FL Series Precision Flow Monitoring

Installation and Operation Instructions

euroSwitch
A Longvale Brand

Operating Principles

The FL Series flow switch is a robust paddle type device utilising stainless steel 316L wetted parts guaranteeing long life. The sensing paddle is deflected by the flowing process media, moving a permanent magnet into proximity of the dry contact switch arrangement. The paddle mechanism is spring loaded so when the flow is reduced, the magnet is moved out of proximity of the switch and the contacts reset. The switch set point is always factory set, either corresponding to our standard range values or a custom value depending on customer application.

Either SPDT/SPCO Form C or DPDT/DPCO (2x Form C) volt free contacts, maximum switching current is 4A and can switch multiple voltages up to 240V AC/DC. Can be used across a wide temperature range whilst providing output signals suitable for PLC monitoring and/or driving beacons or sounders where the 24A in-rush capability ensures that the switch can safely handle any start-up current surge.

Designed to be mounted in horizontal pipework, models are available installed and sealed into a threaded tee, or supplied without a tee for direct insertion into an existing threaded process connection. Models are available with BSPT or NPT threads.

Electrical connection options include a variety of cable types and our unique integral wireable connection head in one of four styles W, WL, WLR and WLRT.

Hardwired
Integral cable or lead wires

Wireable WL Type
Side Entry (without Tee)

Wireable WLR Type
Side Entry - Rotatable (with Tee)

Installation Considerations

- The unit is designed to be mounted in horizontal pipework, with the switch unit orientated vertically. Flow rates are factory set and tested in this orientation, and any deviation may result in different flow rates being achieved or non-operation.

- The inlet and outlet section of pipework must be a minimum of 5 x Pipe ID in front of and after the flow switch.

- The unit must be installed with the arrow on the housing matching the flow direction.

- For models not supplied fixed into a Tee, carefully ensure the paddle does not foul when installing - otherwise damage can easily be caused by over-tightening. Use suitable pipe thread sealant to ensure fluid tight seal.

- The purchaser must consult the manufacturer regarding any aggressive substances or external effects that may affect the equipment.

- A difference between the switch point in either a rising or a falling flow will always be present due to switch hysterisis. For custom flow rate products - please indicate priority for the application.

- In case the measured process fluid is not polluted, the unit will remain maintenance-fee. However if the fluid is polluted, ferritic iron particles in the fluid may deposit on the magnet, and larger particles of dirt can cause fouling of the paddle mechanism. To avoid these conditions, it is recommended to install a magnetic filter trap upstream of the flow switch. Regular removal and cleaning of the trap should be performed.

- For Field-Wireable models, the lid of the enclosure must be fully tightened down (20Nm) to maintain both IP rating and explosion protection, the grub screw must be further tightened to prevent the lid from being unscrewed.

Part Numbering

The FL 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.

FL-	A	2	2	2	-	1	-	2	-		-	
Option	1	2	3	4		5		6		7		8

2 – Certification

Standard Approvals
- **1** General Industrial
- **2** IECEx/ATEX Ex ia IIC/IIIC Intrinsically Safe Zone 0 & 20 †
- **3** IECEx/ATEX Ex db/tb IIC/IIIC Explosion Proof Zones 1, 2, 21 & 22
- **4** UL/CSA Class I&II Div 1 Groups A-G No lead seal required
- **5** UL/CSA Class I&II 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

Multi Approvals
- **B** IECEx/ATEX Ex db/tb & UL/CSA Class I&II Div 1 (Consult factory).

Regional Approvals Explosion Proof (Ex db/tb)
- **X** INMETRO (Consult factory) (Brazil)

Regional Approvals Intrinsically Safe (Ex ia)
- **W** INMETRO (Consult factory) (Brazil)

3 – Material

Body Material
- **2** 316L Stainless Steel
  ** Brass Optional - Consult Factory*

4 – Temperature Range

Standard Temperature
-20°C to +70°C (+80°C IS & GI)
-40°C to +100°C (Certifications 4, 5 & 6)
- **1** PVC Cable
- **1L** PVC Leads Additional cost per meter over 2m.

Low Temperature
-60°C to +120°C (+125°C IS & GI)
-60°C to +100°C (Certifications 4, 5 & 6)
- **2** Polyolefin Cable Polyolefin Cable (Blue) - IS certification Additional cost per meter over 2m.

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

5 – Tee Connection

- **1/1N** 1/2" BSPT / 1/2" NPT
- **2 /2N** 3/4" BSPT / 3/4" NPT
- **3/3N** 1" BSPT / 1" NPT
- **4/4N** 1 - 1/4" BSPT / 1 - 1/4" NPT
- **5/5N** 1 - 1/2" BSPT / 1 - 1/2" NPT
- **6/6N** 2" BSPT / 2" NPT

All Tee Connections other than 1/2» provided via an adapter bush.
Standard Tee is Stainless Steel 316 ; Brass optional
Please consult factory.

6 – Tee Options

- **0** No Tee supplied
- **2** Supplied with equal Tee (pipe size as per 5 - Tee Connection)

May be supplied with unequal Tee.
Please consult factory.

7 – Additional Options

Contact Arrangement
- **-** SPDT/SPCO
- **D** DPDT/DPCO

Contact Material
- **-** Silver as Standard
- **AU** Gold Flashed (consult factory)

Earthing/Grounding
- **E** Earth (Ground) wire Required on certifications 4, 5 & 6

8 – Connection Options

Wireable Connection Head
- **W** Back / Top entry
- **WL** Side entry
- **WLR** Side entry 360° Rotatable
- **WLRT** Twin Side entry 360° Rotatable

For wireable heads, append preferred conduit entry from below. e.g. -WLR-M20
Temperature range must be 1 or 2.

Conduit Entry
- **-** Imperial 3/4» NPT-M (if cabled)
- **M20** Metric M20 x 1.5 (wireable only)
- **NPT** Imperial 1/2" NPT-F (wireable only)

Special Conditions for Safe Use

ATEX/IECEx/UKEX Ex db/tb and Ex ia

A1. External earth bonding of the stainless steel enclosure may be achieved via the external mounting thread and/or the threaded cable entry.

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

A3.The flamepath must not be repaired.

A4. It is the responsibility of the installation engineer to ensure that the IP rating of IP66/67/68 of the equipment is maintained between the hazardous area requiring EPL Ga and the less hazardous area.

A5. It is the responsibility of the installation engineer to ensure that suitably rated cable and cable glands are used to install this equipment.

A6. Only fasteners of type M4 x 0. 7 6g DIN913 and M3 x 0.5 6g socket set scr ew DIN 913 type 316 stainless steel may be used to prevent rotation of the the lid and/or WLR connection head in the installed position.

A7. The process medium must not exceed the ambient temperature range of the equipment.

A8. 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.

Additional Conditions for ATEX/IECEx/UKEX Ex ia Only

A9. Metallic switches may pose an electrostatic risk if not earthed. This should be taken into account during installation.

A10. Where a sensor has two sets of switching contacts, both sets of switching contacts may be considered to be separate intrinsically safe circuits. Where the two circuits are separate intrinsically safe circuits, the user shall ensure segregation of the external cabling between the two circuits is maintained during installation and either type A or type B cable as defined in clause 9.5.2 & 9.5.3 of IEC 60079-25 : 2010 is used.

UUCSA Cl I/II/III Div 1/2 Only

B1. **CAUTION - KEEP ENCLOSURE TIGHTLY CLOSED WHEN IN OPERATION**

B2. All models do not require a conduit seal to be installed (exception WLRT - at least one of the threaded entries is to be sealed within 50 mm from the threaded connection).

B3. External earthing is via the mounting or entry threads. Models with option -E are provided with an earth wire connected to the metallic housing.

B4. A supplementary 7A fuse is to be installed in every incoming supply line for the device (per the NEC/CEC).

B5. For field-wireable type W models with conduit entry through the lid, conduit unions are recommended for ease of installation of glanding.

B6. For all field-wireable models, 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.

B7. Install as per the pertinent clauses of the NEC/CEC.

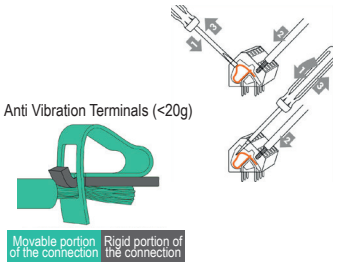
Explosion Proof >			
Certification/ Approval	**Certificate Number**	**Compliance Standards**	**Marking**
ATEX Ex db	Baseefa16ATEX0049X	EN IEC 60079-0: 2018, EN 60079-1: 2014, EN 60079-26: 2015, EN 60 079-31: 2014, EN ISO 80079-36: 2016	Ex II 1/2 GD Ex db h IIC T6* Ga/Gb (-20°C <Ta< +70°C) Ex h tb IIIC T85°C * Da/Db IP66/67/68 * alternative T4/T135°C (-60°C <Ta<+120°C) UK CA CE
IECEx Ex db	IECExBAS16.0034X	IEC 60079-0:2017, IEC 60079-1:2014-06, IEC 60079-31:2013	
UKEX Ex db	BAS21UKEX0758X	EN IEC 60079-0: 2018, EN 60079-1: 2014, EN 60079-26: 2015, EN 60 079-31: 2014, EN ISO 80079-36: 2016	
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 * 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
INMETRO Ex db	NCC-14.2911X	ABNT NBR IEC 60079-0:2020 ABNT NBR IEC 60079-1:2016 ABNT NBR IEC 60079-31:2014	As per ATEX/IECEx Ex db with addition of regional certificate number and mark where applicable.

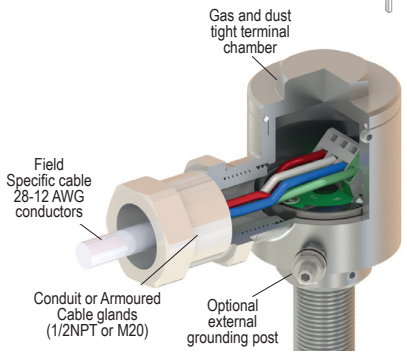
Intrinsically Safe >			
Certification/ Approval	**Certificate Number**	**Compliance Standards**	**Marking**
ATEX Ex ia	Baseefa16ATEX0172X	EN IEC 60079-0:2018 EN 60079-11:2012	Ex II 1 GD Ex ia IIC T6* Ga (-20°C <Ta<+80°C) Ex ia IIIC T85°C* Da IP6 6/67/68 * alternative T4/T135°C (-60°C <Ta<+125°C) UK CA CE
IECEx Ex ia	IECExBAS16.0124X	IEC 60079-0: 2017 IEC 60079-11: 2011	
UKEx Ex ia	BAS21UKEX0625X	EN IEC 60079-0: 2018 EN 60079-11: 2012	
INMETRO Ex ia	NCC-14.2910X	ABNT NBR IEC 60079-0:2020 ABNT NBR IEC 60079-11:2013	As per ATEX/IECEx Ex db 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

Electical 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

Electrical Ratings

1. The enclosure is supplied with terminals suitable for conductor sizes 0.08 - 2.5mm2 (28 - 12 AWG). Internal earth connection provided.
2. External earthing is via the mounting or entry threads.
3. The instrument utilises switching elements rated as follows:

Supply Voltages: 115V AC, 125V AC, 250V AC, 30V DC

UL Rating: 4A@250VAC

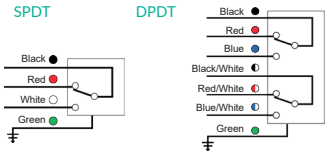
Maximum In-rush Current: 24A

For Intrinsically Safe Versions, a separately certified intrinsically safe source having the following parameters:
Ui = 30V, Ii = 250mA, Pi = 1.3W

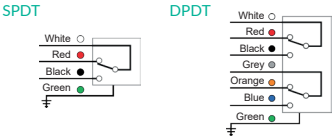
Connection Diagrams - Hardwired & Wireable Models

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

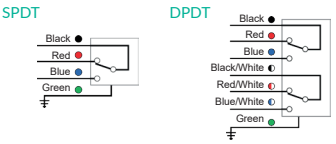
Cable - PVC



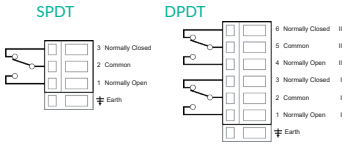
Cable - Polyolefin



Lead Wires - PVC or PTFE/Teflon™



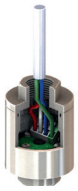
Wireable - W, WL, WLR, WLRT



Field-Wireable (W Type) Version

Conduit Connection
Conduit Unions (suitability certified) may be used on - W designated switches. These allow for modification and removal of enclosures without turning or removing of the conduit.

Cable Gland Installation
Follow the 4 step procedure shown to install cabling and glands.



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.

1. 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).

2. 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.

Field-Wireable (WLR Type) Version

The rotatable connection head (WLR) can be orientated to suit the particular installation via loosening of the lower grub screw located on side of the connection head and rotating the head by hand. Re-tighten the grub screw to lock the position of the head.
CAUTION: Any rotation of the head should be conducted with the electrical conductors removed from the terminals.

Wrench Sizes

Housing	25.4mm / 1" A/F
Lid Hex	25.4mm / 1" A/F
Grub Screw	1.5mm A/F

Industrial Sensor Specialist
Longvale

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

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