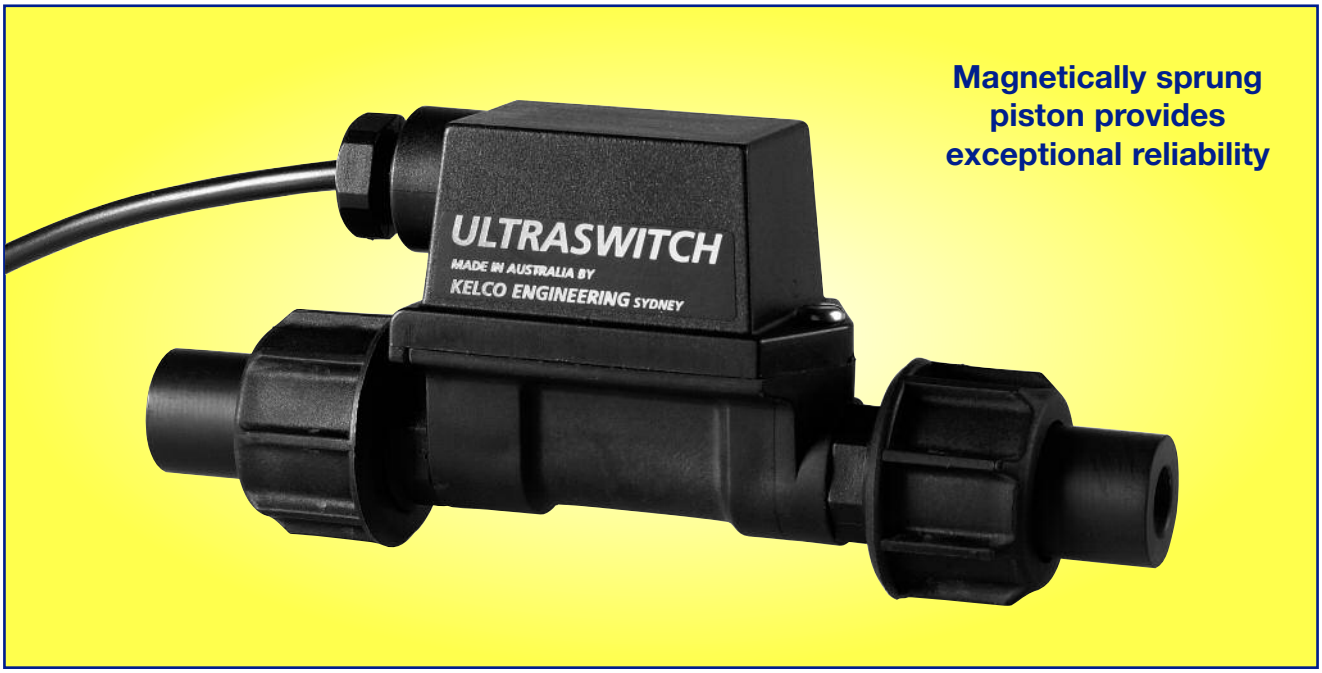
KELCO

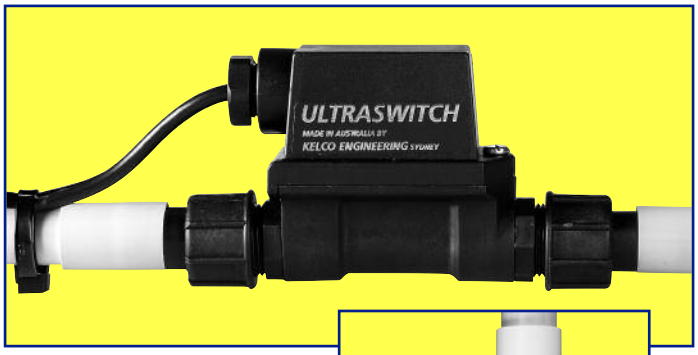
P20 CORROSION RESISTANT IN LINE FLOW SWITCHES



Magnetically sprung piston provides exceptional reliability

FEATURES

- SUITS TUBES & PIPES 6 TO 20 MM (¼" TO ¾") DIA.
- NO METAL PARTS IN CONTACT WITH LIQUIDS
- ALL POSITION MOUNTING
- CHOICE OF 3 SWITCHING FLOW RATES
- DETECTS VERY LOW FLOWS
- ROBUST RELIABLE SWITCH
- EASY TO INSTALL
- HIGH FLOW THROUGH
- 18 BAR (260 PSI) PRESSURE RATING
- VERY LOW HEAD LOSS
- MANY OPTIONS AVAILABLE



HORIZONTAL MOUNTING

VERTICAL MOUNTING

APPLICATIONS

- Liquid or gas flow detection
- Constant pressure pump control
- Loss of prime pump protection
- Water treatment contol
- Industrial process control
- Irrigation control
- Chemical dosing systems
- Chilled water control
- Vapour flow detection

AUSTRALIAN MADE

GENERAL INFORMATION

DESCRIPTION

The P20 In line Flow Switch is a simple and reliable flow switch that can detect the flow of liquids or gases in tubes and small diameter pipes. The P20 can detect either continuous or pulsed flows. Typical applications include monitoring flow in water treatment and irrigation systems, domestic constant pressure system control, gland cooling systems and a myriad of uses in industrial process control. The P20 flow switch gives a simple on or off response to liquid flow. There are no metal parts in contact with liquids within the switch, so the P20 is ideal for use in aggressive liquids such as seawater, groundwater, acids and many chemical solutions. The standard switch is supplied complete with pipe spigots and unions, for direct fitting into PVC or ABS pipe work. In addition 5 electrical modules are available that give a wide choice of control options. These include electrical modules with single and multiple reed switches, relays with various coil voltages, and solid-state switches. Each P20 flow switch is supplied complete with 3 pistons, to provide the user with a wide choice of flow switching points.

OPERATING PRINCIPLE

The body of the P20 flow switch houses a fluted piston. Any flow, either pulsed or continuous, causes the piston to be pushed back within the switch body to a point where the liquid can pass over the piston and out of the switch. The piston contains a magnet that actuates a reed switch and this provides the switching output. When flow stops, the piston is pushed back to the off position by a second magnet built into the switch body. No metal parts are in contact with the process liquid, and the magnetically sprung piston provides an exceptionally reliable corrosion proof mechanism. The sensitivity of the flow switch and its switching point are determined by the viscosity of the fluid and by the clearance between the piston and the switch body. The P20 flow switch can be mounted in any orientation in pipe-work, including upside down, with no adverse effects.

CONSTRUCTION

The standard P20 flow switch is made entirely from glass reinforced polypropylene, with neoprene O-ring seals. The piston return mechanism and the electrical switching action within the switch are achieved using high power magnets operating through the solid body of the switch. The electrical housing is hose-proof & weatherproof, and is supplied with a built in 20mm cable gland, for conduit or flexible cable entry. The electrical circuit boards used in the switch are interchangeable, and all of the parts of the P20 flow switch are available as spare parts.

OPTIONS

In addition to a choice of 5 standard circuit boards to suit the P20 flow switch; the user also has the following options.

Each P20 flow switch is supplied complete with 3 pistons. By simply changing pistons the user has the choice of 3 switching points, 140 millilitres per minute, 570 millilitres per minute or 1.70 Litres per minute. In addition, for OEM applications, switches can be ordered pre-set to any required switching point from one Litre per hour to 4 Litres per minute. Contact your supplier for details.

The standard P20 flow switch is supplied complete with inlet and outlet pipe connections with 20mm (3/4 BSP) male threads and unions. Pipe spigots in 15 nominal size are also included. In addition, the P20 flow switch can also be ordered with optional 25mm (1" BSP) unions and 20mm (3/4") nominal size spigots, in PVC.

Power Control P PRODUCTS
Unit 3, 8 Hayden Court, Myaree WA 6154
Phone (08) 9317 4322, Fax (08) 9317 4465
www.powercontrol.com.au

KELCO Engineering Pty Ltd
ABN 20 002 834 844
Head office and factory
9/9 Powells Road Brookvale 2100 NSW Australia
Phone: +61 2 9905 6425 Fax: +61 2 9905 6420
Email: sales@kelco.com.au Web: www.kelco.com.au

INSTALLATION AND OPERATING SHEET FOR P20 IN LINE FLOW SWITCH

PLEASE READ THIS INSTALLATION SHEET CAREFULLY AND FULLY BEFORE INSTALLING THIS FLOW SWITCH

INTRODUCTION

The P20 flow switch is an in line piston flow switch that is supplied preset to switch on or off at a specific flow rate. The body of the switch contains a piston that obstructs the line of flow. To pass through the switch, the process fluid must push the piston back and flow over the piston and out through the outlet fitting. When fluid pushes the piston back, a magnet inside the piston actuates a reed switch in the electrical enclosure; this provides a set of closed, (or open) electrical contacts, which can be used in control circuits to indicate flow. The body of the P20 contains a fixed magnet that opposes the magnet in the piston. The repulsive force generated between the piston and body magnets constantly pushes the piston back to the off position, against the incoming flow. This unique magnet system negates the need for metal springs and provides the switch with exceptional reliability.

OPERATING ENVIRONMENT

The P20 flow switch has no metal parts in contact with the process fluid. Inert thermoplastics are all that come in contact with the liquid passing through the switch. This means the P20 can be used in aggressive chemical solutions, seawater, and bore water and in many fluids that would attack metal parts. The P20 flow switch contains a close fitting piston, and should only be used in applications where the process fluid is reasonably clean and free of entrained or suspended material. Fluids containing large particulate matter, ferrous materials or fibrous matter should not be used in this switch. If the degree of contamination of the process fluid can't be guaranteed, then suitable line filtration should be fitted to the system upstream of the P20 flow switch.

The standard P20 flow switch is constructed entirely from glass reinforced polypropylene, with neoprene o-ring seals. The P20 flow switch is weatherproof to IP56, that is it is hose-proof and suitable for all outdoor exposed applications. The switch should be protected from freezing, or from exposure to fluid temperatures in excess of 80°C (SEE IMPORTANT NOTE ABOVE). The P20 flow switch should not be used in applications where the line pressure exceeds 18 bars, in the interest of safety, the switch has a burst pressure rating of >97 bars. Care should be taken not to expose the P20 switch to excess pressures such as may be generated by water hammer.

The environmental limitations of the standard P20 flow switch are set out in the following table.

Maximum Operating Pressure (Static or Dynamic) at Ambient Temperature	1800 Kpa (260 P.S.I.)
Minimum Burst Pressure at Ambient Temperature	9700 Kpa (1400 P.S.I.)
Maximum Liquid Temperature (Standard P20 Switch)	80 Degrees C at a pressure 1 bar absolute, see note below
Minimum Liquid Temperature (Standard P20 Switch)	-30˚C
Maximum Recommended Continuous Flow Rate (Water)	25 Litres per Minute
Liquid Ph range	1 to14

Note: Temperature for the maximum operating pressure shown in the above operating environment table is 15°C, In the interest of safety, when using the P20 series, maximum operating pressure must be de-rated linearly in direct proportion to temperature increase, to a maximum pressure of 1 bar absolute at 80 degrees Centigrade. In other words only use this switch at elevated temperatures in non pressurised systems that are totally open to atmosphere in all circumstances and under all conditions.

INSTALLATION

The P20 flow switch can be mounted in any orientation in the pipe-work, including upside down. There is a direction of flow arrow on the switch body. This directionality must be adhered to, as the switch will not operate against a reversed flow. Pipe-work can be used to support the switch, or the switch can be connected directly into valve manifolds or pump ports.

PIPE TERMINATION & SPIGOTS

There are a number of optional piping terminations available that may have been supplied with the P20 flow switch. These include tapered or parallel BSP male fittings, in $^{3}/_{4}$" or 1" sizes. The parallel thread fittings are supplied with suitable union nuts, O-rings and pipe sockets or spigots. The taper thread adaptors are not supplied with unions, as they are intended to be screwed directly into pipe-work. Where parallel thread fittings and unions are supplied, a set of tube flare fittings to suit standard flexible tubing may also be included. The tube flare fittings accept flexible poly tubing in sizes 12 by 9, 8 by 4 and 6 by 5mm.

FLOW SENSITIVITY & SWITCHING POINT

The P20 flow switch is supplied configured to switch at one of three possible flow rates. It is possible to alter the switching point of the flow switch, on site, simply by substituting one of the 2 alternate pistons. The piston fitted to a specific P20 flow switch can be identified by a letter, either A, B or C that is engraved on the conical nose of each piston. The "A" piston is supplied as standard fitted to the switch, and detects the lowest flow rate, 0.14 L/m, it is therefore the most sensitive. The "B" piston switches at 0.57 L/m, and the "C" piston is the least sensitive, and requires a flow of 1.70 L/m to actuate. Pistons are easily cleaned or replaced simply by unscrewing the inlet adaptor and removing the specific piston, a piston kit is included with each switch that contains the optional "B" and "C" pistons.

ELECTRICAL

The electrical enclosure on the P20 switch is accessible by removing one screw on the lid. The lid has an integral 20mm cable gland designed to accept flexible cable up to 10mm diameter. If the gland nut is removed the exposed female thread will then accept a 20mm conduit bush. Various electrical options are available for the P20 flow switch. Details of the specific circuit board module, including its model number are located inside the lid of the electrical housing of each switch. All the available electrical modules use a reed switch as the primary switching element. The contacts of the reed switch open and close in response to the position of the switch piston magnet. The reed switch may be the primary switch, or it may be used to drive a triac or a relay, that is included on the circuit board in the switch. Where the reed switch is used as the main switch, care should be taken to ensure it is not overloaded. Reed switches are very reliable devices but may be damaged easily if overloaded. Use interposing relays and avoid inductive loads, fit suitable protection such as diodes or rate effect suppression circuits. Avoid capacitive coupling effects associated with long cable runs, use shielded cable in such situations, and fit diode protection to the reed switches in DC applications.

The table below sets out details of the various electrical modules, their model numbers and their electrical specifications.

Switch Model	Module Type	Contact Configuration	Switched Power Maximum	Switched Voltage Maximum	Switched Current Resistive AC (rms) Maximum	Inductive Loads (Power Factor 0.4)	Typical Application
P20-B	Dry Reed Switch	S.P.S.T. N.O	40W	240V AC 200V DC	1A	Not Suitable	PLC and General Control Circuits
P20-C	Dry Reed Switch	S.P.D.T.	40W	240V AC 200V DC	1A	Not Suitable	PLC and General Control Circuits
P20-R	Solid State Relay (Triac)	S.P.S.T. N.O	750W	2 to 240V AC	4A Continuous (Spike to 16A)	4A at 240V AC	AC Control circuits and AC Motor Control to 1 HP
P20-A-240	Standard Relay 240V AC Coil	S.P.D.T.	2500VA at 250VAC 300VA at 30VDC	0 to 240 V AC	10A	7.5A at 240V AC 5A at 30V DC	General AC or DC Control
P20-A-24	Standard Relay 24V AC Coil	S.P.D.T.	2500VA at 250VAC 300VA at 30VDC	0 to 240V AC	10A	7.5A at 240V AC 5A at 30V DC	General AC or DC Control

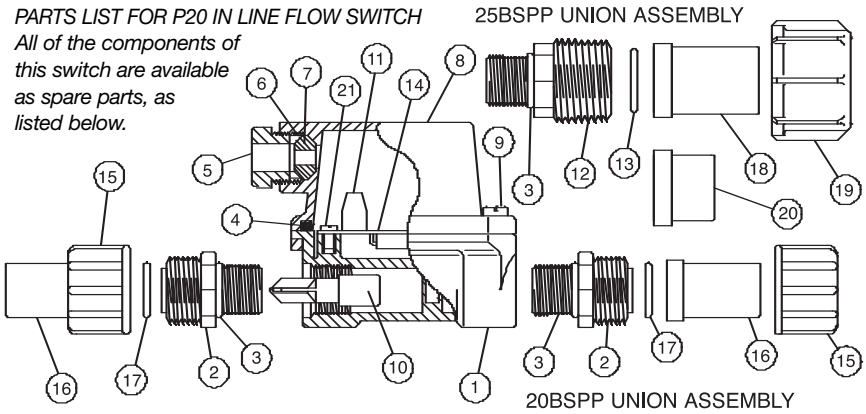
TESTING

The P20 switch can be tested for electrical function in the following way. With the switch isolated, place a continuity tester across terminals S1 and S2 or C and NO. (Do not use a lamp tester for this, due to the high inrush current.) Use a pencil or similar object to depress the piston. Each time the piston is depressed a closed circuit should appear across S1 and S2 or C and NO. The piston is accessed by pushing the pencil straight down the centre of the switch, through the inlet fitting. This test can be done dry, and without the switch in the pipe-work. Each time the piston is released it should return to the off position, due to the internal magnetic repulsion, and the switch should respond with an open circuit across its terminals.

MAINTENANCE

This flow switch is a very low maintenance device. If The P20 flow switch is correctly installed and if the process fluid is compatible with the materials of construction of this switch, then a very long service life can be expected. Factors that may contribute to early failure of this device include excess temperature, excess pressure or electrical loads in excess of the electrical modules ratings.

PARTS LIST FOR P20 IN LINE FLOW SWITCH
All of the components of this switch are available as spare parts, as listed below.



ITEM	DESCRIPTION	QTY	MATERIAL
1	SWITCH BODY	1	GLASS REINFORCED POLYPROPYLENE
2	M20 by 3/4BSPP ADAPTOR	2	GLASS REINFORCED POLYPROPYLENE
3	No 018 O-RING	2	NEOPRENE
4	MAIN LID GASKET	1	SANOPRENE
5	CABLE GLAND NUT	1	GLASS REINFORCED POLYPROPYLENE
6	CABLE GLAND THRUST RING	1	GLASS REINFORCED POLYPROPYLENE
7	CABLE GROMMET	1	SANOPRENE
8	LID	1	GLASS REINFORCED POLYPROPYLENE
9	LID FIXING SCREW	1	M5 BY 16 STAINLESS STEEL TYPE 304
10	PISTON,MODEL A, B or C	1	GLASS REINFORCED POLYPROPYLENE
11	TERMINAL BLOCK	1	ACETAL RESIN
12	M20 by 1" BSPP ADAPTOR	2	GLASS REINFORCED POLYPROPYLENE
13	No 117 O-RING SEAL	2	NEOPRENE
14	CIRCUIT BOARD ASSEMBLY	1	COMPLETE ELECTRICAL MODULE
15	20 mm BSPP UNION NUT	2	GLASS REINFORCED POLYPROPYLENE
16	15 mm (1/2") PIPE SPIGOT	2	PVC OR ABS
17	No 115 O-RING SEAL	2	NEOPRENE
18	20mm (3/4") PIPE SPIGOT	2	PVC OR ABS
19	25mm BSPP UNION NUT	2	GLASS REINFORCED POLYPROPYLENE
20	15mm (1/2") PIPE SOCKET	2	PVC OR ABS
21	CIRCUIT BOARD SCREW	2	STAINLESS STEEL

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ABN 20 002 834 844
Head office and factory
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Email: sales@kelco.com.au Web: www.kelco.com.au