

## F25 CORROSION RESISTANT FLOW SWITCHES

### FEATURES

- RELIABLE ROBUST CONSTRUCTION
- WEATHERPROOF ENCLOSURE IP56
- ALL WETTED PARTS IN THERMO PLASTIC
- NO METAL PARTS IN CONTACT WITH FLUIDS
- FULLY ADJUSTABLE FLOW SENSITIVITY
- SUITS PIPE SIZES 25MM TO 150MM +
- REED SWITCH OR SOLID STATE RELAY OUTPUT
- TOTALLY SERVICEABLE DESIGN
- FULL 18 BAR (260 PSI) PRESSURE RATING
- ENERGY AUTHORITY APPROVED

### APPLICATIONS

- Loss of flow protection for pumps
- Control of flow in ultra pure water systems
- Flow status signalling in water treatment plants
- Control of effluent and fluid neutralising systems
- Corrosive and saline ground water applications
- Applications involving sea water or brine solutions
- Safety and control signalling for chemical handling
- Control and protection of chemical pumps
- Irrigation and turf watering systems control
- Horticultural and hydroponics system control

The F25 series flow switch has been specifically developed to fill the need for a flow sensor, capable of working reliably in applications in which metal flow switches fail. Typical areas include chemical, process, pharmaceutical, scientific and agricultural uses in which the metal components of traditional flow switches either interfere with, or are attacked by, the liquids being handled.

Modern thermo plastic pipe systems are used extensively in agriculture, industry, and in commercial and domestic fluid handling. The F25 flow switch has been specifically designed to integrate into plastic piping systems, and to enhance the advantages of such systems. Total avoidance of metal components, in the fluid stream, has been achieved. In addition, an advanced frictionless sensitivity adjusting system gives total external control over the switching threshold.



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# TECHNICAL DATA

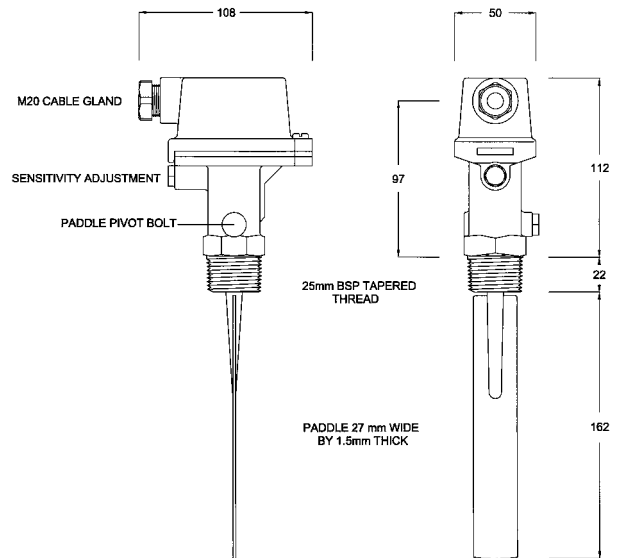
## CONSTRUCTION

The F25 series flow switch is made from glass reinforced polypropylene, with an ABS electrical housing and paddle. Optional PVC paddles can be supplied for special applications.

Polypropylene is non-ageing and is unaffected by ground conditions. It will not support algae or bacterial growth, and has exceptional resistance to most acids, alkalis and solvents. ABS will withstand weak acids and both weak and strong alkali solutions.

The F25 series flow switch should not be used with organic solvents. Either the standard ABS paddle or the optional PVC paddles can be used in chlorinated water or in acid or alkali solutions.

## DIMENSIONS



## ELECTRICAL DATA

Switches can be supplied with a variety of circuit boards to suit specific applications. The electrical specifications of these boards are listed below.

Switch Model	Module Type	Contact Configuration	Switched Power	Switched Voltage Maximum	Switched Current Resistive AC (rms) Maximum	Inductive Loads (Power Factor 0.4)	Typical Application
F25-B	Dry Reed Switch	S.P.S.T. N.O/N.C.	40W	240V AC 200V DC	1A	Not Suitable	PLC & control circuits
F25-C	Dry Reed Switch	S.P.D.T.	40W	240V AC 200V DC	1A	Not Suitable	PLC & control circuits
F25-R	Solid State Relay (Triac)	S.P.S.T. N.O/N.C.	750W	240V AC	4A	4A at 240V AC	AC control circuits & motor control
F25-A-240	Standard Relay 240V AC Coil	S.P.D.T.	2500VA at 250V AC 300VA at 30V DC	240V AC	10A	7.5A at 250V AC 5A at 30V DC	General AC or DC control
F25-A-24	Standard Relay 24V AC Coil	S.P.D.T.	2500VA at 250V AC 300VA at 30V DC	240V AC	10A	7.5A at 250V AC 5A at 30V DC	General AC or DC control

The circuit boards fitted to the F25-B and the F25-R switches are supplied as normally off switches that turn on when flow starts. Turning the circuit board end for end will reverse this standard switch function. Circuit boards with S.P.D.T. contacts, such as the F25-C and the boards that include built in relays, should not be reversed. Normally on and normally off functions are available directly from the terminal blocks of these switches.

Data on maximum and minimum flow rates needed to actuate F25 flow switches is not included. Pipe size, paddle arm trimming and sensitivity settings all interact to determine the switching thresholds. The unique magnetic system employed in the Ultraswitch F25 series provides a range of settings unequalled - covering extreme sensitivity to very low flows through to relative insensitivity to quite high flow rates.

## OPERATING ENVIRONMENT

Maximum Operating Pressure (Static or Dynamic) at Ambient Temperature	1800 Kpa 260 P.S.I.
Minimum Burst Pressure at Ambient Temperature	7000 Kpa 1000-P.S.I.
Maximum Operating Temperature	80°C
Minimum Operating Temperature	-20°C
Ph Range Standard Switch	1 to 10
Ph Range with ABS Arm	1 to 14

NOTE: Maximum operating pressures must be derated at elevated temperatures.

NEW SOUTH WALES DEPARTMENT OF MINERALS AND ENERGY APPROVAL No. CS4937N

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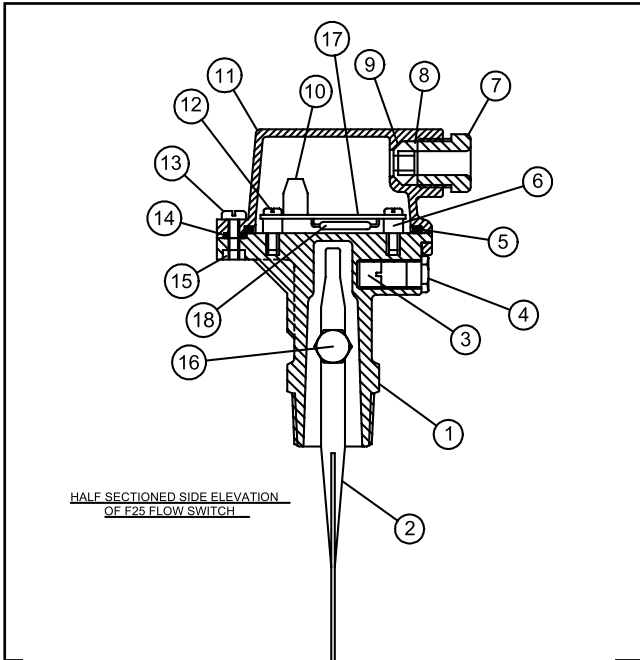
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# INSTALLATION AND OPERATING INSTRUCTIONS FOR F25 SERIES FLOW SWITCH

**PLEASE READ THIS INSTALLATION SHEET CAREFULLY AND FULLY BEFORE ATTEMPTING TO INSTALL OR SERVICE THIS FLOW SWITCH**



ITEM	DESCRIPTION	QTY	MATERIAL or MODEL
1	BODY	1	POLYPROPYLENE
2	PADDLE C/W MAGNET	1	POLYCARBONATE PVC ABS
3	SENSITIVITY SCREW	1	POLYPROP, C/W MAGNET
4	DUST CAP	1	POLYPROPYLENE
5	LID SEAL RING	1	NEOPRENE
6	PC BOARD SPACER	2	POLYPROPYLENE
7	CABLE GLAND NUT	1	HIGH IMPACT ABS
8	BACKING WASHER	1	HIGH IMPACT ABS
9	CABLE GROMMET	1	SANOPRENE
10	TERMINAL BLOCK	1	ACETAL
11	LID	1	HIGH IMPACT ABS
12	PC BOARD SCREW	2	CADMIUM PLATED STEEL
13	LID SCREW	1	304 STAINLESS STEEL
14	SCREW RETAINER	1	NEOPRENE
15	NUT	1	304 STAINLESS STEEL
16	PADDLE PIVOT BOLT	1	POLYPROPYLENE
17	CIRCUIT BOARD	1	FL25R, FL25B, or FL25C
18	REED SWITCH	1	FRAGILE GLASS

PARTS LIST FOR F25 SERIES FLOW SWITCH

## APPLICATION

The F25 series flow switch has been specifically designed to be used in both water and aggressive chemical solutions. All wetted parts of the switch are made from thermo-plastics, which resist a wide range of chemicals such as acids, bases, sea water, ground water, and many solutions containing dissolved mineral salts. This switch should not be used in organic solvents.

There are no metal parts in the wetted area of this switch. The spring action of the paddle arm and the actuation of the switch is achieved solely by magnetic force, acting through the polypropylene walls of the switch.

If there is any doubt as to the suitability of this flow switch to be exposed to specific chemicals, seek the advice of the manufacturer before installing this switch.

## ENVIRONMENT

The F25 series flow switch has an IP rating of 56, that is, the unit is weather proof and may be used for all exposed outdoor applications. In situations where the whole switch may be submerged in water for long periods, it is recommended that the electrical housing be filled with an electrical grade (non acid curing) silicon sealant. There are no moving parts in the electrical enclosure of this switch so the entire housing can be simply potted in this way, if required.

## GENERAL

Do not use this switch in pipe systems where the liquid temperature is greater than 80°C, or lower than -20°C. At temperatures approaching 80°C the maximum pressure rating of the switch (18 Bars, or 264 PSI) must be reduced, preferably to less than 10 Bars (150 PSI). Safety should always be considered when using these switches, particularly with high temperature, or dangerous solutions. Take special note that both the temperature and pressure ratings of the switch may need to be reduced, if the switch is to be used in chemical solutions, at elevated temperatures and or pressures.

## INSTALLATION

This flow switch is intended to be installed in either horizontal or vertical pipework. If the switch is to be used in vertical pipework, the flow of liquid in the pipe should be upward only. Never in a downward direction. There is some loss of sensitivity to flow when the flow switch arm lays in the horizontal plane, this is due to the weight of the paddle itself, and is particularly relevant in large pipes, operating at low flows, where a full length paddle may be used.

The switch may be installed in the suction or the discharge pipes of pumping systems. When bracket mounted, the switch may be used to detect flow in open channels. It will also function as an air flow switch in applications such as airconditioning ducting, due to its high sensitivity.

In horizontal pipework, the switch may be oriented at up to 60° either side of vertical. Under no circumstances should the flow switch be mounted on the underside of horizontal or angled pipework. Regardless of the orientation of the switch, it is important to ensure the paddle is exposed to a linear non turbulent flow of liquid. This is best achieved by mounting the switch in a straight run of pipe, of at least 5 pipe diameters both up and downstream of the switch. Never mount this switch close to valves or bends in the pipework, as both can cause turbulent flow.

The F25 flow switch is designed to be used in pipe systems ranging from 25mm (1 inch) upward. A 25mm BSP threaded socket must be provided, fixed at 90° to the axis of the pipe. For steel pipes of the larger sizes, a suitable socket may be welded to the main pipe. The most usual method however, for both steel and plastic pipe, is to use a reducing tee in the main pipe. The tee should have a 25mm BSP female thread to accept the flow switch. The F25 flow switch must be oriented in the flow stream so the liquid impinges on the paddle face, squarely.

There is an arrow on the side of the body of the flow switch which indicates the alignment of the switch in relation to the direction of flow through the pipe. The flow switch will not operate unless this orientation is correct.

## PADDLES

Paddles are available in ABS or PVC. The standard paddle supplied with the F25 switch is made from ABS, and is suitable for use with water, bore water, sea water and a wide variety of chemicals.

## PADDLE TRIMMING

The paddle of the F25 flow switch is intended to be cut off at a suitable length on each installation. Several factors should be considered when deciding how long the paddle should be. Firstly, the F25 flow switch is an extremely sensitive device. It only takes a slight force against the paddle to actuate the switch. Liquid moving at reasonable velocity in a pipe will generate a considerable amount of force against the flow switch paddle. Any more load than is required to actuate the switch will only represent unnecessary stress, and possible premature failure of the paddle. As a general recommendation, keep the paddle length as short as possible. Usually the paddle need not extend past the centre line of the pipe, and often even less paddle area exposed to the flow will suffice. In situations where the flow is known to be low, or in large pipes prone to partial draining, it may be necessary to use a longer paddle. If the paddle is inadvertently cut too short, this can, in many instances be compensated for by adjustment of the sensitivity screw located under the end of the electrical housing.

Take care that the paddle is able to pivot freely through its full arc of motion, unencumbered. This is particularly relevant when the switch is mounted in an extension or stand off socket, for example in pipework which is to be lagged. The paddle must be free to pivot fully back and forward, in order to actuate the switch correctly.

## ELECTRICAL INSTALLATION

All electrical work associated with this flow switch must conform to the relevant local codes, and should be carried out by qualified persons only. The switch lid is fitted with a cable gland sized to accept 10mm cable, or by removing the inner gland rubber, 6mm cable. If the cable gland nut is removed, the thread will accept a 20mm conduit bush. The switch should be connected in series with the load. The terminals are marked S1, S2 and Earth. The switch is bi-directional so the active can be fed to either S1 or S2 and the switch wire to the load taken from the other available terminal, S1 or S2. The earth terminal is provided for safety, and should be used on every mains voltage installation. The F25 flow switch is available with 5 different circuit boards. The details of the electrical rating of each model can be found inside the lid of the electrical housing. Some additional details are included here:

1) F25-R (Circuit board is marked FL25R) Solid state relay, suited to control AC circuits between 2 and 250 volts. This switch is suitable for all general purpose applications, for example, control of contactors and relays, or direct control of small motors. This switch will not operate in DC circuits, or in AC applications where the load is less than 10mA. To test the FL25R circuit board, use a 240 volt lamp connected in series with the switch. Continuity testers and multimeters may yield false results if applied to the FL25R circuit board. The switch is supplied as a normally OFF switch which turns ON when flowing liquid moves the paddle. The terminal block, on the circuit board, is toward the down stream end of the switch body. To convert the switch to a normally ON function, simply remove the 2 fixing screws and turn the circuit board end for end.

Due to thermal dissipation factors, the amount of power the FL25R circuit board can control is limited to 750 Watts, continuous. If the continuous load is not limited to this rating, the triac temperature will become excessive ( $> 130^{\circ}\text{C}$ ) and the switch may lock in the ON state, until allowed to cool.

2) F25-B Single reed switch contact switch, suited to control of AC or DC circuits up to 250 volts at up to 40VA Principally intended for signalling of PLC's the F25-B can also be used as a light duty general purpose control switch. As with any reed switch based device, care must be taken not to overload, or to apply inductive loads to this switch. The F25-B is supplied as a normally OFF switch, and this may be reversed as required by turning the circuit board end for end.

3) F25-C Double reed switch circuit board. Essentially similar the F25-B, the F25-C gives a single pole double throw action by employing 2 reed switches. The circuit board should not be reversed on this model.

All 3 circuit boards have magnetically actuated reed switches, located under the boards. These are small green glass tubes which are extremely fragile. Take care if removing or replacing the circuit board not to in any way damage the reed switch, to bend its leads, or change its position.

## HAZARDOUS LOCATIONS

The F25 flow switch is classed as a simple device, it contains no mechanism for the storage or production of electrical energy. The switch does not require separate certification to be used in hazardous locations. The F25-B and F25-C switches are suited to hazardous area use, when isolated via an intrinsically safe relay (zener barrier)

## SENSITIVITY ADJUSTMENT

There are two methods of setting the point at which the F25 flow switch operates, in relation to any given flow. By far the most effective is careful trimming of the paddle length. The second method should only be used to fine tune an installation. There is a sensitivity adjusting screw located at the upstream end of the switch under the end of the electrical housing. This is accessible by removing the hexagon headed plug, and adjustable using a broad bladed screwdriver. As supplied, the screw is wound fully in. This setting makes the switch least sensitive to liquid impinging on the paddle. The screw may be wound anticlockwise, to increase the sensitivity. That is, to make the switch respond to lower flows, or to a smaller area of paddle exposed to the flow. The screw should never be removed or wound out more than 6 full turns, and never wound in beyond its stop. The switch will not operate if the screw is removed.

## MAINTENANCE AND REPAIRS

Full overhaul and service of the F25 flow switch may be carried out in the field, and in most instances without disturbing existing pipework. Note that repairs should only be carried out by qualified electrical personnel. All components of the switch are available as spare parts, from the manufacturer, or supplier. See Fig 1 for a complete parts list for this switch.

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