INSTALLATION & OPERATING INSTRUCTIONS

INSTALLING THE KELCO LM SERIES LEVEL SWITCH

FOR LM-L MODELS · LOW VOLTAGE GOLD CONTACT MICROSWITCH

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 licensed electrician.

CHECK THE SWITCH MODEL NUMBER

Check the part number on the label inside the lid against the codes below – for example **LM-L-25B**.

LM	–	L	–	25B

SERIES

LM Series level switch

SWITCH

L Low voltage gold contact switch

PROCESS CONNECTION SIZE

25B 1" BSP thread

25N 1" NPT thread

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.

Chemical Compatibility Checker ›

SWITCHING POINT

The tip of the arm of the LM level switch is free to travel vertically 45 mm 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 25 mm of clearance above and below its centre line axis to facilitate the free movement of its float (see Fig. 1).

Do not install this switch where the pressure is greater than the float rating of 980 kPa (100 metres head) or 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 4 mm 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 of 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.

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

TYPICAL INSTALLATION

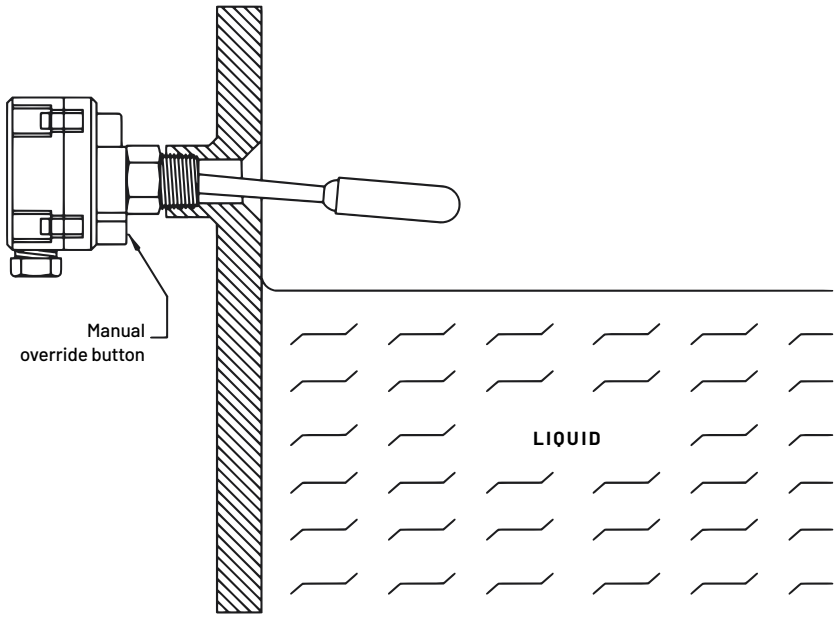


FIG. 1 LM Series installed in a tank socket on the side wall of a tank

ELECTRICAL INSTALLATION

1. This sheet covers the **LM-L** models: an S.P.D.T. gold contact microswitch for low voltage, low current signalling (PLC inputs, telemetry, hazardous areas via a certified IS barrier or isolator). Check the part number on the lid label before wiring – LM-H models have their own installation sheet.
2. Confirm the load is within the electrical ratings on page 4. The 'L' switch is easily damaged by overload.
3. The switch has terminals marked COM (common), NO (normally open) and NC (normally closed). For a two-wire connection use COM plus either NO or NC to suit the application.
4. Connect the earth terminal inside the housing. The LM must be earthed when operated at mains voltage.
5. Fully tighten the cable gland nut, check the lid gasket is in place and tighten the lid down.

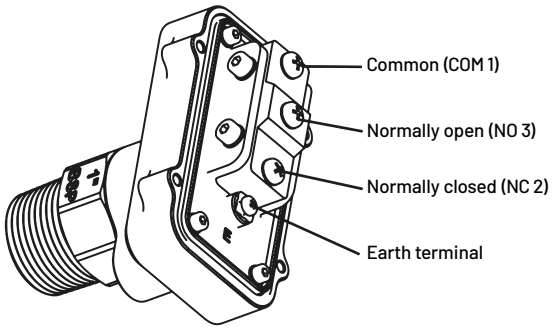


FIG. 2 Switch terminals

HAZARDOUS AREAS

The LM-L is a passive switch that meets the definition of simple apparatus under AS/NZS 60079.11. It is not Ex certified in its own right. It may be used in a hazardous area only as part of an intrinsically safe circuit, connected through suitably certified associated apparatus such as a Zener barrier or galvanic isolator. The design of the intrinsically safe system and its installation are the responsibility of the system designer and installer, in accordance with AS/NZS 60079.14 and AS/NZS 60079.25. The LM-L uses gold alloy contacts, which switch reliably at intrinsically safe signal levels. Contact rating: minimum load 1 mA at 5 VDC; maximum 0.1 A resistive at up to 30 VDC. The associated apparatus must not exceed these limits (Uo ≤ 30 V, Io ≤ 100 mA). Where the associated apparatus monitors for line faults, end-of-line resistors must be fitted as specified by its manufacturer. The housing and stainless steel process connection must be bonded to the plant earth. The LM-L is not suitable for use in a hazardous area outside an intrinsically safe circuit.

WARNING

Always refit the lid and fully tighten the lid screw and cable gland after installing or servicing. Without its lid the switch is not water, weather or insect proof and presents a **shock hazard that may cause death or serious injury**. Never splash water into the open housing or leave the lid off for extended periods.

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 m / 602 ft of head)
Minimum burst pressure of the switch body at ambient temperature	**800 bar** 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**

'L' SWITCH ELECTRICAL DATA

The 'LM-L' models use an S.P.D.T. gold contact microswitch rated down to 1 mA at 5 VDC, so they switch reliably at the low wetting currents of PLC inputs, telemetry and relay logic.

> **PLEASE NOTE**
> Not suitable for inductive or capacitive loads (contactors, relays). Loads above the rating will damage the switch.

Switch type	**Gold contact microswitch**
Contact configuration	**S.P.D.T.**
Contact material	**Gold alloy**
Rated current (resistive)	**0.1 A at 125 VAC** **0.1 A at 8, 14 and 30 VDC**
Inrush current	**0.1 A maximum (NC and NO)**
Minimum applicable load	**1 mA at 5 VDC**
Operating range (micro load)	**5 to 30 V, 5 to 800 mW** **(26 mA maximum at 30 V)**
Contact resistance	**50 mΩ maximum (initial)**
Typical applications	**PLC, telemetry and low voltage control**

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 align 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 the up position, the arm should drop to the off position under its own volition when released.

FLOAT ARM ASSEMBLY

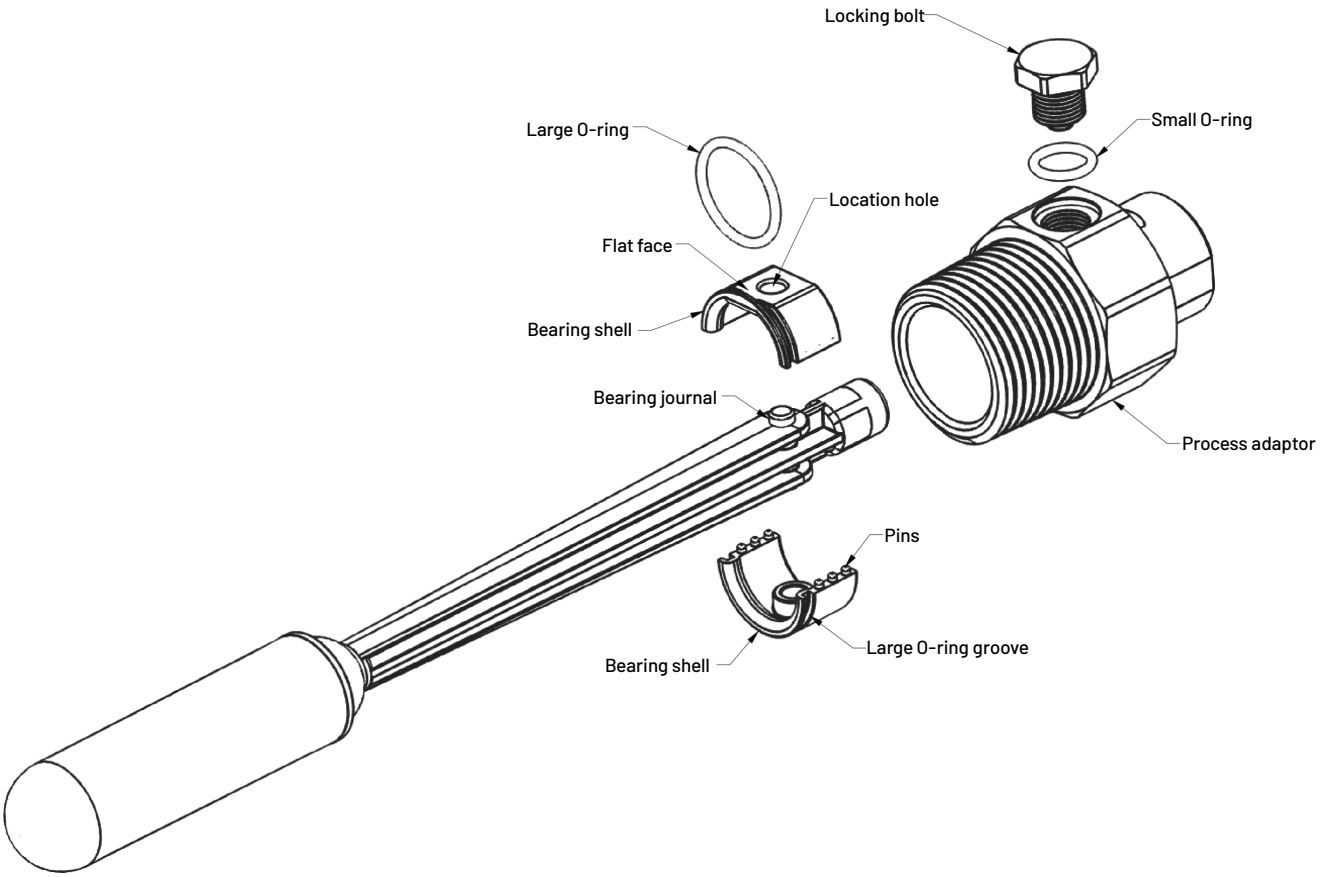


FIG. 3 Exploded view of the LM float arm assembly

Kelco Engineering Pty Ltd

ABN 20 002 834 844

HEAD OFFICE & FACTORY
9/9 Powells Road
Brookvale NSW 2100, Australia

POSTAL ADDRESS
PO Box 7485, Warringah Mall
Brookvale NSW 2100, Australia

SALES ENQUIRIES
sales@kelco.com.au
www.kelco.com.au

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