euroSwitch
A Longvale Brand

ES Series Proximity/Limit Switch
Installation and Operating Instructions

Operating Principles

The Euroswitch ES Series Proximity Switches utilise proven hermetically sealed reed switch technology are highly adaptable, and can be used in a multitude of applications where a reliable signal is required. Constructed from either 316L Stainless Steel or robust engineered resin housings allows it to be used in some of the most extreme environments from -60°C (-76F) to 204°C (400°F).

The switches are dry contact volt-free, and a multitude of contact forms are available including changeover types SPCO/SPDT, DPCO/DPDT, Latching, and 2-wire types Normally Open (NO) or Normally Closed (NC), and NAMUR with line fault monitoring function.

The switches are highly flexible and capable of switching multiple voltages up to 240V AC/DC. The presence of an external magnetic actuator is required for operation. Sensing range is dependent on the magnetic actuator used. Please refer to individual product datasheets for the specific sensing range of each model.

Cylindrical models are available with imperial or metric threads to suit the majority of applications. Rectangular housing models are available for direct mount onto equipment via screw connection. Termination options include a variety of cable or connector types and our unique integral field-wireable connection head available in one of four styles W, WL, WLR and WLRT.


Hardwired
Integral cable
or lead wires


Connector
Quick
disconnects


Wireable
W Type
Top Entry


Wireable
WL Type
Side Entry


Wireable
WLR Type
Side Entry
360° Rotatable


Wireable
WLRT Type
Twin Side Entry
360° Rotatable

Installation Considerations - Sensing

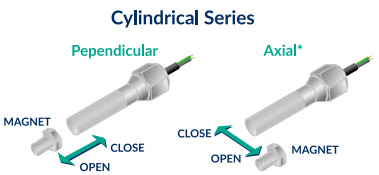
Euroswitch Magnetic Target Actuators should always be used for guaranteed performance. Other magnets (Neodymium, Samarium Cobalt, Alnico, Ferrite etc.) may be used but performance may be reduced.

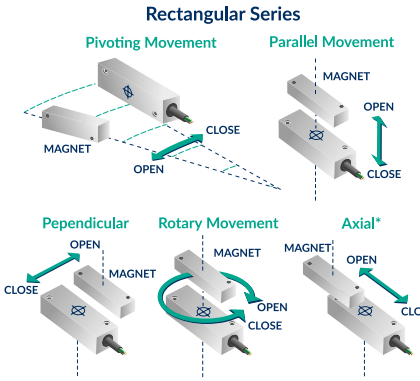
Sensing range measurements are provided in ideal conditions and these may vary due to outside influences. Where possible avoid mounting ferrous material close to the sensor as sensing performance will be affected. If this cannot be avoided then spacers made from brass or stainless steel 316 can be used.

Differential / Hysteresis: This is the distance between the point at which the switch triggers as an object enters the sensing area, and the point at which the switch resets upon the target leaving sensing area. Avoid setting the switch/target to activate on the extremes/edge of the sensing envelope to ensure repeatability.

* Rectangular models with axial approach will experience two switch points.

Please refer to the diagrams below for movement of the target in axial/perpendicular directions.





Part Numbering

The ES 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.

ES-	5	D	2	1	-	AU	-	WLR
Option	1	2	3	4		5		6

2 – Certification

Standard Approvals

1 General Industrial
2 IECEx/ ATEX/UKEX Ex ia IIC/IIIC **
Intrinsically Safe Zone 0 & 20 †
3 IECEx/ ATEX/UKEX Ex db/tb IIC/IIIC **
Explosion Proof Zones 1, 2, 21 & 22
4 UL/CSA Class I, II, III Div 1 Groups A-G
5 UL/CSA Class I, II, III Div 2 Groups A-D, F, G
6 UL/CSA Ordinary Location
General Purpose
7 UL/CSA Class I, II, III Div 1
Intrinsically Safe Zone 0

Multi Approvals

B IECEx/ATEX/UKEX Exdb/tb & UL/CSA Class I, II, III Div 1 **
D Globally Approved - Explosion Proof **
Includes approvals 3,4,P,R,X,Z hardwired & 3,4,P,R,V,X,Z wireable.
E Globally Approved - Intrinsically Safe **
Includes approvals 2,7,N,Q,W,Y.

Regional Approvals Explosion Proof (Ex db/tb)

J JPN Ex (Japan)
K TS Mark (Taiwan)
R PESO (India)
V KCs (Korea)
X INMETRO (Brazil)
Z EAC/TRCU (EAC*)

Regional Approvals Intrinsically Safe (Ex ia)

Q PESO (India)
U KCs (Korea)
W INMETRO (Brazil)
Y EAC/TRCU (EAC*)

Specialist Approvals

N Nuclear Qualified

** Russia, Kazakhstan, Belarus.*
† also suitable for zones 1, 2, 21 & 22.
****Also Includes, CCC-Ex (China) ECAS Ex (UAE)**

3 – Material

Body Material

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+ 100°C (Certifications 4, 5 & 6)
3 PUR Cable
-40°C to + 90°C
Only available on Ex ia certification.

Low Temperature

2 Polyolefin Cable
-60°C to+120°C (+125°C IS&GI)
-60°C to+ 100°C (Certifications 4, 5 & 6)

High Temperature

4L PTFE/Teflon™ Leads
-40°C to+204°C
Certification limitations apply
5L PEEK Leads
Only available on Ex db, Ex ia & GI.
-60°C to + 204°C
Certification limitations apply
6 Silicone Cable
-55°C to + 175°C
Only available on Ex ia certification.

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

5 – Additional Options

Contact Arrangement

– SPDT/SPCO (Form C) Standard
D DPDT/DPCO (2x Form C) Specific Models Only
F Latching Bi-Stable
B Extended range (ES-0,1,3,5,6,7,8,9,10,11,12)
LFC Line Fault Monitoring
NAMUR (Normally Closed)
Ex ia & Standard Temperature*
LFO Line Fault Monitoring
NAMUR (Normally Open)
Ex ia & Standard Temperature*

Contact Material

– Palladium/Silver Standard
AU Gold Flashed
(H) Tungsten Contacts

Earthing/Grounding

E Earth (Ground) wire
Required on certifications 4, 5 & 6

Sensing Face Pressure Rating

– 2,000 psi/ 138 Bar Standard
5K 5,000 psi/ 345 Bar
10K 10,000 psi/ 690 Bar
Decreased sensing range on 5K & 10K.

** Low Temperature & Ex db/tb version available please consult factory. Some options may be combined. Please consult factory.*

6 – Connection Options

Wireable Connection Head

W Back/Top entry
WL Side entry
WLR Side entry 360° Rotatable
WLRT Side entry 360° Rotatable Twin Entry

Alternative Conduit Entry

M20 M20 (On Imperial models only)
NPT ½" 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
SE Side Exit Outlet Position

Micro Change Connector - Quick Disconnect (QDC)

V2-3 3 pin· M 12, Single Keyway, QDC
V2-4 4 pin - M 12, Single Keyway, QDC
V5-3 3 pin ·½"-20, Twin Keyway, QDC
V5-4 4 pin· ½"-20, Twin Keyway, QDC

Mini Change Connector - Quick Disconnect (QDC)

V3-3 3 pin, QDC
V3-4 4 pin, QDC

LED Options

LEDG **Green LED -** Target Detected
LEDR **Red LED -** Target Detected
LEDB **Red & Green LED -** (Green = Target Detected)

Subsea Connector

3SS 3 pin - Standard Circular
4SS 4 pin - Standard Circular
3SSM 3 pin - Micro Circular
4SSM 4 pin - Micro Circular
3LSS 3 pin 90° - Low Profile
4LSS 4 pin 90° - Low Profile
3LSSM 3 pin 90° - Micro Circular
4LSSM 4 pin 90° - Micro Circular

Some options may be combined. Please consult factory.

Explosion Proof >

Certification/ Approval	Certificate Number		Compliance Standards	Marking
	Hardwired and Connector Models	Wireable Models		
ATEX Ex db	Baseefa14ATEX0256X	BASEEFA14ATEX0119X	EN IEC 60079-0: 2018, EN 60079-1: 2014, EN 60079-31: 2014	II 2 GD Ex db IIC T6* Gb (-20°C <Ta<+70°C) Ex tb IIIC T85°C* Db * alternative T4/T135°C (-60°C <Ta<+120°C) T3/T200°C (-20°C <Ta<+175°C) IP66/67/68
IECEx Ex db	IECExBAS14.0121X	IECExBAS14.0056X	IEC 60079-0:2017, IEC 60079-1:2014-06, IEC 60079-31:2013	
UKEX Ex db	BAS21UKEX0756X	BAS21UKEX0754X	EN IEC 60079-0:2018 EN 60079-1:2014, EN 60079-31:2014	
UL/CSA Cl/II/III Div 1	E364212		UL1203, CSA C22.2 25 & 30	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 +100°C T4A NEMA 4X/6P -40°C to +100°C T4A * alternative -60°C to +100°C NEMA 4X/6P
UL/CSA Cl/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 F, G Class III Division 2 -40°C to +100°C T4A NEMA 4X/6P * alternative -60°C to +100°C Connector versions: -40°C to +60°C T6
EAC/TRCU Ex db	ЕАЭС RU C-GB. АД07.B.05686/23	ЕАЭС RU C-GB. АД07.B.05700/23	TP TC 012/2011, GOST 31610.0-2014 (IEC 60079-0: 2011), 60079-1: 2011, 60079-31-2013	1 Ex d IIC T4* Gb X (-60°C <Ta<+120°C) Ex tb IIIC T135°C* Db X * alternative T6/T85°C (-20°C <Ta<+70°C)
CCC Ex db	2020322304000801	2020322304000800	GB/T 3836.1-2021 GB/T 3836.2-2021 GB/T 3836.31-2021	As per ATEX/IECEx Ex db with addition of mark where applicable.
INMETRO Ex db	NCC-14.2911X		ABNT NBR IEC 60079-0:2018, IEC 60079-1:2016, IEC 60079-31:2014	As per ATEX/IECEx Ex db with addition of regional certificate number and mark where applicable.
PESO Ex db	P581420	P580630	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.
KCs Ex db	16-KA4BO-0032X	16-KA4BO-0162X 18-KA4BO-0286X (WLRT)	Announcement No. 2016-54 Ministry of Employment and Labor	
TS Mark	–	(ITRI)2023 07-00141X	CNS 3376-0:2014, IEC 60079-1: 2014, IEC 60079-31: 2013	
JPEx Ex db	–	CML 20JPN1175X	JNIOSH-TR-46-1:2015, JNIOSH-TR-46-2:2018, JNIOSH-TR-46-9:2015	
ECAS Ex db	23-08-83642/E23-07-083188/NB0010		UAE.S IEC 60079-0, UAE.S IEC 60079-1, UAE.S IEC 60079-31	

Intrinsically Safe >

Certification/ Approval	Certificate Number	Compliance Standards	Marking
	All Model Types		
ATEX Ex ia	Baseefa14ATEX0013X	EN IEC 60079-0:2018 EN 60079-11:2012	II 1 GD Refer to Certificate for other permitted marking variations. IP66/67/68
IECEx Ex ia	IECExBAS14.0003X	IEC 60079-0: 2017 IEC 60079-11: 2011	
UKEx Ex ia	BAS21UKEX0626X	EN IEC 60079-0: 2018 EN 60079-11: 2012	
UL/CSA Cl/II/III Intrinsically Safe Zone 0	E364212	UL 913, CAN/CSA C22.2 NO. 60079-11:15	Industrial Control Equipment for Haz. Loc. Install as per GA-029 Intrinsically Safe for Use in Class I Division 1 Groups A,B,C,D Class II Division 1 Groups E,F,G Class III Division 1 -20°C to +75°C T6 NEMA 4X/6P -60°C to +125°C T4
EAC/TRCU Ex ia	ЕАЭС RU C-GB. АД07.B.05701/23	TP TC 012/2011, GOST 31610.0-2014 (IEC 60079-0: 2011), GOST 31610.11-2014 (IEC 60079-31: 2013)	0 Ex ia IIC T4* Ga X (-60°C <Ta<+125°C) Ex ia IIIC T135°C* Da X * alternative markings - refer to certificate
CCC Ex ia	2020322304000873	GB/T 3836.1-2021 GB/T 3836.4-2021	As per ATEX/IECEx Ex db with addition of mark where applicable.
PESO Ex ia	P580629	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 60079-0:2018, IEC 60079-11:2013, IEC 60079-26:2016	As per ATEX/IECEx Ex db with addition of regional certificate number and mark where applicable.
ECAS Ex ia	23-08-83642/E23-07-084996/NB0010	UAE.S IEC 60079-11, UAE.S IEC 60079-0	As per ATEX/IECEx Ex ia with addition of regional certificate number and mark where applicable.

Other Approvals >

UL/CSA Ordinary Location	E327326	UL 508 CSA C22.2 No. 14-13	Industrial Control Equipment
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/tb

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. The PG9 rear entry thread (where provided) does not meet the flameproof requirements, and shall not be used for direct interface with flameproof enclosures.

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 Cl I/II/III Div 1/2

B1. All models 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 7A fuse is to be installed in every incoming supply line for the device (per the NEC/CEC).

B4. Install as per the pertinent clauses of the NEC/CEC.

For Wireable Types:

Ex db/tb

C1. The lid of the enclosure must be fully tightened down to maintain both IP/NEMA rating and explosion protection, the grub screw must be further tightened to prevent the lid from being unscrewed.

C2. An internal earth connection point is provided on the wireable types.

C3. External earthing is via the mounting or entry threads. External earth stud optional.

C4. The flamepath must not be repaired.

C5. When used in a dust atmosphere the separately certified cable gland arrangement shall maintain the IP6X rating of the enclosure.

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

D1. CAUTION – KEEP ENCLOSURE TIGHTLY CLOSED WHEN IN OPERATION

D2. All models (except Wireable WLRT Type) do not require a conduit seal to be installed.

D3. For wireable models WLRT Type only– at least one of the threaded entries is to be sealed within 50 mm from the threaded connection.

D4. For wireable type W models with conduit entry through the lid, conduit unions are recommended for ease of installation of glanding. Please contact Euroswitch for further details.

D5. Field wiring size to be between 12AWG and 28AWG with copper conductors. Insulation temperature rating 105°C.

D6. Install as per the pertinent clauses of the NEC/CEC.

D7. A supplementary 7A fuse is to be installed in every incoming supply line for the device (per the NEC/CEC).

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

E1. For Models suffixed - V2/V3/V5 - The external connector must be mated with Class I, Division 2, UL Listed Cordsets: UL File Number E476689 or E359524.

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.

E4. A cable assembly is to always be connected during operation, and is only to be disconnected / reconnected by trained service personnel.

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. Non-metallic proximity sensors may pose an electrostatic risk. This should be taken into account during installation.

F3. The cable entry to the wireable switch models must be fitted with a cable gland which is suitably equipment certified for Ex e and Ex ta.

F4. 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.

F5. 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.

F6. 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.

F7. 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.

F8. UL/CSA Intrinsically Safe models to be installed as per Control Drawing GA-029.

Mechanical Installation Parameters

Switch Mounting

Each cylindrical switch is provided with two lock nuts for securing into a mounting plate or bracket. Anti-vibration lock washers are recommended for applications with high vibration levels. The lock nuts should be tightened to the torque specified below.

3/8″-24 UNF	7 Nm ±1 Nm (62 lbf·in ±9 lbf·in)	9/16″ A/F
M12 x 1.0	7 Nm ±1 Nm (62 lbf·in ±9 lbf·in)	17mm A/F
5/8″-18 UNF	25 Nm ±5 Nm (18 lbf·ft ±4 lbf·ft)	7/8″ A/F
M18 x 1.0	25 Nm ±5 Nm (18 lbf·ft ±4 lbf·ft)	24mm A/F

For Wireable Types (All)

When tightening each lock nut the switch should **be prevented from rotating by using a wrench on the 24mm flats provided beneath the wireable head** (not using the flats on the lid).

Lid Hex	25mm A/F
M3 Lid Screw	1.5mm Hex Key

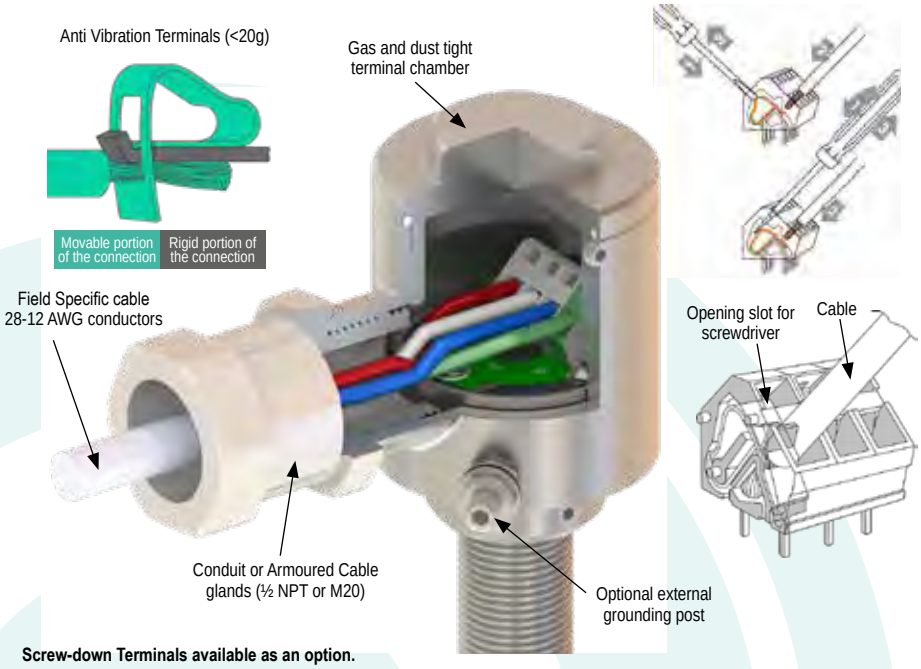
For Wireable Types (WLR and WLRT only)

The head is able to rotate to suit the cable routing - Note the terminals MUST NOT be populated with conductors when rotating the head in order to prevent damage. Once the final position of the switch is reached, ensure the M4 grub screw is fitted beneath the wireable head and tightened.

M4 Head Locking Screw — 2mm Hex Key

Electrical Connection

The wireable type models are equipped with anti-vibration cage clamp terminals. Use a small flat blade screwdriver to operate the terminal in either way shown below. The conductor should be pushed in and the screwdriver removed to clamp the conductor.



Screw-down Terminals available as an option.

Wireable (W Type) Gland Installation

Follow the 4 step procedure below to install cabling and glands to the Wireable W-Type.

1. Prepare the cable to suit the particular gland being used, ensuring correct strip lengths for outer sheath and armour.

Install conductors into terminal block.

2. Slide the lid along the cable and tighten into the head.

Tighten the M3 grub screw.

3. Slide the front component of the gland along the cable and tighten into the lid. This should freely rotate around the cable.

Caution: ensure the torque is reacted with a second wrench on the lid hex (25mm).

4. Make-off the gland as specified in the gland installation instructions ensuring the armour is properly anchored.

Tighten the final compression nut to secure the outer sheath.

Electrical Installation Parameters

Electrical Ratings *[provided for standard models - refer to individual product datasheet for custom coded products denoted by part numbers ending (X...)]*

SPDT or DPDT Models:
ES-0, 1, 3, 5, 6, 7, 8, 9, 10, 11, 12 or RS-V1, M12, M18
2.5A @24 VDC, 540mA @110/120 VAC,
250mA@230/240VAC

SPDT or DPDT Models:
ES-2, 4, 13, 14, 15, 16, 44 or RS-V3
830mA @24 VDC, 180mA @110/120 VAC 20W MAX

SPDT Models with LEDs:
250mA @24 VDC or 250mA @110/120 VAC*

Installation Considerations — All Models

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

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

Series and Parallel Operation Any number of the ES series of switches may be wired either in series or in parallel without any current drain or voltage drop across their contacts.

*Note exception: LED models require a minimum of 20mA to ensure correct illumination. These models have ~5V drop per switch.

Installation Considerations — LED Models

These models are provided with LED visual indication of the switch state in response to the sensing target. For single colour LED models (LEDG or LEDR), the LEDs are wired across the NO (Normally Open) contact which "closes/makes" with the target present. The Bi-colour (LEDB) model provides RED and GREEN LED indication from the NC and NO contacts respectively.

The LED models require a minimum current of 20mA to illuminate the LEDs satisfactorily (the switch will operate below this, but LEDs may not be visible). >50mA is recommended to ensure maximum brightness of the LEDs. However care must be taken to ensure these units are only supplied with a maximum current of 250mA to prevent damage occurring to the LEDs.

⚠ IMPORTANT:

The unit MUST NOT be connected directly to the +ve and -ve terminals of a power supply without connecting a load (resistor) in circuit to limit the current.

For example, to provide the recommended 50mA, a 24VDC supply will require a 390R resistor to be connected in series with the supply. Consideration of heat dissipation from the resistor should be considered depending on mounting. A suggested surface mount model is Arcol HS10 R39 J (10W). Please contact the factory for further details and assistance.

LEDR (RED) – Connect COM and NO wires to provide signal and LED illumination from the NO Contact when the target is present. The NC (Normally Closed) contact wire is provided for signalling only (no LED illumination) and provides a switch output when the target is not present.

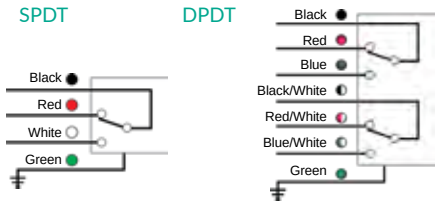
LEDG (GREEN) – Connect COM and NO wires to provide signal and LED illumination from the NO Contact when the target is present. The NC (Normally Closed) contact wire is provided for signalling only (no LED illumination) and provides a switch output when the target is not present.

LEDB (RED & GREEN) – Connect COM wire. Also connect the NO and NC wires to provide signal and bi-colour LED illumination. GREEN LEDs are wired across NO Contact which illuminate when the target is present; and RED LEDs are wired across NC Contact which illuminate when the target is not present.

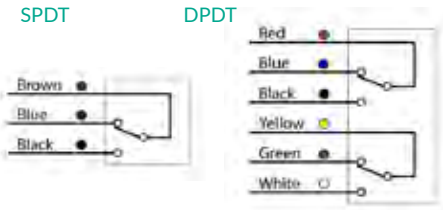
Connection Diagrams - Hardwired & Wireable Models

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

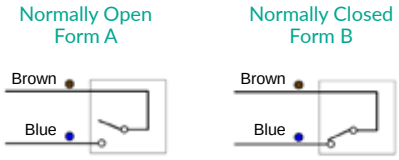
Cable - PVC



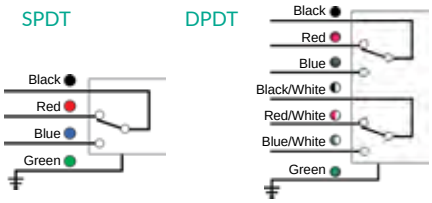
Cable - PVC [Non UL/CSA]



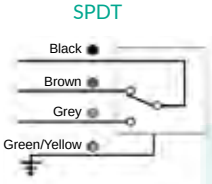
Cable - PUR



Lead Wires - PVC or PTFE/Teflon™

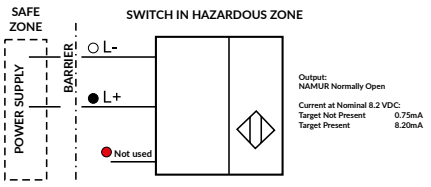


Cable - Silicone

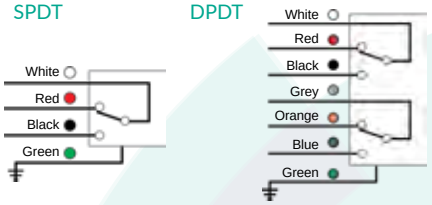


Cable - PVC ES-46 or RS-V3

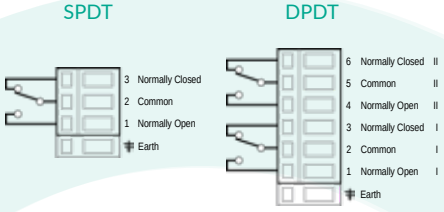
LFO – Cable PVC/Polyolefin



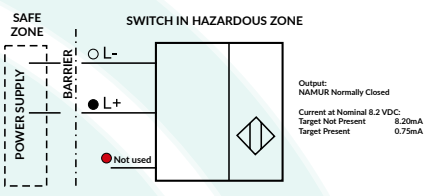
Cable - Polyolefin



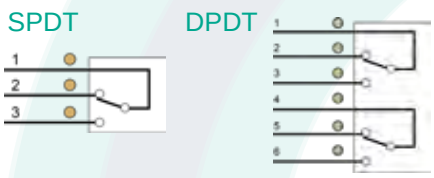
Wireable - W, WL, WLR



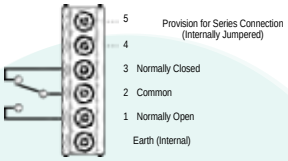
LFC – Cable PVC/Polyolefin



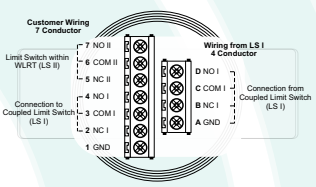
Lead Wires - PEEK



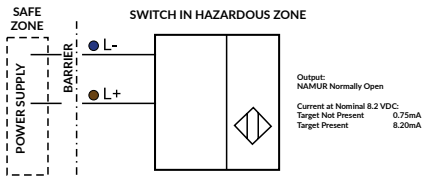
Wireable - WLRT - (For Wiring in Series)



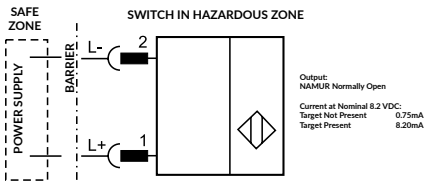
Wireable - WLRT (Through Wire)



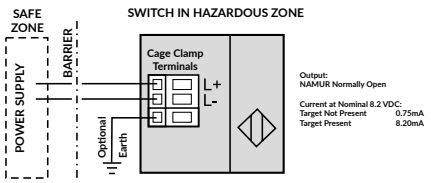
LFO - Cable PUR



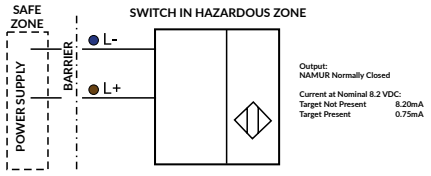
LFO - Connector V2-4



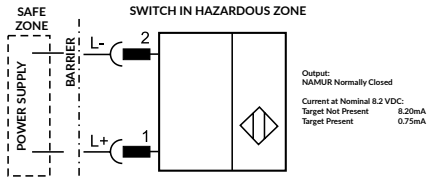
LFO - Wireable



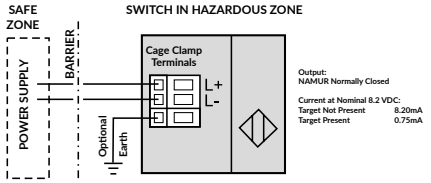
LFC - Cable PUR



LFC - Connector V2-4



LFC - Wireable

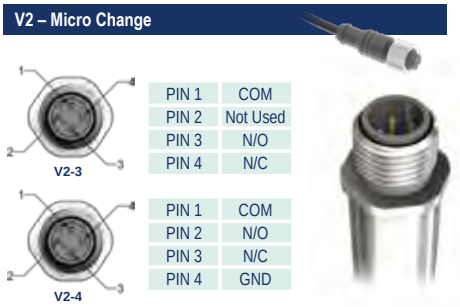


Connection Diagrams - Connector Models

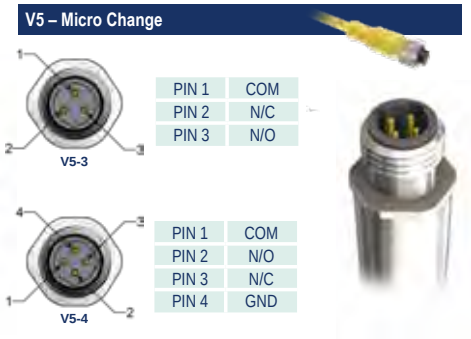
Most models are available with integral connector.
Diagrams below show face view of the male connector provided on the switch.

V3 – Mini Change

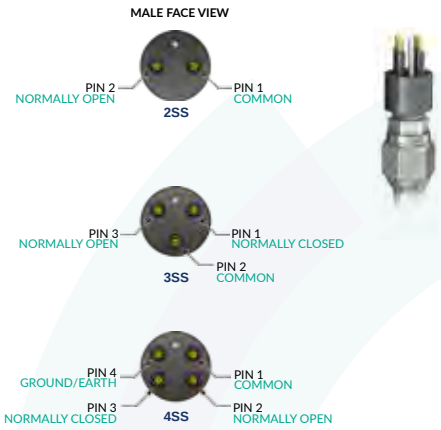
V2 – Micro Change



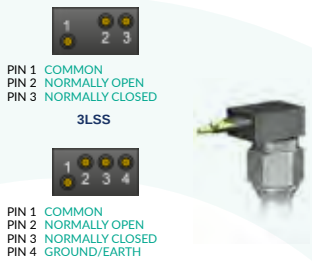
V5 – Micro Change



SS – Subsea Wet Mate – Standard Circular



LSS – Subsea Wet Mate Low Profile



SSM – Subsea Wet Mate – Micro Circular

Industrial Sensor Specialist
Longvale

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

Euroswitch – Global
Lancaster Park
Burton upon Trent
Staffordshire
DE13 9PD
United Kingdom

t: +44 (0) 1283 575 811
e: sales@euroswitch.com

Euroswitch – Americas
5718 Westheimer
Suite 1000
Houston
TX 77057
USA

t: + (1) 281 909 4477
e: sales@euroswitch.com

Euroswitch – Middle East
48 Burjgate Tower
Level 20
Dubai
PO BOX 36615
UAE

t: +971 4 518 2545
e: sales@euroswitch.com

euroSwitch
A Longvale Brand
www.euroswitch.com

TRANSLATIONS >
Please scan the QR Code to view the booklet translations available online.