

ES-SS Safety Limit Switch

Installation and Operating Instructions

Application

The **ES-SS Series** range of magnetically actuated Safety Switches offer non-contact reliability together with tolerance to misalignment. They are designed to interlock hinged/ sliding or removable guard doors on machinery, and should be connected to a suitable safety-related evaluation unit such as a safety relay or control device.

They protect movable guards in the following way:

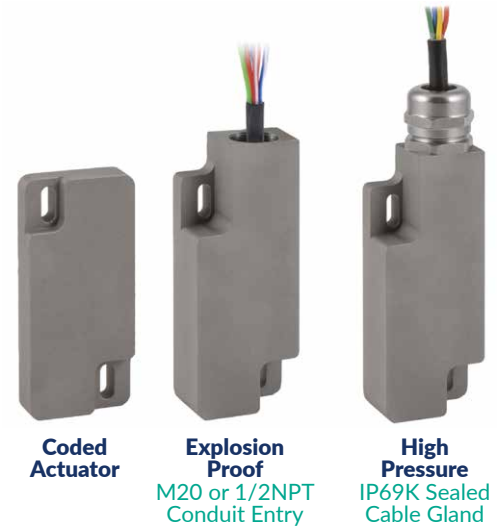
- The dangerous state of the machine can only be switched on when the guard is closed.
- If the guard is opened while the machine is running, astop command is triggered.

For the control this means:

- Activation commands that result in dangerous states are only allowed to become effective if the guard is in the protective position.
- Dangerous states must have been terminated before the protective position is left.



Safety switches provide a protection function for persons. Incorrect installation or manipulation can result in serious injuries. Safety switches are not allowed to be bypassed, turned away or made ineffective in any other manner.



Operating Principles

The ES-SS Safety Switches are designed to conform to EN60947-5-3 and be used as directed by ISO14119 and EN ISO12100. They utilise magnetic sensing which provides a wide sensing distance and provides a high tolerance to misalignment after sensing. They can operate in extreme environments of temperature (-60°C to +204°C) and moisture.

The use of a safety-related evaluation unit is required for monitoring ES-SS Safety Switches. These devices monitor 2 complementary switching contacts in normally open-normally closed combination (NO/NC) as per ISO 13849-1 for up to PLe / Category 4 protection.

On integrating the switches into suitable safety related evaluation units, the following must be taken into account:

- It is imperative all contact signals are evaluated separately.
- On the detection of a fault related to the safety switch, the safety-related evaluation unit must shut down and adopt a locked state.
- Both contacts must change output state, before it can be reset. Compliance with this sequence must be monitored by the safety-related evaluation unit.

Part Numbering

The ES-SS Series part number breakdown is shown below. Please note not all options/combinations are available.

Please consult www.euroswitch.com or contact the factory for the most up to date information.

Option 1 - Model Series Please refer to www.euroswitch.com for available model series and technical specifications.

FS-	SS	5	2	1	-	E	-	5M
Option	1	2	3	4	5	6		

2 - Certification

Standard Approvals

- General Industrial
- IECEX/ATEX Ex ia IIC/IIIC Intrinsically Safe Zone 0 & 20 †
- IECEX/ATEX Ex db/IIIC Explosion Proof Zones 1, 2, 21 & 22
- UL/CSA Class I, II, III Div 1 Groups A-G No lead seal required
- UL/CSA Class I, II, III Div 2 Groups A-G No lead seal required
- UL/CSA Ordinary Location General Purpose

Multi Approvals

- B IECEx/ATEX Ex db/IIIC & UL/CSA Class I, II Div 1
D Globally Approved - Explosion Proof Includes approvals 3,4,P,R,X,Z hardwired & 3,4,P,R,V,X,Z wireable.

Regional Approvals Explosion Proof (Ex db/IIIC)

- K TS Mark (Taiwan) & JPEX (Japan)
M ECASEx UAE
P NEPSI China
R PESO India
V KCs Korea
X INMETRO Brazil
Z EAC/TCRU EAC*

Regional Approvals Intrinsically Safe (Ex ia)

- L ECASEx UAE
N NEPSI China
Q PESO India
U KCs Korea
W INMETRO Brazil
Y EAC/TCRU EAC*

* Russia, Kazakhstan, Belarus.

† also suitable for zones 1, 2, 21 & 22.

3 - Material

Body Material

- 0 Engineered Resin (Only on Certifications 1 & 2)
2 316L Stainless Steel
Consult factory for alternative body material.

4 - Temperature Range

Standard Temperature

- 1 PVC Cable
1L PVC Leads -20°C to +70°C (+80°C IS&GI)
-40°C to +105°C (Certifications 4, 5 & 6)

Low/High Temperature

- 4L PTFE/Teflon™ Leads
-40°C to +204°C
Certification limitations apply

All hard wired switches are supplied with 2 meters (78") as standard.

5 - Additional Options

Contact Arrangement

- Safety circuit normally closed
Auxiliary circuit normally open

Contact Material

- Rhodium Standard
- AU Gold Flashed
Earthing/Grounding
- E Earth (Ground) wire
Required on certifications 4, 5 & 6

Installation Considerations - Sensing

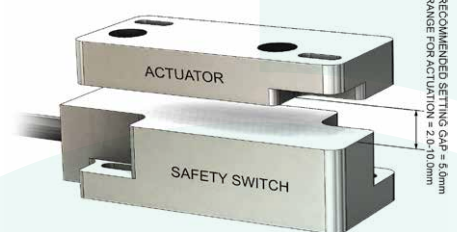
The switch and coded actuator must be mounted on nonferrous material such as stainless steel (300 series).

The recommended setting gap between the switch and the actuator is 5mm (0.20").

The switch will be activated with a correctly aligned actuator positioned within 10mm (0.39").

A minimum of 2mm (0.08") gap must always be maintained. The switch must not be used as a mechanical stop or adjusted by striking with a hammer.

Minimum recommended distance between two adjacent magnetic safety switches: 40 mm (1.6").



5 - Connection Options

Some options may be combined. Please consult factory.

Alternative Conduit Entry

NPT 1/2" NPT (On Metric models only)

Non Standard Cable/Lead Lengths

- Standard length is 2 metres
- xxM Non standard length, specify in metres e.g. -10M

Micro Change Connector - Quick Disconnect (QDC)

- V2-4 4 pin - M 12, Single Keyway, QDC
V2-5 5 pin - M 12, Single Keyway, QDC
V5-4 4 pin - 1/2"-20", Twin Keyway, QDC
V5-5 5 pin - 1/2"-20", Twin Keyway, QDC

Mini Change Connector - Quick Disconnect (QDC)

- V3-4 4 pin, QDC
V3-5 5 pin, QDC

Explosion Proof >				
Certification/ Approval	Certificate Number		Compliance Standards	Marking
	Hardwired and Connector Models	Wireable Models		
ATEX Ex db	Baseefa14ATEX0256X	BASEEFA14ATEX0119X	EN 60079-0: 2012 + A11:2013, EN 60079-1: 2014, EN 60079-31: 2014	Ex d IIC T4 Gb (-20°C <Ta<+70°C) Ex tb IIC T85°C Db *alternative T4/T135°C (-60°C <Ta<+120°C) T3/T200°C (-20°C <Ta<+75°C)
IECEx Ex db	IECEBAS14.0121X	IECEBAS14.0056X	IEC 60079-0: 2011, IEC 60079-1: 2014-06, IEC 60079-31: 2013	Industrial Control Equip for Haz. Loc. Seal not Required Class I Division 1 Groups A,B,C,D Class II Division 1 Groups E,F,G Class III Division 1 -40°C to +105°C T4a NEMA 4X/6P
UL/CSA CI/II/III Div 1		E364212	UL1203, CSA C22.2 25 & 30	Industrial Control Equip for Haz. Loc. Seal not Required Class I Division 2 Groups A,B,C,D Class II Division 2 Groups E,F,G Class III Division 2 -40°C to +105°C T4a NEMA 4X/6P (IP66/67/68) *Alternative: -60°C to +120°C Connector versions: -40°C to +60°C T6 NEMA 4X/6 (IP66/67)
UL/CSA CI/II/III Div 2		E364212	UL 121201, CSA C22.2 NO 213	Industrial Control Equip for Haz. Loc. Seal not Required Class I Division 2 Groups A,B,C,D Class II Division 2 Groups E,F,G Class III Division 2 -40°C to +105°C T4a NEMA 4X/6P (IP66/67/68) *Alternative: -60°C to +120°C Connector versions: -40°C to +60°C T6 NEMA 4X/6 (IP66/67)
EAC/TRCU Ex db	EA3C RU C-GB, AK58.B.00539/20	EA3C RU C-GB, AK58.B.00538/20	TP TC 012/2011, GOST 31610-0:2014 (IEC 60079-0: 2011), 60079-1: 2011, 60079-31: 2013	Ex d IIC T4 Gb (-60°C <Ta<+120°C) Ex tb IIC T135°C Db X *alternative T6/T85°C (-20°C <Ta<+70°C)
NEPSI Ex db	GY18.1497X	GY18.1496X	GB 3836.1-2010, GB 3836.2-2010, GB 12476.1-2013, GB 12476.5-2013	Ex d IIC T4 Gb (-60°C <Ta<+120°C) Ex ID A21 IP66/67 T135°C *alternative T6/T85°C (-20°C <Ta<+70°C)
PESO Ex db	P433821/1	P433822/1	IEC 60079-0: 2011, IEC 60079-1: 2014-06, IEC 60079-31: 2013	As per ATEX/IECEx Ex db with addition of regional certificate number and mark where applicable.
INMETRO Ex db		NCC-14.2911X	ABNT NBR IEC 60079-0:2013, IEC 60079-1:2014, IEC 60079-31:2014	

Intrinsically Safe >			
Certification/ Approval	Certificate Number		Marking
	All Model Types	Compliance Standards	
ATEX Ex ia	Baseefa14ATEX0013X	EN 60079-0:2012 + A11: 2013, EN 60079-11:2012	Ex i GD Refer to Certificate for other permitted marking variations.
IECEx Ex ia	IECEBAS14.0003X	IEC 60079-0: 2011, IEC 60079-11: 2011	
EAC/TRCU Ex ia	EA3C RU C-GB AK58.B.00540/20	TP TC 012/2011, GOST 31610-0:2014 (IEC 60079-0: 2011), GOST 31610.11-2014 (IEC 60079-11: 2011).	Ex ia IIC T4 Gb (-60°C <Ta<+125°C) Ex ia IIC T135°C Db X *alternative markings - refer to certificate
NEPSI Ex ia	GY18.1495X	GB 3836.1-2010, GB 3836.4-2010, GB 3836.20-2010, GB 12476.1-2013, GB 12476.4-2010	Ex ia IIC T4 Gb (-60°C <Ta<+125°C) Ex iaD 20 T135°C *alternative markings - refer to certificate
PESO Ex ia	P433820/1	IEC 60079-0: 2011, IEC 60079-11: 2011	As per ATEX/IECEx Ex ia with addition of regional certificate number and mark where applicable.
INMETRO Ex ia	NCC-14.2910X	ABNT NBR IEC 60079-0:2013, IEC 60079-11:2013, IEC 60079-26:2016	

Other Approvals >			
UL/CSA Ordinary Location	E327326	UL 508 CSA C22.2 No. 14-13	
Safety Integrity Level (SIL)	FSP18015	IEC 61508:2010: SC3 SIL 2 with HFT+0 (1oo1) and SIL 3 with HFT+1 (1oo2)	

Special Conditions for Safe Use Explosion Proof / Non-Incendive (Certifications 3,4,5,B,D,P,R,V,X,Z)

For Hardwired Types:

Ex db

A1. Where no conduit connection facilities are provided the integral non armoured cable must be suitably terminated and protected from pulling, twisting and mechanical damage.

A2. When used in a dust atmosphere the separately certified cable gland arrangement shall maintain the IP6X rating of the enclosure.

A3. When used in a dust atmosphere additional sealing should be considered in the threaded entries (e.g. washer, grease, gasket). Regular cleaning should also be carried out to prevent the build up of dust layers.

A4. External earthing is via the mounting or entry threads. Models with option -E are provided with an earth wire connected to the metallic housing.

UL/CSA CI I/II/III Div 1/2

B1. All models (except Wireable WLRT Type) do not require a conduit seal to be installed.

B2. External earthing is via the mounting or entry threads. Models with option -E are provided with an earth wire connected to the metallic housing.

B3. A supplementary fuse is to be installed in every incoming supply line for the device (per the NEC/CEC).

For Connector Types (UL/CSA CI I/II/III Div 2 Only)

E1. For Models suffixed - V2/V3/V5 - The external connector must be mated with Class I, Division 2, UL Listed Cordsets. e.g. UL File Number E476689.

E2. Warning – Explosion Hazard – Substitution of components may impair suitability for Class I/II Division 2.

E3. Warning – Explosion Hazard – Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

Intrinsically Safe - (Certifications 2,7,E,N,Q,U,W,Y)

For All Types:

F1. Metallic proximity sensors or metallic parts of non-metallic proximity sensors may pose an electro-static risk if not earthed. This should be taken into account during installation.

F2. The cable entry to the wireable switch must be fitted with a cable gland which is suitably equipment certified for Ex e and Ex ta.

F3. Integral cables shall be fixed and effectively protected against damage as required of a Type B cable as defined in clause 9.5.3 of IEC 60079-25: 2010.

F4. External cabling to the proximity sensors shall use either type A or type B cable as defined in clause 9.5.2 & 9.5.3 of IEC 60079-25: 2010.

F5. Junction boxes used to extend the sensor cabling, that are located in a dust hazardous area must be separately certified and appropriate for use in that hazardous area.

F6. Where a sensor has two sets of switching contacts, both sets of switching contacts are considered to be part of the same single intrinsically safe circuit, not separate intrinsically safe circuits.

Electrical Installation Parameters

Electrical Ratings

The ES-SS safety switch should be monitored by a safety-related device supplying maximum current:

400mA @ 24 VDC

300mA @ 24 VAC

60mA @110/120 VAC

FS Series are factory sealed and do not require the fitment of separate conduit seals in conduit connected systems (e.g. UL/CSA CI I/II Div1).

Connected conduit and/or cable should be suitably supported to prevent pulling and twisting of the cable and/or switch.

Connection Diagrams - Hardwire & Wireable

An Earth wire is fitted to models with Option -E. Models without an Earth wire are available for specific certifications/approvals.

PVC - Cables

Shown with Target Actuator in Position

PVC - Leads / PTFE/Teflon™

Shown with Target Actuator in Position

V3 - Mini Change

PIN 1	COM
PIN 2	N/O
PIN 3	N/C
PIN 4	GND

PIN 1	N/O
PIN 2	N/C
PIN 3	GND
PIN 4	N/C
PIN 5	COM

V2 - Micro Change

PIN 1	COM
PIN 2	N/O
PIN 3	N/C
PIN 4	GND



Please ask to speak to one of our solutions team for advice on your specific application.

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