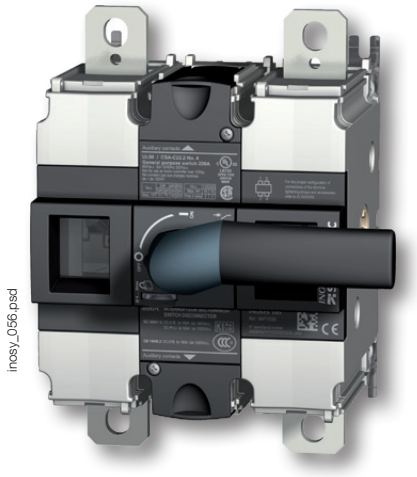
INOSYS LBS DC

Load Break Switches for DC and PV applications
from 160 to 1600 A, up to 2000 VDC



The solution for

> Industry

Strong points

> High performance power switching in a compact frame
> Safe & reliable operation
> Designed for harsh environments
> Easy to install
> Modular solution for flexible configuration

Conformity to standards

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

Function

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 direct current low voltage electrical circuit up to 2000 VDC. They can also be used for emergency power switching applications. They are the first switches in the market capable to handle 2000 VDC.

Advantages

High performance power switching in a compact frame

- INOSYS load break switches incorporate patented technology that provides a breaking capacity of 750 VDC per pole, providing 1500 VDC in just 2 poles, and significantly limiting power dissipation. All in an exceptionally compact device.
- Also available in 2000 VDC in 3 or 4 poles configuration. The upgrade from 1500 VDC to 2000 VDC allow the switches to handle higher voltage applications and bring more power. INOSYS range meets or exceeds industry standards and certifications, ensuring compliance with electrical safety regulations and guidelines.

Safe & reliable operation

- Direct position indication on the bar and visible contact with containment of the electrical arc.
- The opening and closing of the switch is fully independent from the speed of operation, ensuring safe operation under all conditions.
- High temperature withstand: no derating up to 55 °C, functional from -40 to +70 °C.

Designed for harsh environments

- Vibration testing (from 13.2 to 100 Hz at 0.7 g).
- Shock testing (15 g during three cycles).
- Humid temperature testing (2 cycles, 55°C with 95% humidity level).
- Salt mist testing (3 cycles with humidity storage, 40°C, 93% humidity after each cycle).

Easy to install

- Wiring: as the switch is non-polarized all types of wiring and connections are possible.
- Easy access without tools to integrate auxiliary contacts (located within the switch footprint).
- Mechanism can be centred or left aligned (in the factory) to accommodate installation requirements.

Modular solution for flexible configuration

- Single or dual polarity switching.
- The same switch can be used for installation with either grounded or floating networks by choosing the wiring configuration.

General characteristics

- Range 160 A to 1600 A.
- Up to 2000 VDC.
- High-performance switching with a compact design.
- Easy integration.
- Reinforced safety with visible breaking indication.
- High efficiency with low power loss.

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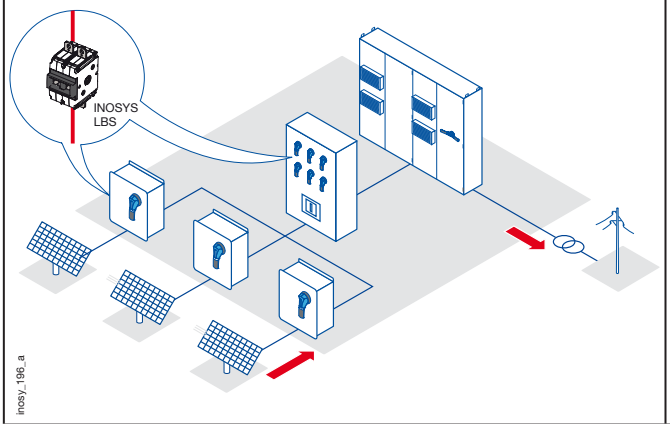
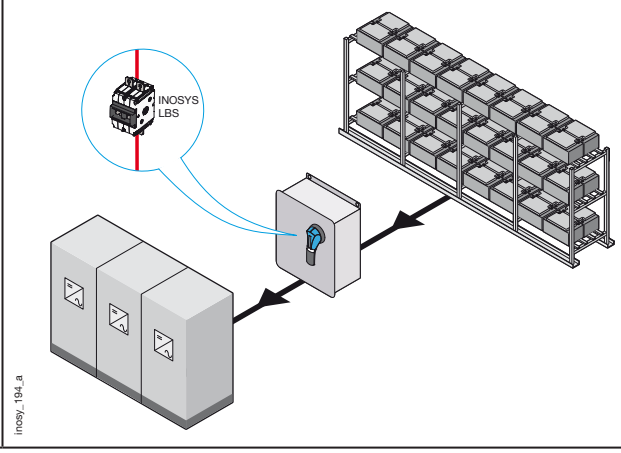
Typical applications: local safe disconnection for DC and PV applications

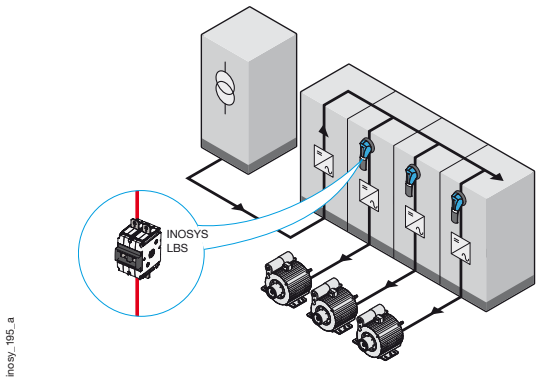
PV installation: Combiner box, Recombiner box or Inverter



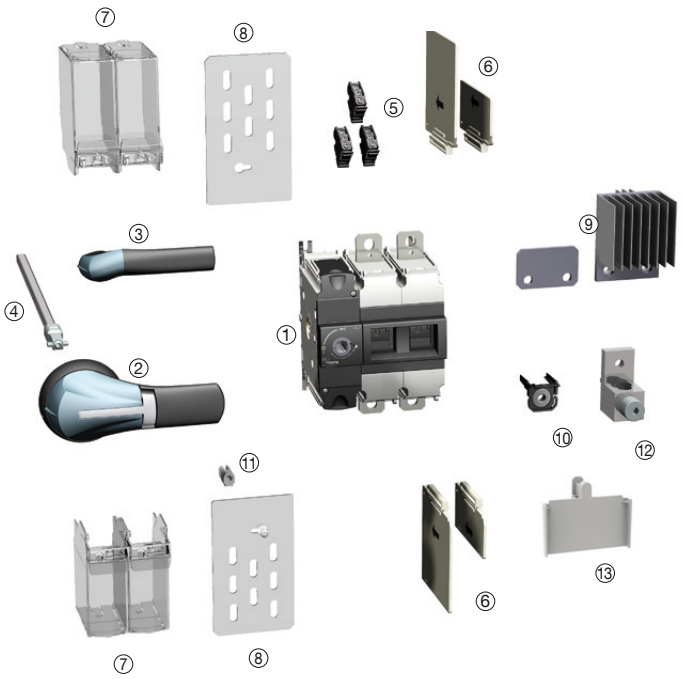
Battery protection



Isolation of DC processes



Overview



1. INOSYS LBS 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
13. Isolation plate

References

INOSYS LBS

1000 VDC - 1 circuit

Rating (A)	Frame size	No. of poles per circuit	Switch body[1]	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.

1500 VDC - 1 circuit

Rating (A)	Frame size	No. of poles per circuit	Switch body[1]	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**[2]		
		3 P (2 P+, 1P-)	86P0 **3016**		
250 A	F2	2 P (1 P+, 1 P-)	86P0 **2026**		
			86P1 **1026**[2]		
		3 P (2 P+, 1 P-)	86P0 **3025**		
315 A	F2	2 P (1 P+, 1 P-)	86P0 **2032**		
			86P1 **1032**[2]		
		3 P (2 P+, 1 P-)	86P0 **3031**		
400 A	F3	2 P (1 P+, 1 P-)	86P0 **2041**	Shaft 320 mm 1400 **1032** Handle type S2L Black IP 65 14AF **2111**	
			86P1 **1041**[2]		
500 A	F3	2P (1P+, 1P-)	86P0 **2051**		
			86P1 **1051**[2]		
630 A	F3	2 P (1 P+, 1 P-)	86P0 **2064**		
			86P1 **1064**[2]		

(1) The switches are supplied without accessories.
(2) Centred mechanism.

1500 VDC - 2 circuits

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

(1) The switches are supplied without accessories.
(2) Centred mechanism.

1500 VDC - high rating

Rating (A)	Frame size	No. of poles per circuit	Switch body [1]	External operation	Aux. Contact
800 A	F3	4P (2P // 2P)	86P2 **2081**	Shaft 320 mm 1400 **1032** Handle type S2L Black IP 65 14AF **2111**	NO/NC 8499 **0001**
1000 A			86P2 **2100**		
1250 A			86P2 **2125**		
1400 A			86P2 **2140**		
1600 A			86P2 **2160**		

(1) The switches are supplied without accessories.

2000 VDC - 1 circuit

Rating (A)	Frame size	No. of poles per circuit	Switch body[1]	External operation	Bridging bar
400 A	F3	3P (2P+, 1P-)	88P1 **2041**	Shaft 320 mm 1400 **1032** Handle type S2L Black IP 65 14AF **2111**	8409 **0040**
		4P (2P+, 2P-)	88P2 **2041**[2]		
500 A		3P (2P+, 1P-)	88P1 **2051**		8409 **0041**
		4P (2P+, 2P-)	88P2 **2051**[2]		
630 A		3P (2P+, 1P-)	88P1 **2064**		
		4P (2P+, 2P-)	88P2 **2064**[2]		

(1) The switches are supplied without accessories.
(2) Centred mechanism.

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

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External operation handle

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

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

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Frame size	Handle type	Handle colour	Protection degree	Front operation Reference	Side operation Reference(2)
F2	S2	Black	IP65	742F **2111**	14YA **2111**
F2	S2	Red	IP65	14AE **2111**	
F3	S2L(1)	Black	IP65	14AF **2111**	14AA **2111**
F3	S2L(1)	Red	IP65	14AE **2111**	

(1) S2L handles have an extended socket; please see the section on dimensions.
(2) Only comptatible with left mechanism version.

Shaft for external handle

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 lengths: please consult us.

Shaft for S2 and S2L type handle

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Isolation plate

Use
This isolation plate ensure safety for the customer.

Characteristics
Products above 800A are supplied from factory with isolation plates.
For replacement purposes, quantity to order should be 2 kits.

Description	Quantity to order	Reference
Isolation plate	2	8499**1000** (1)

(1) Kit includes 2 identical isolation plates

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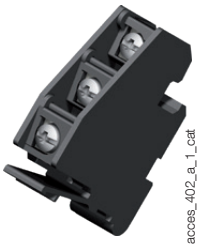
Auxiliary contact

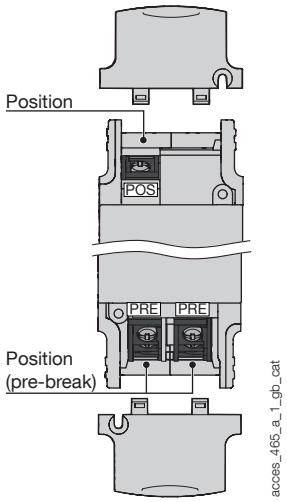
Use

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**

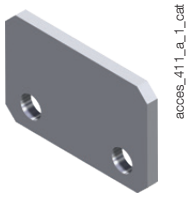
Characteristics

Type of auxiliary contact	Min. current (A)	I_{th} (A)	Operating current I_e (A)			
			24 VDC	48 VDC	230 VAC	440 VAC
			DC-14	DC-14	AC-15	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

Bridging bar for poles in series

Use

The bridging bars enable the poles to be connected in series and parallel, allowing the following configurations for 1500 VDC and 2000 VDC.



1500 VDC - 1 circuit

Frame Size	Rating (A)	No. of poles	Quantity to be ordered	Reference
F2	160 … 315	3 P	2	8409 **0025**
F3	1600	4P / 2P	2	8409 **1600**

1500 VDC – 1 circuit with full voltage switching per polarity

Frame Size	Rating (A)	No. of poles	Quantity to be ordered	Reference
F3	400	4P / 2P	2	8409 **0040** (1)
F3	500	4P / 2P	2	8409 **0041**
F3	630	4P / 2P	2	8409**0063**

2000 VDC - 1 circuit

Frame Size	Rating (A)	No. of poles	Quantity to be ordered	Reference
F3	400	3P	1	8409 **0040**
F3	400	4P	2	8409 **0040**
F3	500...630	3P	1	8409 **0041**
F3	500...630	4P	2	8409 **0041**

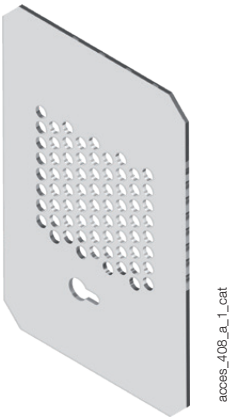
(1) Centered mechanism.

Accessories (continued)

Terminal screen

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).

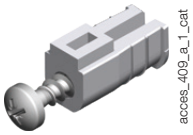


Frame size	No. of poles	Position	Reference(1)
F2	2 P	Top and bottom	8499 **3222**
F2	3 P	Top and bottom	8499 **3232**
F3	2 P	Top and bottom	8499 **3722**

(1) Each reference comprises 2 terminal screens for top and bottom protection.

Holding insert

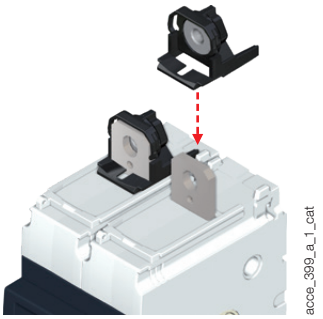
Use
Used to secure terminal on the switch.



Frame size	Pack (unit)	Reference
F2 - F3	10	8499 **6220**
F2 - F3	100	8499 **6221**

Captive nut

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



Frame size	Pack (unit)	Reference
F2	12	8499 **6120**
F2	120	8499 **6121**
F3	12	8499 **6130**
F3	120	8499 **6131**

Voltage tap

Use
Allows connection of voltage sensing or power cables, with fast-on connection.

Frame size	Pack (unit)	Reference
F2	12	8499 **9012**
F3	12	8499 **9013**

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
Thermal current at 70°C (A)			160	250	315	400	480	580
Thermal current at 80°C (A)			140	220	280	360	430	520
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)**	**I_e (A)**
1 circuit	1000 VDC[1]	DC-21 B	160	250	315	400	500	630
1 circuit	1500 VDC [2]	DC-21 B	160	250	315	400	500	630
Number of circuits	**Nominal voltage**	**Utilisation category**	**I_e (A)**	**I_e (A)**	**I_e (A)**	**I_e (A)**	**I_e (A)**	**I_e (A)**
1 circuit	1000 VDC [1]	PV2	-	-	-	-	-	-
1 circuit	1500 VDC [2]	PV2	160	250	315	400	500	630
2 circuits	1500 VDC [2]	PV2	-	-	-	400	500	630
Short-circuit operation at 1000 VDC and 1500 VDC (unprotected)								
Current rated as short-time withstand I_{cw} 1s (kA rms)			10	10	10	10	10	10
Rated short-circuit breaking capacity I_{cm} (peak kA) – 60 ms			10	10	10	10	10	10
Connection								
Recommended Cu rigid cable cross-section [3]			70	120	185	240	2 x 150	2 x 185
Recommended width of copper bars (mm) [3]			20	20	20	25	25	25
Mechanical characteristics								
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.

Characteristics (continued)

Characteristics according to IEC 60947-3

Rated current I_n		**800**	**1000**	**1250**	**1400**	**1600**
		(A)	**(A)**	**(A)**	**(A)**	**(A)**
Rated insulation voltage Ui (V)		1500	1500	1500	1500	1500
Rated impulse voltage Uimp (kV)		12	12	12	12	12
Frame Size		F3	F3	F3	F3	F3
Rated voltage	**Ambient temperature (°C)**	**(A)**	**(A)**	**(A)**	**(A)**	**(A)**
1500 VDC	40	800	1000	1250	1400	1600
1500 VDC	50	800	1000	1250	1400	1480
1500 VDC	60	720	900	1120	1260	1330
1500 VDC	70	650	810	1010	1130	1200
1500 VDC	80	580	730	910	1020	1080
Rated voltage	**Utilization category**	**(A)**	**(A)**	**(A)**	**(A)**	**(A)**
1500 VDC	DC-21 B	800	1000	1250	1400	1600
1500 VDC	PV1	800	1000	1250		
1500 VDC	PV2	800	1000			
Short circuit capacity						
Rated short time withstand current Icw 1s (kA rms)	IEC 60947-3	20	20	20	20	20
Rated short-circuit making capacity Icm (kA peak)	IEC 60947-3	20	20	20	20	20
Connection						
Recommended width of copper bars (mm)		2 x 5 x 50	2 x 5 x 60	2 x 5 x 80	2 x 5 x 100	2 x 5 x 100
Tightening torque min (Nm)		35	35	35	35	35
Tightening torque max (Nm)		42	42	42	42	42
Mechanical characteristics						
Durability (number of operating cycles)		8000	8000	8000	8000	8000
Power dissipation per pole (W/pole)		12	18	28	35	46

Characteristics according to an extrapolation of IEC 60947-3

Rated current I_n		**400 A**	**500 A**	**630 A**
Frame size		**F3**	**F3**	**F3**
Rated insulation voltage U_i (V)		2000	2000	2000
Rated impulse withstand voltage U_{imp} (kV)		12	12	12
Rated voltage	**Ambient temperature (°C)**	**I_e (A)**	**I_e (A)**	**I_e (A)**
2000 VDC	40	400	500	630
2000 VDC	50	400	500	630
2000 VDC	60	400	500	630
2000 VDC	70	400	480	580
Rated voltage	**Utilization category**	**I_e (A)**	**I_e (A)**	**I_e (A)**
2000 VDC	DC-21B	400	500	630
Short cricuit capacity				
Rated short circuit current Icw 1s (kA)	based on IEC 60947-3	20	20	20
Rated short circuit making capacity I_{cm} (kA)	based on IEC 60947-3	20	20	20
Connection				
Recommended width of copper bars (mm)		240	2 x 150	2 x 185
Tightening torque min (Nm)		35	35	35
Tightening torque max (Nm)		42	42	42
Mechanical characteristics				
Durability (number of operating cycles)		8000	8000	8000
Power dissipation per pole (W/pole)				

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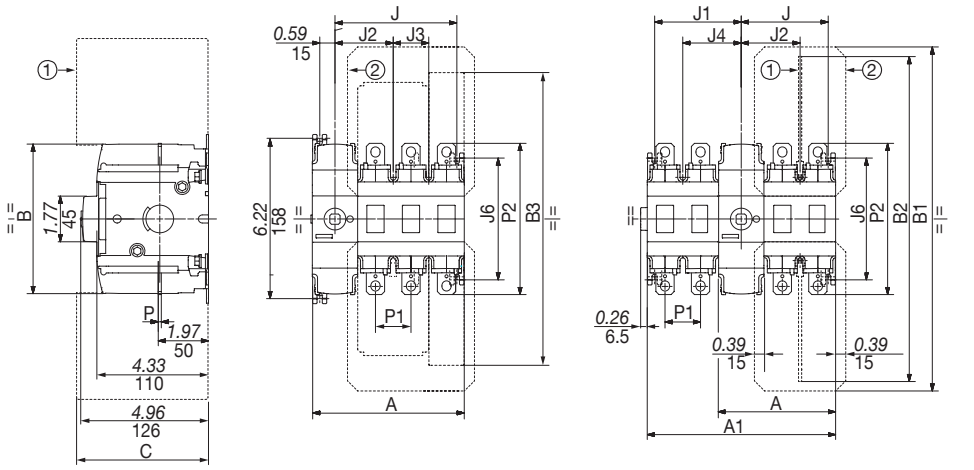
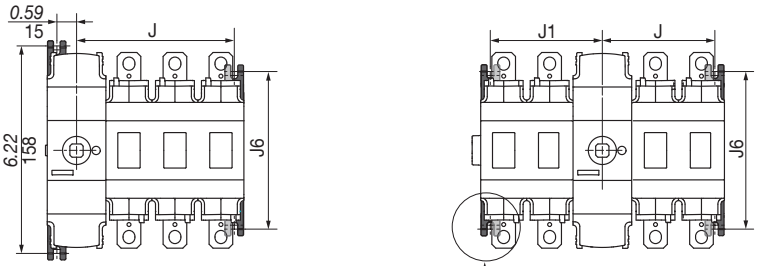
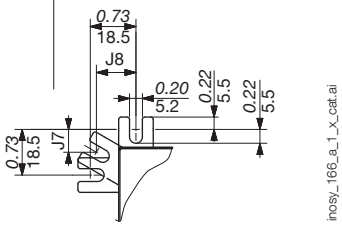
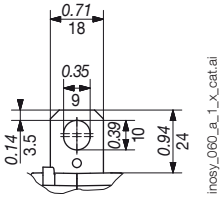




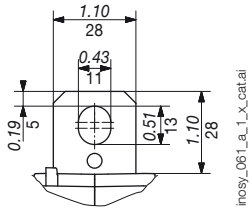
1. Inter-phase barrier.
2. Terminal screens.



Connection terminal F2



Connection terminal F3

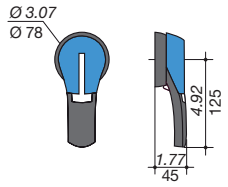
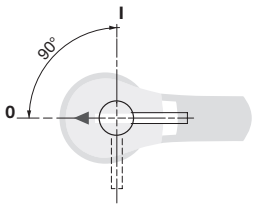
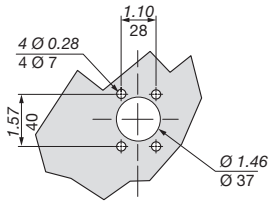


			A					A1			J				J1	
Rating (A)	Frame size	Units	2 P	3 P	1+1 P	1+2 P	2+2 P	1+1 P	1+2 P	2+2 P	2 P	3 P	1+1 P	2+2 P	1+1 P	2+2 P
100 … 250	F2	mm	117	152	82	-	117	117	-	187	85.5	120.5	50.5	85.5	52.5	87.5
400 … 1600	F3	mm	137	182	92	137	137	137	182	227	105.5	150.5	60.5	105.5	62.5	107.5

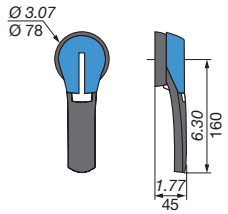
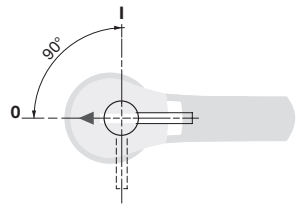
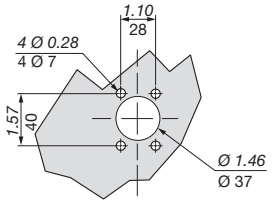
Rating (A)	Frame size	Units	B	B1	B2			B3	C		J2	J3	J4	J6	J7	J8	P1	P2
					IEC short	IEC long	UL		IEC	UL								
100 … 250	F2	mm	154	339	199	320	262	296	110	110	57,5	35	59,5	120	10	15	35	149
400 … 1600	F3	mm	154	414	237	358	359	359	110	135	67.5	45	69.5	158	4	8	45	200

Dimensions for external handles (in/mm)

F2 frame size

Handle type	Front operation Direction of operation	Door drilling
S2 type		
		

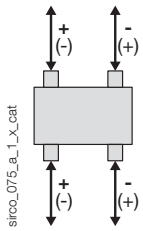
F3 frame size

Handle type	Front operation Direction of operation	Door drilling
S2L type		
		

Wiring configuration

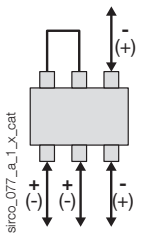
1 circuit - 1000 VDC

F2-F3 - 2 P

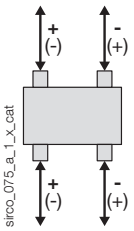


1 circuit - 1500 VDC

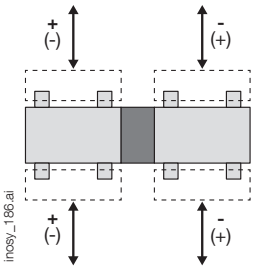
F2 - 3P



F2-F3 - 2P

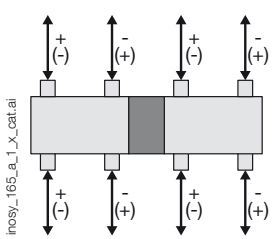


F3 - 2 P // 2P



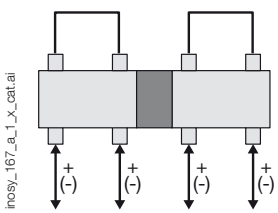
2 circuits - 1500 VDC

F3 - 2 P



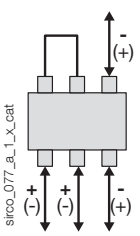
1 circuit - 1500 VDC per polarity

F3 - 2P+2P

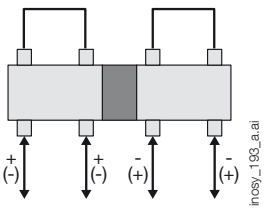


1 circuit - 2000 VDC

F3 - 3P



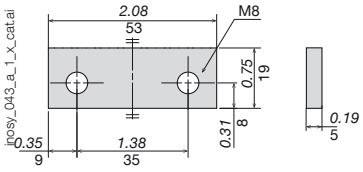
F3 - 2P+2P



Bridging bars (in/mm)

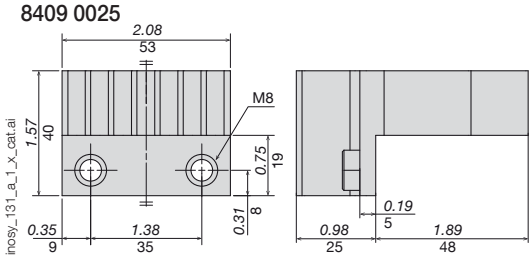
F2

8409 0016 (1)



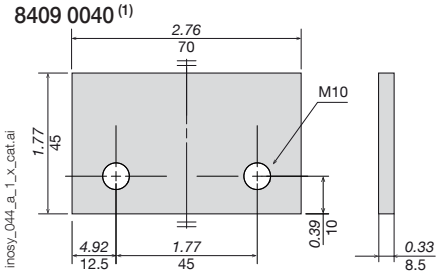
(1) Kit comprises 2 identical bars.

8409 0025



F3

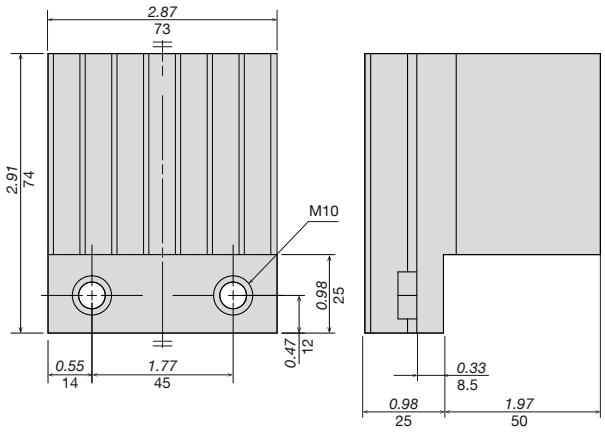
8409 0040 (1)



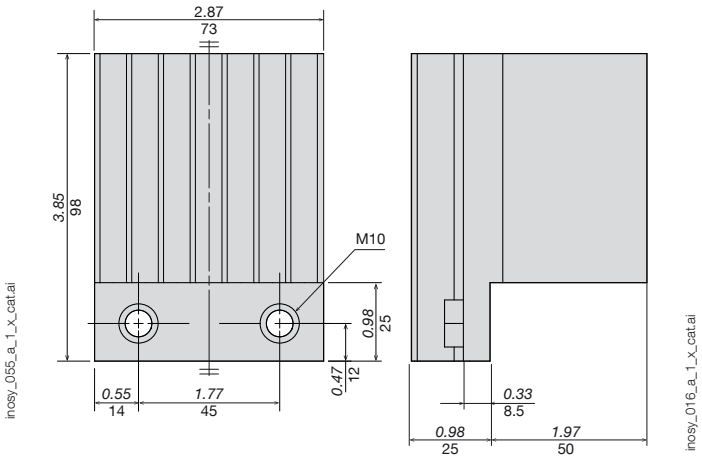
(1) Kit comprises 2 identical bars.

F3

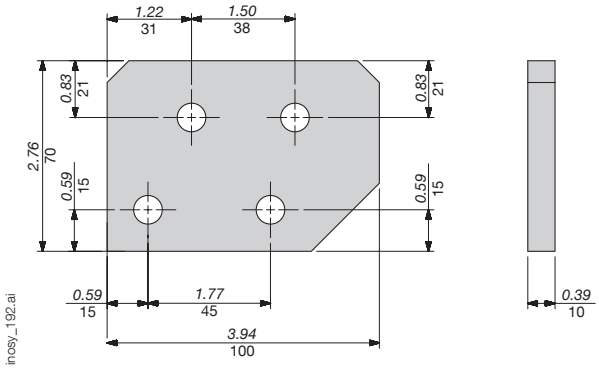
8409 0041



8409 0063



8409 1600



Mounting orientation

F2 - F3

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