

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 SPDO/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.



Installation Considerations - Sensing

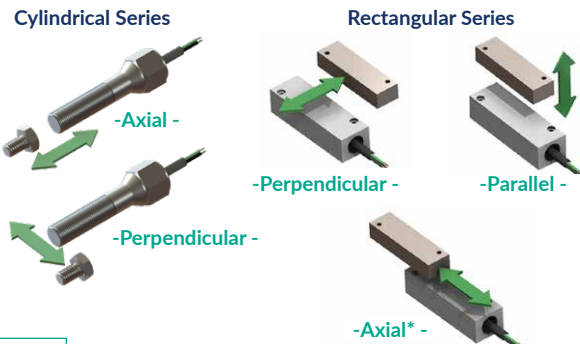
Euroswitch Magnetic Target Actuators should always be used for guaranteed performance. Other magnets (Neodymium, Samarium Cobalt, Alnico, Ferrite etc.) may be used but performance may be reduced.

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	3 – Material	5 – Additional Options	6 – Connection Options
Standard Approvals 1 General Industrial 2 IECEx/ ATEX Ex ia IIC/IIIC Intrinsically Safe Zone 0 & 20 † 3 IECEx/ ATEX Ex db/IIIC Explosion Proof Zones 1, 2, 21 & 22 4 UL/CSA Class I, II, III Div 1 Groups A-G No lead seal required 5 UL/CSA Class I, II, III Div 2 Groups A-G No lead seal required 6 UL/CSA Ordinary Location General Purpose 7 UL/CSA Class I, II, III Div 1 Intrinsically Safe Zone 0 Multi Approvals B IECEx/ATEXExdb/IIIC & 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/IIIC) K TS Mark (Taiwan) & JPEX (Japan) M ECASEx UAE P NEPSI China R PESO India V KCs Korea X INMETRO Brazil Z EAC/TRCU EAC* Regional Approvals Intrinsically Safe (Ex ia) L ECASEx UAE N NEPSI China Q PESO India U KCs Korea W INMETRO Brazil Y EAC/TRCU EAC* * Russia, Kazakhstan, Belarus. † also suitable for zones 1, 2, 21 & 22.	Body Material 2 316L Stainless Steel <i>Consult factory for alternative body material.</i> 4 – Temperature Range Standard Temperature 1 PVC Cable 1L PVC Leads -20°C to +70°C (+80°C IS&GI) -60°C to +120°C (+125°C IS&GI) -60°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. <i>All hard wired switches are supplied with 2 meters (78") as standard.</i>	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. <i>* Low Temperature & Ex db/IIIC version available please consult factory. Some options may be combined. Please consult factory.</i>	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 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 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 - 1/2"-20, Twin Keyway, QDC V5-4 4 pin - 1/2"-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 <i>Some options may be combined. Please consult factory.</i>

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	Ex II 2 GD Ex db IIC T6° Gb (-20°C <Ta<+70°C) * alternative 14T/135°C (-40°C <Ta<+120°C) T3/1200°C (-20°C <Ta<+175°C) UK IP66/67/68
IECEx Ex db	IECExBAS14.0121X	IECExBAS14.0056X	IEC 60079-0:2017, IEC 60079-1:2014-06, IEC 60079-31:2013	UK Ex db IIC T6° Gb (-20°C <Ta<+70°C) * alternative 14T/135°C (-40°C <Ta<+120°C) T3/1200°C (-20°C <Ta<+175°C) CE IP66/67/68
UREx Ex db	BAS21UKEx0756X	BAS21UKEx0754X	EN IEC 60079-0:2018 EN 60079-1:2014, EN 60079-31:2014	UK Ex db IIC T6° Gb (-20°C <Ta<+70°C) * alternative 14T/135°C (-40°C <Ta<+120°C) T3/1200°C (-20°C <Ta<+175°C) CE IP66/67/68
UL/CSA CI/II/III Div 1	E364212		UL1203, CSA C22.2 25 & 30	UL 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
UL/CSA CI/II/III Div 2	E364212		UL 121201, CSA C22.2 NO 213	UL 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 +100°C T4A NEMA 4X/6P/IP66/67/68 * Alternative -40°C to +100°C Connector versions -40°C to +60°C T6 NEMA 4X/6P
EAC/TCRU Ex db	EA3C RU C-GB, AHSB.B.00539/20	EA3C RU C-GB, AHSB.B.00538/20	TP TC 012/2011, GOST 31610-0-2014 (IEC 60079-0:2011), 60079-1:2011, 60079-31-2013	ERC Ex db IIC T6° Gb X (-40°C <Ta<+120°C) Ex db IIC T135°C Db X alternative T6/TB5°C (-20°C <Ta<+70°C)
NEPSI Ex db	GV18.1497X	GV18.1496X	GB 3836.1-2010, GB 3836.2-2010, GB 12476.1-2013, GB 12476.5-2013	NEPSI Ex db IIC T6° Gb (-40°C <Ta<+120°C) Ex ID A21 IP66/67 T135°C * alternative T6/TB5°C (-20°C <Ta<+70°C)
PESO Ex db	P433822/1	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.
KCS Ex db	16-KA4BO-0032X	16-KA4BO-0162X 18-KA4BO-0286X (WLRT)	Announcement No. 2016-54 Ministry of Employment and Labor	
INMETRO Ex db	NCC-14.2911X		ABNT NBR IEC 60079-0:2013, IEC 60079-1:2014, IEC 60079-31:2014	
TS Mark	-	(TR)02020 07-00121X	CNS 3376-0:2014, IEC 60079-1:2014, IEC 60079-31:2013	
JPEX Ex db	-	CML 20IPN1175X	JNIOH-TR-46-1:2015, JNIOH-TR-46-2:2018, JNIOH-TR-46-9:2015	

Intrinsically Safe >				
Certification/ Approval	Certificate Number		Compliance Standards	Marking
	All Model Types			
ATEX Ex ia	Baseefa14ATEX0013X		EN IEC 60079-0:2018 EN 60079-1:2012	Ex II 1 GD Refer to Certificate for other permitted marking variations.
IECEx Ex ia	IECExBAS14.0003X		IEC 60079-0:2017 IEC 60079-1:2011	UK Ex ia IIC T6° Gb (-20°C <Ta<+70°C) * alternative markings - refer to certificate
UREx Ex ia	BAS21UKEx0626X		EN IEC 60079-0:2018 EN 60079-1:2012	UK Ex ia IIC T6° Gb (-20°C <Ta<+70°C) * alternative markings - refer to certificate
UL/CSA CI/II/III Intrinsically Safe Zone 0	E364212		UL P13, CAN/CSA C22.2 NO. 60079-11:15	UL 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 T4 NEMA 4X/6P -60°C to +125°C T4
EAC/TCRU Ex ia	EA3C RU C-GB AHSB.B.00540/20		TP TC 012/2011, GOST 31610-0-2014 (IEC 60079-0:2011), GOST 31610-11-2014 (IEC 60079-1:2011)	ERC Ex ia IIC T6° Gb X (-40°C <Ta<+125°C) Ex ia IIC T135°C Db X alternative markings - refer to certificate
NEPSI Ex ia	GV18.1495X		GB 3836.1-2010, GB 3836.4-2010, GB 3836.20-2010, GB 12476.1-2013, GB 12476.4-2010	NEPSI Ex ia IIC T6° Gb (-40°C <Ta<+125°C) Ex ia IIC T135°C Db X alternative markings - refer to certificate
PESO Ex ia	P433820/1		IEC 60079-0:2011 IEC 60079-1:2011	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 60079-1:2011, IEC 60079-26:2016	

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 (loc1) and SIL 3 with HFT=1 (loc2)	
CCC Mark - Explosion Proof	2020322304000800 (Wireable) 2020322304000801 (Hardwired)	GB 3836.1-2010, GB 3836.2-2010 GB 12476.1-2013, GB 12476.5-2013	
CCC Mark - Intrinsically Safe	2020322304000873	GB 3836.1-2010, GB 3836.4-2010 GB 12476.1-2013, GB 12476.4-2010	

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 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 7A supplementary fuse is to be installed in every incoming supply line for the device (per 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 flame-proof gap of the rotating terminal head (WLR or WLRT Types) is smaller than the maximum permitted by Table 2 of IEC 60079-1 please consult the manufacturer for details if required.

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

UL/CSA CI 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 to be selected based on suitable ratings for the application ambient temperature.

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 models must be fitted with a cable gland which is suitably equipment certified for Ex e and Ex ta.

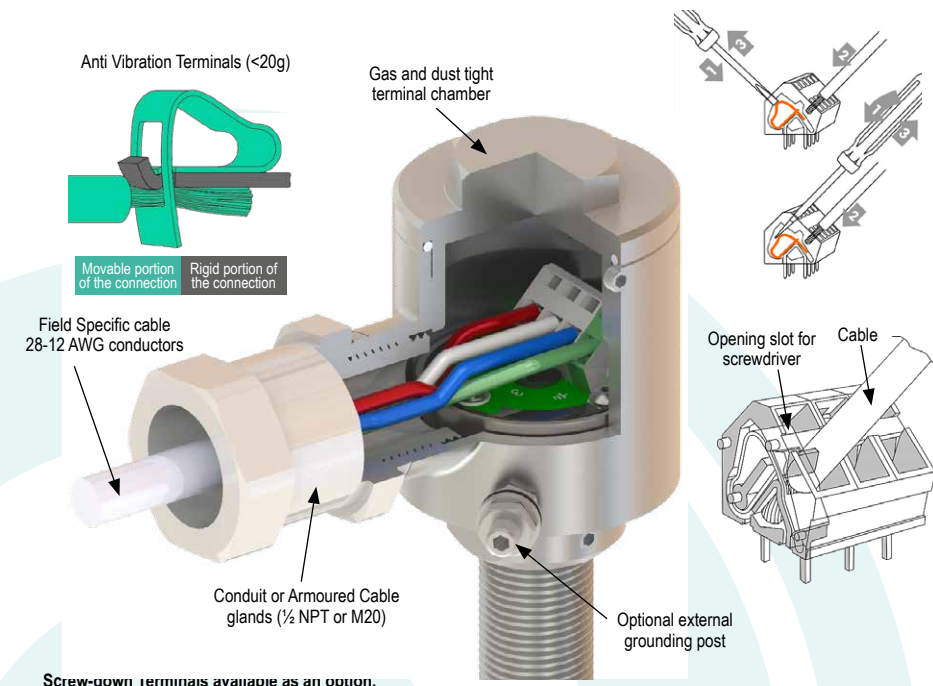
F3. Integral cables shall be fixed and effectively protected against damage as required of a Type B cable as defined in clause 9.5.3 of IEC 60079-25: 2010.

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.

F7. 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
Grub Screw	1.5mm A/F

For Wireable Types (WLR and WLRT only)

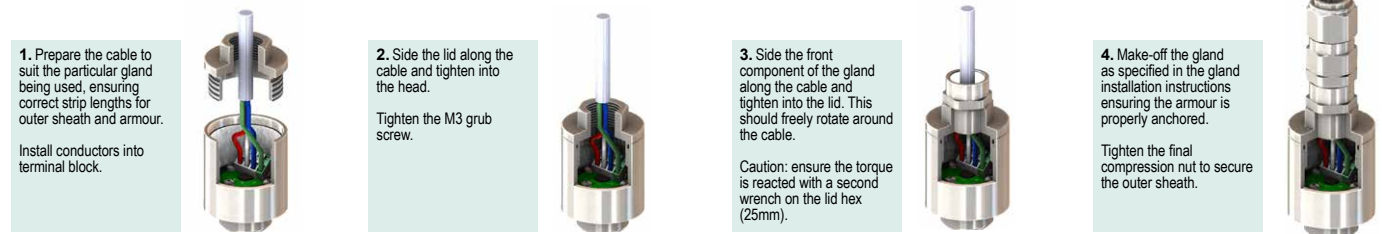
Once the final position of the switch is reached, ensure the M4 grub screw is fitted beneath the wireable head and tightened.

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.

Wireable (W Type) Gland Installation

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



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 CI I/II Div1).

Connected conduit and/or cable should be suitably 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.

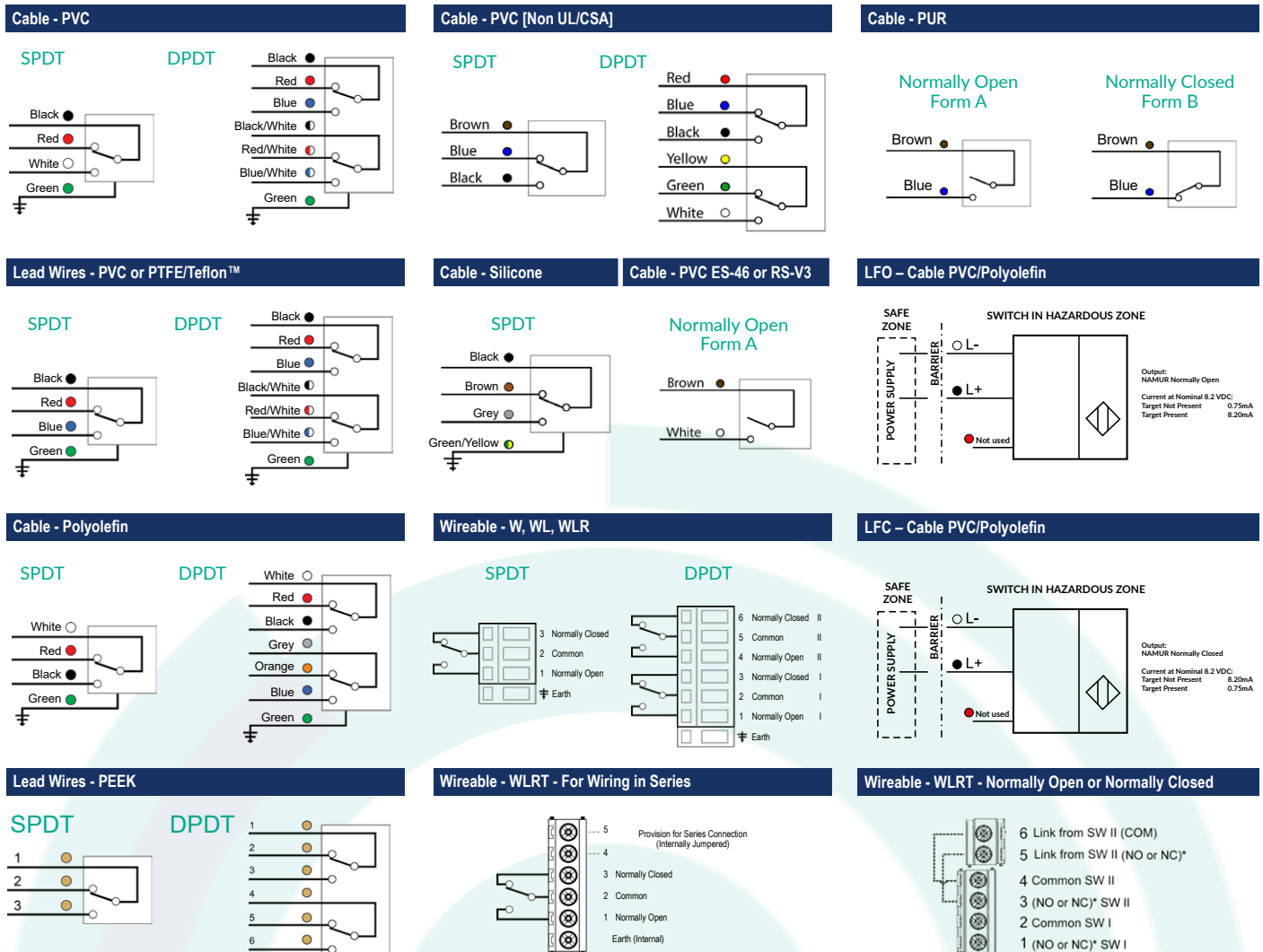
LEDR (RED) – Connect COM and NO wires to provide signal and LED illumination from the NO Contact when the target is present. The NC (Normally Closed) contact wire is provided for signalling only (no LED illumination) and provides a switch output when the target is not present.

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.

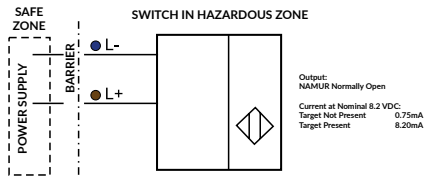
LEDB (RED & GREEN) – Connect COM wire. Also connect the NO and NC wires to provide signal and bi-colour LED illumination. GREEN LEDs are wired across NO Contact which illuminate when the target is present; and RED LEDs are wired across NC Contact which illuminate when the target is not present.

Connection Diagrams - Hardwired & Wireable Models

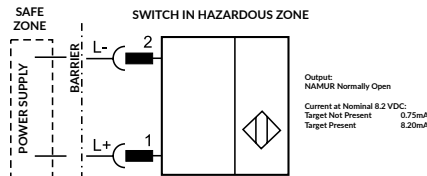
An Earth wire is fitted to models with Option -E. Models without an Earth wire are available for specific certifications/approvals.



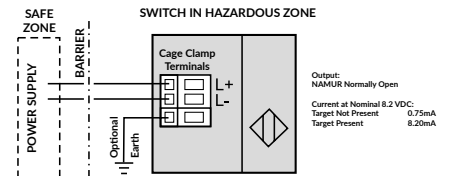
LFO - Cable PUR



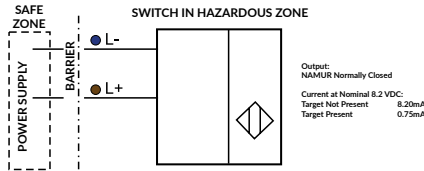
LFO - Connector V2-4



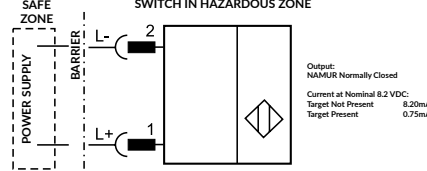
LFO - Wireable



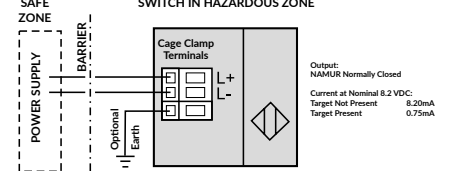
LFC - Cable PUR



LFC - Connector V2-4



LFC - Wireable

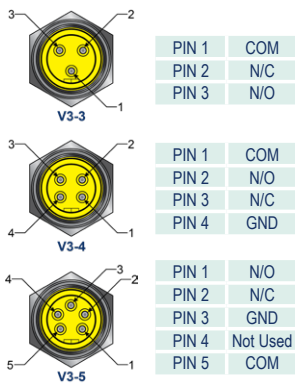


Connection Diagrams - Connector Models

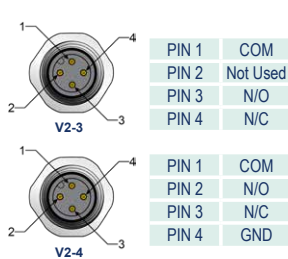
Most models are available with integral connector.

Diagrams below show face view of the male connector provided on the switch.

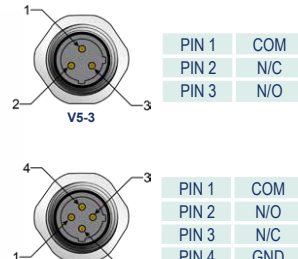
V3 - Mini Change



V2 - Micro Change



V5 - Micro Change



SS - Subsea Wet Mate - Standard



LSS - Subsea Wet Mate Low Profile



SSM - Subsea Wet Mate - Micro Circular



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

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