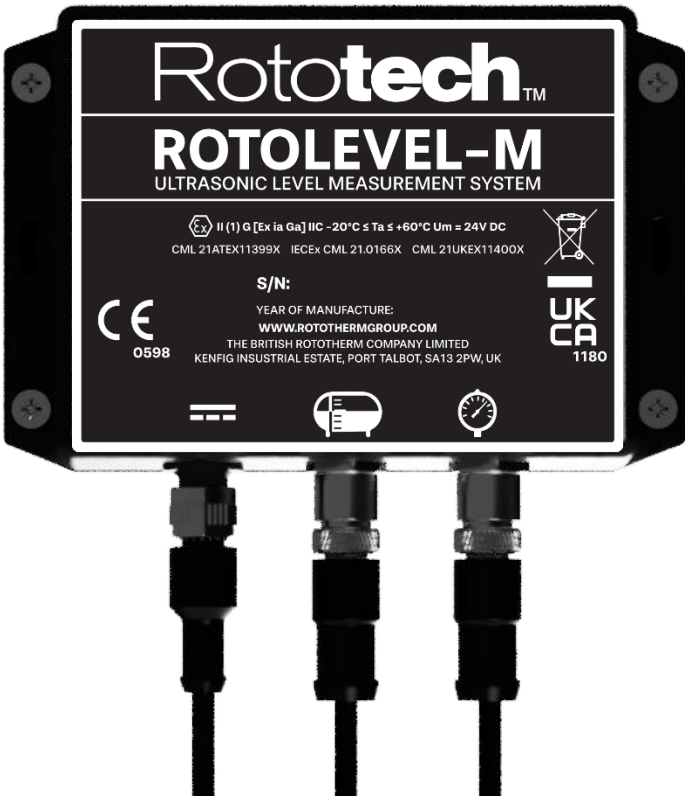
ROTOLEVEL M



Installation Manual

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DOCUMENT AUTHORITY

Issue	Date	Originator	
1	06/11/2025	Antony Hart	

The equipment you have purchased is built to the highest quality standards and has been thoroughly tested before leaving our factory. It will provide years of reliable and accurate service.

If you require additional information, or have any queries
Rototech is a brand name part of British Rototherm Company Limited.

For advice or information contact our Service Support Team:

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UK

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Company Registration Number: 2570730

Warranty

Rototech warrants your Rotolevel M system hardware product against defects in materials and workmanship for one year from the date of receipt by the end user. If Rototech receives notice of such defects during the warranty period, Rototech will, at its option, repair or replace the defective product.

If Rototech is unable to repair or replace the product within a reasonable time, the customer may return the product for a refund of the purchase price.

Exclusions

The above warranty shall not apply to defects resulting from: improper or inadequate maintenance by the customer; customer-supplied software or interfacing; unauthorised modification or misuse; operation outside the environmental specifications for the product; or improper site preparation and maintenance.

Obtaining Warranty Service

To obtain warranty service, the customer should contact Rototech Technical support, as detailed at the beginning of this manual, or the authorised distributor through whom the product was purchased.

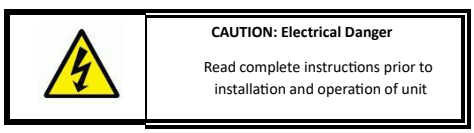
Obtaining Service After Warranty

If you are experiencing problems with your equipment after the warranty period, follow the procedures in the manual to determine whether service is required. If service is required, follow the procedure detailed for obtaining Warranty Service.

Notice

The information contained in this document is subject to change without notice.
Rototech makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Rototech shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.



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1 Introduction

This manual supports Rotolevel M/RotoMultigauge M software version V1.00 or above.

The Rotolevel M system is a versatile, non-invasive liquid level measurement system for use in zone 1/2 potentially explosive atmospheres and ordinary locations. This manual details the installation, setup, and operation of the Rotolevel M system for Hazloc automotive use cases, including special precautions for potentially explosive atmospheres.

The Rotolevel M (RL M) operates a remotely mounted sensor (TUIP2) attached to the outside of a vessel. The sensor transmits pulses into the vessel, and the reflections from the liquids surface are detected and communicated back to the RL M. The RL M measures the time taken for an echo to return, which is proportional to the distance to the liquid surface. Temperature variations are corrected using a temperature probe.

The system requires a 12-24V DC power supply and may include an integral display.

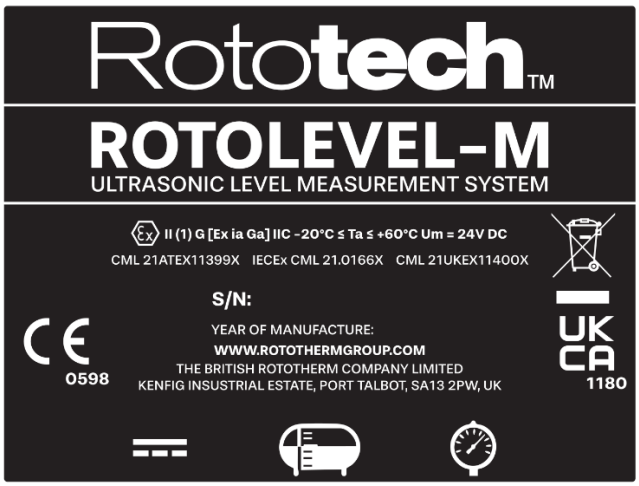
The RL M is certified [Ex ia] and **must be installed in the safe zone of any hazardous location**, such as within the cabin for trucks/bobtails. The TUIP2 sensor is certified Ex ia. Details of the ATEX and IECEx certificates are provided in the following section.

For LPG applications, Rototech's RotoMultigauge (RMG M) forms part of the Rotolevel M system to compensate for changes in product density. By measuring LPG pressure and temperature, the RMG M determines product density and connects seamlessly to the RL M. The density measurement is used by the RL M to correct for sonic velocity changes due to variations in the LPG mixture, and to calculate product mass and vapor content.

2 Technical Specification

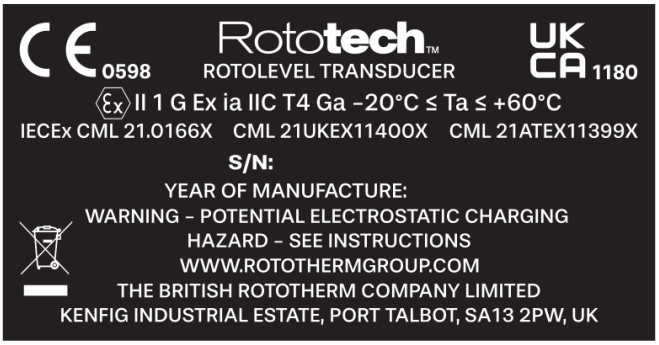
2.1 Rotolevel M (RL M)

Power	12 to 24VDC 2A (MAX)		
Material	ABS FR UV(f2)		
Weight	1.2KG		
Size	146 x 106 x 38mm		
Operational Temperature	-20 to 60°C		
Maximum Cable Distance from Sensor	20m		
Cellular Communications	Worldwide LTE (4G), MQTT/ SMS. Firmware Update: FTP (File Transfer Protocol) GNSS (Global Navigation Satellite Systems): GPS		
Sensor Connections	M12 Male Waterproof Connector (Power) M12 Female Waterproof Connector (Sensor) M12 Female Waterproof Connector (RMG M)		
Standards and Certifications **Standards and Certifications**	Environmental Protection	IP67	
	EMC	EN 61326-1:2021 EN 301 489-1 V2.2.3 (2019-11) EN 301 489-17 V3.2.4 (2020-09) CFR47 part 15 subpart B (FCC TESTING)	
	Safety	Safety testing to IEC 61010-1: (Edition 3.1) 2010 +A1: 2016 Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements European Group Differences and National Differences for EN 61010-1: 2010 +A1: 2019	
	Hazardous Area Classification		
	Marking	Certificate	Standards
	(Ex) (1) G [Ex ia Ga] IIC -20 °C ≤ Ta ≤ +60 °C	CML 21ATEX11399X CML 21UKEX11400X IECEx CML 21.0166X	EN IEC 60079-0:2018 IEC 60079-0:2017 Ed 7 EN 60079-11:2012 IEC 60079-11:2011 Ed.6



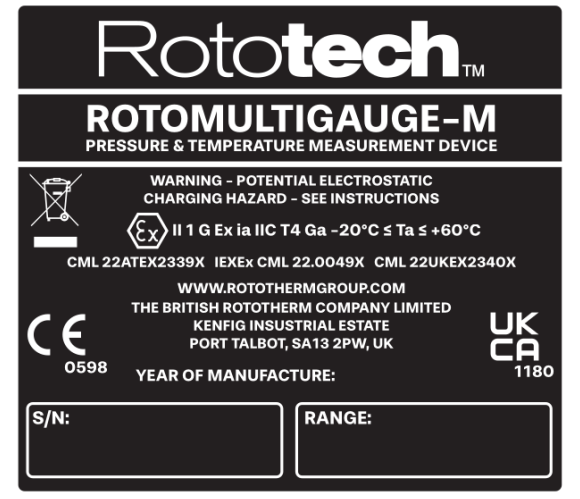
2.2 Ultrasonic Sensor (TUIP2)

Power	Supplied by RL M		
Material	Acetal / Tufnell		
Weight	0.4 KG		
Size	60mm x 38mm		
Operational Temperature	-20 to 60°C		
Maximum Cable Length	5m		
Connection	M12 Male Waterproof Connector		
Standards and Certifications	Environmental Protection	IP67	
Standards and Certifications	EMC	EN 61326-1:2021 EN 301 489-1 V2.2.3 (2019-11) EN 301 489-17 V3.2.4 (2020-09) CFR47 part 15 subpart B (FCC TESTING)	
	Safety	Safety testing to IEC 61010-1: (Edition 3.1) 2010 +A1: 2016 Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements European Group Differences and National Differences for EN 61010-1: 2010 +A1: 2019	
	Hazardous Area Classification		
	Marking	Certificate	Standards
	Ⓔx II 1 G Ex ia IIC T4 Ga -20 °C ≤ Ta ≤ +60 °C	CML 21ATEX11399X CML 21UKEX11400X IECEx CML 21.0166X	EN IEC 60079-0:2018 IEC 60079-0:2017 Ed 7 EN 60079-11:2012 IEC 60079-11:2011 Ed.6



2.3 RotoMultigauge M (RMG M)

Power	Supplied by RL M		
Material	Stainless Steel		
Weight	0.8 KG		
Size	60mm x 38mm		
Operational Temperature	-20 to 60°C		
Cable Lenths	10m interconnect to RL M 1m interconnect to Temp probe		
Connections	M8 Male Waterproof Connector (to RL M) M8 Female Waterproof Connector (to Temp probe)		
Standards and Certifications	Environmental Protection	IP67	
Standards and Certifiations	EMC	EN 61326-1:2021 EN 301 489-1 V2.2.3 (2019-11) EN 301 489-17 V3.2.4 (2020-09) CFR47 part 15 subpart B (FCC TESTING)	
	Safety	Safety testing to IEC 61010-1: (Edition 3.1) 2010 +A1: 2016 Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements European Group Differences and National Differences for EN 61010-1: 2010 +A1: 2019	
	Hazardous Area Classification		
	Marking	Certificate	Standards
	Ex II 1 G Ex ia IIC T4 Ga -20 °C ≤ Ta ≤ +60 °C	CML 22ATEX2339X CML 22UKEX2340X IECEx CML 22.0049X	EN IEC 60079-0:2018 IEC 60079-0:2017 Ed 7 EN 60079-11:2012 IEC 60079-11:2011 Ed.6



2.4 Cables

Technical data

Classification ETIM 5/6
ETIM 5.0/6.0 Class-ID: EC001578
ETIM 5.0/6.0 Class-Description:
Flexible cable

Peak operating voltage
300 V (not for power applications)

Conductor stranding
Extra-fine wire acc. to VDE 0295, class 6/ IEC 60228 class 6

Minimum bending radius
Fixed installation: 5 x outer diameter
Flexing: 10 x outer diameter

Temperature range
Occasional flexing: -25°C to +80°C
Fixed installation: -40°C to +80°C

2.5 Environmental Conditions

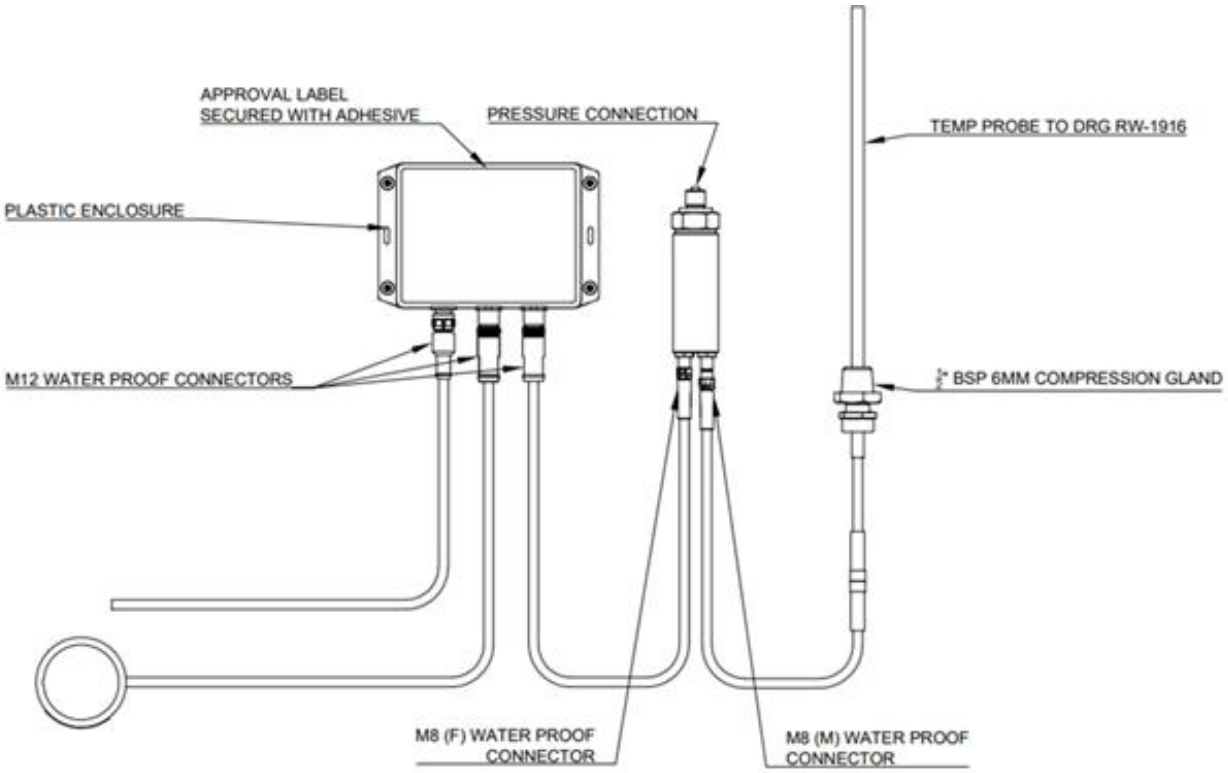
1. **Indoor or Outdoor Use**:
   - Designed for outdoor use, specifically in mobile applications such as LPG trucks.
2. **Altitude**:
   - Suitable for operation at altitudes up to 2000 meters above sea level.
3. **Temperature**:
   - Operating Temperature Range: -20°C to +60°C
   - Storage Temperature Range: -40°C to +85°C
4. **Relative Humidity**:
   - Operating Humidity: 0% to 100% RH, non-condensing
5. **Mains Supply Voltage Fluctuations**:
   - The system is powered by the vehicle's electrical system, typically 12V or 24V DC, and can handle voltage fluctuations within ±10%.
6. **Overvoltage Category**:
   - Overvoltage Category II (suitable for equipment connected to the vehicle's electrical system)
7. **Wet Location**:
   - The system is designed to be weather-resistant and can operate in wet conditions, but it is not intended for submersion in water.
8. **Pollution Degree**:
   - Pollution Degree 2 (suitable for environments where only non-conductive pollution occurs, except for occasional temporary conductivity caused by condensation)

3 Installation

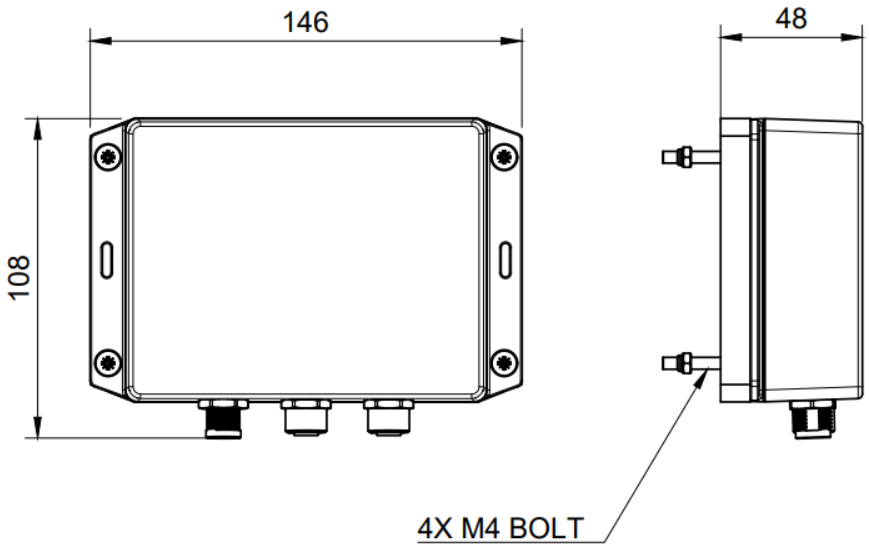
Note: These guidelines do not cover the certification of the Rotolevel M System installation.

- All work must comply with local and national codes of practice and safety procedures for electrical equipment. Installation must be performed by qualified individuals.
- Before use, ensure the Rotolevel M System is free from mechanical damage and that its certification is appropriate for the application and area. Do not modify certified apparatus.
- After installation, do not connect the electrical supply until a competent, authorized person has approved the work and certified the apparatus as ready for use.
- Protect the Rotolevel M System from direct sunlight to prevent overheating. Ensure heat from the process or environment does not cause the system to exceed its specified temperature limits.
- The system comes with M8/M12 waterproof connectors that must not be removed or tampered with. Connect the system as directed in the manual. For larger installations, the TUIP2 sensor cable can be extended, contact your sales representative for available options. Modification of the cables provided is strictly prohibited.
- **Do NOT connect any devices or cables not specified in this procedure.** This will invalidate any safety certifications.
- **Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. This is particularly important if the equipment is installed in a zone 0 location. In addition, the equipment shall only be cleaned with a damp cloth.**
- **The equipment is not capable of withstanding the 500V insulation test required by Clause 6.3.13 of IEC 60079-11. This shall be taken into account when installing the equipment.**
- **The enclosure is manufactured from aluminium. In rare cases, ignition sources due to impact and friction sparks could occur. This shall be considered during installation, particularly if the equipment is installed in a zone 0 location.**

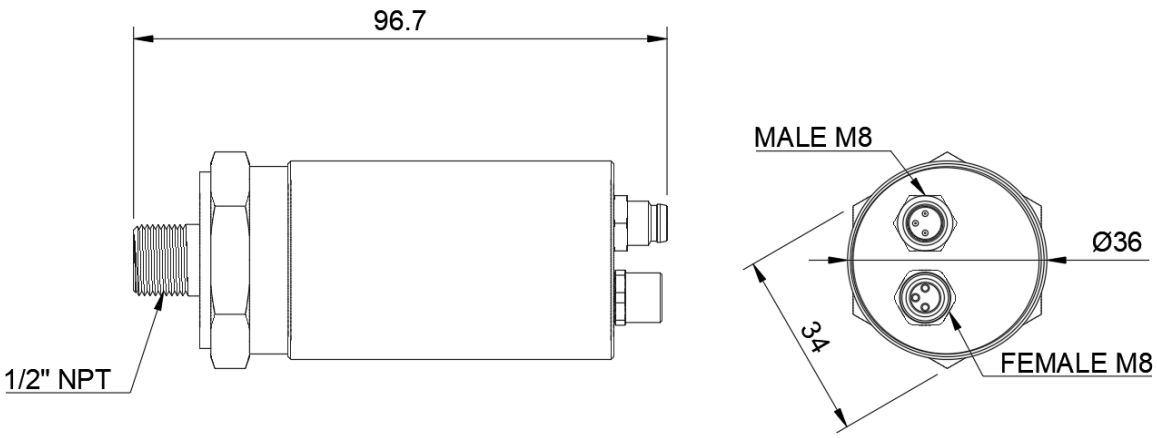
3.1 Rotolevel M System Layout



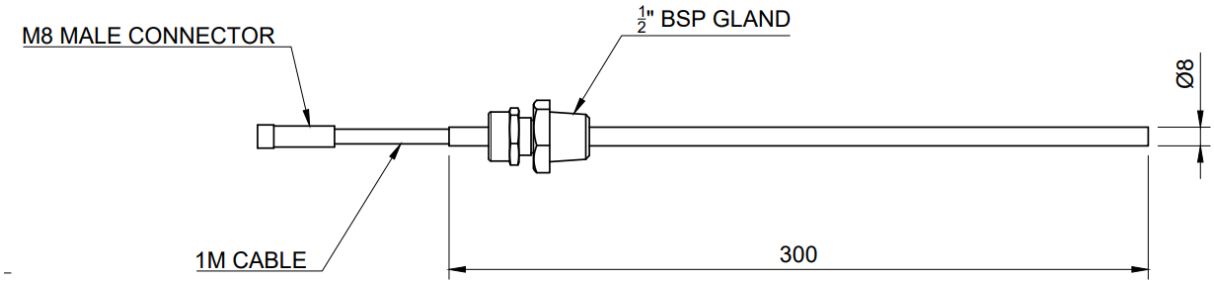
3.2 RL M Dimensions (not to scale)



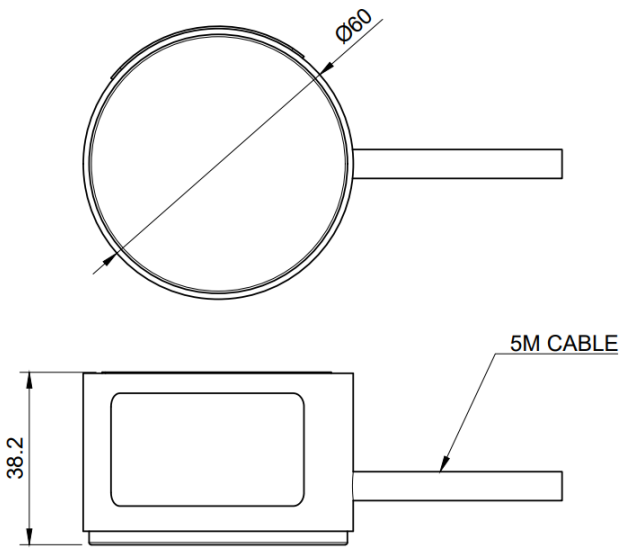
3.2.1 RMG M Dimensions (not to scale)



3.2.2 TEMP PROBE Dimensions (not to scale)



3.2.3 TUIP2 SENSOR Dimensions (not to scale)



3.3 Installation Equipment

The following items are supplied with the RotoLevel M System:

- RL M
- RMG M
- Temperature Probe
- Intrinsically Safe Ultrasonic Sensor (TUIP2).
- 3m Power Cable.
- 10m Communication Cable.
- 1x Loctite Double bubble adhesive
- 1x Syringe – 5ml preloaded SuperLube Coupling Grease
- 1x Mixing Stick
- Declaration of conformity certification
- Rotolevel M manual

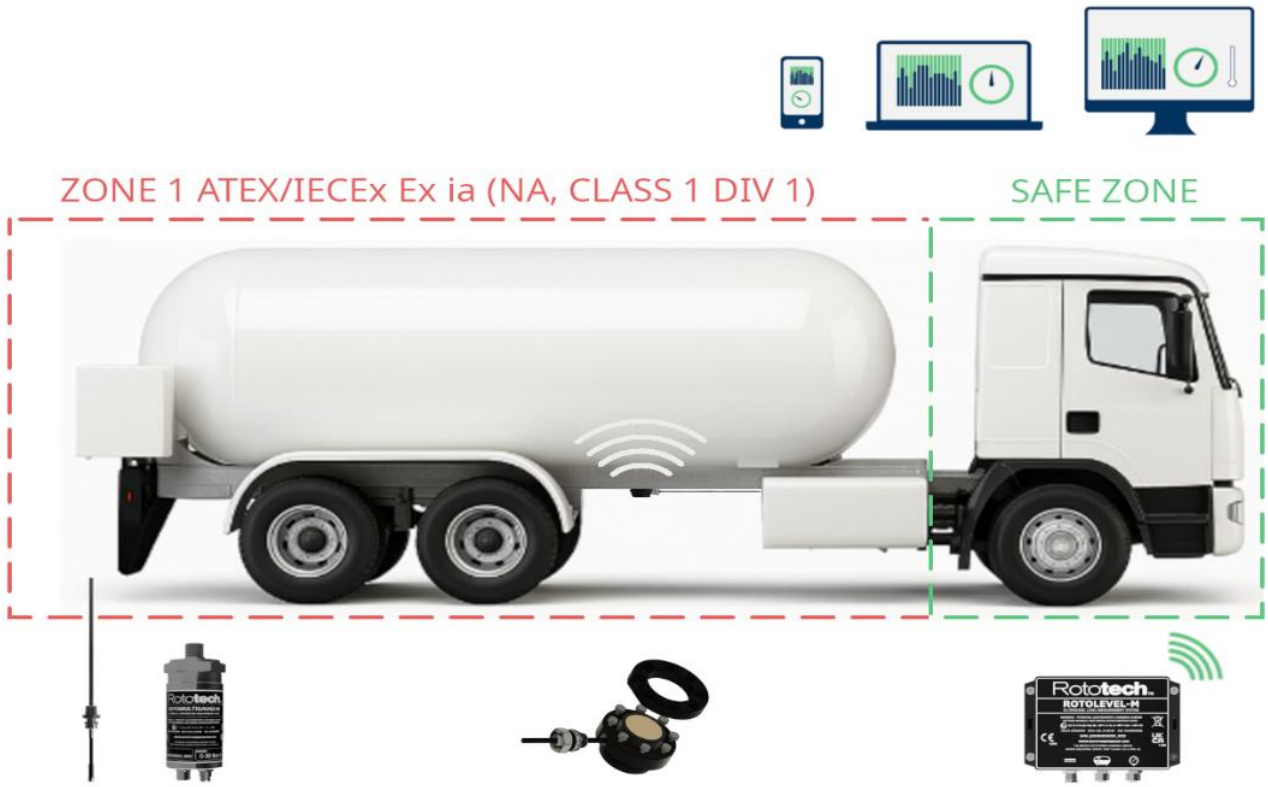
The following items are required before installation and calibration of the system begins:

- Paint remover (where vessels are painted)
- Cleaning solvent / degreaser
- Abrasive paper
- Silicon Sealant

Items that may be useful during installation:

- Basic hand tools
- Marker pen
- Paper towel roll

3.3.1 Rotolevel M System Installation



Ensure sufficient space is available to make connections once device is installed.

WARNING: To maintain ATEX and IECEx compliance, **do not drill, modify, or add to the enclosure** in any way.

Location: The RL M is in the safe zone.

Power Connection

The unit will work over a supply voltage range of 12Vd.c. to 24Vd.c. Supplied by vehicle auxiliary or direct from battery.

Step 1: Mounting the Rotolevel M

1. **Site Survey**
   Begin by surveying the tank and surrounding area to determine the optimal location for positioning the controller and sensor, ensure the RL M is in an ORLOC (non-hazardous) zone.
2. **Environmental Considerations**

- Ensure the controller is placed away from sources of excessive vibration and electrical interference.
- It is recommended to mount the processor unit in a shaded area at eye level for ease of access and visibility.

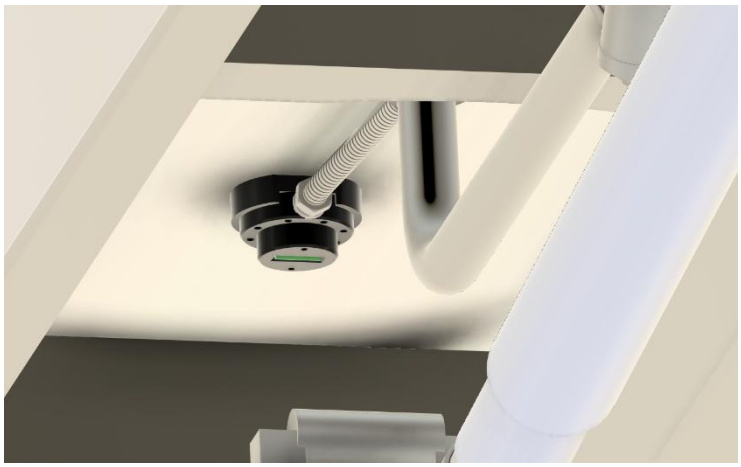
3. **Mounting the Enclosure**

- Measure, mark, and drill 4 x 4mm holes aligned with the flange holes on the enclosure.
- Remove the RL M rear label, exposing the adhesive and secure in place.
- Secure the enclosure using supplied M4 bolts and nuts.

The RL M controller is installed in the safe zone at the rear of the driver's cab. Fix or stick the unit to the rear of the firewall. The RL M controller must be levelled, with the faceplate facing forward to ensure the accelerometer can accurately account for the angle of the bobtail.

Sensor connection: All sensor connections must be made using the supplied M12 connectors, cables should only be extended using an approved extension cable. It is recommended that no more the one extension is used on each sensor. Extensions are available in different lengths up to 30m.

3.4 Sensor Installation



To satisfy certification requirements the transducer must not be subjected to any external source of heating or cooling outside the stated ambient temperature limits.

The sensor is attached to the vessel using the magnetic clamp (included with every RotoLevel M System) or using a suitable permanent bond. In each case, it is crucial that an effective acoustic coupling compound is used to properly couple the sensor's ultrasonic signal through the vessel wall and into the monitored liquid. Sensors cannot be dry coupled.

If the sensor has been permanently bonded using the Loctite Double Bubble adhesive it cannot be removed without damaging it, however, this method of coupling is maintenance free.

If the sensor is fitted using the magnetic clamp assembly, along with the SuperLUBE coupling grease supplied, over a period of time, the SuperLUBE coupling grease may have to be replaced, this will be dependant on the environmental conditions.

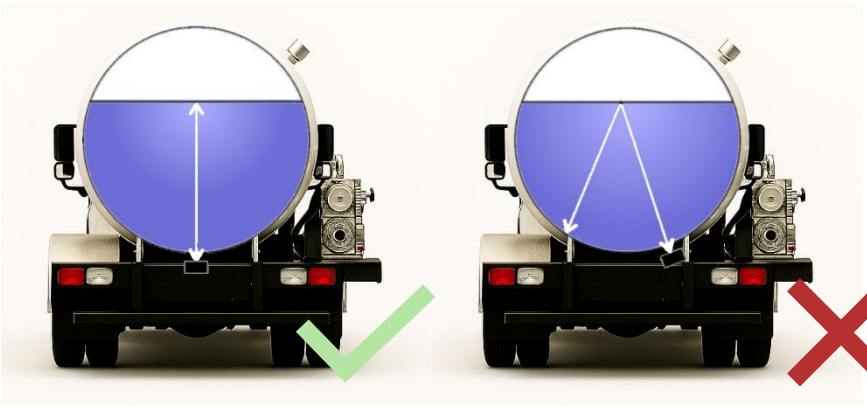
Warning: Personal Protection Equipment must be worn when preparing the surface and adhering the sensor, minimum protection gloves and goggles.

3.4.1 Sensor Positioning

To ensure optimum performance, it is imperative that the ultrasonic sensor is installed in the best location on the vessel. Carefully study the sensor location diagrams below. An angle of up to 2° from horizontal is usually satisfactory, however the smaller the angle the better the signal will be.

The sensor must not be placed over welds or irregularities on the vessel surface. Ensure the sensor is not placed below filling points or where an obstruction may be directly in the line of fire of the sensor.

On applications where there is a high level of sludge build up in the tank it may be best to locate the sensor near the outlet. The higher flowrate near the outlet typically has less sludge build up.



3.4.2 Adhesion using Loctite Double Bubble Adhesive.

The adhesive will cure best when warm, so when working in a cold environment keep the adhesive warm until applied.

- Ensure the tank surfaces are clean and free from paint, rust, dirt and grease. Use an abrasive to remove paint and corrosion.
- Degrease both the sensor and vessel surfaces with a solvent cleaner. The cleaner must not leave a residue, must be compatible with the adhesive and the sensor surface.
- Follow the adhesive manufacturer's instructions for the best possible bond and safety instructions, detailed on the card provided.
- The sensor can be held with the magnetic clamp during curing, so first thread the sensor cable through the body. Apply the adhesive to the sensor surface. Lightly press the sensor onto the vessel surface and rotate backwards and forwards slightly, 4 or 5 times, increasing the applied pressure on each rotation. Use the magnetic clamp to apply pressure until the sensor is bonded.
- It is recommended that a silicon sealant should be used to form a continuous sealing fillet around the joint between sensor and vessel, also any bare metal surfaces must be repainted.

½ in – 14 NPT Gland NOT included

3.4.3 Fixing with Magnetic Clamp and SuperLUBE Grease

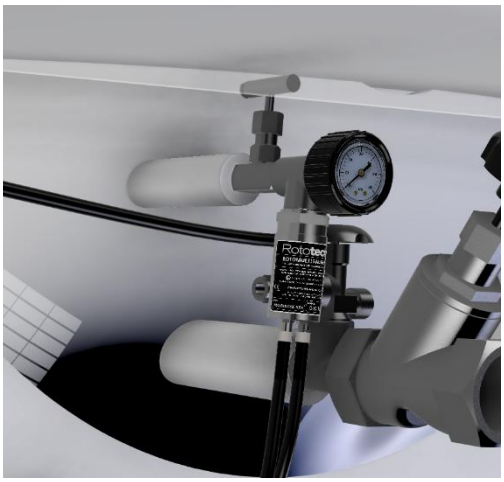
On applications where the sensor is to be secured with the Magnetic Clamp, SuperLUBE grease must be used to ensure a reliable sensor coupling. The clamping arrangement must be spring tensioned, to ensure the sensor does not work loose. The grease should cover the complete sensor face with a thickness of no more the 1 mm.

3.5 Temp sensor Installation

Install the temperature probe into the available thermowell as shown in the image (left).

Connect the 1.6m cable to the RMG M female connector.

3.6 RMG M Installation



The RMG M will be located in the hazardous area at the rear of the truck. The RMG M will ‘T’ from the existing pressure gauge enabling direct pressure reading. See the image (LEFT) as a visual example of the RMG M installation.

The 10m cable supplied connects the RL M M12 female connector to the RMG M M8 male connector.

4 Commissioning

Contact your sales representative to schedule remote commissioning of your Rotolevel-M system.

5 Maintenance

5.1 General Safety

Maintenance should only be carried out by competent individuals. If maintenance of a certified enclosure is required contact Rototherm before attempting repair or replacement of parts.

5.2 Periodic Inspection

Periodic inspection of apparatus used in potentially explosive atmospheres should be carried out to ensure that equipment is free from corrosion, damage or contamination that would affect certification.

5.3 Sensor Cleaning

To avoid the potential of electrostatic charging hazard the sensor should only be wiped with a damp anti static cloth.

5.4 Sensor Regreasing

If the sensor grease has dried, then both surfaces must be cleaned thoroughly before refitting as detailed in the installation section.

5.5 Decommissioning and Dismantling.

Any work must be completed by a competent individual possessing adequate training and certification.

5.6 Repair

Repair must not be carried out on the equipment. In case of faults please contact your sales representative to arrange collection so that repair may be carried out by Rototech.

See the beginning of this guide for warranty information.