

# INSTALLING AND OPERATING THE KELCO LM SERIES LEVEL SWITCH



## WARNING



Please read these installation and operating instructions fully and carefully before installing or servicing this level switch. The LM Series level 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.

## OUTLINE

The LM level switch is a side entry tank level switch that provides a single switch point level reference when installed in the side wall of a tank or vessel. This document sets out in detail the installation and functions of the level switch and some of the main ways in which it can be used.

## APPLICATION

The LM level switch has been designed to operate in water and sea water applications. The process connection on the switch is made from 316 Stainless Steel. The float and all other wetted parts of the switch are made from glass reinforced Polypropylene.

## ENVIRONMENTAL LIMITATIONS

Parameter	Standard LM Series Level Switch
Maximum submergence of the float	100 Metres (328 feet)
Minimum burst pressure of the Polypropylene float at ambient temperature	1800 kPa (260 PSI) (183 Metres or 602 feet of head)
Minimum burst pressure of the switch body at ambient temperature	800 Bars (11600 PSI)
Maximum operating temperature (Process Liquid)	80°C
Minimum operating temperature	-60°C (-76°F)
Minimum liquid S.G.	0.95
Ingress protection rating	IP67

## SWITCHING POINT

The tip of the arm of the LM level switch is free to travel vertically 45mm each side of the horizontal centre line of the switch. The switching point is in the middle of this travel and occurs 2 degrees each side of the horizontal centre line. The movement of the switch arm can therefore be confined to within 3 to 4 degrees each side of horizontal and the switch will operate properly.

## MECHANICAL INSTALLATION

This level switch should be installed in a tank socket on the side wall of a tank. The switch requires a minimum of 25mm of clearance above and below its centre line axis to facilitate the free movement of its float, see drawing.

Do not install this switch in either pressure vessels or in vented tanks where the liquid temperature is greater than 80°C. Safety should always be considered when installing this switch, particularly where aggressive or dangerous process liquids are involved.

This level switch is intended to be installed in the horizontal plane in the side of a tank or riser pipe. A suitable female threaded tank socket should be installed at a level where the switch point is required. The level switch is supplied with a float designed to pass through the inside diameter of a standard pipe thread socket. This allows the switch to be installed from the outside of the tank. Apply thread tape or sealant to the thread on the switch and screw the switch into the tank socket using the spanner flats on the process adaptor of the switch. Do not screw the switch into the tank socket by twisting the electrical housing, always use the spanner flats provided. Do not wind the switch all the way into the tank socket, leave a gap of approximately 4mm between the end of the thread on the switch and the face of the tank socket. Orient the switch so the float arm rises and falls vertically. The cable entry on the switch must be on the underside or the switch and pointing straight down.

Do not expose this level switch to freezing. If the level switch is to be used in areas where low temperatures will be encountered, always lag the tank and switch to prevent the unit from freezing. Do not use this level switch in high temperature applications. This level switch is not designed to be used in water hotter than 80°C. Do not use this level switch in pressure vessels.

The stainless body of the switch is rated to withstand 400 Bars pressure, however, the float itself is only designed to withstand 100 metres head pressure, (980kPa or 142 psi).



## WARNING



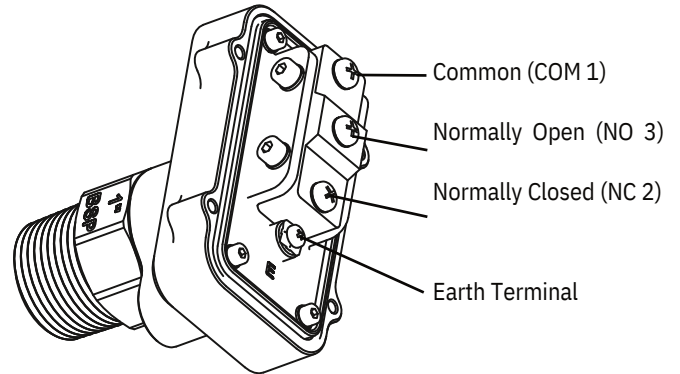
After installing or servicing this flow switch always replace its lid and fully tighten its lid screw. Also ensure the cable gland is fully tightened. Never leave the lid off the switch for extended periods. Without its lid in place this flow switch is not water resistant and presents a potential shock 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

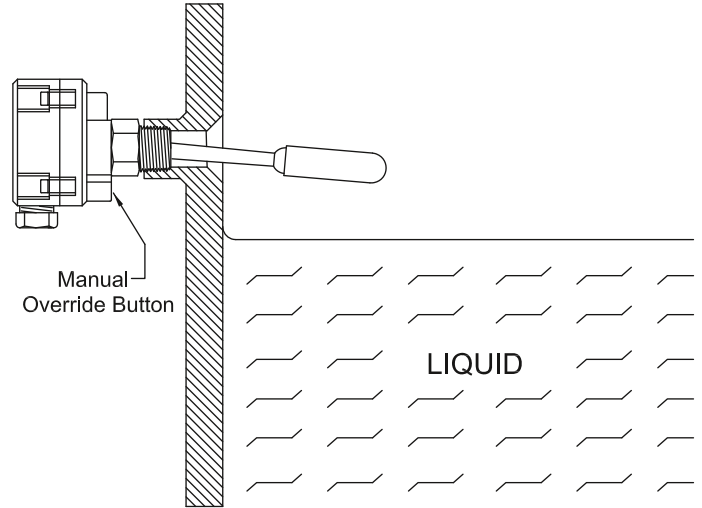
The standard microswitch fitted to the LM Series is a Single Pole Double Throw (S.P.D.T) high voltage switch suitable for general purpose control circuit applications up to 500VAC. It can also be used in low voltage AC and DC application, for example at 12 or 24V AC or DC power.

#### 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.



### TYPICAL INSTALLATION



Electrical Data							
RATED VOLTAGE	NON INDUCTIVE LOADS				INDUCTIVE LOADS		
	RESISTIVE LOAD		LAMP LOAD		INDUCTIVE LOAD		MOTOR LOAD
	NO	NC	NO	NC	NO	NC	NO
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	0.75	
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.

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# REPLACING THE LM FLOAT ARM

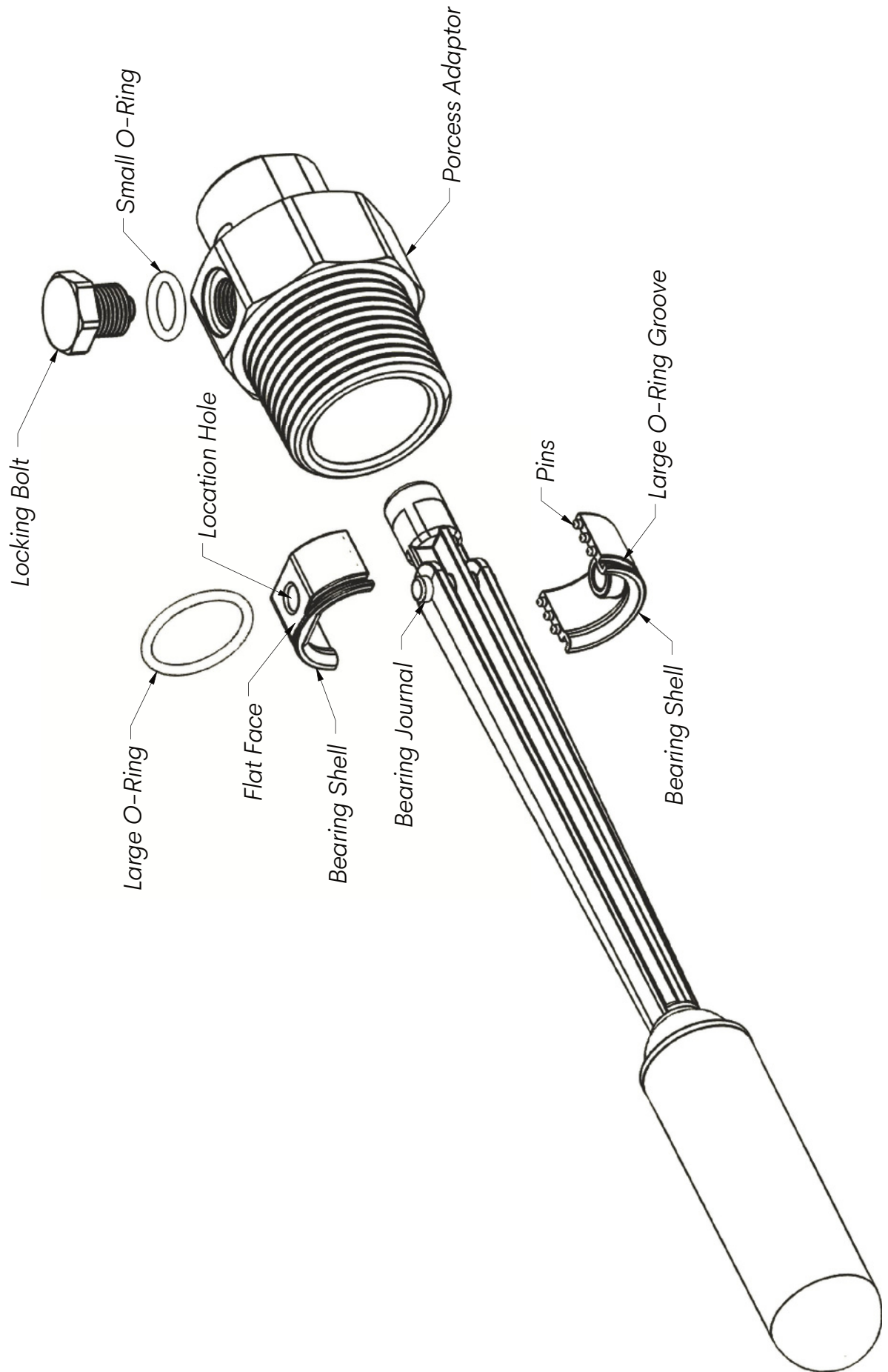
The float arm and its associated pivot bearings are replaceable items. Spare assemblies can be obtained from your supplier. Please quote the part number of the level switch when ordering spare float arm assemblies.

## REMOVING THE FLOAT ARM 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 float arm assembly straight out of the process adaptor. Do not twist the arm when doing this, pull the arm 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 FLOAT ARM ASSEMBLY

- 1) Replacement arm assemblies are supplied with new bearing shells and a large retaining O-ring. Assemble the two bearing shells onto the arm so the bearing holes in the bearing shells engage with the bearing journals on the float arm. *Note:* The bearing shells have an O-ring groove at one end. Ensure this groove is towards the long end of the float arm. 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 float arm.
- 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 float arm 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 float arm 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 float arm 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 float arm by pushing it up and down to ensure it swings freely. When pushed into up position, the arm should drop to the off position under its own volition when released.



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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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