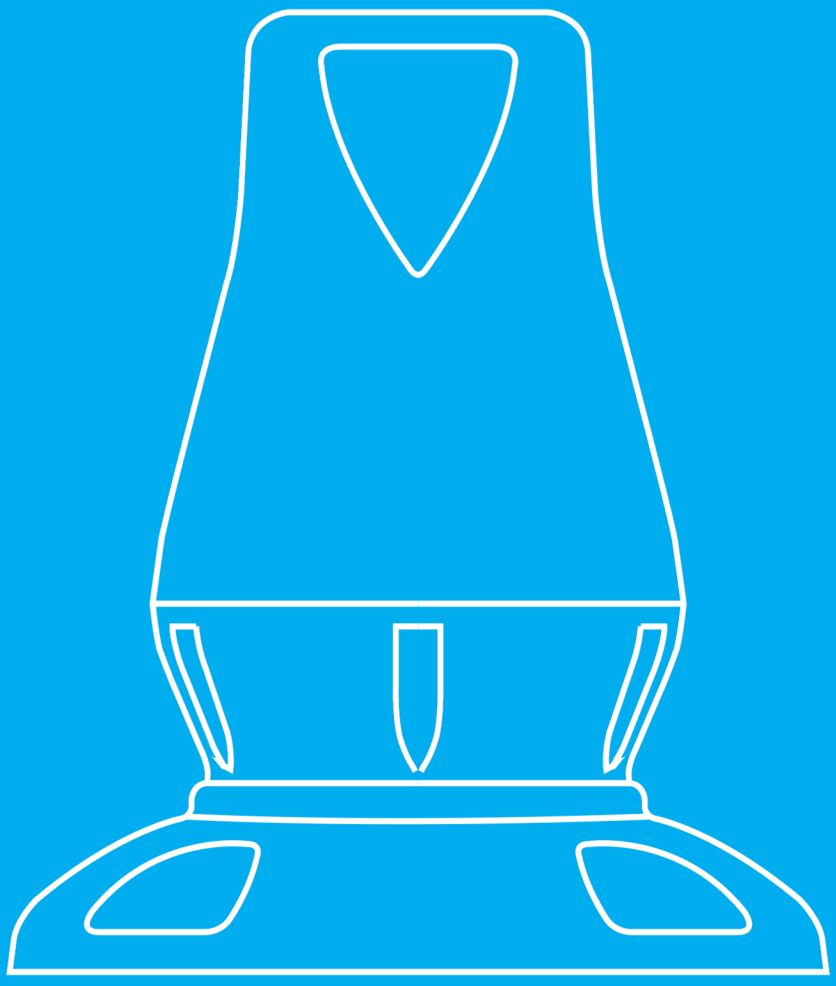
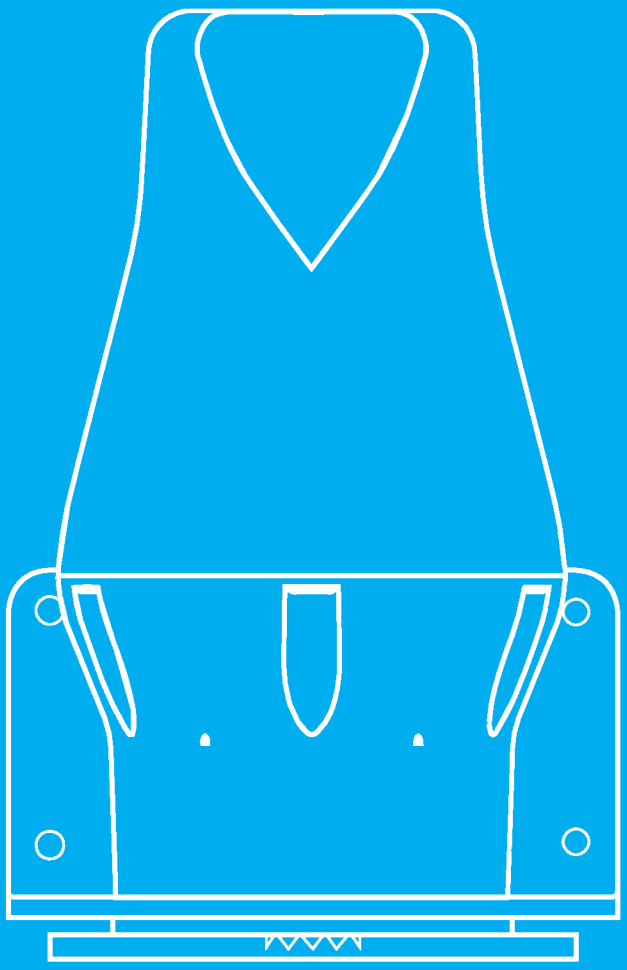
LS1R and T35 Intrinsically Safe Radar level Monitors





This document relates to intrinsic safe versions of HiLo products only.

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Document: D-108-V3

1. General product information

HiLo level monitoring manufacture industrial-grade liquid level monitors, using radar technology, combined with smartphone capability. This combination makes for an easy-to-use, remote management system.

HiLo level monitors are used to;

- optimise bulk fuel and chemical delivery,
- monitor stock and household water tanks,
- track river, lake and sea levels,
- surveil storm and waste water networks.

This document outlines the safe use of HiLo intrinsically safe monitors. These monitors are designed to be part of a battery powered explosive rated remote liquid level monitoring system.
HiLo also manufacture level monitors that are not approved for hazardous locations please check product labelling for more information.

1.1 Technical Information

Environmental

Water resistance	IP68 (4m for 4 days)
Operational temperature	-20°C to +55°C
Recommended storage temperature	+15°C to +25°C

Measurement

Technology	60GHz pulsed radar
Accuracy	0.2% of measurement range
Resolution	1mm
Beam pattern	10° HPBW

Physical Characteristics

Weight	~500g

Communication Capability

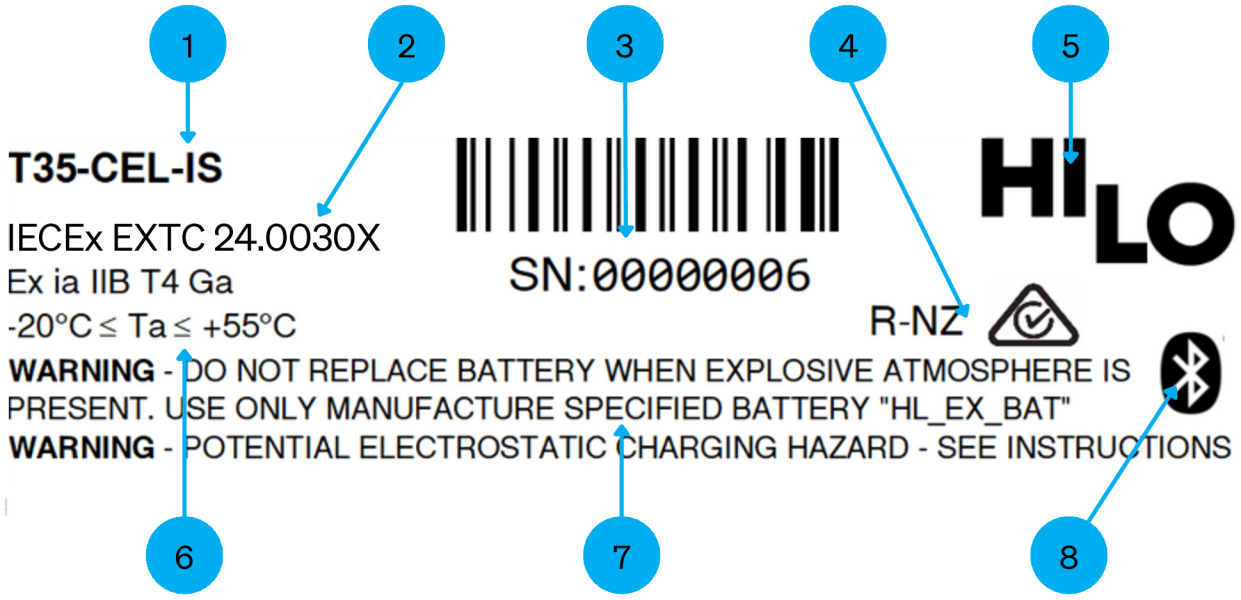
Bluetooth Low Energy	2.4/2.483GHz:0dB
LTE Cat M/NB-IoT	LTE Bands 3,5,8,28:<24dB

External Antenna Interface

Uo:	3.9V	Co:	100nF
Io:	1.92A	Lo:	5uH
Po:	232mW		

1.2 HiLo Product Labelling

HiLo LS1R and T35 products have identification label on the rear of the product. See the detailed description of this label below.



- 1: Product Model Descriptor
- 2: IECEx Certificate Number
- 3: Product Serial Number
- 4: Regional Approvals
- 5: HiLo Company Logo
- 6: IECEx Marking Code
- 7: Additional Conditions Of Use
- 8: Certified Bluetooth Product

Model Descriptor

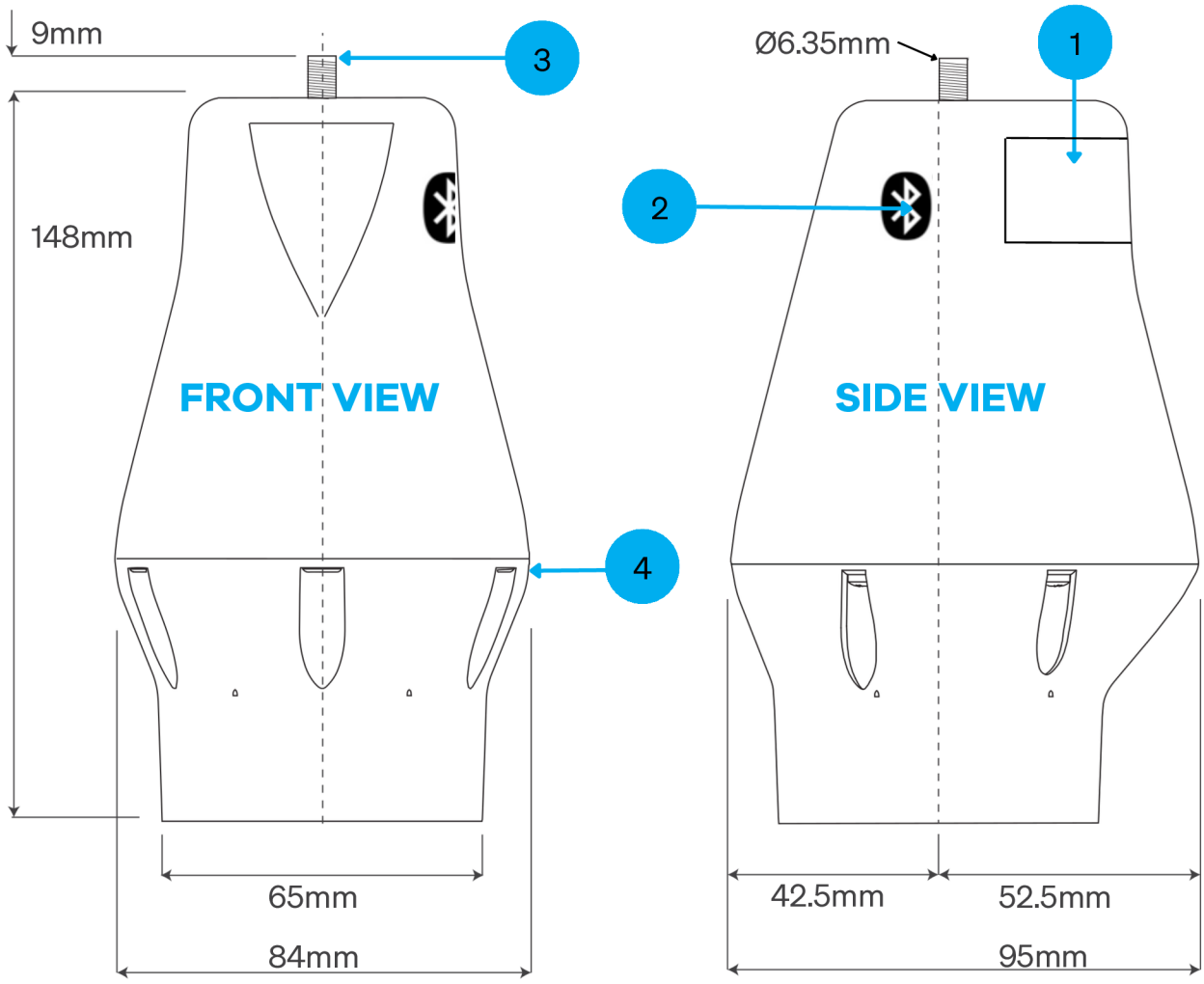
LS1-CEL-EXT-R-IS	
Mount and software model [LS1 or T35]	level monitor
Radio option [CEL]	Cellular LTE M1/NB1
External antenna option [EXT]	external antenna mount (SMA)
Sensor range [R] (5m if not specified)	60GHz radar 7m range
Explosive Environment Rated [IS]	See product label for classification

Explosive Environment Variants

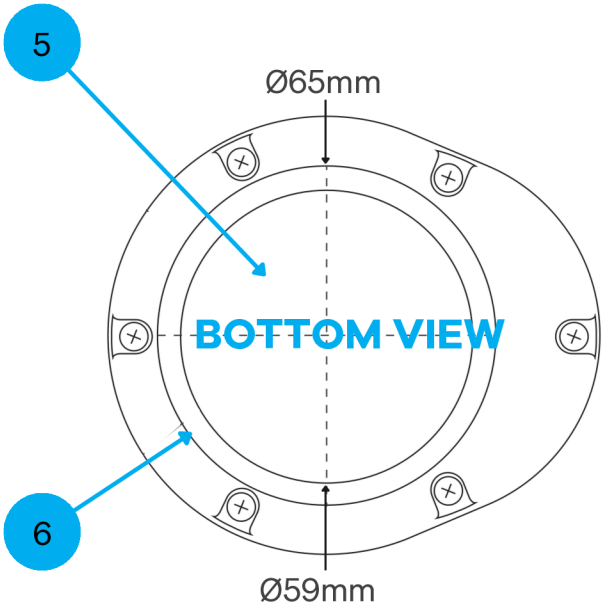
LS1-CEL-R-IS	Level monitor cellular 7 m
LS1-CEL-EXT-R-IS	Level monitor external ant cellular 7 m
T35-CEL-IS	Tank level monitor cellular 5 m

1.2.1 Level Monitor Part Dimensions and Labelling

Before use please check the product for damage and refer to any additional conditions of use.



- 1: Product Label
- 2: Bluetooth Activation Location
- 3: External Antenna Port (EXT model only) SMA Female
- 4: Battery Access Port and Screws
- 5: Radar Sensor Face
- 6: Mount Point, 2” BSP internal thread

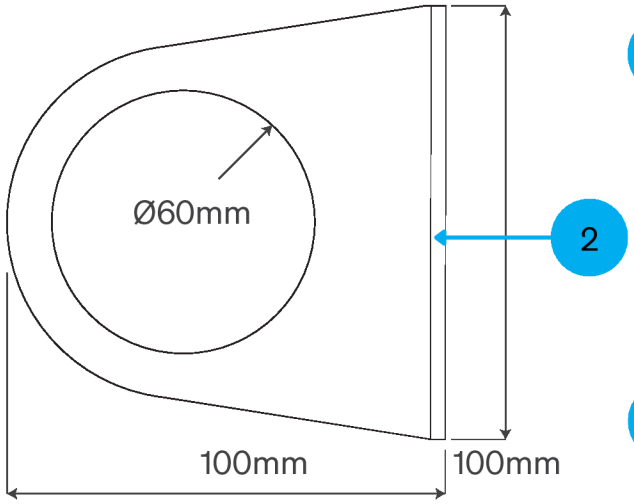


1.2.2 LS1R Assembly Dimensions and Labelling Continued

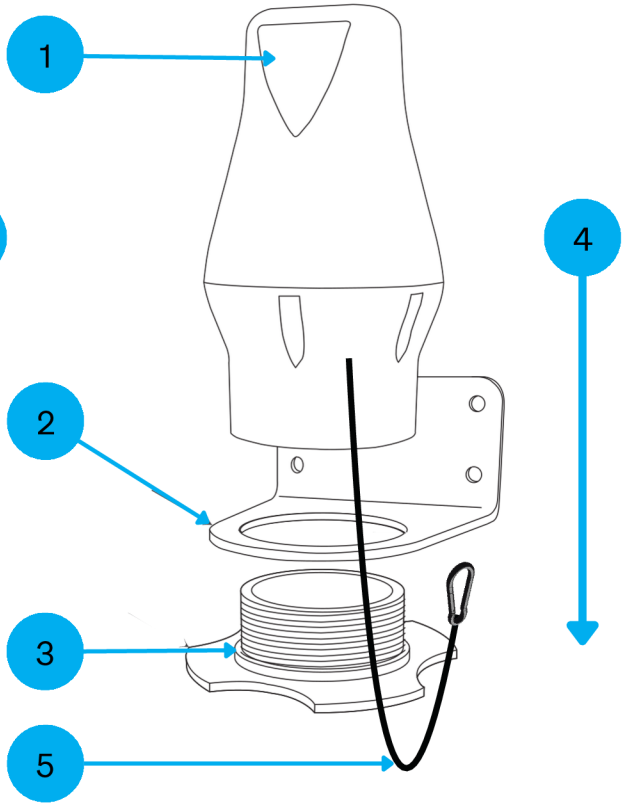
Before use please check the product for damage and refer to any additional conditions of use.

- 1: Radar Assembly
- 2: Aluminium Mounting Bracket
- 3: Plastic 2" BSP thread keeper bolt
- 4: Direction to target level
- 5: 60cm Stainless Steel 316 Safety Cable and Carabiner

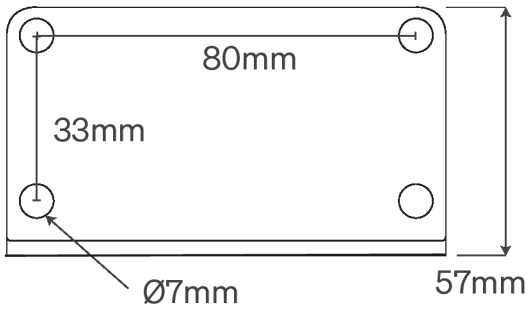
MOUNT TOP VIEW



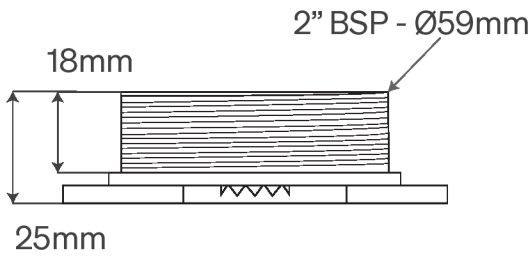
ASSEMBLY VIEW



MOUNT FRONT VIEW



2" KEEPER BOLT

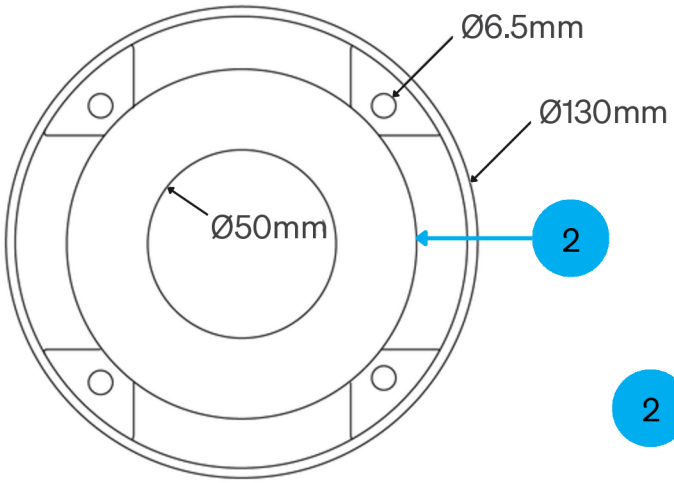


1.2.3 T35 Assembly Dimensions and Labelling

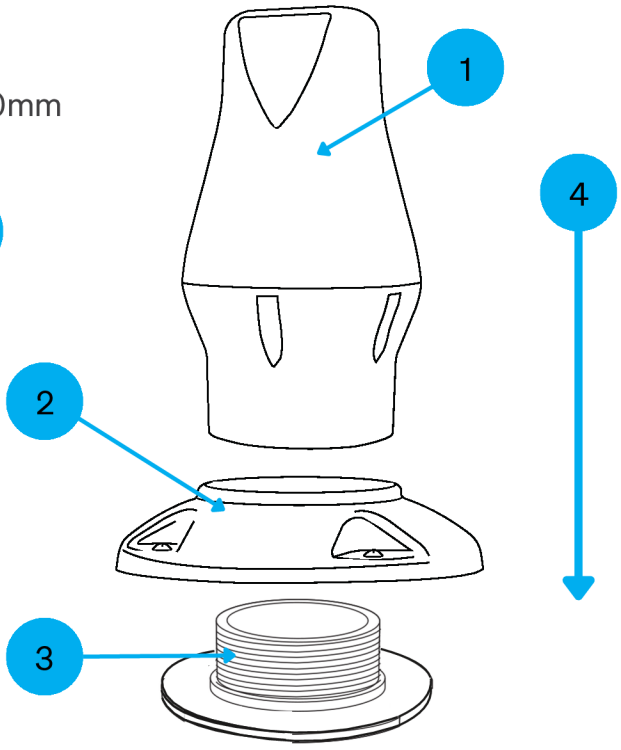
Before use please check the product for damage and refer to any additional conditions of use.

- 1: Radar Assembly
- 2: Plastic Mounting Bracket
- 3: Plastic 2" BSP thread keeper bolt
- 4: Direction to target level

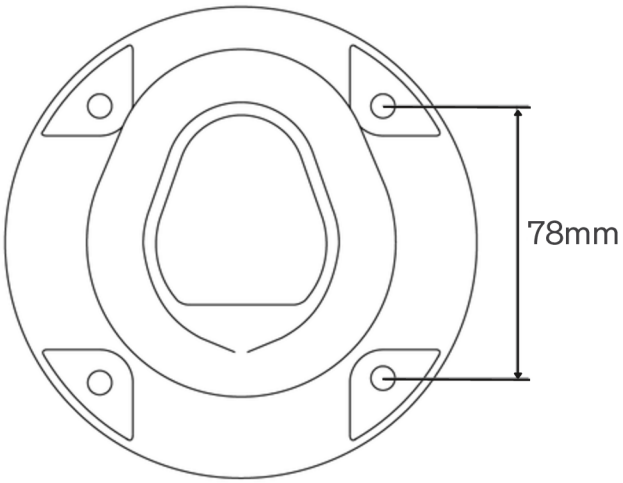
BOTTOM MOUNT VIEW



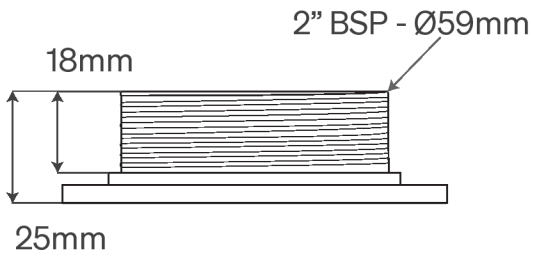
ASSEMBLY VIEW



TOP MOUNT VIEW



2" KEEPER BOLT

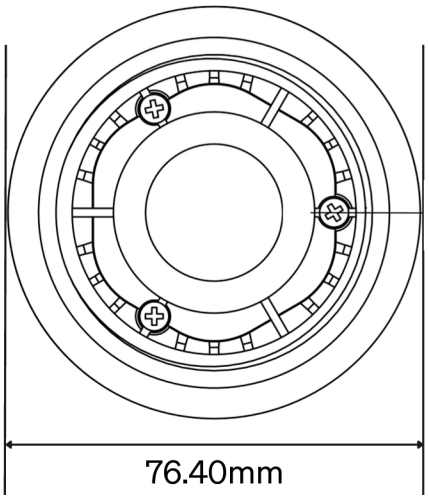


1.2.3 T35 Fuel Tank Assembly Dimensions and Labelling

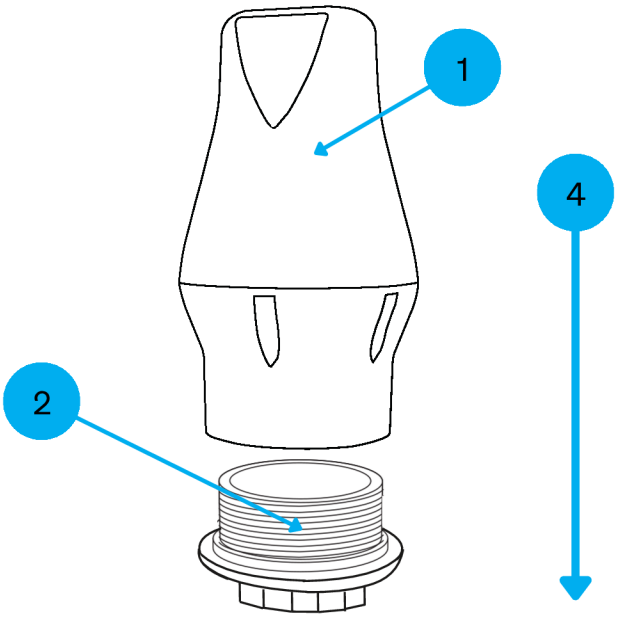
Before use please check the product for damage and refer to any additional conditions of use.

- 1: Radar Assembly
- 2: Spark Arresting Vent (538mm² minimum air flow)
- 3: Plastic 2" BSP to 1" BSP Thread Reduction
- 4: Direction to target level

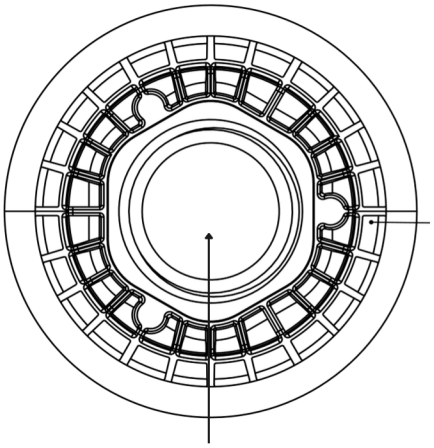
BOTTOM VENT VIEW



ASSEMBLY VIEW

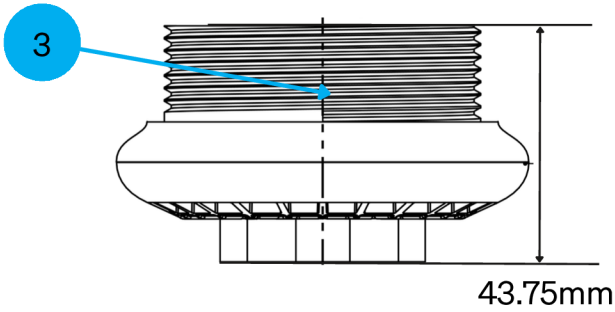


TOP VENT VIEW



Spark Arresting Vent
538mm² Minimum Air Flow

SIDE VENT



1.3 User Modifications

Modifications to this product are not permitted. Contact HiLo Level Monitoring for further information.

2. Safety Instructions

2.1 Presentation of warnings in this document

HiLo explosive rated products must be operated and installed following all manufacture and local regulatory warnings. Failure to following warnings could result in injury, damage or death.

The following warnings are used in this document.

WARNING

Source of danger

This notice warns of a potentially hazardous situation that could result in serious injury, death and/or damage

CAUTION

Possible source of danger

This notice warns of potentially hazardous situation that could result in minor or moderate injury

NOTE

Possible source of danger

This notice warns of potentially product damage or malfunction

2.2 Hazardous Area Approval

HiLo intrinsically safe monitors are designed to be part of a battery powered explosive rated remote liquid level monitoring system.

Please check your product for the IECEx marking and that the product marking is appropriate for your intended use before continuing. Also check any additional conditions of use.

IECEx Marking

IECEx ExTC 24.0030X
Ex ia IIB T4 Ga
-20°C ta +55°C

Conditions of use

Please note the 'X' marking conditions of use. These warnings are noted below.

WARNING

CONDITIONS OF USE - 'X'

DO NOT REPLACE BATTERY WHEN EXPLOSIVE ATMOSPHERE IS PRESENT

USE ONLY MANUFACTURER-SPECIFIED BATTERY

POTENTIAL ELECTROSTATIC CHARGING HAZARD - WIPE ONLY WITH DAMP CLOTH.

IF A METAL MOUNTING BRACKET IS USED IT SHALL BE INSTALLED IN A LOCATION TO AVOID AN IGNITION HAZARD DUE TO IMPACT OR FRICTION.

ANY METAL MOUNTING BRACKET AND SAFETY CABLE SHALL HAVE A RESISTANCE TO EARTH NO GREATER THAN 1GΩ

3 Installation

- When installing a HiLo Level Monitor first identify and prepare an appropriate mount and location for your specific use.
- Pay attention to local hazardous area regulations during site and mount selection.
- Conditions of use must be met for every installation.
- It is possible to activate the HiLo Level Monitor outside the explosive atmosphere if the hazardous area extends further than the Bluetooth range permits

WARNING

BEFORE INSTALLATION

FOLLOW LOCAL HAZARDOUS AREA AND SAFE WORKER REGULATIONS.

VERIFY THE PRODUCT CAN BE INSTALLED AS PER CONDITIONS OF USE.

NOTE

For the best results your monitor should be installed at least 300mm above the highest liquid level.

Monitor ranges:
3 & 5 meter variants 0.2m - 3.5 or 5m
7 meter variant 0.3m - 7m
12 meter variant 0.5m - 12m

3.1 Account Setup

An account may be needed to activate and control your HiLo product. In most situations an account setup email will have been sent to you with a link to create your HiLo account.
Follow the link to complete your account setup.
If you haven't received an email, let us know and we'll sort it out.

Need help

Chat:	hilomonitoring.com
Guides:	help.hilomonitoring.com
Email:	support@hilomonitoring.com
Phone:	NZ (+64) 3 477 2779
	AUS (+61) 7 5300 2959

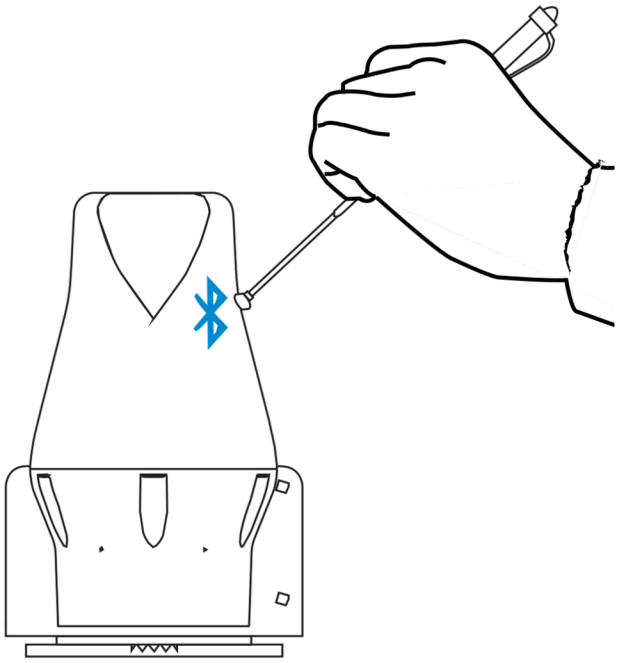
3.2 App Based Level Monitor Commissioning

Level monitor activation requires use of your mobile phone, search for the HiLo Mobile App in the Play Store for Android or the App Store and install.

Log into the app using the email and password you have set in your HiLo Live account.

3.3 Level Monitor Activation And Deactivation

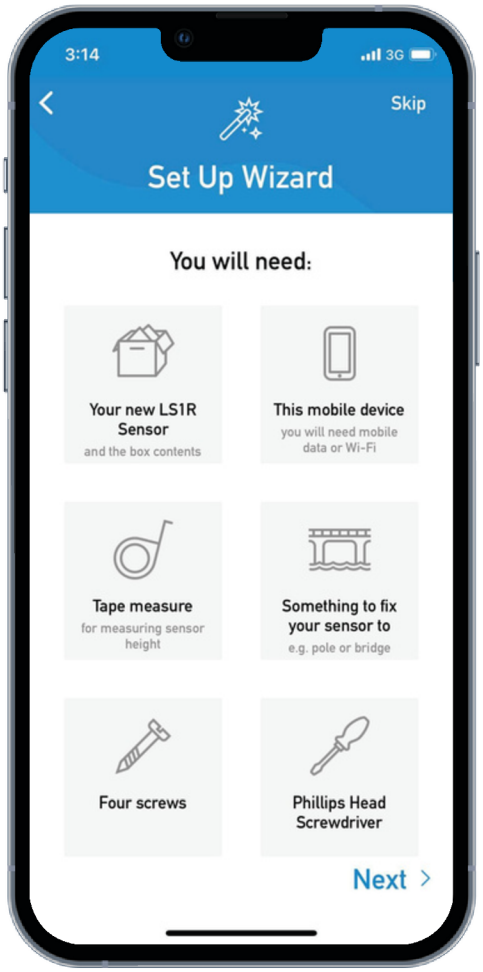
To activate the level monitor regardless of model place the provided magnet over the Bluetooth marking as shown below and follow the mobile app activation wizard.



The Setup Wizard will help you to:

- Connect to your monitor via Bluetooth
- Check your 4G coverage
- Mount your monitor
- Enter the specifics for your site
- Verify your first measurements
- Name your monitor

You'll need to be at your installation site when you are ready to follow the Setup Wizard steps.



Select to begin the Set Up Wizard

WARNING

BEFORE INSTALLATION

VERIFY YOUR INSTALLATION METHOD AND THE TOOLS USED DO NOT BREACH THE REQUIREMENTS OF THE SELECTED HAZADOUS ENVIRONMENT

REFER TO CONDITIONS OF USE - 'X'

NOTE

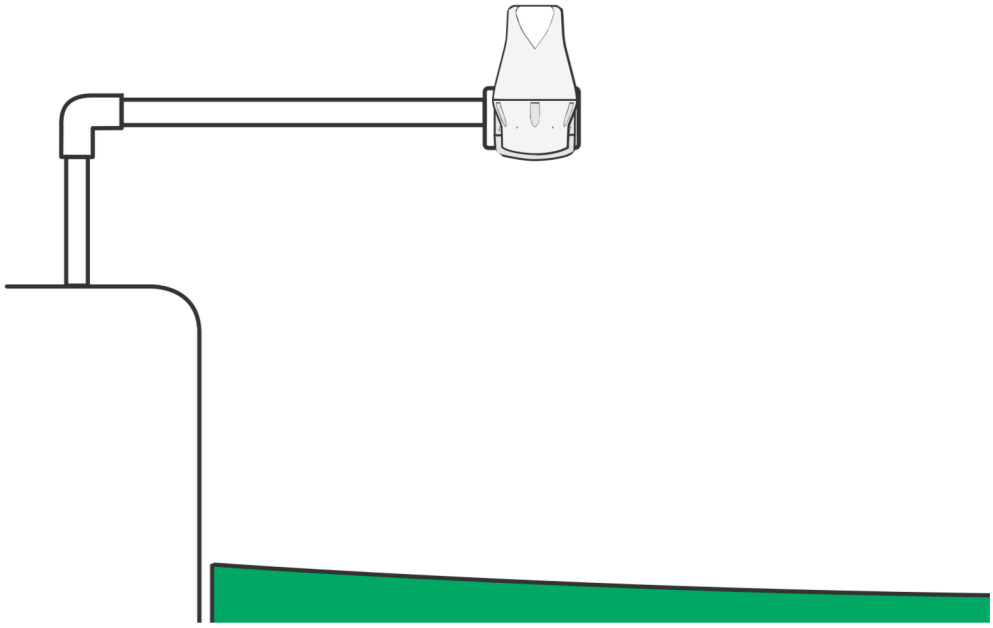
For the best results your monitor should be installed at least 300mm above the highest liquid level.

Monitor ranges:
3 & 5 meter variants 0.2m - 3.5 or 5m
7 meter variant 0.3m - 7m
12 meter variant 0.5m - 12m

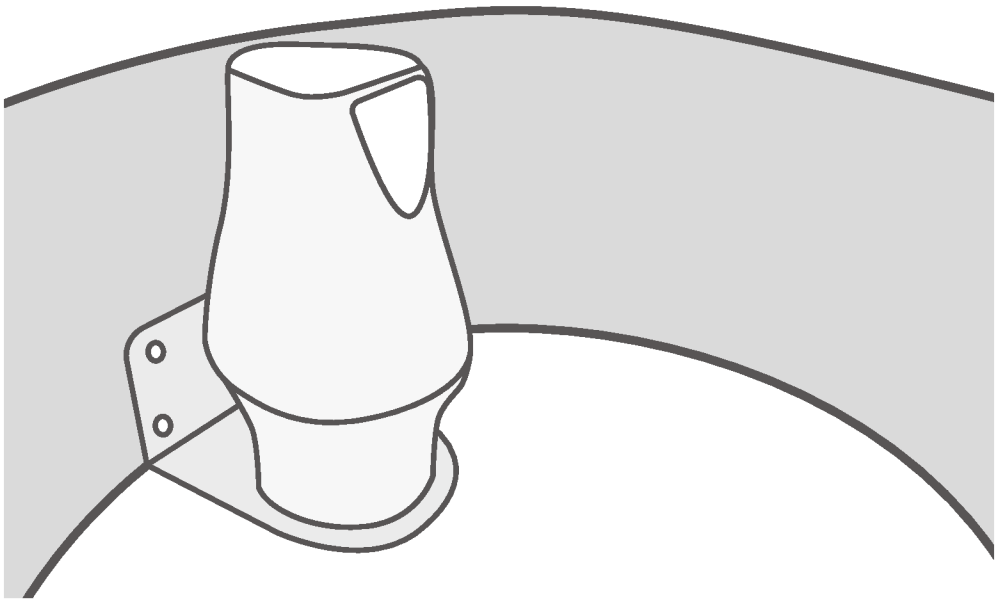
3.3.1 LS1R Example Mounts

The HiLo LS1R comes with an aluminium mount containing four M6 holes. This mount can be installed with bolts or screws. NOTE the CONDITIONS OF USE during as these affect operation, servicing and installation. The following examples show how the LS1R could be mounted.

LS1R Example Pole Or Bracket Mount



LS1R Example Manhole Riser Wall Mount



Tips for successful installation

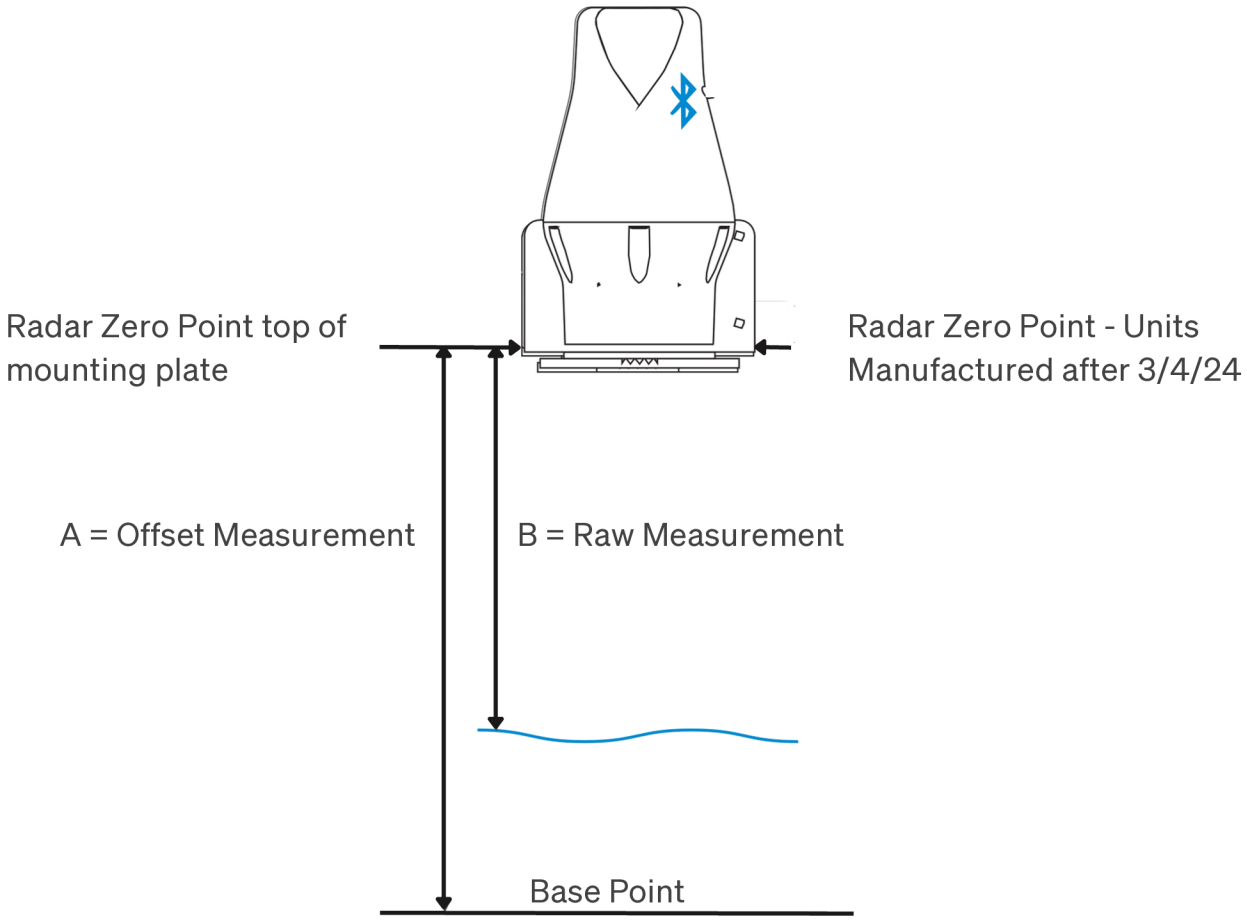
The monitor measures the distance to the target by bouncing signals off the target surface and back to the sensor.
If the signal hits objects like rocks and grass or the sensor is on an angle, it may not report correct measurements.

- Check that there is nothing blocking the monitors view of the target, like rocks, grass or concrete.
- The monitor should be as level as possible with no more than a three degree angle.
- Before fixing to a structure with screws ensure that the structure is firm and will not move.

Offset

The offset is a value used to create more installation context. It is the measurement between the monitor and the base point. The base point could be the bottom of a stream, trough or even mean sea level depending on what you are measuring.

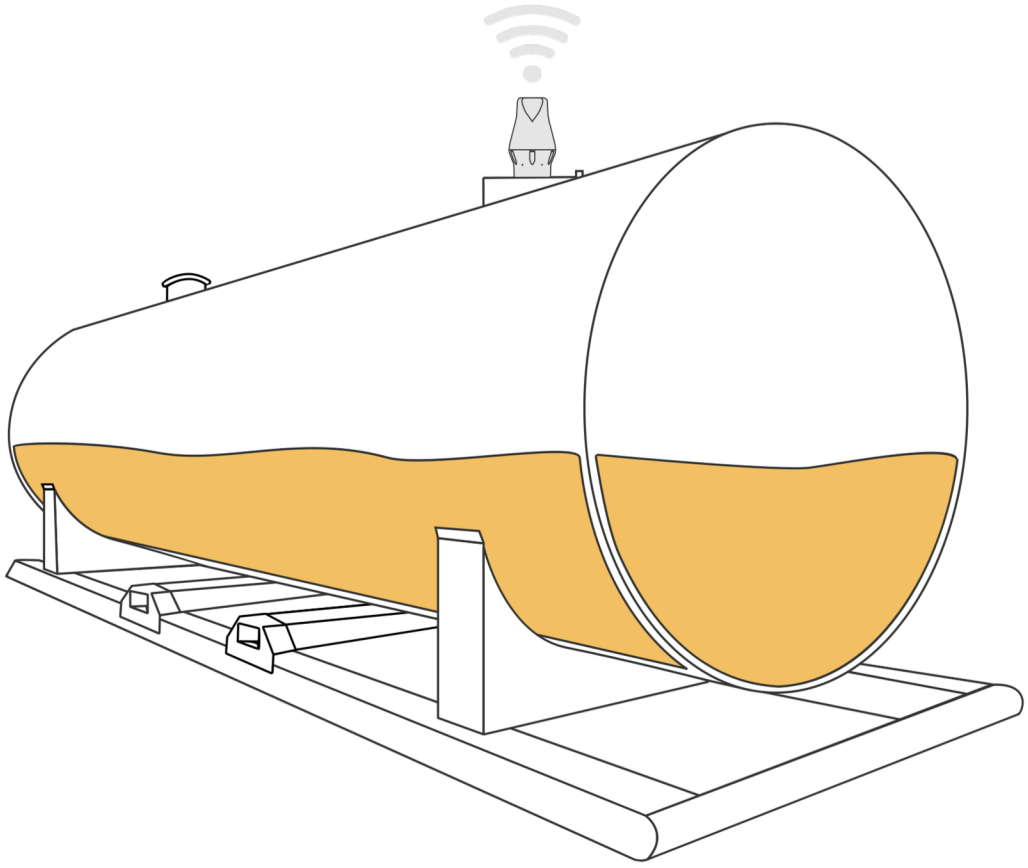
The HiLo software uses the monitor offset to calculate the real water level (A-B) rather than the distance between the sensor and the top of the water.



3.3.2 T35 Example Mounts

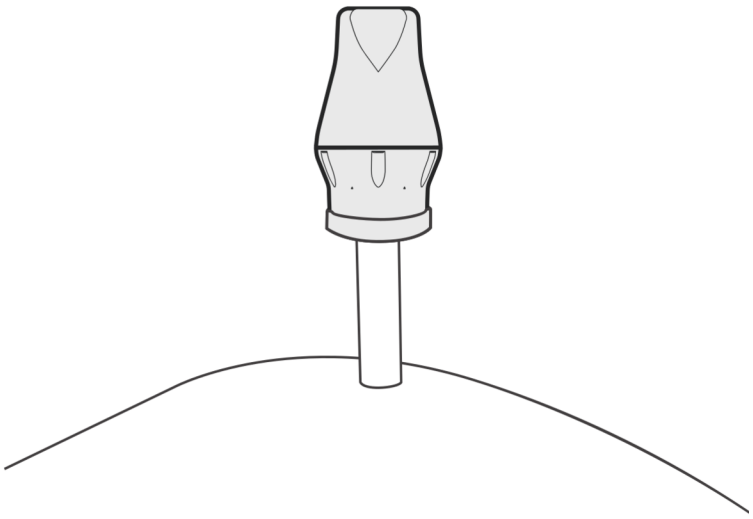
Large Fuel Tank Mount

Direct 2" port mount to base of level monitor



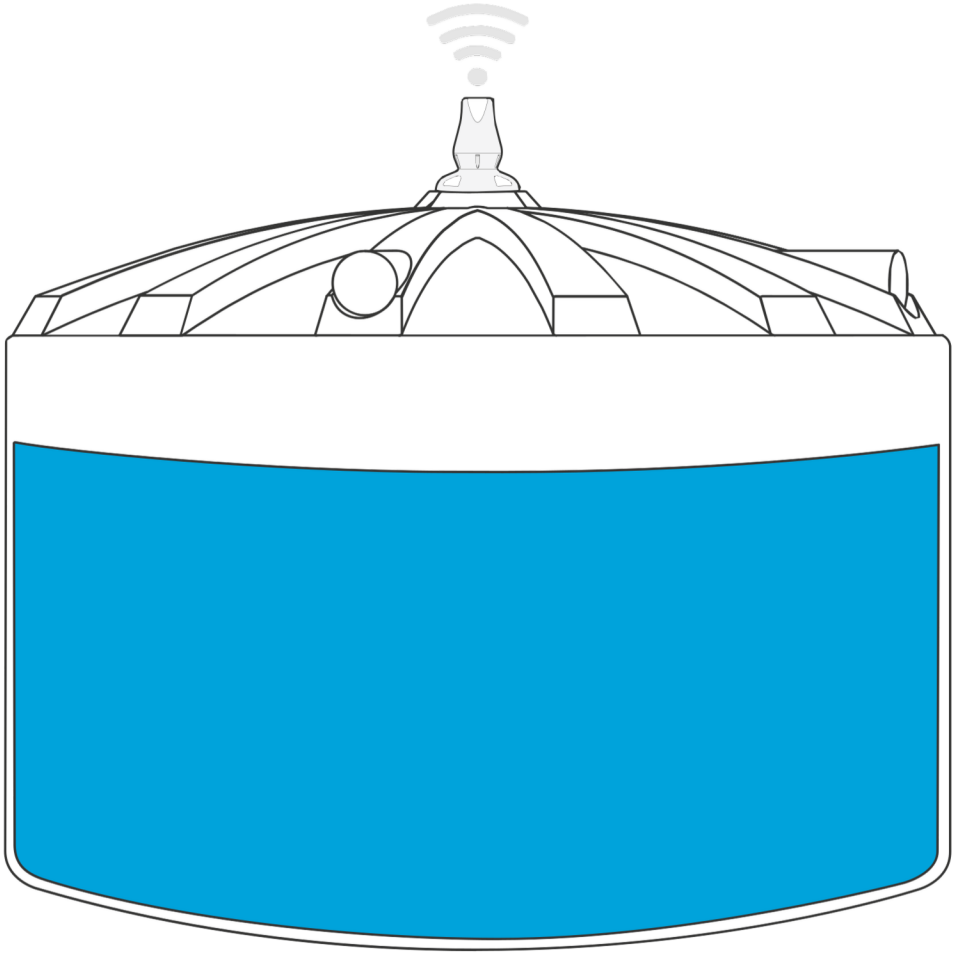
T35 Example Small Fuel Tank Mount

2" BSP to 1" reducing vent mount onto 1" vent riser



T35 Example Chemical Tank Mount

Direct plastic tank mount. Place 5mm to 10mm spacing washers between the plastic mounting bracket and the tank to allow free flow of air under level monitor. This installation can be completed without drilling into the tank.



4.0 Servicing

Servicing HiLo monitors is required from time to time and includes the following tasks.

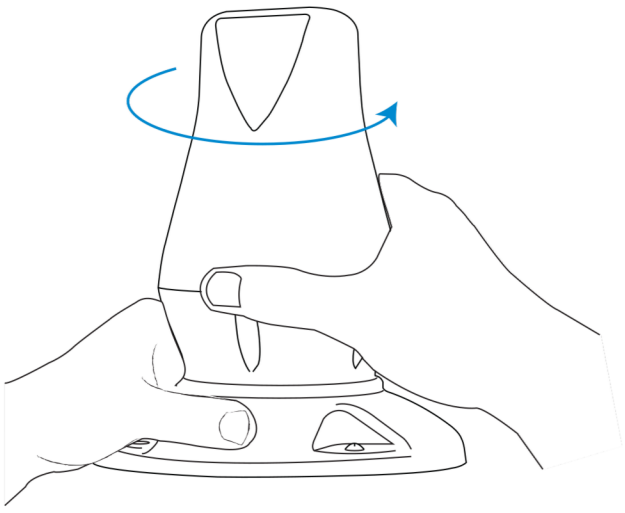
- 1: Cleaning
- 2: Replacing the battery
- 3: Inspection for corrosion
- 4: Inspection for plastic crazing

These tasks should be performed at battery replacement time or a period defined by the installed environmental conditions. During servicing NOTE CONDITIONS OF USE.

Serviceable parts are limited to the battery and the M3.5 x 10 stainless steel enclosure screws.

4.1 Battery Replacement

Remove monitor from mount using a damp cloth.

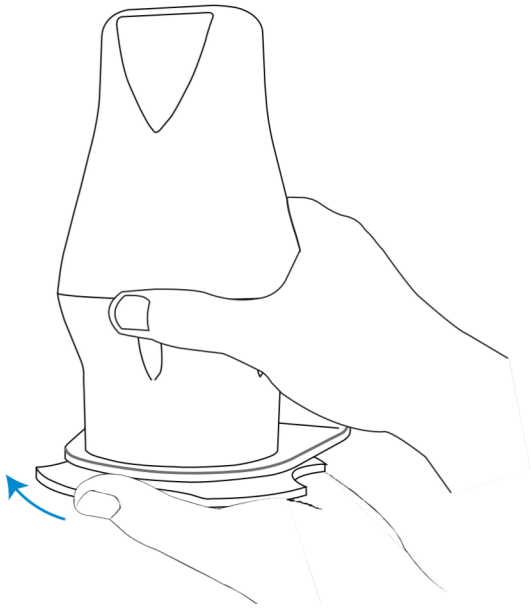


T35 Tank Level Monitor

Hold the mount and unscrew the monitor. You don't need to remove the mount from the tank.

LS1R Level Monitor

Hold the monitor and unscrew the lock nut. You should not need to remove the bracket

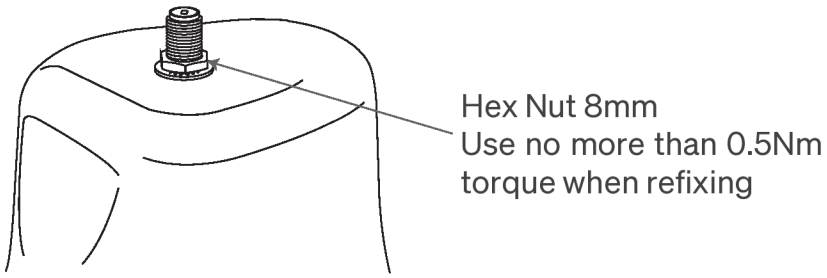


Remove the monitor from the hazardous area and clean it with a damp cloth. Inspect the monitor for hairline cracks (crazing) in the plastic. Inspect the attached metal fixings like the external antenna connector and enclosure screws.

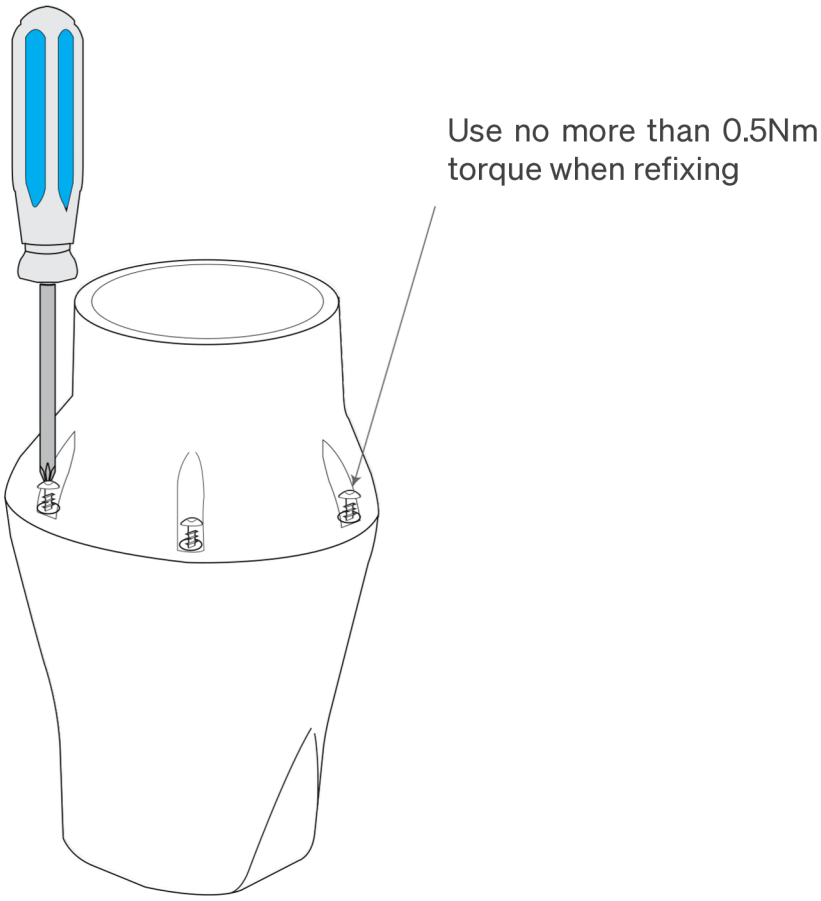
CAUTION

If damage has occurred to non serviceable parts replace the monitor.

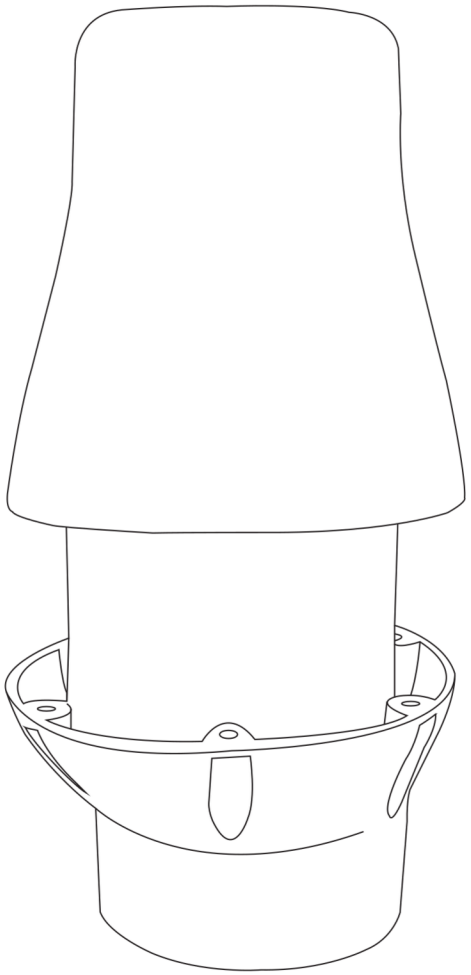
- 1. Remove the nut and washer if you monitor has an external antenna

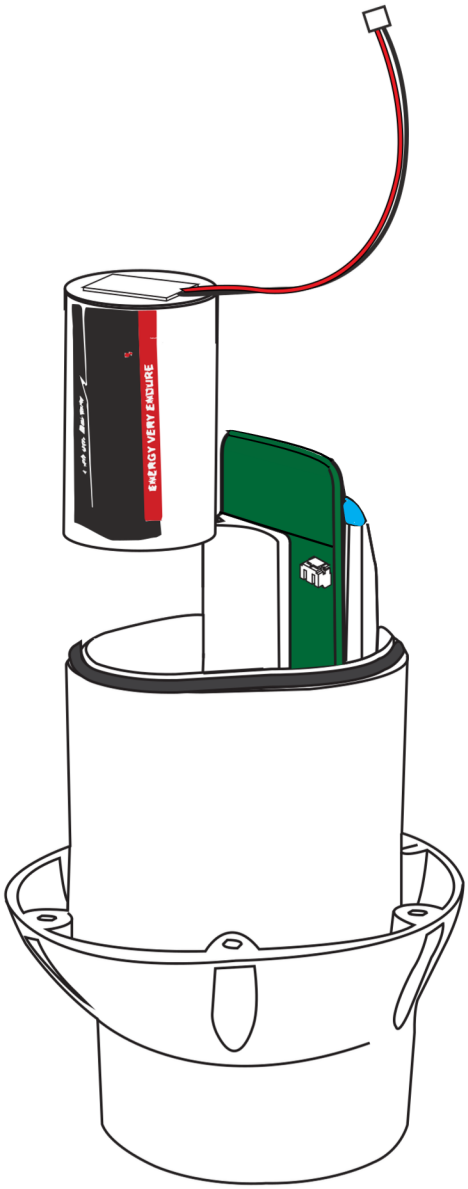


- 2. Remove the screws from the base



- 3. Carefully lift the top case from the base





- 4. Grip the battery cord and carefully unplug it. Then remove the old battery from the cradle. Leave the packing foam in the enclosure and take care not to puncture or damage the silicone rubber coating. (Shown here in blue)

- 5. Plug the new battery in and push it firmly into the cradle. Place a section of packing foam on top of the battery.

  Check that the O-ring is in place and place the top cover back on. Turn the unit upside down and screw the base into the top cover. If you are using a power tool select the lowest setting to avoid damage.

  In the app, you'll be prompted to reset the battery when you select your monitor. There is also a battery reset option when you connect via Bluetooth

5.0 Document History

	Date
Initial release	20/02/25
Added Safety Cable Information	14/03/25
Added Safety Cable Length	25/03/25

6.0 Further Support

Chat: hilomonitoring.com
Guides: help.hilomonitoring.com
Email: support@hilomonitoring.com

Phone: NZ (+64) 3 477 2779
AUS (+61) 7 5300 2959