INSTALLATION & OPERATING INSTRUCTIONS

INSTALLING AND OPERATING THE KELCO D50 DISPLACEMENT LEVEL SWITCH

WARNING

Please read these installation and operating instructions fully and carefully before installing or servicing this level switch. The D50 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 D50 top entry level switch is a two position level regulator capable of controlling both the high and low level switching points of a pump or contactor. It can be configured to pump liquid into or out of a pit or tank. The D50 level switch operates by Archimedes' principle. When an object is immersed in liquid its weight is reduced by an amount equal to the weight of the liquid it displaces. In the D50 switch a magnetically actuated switch detects the weight change that occurs when liquid submerges a set of solid polypropylene displacers suspended from the switch. Since it is weight change that actuates the switch, the specific gravity, or weight per unit volume, of the liquid medium is critical to the operation of the switch. The D50 level switch is set up to operate in water with a specific gravity of 0.95 or greater.

INSTALLATION

The D50 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 D50's lid is perfectly horizontal. This ensures the cord and displacers 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 various parts of the displacers as per the drawing on this sheet. Twist and lock the displacers onto the cord in appropriate positions, one at the required low level switching point and one at the top switching point. The D50 level switch is supplied with 3 metres of cord. Cords up to 20 metres in length can be used with the D50 switch and are available from Kelco or your supplier if required. Tie a knot in the bottom end of the cord to prevent the displacers from slipping off during adjustment.

OPERATING ENVIRONMENT

The D50 level switch can be used to control the level of liquid in wells, tanks, pits, sumps and bores. It can be used in potable water, distilled water or water that contains solids, pulp, froth, foam, grit or waste materials. It is not suitable for sea water or chemical solutions.

The weatherproof electrical housing of the switch is normally mounted above the liquid to be sensed, and the displacers suspended by cord at the points where the rising or falling liquid levels are required to operate the switch.

The suspension cord and the displacers are the only components of the switch that come in contact with the liquid and these are made from polypropylene.

EXPOSED APPLICATIONS

If this switch is to be mounted in an outside location, for example on top of an open water tank, we recommend the cord and displacers as well as the electrical lead be protected from direct exposure to the sun. A simple shroud can be constructed from a length of 50 mm or larger PVC pipe. Stand the pipe on end in the tank and mount the D50 so its displacers and cord sit inside the open pipe and are thus protected from the sun. The electrical lead to the switch can be protected from the sun by running it through a length of flexible conduit.

HAZARDOUS AREAS

The D50 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

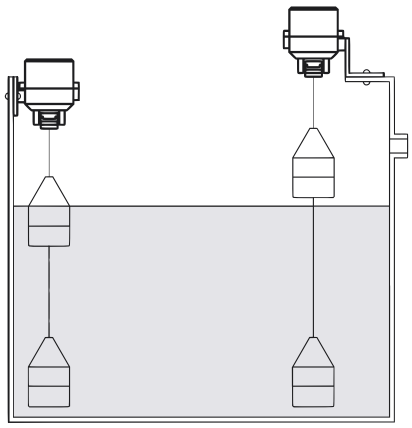


FIG. 1 Typical D50 installations

DIMENSIONS

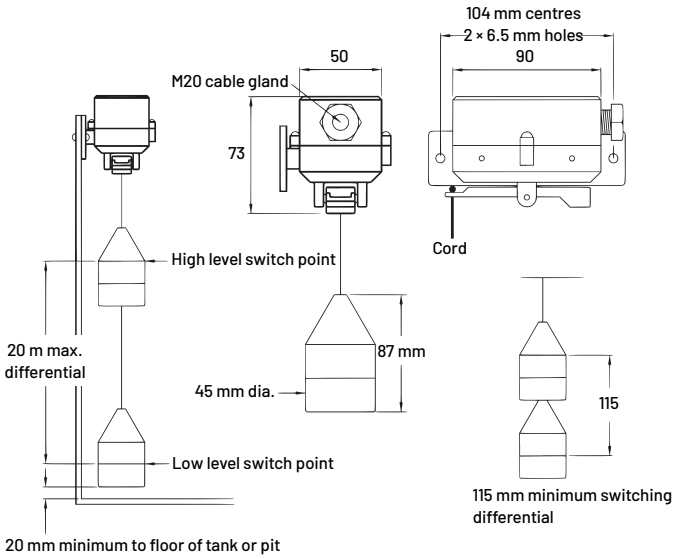


FIG. 2 D50 dimensions in millimetres

THE DISPLACERS

The D50 level switch is supplied with two displacers. The displacers should be assembled as shown and positioned on the cord with their conical ends pointing upwards. Space the displacers apart and twist and lock them onto the cord. Position the displacers so one sits at the required high level switching point and one at the low level switching point. Ensure the bottom displacer sits clear of the floor of the pit or tank and ensure both displacers are well clear of any inlet or outlet pipes, floor of the tank or pit by at least 20 mm.

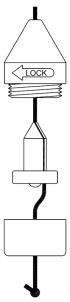


FIG. 3 Displacer assembly

1. Thread cord through the three components.
2. Lay the cord in the trench in the anvil.
3. Slide the anvil into the top body half.
4. Screw the two body halves together.
5. Tie a knot in the free end of the cord.

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.

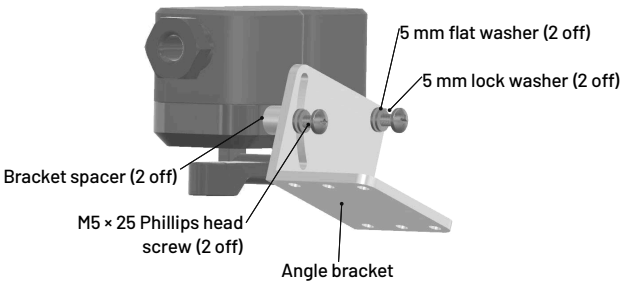


FIG. 4 Angle bracket assembly

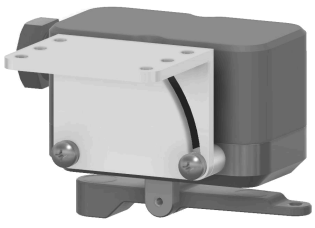


FIG. 5 The angle bracket can be inverted if required

ELECTRICAL DATA

ELECTRICAL LIMITS OF THE STANDARD D50

The D50 level switch houses an S.P.D.T. (single pole, double throw) switch. The standard D50 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.

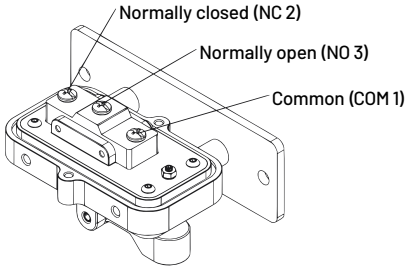
IMPORTANT

The standard D50 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)							

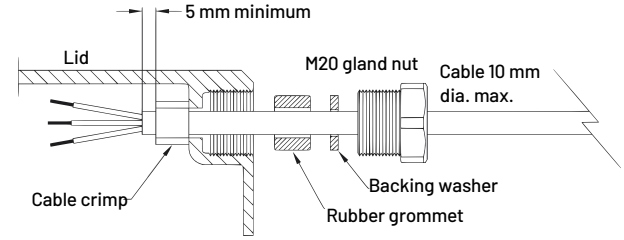
NOTE Do not apply maximum voltage at maximum current across the switch contacts. See the data table above for current limits at specific voltages and for specific loads.

TERMINAL IDENTIFICATION



NOTE To pump out of a tank, use terminals 1 (COM) and 3 (NO). To pump into a tank, 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 D50

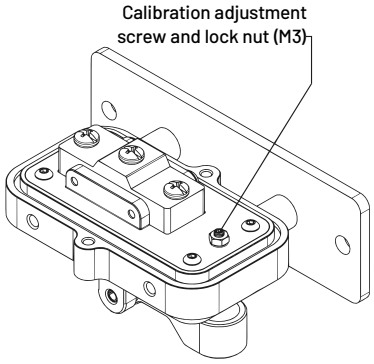
An M4 earth screw is provided inside the lid of the D50 level switch. In the interests of safety, all applications should be properly earthed using the earth screw.

CABLE ANCHOR

Each D50 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.

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