INSTALLATION & OPERATING INSTRUCTIONS

INSTALLING AND OPERATING THE KELCO D40 DISPLACEMENT LEVEL SWITCH

WARNING

Please read these installation and operating instructions fully and carefully before installing or servicing this level switch. The D40 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.

OPERATING PRINCIPLE

The D40 top entry level switch operates by Archimedes' principle. When an object is immersed in a liquid its weight is reduced by an amount equal to the weight of the liquid it displaces. In the D40 level switch a magnetically actuated switch detects the weight reduction that occurs when liquid submerges a solid polypropylene displacer suspended from a cord below the switch. Since it is the change of weight sensed by the displacer as it is submerged that actuates the switch, the specific gravity of the liquid will directly affect the operation of the switch. The D40 level switch will only operate in liquids that have a specific gravity of 0.95 or greater (water). It will not operate if used in liquids with an S.G. of less than 0.95.

INSTALLATION

The D40 level switch is supplied with a flat mounting plate for installing the switch against the walls of pits or tanks. In addition to the flat plate, an angle bracket is also supplied. The angle bracket can be used to mount the switch on any flat horizontal surface such as tank lids or horizontal bracing. M5 threaded mounting holes are provided in the sides of the switch body so the switch can be oriented with its cable entry pointing to the right or left.

Whichever mounting bracket is used, ensure that once installed, the top face of the D40's lid is perfectly horizontal. This ensures the cord and displacer hang vertically beneath the switch and apply force to the switch arm directly downwards.

Thread the supplied cord through the hole at the end of the switch actuating arm and tie a double knot in it so the cord can't pull back through the hole. Thread the free end of the cord through the hole in the top of the displacer and tie it off securely. The D40 level switch is supplied with 3 metres of cord. Cords up to 20 metres in length can be used with the D40 switch and are available from Kelco or your supplier if required.

OPERATING ENVIRONMENT

The D40 level switch is an extremely versatile device. It can be used to detect a liquid level in wells, tanks, pits, sumps, bores and bund areas. It is designed for fresh water and waste water, and is not suitable for sea water or chemical solutions. The D40 is highly tolerant of liquids containing solids, slurries or pulp. It will also work reliably in froth or foam and in applications where there is floating scum or debris of various kinds.

The electrical enclosure on the D40 level switch is sealed and separated from the switch's actuating arm by a solid metal wall. The switch is actuated magnetically through the solid wall. This means the electrical housing is totally sealed and weatherproof provided the lid is fully tightened and the cable gland is properly utilised. The polypropylene suspension cord and the displacer are the only components in contact with the process liquid.

The D40 is ideal for warm liquid applications provided the electrical head is mounted well above the liquid and is protected from hot vapour. The wetted components, the cord and displacer, are highly tolerant of liquids at elevated temperatures.

HAZARDOUS AREAS

The D40 is not certified for use in hazardous areas and must not be installed in any area classified as hazardous under AS/NZS 60079.10 (Zone 0, 1, 2, 20, 21 or 22). It contains a heavy-duty silver-contact microswitch rated for mains voltage and direct motor control, has no recognised Ex protection concept, and is not suitable as simple apparatus in an intrinsically safe circuit because its contacts are not rated for the low currents of intrinsically safe circuits.

TYPICAL INSTALLATIONS

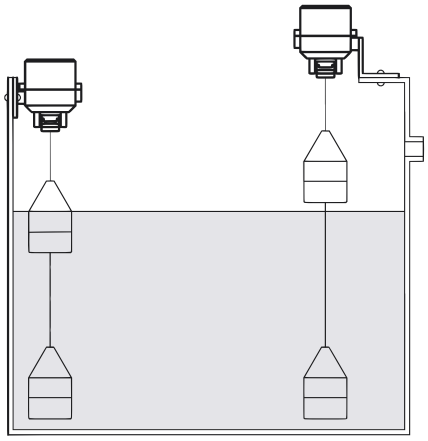


FIG. 1 Typical D40 installations

DIMENSIONS

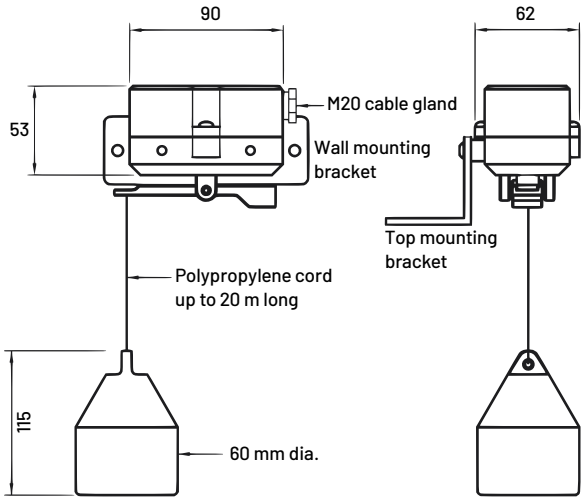


FIG. 2 D40 dimensions in millimetres

OPERATING LIMITATIONS

Fixed switching differential	**60 mm**
Maximum distance between D40 and displacer	**20 metres (3 m of cord is supplied with the switch)**
Minimum distance from displacer to the floor of a tank or sump	**20 mm**
Minimum inside diameter of pipe housing or shroud	**70 mm**
Maximum liquid temperature	**90 °C**
Specific gravity of process liquid	**0.95 or greater**

USING THE SLOTTED ANGLE BRACKET

In all installations the top face of the switch lid must lie horizontal in both planes. The angle bracket can be used to install the switch on sloping beams and tank lids. Fully tighten the 2 × M5 Phillips head screws to ensure the switch is solidly mounted.

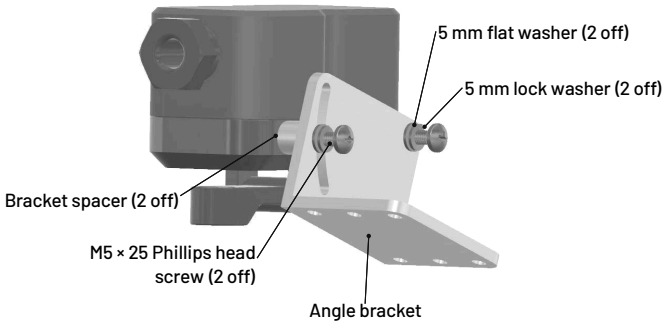


FIG. 3 Angle bracket assembly

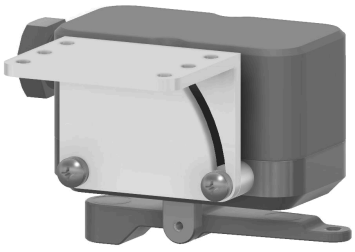


FIG. 4 The angle bracket can be inverted if required

ELECTRICAL DATA

ELECTRICAL LIMITS OF THE STANDARD D40

The D40 level switch houses an S.P.D.T. (single pole, double throw) switch. The standard D40 is suitable for all general control circuit applications up to 500 VAC. It is ideal for the control of pump starters, relay logic circuits, and for the direct control of contactors and timers.

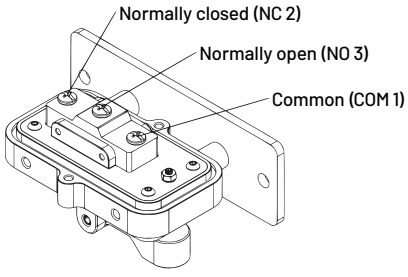
IMPORTANT

The standard D40 is rated to 500 VAC: 20 A resistive (15 A at 500 VAC). Motor load ratings are 12.5 A at 125 VAC, 8.3 A at 250 VAC and 2 A at 500 VAC (UL: 1 HP at 125 VAC, 2 HP at 250 VAC).

RATED VOLTAGE	NON-INDUCTIVE LOADS (A)				INDUCTIVE LOADS (A)			
	RESISTIVE		LAMP		INDUCTIVE		MOTOR	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	20		7.5		20		12.5	
250 VAC	20		7.5		20		8.3	
500 VAC	15		4		10		2	
8 VDC	20		3	1.5	20		12.5	
14 VDC	20		3	1.5	15		12.5	
30 VDC	6		3	1.5	5		5	
125 VDC	0.5		0.5	0.5	0.05		0.05	
250 VDC	0.25		0.25	0.25	0.03		0.03	
Maximum switched voltage			**500 VAC**					
Maximum switched current			**20 A** (15 A at 500 VAC)					

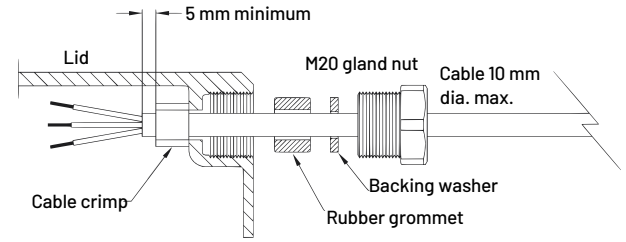
NOTE Do not apply maximum voltage at maximum current across the switch contacts. See the data table above for current limits at specific voltages and for specific loads.

TERMINAL IDENTIFICATION



NOTE To switch ON when a rising water level covers the displacer, use terminals 1 (COM) and 3 (NO).
To switch ON when a falling water level uncovers the displacer, use terminals 1 (COM) and 2 (NC).

CABLE GLAND ASSEMBLY



Crimp the ears using pliers so the ring is as tight as possible on the cable outer sheathing.

EARTHING THE D40

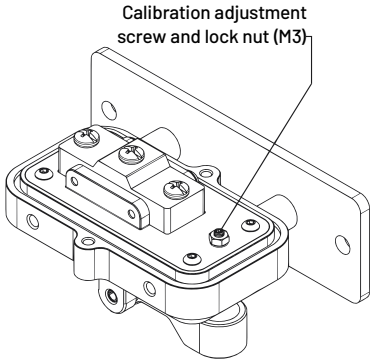
An M4 earth screw is provided inside the lid of the D40 level switch. In the interests of safety, all applications should be properly earthed using the earth screw.

CABLE ANCHOR

Each D40 level switch is shipped with two cable crimps to suit various cable sizes. A cable crimp should be crimped onto the outer sheathing of the cable at least 5 mm back from the end of the outer sheathing. The cable should then be pulled back through the cable gland until the cable crimp rests hard up against the inner wall of the cable gland. After bedding the cable crimp into position, fully tighten the cable gland.

KELCO D50 & D40 LEVEL SWITCH CALIBRATION

The Kelco D50 and D40 level switches are factory calibrated to operate with the displacer or displacers supplied with each switch. If required, the switch can be re-calibrated by adjusting the calibration screw located on the top deck of the switch. The calibration screw is an M3 Allen head stainless grub screw secured with a lock nut.



D50 LEVEL SWITCH

The D50 level switch is supplied with two displacers. If the D50 level switch fails to operate on a falling level, that is, fails to switch when the falling water level uncovers the bottom displacer, then the switch will require re-calibration. In such a situation unlock the calibration screw lock nut, wind the calibration screw ¼ turn anti-clockwise and re-lock the lock nut. Test the switch on a falling water level and ensure it operates properly. If it fails to switch, adjust the sensitivity screw a further ¼ turn anti-clockwise and repeat the test.
If the switch fails to operate on a rising level, that is, fails to switch when the topmost displacer is covered by water, it will require re-calibrating. Unlock the calibration lock nut, turn the calibration grub screw ¼ turn clockwise and re-tighten the lock nut. Test the switch on a rising water level. If it fails to switch when the top displacer is covered by water, wind the calibration screw a further ¼ turn clockwise and repeat the test.

D40 LEVEL SWITCH

The D40 level switch has a single displacer and switching must occur within the length of the single displacer. When correctly adjusted the switch should change state at the bottom edge of the conical section on a rising level and at the seam line halfway down the straight section on a falling water level. If a rising water level fails to actuate the switch when the displacer is fully submerged, recalibrate the switch by adjusting the calibration screw clockwise in ¼ turn steps until the switch operates at the correct point.
If the switch fails to operate on a falling water level, adjust the calibration screw anti-clockwise by ¼ turn and retest it. If required, repeat the adjustment until the switch operates properly.

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

Please note: Kelco Engineering Pty Ltd reserves the right to change the specification of this product without notice. Information in this document is believed to be accurate at the date of publication. Always check www.kelco.com.au for the current version before specifying or installing. 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 downloaded from www.kelco.com.au/en/information/warranty.

All rights reserved. Copyright © 2026 Kelco Engineering Pty Ltd