

INSTALLATION AND OPERATION OF THE CR20 MICROFLOW SWITCH

INTRODUCTION

The CR20 Microflow switch is a compact all position mounting in line flow switch capable of detecting extremely low flows. Its main application is in detecting loss of flow in chemical metering and injection systems. The CR20 Microflow switch operates on the displaced piston principle. Liquid passing through the switch moves a precision piston. Every time the piston is moved a magnet within it actuates an external reed switch. The closing of the reed switch contacts provides a signal indicating flow. The CR20 can be setup to provide an on or an off signal in response to flow, or to loss of flow.

OPERATING ENVIRONMENT

The CR20 Microflow switch is suitable for detecting very low flows in a wide variety of liquids and gases. The wetted parts of the switch are made from UPVC or PVDF, with Viton®, or EPDM O-ring seals. There are no metal parts within the wet area of the switch. The CR20 can be used with a variety of chemical solutions, including most mineral salt solutions, acids and alkalis. The switch can only be used with clean liquids that are free from suspended solids larger than 20 microns, and free from particulates or sludge that is attracted to magnets, such as Ferric solutions. Organic solvents, esters and ketones in general should not be used with the CR20. In the interest of safety the CR20 flow sensor should only be used with process liquids and gases that are at or close to ambient temperature.

ADDITIONAL CONSIDERATIONS

The CR20's switching point is affected by the viscosity, and specific gravity of the process liquid. In general, liquids with an SG > 1.0 or kinematic viscosity of >1.0 will proportionally increase the sensitivity of the switch, and slow down its response time, that is, such liquids will reduce the flow required to actuate the switch. The reverse effect also applies, liquids with a low SG and viscosity will make the switch less sensitive and it will take a proportionally higher flow to reach the switch's trip point. In this situation the delay time of the switch's response will be proportionally reduced. The CR20 is not suitable for use with highly viscous liquids or liquids that crystallize.

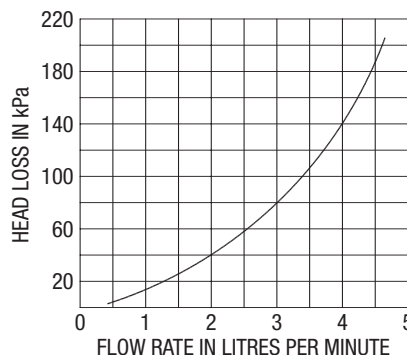
INSTALLING THE SWITCH

The CR20 flow switch can be mounted in a number of different positions in a dosing system. It can be mounted directly onto the discharge valve of the pump, on an adjacent wall or backing board, or directly onto an injection point. Mounting the switch at an injection or discharge point rather than at the pump means the switch will indicate loss of flow for the entire system including all the pump's discharge pipework and associated valves. The switch can be mounted in any orientation, including upside down. Normally the CR20 is mounted vertically with flow passing upward. Two mounting clips are supplied with each switch. To use the clips, drill 2 holes 53mm apart and screws the clips in place using 4mm stainless screws (not supplied). The CR20 can be installed in rigid PVC pipework using the PVC pipe spigots normally supplied with it. Take great care when solvent gluing the pipe spigots and ensure no solvent or glue enters the switch body. Do not over tighten union nuts or the inlet or outlet adaptors (parts 5 and 6). The switch is sealed by O-rings and does not require tight joints in order to seal. In particular, over tightening the inlet adaptor may distort the

switch body and cause the close fitting piston within to jam. Ensure the process liquid is clean and free from suspended solids. Purge all pipework before installing the CR20, and if necessary install a 20 micron filter on the inlet side of the switch. Do not install the CR20 on the suction side of a dosing system, as the flow restriction caused by the switch may cause the pump to cavitate or fail to prime.

HEAD LOSS

The graph below shows the head loss measured across a CR20 Microflow switch as a function of a continuous flow through the switch. The graph shown is for water at ambient temperature.



NORMALLY ON OR NORMALLY OFF OPERATION

The CR20 Microflow switch can be configured to give a normally on or normally off signal. As supplied the switch is configured as normally off, switching on in response to flow. To reverse this function, simply reverse the inlet and outlet fittings. Unscrew the inlet and outlet adaptors, parts 6 and 7, from the switch body and reassemble with the inlet adaptor fitted to the outlet end of the switch body, and the outlet adaptor fitted to the inlet end of the switch body. Note that the electrical module on the switch can be removed and reversed so the electrical cable enters the switch from either the right or left side. Reversing the electrical module does not reverse its electrical function. The electrical module is a slip fit on the switch body and can be rotated to any required position without affecting operation.

SWITCHING THRESHOLD & OUTPUT

The flow rate required to actuate the CR20 depends on the viscosity of the process fluid, for water based solutions at ambient temperature the switching threshold is 250ml \pm 10% per hour, on a rising flow. When applied to a pulsing flow such as from a dosing pump, the nature of the flow needs to be considered. Liquid passing through the flow switch causes its reed switch to change state, either turning it on or turning it off depending on how the switch has been set up. If the flow stops, the switch will change state, after a delay. The delayed response time depends on the process liquids viscosity. For water, the delay is typically 7 seconds.

When connected directly to a dosing pump, the flow switch will normally receive a train of pulses of liquid. If the frequency of the pulses is greater than one pulse every 7 seconds, the flow switch will provide a steady output state, while ever the pulses are maintained by the pump. If however the pulse frequency from the pump is less than one pulse every 7 seconds, the flow switch will respond with a series of on and off signals that are directly proportional to the dosing pump's pulse frequency.

OPERATING PARAMETERS

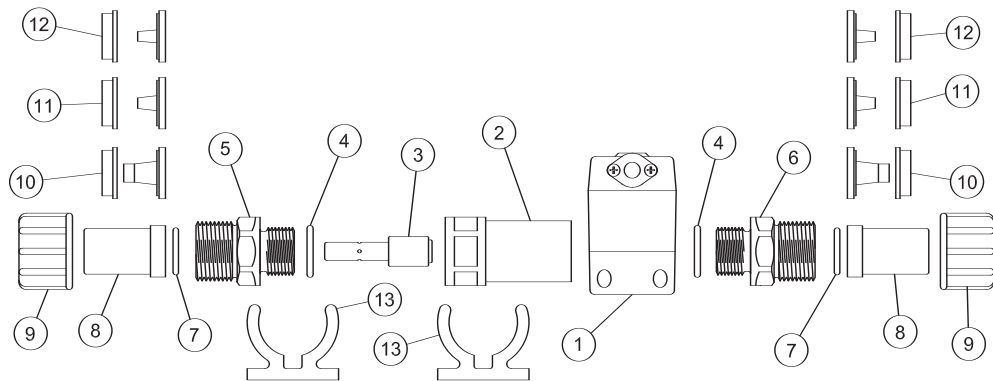
Switching point on a slowly rising flow (water at ambient temperature)	250mL per Hour +/- 10%
Response to loss of flow (water at ambient temperature)	7 seconds +/- 10%
Maximum recommended operating pressure, (static or dynamic) at ambient temperature	1800 kPa (260 PSI)
Minimum burst pressure at ambient temperature	9700kPa (1400 PSI)
Maximum process liquid temperature	60°C
Minimum liquid temperature	0°C
Maximum recommended continuous flow through switch	5 Litres per minute
Liquid Ph range	1 to 14
Maximum process liquid S.G.	1.84
Minimum process liquid S.G.	0.8
Weatherproof rating of electrical module	IP56

HAZARDOUS APPLICATIONS

The model CR20-B Microflow switch can be used in hazardous areas. This flow switch is classed as a simple device and does not contain components capable of storing or producing an electric charge. As a simple device the CR20-B flow sensor can be used in hazardous applications provided it is isolated by an intrinsically safe barrier, a zener barrier.

PARTS LIST

ITEM	Qty	DESCRIPTION	MATERIAL
1	1	SENSOR HEAD	GLASS REINFORCED POLYPROPYLENE
2	1	BODY	UPVC
3	1	PISTON	UPVC
4	2	115 O-RING	VITON
5	1	INLET ADAPTOR	UPVC
6	1	OUTLET ADAPTOR	UPVC
7	2	2-114 O-RING	VITON
8	2	15 ND (1/2") PIPE SPIGOT	UPVC
9	2	20 NB UNION NUT	GLASS REINFORCED POLYPROPYLENE
10	2 SETS	12 X 9 TUBE ADAPTORS	UPVC
11	2 SETS	8 X 4 TUBE ADAPTORS	UPVC
12	2 SETS	6 X 5 TUBE ADAPTORS	UPVC
13	2	WALL MOUNTING CLIPS	POLYPROPYLENE



ELECTRICAL DATA

Sensor Model	Module Type	Contact Configuration	Switched Power Maximum	Switched Voltage Maximum	Switched Current Resistive AC (rms)	Inductive Loads	Typical Application
B	Dry contact reed switch	S.P.S.T NO or NC	40Watts	240V AC 200V DC	1 Amp Maximum	Not Suitable	PLC telemetry and relay logic circuits
R	Solid state switch	S.P.S.T NO or NC	750W	240V AC	4 Amps	4A at 240V AC	AC control circuits and AC motor control

Note: The CR20 Microflow switch uses a dry contact reed switch as the primary switching element. Reed switches are one of the most reliable mechanical devices ever devised. They offer an operating life in excess of 100 million cycles; however care needs to be taken to ensure they are not electrically overloaded. If applied in questionable applications suitable protection should be added to the control circuit. Details of reed switch protection circuits can be downloaded from www.kelco.com.au

Note: The CR20-R Microflow switch contains a Triac. It can only be used in AC applications. To operate correctly a minimum load of 10mA must be impressed across the switch, at any voltage from 5 to 240 V AC.

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