

# LevelSlick

Specialist Liquid Level Sensor

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## Manual



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Thank you for purchasing this LevelSlick sensor manufactured by Gill Sensors & Controls Limited. The unit has no customer serviceable parts. To achieve optimum performance we recommend that you read the whole of this manual before proceeding with installation and use.

Gill Sensors & Controls Limited are continually improving their products and specifications may be subject to change without prior notice.

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## 1. Introduction

LevelSlick provides continuous real-time monitoring of the level of any water based liquid. Having no moving parts, no floats and no holes the sensor will continue to report accurate liquid levels even if there is particulate matter suspended in the liquid. There are three analogue output options to allow integration into a variety of measurement systems.

## 2. Principle of operation

Using conductive sensor elements over the length of the probe, this LevelSlick sensor can measure the extent that the probe part is immersed in a liquid and hence determine the liquid level. This is done without direct contact between the sensor elements and the liquid and without any moving parts.

The sensor can operate in any water based liquid, with or without suspended particle matter. However, it will not work with liquids that are based on non-conductive materials, such as oil and fuel.

The measured liquid level is reported via a choice of 3 analogue outputs:

- Industry standard 4 – 20 mA current loop
- Voltage output scalable anywhere in the range 0 – 10 volts
- Resistive, for direct drive of resistive gauges

Using the GSlevel software, a free configuration programme available from [www.gillsc.com/support](http://www.gillsc.com/support), the output from the sensor can be adjusted to meet any required measurement range.

In addition, all sensor variants include a second output. This consists of a zero-volt switch that can be configured as either a maximum or minimum level warning switch.

**3. Installation**

**Safety Warning, This equipment is not ATEX certified and has not been designed for use in areas which fall within the scope of the ATEX directive. If an area of intended usage is within the scope of the ATEX directive, then contact Gill Sensors & Controls Ltd for further information.**

Please check the sensor for any signs of transit damage prior to installation. Do not remove the packaging until you are ready to install the sensor.

DO NOT attempt to cut the sensor to length or bend the sensor probe. Both actions will result in the sensor failing and will invalidate the warranty.

The sensor is supplied as standard with a 1.25" BSP thread for fitting to the tank.

The sensor must be installed on a flat surface where the probe can extend into the deepest part of the tank.

When choosing where to position the sensor on the tank, please note that LevelSlick is a rigid sensor and requires sufficient clearance above and to the side to allow the sensor to be fitted and when inspection is necessary. An example of a marine installation is shown in Fig 1.

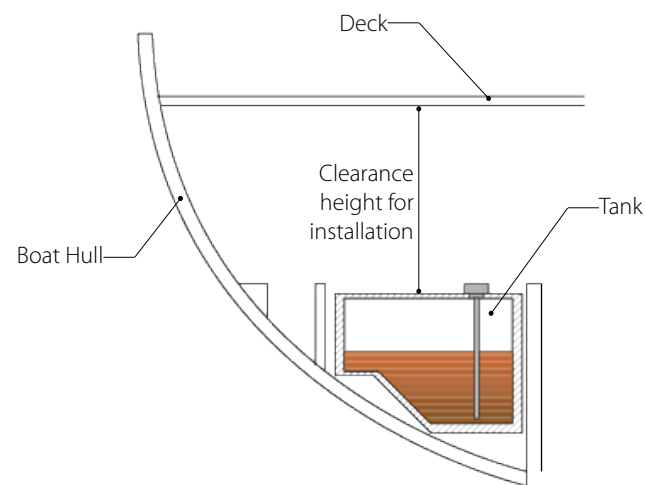


fig 1

Install the sensor into a 1.25" BSP threaded hole, and tighten using a 46mm A/F spanner. The sensor is supplied with an O-ring and gasket for sealing. To use the O-ring, the mounting hole requires a chamfer to be machined around the upper edge (fig 2). Tighten to a torque of 50Nm +/-10%, when the sensor face 'touches' the top of the tank.

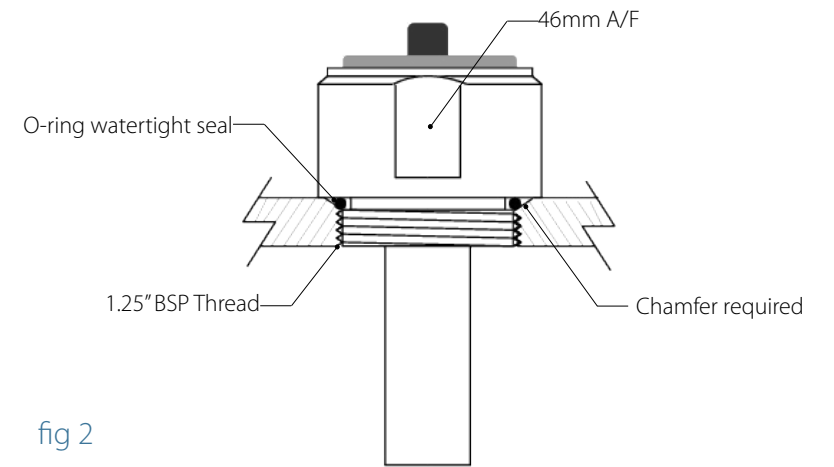
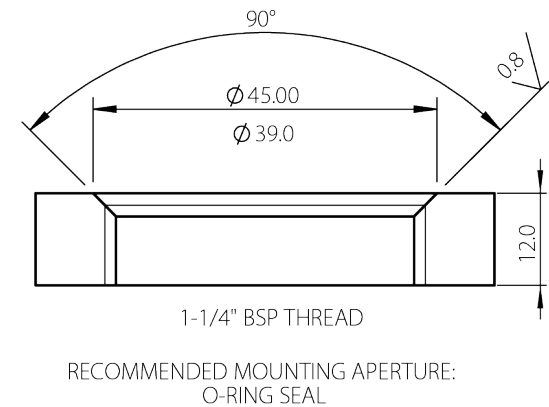


fig 2

If it is not possible to create a chamfer, then the gasket should be used. Remove the O-ring and fit the gasket over the thread mount, black face up. Create a hole for the sensor as shown in Fig 3. Ensure the gasket is centered under the sensor and tighten to a torque of 50Nm +/-10%, approximately 4.5 turns.

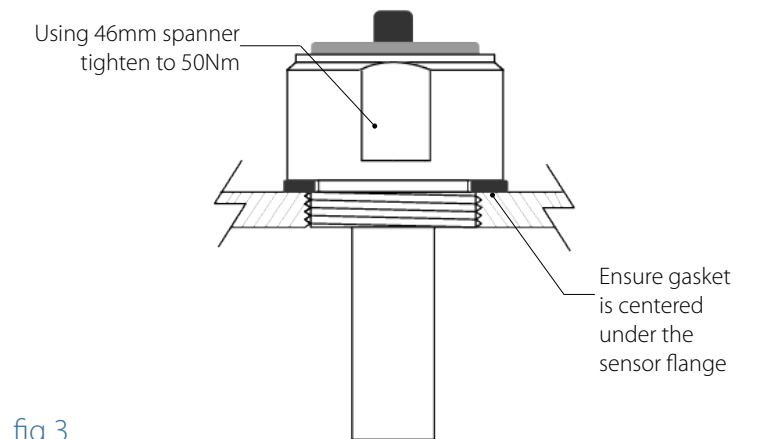
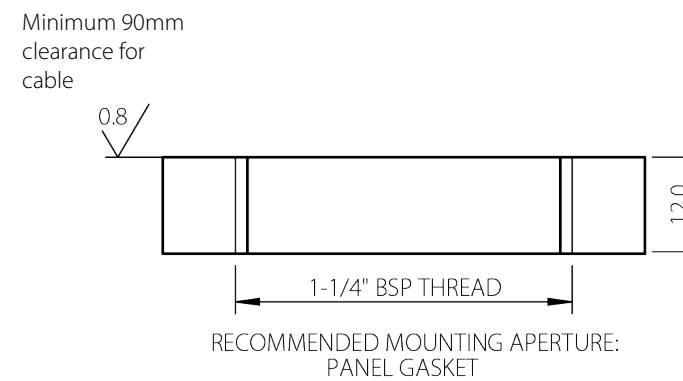


fig 3

Please note, a sensor position with a minimum of 90mm from the top of the tank to the underside of a housing is needed to allow for cable bend as shown in fig 4.

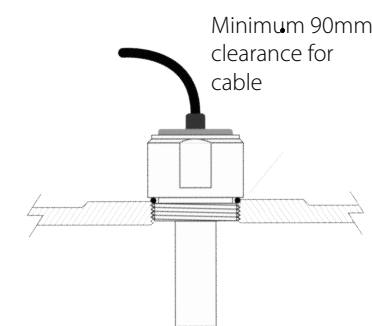


fig 4

The sensor can be installed at any angle from vertical to a maximum recommended angle of 45°. The sensor does not require any support inside the tank. However, you must ensure that the mounting hole in the tank is strong enough to withstand the forces imposed by the sensor from weight and vibrations.

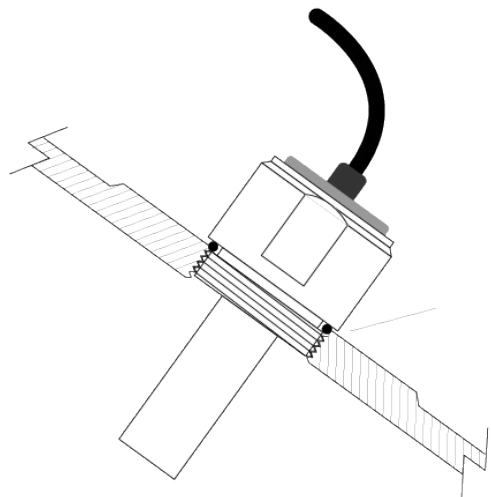


fig 5

**Important:** LevelSlick sensor must not be used in a tank that is not adequately vented.

**4. Electrical connection**

The sensor cable has four wires:

- Red = d.c. power supply
- Black = ground
- White = measurement output
- Blue = switch output

The installation of the sensor has different requirements, depending on the analogue output:

- Voltage:** The power supply must be at least 0.5V greater than the maximum output voltage required. The switch output requires a pull-up resistor of 1 to 10 kOhms
- Current:** The measurement output requires a 250 Ohm load resistor across the output. The switch output requires a pull-up resistor of 1 to 10 kOhms
- Resistive:** The resistive meter requires its own d.c. power supply.

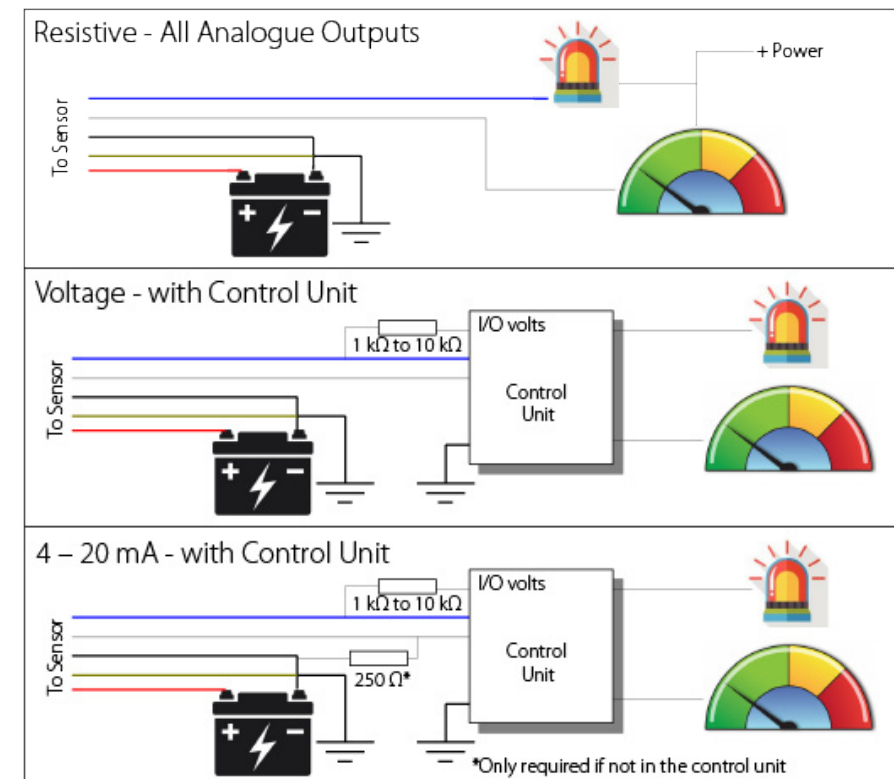


fig 6

Please note; See section 10 for further connection details.

**5. Commissioning & setup**

To setup and commission the sensor you will require a standard USB lead - Type A to Mini B.



fig 7

On the top of the sensor flange, remove the retaining screw and cover using a 1.5mm Allen key. This enables access to the USB connection.

Please note, there is an O-ring seal around the cover which makes removal more difficult, but ensures protection against moisture.

When replacing the cover please ensure that a good seal is re-established.



fig 8

**6. Graphical user interface**

LevelSlick is configured for use by downloading the GSlevel software from [www.gillsc.com/support](http://www.gillsc.com/support). Connect the host PC to the sensor using a suitable USB cable. Power the sensor according to guidance in section 5 and 10 and follow the instructions for sensor set up in the software manual (within GSlevel).

**7. Tank profiling**

LevelSlick is capable of sensing liquid level in tanks that are regular in shape where the sensor output is linear across the full height of the tank. As shown in Fig 9, a liquid that reaches half way up the tank is 50% full.

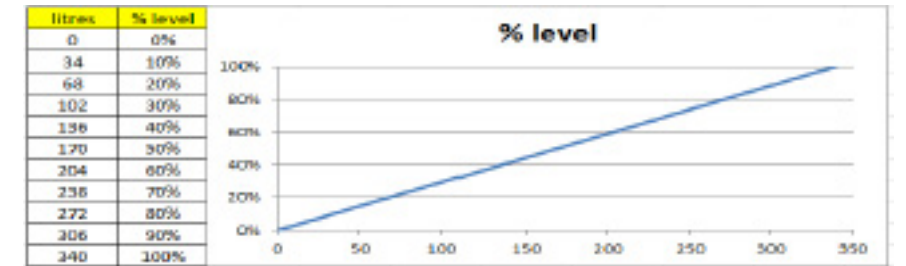
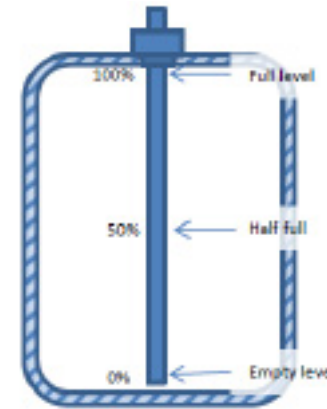


fig 9

The sensor is factory supplied so that it reports the level in a linear path as the level rises. For a regular shaped tank this is correct. For example, a 340 litre tank would show an output as shown in fig 9

LevelSlick is also capable of sensing liquid level in tanks that are not regular in shape, where the sensor output is non-linear across the full height of the tank. As shown in Fig 10, a half full tank would not be half way up the tank, but using the tank profiling software in GSlevel corrects the output.

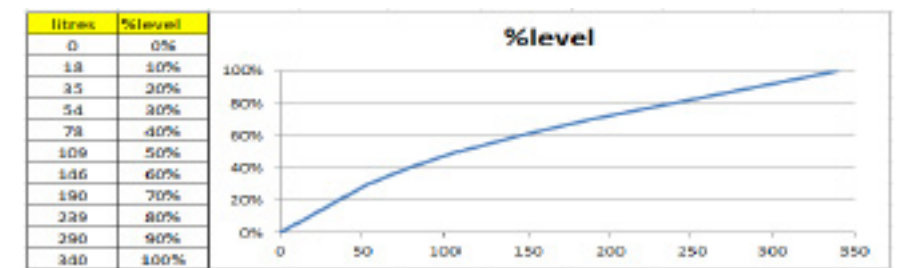
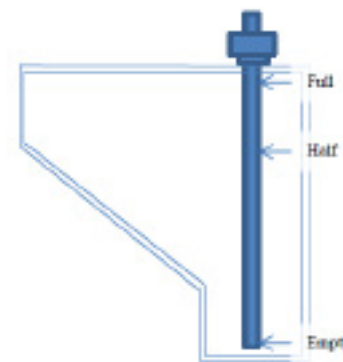






fig 10

If a non-linear output is required through fitting the sensor into a tank that is not regular in shape, please consult guidance in the GSlevel software manual to set up operation for non-linear output.

Without using tank profiling a 50% reported level would only be 109 litres.

**8. Fault indications & returns**

LED Status indications

| LED  | Status                 |
|--|------------------------|
| <br>Green (Solid)     | Normal operation       |
| <br>Yellow (Flashing) | Bad configuration data |
| <br>Red (Flashing)    | Sensor failure         |
| <br>Red (Solid)       | Firmware not running   |

If any of these faults arise, please contact Gill Sensors and Controls. Contact details can be found at the end of this document.

LevelSlick has no moving parts and requires minimal maintenance in use. Faults in operation are most likely to occur if the sensor is incorrectly configured during installation. Configuring the measurement output and the tank or the tank profiling incorrectly will cause the reported output to be incorrect. A very bad configuration will prevent any output being reported at all.

**Important:** Due to potential health risks from contamination, we cannot accept LevelSlick sensors back from a customer or installer if the sensor has been used in a waste liquid environment (either full or empty tank or pipes) or if the sensor(s) may have been contaminated by handling.

LevelSlick sensors returned without authorization will be rejected back to the carrier or held, package unopened, at Good Inwards pending pick-up by customer.

If a LevelSlick sensor fails within the warranty period Gill Sensors and Controls will send a replacement sensor.

**9. Sensor specifications**

|   |  |  |  |
|---|--|--|--|
| <b>Feature</b><br><br>Wiring:<br>Outer diameter: 6.9 mm<br>Power pair: Red & Black<br>22 AWG<br>1.4 mm diameter<br>PVC insulation<br>Output pair: Blue & White<br>24 AWG<br>2.0 mm diameter<br>PVC insulation<br>Drain: 22 AWG: 19 strands<br><br>Power Supply:<br>Reverse voltage protected.<br>Overvoltage protected: +/-50 V | <b>007 Variant</b><br>4-20 mA<br><br>Red: +ve power supply<br>Black: -ve power supply<br>Blue: Switch output<br>White: 4-20 mA output<br>Screen: Bare drain wire     | 6V to 32V<br>30mA at 6V<br>20mA at 12V<br>14mA at 16 to 32V<br><br>Assuming 25 ohm resistor<br>+ up to 20mA<br>output current              | Storage: -40°C to +85°C<br>Operation: -40°C to +85°C<br><br>An App is available from <a href="https://www.gillsc.com/">https://www.gillsc.com/</a> which may be used to configure the tank profile, the output measurement range and calibration information. The App is PC based and connection to the Black water probe is via a micro-USB type B connection under a cover in the cap of the sensor. |
|   | <b>008 Variant</b><br>0-10 V<br><br>Red: +ve power supply<br>Black: -ve power supply<br>Blue: Switch output<br>White: 0 to 10 volt output<br>Screen: Bare drain wire | 6V to 32V<br>30mA at 6V<br>20mA at 12V<br>15mA at 16 to 32V<br><br>Note: Supply voltage must be greater than the configured output voltage |  |
|   | <b>010 Variant</b><br>Resistive<br><br>Red: +ve power supply<br>Black: -ve power supply<br>Blue: Switch output<br>White: Resistive output<br>Screen: Bare drain wire | 6V to 32V<br>40mA at 6V<br>30mA at 12V<br>26mA at 16 to 32V  |  |



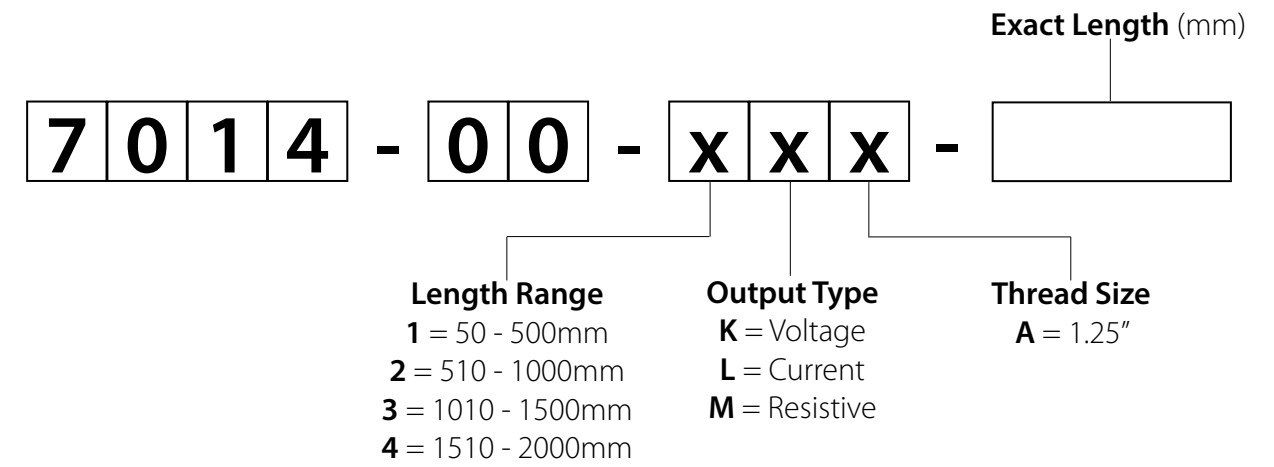
10. Environmental specifications

|  |   |   |  |
|--|---|---|--|
| Feature                                  | 007 Variant<br>4 – 20 mA  | 008 Variant<br>0 – 10 V   | 010 Variant<br>Resistive   |
| Outputs:<br>Measurement output           | Industrial standard current-loop in the nominal range 4 mA to 20 mA. Normally this will linearly represent the measured liquid level, but may be reconfigured to match non-linear tank profiles and to be any range within the 4 to 20 mA range.<br>The power supply –ve is the return path for the output current.                 | Voltage output representing measured liquid level. Normally this will linearly represent the measured liquid level, but may be reconfigured to match non-linear tank profiles and to be any range within the 0.5 V to 10 V range.<br>Note: output voltage must be configured to be less than the supply voltage.<br>Output impedance: 500 ohms<br>Recommended load resistor >= 10 kΩ. | The resistive output is designed for direction connection to a level gauge. The output is configured as a nominal 10Ω to 180Ω but should be re-configured to suit the fitted gauge and the installation arrangement.<br>Note: The default settings may vary between gauge manufacturers. In this instance, use the custom configuration option in Glevel to set empty, mid and full scale outputs. |
| Output Resolution:<br>Measurement output | Step size < 0.1 mA.<br>Note: The measurement resolution is less than this.  | Step size < 10 mV<br>Note: The measurement resolution is less than this.  | Step size < 0.2 Ω<br>Note: The measurement resolution is less than this.   |
| Tolerance:                               | +/- 10% of the full scale value.  |   |  |
| Output Rate:<br>Measurement output       | >= 10 Hz  |   |  |
| Outputs:<br>Error                        | Error is reported as a 2.5 mA output current.   | Error is reported as a 0.25 V output voltage.   | Not applicable.  |
| Outputs:<br>Switch output                | Zero-volt switch output that is connected to the –ve power supply when the switch is turned on.<br>Maximum ‘off’ voltage : 32 V<br>Maximum ‘on’ current: 150 mA<br>The switch output may be configured to measure any liquid level threshold and may switch “on” when the level is either greater or less than the threshold level. |   |  |
| Configuration Interface:                 | USB micro-B connector under a cover in the cap of the sensor. See the section “Configuring the sensor for detailed information.   |   |  |
| Mounting:                                | Standard 1.25” BSP thread.<br>5-bolt SAE adaptor available as an optional extra.  |   |  |

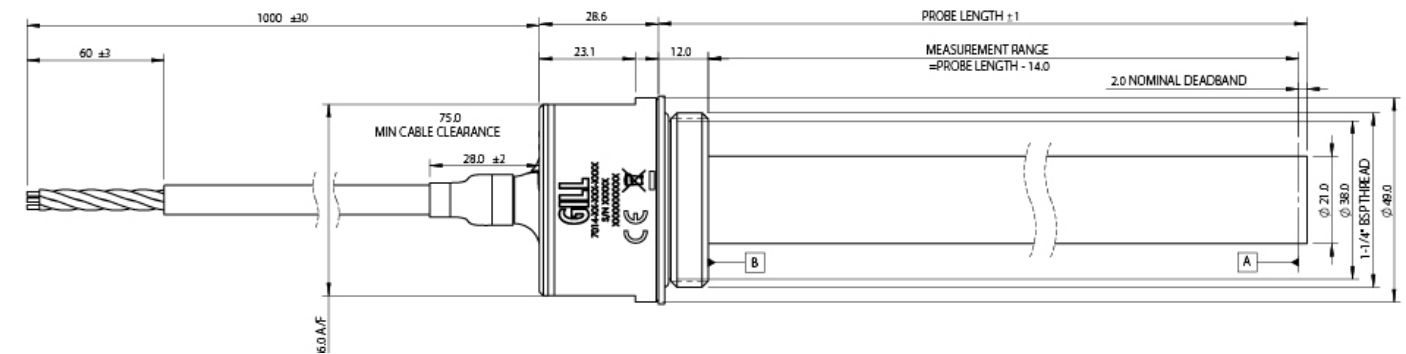
|   |  |                       |                          |
|---|--|-----------------------|--------------------------|
| Feature   | 007 Variant<br>4-20 mA   | 008 Variant<br>0-10 V | 010 Variant<br>Resistive |
| Size:   | Body: 46 mm diameter x 41 mm height.<br>Body height above mounting flange: 29 mm.<br>Clearance above mounting flange (once installed) 90 mm (to allow for cable bend radius).<br>Probe : 22 mm diameter x requested probe length.        |                       |                          |
| Weight:   | 0.33 Kg + 0.042g / 10 cm probe length.<br>E.g. 500mm length probe will weigh 0.54 kg   |                       |                          |
| Materials:  | Cable: PVC sheathing + Tinned copper cores.<br>Cap: ULTEM 1000<br>Body: Stainless steel-316 EPDM-70<br>Probe outer: FEP<br>Probe : Copper + Glass reinforced Polyester   |                       |                          |
| LED Status Indicator:<br>(In cap of body of sensor) | Green (solid): Powered and fully operational<br>Yellow (flashing) : Configuration data invalid or corrupt<br>Red (flashing): Sensor failure, measurement beyond calibrated range<br>Red (solid): Firmware upgrade expected / in progress |                       |                          |

|                                       |  |  |                          |
|---------------------------------------|--|--|--------------------------|
| Feature                               | 007 Variant<br>4-20 mA   | 008 Variant<br>0-10 V  | 010 Variant<br>Resistive |
| Operational Temperature:              | Minimum: EN60945:2002 (8.4) Low Temperature, extended to -40 °C<br>Maximum: EN60945:2002 (8.2) Dry heat, extended to +85 °C<br>EN60945:2002 (8.5) Thermal Shock  |  |                          |
| Shock:                                | EN60068-2-27:2009  |  |                          |
| Vibration :                           | EN60945:2002 (8.7) Vibration   |  |                          |
| Ingress:                              | BS EN 60529:1992 +A2:2013 IP6X Cat 1<br>BS EN 60529:1992 +A2:2013 IPX6<br>BS EN 60529:1992 +A2:2013 IPX8<br>BS EN 60529:1992 +A2:2013 IPX9K  |  |                          |
| Drop:                                 | 1 m - 3 sides  |  |                          |
| Within packaging<br>External Pressure | > 10 bar differential (across mounting flange)<br>> 5 bar absolute   |  |                          |
| Damp Heat:                            | EN60945:2002 (8.3) Damp Heat -95% RH +55 °C  |  |                          |
| Chemical compatibility:               | Fuels<br>Oils<br>Coolants<br>Fluids  | Diesel, Gasoline<br>Hydraulic, Gear, Motor, Vegetable,<br>Synthetic ester, Polyalphaolefin, Polyglycol<br>Ethylene Glycol, water |                          |
| Cable pull:                           | 50 N all 3 axis, in both directions  |  |                          |
| EMC:                                  | EN 60945:2002 (7.1) Extreme power supply<br>EN 60945:2002 (9) Electromagnetic Emissions (all sub-sections)<br>EN 60945:2002 (10) Immunity to Electromagnetic Environment (all sub-sections)                                  |  |                          |
| Categories: Protected &<br>Exposed    | EN 61000-6-2:2005 (residential, commercial and light industrial)<br>EN 61000-6-3:2008 + A1:2011 (residential, commercial and light industrial)<br>EN 61326-2-1:2013 (measurement, control and laboratory)<br>EN 61326-1:2013 |  |                          |
| Compass Safe Distance:                | Recommendation : not to be sited within 0.5 m of magnetic compass measuring equipment  |  |                          |

11. Part number configuration



12. Sensor drawing



13. Parts supplied

- LevelSlick Liquid Level Sensor
- O-ring and gasket
- Quick Start Guide

Access to GSlevel User Software & manuals (via [www.gillsc.com/support](http://www.gillsc.com/support) webpage)



### 14. CE Declaration

Gill Sensors & Controls

EU Declaration of Conformity



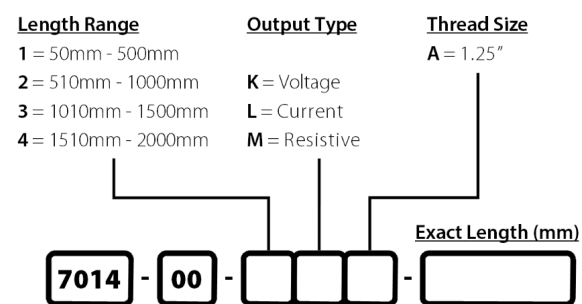
In accordance with the following CE Directives:



**2014/30/EU (Electromagnetic Compatibility – EMC)**  
**2011/65/EU (Restriction of Hazardous Substances – RoHS)**

We, Gill Sensors & Controls Ltd., declare under our sole responsibility that the products:

**GS Level 7014 – Blackwater Liquid Level Sensor (all variants as detailed below):**



Manufactured by: Gill Sensors & Controls Ltd.  
Unit 600 Ampress Park  
Lymington,  
Hampshire, UK  
SO41 8LW

To which this declaration relates, are in conformity with the protection requirements of Council Directive 2014/30/EU on the approximation of the laws relating to electromagnetic compatibility. This Declaration of Conformity is based upon compliance of the product with the following harmonised standards:

|                     |  |
|---------------------|--|
| Marine              | EN 60945: 2002<br>EN 61326-1: 2013                             |
| Light Industrial    | EN 61000-6-3: 2007 + A1: 2011<br>EN 61000-6-4: 2007 + A1: 2011 |
| Measurement Control | EN 61326-2-1: 2013<br>EN 61000-6-1: 2007                       |
| Heavy Industrial    | EN 61000-6-2: 2005   |

Gill Sensors & Controls Limited certifies that the 7014 Liquid Level Sensor is compliant with the European Union's Restriction on the Use of Hazardous Substances in Electrical and Electronic Equipment ("RoHS II") Directive 2011/65/EC by absence of hazardous materials specified herein.

Restriction of Hazardous Substances EN 50581:2012

Signed by:

Print Name: C. Wright – Director of Group Operations

Date of issue: 15/06/2017

Place of issue: Gill Sensors & Controls Ltd. Unit 600 Ampress Park, Lymington, Hampshire. UK SO41 8LW

Change Note: 358

Doc. no. 3002-272 Iss. 2



### Important Notices:

- Gill Sensors & Controls Limited can take no responsibility for installation and/or use of its equipment if this is not done in accordance with the appropriate issue and/or amendment of the manual.
- The user of this manual should ensure that it is appropriate in all details to the exact equipment to be installed and/or operated. If in doubt, the user should contact Gill Sensors & Controls Limited for advice.
- If further details are required which do not appear in this manual, contact Gill Sensors & Controls Limited or one of our
- Install and use LevelPro Liquid Level Sensor in accordance with local laws and regulations.
- Gill Sensors & Controls Limited are continually enhancing their products and specifications and reserve the right to change or revise the information supplied in this document without notice and without obligation to notify any person or organisation of such revision or change.
- The information contained in this manual remains the property of Gill Sensors & Controls Limited and should not be copied or reproduced for commercial gain.

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### Help Us to Help You:

Every effort has been made to ensure the accuracy in the contents of our documents, however, Gill Sensors & Controls Limited can assume no responsibility for any errors or omissions in our documents or their consequences. Gill Sensors & Controls Limited would greatly appreciate being informed of any errors or omissions that may be found in the contents of any of our documents.

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