

INSTALLING AND OPERATING THE KELCO CR22 MICRO FLOW SWITCH



WARNING

Please read these installation and operating instructions fully and carefully before installing or servicing this Inline Flow switch. The CR22 Microflow switch is mains voltage device. Death or serious injury may result if this switch is not correctly installed and operated. All mains voltage electrical work must be performed by a fully qualified and licensed electrician.

The CR22 microflow switch is a compact vertical mounting in line flow switch capable of detecting very low flows. Its main application is in detecting loss of flow in chemical metering and injection systems. The CR22 microflow switch operates on the displaced piston principle. Liquid passing through the switch lifts a precision piston. Every time the piston is lifted a magnet within it actuates an external reed switch. The closing of the reed switch contacts provides a signal indicating flow. The CR22 can be setup to provide an on or an off signal in response to flow, or to loss of flow.

OPERATING ENVIRONMENT

The CR22 microflow switch is suitable for detecting very low flows in a wide variety of liquids. The wetted parts of the switch are made from UPVC, with Viton O-ring seals. There are no metal parts within the wet area of the switch. The CR22 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 30 microns and free from particulates or sludge that are attracted to magnets. Materials such as Ferric solutions, organic solvents, esters and ketones in general should not be used with the CR22. In the interest of safety the CR22 should only be used with process liquids that are at or close to ambient temperature.

ADDITIONAL CONSIDERATIONS

The CR22'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 actuation point. In this situation the delay time of the switch's response will be proportionally reduced. The CR22 is not suitable for use with highly viscous liquids or liquid containing materials that tend to crystallize.

INSTALLATION

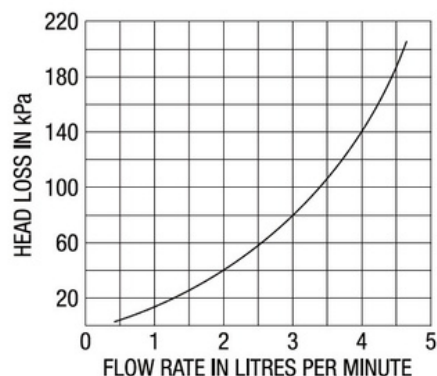
The CR22 flow switch can be mounted in a number of different positions in a dosing system. It can be mounted directly onto the discharge valve of the pump itself, on an adjacent wall or backing board, or directly onto an injection point. Mounting the switch at an injection or discharge point rather than at the pump means the switch will indicate loss of flow for the entire system including the pump's discharge pipework and associated valves. It is critical that the switch be installed vertically with flow passing upward through the switch body.

The CR22 relies on gravity to return its internal piston to the off position when flow stops. If the switch is not installed vertically it may not turn off when flow stops.

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 CR22 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 CR22, and if necessary install a 30 micron filter on the inlet side of the switch. Do not install the CR22 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 CR22 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

The CR22 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 CR22 depends on the viscosity of the process fluid, for water based solutions at ambient temperature the switching threshold is less than 500mL 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 2 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 2 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 2 seconds, the flow switch may respond with a series of on and off signals that are directly proportional to the dosing pump's pulse frequency.



WARNING



All electrical work associated with the CR22 inline flow switch must be carried out by qualified electrical personnel and all electrical work must conform to AS/NZ (or equivalent) standards and to local wiring rules.

OPERATING LIMITATIONS

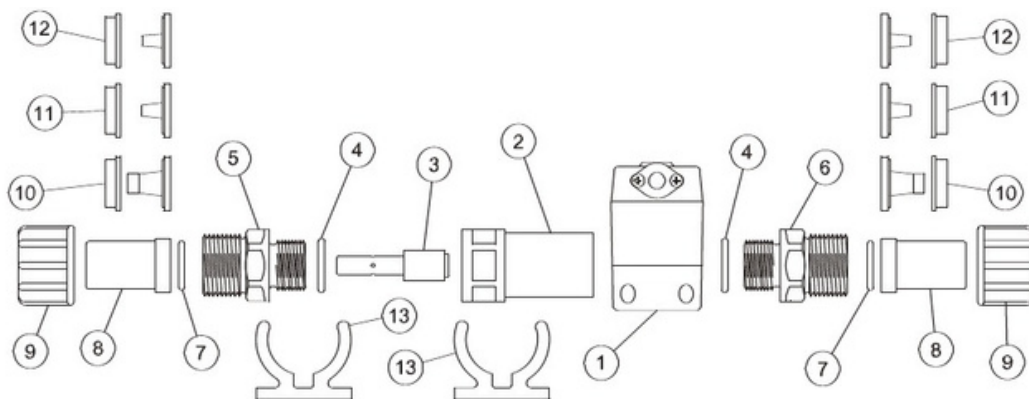
Switching point on a slowly rising flow (water at ambient temperature)	Less than 500mL per Hour
Response to loss of flow (water at ambient temperature)	2 seconds +/- 10%
Maximum recommended operating pressure, (static or dynamic) at ambient temperature	1800 kPa (260 PSI)
Minimum burst pressure at ambient temperature	9700kPa (1400 PSI)
Maximum process liquid temperature	60°C
Minimum liquid temperature	0°C
Maximum recommended continuous flow through switch	4 Litres per minute
Liquid Ph range	1 to 14
Maximum process liquid S.G.	1.5
Minimum process liquid S.G.	0.8
Weatherproof rating of electrical module	IP56

HAZARDOUS APPLICATIONS

The CR22 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 CR22 flow sensor can be used in hazardous applications provided it is isolated by an intrinsically safe barrier, a zener barrier.

SPARE PARTS

ITEM	Qty	Description	Material
1	1	Sensor Head	ASA
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 NB Union Nut	Polypropylene
9	2	20 NB (1/2") Pipe Spiggot	UPVC
10	2 Sets	12 x 9 Tube Adaptors	UPVC
11	2 Sets	8 x 4 Tube Adaptors	UPVC
12	2 Sets	6 x 4 Tube Adaptors	UPVC
13	2	Wall Mounting Bracket	Polypropylene



ELECTRICAL DATA

Mode	Module Type	Contact Configuration	Switched Power Maximum	Switched Voltage Maximum	Switched Current Resistive AC (RMS)	Inductive Loads	Typical Application
I	Dry Contact Reed Switch	S.P.S.T NO or NC	40 Watts	240V AC 200V DC	1 Amp Maximum	Not Suitable	PLC Telemetry and Relay Logic Circuits

Note: The CR22 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

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PLEASE NOTE: Kelco Engineering Pty Ltd reserves the right to change the specification of this product without notice. Users will use their own judgment to determine the appropriateness of using Kelco Products in an application, any safety measures required and that the product is properly installed for that application. To the extent permitted by law Kelco Engineering Pty Ltd disclaims and excludes all and any liability for the use of this product in any particular application or for defective installation. Kelco switches are warranted against malfunction by a 12 month return to base manufacturer's warranty. Full details of our warranty and limitation of liability can be found in this document or downloaded from: <http://www.kelco.com.au/warranty>

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Warranty and Limitation of Liability

Thank you for purchasing Kelco Engineering Pty Ltd, (ABN 200 002 834 844) ("Kelco") products (*Kelco Products*). This document sets out the terms and conditions of the product warranty and Limitation of Liability for *Kelco Products*. It is an important document. Please keep it with your proof of purchase documents in a safe place for future reference should you need to lodge a claim.

This Warranty and Limitation of Liability (or any more recent version in effect when you purchase a *Kelco Product*) ("*Warranty*") applies to all *Kelco Products* regardless of where you purchased the *Kelco Products*.

When you place an order, you are deemed to agree to the *Warranty*, unless otherwise agreed in writing with *Kelco*.

Kelco is located at 9/9 Powells Road, Brookvale, NSW 2100, AUSTRALIA and may be contacted by calling 61 2 99056425 or emailing: sales@kelco.com.au

1. Definition

The following terms used herein are defined as follows:

- (1) *Australian Consumer Law or ACL*: Schedule 2 to the Competition and Consumer Act 2010 (Cth).
- (2) *Brochures and Technical data sheets*: *Kelco* brochures, including, without limitation, sales brochures and technical data sheets, whether or not provided electronically.
- (3) *Customer Application*: Any application of *Kelco Products* or component parts by a you including, but not limited to, embedding and/or using *Kelco Products* in your parts/components, electronic substrates, devices, equipment and /or systems manufactured by customers.
- (4) *Non- Excludable Guarantee*: a Consumer Guarantee applicable to these *Warranty Terms* under the *Australian Consumer Law or New Zealand Consumer Guarantee Act 1993*.
- (5) *Fitness*: (a) fitness for a particular purpose, (b) performance, (c) compliance with laws and regulations and (d) conformity to standards of a *Kelco Product*.
- (6) *Kelco Products*: flow switches, level switches and float switches, related products and electronic/mechanical components under the *Kelco* brand.
- (7) 'You' or "Customer" means the purchaser of the *Kelco Products* not having purchased the *Kelco Products* for re-sale, and 'your' has a corresponding meaning.
- (8) *Usage Conditions*: Usage conditions, rating, performance, operating environment, handling instructions, warnings, restrictions on use, etc. of *Kelco Products* described in the *Brochures and technical data sheets*.

2. Descriptions

You are deemed to accept the following terms and conditions regarding the descriptions provided of *Kelco Products* in the Brochures and technical data sheets when you adopt or use a *Kelco Product* or component thereof.

- (1) Rated values and performance values are based on average performance established from batch production runs and *Kelco* does NOT warrant any rated values and performance values for multiple composite conditions.
- (2) Reference data is provided for your reference only. *Kelco* does NOT warrant that *Kelco Products* work properly at all times or continuously as provided in the reference data.
- (3) Application examples (if any) are provided for your reference only. *Kelco* does NOT warrant the *Fitness* of *Kelco Products* under such applications.
- (4) *Kelco* may discontinue the production of *Kelco Products* or change their specifications for the purpose of improving such products or for other reasons entirely at its own discretion and is under no obligation to notify you of any such change.

3. Precautions

You are deemed to accept the following terms and conditions when you purchase *Kelco Products*:

- (1) You will use *Kelco Products* in compliance with *Usage Conditions* including rating and performance.
- (2) You will confirm *Fitness* and use your own judgment to determine the appropriateness of using of *Kelco Products* in a *Customer Application*. *Kelco products* are unlike conventional flow and level switches and pump controllers in that they can be applied to virtually any fluid or pumping system in any manner defined by an original equipment manufacturer, a wholesaler or end user or their agents. The knowledge and experience of such parties is outside the control of *Kelco*, and their having relevant knowledge and experience is critical to the successful application and operation of the *Kelco Products*. *Kelco* does NOT warrant the *Fitness* of *Kelco Products* in a *Customer Application*.
- (3) You will confirm that *Kelco Products* are properly wired and installed for their intended use in your overall system. In the case of *Kelco* pump controllers, the flexibility of their operating system means it requires an extensive knowledge of pumps and their characteristics and the intended overall goal of the system in order to select the correct functions and settings. Failure to understand the ramifications of incorrect settings may result in a system that fails to perform to your expectations and or may even damage the pump or system itself. It is therefore critical that correct settings are used to achieve a stable and reliable overall system and to provide any such system with appropriate pressure and or flow protection the pump controller is intended to provide. *Kelco* does NOT warrant *Kelco Products* against defective installation, incorrect programming, incorrect wiring or electrical overload in any form.
- (4) When using *Kelco Products*, you will make sure to (i) maintain a margin of safety in relation to the published rated and performance values, (ii) design to minimize risks to any *Customer Application* in case of failure of any *Kelco Products*, such as introducing redundancy i.e. critical systems should include double redundancy of all controls, (iii) adopt system-wide safety measures to notify risks to users such as independent backup protection. Such backup may consist of a simple or complex independent alarm system to alert an operator to any issue with the system, and (iv) conduct regular maintenance on *Kelco Products* and the *Customer Application*.
- (5) It will be your sole responsibility as user to determine and use adequate measures and checkpoints to satisfy your particular requirements for (i) data input and output, (ii) maintaining a means for reconstruction of lost data, (iv) preventing *Kelco Products* installed thereon from being infected with computer viruses and (v) protecting *Kelco Products* from unauthorized access. *Kelco* shall not be responsible and/or liable for any loss, damage, or expenses directly or indirectly resulting from any third-party software or hardware not contained in the product as originally configured by the manufacturer, the infection of *Kelco products*, or any computer equipment, computer programs, networks, databases or other proprietary material connected thereto, by service attack, computer viruses, other technologically harmful material and/or unauthorized access.
- (6) *Kelco Products* are designed and manufactured as general-purpose products for use in general industrial products. They are not intended to be used in the applications described in subsection 3...(5)(a), (b), and (c). If you are using *Kelco Products* in the applications described below, *Kelco* does not provide any warranty for such *Kelco Products*, except for specific applications where *Kelco* has specified that it intends to provide a warranty or by separate written agreement between the customer and *Kelco*.

- a. Applications with stringent safety requirements and applications that could cause physical injury to a person or result in loss of life.
- b. Applications under severe conditions or in severe environment, including but not limited to outdoor equipment, equipment exposed to chemical contamination, equipment exposed to electromagnetic interference and equipment exposed to vibration and shocks.

- c. Applications under conditions or environments not described in any of the Brochures and Technical data sheets.
- d. *Kelco Products* are not intended for use in Hydrocarbons other than Dieseline.

4. Warranty

Kelco warrants that *Kelco Products* will perform in accordance with the specifications set out in the Technical data sheets, subject to and in accordance with the following:

(1) Warranty period: The *Warranty* shall apply for 12 months from the date of original purchase of *Kelco Products* by the customer. .

(2) Sole Remedy: Unless required to do otherwise as a result of statutory guarantees applicable under *ACL*, *Kelco* will provide, at its own discretion, either of the following two services as the sole remedy for a malfunctioning *Kelco Product*:

Repair of the malfunctioning *Kelco Product(s)* or components by *Kelco* or *Kelco* authorised dealer at no charge to the customer, or

- a. Replacement of the malfunctioning *Kelco Product(s)* or components by *Kelco* or *Kelco* authorised dealer with the same number of replacement/alternative products or components at no charge to the customer.

(3) Exceptions: This *Warranty* of *Kelco Products* does not apply if the cause of the malfunction falls under any of the following:

Usage in a manner other than the original intended use for the *Kelco Products* or component thereof.

- a. Usage other than as described in the *Usage Conditions*.
- b. Usage that is not in accordance with Section 2 (Descriptions) and Section 3 (Precautions) above.
- c. Modification or repair made to the *Kelco Products* by persons other than *Kelco*.
- d. Causes which could not have been foreseen with the level of science and technology at the time of shipping from *Kelco*.
- e. Replacement or repair of any (1) consumables (including cables, paddles and circuit boards), or (2) lost parts or accessories.
- f. Service of any product whilst it is outside Australia.
- g. Causes originating from other than *Kelco* or *Kelco Products* (including force majeure such as but not limited to natural disasters)
- h. Causes from any environmental factors. Such factors may include but are not limited to water or chemical ingress, fire damage, lightning damage, mechanical damage, sun damage or degradation, failure due to over-heating, freezing or vibration. Failure due to customers over tightening threads or fittings. Failure due to power supply fluctuations, surges, spikes, brown outs. or AC supplies that do not provide a pure sine wave output.
- i.

(4) If you intend to make a claim under this *Warranty* you must contact *Kelco* to register your claim by telephone on (02)99056425 and provide the following details to enable *Kelco* to assess the claim: (i) proof of purchase; (ii) evidence of the particulars of the claim that gives rise to the application of the *Warranty* ; (iii) confirmation that the cause of the malfunction was not an Exception set out above; and (iv) your phone number, email and address details.

You must provide or make the *Kelco product* available to *Kelco* for evaluation. If you are required to return the product to *Kelco* for repair replacement or evaluation, *Kelco* will provide delivery details and a return goods authorisation number to you. The *Kelco Products* will be at the owner's risk whilst in transit to and from *Kelco*, unless transported by *Kelco* or its authorised representatives.

The *Kelco Product* presented for repair may be replaced by refurbished products of the same type rather than being repaired. Refurbished parts may be used to repair the product.

To the extent permitted by law replacement of the product or a part does not extend or restart the *Warranty Term*.

Kelco may seek reimbursement of any costs incurred by them when the *Kelco* product is found to be in good working order.

5. Non-excludable Statutory Guarantees

(1) The *Warranty* is given by *Kelco* in addition to other rights and remedies which you may be entitled to under by law, nothing contained in this agreement excludes, restricts or modifies any condition, guarantee, warranty or other obligation which is applicable to or is conferred on *Kelco* pursuant to law where to exclude, restrict or modify any such condition, warranty or other obligation is unlawful. (2) Australia: To the extent that you are a consumer for the purposes of the *ACL*, *Kelco Products* come with guarantees that cannot be excluded under the *ACL*. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure. "Acceptable Quality" and "major failure" have the meaning they have in the *ACL*. (3) New Zealand: For *Kelco Products* provided by *Kelco* in New Zealand, the *Kelco Products* come with a guarantee by *Kelco* pursuant to the provisions of the Consumer Guarantees Act, section 345(1)(i) of the Contract and Commercial Law Act 2017 and the Fair Trading Act. Where the *Kelco Product* was purchased in New Zealand for commercial purposes the Consumer Guarantee Act does not apply.

6. Disclaimer and Limitation of Liability

TO THE EXTENT PERMITTED BY APPLICABLE LAW:

(1) SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, OTHER THAN AS STATED IN SECTION 4 ABOVE AND SELLER DISCLAIMS AND EXCLUDES ANY WARRANTY OF ANY OTHER KIND. (2) THE SOLE AND EXCLUSIVE REMEDY FOR MALFUNCTIONING KELCO PRODUCTS SHALL BE AS SET FORTH IN SECTION 4. ABOVE. (3) KELCO AND THE DISTRIBUTORS OF KELCO PRODUCTS ARE NOT LIABLE FOR ANY DAMAGES WHICH MAY ARISE FROM OR BE RELATED TO KELCO PRODUCTS.

7. Confidentiality: You accept that if you make a *Warranty* claim, *Kelco* and its agents may exchange information in relation to you to enable *Kelco* to meet its obligations under this *Warranty*.

8. Export/ Import Controls

Customers of *Kelco Products* shall comply with all applicable laws and regulations of Australia and/or other relevant countries with regard to security export/import control, when exporting/importing *Kelco Products* and/or technical documents or providing such products and/or documents to a non-resident of Australia. At its discretion *Kelco* may not provide customers with *Kelco Products* and/or technical documents should they fail to comply with such laws and regulations.

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