

*process measurement solutions*



# Radar Level Transmitter

Radar-Based Continuous Level Measurement

Installation &  
Maintenance  
Manual  
IP2028/IM



CE

891  
518



## **Disclaimer**

Solartron Mobrey has made every effort to ensure the accuracy and completeness of this manual. However, we cannot be responsible for errors, omissions or any loss of data as a result of errors or omissions. Solartron Mobrey reserves the right to make changes to the manual or improvements to the product at any time without notice.

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## **Trademarks**

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## **Associated Publications**

IP2028/SI	Safety Instructions (ATEX)
IP2028/QS	Quick Start Operating Manual
IP2028/OM	Technical Handbook
IP293	Sales Brochure
L2007	Radio Licence Application Pack (United Kingdom)

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## Safety Precautions

The following safety precautions should be observed before using this product or working on the attached cables.

This Radar Level Transmitter is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read the operating information carefully before using the product.

The types of product users are:

**Responsible body:** This is the individual or group responsible for the use and maintenance of equipment, and for ensuring that operators are adequately trained.

**Operators** use the product for its intended function. They do not require access to the electrical connections within the instrument, and would normally only programme the instrument as required.

**Maintenance personnel** perform routine procedures on the product to keep it operating, for example, checking the line voltage or checking electrical connections, replacing fuses etc.

**Service personnel** are trained to work on live circuits, and perform safe installations and repairs of products. Only properly trained service personnel may perform installation and service procedures.

Users of this product must be protected from electric shock at all times. Product users must be trained to protect themselves from the risk of electric shock.

Before operating the instrument, make sure the supply is connected to a properly grounded power supply.

Periodically inspect the connecting cables for possible wear, cracks, or breaks.

To clean the instrument, use a damp cloth or mild, water based cleaner. Clean the exterior of the instrument only. Do not allow liquids to enter the instrument.

**WARNING** - If this equipment is used in a manner not specified by Solartron Mobrey, the protection provided may be impaired.

A protective earth should be used for all applications.

The installation of the Radar Level Transmitter and its associated power cables must be such that tank overflow, local flooding or pump failure do not cause these to be submerged or subject to flows of water.

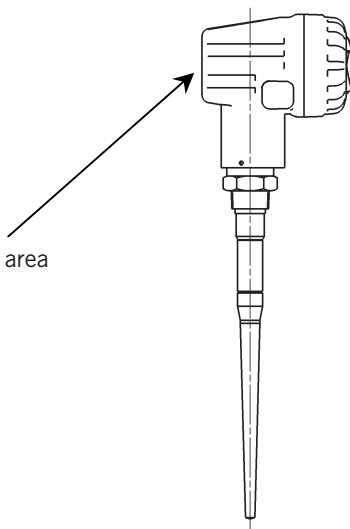
Explanation of symbols:

The IEC Protective Earth Symbol is :



CHECK THAT THE POWER SUPPLY IS SUITABLE  
BEFORE SWITCHING POWER ON.

Certification plate  
States hazardous area  
certification data



Rod antenna model

## Approvals

The Radar Level Transmitter is certified for use in hazardous locations as follows :

### ATEX

- Detail available once certification process is complete
- 

### FM

- 
- Detail available once certification process is complete
- 

### CSA

- 
- Detail available once certification process is complete
- 

### Note :

Refer to the tag on your gauge for the latest hazardous location approval information.

The Radar Level Transmitter complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation
3. Any changes or modification made to this device, not expressly approved by the party responsible for compliance, could void the users authority to operate the equipment.

## **1.0 Introduction**

The Radar Level Transmitter uses an FMCW microwave signal to measure the level of the process material. The Radar Level Transmitter provides superior performance to pulsed measurement systems, particularly in hostile environments, because the continuous microwave signal is unaffected by mist, surface agitation, temperature changes, or pressure changes.

The standard menu-driven user interface, with built-in help screens and the optional Windows-based Setup Software are designed to make the Radar Level Transmitter easy to set up and operate. Full programming details are given in Technical Handbook IP2028/OM.

### **1.1 Description**

The Radar Level Transmitter consists of an antenna and a factory sealed control electronics cassette. The microwave signal is launched from the RF circuit in the electronics into the antenna. The antenna serves to focus the transmitted signal as well as to receive the reflected echo. Both rod and horn style antennae are available.

#### **Antennae**

Verification of chemical compatibility with the exposed antenna materials is ultimately the responsibility of the customer.

The standard antenna configuration for the Radar Level Transmitter consists of a dielectric-filled, 316 stainless steel waveguide with a dielectric rod antenna. The dielectric rod antenna is PTFE.

The dielectric rod antenna is fitted with either a 1.5" threaded mounting nipple, welded to the waveguide, or with a welded flange. Waveguides are available in lengths of 160mm, 238mm or 391mm where the length refers to the portion of the waveguide that extends below the mounting nipple or the flange. For optimum performance, the end of the waveguide or the horn should protrude a minimum of 5mm into the vessel.

The Radar Level Transmitter is also available in options with a horn style antenna.

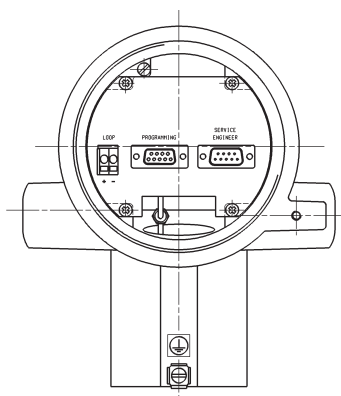
## Programming

The microwave signal that is reflected from the surface of the process material is received by the Radar Level Transmitter. Digital Signal Processing (DSP) software detects the echo and computes the distance to the liquid or solid material in the tank. The Radar Level Transmitter firmware uses the distance measurement to calculate the level in the tank.

The Solartron Mobrey Hand Held Communicator (MRL-HHC) can be connected to the Radar Level Transmitter using the lead provided which allows the user to interrogate, programme or display values in the transmitter.

The RS-232 connection allows communications with a PC running the Radar Level Transmitter Window's based Setup Software.

**Note: -**



**As the cover of the Radar Level Transmitter has to be removed to allow wiring and connection of a PC or HHC, a work permit or similar will be required if the Radar Level Transmitter is installed in a hazardous area, in accordance with site regulations. The cover must be replaced for normal use in hazardous areas.**

The HHC and RS232 links are provided for programming and installation only and must be disconnected after setup.



The standard Radar Level Transmitter provides a 4-20 mA current output, with HART digital protocol super imposed.

Characteristics Table (1) below.

<b>Input / Output Characteristics</b>		
<b>Type</b>	<b>Characteristics</b>	<b>Comments</b>
<b>Input Power</b>	13-30Vdc	18-30Vdc when RS232 connected
<b>Current output</b>	4-20 mA dc. Full HART communication. Isolated, Loop-Powered, 24 Vdc Nominal Supply Voltage, 700 ohm max. load	One current output is provided.  See options below.
<b>Serial communications</b> (used for installation and programming only)	RS232 : One 9 pin D type connector	Half-duplex party line communication to Hand-Held Programmer or P.C.
<b>Service Engineer connector</b>	RS232 : One 9 pin D type connector	For trained Service personnel use only.

**Table 1 : Input / Output Characteristics**

Options:

The standard electronics cassette may be replaced with a similar cassette having either Profibus PA or Foundation Fieldbus digital protocol in place of the standard 4-20mA / HART output.

## **1.2 How the Radar Level Transmitter Works**

The Radar Level Transmitter generates and transmits a swept frequency modulated radio signal, which is reflected from the surface of the process material.

The distance to the liquid surface is calculated by measuring the difference between the transmit frequency and the received echo frequency; this frequency difference is proportional to the distance that the microwave signal has travelled.. This highly consistent microwave signal ensures that changes in level are reported accurately in real-time. A variety of tools are provided in the menus in order to eliminate any problems which may occur associated with measuring levels in an active process.

DSP software processes the microwave signal and converts it to measurement information which is output as a 4-20mA loop current output and may also be displayed on the HHC readout when connected.

Automatic verification and error correction software continuously monitors system operations. System faults can be programmed to trigger alarms.

## **1.3 How to use this manual**

This manual details hardware mounting and installation wiring procedures for the Radar Level Transmitter.

The Radar Level Transmitter Quick Start Manual, IP2028/QS describes how to set up and operate the Radar Level Transmitter.

Chapter 2.0, "Installation procedure" details the mechanical installation procedure for installing the Radar Level Transmitter.

Chapter 3.0, "Wiring procedure" details the electrical wiring procedures for installing the Radar Level Transmitter.

Chapter 4.0, "Maintenance" details maintenance procedures for the Radar Level Transmitter.

#### **1.4 Technical Services**

Should you experience problems with the Radar Level Transmitter that can not be resolved with the help of this manual, refer in the first instance to your local Solartron Mobrey Distributor or Representative.

Contact details can be found on the Solartron Mobrey website at

**[www.solartronmobrey.com](http://www.solartronmobrey.com)**

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## **2.0 Installation procedure**

The Radar Level Transmitter must be installed in accordance with the instructions given in this manual.

Radar Level Transmitter models with hazardous area nameplates may be installed in a hazardous area. Check nameplate for certification data.

The equipment enclosure is manufactured from aluminium with a nitrile gasket and wetside materials as specified by the ordering code (see appendices). The characteristics of these materials must be taken into account with regard to attack by aggressive substances in a hazardous area.

The equipment is intended for use in conditions of normal industrial vibration, not extreme vibration.

Installation must be carried out in accordance with the applicable code of practice by suitably trained personnel.

Installation and wiring require no special tools.

## **2.1 Radio licensing approvals**

### **2.1.1 General**

The transmitted signal is very low power, less than 10mW.

The Radar Level Transmitter must be securely mounted using the threaded mounting nipple or flange provided.

If it is intended to install the Radar Level Transmitter other than as specified, it is the responsibility of the user to ensure compliance with local telecommunications regulations. Solartron Mobrey accept no liability whatsoever resulting from incorrect installation or use of the Radar Level Transmitter.

Further, although highly unlikely, the user must accept that other users of radar equipment in the same frequency band may interfere with operation of the Radar Level Transmitter. On the other hand, if the Radar Level Transmitter is found to interfere with other users then the user may be required to remove the Radar Level Transmitter.

### **2.1.2 European Union**

The Radar Level Transmitter meets all the essential requirements of the 1999/05/EC (Radio Equipment & Telecommunications Terminal Equipment) R&TTE Directive, ETS 300 440 and ETS 300 683 for installation and use in the member countries of the EU.

The Radar Level Transmitter operates using a frequency band which is not harmonised throughout the Community, the product therefore bears the Class 2 equipment identifier, otherwise known as the Alert Symbol, the notified body number and the CE mark.

It may be necessary to obtain a user or site license to operate microwave frequency devices in your country. A license is currently required in the United Kingdom and Norway.

If in any doubt, refer to your Solartron Mobrey Distributor for assistance. Note also any restrictions on use imposed. It is the responsibility of the user to ensure any such licence is obtained.

### **2.1.3 Outside of European Union**

Approval requirements vary greatly outside of the EU.

It remains the responsibility of the user to ensure compliance with local requirements and obtain any licence if necessary.

## **2.2 General installation requirements**

All installation and wiring must be carried out by qualified individuals in accordance with any local or national regulations.

The cable entries must be sealed or fitted with a suitable cable gland.

## **2.3 Hazardous Area Installation requirements : Refer also to IP2028/SI**

The Radar Level Transmitter is certified for use in hazardous locations as follows :

ATEX / FM / CSA

- Details available once certification process is complete
- 

### **Note :**

**Refer to the nameplate on your gauge for the latest hazardous location approval information.**

### **Warning :**

**Do not locate the unit in any hazardous area other than those approved. Follow all installation instructions given in this manual.**

- 1. Do not apply power to the unit in any hazardous area unless the safety ground is properly wired and the cover is properly installed. See Section 3.0 for installation wiring instructions.**
- 2. The cable entries into the enclosure must be sealed as stated in Section 3.0.**
- 3. Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.**

## 2.4 Selecting a location

Selecting a good location to mount the Radar Level Transmitter will ensure optimum performance and ease of operation of the instrument.

Follow these guidelines when selecting a location for the Radar Level Transmitter:

- The ambient temperature range is  $-20^{\circ}\text{C}$  to  $60^{\circ}\text{C}$ .
- The Radar Level Transmitter should be mounted above the least turbulent area of the process material surface.
- There should be a clear path between the Radar Level Transmitter and process material to avoid false reflections. Verify that the path is clear of pipes, beams, or any intermittent liquid sprays that could block the microwave beam. The Radar Level Transmitter beam path is as shown in Table (2) below.

Range to Target	NOMINAL BEAM WIDTH		
	Rod Antenna : $\alpha = 27^{\circ}$	6" Horn Antenna : $\alpha = 26^{\circ}$	4" Horn Antenna : $\alpha = 36^{\circ}$
1m	0.48	0.46	0.65
2m	0.96	0.94	1.30
3m	1.44	1.39	1.95
5m	2.40	2.31	3.25
8m	3.84	3.70	5.20
10m	4.80	4.62	6.50
12m	5.76	5.54	7.80
15m	7.20	6.93	9.75
20m	9.60	9.24	13.0
25m	12.00	11.55	16.25
30m	14.40	13.86	19.50

**Table(2) Beam diameter with range**

- If the tank is fitted with a stirrer or agitator, the user will need to programme the Radar Level Transmitter to ignore reflections from uncovered agitator blades. Refer to Technical Handbook IP2028/OM.
- The mounting location should also avoid horizontal structural surfaces such as baffle support brackets, side wall joints, and so forth, because these surfaces reflect a strong false signal. If this cannot be avoided, refer to the section "False Echo Management" in the Technical Handbook (IP2028/OM).

- If the vessel has a **dome top**, a good guideline is to mount the Radar Level Transmitter away from the vessel's centre point by at least 10% of the vessel diameter. If the Radar Level Transmitter is mounted in the centre of the vessel, the dome top will act as a parabolic antenna, potentially enhancing “false” echoes due to multiple reflections of the transmitted energy.
- If the vessel has a **flat roof**, then mounting the Radar Level Transmitter in the centre is preferred.

## 2.5 Mounting the Radar Level Transmitter

Mount the Radar Level Transmitter to the tank before attaching any wires or conduits.

If the Radar Level Transmitter is mounted on a nozzle or stand-off, ensure that the mounting surface is aligned to within 3° of horizontal.

Note the small grub screw at the bottom of the enclosure adjacent to the mounting nipple or flange. This grub screw may be untightened, allowing the enclosure to be rotated on the antenna to position the conduit entry as required.

Do not rotate the enclosure by more than 180°. Once in the required orientation, re-tighten the grub screw to lock the enclosure in position.

### 2.5.1 1.5” thread mounting

- The internal diameter of any nozzle must be larger than 50mm. For best performance, the bottom of the stainless steel waveguide tube must extend below the bottom of the nozzle by at least 5mm. (See Fig. i below)

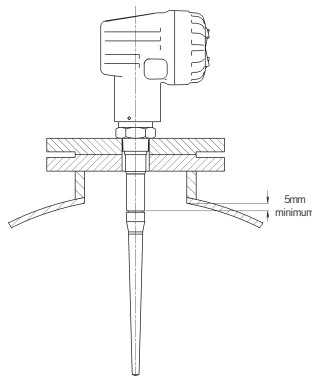


Fig. i



To mount an Radar Level Transmitter with the 1.5" thread, simply screw the threaded mounting nipple into the corresponding fitting on the tank to achieve a pressure tight seal. PTFE tape or equivalent should be used on the taper threaded models, or a suitable seal/gasket on the parallel threaded models.

Note: Do not apply force to the housing to tighten the mounting nipple. Use a wrench on the hexagonal portion (60mm) of the mounting nipple.

### 2.5.2 Flange & horn model mounting instructions

Check that a suitable gasket is in place before tightening flange bolts. Centre the gasket on the nozzle flange. Check that the antenna will pass freely through the nozzle.

Slide the horn antenna into the opening. For best performance the horn should extend below the bottom of the nozzle by at least 5mm, although the Radar Level Transmitter will operate in longer nozzle lengths (see Fig. ii below).

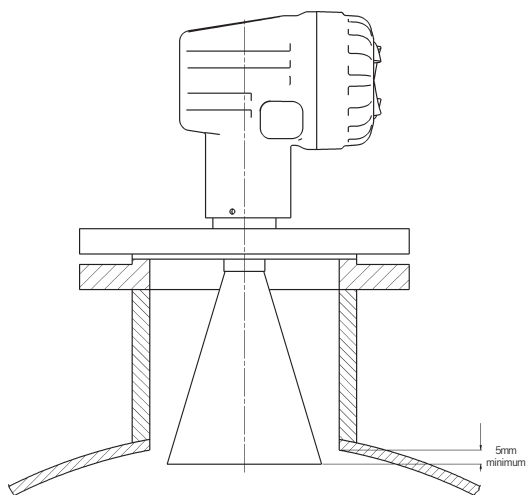


Fig. ii

Centre the Radar Level Transmitter flange on the gasket and line up the bolt holes in the flange and the nozzle flange such that the conduit entries are in the most convenient orientation for subsequent wiring.

Install the bolts and washers, and attach the nuts. Tighten the bolts in a star-patterned sequence to equalise compression. (See bolting torques 2.5.3)

### 2.5.3 Bolting torques

The information in this section is to the best of our knowledge correct. Since conditions of use are beyond our control users must satisfy themselves that bolt torques are suitable for the flange/process/conditions of their applications.

#### 2.5.3.1 High tensile steel bolts only

The following recommended torques assume the use of high tensile bolts. If ordinary carbon steel bolts are fitted see section 2.5.3.2. for bolt tightening torques for this type of bolt.

Min. torques are in Nm (lbf. ft.). Max. torque = Min +10%.

Flange	#150	#300
3" ANSI	230(169)	125(92)
4" ANSI	190(140)	220(169)

**Table(3) ANSI flanges, high tensile steel bolts only**

Flange	PN16	PN40
DN50	185(136)	80(59)
DN80	125(92)	97(70)
DN100	125(92)	150(111)

**Table(4) DN flanges, high tensile steel bolts only**

Initial gasket thickness	Compressed thickness	Compression
1.6mm	1.3/1.4mm	0.2/0.3mm
2.5mm	1.9/2.0mm	0.5/0.6mm
3.2mm	2.3/2.5mm	0.7/0.9mm
4.4mm	3.2/3.4mm	1.0/1.2mm
6.4mm	4.6/5.1mm	1.3/1.8mm

**Table(5) Gasket compression for joints without compression stops, high tensile steel bolts only**

#### 2.5.4.2 Carbon steel bolts only

If ordinary carbon steel or similar low quality bolts are used the recommended torques are shown below

The gasket sealing force created by the application of these torques is not sufficient to withstand full flange pressure rating. To achieve full rating, use high tensile steel bolts as above.

If in doubt about your bolt/sealing application consult your engineering department or gasket manufacturer.

Min. torques are in Nm (lbf. ft.). Max. torque = Min +10%.

Flange	#150	#300
3" ANSI	54(40)	95(70)
4" ANSI	54(40)	95(70)

**Table(6) ANSI flanges, carbon steel bolts only**

Flange	PN16	PN40
DN50	58(43)	58(43)
DN80	58(43)	58(43)
DN100	58(43)	113(83)

**Table(7) DN flanges, carbon steel bolts only**

### 3.0 Wiring procedure

#### Warnings :

- All wiring must be carried out by qualified individuals in accordance with national codes.
- Caution: remove all power from the unit before making any connections.
- The unit is for connection to SELV voltage levels only.
- The equipment must only be powered from a limited current power supply in accordance with clause 9.3 of EN61010-1:2001.

#### Hazardous Areas locations : Refer also to IP2028/SI

- Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- Do not locate the unit in any hazardous area other than those approved. Follow all instructions in this manual.
- Do not apply power to the unit in any hazardous area unless the safety ground is properly wired and the cover is properly installed.
- The cable entries must be sealed or fitted with a suitable cable gland.

#### Non-Hazardous Location Installations :

The cable entries into the enclosures must be sealed to prevent passage of gas or vapours.

The sealing compound should not be affected by the surrounding atmosphere or liquids.

### 3.1 Wiring

The Radar Level Transmitter requires a 2 core screened cable to operate.

**Note:** It is the users responsibility to ensure that the cable and cable glanding used are suitable for the environment and temperature of the application.

### 3.2 Wiring instructions

Loosen the enclosure cover retaining clamp, then unscrew and remove the cover.

Screw a suitable cable gland into the conduit entry provided :

Model Code	Conduit Entry Thread
*****A***	M20 x 1.5
*****U***	3/4" NPT

Feed the 2 core cable into the enclosure and strip wire to reveal the 2 conductors and the screen.

Connect the cable as shown in Figure iii below.

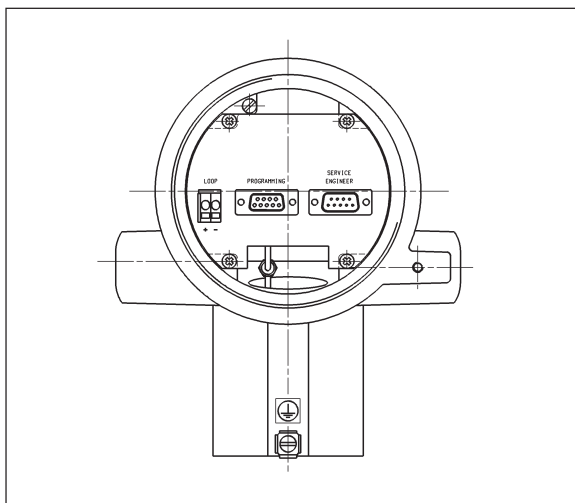


Figure iii Cable connections

The terminals are 'tension clamp' type will accept up to 2.5mm<sup>2</sup> conductors. The tension clamp type terminals provide constant force on the conductor of the connecting cable and carry all necessary international approvals.

To open the terminal, simply insert a standard electricians screwdriver tip into the lower rectangular hole in the terminal block such that the tension clamp is opened.

Having prepared the connecting cable by stripping the conductor insulation back by 5mm, insert the bare conductor into the tension clamp and withdraw the screwdriver from the terminal block. Ensure the tension clamp has firmly gripped the bare conductor. (See Fig. iv)

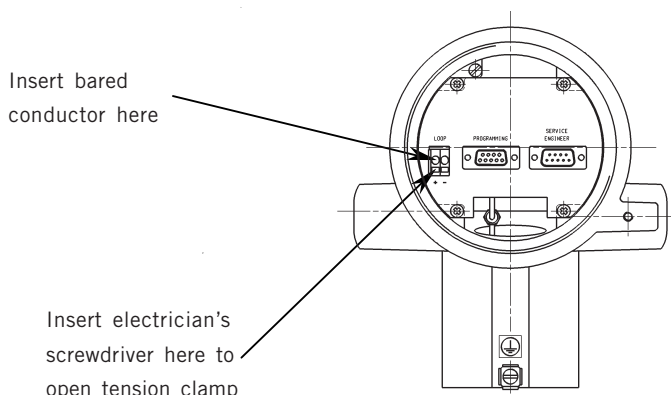



Fig. iv

Note :

The Radar level transmitter is protected against reverse polarity connection.

### 3.2.1. Earthing

The external protective earth terminal marked  must be connected to the same earth as the vessel and surrounding metalwork. this is a system safety ground.

The screen of the 2 core loop supply cable must be connected to ground at one end only.

For Intrinsically Safe installations, connect the screen at the Safety Barrier.

For all other installations, connect the screen to a convenient earth in the junction box or control room.

### 3.2.2 Power consumption

The Radar Level Transmitter is designed to operate on 13-30Vdc. The maximum input power requirement is 630mW.

### 3.2.3 4-20mA current output

The current output is fully isolated, and will vary between 4-20mA proportionally to the liquid level.

The current output can in fact be driven outside of the 4-20mA range to signal fault or alarm conditions. The User may choose either 3.6mA or 21.0mA to signal a fault or alarm condition. Refer to Technical Handbook IP2028/OM.

Maximum load at 24Vdc nominal supply voltage : 500 Ohm

Maximum load at 30Vdc supply voltage : 800 Ohm

### 3.2.4 HART operation

If the Radar level transmitter is to be used in HART digital communications mode or the user will use a HART programming tool a minimum of 250 Ohm resistance must be provided in the loop. See Fig. v.

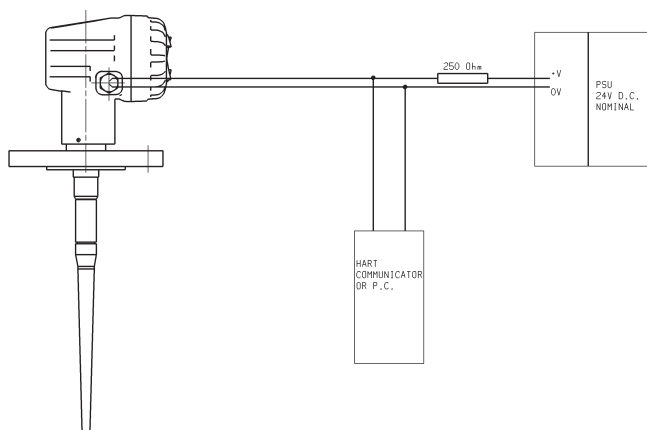


Fig. v

### **3.2.5 Programming and commissioning**

Refer to Technical Handbook IP2028/OM for full programming details.

#### **3.2.5.1 Programming using the MRL-HHC programmer**

To use the Mobrey MRL-HHC programmer, simply connect the flying lead of the programmer to the gauge at the RS232 socket marked "programming".

**(Note - this must not be left connected once commissioning is complete)**

#### **3.2.5.2. Programming using HART commands on the 2 wire loop**

A HART communicator, or a P.C. with a HART modem, may be connected across the 2 wire loop, which allows programming of the Radar level transmitter.

#### **3.2.5.3 Programming using HART commands over the RS232 connection**

With Mobrey H-Conf (or similar) communication software installed, a P.C. may be connected to the RS232 programming socket of the Radar level transmitter, allowing programming of the transmitter without the need for a HART modem.

### **3.2.6 Final checks**

Ensure the loop power cable is correctly connected to the terminal block, check that the cover seal is in good condition, then replace the cover. Screw the cover fully down and replace the cover retaining clamp.

Ensure the protective Earth connection is in place.



## **4.0 Maintenance**

The Radar Level Transmitter requires minimal maintenance apart from an occasional check to ensure that the antenna is clean and that all seals, gaskets and wiring are in good condition.

Repair of equipment must be carried out in accordance with the applicable code of practise.

The Radar Level Transmitter must not be dismantled in any way other than to remove the lid for wiring and/or programming or to replace the electronics cassette.

## **5.0. Spare Parts**

The only spare part for the Radar Level Transmitter, is the replaceable electronics cassette. When replacing the cassette, refer to the instructions supplied with the cassette.

### **Technical Services**

Should you experience problems with the Radar Level Transmitter that can not be resolved with the help of this manual, refer in the first instance to your local Solartron Mobrey Distributor or Representative.

Contact details can be found on the Solartron Mobrey website at

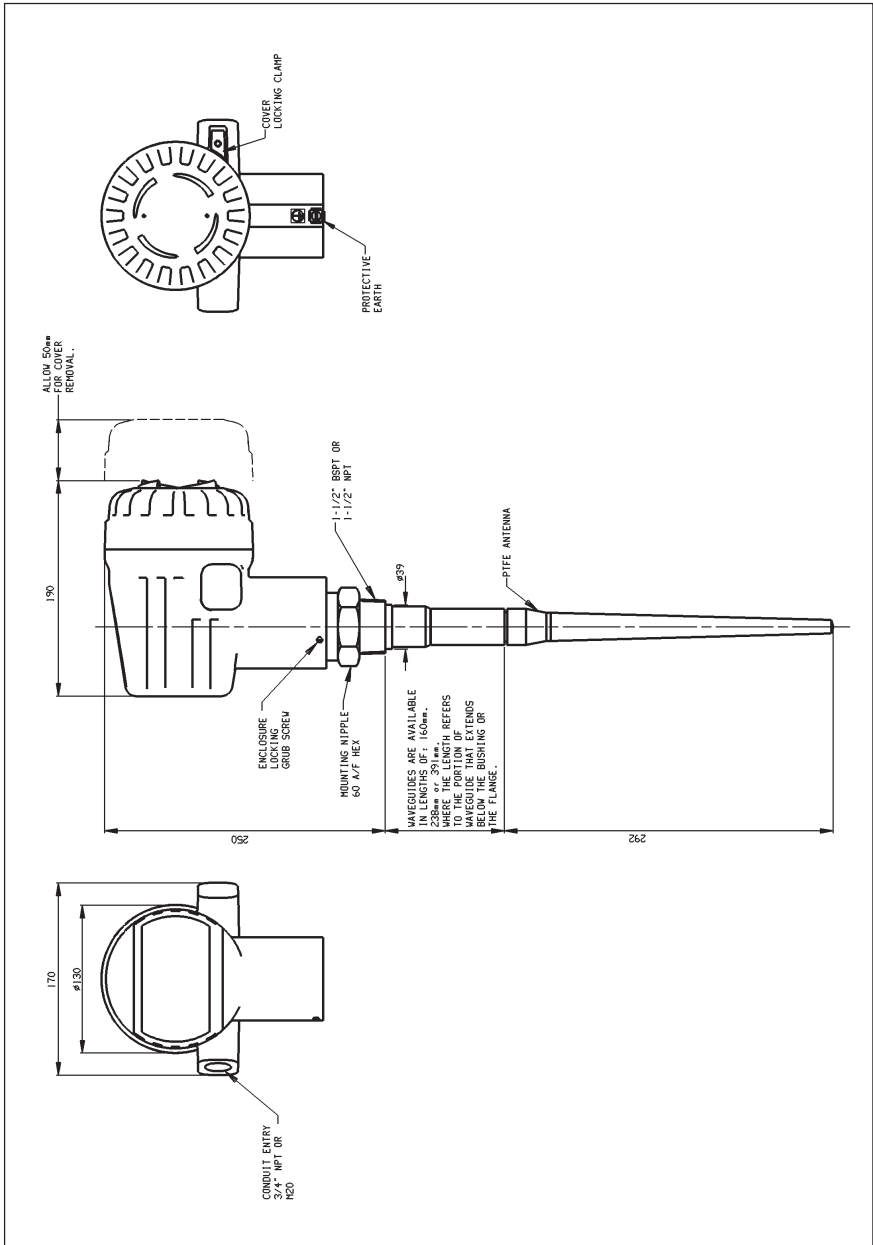
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<u>Web Site:</u>	<a href="http://www.solartronmobrey.com">http://www.solartronmobrey.com</a>

Radar Level Transmitter - ROD ANTENNA : THREAD MOUNTING



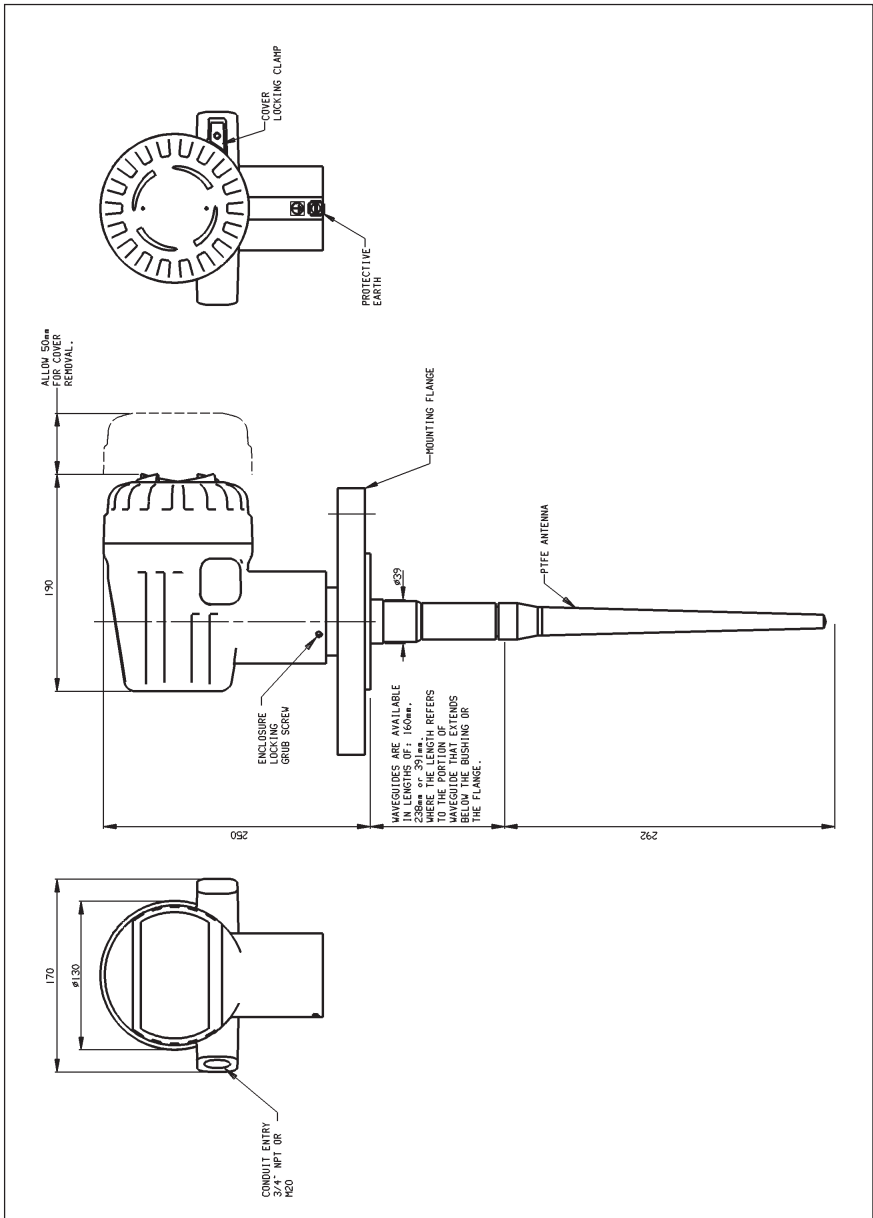
## ROD ANTENNA : Threaded Mounting

## APPENDIX A

### General Specifications :

Enclosure :	Cast Aluminium
Paint :	Polyester Powder Coat
Ambient Temperature :	-20°C to +60°C
Rating :	IP66 / NEMA 4X
Mounting :	1.5" BSPT, 1.5" NPT
Wetside Material :	316L Stainless Steel / Viton seals on antenna
Antenna :	PTFE
Max. Mounting Nipple Temperature :	-20°C to +150°C (Process temperature may be higher)
Max. Operating Pressure :	Full vacuum to 16b from -20°C to +150°C
Measurement range :	Range : 0.5 to 30m
Beam angle :	$\pm 13.5^\circ$ (half power point)
Process conditions :	Dielectric Constant Greater than 1.8
Weight :	6.0g
Power supply :	13 to 30V dc; 24V dc nom. 2 wire loop powered
Output (Isolated) :	4-20mA / HART. (Options : Profibus PA, Foundation Feildbus)
Hazardous area approval :	
FM pending	
CSA pending	
ATEX pending	

Radar Level Transmitter - ROD ANTENNA : FLANGE MOUNTING



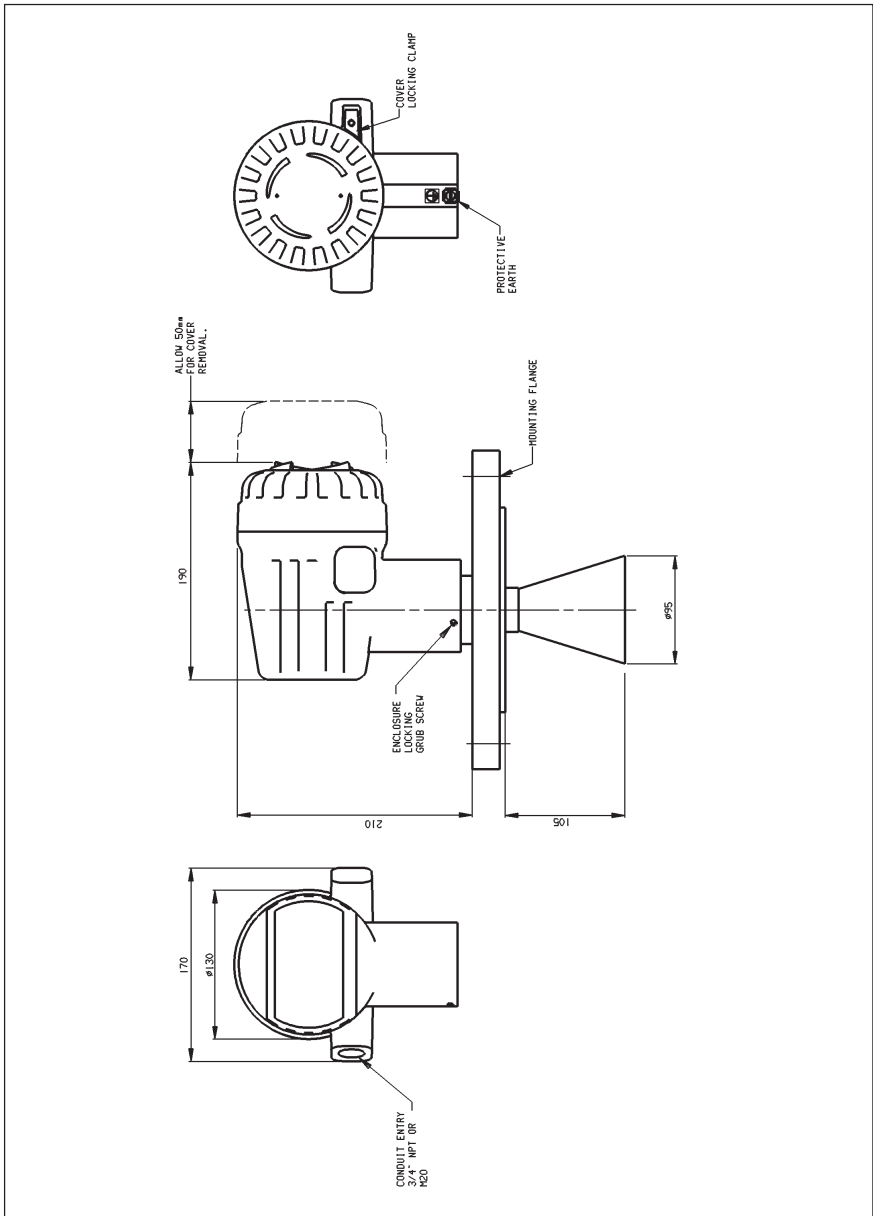
## ROD ANTENNA : Flange Mounting

## APPENDIX B

### General Specifications :

Enclosure :	Cast Aluminium
Paint :	Polyester Powder Coat
Ambient Temperature :	-20°C to +60°C
Rating :	IP66 / NEMA 4X
Mounting flange : (Others on request)	ANSI 2", 3", 4" or 6" ANSI # 150RF 2", 3" or 4" ANSI # 300RF DIN DN50, 80, 100 or 150 PN16RF DN50, 80 or 100 PN40RF
Wetside Material : Antenna :	316L Stainless Steel / Viton seals on antenna PTFE
Max. Mounting Flange Temperature :	-20°C to +150°C (Process temperature may be higher)
Max. Operating Pressure :	Full vacuum to 16b from -20°C to +150°C Unless limited by mounting flange rating
Measurement range :	Range : 0.5 to 30m
Beam angle :	±13.5° (half power point)
Process conditions :	Dielectric Constant Greater than 1.8
Weight :	8.0g
Power supply :	13 to 30V dc; 24V dc nom. 2 wire loop powered
Output (Isolated) :	4-20mA / HART. (Options : Profibus PA, Foundation Feildbus)
Hazardous area approval :	
FM pending	
CSA pending	
ATEX pending	

Radar Level Transmitter - 4" HORN ANTENNA



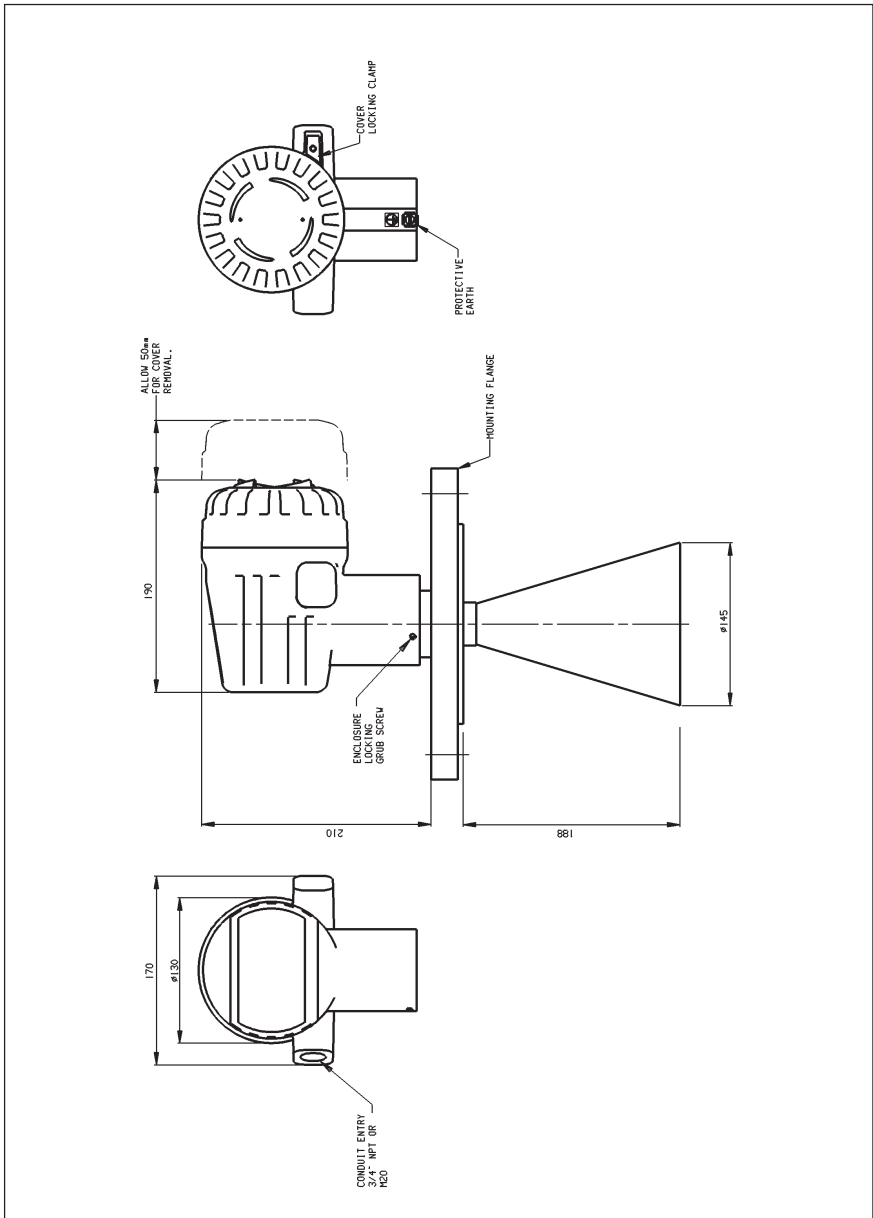
## 4" HORN ANTENNA : Flange Mounting only

## APPENDIX C

### General Specifications :

Enclosure :	Cast Aluminium
Paint :	Polyester Powder Coat
Ambient Temperature :	-20°C to +60°C
Rating :	IP66 / NEMA 4X
Mounting flange : (Others on request)	Minimum flange size : ANSI 4"/DN100 ANSI 4" or 6" ANSI # 150RF 4" ANSI # 300RF DIN DN100 or 150 PN16RF DN100 PN40RF
Wetside Material : Antenna :	316L Stainless Steel / Viton seals on antenna PTFE
Max. Mounting Flange Temperature :	-20°C to +150°C (Process temperature may be higher)
Max. Operating Pressure :	Full vacuum to 16b from -20°C to +150°C Unless limited by mounting flange rating
Measurement range :	Range : 0.5 to 30m
Beam angle :	±18° (half power point)
Process conditions :	Dielectric Constant Greater than 1.8
Weight :	10Kg
Power supply :	13 to 30V dc; 24V dc nom. 2 wire loop powered
Output (Isolated) :	4-20mA / HART. (Options : Profibus PA, Foundation Feildbus)
Hazardous area approval :	
FM pending	
CSA pending	
ATEX pending	

Radar Level Transmitter - 6" HORN ANTENNA





## 6" HORN ANTENNA : Flange Mounting only

## APPENDIX D

### General Specifications :

Enclosure :	Cast Aluminium
Paint :	Polyester Powder Coat
Ambient Temperature :	-20°C to +60°C
Rating :	IP66 / NEMA 4X
Mounting flange : (Others on request)	Minimum flange size : ANSI 6"/DN150 ANSI 6" ANSI # 150RF DIN DN150 PN16RF
Wetside Material : Antenna :	316L Stainless Steel / Viton seals on antenna PTFE
Max. Mounting Flange Temperature :	-20°C to +150°C (Process temperature may be higher)
Max. Operating Pressure :	Full vacuum to 16b from -20°C to +150°C Unless limited by mounting flange rating
Measurement range :	Range : 0.5 to 30m
Beam angle :	±13° (half power point)
Process conditions :	Dielectric Constant Greater than 1.8
Weight :	14Kg
Power supply :	13 to 30V dc; 24V dc nom. 2 wire loop powered
Output (Isolated) :	4-20mA / HART. (Options : Profibus PA, Foundation Feildbus)
Hazardous area approval :	
FM pending	
CSA pending	
ATEX pending	

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