

# INSTALLATION AND OPERATING INSTRUCTIONS FOR KELCO D40 DISPLACEMENT LEVEL SWITCH

## INTRODUCTION

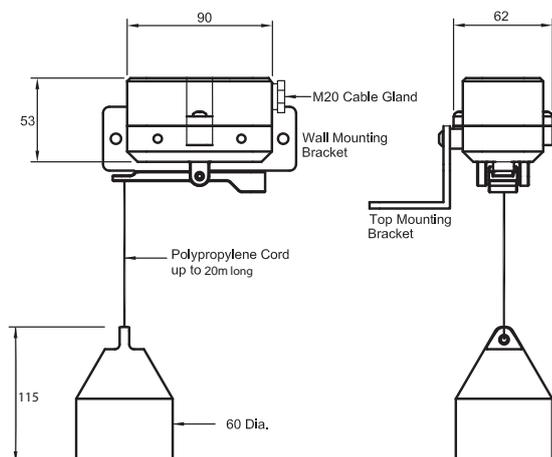
The D40 top entry level switch operates by Archimedes principle. When an object is immersed in a liquid its weight is reduced by an amount equal to the weight of the liquid it displaces. In the D40 level switch a magnetically actuated switch detects the weight reduction that occurs when liquid submerges 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 effect the operation of the switch. The D40 level switch will only operate in liquids that have a specific gravity that is 0.95 or greater (water). They will not operate if used in liquids with an S.G. of less than 0.95.

## 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. The inert materials of construction mean the switch can be used in water, sea water, mild acids and in many common 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. Polypropylene is a very inert material and is well known for its resistance to many commonly encountered chemicals.

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.



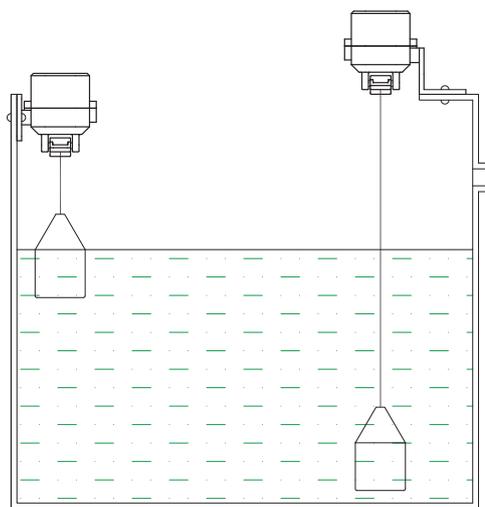
## INSTALLATION

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. 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.

## TYPICAL INSTALLATIONS



## LIMITATIONS

|   |  |
|---|--|
| Fixed switching differential                                    | 40mm +/- 5mm                                       |
| Maximum distance between D40 & displacer.                       | 20 metres (3m of cord is supplied with the switch) |
| Minimum distance from displacer to the floor of a tank or sump. | 20mm   |
| Minimum inside diameter of pipe housing or shroud.              | 70mm   |
| Maximum liquid temperature.                                     | 90°C   |
| Specific gravity of process liquid.                             | 0.95 or greater                                    |

## ELECTRICAL



### 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 associated with this switch must be performed by a fully qualified and licenced electrician.

### ELECTRICAL LIMITS OF THE STANDARD D40

The D40 level switch houses a S.P.D.T (Single Pole Double Throw) switch. The standard D40 is suitable for all general control circuit applications up to 500V AC. It is ideal for the control of pump starters, relay logic circuits, and for the direct control of contactors and timers. **The standard D40 can operate at ANY voltage from 5 to 500VAC. It is rated to directly control motors up to 1.5kW (2HP).**

| 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       | 20 A                |    | 7.5 A     |       | 20 A            |    | 12.5 A     |    |
| 250 VAC       | 20 A                |    | 7.5 A     |       | 20 A            |    | 8.3 A      |    |
| 500 VAC       | 15 A                |    | 4 A       |       | 10 A            |    | 2 A        |    |
| 8 VDC         | 20 A                |    | 3 A       | 1.5 A | 20 A            |    | 12.5 A     |    |
| 14 VDC        | 20 A                |    | 3 A       | 1.5 A | 15 A            |    | 12.5 A     |    |
| 30 VDC        | 6 A                 |    | 3 A       | 1.5 A | 5 A             |    | 5 A        |    |
| 125 VDC       | 0.5 A               |    | 0.5 A     |       | 0.05 A          |    | 0.05 A     |    |
| 250 VDC       | 0.25 A              |    | 0.25 A    |       | 0.03 A          |    | 0.05 A     |    |

|                          |        |
|--------------------------|--------|
| 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.

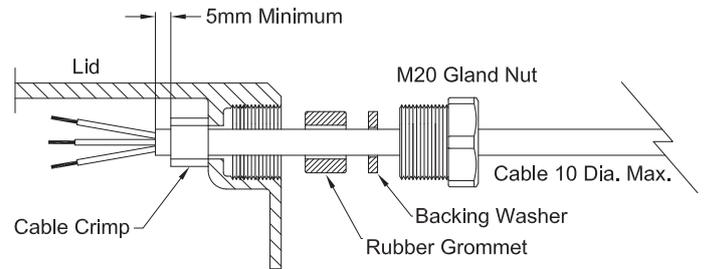
### ELECTRICAL LIMITS OF THE LOW VOLTAGE D40-L

The D40-L level switch houses a S.P.D.T. low voltage low wetting current switch with gold contacts it is suitable for Ex and signalling applications.

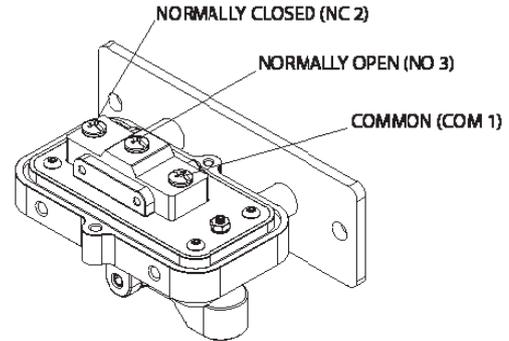
|                          |       |
|--------------------------|-------|
| Maximum Switched Voltage | 30VDC |
| Maximum Switched Current | 26mA  |
| Minimum Switched Voltage | 5VDC  |
| Minimum Switched Current | 1mA   |

**Note:** Do not apply loads in excess of the limits in the table above. Do not apply inductive or capacitive loads to the L microswitch. The "L" microswitch will be damaged by loads in excess of the limits in the table above.

### CABLE GLAND ASSEMBLY



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



### 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)

## 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 5mm 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.

### HAZARDOUS APPLICATIONS

The D40-L Level switch switch can be used in hazardous areas. The switch is classed as a simple device and does not contain components capable of storing or producing an electric charge. As a simple device the D40-L can be used in hazardous applications provided it is isolated by an intrinsically safe barrier, a zener barrier.

## KELCO Engineering Pty Ltd

ABN 20 002 834 844 Head office and factory: 9/9 Powells Road Brookvale NSW 2100 Australia. Postal Address: PO Box 7485 Warringah Mall Post Shop Brookvale NSW 2100 Australia. Phone: +61 2 9905 6425 Fax: +61 2 9905 6420 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. Kelco Engineering Pty Ltd accepts no liability for personal injury or economic loss as a consequence of the use of this product. All rights reserved copyright Kelco Engineering Pty Ltd © 2018 The Kelco D40 Displacer Level Switch is protected by a 12 month return to base warranty. Full details of our warranty can be downloaded from: <http://www.kelco.com.au/warranty>