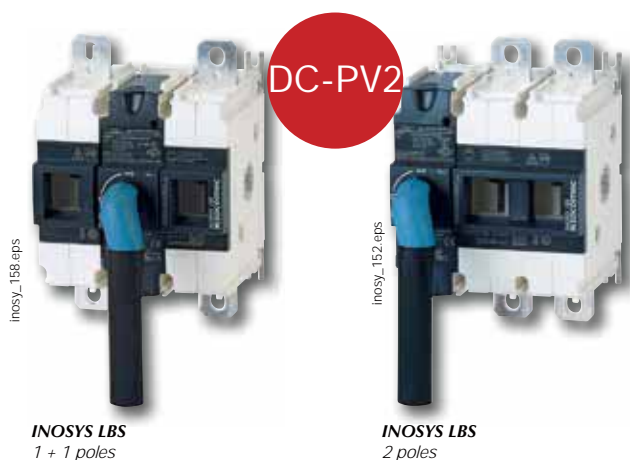




# INOSYS LBS

Load break switches for DC and PV applications  
160 to 630 A, up to 1500 VDC

Load break switches



## The solution for

- > Disconnection within PV installation
- > Battery protection
- > DC equipment & process isolation

## Strong points

- > High-performance switching in a compact design
- > Easy integration
- > Reinforced safety with visible contact indication
- > Efficient with low power-loss

## Compliance with standards

- > IEC 60947-3, DC-21B & DC-PV2



- > UL98B File E346418



- > KEMA-KEUR



- > CCC



## Compatible with requirements

- > IEC 60364-7-712
- > NEC art. 690
- > AS/NZS 5033

## Compliance with environmental standards

- > IEC 60947-1 Annex Q, Stage F
- > IEC 60068-2-1
- > IEC 60068-2-2
- > IEC 60068-2-27
- > IEC 60068-2-30
- > IEC 60068-2-52
- > IEC 60068-2-6



## Functions

INOSYS LBS is a range of load break switches that can be manually controlled. These switches can be operated manually using the handle to disconnect all or part of the electrical installation. They ensure on-load opening / closing and safe disconnection of any low voltage electrical circuit up to 1500 VDC. They can also be used for emergency power switching applications. They are available for DC-PV2 utilization category.

## Advantages

### High performance power switching in confined spaces

INOSYS LBS load break switches incorporate patented technology that provides a breaking capacity of between 500 and 750 VDC per pole, providing 1500 VDC in just 2 poles, and significantly limiting power dissipation. All in an exceptionally compact enclosure.

### Safe to use

- Direct position indicator on the bar and visible contact with containment of the electrical arc.
- The switch is completely independent of the operating speed, which ensures safe use under any conditions.
- High temperatures permitted: without derating up to 55 °C (131 °F), operational from -40 to +70 °C.

### Designed for harsh environments.

- Vibration-tested (13.2 Hz to 100 Hz at 0.7 G).
- Impact-tested (15 g for three cycles).
- Humidity-tested (2 cycles, 55 °C, 95% humidity).
- Salt spray-tested (3 cycles with storage humidity, 40 °C, 93% humidity after each cycle).

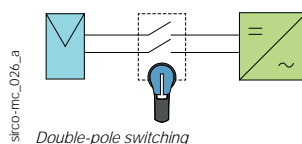
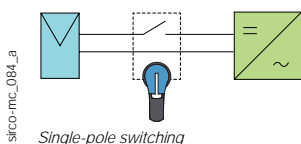
### Easy to install

- Wiring: the non-polarisation of the switch allows for all types of wiring and connections.
- Integrated auxiliary contacts.

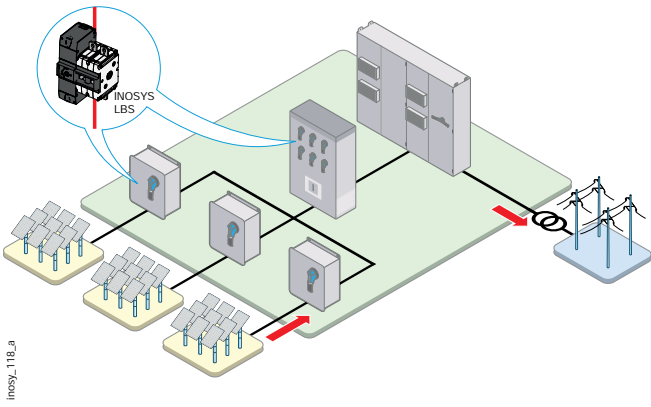
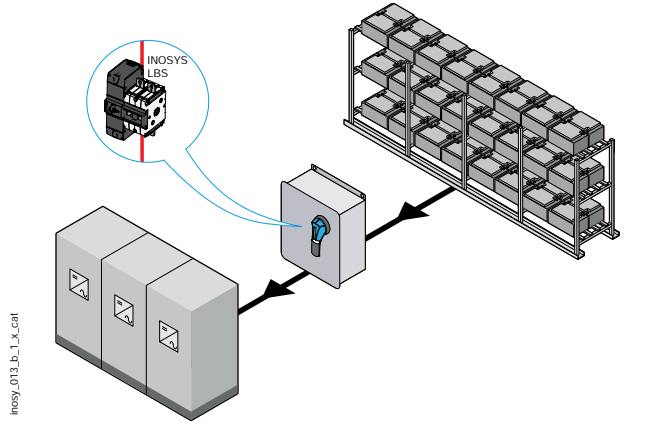
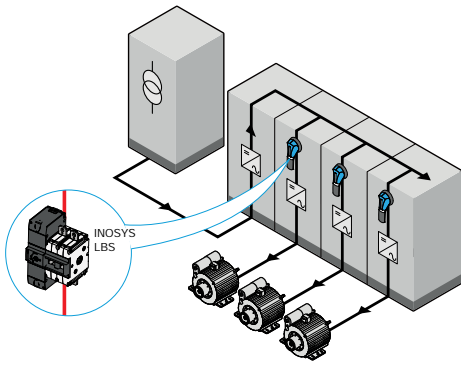
## Modular solution for flexible configuration

- Single or double-pole switch

The same switch can be used on earth-connected or insulated networks with a simple change in the wiring configuration.



Typical applications: local safe disconnection for DC and PV applications

<p><b>PV system: Junction box, combiner box or inverter</b></p>  <p><small>inosy_118_a</small></p>	<p><b>Battery isolation</b></p>  <p><small>inosy_013_b_Lx_cdt</small></p>
<p><b>DC process isolation</b></p>  <p><small>inosy_014_b_Lx_cdt</small></p>	

The SOCOMEC solutions

<p><b>SIRCO PV</b> Manual PV switches</p>  <p><small>sirco-pv_059 - 060 - 061</small></p> <p>Up to 3200 A at 1000 VDC        Up to 2000 A at 1500 VDC        Up to 4 circuits</p>	<p><b>INOSYS LBS</b> Visible breaking switches for DC and PV applications</p>  <p><small>inosy_152</small></p> <p>Up to 630 A (IEC) and        600 A (UL) at 1500 VDC</p>
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# INOSYS LBS

Load break switches for DC and PV applications  
160 to 630 A, up to 1500 VDC

## Introduction



1. INOSYS LBS 400 A - 1500 V DC
2. External operation handle
3. Direct operation handle
4. Shaft for external operation
5. Auxiliary contact
6. Inter-phase barriers
7. Terminal shrouds
8. Terminal screen
9. Bridging bar to arrange the poles in series
10. Captive nut
11. Mounting insert
12. Cage terminals

inosy\_168\_a\_1\_x\_cat.ai

## References

### INOSYS LBS

#### 1000 VDC - 1 circuit

Rating (A)	Frame size	No. of poles per circuit	Switch body <sup>(1)</sup>	External operation	Aux. Contact
160 A	F2	2 P (1 P+, 1 P-)	86P0 2016	Shaft 320 mm 1400 1032  Handle type S2 Black IP65 742F 2111	NO/NC 8499 0001
250 A	F2	2 P (1 P+, 1 P-)	86P0 2025		
315 A	F2	2 P (1 P+, 1 P-)	86P0 2031		
400 A	F3	2 P (1 P+, 1 P-)	86P0 2040	Shaft 320 mm 1400 1032  Handle type S2L Black IP65 14AF 2111	

(1) The switches are supplied without accessories.

(2) Please contact us

#### 1500 VDC - 1 circuit

Rating (A)	Frame size	No. of poles per circuit	Switch body <sup>(1)</sup>	External operation	Aux. Contact
160 A	F2	2 P (1 P+, 1 P-)	86P0 2017	Shaft 320 mm 1400 1032  Handle type S2 Black IP 65 742F 2111	NO/NC 8499 0001
			86P1 1017 <sup>(3)</sup>		
		3 P (2 P+, 1 P-)	86P0 3016		
250 A	F2	2 P (1 P+, 1 P-)	86P0 2026		
			86P1 1026 <sup>(3)</sup>		
		3 P (2 P+, 1 P-)	86P0 3025		
315 A	F2	2 P (1 P+, 1 P-)	86P0 2032		
			86P1 1032 <sup>(3)</sup>		
		3 P (2 P+, 1 P-)	86P0 3031		
400 A	F3	2 P (1 P+, 1 P-)	86P0 2041	Shaft 320 mm 1400 1032	
			86P1 1041 <sup>(3)</sup>		
630 A	F3	2 P (1 P+, 1 P-)	86P0 2064	Handle type S2L Black IP 65 14AF 2111	
			86P1 1064 <sup>(3)</sup>		

#### 1500 VDC - 2 circuits

Rating (A)	Frame size	No. of poles per circuit	Switch body <sup>(1)</sup>	External operation	Aux. Contact
400 A	F3	2 P (1 P+, 1 P-)	86P2 2041 <sup>(2)</sup>	Shaft 320 mm 1400 1032	NO/NC 8499 0001
500 A			86P2 2051		
630 A			86P2 2064 <sup>(2)</sup>	Handle type S2L Black IP 65 14AF 2111	

(1) The switches are supplied without accessories.

(2) Centred mechanism.

# INOSYS LBS

Load break switches for DC and PV applications

160 to 630 A, up to 1500 VDC

## Accessories

### Direct operation handle

Frame size	Handle type	Handle colour	Reference
F2	E2	Black	8499 5022
F2	E2	Red	8499 5023
F3	E3	Black	8499 5032



E2 handle

access\_400\_a\_1\_cat

### External operation handle

#### Use

The external control handles include a breastplate and can be padlocked. External handles should be used with a shaft extension.

Note: We recommend using IP55 for indoor and IP65 for outdoor applications.

#### Example of use:

When the handle is locked in the "ON" position, the operator must make sure to disconnect and isolate the circuit before accessing the board and carrying out maintenance work.

You can open the door when the switch is in the "ON" position by bypassing the lock function with a specially designed tool (authorised persons only). The lock is automatically re-applied when the door is closed.



Handle type S2

access\_150\_eps

Frame size	Handle type	Handle colour	Protection degree	Front operation Reference	Side operation Reference <sup>(2)</sup>
F2	S2	Black	IP55	7421 2111	
F2	S2	Black	IP65	742F 2111	14YA 2111
F2	S2	Red	IP65	742G 2111	14YB 2111
F3	S2L <sup>(1)</sup>	Black	IP55	14A1 2111	
F3	S2L <sup>(1)</sup>	Black	IP65	14AF 2111	14AA 2111
F3	S2L <sup>(1)</sup>	Red	IP65	14AG 2111	14AB 2111

<sup>(1)</sup> S2L handles have an extended socket; please see the section on dimensions.

<sup>(2)</sup> only compatible with left mechanism version.

### Shaft for external operation

Frame size	Handle type	Length (mm)	Reference
F2 - F3	S2, S2L	200	1400 1020
F2 - F3	S2, S2L	320	1400 1032
F2 - F3	S2, S2L	400	1400 1040

Other colour schemes: please contact us.



Shaft for S2 and S2L handles

access\_401\_a\_1\_cat

### Shaft guide for external operation

#### Use

Allows you to guide the shaft for external control.

This accessory can correct any misalignment of the control shaft by up to 15 mm.

Recommended for shaft lengths over 320 mm.

Description	Reference
Shaft guide	1429 0000



access\_260\_a\_2\_cat

## Auxiliary contact

### Use

Provide information about the position and pre-break depending on installation location.

### Characteristics

Switching type: NO/NC,  
IP2X with front control (screw cap).  
10 000 operations.  
Max. 3 per switch.

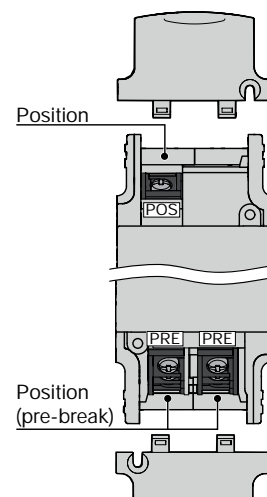
Frame size	Connection type	Type	Reference
F2 - F3	Screws	Standard NO/NC	8499 0001
F2 - F3	Screws	Low level NO/NC	8499 0002

### Characteristics

Type of auxiliary contact	Min. current (A)	I <sub>th</sub> (A)	Operating current I <sub>e</sub> (A)			
			24 VDC DC-14	48 VDC DC-14	230 VAC AC-15	440 VAC AC-15
Standard	12.5 mA / 24 V	16	1	0.2	4	4
Low level	1 mA / 4 V	16	1	0.2	2	1



access\_402\_a\_1\_cat



access\_405\_a\_1\_gb\_cat

## Bridging bar for poles in series

### Use

The bridging bars enable the poles to be connected in series, allowing the following configurations.

### 1500 VDC – 1 circuit – dual polarity switching

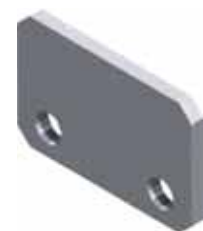
Frame size	Rating (A)	No. of poles per circuit	Quantity to order	Reference
F2	160 ... 315	3 P	1	8409 0016 <sup>(1)</sup>

<sup>(1)</sup> Kit includes 2 identical bridging bars.

### 1500 VDC – 1 circuit with full voltage switching per polarity / 2 circuits – single polarity switching

Frame size	Rating (A)	No. of poles per circuit	Quantity to order	Reference
F3	400	4 P / 2 P	2	8409 0040 <sup>(1)</sup>
F3	500	4 P / 2 P	2	8409 0041
F3	630	4 P / 2 P	2	8409 0063

<sup>(1)</sup> Kit includes 2 identical bridging bars.



access\_411\_a\_1\_cat

# INOSYS LBS

Load break switches for DC and PV applications

160 to 630 A, up to 1500 VDC

## Accessories (continued)

### Inter-phase barriers

#### Use

Safety isolating break between the terminals, essential for use at 1000 VDC and 1500 VDC or between 2 circuits.

Frame size	Type	Packaging (units)	Reference
F2 - F3	Short	2	8499 2202
F2 - F3	Short	3	8499 2203
F2 - F3	Long	2	8499 2212
F2 - F3	Long	3	8499 2213



access\_405\_a\_1\_cat access\_406\_a\_1\_cat

### Terminal shrouds

#### Use

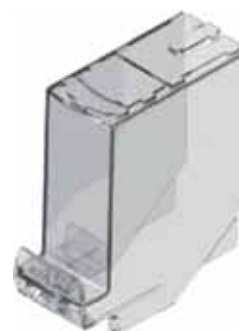
For top or bottom protection against direct contact with terminals or connection parts; provides IP4 protection and phase separation. 1 P type to cover 1 pole connection.

#### Advantages

Perforations for thermographic inspection / voltage check without the need to remove the shrouds. Terminal shrouds can be fixed in place with a holding insert. Includes break-off tabs for precise adaptation to cables or insulated bars.

Frame size	Packaging (units)	No. of poles	Position	Reference
F2	3	1 P	Top or bottom	8499 4213 <sup>(1)</sup>
F2	4	1 P	Top or bottom	8499 4214 <sup>(1)</sup>
F3	4	1 P	Top or bottom	8499 4314 <sup>(1)</sup>

<sup>(1)</sup> Compatible with the holding insert which can be fitted to lock the shrouds in place.



access\_407\_a\_1\_cat

### Terminal screens

#### Use

Provides top and bottom protection against direct contact with terminals or connection parts.

#### Advantages

Perforations for thermal checks. Assembly requires mounting inserts (provided with terminal screens).

Frame size	No. of poles	Position	Reference <sup>(1)</sup>
F2	2 P	Top and bottom	8499 3222
F2	3 P	Top and bottom	8499 3232
F3	2 P	Top and bottom	8499 3322

<sup>(1)</sup> Each reference comprises 2 terminal screens for top and bottom protection.



access\_408\_a\_1\_cat

## Mounting insert

### Use

Used to secure terminal shrouds / inter-phase barriers on the switch.

Frame size	Packaging (units)	Reference
F2 - F3	10	8499 6220
F2 - F3	100	8499 6221



access\_409\_a\_1\_cat

## Captive nut

### Use

This accessory enables simple one-sided connection to the power terminals. It can be mounted on either side of the terminal for front or rear connection.

Frame size	Packaging (units)	Reference
F2	12	8499 6120
F2	120	8499 6121
F3	12	8499 6130
F3	120	8499 6131



access\_399\_a\_1\_cat

## Voltage tap

### Use

Allows you to connect sensors or measure voltage with a fast-on connection.

Frame size	Packaging (units)	Reference
F2	12	8499 9012
F3	12	8499 9013



access\_412\_a\_1\_cat



## Characteristics

### Characteristics according to IEC 60947-3

Rated current $I_n$		160 A	250 A	315 A	400 A	500 A	630 A
Frame size		F2	F2	F2	F3	F3	F3
Thermal current at 40 °C (A)		160	250	315	400	500	630
Thermal current at 50 °C (A)		160	250	315	400	500	630
Thermal current at 60 °C (A)		160	250	315	400	500	630
Rated insulation voltage $U_i$ (V)		1500	1500	1500	1500	1500	1500
Rated impulse withstand voltage $U_{imp}$ (kV)		12	12	12	12	12	12
Number of circuits	Nominal voltage	Utilisation category	$I_e$ (A)	$I_e$ (A)	$I_e$ (A)	$I_e$ (A)	$I_e$ (A)
1 circuit	1000 VDC <sup>(1)</sup>	DC-21 B	160	250	315	400	500
1 circuit	1500 VDC <sup>(2)</sup>	DC-21 B	160	250	315	400	500
Number of circuits	Nominal voltage	Utilisation category	$I_e$ (A)	$I_e$ (A)	$I_e$ (A)	$I_e$ (A)	$I_e$ (A)
1 circuit	1000 VDC <sup>(1)</sup>	PV2	-	-	-	-	-
1 circuit	1500 VDC <sup>(2)</sup>	PV2	160	250	315	400	500
2 circuits	1500 VDC <sup>(2)</sup>	PV2	-	-	-	400	500
<b>Short-circuit operation at 1000 VDC and 1500 VDC (unprotected)</b>							
Current rated as short-time withstand $I_{cw}$ 1s (kA rms)		5	5	5	8	8	8
Rated short-circuit breaking capacity $I_{cm}$ (peak kA) – 60 ms		10	10	10	10	10	10
<b>Connection</b>							
Recommended Cu rigid cable cross-section <sup>(3)</sup>		70	120	185	240	2 x 150	2 x 185
Recommended width of copper bars (mm) <sup>(3)</sup>		20	20	20	25	25	25
<b>Mechanical characteristics</b>							
Durability (number of operating cycles)		8000	8000	8000	8000	8000	8000
Power dissipation per pole (W/pole)		4.5	11.2	13	13	21.6	30.2

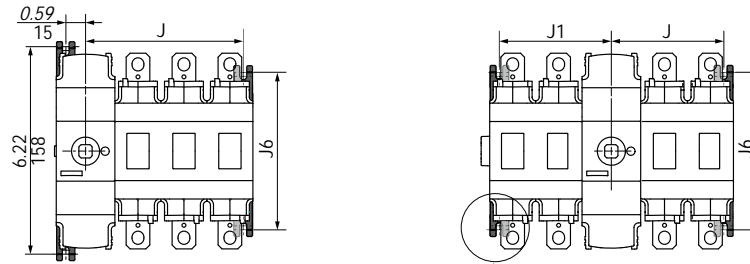
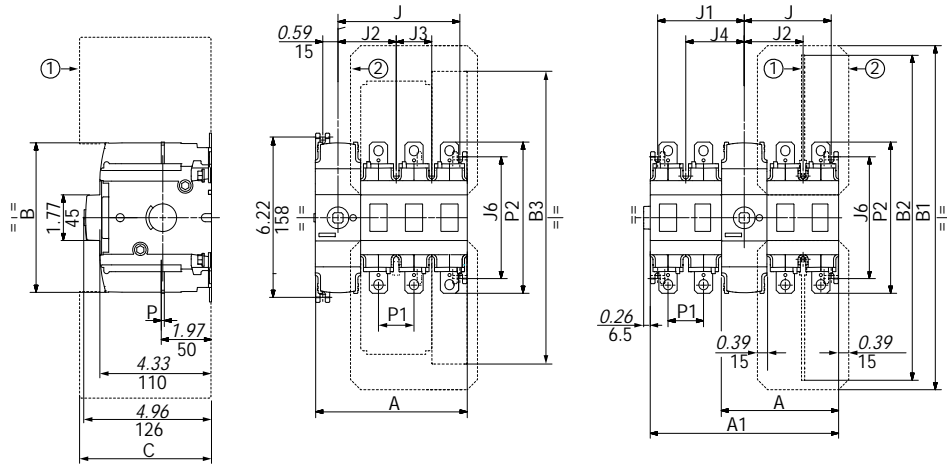
(1) 2 poles in series.

(2) 2 or 3 poles in series.

(3) For aluminium connections, please contact us.

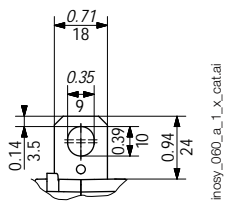
## Dimensions (in/mm)

### INOSYS LBS



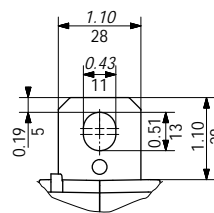
- 1. Inter-phase barrier.
- 2. Terminal screens.

### Wiring terminal F2



inosy\_060\_a\_1\_x\_cat.ai

### Wiring terminal F3



inosy\_061\_a\_1\_x\_cat.ai

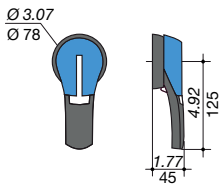
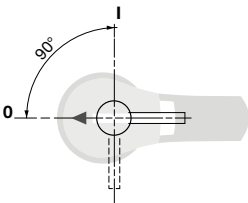
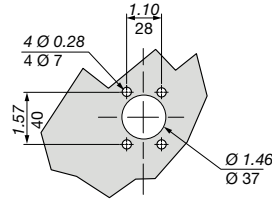
inosy\_166\_a\_1\_x\_cat.ai

Rating (A)	Frame size	Units	A		A1	J	J1	J	
			2 P	3 P	1+1 P / 2+2 P	1+1 P / 2+2 P	1+1 P / 2+2 P	2 P	3 P
160 ... 315	F2	inches	4.60	5.98	4.60 / 7.36	1.97 / 3.37	2.05 / 3.44	3.35	4.72
		mm	117	152	117 / 187	50.5 / 85.5	52.5 / 87.5	85.5	120.5
400	F3	inches	5.40	7.17	5.40 / 8.94	2.36 / 4.15	2.44 / 4.23	4.13	-
		mm	137	182	137 / 227	60.5 / 105.5	62.5 / 107.5	105.5	-

Rating (A)	Frame size	Units	B	B1	B2			B3	C		J2	J3	J4	J6	P1	P2
			IEC short	IEC long	UL	IEC	UL									
160 ... 315	F2	inches	5.90	13.35	7.85	12.61	10.31	11.64	4.33	4.33	2.26	1.38	2.34	4.72	1.38	5.87
		mm	154	339	199	320	262	296	110	110	57.5	35	59.5	120	35	149
400	F3	inches	5.90	16.28	9.35	14.11	15.5	14.12	4.33	5.31	2.64	1.77	2.72	6.22	1.77	7.87
		mm	154	414	237	358	394	359	110	135	67.5	45	69.5	158	45	200

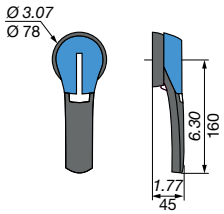
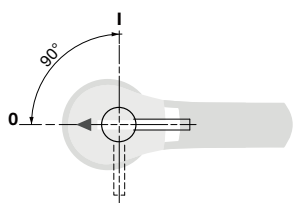
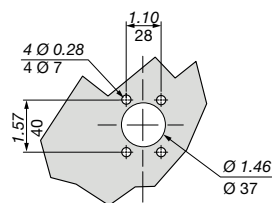
## Dimensions of external handles (in/mm)

### F2

Handle type	Front operation Direction of operation	Door drilling
<b>S2 type</b>  		

poign\_013\_b\_1\_us\_cat.eps

### F3

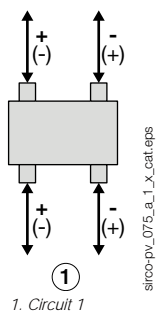
Handle type	Front operation Direction of operation	Door drilling
<b>S2L type</b>  		

poign\_069\_b\_1\_us\_cat.eps

## Wiring configuration

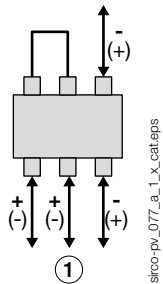
### 1 circuit - 1000 VDC

#### F2-F3 - 2 P

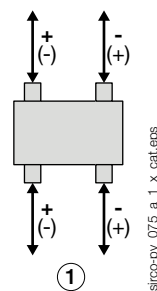


### 1 circuit - 1500 VDC

#### F2 - 3 P

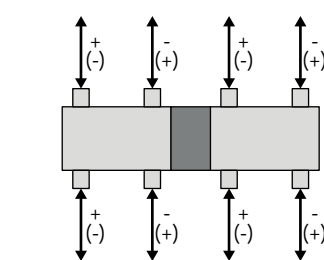


#### F2-F3 - 2 P

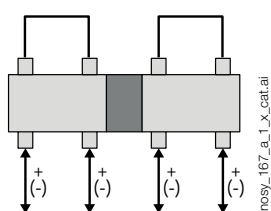


### 2 circuits - 1500 VDC

#### F3 - 2 P



### 1 circuit - 1500 VDC per polarity

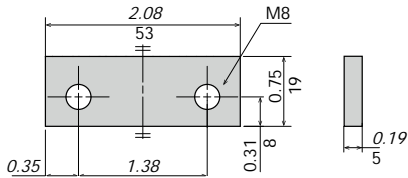


## Bridging bars (in/mm)

### F2

8409 0016<sup>(1)</sup>

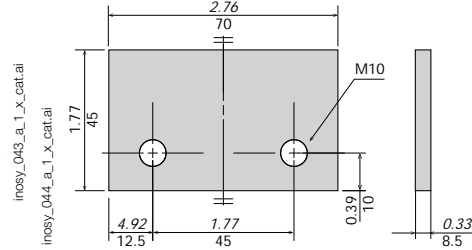
(1) Kit includes 2 identical bars.



### F3

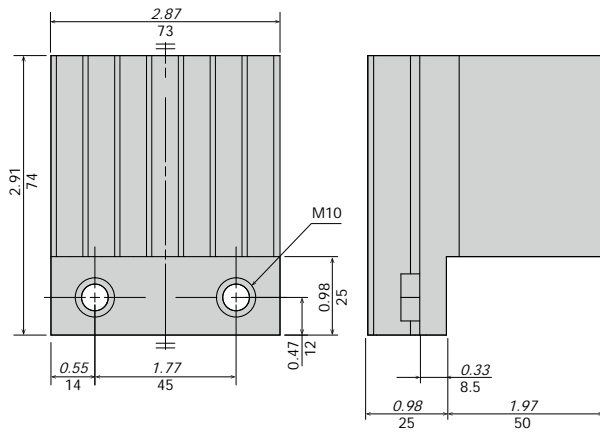
8409 0040<sup>(1)</sup>

(1) Kit comprises 2 identical bars.

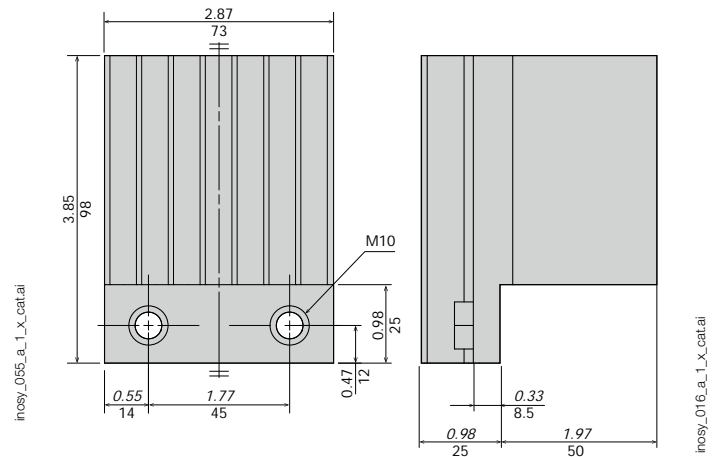


### F3

8409 0041



8409 0063



## Mounting orientation

### F2 - F3

All mounting orientations are possible. Derating may apply - please consult us.





# Load break switches

for specific applications

Load break switches

Despite already offering a wide range of load break switches, SOCOMEC also manufactures specific products to suit any requirement. Some of these products can be seen on these two pages. This list is not exhaustive.

Please do not hesitate to contact us.

## SIRCO range with overrated neutral



sirco\_255

The use of power electronics is becoming more and more frequent. Chopper, rectifiers and current inverters distort the signal by reinjecting the 3rd order harmonics which are combined in the neutral. Range available from 125 to 1800 A.

SIRCO 3 x 250 A with 400 A rated neutral

## Compliance with standards

- > IEC 60947-3
- > BS EN 60947-3
- > EN 60947-3
- > NBN EN 60947-3
- > VDE 0660-107 (1992)



## SIRCO high short-circuit withstand



sirco\_353

- 80 kA rms 1 s.
- 110 kA rms 0.1 s.
- 240 kA peak.

## SIRCO early break AC

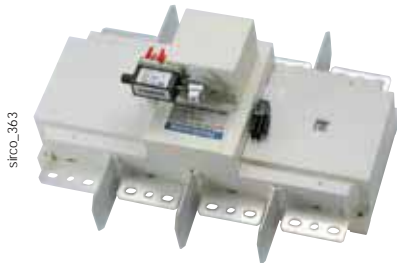


sirco\_380

- Complete range from 125 to 3200 A.
- Double positive break indication given through a position indication window, located directly on the product, and by the operating handle.
- Features an early break auxiliary contact as standard.
- Severe load duty categories (AC-22 and AC-23).
- High resistance to damp heat (supplied "tropicalised").

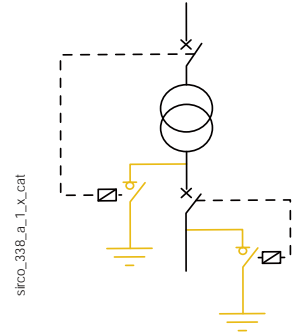
SIRCO 3 x 1250 A with early prebreak AC

## SIRCO for earthing



sirco\_363

- From 800 to 1800 A.
- 50 kA rms 1 s.
- Special S4 type handle.
- Undervoltage coil interlocking.



sirco\_338\_a\_1\_x\_cat

## Remotely operated load break switches

### SIRCO MOT AT



sirco\_310

#### Function

SIRCO MOT AT are remotely operated 3/4 pole load break switches. They make and break under load conditions and provide safety isolation for any low voltage electrical circuit. This is ensured via volt-free contacts using either a pulse or contactor logic.

#### Advantages

- **Extended power range**  
These products offer great flexibility thanks to a wide power supply range of 208 to 277 VAC  $\pm 20\%$ .
- **Integrated auxiliary contacts**  
As part of the product monitoring function, the SIRCO MOT AT enables the transmission of information relating to their position. This is possible thanks to the standard integration of an auxiliary contact for each position.

#### General characteristics

- 2 stable positions (I, 0).
- One auxiliary contact per position as standard.
- Positive break indication
- AUT/MAN selector.
- Manual emergency operation.
- Padlocking in position 0 (position I optional).
- Ratings: from 125 to 3200 A.

## References

Rating (A)		125	160	250	400	630	800
No. of poles	Power supply voltage	Reference	Reference	Reference	Reference	Reference	Reference
3 P	230 VAC	9915 3012	9915 3016	9915 3025	9915 3040	9915 3063	9915 3080
4 P	230 VAC	9915 4012	9915 4016	9915 4025	9915 4040	9915 4063	9915 4080

Rating (A)		1000	1250	1600	2000	2500	3200
No. of poles	Power supply voltage	Reference	Reference	Reference	Reference	Reference	Reference
3 P	230 VAC	9915 3100	9915 3120	9915 3160	9915 3200	9915 3250	9915 3320
4 P	230 VAC	9915 4100	9915 4120	9915 4160	9915 4200	9915 4250	9915 4320



# UL and CSA load break switches

from 16 to 1200 A

Load break switches



sirco-ul\_022\_b\_1\_cat.eps

## Something to think about

- > SOCOMEC also offers a full range of load break switches, with direct or front external control that fully comply with UL & CSA standards.
- > A specific UL/CSA product catalogue is available on request, don't hesitate to contact us for your copy.
- > Important: all electrical equipment designed for the North American market must conform to UL/CSA standards.

## Compliance with standards

- > UL 508 (file UL E 173959)
- > UL 98 (file UL E 201138)
- > CSA 22.2 n°4 (file CSA 189705)



## Function

### Standard UL 508: load break switches for control of electric motors

They ensure on-load making and breaking and provide safety isolation for motor control up to 600 V.

### Standard UL 98 and UL 489: load break switches

They ensure on-load making and breaking and provide safety isolation for all electrical circuits up to 600 V.

## General characteristics

### SIRCO M

- Positive break indication
- Backplate or DIN-rail mounting.
- Padlocking in position 0 with max. 3 padlocks for external control.
- Door locked when the switch is on for devices with external front operation.

### SIRCO

- Positive break indication.
- Padlocking in position 0 with max. 3 padlocks for external control.
- Door locked when the switch is on for devices with external front operation.

### INOSYS LBS

- Visible breaking (contact position indication).
- Shunt or undervoltage tripping function from 24 to 220 VDC and from 24 to 230 VAC.
- Opening and closing independent of speed of movement.
- No de-rating up to 60°C and an operating temperature range of -25 to +70°C.

## Standard UL 508: motor control

### SIRCO M

Rating (A)	16	20	25	30	40	60	80
<b>N° of poles</b>							
3 P	•	•	•	•	•	•	•
4 P	•	•	•	•	•	•	•
<b>Operation type</b>							
Frontal direct/external	•	•	•	•	•	•	•
<b>Type of mounting</b>							
Front/back	•	•	•	•	•		



sircm\_132\_a

## Standard UL 489: load break switches

### SIRCO V

Rating (A)	Operation type	30
3 P	Frontal direct/external	•
3 P + switched neutral	Lateral direct/external	•



sirco\_092\_a\_1\_cat

## Standard UL 98: load break switches

### SIRCO M and SIRCO

Type	SIRCO M			SIRCO					
Rating (A)	30	60	100	200	400	600	800	1000	1200
<b>N° of poles</b>									
3 P	•	•	•	•	•	•	•	•	•
4 P	•	•	•	•	•	•	•	•	•
<b>Operation type</b>									
External front	•	•	•	•	•	•	•	•	•



sirco\_ul\_022\_b\_1\_cat