

INSTALLING AND OPERATING THE KELCO FM FLOW SWITCH

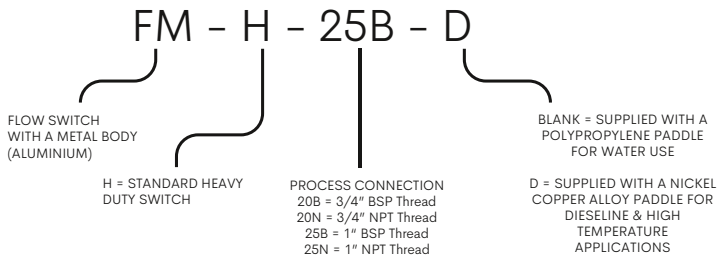


WARNING



Please read these installation and operating instructions fully and carefully before installing or servicing this Flow Switch. The FM Series flow switch is a mains voltage device. Death or serious injury may result if this switch is not correctly installed and operated. All electrical work on this switch must be performed by a fully qualified and licenced Electrician.

CHECK THE SWITCH MODEL NUMBER



MECHANICAL INSTALLATION

1) Before installing check the part number of the switch to ensure it is suitable for the application in terms of pressure, temperature and electrical load. The part number can be found on a label on the inside of the lid of the switch. Check the suitability against the tables of data on this sheet.

2) Cut the paddle of the switch using a hacksaw or tin snips so that when installed in the pipe the paddle clears the inside of the pipe at all points. Paddle length can be found using our online paddle trimming calculator.

<https://kelco.com.au/paddle-trimming-calculator/>

If you are unsure of the flow rate, cut the paddle so it intrudes 3/4 of the way across the pipe. If you think the flow rate will be low, cut the paddle so it just clears the bottom of the pipe. If you think the flow rate may be high, cut the paddle so it intrudes 1/4 to 1/2 way across the pipe. If you cut too much off the paddle and the switch fails to detect flow note that spare paddles are available from your supplier.

3) Select a suitable location for the switch in the pipework. Allow at least 5 diameters of straight pipe before and after the switch. This switch can be installed in either the suction or delivery pipework of a pump. The flow switch can be installed in either horizontal or vertically running pipework.

Note: When used in vertical pipework flow must be upward, not downward. Do not install this switch on the underside of horizontal pipework.

4) The switch can be installed in a pipe tee, a tapping saddle or a pipe socket welded to the pipe. The flow switch must be mounted square to the line of flow, so flow impacts on the flat face of the paddle. The direction of flow arrow on the switch must point in the direction of flow.

5) Use Teflon tape or a suitable thread sealing compound and screw the switch into the socket allowing at least 4mm of thread between the top of the socket and the top end of the thread on the switch. Use a spanner and the spanner flats on the switch to screw the switch in. Never twist the switch body or use it to screw the switch into the pipework.

6) As supplied, the FM flow switch is set to its **maximum sensitivity**. That means it will detect the lowest possible flow. If you need to reduce its sensitivity to flow, remove the red dust cap and adjust the sensitivity screw on the switch. Use a wide straight bladed screwdriver for this. Wind the sensitivity screw out (anti clockwise). This reduces the sensitivity to flow. It will require a higher flow to actuate the switch the further out the screw is wound. Replace the dust cap once the adjustment is complete.

ELECTRICAL INSTALLATION

1) This FM flow switch is supplied with a standard microswitch is suitable for the general purpose control circuit applications from 5 to 500VAC. Check the part number on the label inside the lid of the switch against the part number reference on this sheet before using this flow switch.

2) Check the electrical data tables on this sheet and ensure the switch is suitable for the application before wiring the switch up.

3) The terminals on the standard microswitches are marked "C" for the common terminal, "NO" for the normally open terminal and "NC" for the normally closed terminal. In a two wire installation one wire will always be connected to the common terminal and the switch wire will be connected to either the normally open or normally closed terminal, depending on the application.

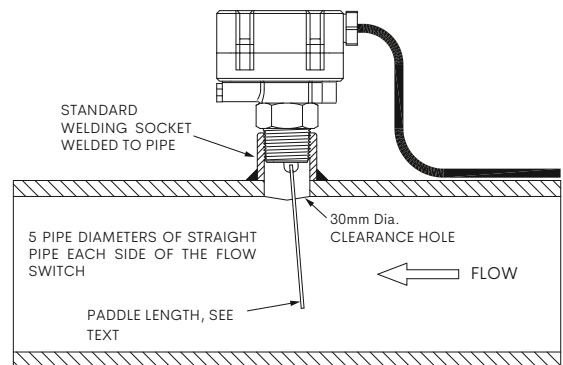
4) For all applications, the FM flow switch should be properly earthed. A dedicated earth terminal is provided inside the switch housing for this purpose.

Note: This flow switch must be earthed when operated at mains voltage.

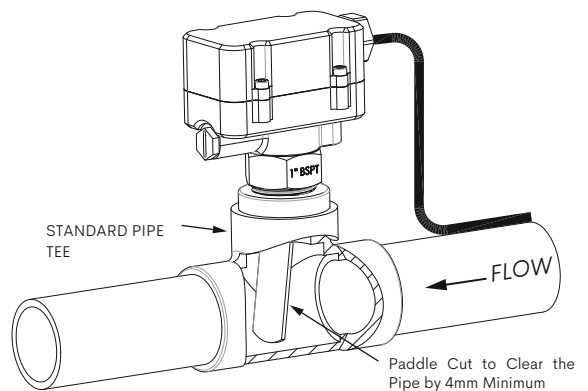
5) After wiring the switch, ensure the cable gland is correctly assembled and the cable gland nut is fully tightened. Also make sure the lid gasket is in place and the lid is fully tightened down.

6) Once the flow switch is wired up it can be functionally tested using the red manual override button located on the body of the switch directly under the cable gland. Pressing the red override button causes the switch to change state and simulates liquid pushing the paddle.

TYPICAL LARGE PIPE INSTALLATION



TYPICAL SMALL PIPE INSTALLATION



MAINTENANCE

The FM flow switch is a low maintenance device. Provided it is correctly installed it should function properly for many years. Factors that may reduce its useful life are pressures and temperatures in excess of its rating and electrical loads greater than the limits of its built in microswitch.

Should maintenance be required, spare parts including spare paddles are available from your supplier.



WARNING



After installing or servicing this flow switch always replace its lid and fully tighten its lid screw. Also ensure the cable gland is fully tightened. Never leave the lid off the switch for extended periods. Without its lid in place this flow switch is not water resistant and presents a potential shock hazard. Take great care not to splash water onto the inside of the flow switch's electrical housing when the lid is not in place. Without its lid the flow switch is not weather or insect proof and presents a potential shock hazard that may result in death or serious injury.

ELECTRICAL DATA FOR THE STANDARD 'H' SWITCH

The standard microswitch fitted to the FM is a Single Pole Double Throw high voltage switch suitable for general purpose control circuit applications up to 500VAC. It can also be used in low voltage AC and DC application, for example at 12 or 24VAC or DC.

IMPORTANT

The standard 'H' switch can operate at ANY voltage from 5 to 500VAC. It can be used to directly control pump motors up to **375 Watts (0.5HP)** at 240VAC. For larger motors always use an interposing contactor or relay between the flow switch and the motor.

RATED VOLTAGE	NON INDUCTIVE LOADS				INDUCTIVE LOADS			
	RESISTIVE LOAD		LAMP LOAD		INDUCTIVE LOAD		MOTOR LOAD	
	NO	NC	NO	NC	NO	NC	NO	NC
125 VAC	15A	3A	1.5A	15A	5A	2.5A		
250 VAC	15A	2.5A	1.25A	15A	3A	1.5A		
500 VAC	10A	1.5A	0.75A	6A	1.5A	0.75A		
8 VDC	15A	3A	1.5A	15A	5A	2.5A		
14 VDC	15A	3A	1.5A	10A	5A	2.5A		
30 VDC	6A	3A	1.5A	5A	5A	2.5A		
125 VDC	0.5A	0.5A	0.25A	0.05A	0.05A	0.05A		
250 VDC	0.5A	0.5A	0.25A	0.03A	0.03A	0.03A		

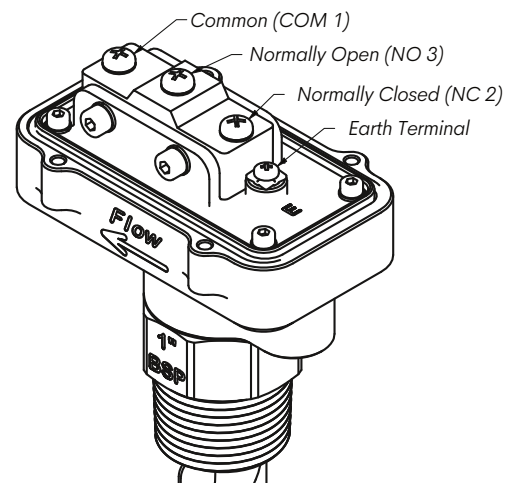
Maximum Switched Voltage	500VAC
Maximum Switched Current	15A
Minimum Switched Voltage	5VDC
Minimum Switched Current	160mA

Note: Do not apply maximum voltage at maximum current across the switch contacts. See main data table for current limits at specific voltages and for specific loads.

ENVIRONMENTAL LIMITATIONS

Parameter	Standard FM Switch with a Polypropylene Paddle	FM-D Switch with a Metal Paddle
Maximum operating pressure (Static or Dynamic) at ambient temperature	400 Bars (5800 psi)	400 Bars (5800 psi)
Minimum burst pressure at ambient temperature	800 Bars (11600 psi)	800 Bars (11600 psi)
Maximum operating temperature	80°C (176°F)	100°C (212°F)
Minimum operating temperature	-60°C (-76°F)	-60°C (-76°F)
Ingress protection rating	IP67	IP67

TERMINAL CONFIGURATION



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Email: Sales@kelco.com.au
Web: www.Kelco.com.au

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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REPLACING THE FM FLOW SWITCH PADDLE

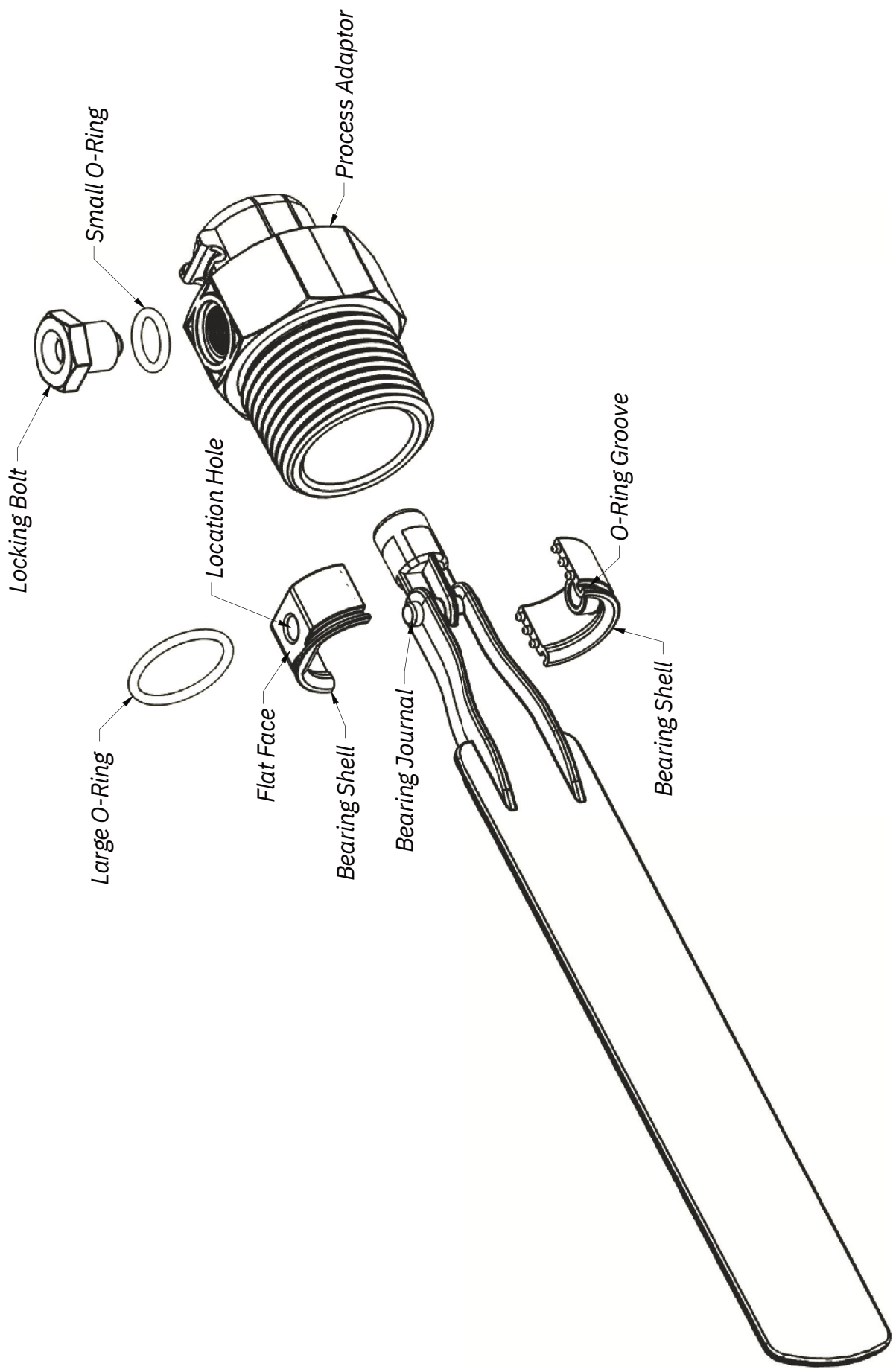
The paddle and its associated pivot bearings are replaceable items. Spare paddles can be obtained from your supplier. Please quote the part number of the flow switch when ordering spare paddles.

REMOVING THE PADDLE ASSEMBLY FROM THE SWITCH

- 1) Unscrew and remove the locking bolt located on the side of the process adaptor (right hand thread).
- 2) Pull the paddle assembly straight out of the process adaptor. Do not twist the paddle when doing this, pull the paddle in a straight line outwards and away from the process adaptor thread.
- 3) Check the inside of the process adaptor and ensure it is perfectly clean. If needed clean the inside of the process adaptor thoroughly.

FITTING A REPLACEMENT PADDLE ASSEMBLY

- 1) Replacement paddles are supplied with new bearing shells and a large retaining O-ring. Assemble the two bearing shells onto the paddle so the bearing holes in the bearing shells engage with the bearing journals on the paddle.
Note: The bearing shells have an O-ring groove at one end. Ensure this groove is towards the long end of the paddle. Also ensure the three tiny locating pins on one of the bearing shells locate in the three holes in the opposite bearing shell.
- 2) Fit the large O-ring into the groove in the assembled bearing shells so the O-ring holds the two shell halves together and the bearing holes in the bearing shells are engaged on the bearing journals on the paddle.
- 3) One of the two bearing shells has a flat face. Ensure this flat face is aligned with the locking bolt hole in the side of the process adaptor.
- 4) Push the paddle assembly straight into the process adaptor ensuring the flat face and locating hole in the bearing shell aligns with the locking bolt hole in the process adaptor.
- 5) Push the paddle assembly all the way into the process adaptor until the bearing shells reach the dead stop in the process adaptor. Check and ensure the location hole in the bearing shell aligns perfectly with the locking bolt hole in the process adaptor. Rotate the paddle assembly to align the location hole with the locking bolt hole if the initial alignment is slightly out of position.
- 6) Check and replace (if required) the small O-ring that sits under the head of the locking bolt.
- 7) Apply Silicone grease or Vaseline to the thread on the locking bolt.
- 8) Fit and screw the locking bolt into the locking bolt hole in the side of the process adaptor.
- 9) Fully tighten the locking bolt.
- 10) Test the replacement paddle by pushing it back and forward to ensure it swings freely. When pushed into the forward position, the paddle should return to the off position under its own volition when released.



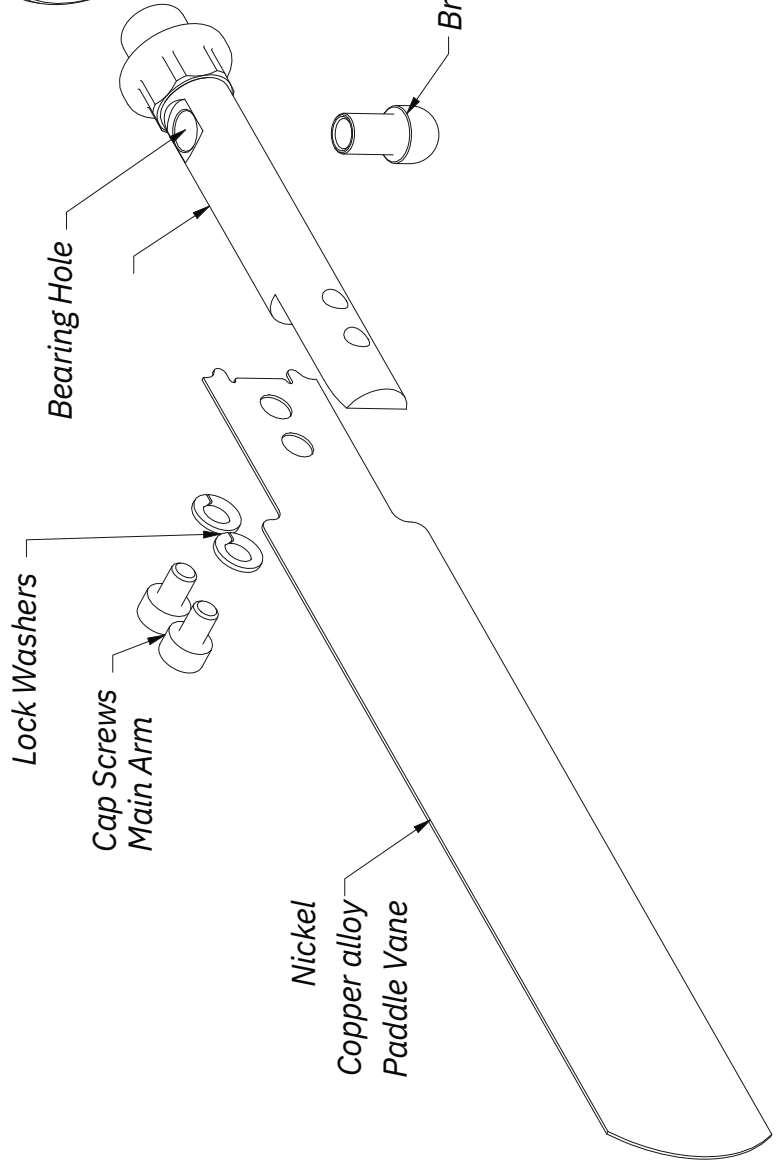
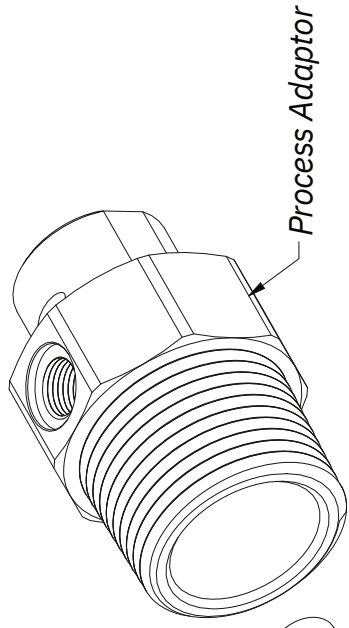
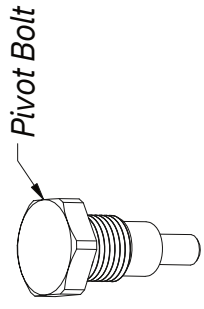
The Nickel Copper alloy paddle and its associated arm and pivot bearing are replaceable items. Spare parts can be obtained from your supplier. Please quote the part number of the flow switch when ordering spare parts.

REMOVING AND REPLACING THE METAL PADDLE

- 1) The metal paddle is terminated at its top end with 2 Allen screws secured with lock washers.
- 2) Using an Allen key, remove the paddle from the main switch arm (right hand threads).
- 3) Fit the replacement paddle and fully tighten the 2 Allen screw. For additional security a drop of Loctite Stud Lock can be placed on the threads.
- 4) Trim the paddle to match to original paddle or to suit the application using heavy duty tin snips.

FITTING A REPLACEMENT ARM ASSEMBLY

- 1) Replacement arms are supplied complete with a new bronze bearing. To fit a replacement arm, first ensure a metal paddle is attached to the end of the replacement arm.
- 2) To remove an arm first undo the pivot bolt located on the side of the process adaptor (it has a right hand thread). Completely remove the pivot bolt and then withdraw the main arm from the process connector by pulling on the paddle.
- 3) Do not under any circumstances undo or remove the hexagonal cap at the top end of the main arm. it is sealed and is not intended to be opened. It houses a magnet that is oriented for proper operation of the switch.
- 4) Place the new bronze bearing through the bearing hole in the replacement main arm. Prepare the pivot bolt by ensuring its O-ring is in good order and apply a small amount of Silicone oil or Vaseline to the thread on the pivot bolt.
- 5) Insert the main arm with its bronze bearing into the process adaptor. Use the paddle to rotate the arm into a position where the hole in the bronze bearing lines up with the pivot bolt hole in the process adaptor.
- 6) Fit the pivot bolt and screw it into the process adaptor ensuring the pin on the nose of the pivot bolt engages in the bore of the bronze bearing bush.
- 7) Fully tighten the pivot bolt.
- 8) Test the replacement arm by pushing the paddle back and forward to ensure it swings freely. When pushed into the forward position, the paddle should return to the off position under its own volition when released.



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.

Kelco Engineering Pty Ltd

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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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