

## Flow Switch - FL Series Installation and Operating Instructions



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# FL Series Precision Flow Monitoring

## Installation and Operation Instructions



**Hardwired**  
Integral cable or  
lead wires



**Wireable  
WL/WLA Type**  
Side Entry



**Wireable  
WLR Type**  
Side Entry - Rotatable

## 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 supplied installed and sealed into a threaded tee. Models are available with BSPT or NPT threads.

Electrical connection options include a variety of cable types and our unique integral wireable connection head, available in 316 stainless steel or aluminium.

## 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 hysteresis.
- If the process fluid is contaminated with ferritic iron particles these could be deposited on the magnet, and larger particles of debris can cause fouling of the paddle mechanism. To avoid this 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 / 15 ft-lbs to maintain both IP/Type rating and explosion protection, the grub screw must be further tightened to prevent the lid from being unscrewed.

### Actuation Flow Rates (Standard Models)

Pipe Size	Actuation Point		Max Flow Rate	
	L/min	US Gpm	L/min	US Gpm
1/2"	<7.6	<2.1	60	15
3/4"	<9.1	<2.4	Consult Factory	
1"	<9.1	<2.4	Consult Factory	
1-1/4"	<9.1	<2.4	260	70
1-1/2"	<9.1	<2.4	Consult Factory	
2"	<9.1	<2.4	Consult Factory	

## Field-Wireable (WLR/WLRT Type) Version

The rotatable connection head 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.

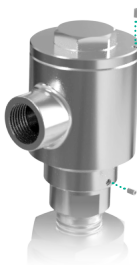


**CAUTION:** Any rotation of the head should be conducted with the electrical conductors **removed** from the terminals.

### Wrench Sizes

Housing ⚗ 25.4mm / 1" A/F

Lid Hex ⚗ 25.4mm / 1" A/F



### Allen Key Sizes

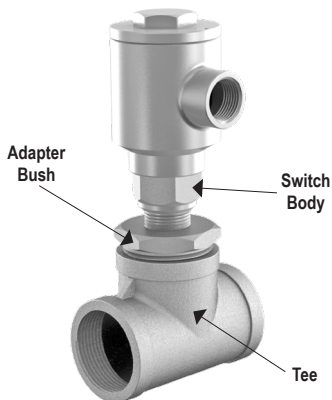
Lid Grub Screw ⚗ 1.5mm

Head Grub Screw ⚗ 2mm



### WARNING: Factory-Assembled Connections

No user adjustment as this will damage switch and void warranty.

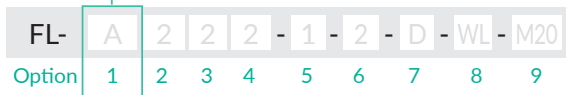


- The Switch Body, Adapter Bush, and equal Tee are supplied as a factory-assembled unit.
- These joints are not user-serviceable.
- Under no circumstances should any of these connections be loosened, tightened, adjusted, or otherwise manipulated with any tools.
- Any attempt to alter these joints may compromise product integrity or performance.

# Part Numbering

The FL Series part number breakdown is shown below. Please note not all options/combinations are available. *Please consult [www.euroswitch.com](http://www.euroswitch.com) or contact the factory for the most up to date information.*

**Option 1 – Model Series.** Please refer to [www.euroswitch.com](http://www.euroswitch.com) for available model series and technical specifications.



## 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 Div 1 Groups A-G  
No lead seal required
- 5 UL/CSA Class I&II Div 2 Groups A-D-F-G  
No lead seal required
- 6 UL/CSA Ordinary Location  
General Purpose
- 7 UL/CSA Class I,II & III Div 1  
(Consult factory)

### Multi Approvals

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

### Regional Approvals Explosion Proof (Ex db/tb)

- X INMETRO (Brazil)

### Regional Approvals Intrinsically Safe (Ex ia)

- W INMETRO (Brazil)

## 3 – Material

### Body Material

- 2 316L Stainless Steel  
\* Brass Optional - Consult Factory

## 4 – Temperature Range

### Standard Temperature - Hard wired

- 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  
Additional cost per meter over 2m.

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

- 2 For wireable connection head.  
Low temperature as standard.

## 5 – Process Connection

- 1 or 1N 1/2" BSPT / 1/2" NPT
- 2 or 2N 3/4" BSPT / 3/4" NPT
- 3 or 3N 1" BSPT / 1" NPT
- 4 or 4N 1 - 1/4" BSPT / 1 - 1/4" NPT
- 5 or 5N 1 - 1/2" BSPT / 1 - 1/2" 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

- 2 Supplied with equal Tee  
(pipe size as per 5 - Tee Connection)

## 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 hardwired & certification  
4, 5 & 6

## 8 – Connection Options

### Wireable Connection Head

- W** Back / Top Entry
- WL** Side Entry
- WLA** Side Entry Aluminium
- WLR** Side Entry 360° Rotatable
- WLRT** Side Entry 360° Rotatable Twin Entry

## 9 – Conduit Entry

- Imperial 3/4" NPT-M (hardwired model only)
- M20** Metric M20 x 1.5 (wireable only)
- NPT** Imperial 1/2" NPT-F (wireable only)  
For wireable heads, append preferred  
conduit entry e.g. -WLR-M20

## 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 screw type 316 stainless steel may be used to prevent rotation of 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/Type rating and explosion protection, the grub screw must be further tightened to prevent the lid from being unscrewed.
- A9. When used for a Group III applications the non-metallic coating of the aluminium head version presents a potential electrostatic charging hazard - see instructions.

### Additional Conditions for ATEX/IECEx/UKEX Ex ia Only







- A10. Metallic switches may pose an electrostatic risk if not earthed. This should be taken into account during installation.

- A11. 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.
- A12. Aluminium head options must be protected from impact and friction when located in a Zone 0 area.




## UL CSA CI 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 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	 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)  
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 CI/I/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 CI/I/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 with addition of regional certificate number and mark where applicable. NCC 14.2911X

## Intrinsically Safe >

Certification/ Approval	Certificate Number	Compliance Standards	Marking
ATEX Ex ia	Baseefa16ATEX0172X	EN IEC 60079-0:2018 EN 60079-11:2012	 II 1 GD Ex ia IIC T6* Ga (-20°C <Ta<+80°C) Ex ia IIC T85°C* Da IP66/67/68 * alternative T4/T135°C (-60°C <Ta<+125°C)
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 with addition of regional certificate number and mark where applicable.

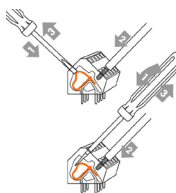
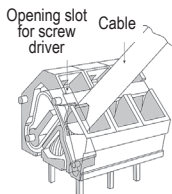
## Other Approvals >

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

The wireable type models are equipped with either anti-vibration cage clamp terminals or Screw-down Terminals.

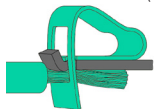
### Cage Clamp



#### Install Steps

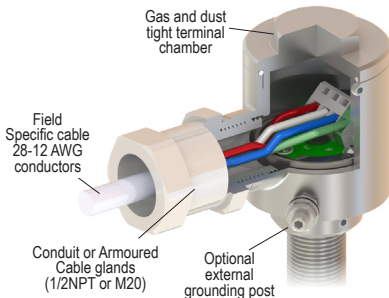
- Strip conductors to 1/4" (6mm).
- Step 1 - Open terminal with small flat blade screw driver.
- Step 2 - Insert conductors into cage clamp terminal.
- Step 3 - Remove screwdriver.

### Anti Vibration Terminals (<20g)

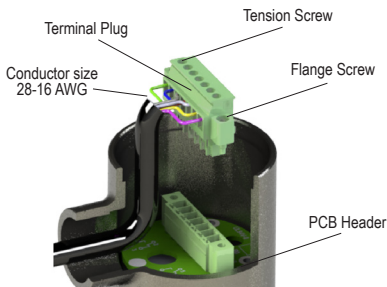


Movable portion of the connection

Rigid portion of the connection



## Screw-down Terminal



### Install Steps

- Strip conductors to 1/4" (6mm).
  - Terminal Plug should be removed from its header for wiring.
- Populate terminal plug with conductors.
- Tighten each tension screw to 1.95 - 2.21in-lb (0.22N/m - 0.25N/m).
- Reinstall the terminal plug into header and tighten flange screws to 2.66in-lb (0.3 N/m) to secure.

## Electrical Ratings

1. The enclosure is supplied with terminals suitable for conductor sizes 0.08 - 2.5mm<sup>2</sup> (28 - 12 AWG) see page 8 for each terminal specifics. 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:** 24V DC (4A), 110-120V AC (4A), 230-240V AC (3A)

**Maximum In-rush Current:** 24A

**For Intrinsically Safe Versions,** a separately certified intrinsically safe source having the following parameters must be used:  $U_i = 30V$ ,  $I_i = 250mA$ ,  $P_i = 1.3W$

## Installation Considerations - Aluminium Wireable Head Models

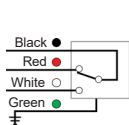
Where painted aluminium head models are intended to be installed in Group III, Potentially Explosive Dust Atmospheres, the installation shall be such that they are protected from dust laden airflow which may cause charge transfer.

## Connection Diagrams - Hardwired & Wireable Models

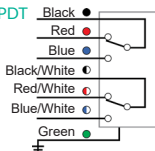
An Earth wire is fitted to models with Option -E. Models without an Earth wire are available for specific certifications/approvals.

### Cable - PVC

#### SPDT

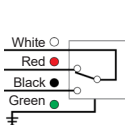


#### DPDT

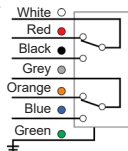


### Cable - Polyolefin

#### SPDT

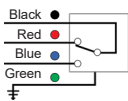


#### DPDT

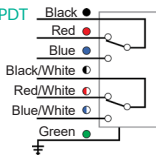


## Lead Wires - PVC

### SPDT

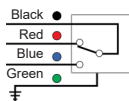


### DPDT

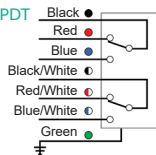


## Lead Wires - PTFE/Teflon™

### SPDT

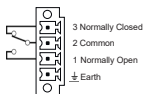


### DPDT

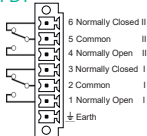


## Wireable - WLA

### SPDT

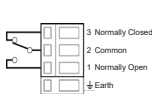


### DPDT

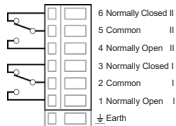


## Wireable - W, WL, WLR, WLRT

### SPDT



### DPDT



## Field-Wireable (W Type) Version

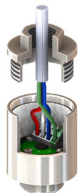
### Conduit Connection

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.



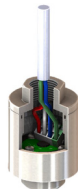
1. Prepare the cable to suit the particular gland being used, ensuring correct strip lengths for outer sheath and armour.

**Install conductors into terminal block.**



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).**



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

**Tighten the M3 grub screw.**



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.**



## TRANSLATIONS >

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

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