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



Current Input:

- 10mA (Standby mode)
- 15A max (Switching mode)
- 2A (Nominal operating current)

Surge Protection:

- Vin_sg: 4 / 8KV – 1.2/50 μ s

Terminal connector:

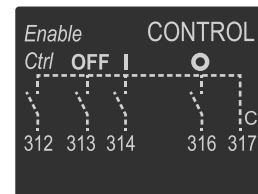
- Minimum 1.5mm²
- Maximum 2.5mm²

5.1.2. Fixed inputs

5.1.2.1. Description

The SIRCO MOT PV 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.

The SIRCO MOT PV Power Supply (301 - 302) must be available to activate inputs 312 to 317.



Pulse duration for activation of contact inputs: ≥ 60 ms.

- **Pin 312:** Remote Control Mode Enable when closed with 317.

This contact must be closed with 317 so as to activate all control inputs except for 313 that takes priority and is active immaterial of the state of input 312. Enabling remote control through 312 activates the remote control inputs.

- **Pin 313:** Position 0 order if closed with 317 when in AUTO. **(Force the switch to the OFF Position)**

This is a **“Priority Order Input”** meaning that when closed with 317 it takes priority over all other electrical commands. The SIRCO MOT PV will remain in 0 position as long as the contact 313 – 317 remains closed. Once the contact is open the SIRCO MOT PV is ready to receive new orders. This contact order is independent of other inputs and is also enabled without 312 connected to 317. Impulse duration to activate and start switching to position 0 is a minimum of 60ms. The product state will be unavailable.

- **Pin 314:** Position I order if closed with 317.

This contact is active with the SIRCO MOT PV in AUT mode with contact 312 – 317 closed and 313 – 317 open. Impulse duration to activate and switch to position I is a minimum of 60ms.

- **Pin 316:** Position 0 order if closed with 317

This contact is active with the SIRCO MOT PV in AUT mode with contact 312 – 317 closed and 313 – 317 open. Impulse duration to activate and switch to position O is a minimum of 60ms. For contactor logic maintain contacts on between terminal 316 and 317.

- **Pin 317:** Common

Common supply for inputs 312 to 316

5.1.2.2. Technical data

	Motorisation Module
Input Qty	5
Direct Current lin	0.35 to 0.5mA
Line resistance	1kΩ
Line length	100m (Min. wire 1.5mm ² #16AWG)
Pulse duration	60ms
Power per Input	0.06VA
Surge protection Vin_sg	4.8kV (1.2/50μs surge)
ESD withstand voltage (Contact/air)	2/4kV
Insulation (Common mode)	4.8kVac (Between I/P and all common parts)
Terminal connector	1.5mm ² minimum / 2.5mm ² max

5.1.2.3. Remote control logic

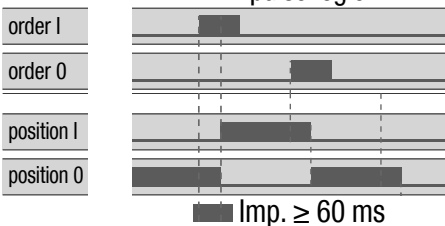
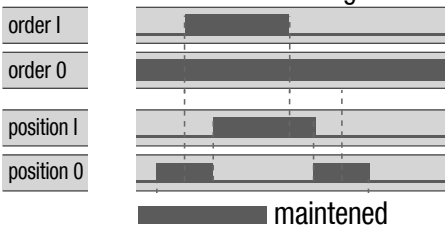
Remote switching operation can be driven in AUT mode by external volt free contacts as described above using input contacts 312 to 317.

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

- Impulse logic or
- Contactor logic.

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

(NOTE: 313 – 317 closed / Force SIRCO MOT PV to OFF Position, takes priority over all other orders no matter of the control logic used.)

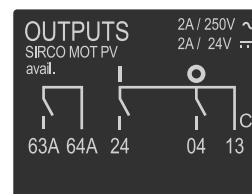
<p>Impulse logic (standard configuration):</p> <p>The SIRCO MOT PV is driven to a stable position (I – O) after receiving an impulse order.</p> <ul style="list-style-type: none"> • A switching command of at least 60 ms is necessary to initiate the switching operation • When switching command disappears, 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 0. 	<p style="text-align: center;">Impulse logic</p>  <p style="text-align: center;">Imp. ≥ 60 ms</p> <p>(Note: Excludes position switching delays)</p>
<p>Contactor Logic:</p> <p>The SIRCO MOT PV is driven to the position I for as long as the order is maintained.</p> <ul style="list-style-type: none"> • Order O is maintained. (Bridge 316 – 317) • Orders I have priority over order 0. • If order I disappears, the device returns to zero position. (With the power supply available). 	<p style="text-align: center;">Contactor logic</p>  <p style="text-align: center;">maintained</p> <p>(Note: Excludes position switching delays)</p>

5.1.3. Fixed outputs - Dry contacts

5.1.3.1. Description

As standard, the SIRCO MOT PV is equipped with four fixed outputs located on the motorisation module.

(Dry contacts to be powered by the user).



5.1.3.2. Position auxiliary contact

The SIRCO MOT PV is equipped with integrated position (I – O) auxiliary contact outputs through 3 off micro switches.

Pins 13, 04, 24

(Normally Open contacts with pin 13 as common)

5.1.3.3. SIRCO MOT PV Product available output (motorisation)

Pin 63A – 64A

(Normally Open contact that is held closed when the motorisation is available).

This contact gives constant feedback about the product’s availability and it’s capacity to operate.

The SIRCO MOT PV 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 PV 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 PV 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 PV (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

5.1.3.4. Technical data

Auxiliary Contact Quantity	2
Configuration	NO
Mechanical Endurance	800 cycles
Response Time	5 – 10 ms
Startup duration	200ms
Rated Voltage / Switching Voltage	250Vac
Rated Current	5A
Surge protection Vin_sg:	4.8kV (1.2/50µs surge)

6. TROUBLE SHOOTING GUIDE

<p>The SIRCO MOT PV does not operate electrically</p>	<ul style="list-style-type: none"> • Verify the power supply on terminals 301-302: 208 - 277 Vac \pm20 % • Verify that the front selector switch is in position (AUT) • Verify that contacts 313 and 317 are open. • 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.
<p>It is not possible to manually operate the switch</p>	<ul style="list-style-type: none"> • 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
<p>Electrical operation does not correspond to external order I,O</p>	<ul style="list-style-type: none"> • Verify the selected control logic wiring (impulse or contactor) • Verify the connector connections.
<p>The fault/manuel LED is ON</p>	<ul style="list-style-type: none"> • 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 PV. To reset a fault condition switch the SIRCO MOT PV 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 PV to off position). This is a normal condition. • Should the Fault LED remain on abnormally, contact SOCOMEC.
<p>Impossible to padlock</p>	<ul style="list-style-type: none"> • 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 PV manual slot. • Verify that the SIRCO MOT PV is in 0 position (Padlocking is only possible in 0 position for standard products)

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