M-Ref-FM-0-001-1P

Full manuals available at:
https://pulsarmeasurement.com/downloads/instruction-manuals/

Installation Guide
REFLECT Radar (I.S. / AEx-ia)
cFMus Approved

pulsar MEASUREMENT

Description

The REFLECT Radar (8m & 20m ranges) are 2-wire non-contacting FMCW radar level measuring sensors designed to meet the requirements of today's demanding process level measurement applications for liquids and solids.

The REFLECT Radar features an innovative design, which has no extra antenna requirements, that can offer very high performance and effective radar level sensing.

It gives all the advantages associated with radar technology and offers best-in-class performance with a narrow beam angle. The signal emanates from the curved face of the radar, but for the purposes of measurement it is measured from the drip shield.

Housed within a robustly engineered enclosure, the REFLECT Radar is designed for easy installation; a range of mounting brackets are available. The integral REFLECT*TILT*™ indicator ensures optimal setup with liquids. Integral Bluetooth allows local setup and monitoring via a smart-phone or PC without the need to install a Pulsar Measurement application. Primary communication is via HART modem & 4-20mA loop.

General Installation

Install the sensor directly above the material to be measured, at a 90° angle.
Avoid positioning near filling or emptying areas.
Check there are no obstructions between the sensor and the material.

Hazardous Area Installation

Intrinisically safe Ex ia: This model must be connected via an intrinsic safety barrier. A typical zener barrier is described below. Entity parameters are:
Power & signal: Ui = 28V, Ii = 162mA, Po = 0.85W. Rs $\geq$ 234Ω

> **Note:** Barrier with resistance of Rs ≤ 250Ω is recommended for best performance.

Colour	Description	Comments
Red	DC Power +Ve	+12V to +28V DC max.
Black	DC 0V / ground	Connect to same point.
Green	Cable Screen	

Note: The sensor's supply voltage range is quoted at the sensor itself; a higher voltage is needed at the supply side of the barrier, but still below the maximum voltage.

X Limitations on use

1. Electro-static hazard – The equipment shall not be installed in a location where the external conditions are conductive to the build up of electrostatic charge. In addition, the sensor may only be wiped with a damp or anti-static cloth.

2. The enclosure is made from Valox 357U, a polyester / polycarbonate blend, or PVDF; consider the performance of these materials with any chemicals that may be present.

3. The installer shall consider the total length of cable attached to the sensor.
The cable shall be considered to have parameters of 200pF/m & 1uH/m or 30uH/Ω.

4. The sensor shall only be connected via a resistive barrier with the following specifications: Resistance ≥ 234Ω.

Disposal Guidance

Incorrect disposal can cause adverse effects to the environment.

Dispose of the device components and packaging material in accordance with regional environmental regulations including regulations for electrical / electronic products.

Transducers/Radars

Remove power, disconnect the Transducer/Radar, cut off the electrical cable and dispose of cable and Transducer in accordance with regional environmental regulations for electrical / electronic products.

Dimensions

162mm

103mm

1" NPT
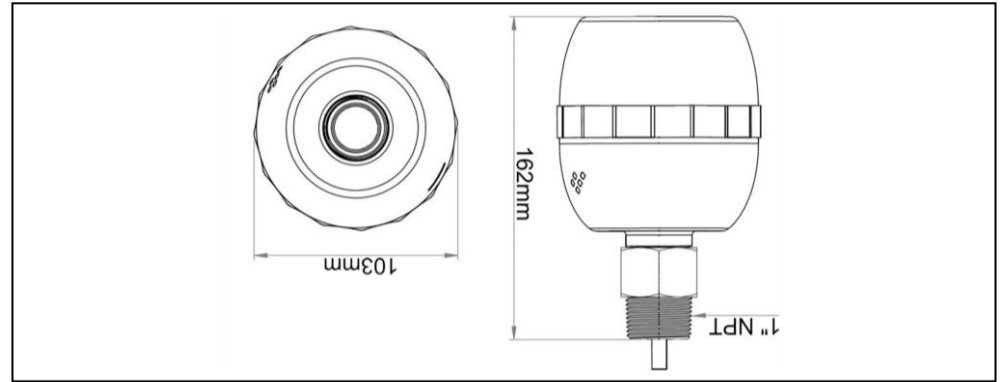
Specification

Enclosure material	Valox 357U (PBT+PC), standard
Enclosure protection	IP68
Mounting connection	Via 1" NPT rear mounting thread
	Optional 1.5" NPT front-thread adapter
Dimensions	162x103mm (6.38"x4.06") maximum
Weight	1.5kg (3.3lbs)
Measurement range	-20: 0.075 to 20m (0.25 to 65.6 ft.)
	-8: 0.075 to 8m (0.25 to 26.2 ft)
Standard cable lengths	5, 10, 20, and 30m (16.4, 32.8, 65.5, and 98.4ft)
Cable extensions	2-core screened
Maximum separation	300m (984 ft)
Frequency	V-Band
Beam angle (full)	6°
Accuracy	±2mm (0.079in)
Repeatability	±1mm (0.039in)
Min / max temperature (electronics)	-40°C to +80°C (-40°F to 176°F)
Supply voltage	12V min. (mA loop with Rs= 0Ω)
	16V min. (HART with Rs= 250Ω)
	28V DC max.
Hazardous area approval	Class I,II,III, Division 1, Groups A,B,C,D,E,F,G
	Class 1, Zone 0, AExia IIC T4, Ga
	Class 1, Zone 20, AExia IIIC T100°C, Da
Regulatory approvals	FCC, CE, cFMus, IECEx, ATEX, UKEx.

Key Advantages of REFLECT Radar

- World beating long range non-contact radar level sensor.
- Class-leading performance, range and exceptionally narrow beam angle.
- Excellent accuracy and repeatability.
- State of the art, proven, algorithms for ignoring unwanted targets (DATEM).
- Measure contents through non-conductive container walls.
- Unaffected by fog, haze, mist or rain.
- Independent of ambient temperature.
- Immune to inert gas, vapour, steam or pressure.
- 4-20mA loop & HART communications.
- No extra antenna selections required no matter what the application.
- Easy installation & alignment using integral REFLECT*Tilt*™ indicator.
- Easy setup & commissioning using Bluetooth radio communications.

NOTE: The Reflect sensor is normally supplied set to installation mode 1, REFLECT*Tilt*™ mode. After installation, this must be changed to health indicator **mode 7** for normal operation, either by rotating sensor or via web app as described below.

Indicator mode applications:

Mode P241	Description	Function	mA output
0	OFF	Any	Dynamic
1 (As shipped)	REFLECT*Tilt*™ – liquid	Long flash, colours related to tilt angle of installation.	20mA fixed
2	REFLECT*Tilt*™ – solid	Long flash, colours related to signal strength.	20mA fixed
4	Measurement – liquid	Short flash, colours related to tilt angle of material being measured.	Dynamic
5	Measurement – solid	Short flash, colours related to average signal strength.	Dynamic
7	Health	Short flash, Indicator follows NAMUR standard for self-monitoring and diagnostics of field devices.	Dynamic

Mode P241	LED functions:		
	GREEN	**AMBER**	**RED**
0	OFF	OFF	OFF
1	Level with horizontal.	Between pass & fail.	Not level.
2	Raw echo strength above threshold 1 (P242).	Raw echo strength above threshold 2 (P243).	Raw echo strength below both thresholds.
4	Level with horizontal.	Between pass & fail.	Not level.
5	Averaged echo strength above P242.	Averaged echo strength above P243.	Averaged echo strength weak.

Mode 7: Health indicator mode description:

Critical (RED)	Warning (AMBER)	Maintenance (BLUE)	Healthy (GREEN)
Echo loss			
Temperature limit			
Voltage limit	Measurement is outside of gate.	Accelerometer not calibrated.	Operating normally.
Alarm flag			
RADAR unresponsive for 5 times			
Ping timeout (45s)			

Mode 1: Install Tilt
Mode 2: Install Signal
Mode 7: Health

Mode 1, Mode 2, Mode 7

x2
x2
x2
xN

N = NEW MODE SELECTED

Home page: Allows Bluetooth connection / disconnection, parameter queries, readings and status.

Trace page: Real time echo trace, DATEM and readings.

Settings: User options to view and update parameters for the Bluetooth communications and REFLECT sensor.

Note: If a Bluetooth password has been set, when 'pair' is selected, a prompt will appear to enter the password.

The Bluetooth radio link may connect to a laptop PC or smart phone after navigating to the Pulsar Bluetooth application. This is available at the following URL:

https://pulsarmeasurement.com/web-app/   or use QR code →

Bluetooth Requirements: Any device with Bluetooth 4.0 and above.
PC: Chrome or Edge browser. Android: Chrome or Edge browser.
iOS: Download "Bluefy – Web BLE Browser" from App store.

Open web app. → Device scan → Click on device to pair → Able to view trace → Successful connection.

If using an iOS device, please scan the QR code and copy the URL link using your share button and paste to the BlueFy App to access the Web page.
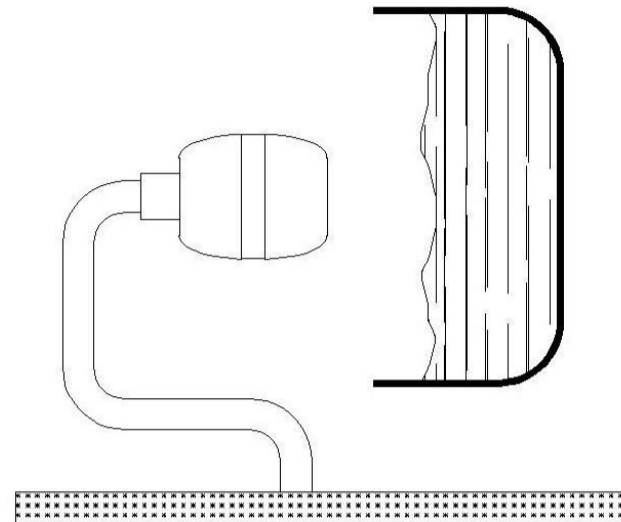
Reflect

D-804-1420-B

Class I Div.1 Group A, B, C & D, T4.
Class II Div.1 Group E, F & G, T4.
Class III, T4.

Class I, Zone 0, AEx/Exia IIC T4 Ga.
Zone 20, AEx/Exia IIIC T100°C Da.
T.amb.: -40 C to +80 C.
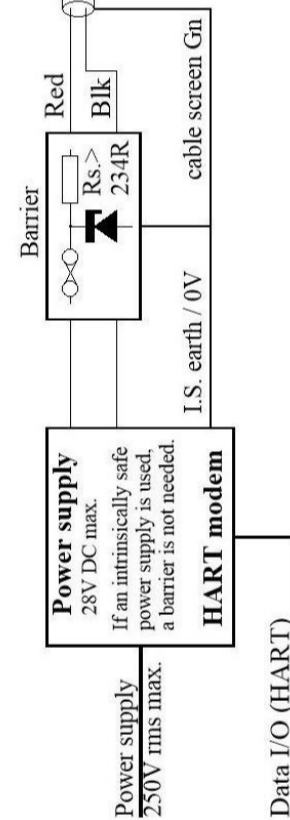
Electro-Static hazard:
Clean only with a damp cloth.

Danger Electro-Statique:
Nettoyer uniquement avec un chiffon humide.

Entity parameters:
$U_i = 28V$,
$I_i = 162mA$,
$P_i = 0.85W$.

Le Canada:
L'installation doit etre conforme a CEC part 1.
Le systeme ne doit pas etre alimente par, ni contenir, dans des conditions normales ou anormales, une source de tension par rapport a la terre depassant 250V rms ou 250V DC.
L'INSTALLATION DOIT ETRE CONFORME AUX DIRECTIVES DU FABRICANT.

SAFE AREA

Barrier
Red
Blk
$Rs. > 234R$
cable screen Gn
I.S. earth / 0V

Power supply
28V DC max.
If an intrinsically safe power supply is used, a barrier is not needed.

HART modem

Power supply
250V rms max.

Data I/O (HART)

Reflect model:
The installation, including the barrier earthing arrangements, must comply with the requirements in the country of use; e.g. ANSI/ISA RP12.6 (Installation of Intrinsically Safe systems for hazardous / classified locations) and the National Electrical Code.

Canada:
Installation must be in accordance with CEC part 1.
The system must not be supplied from, nor contain, under normal or abnormal conditions, a source of potential with respect to earth exceeding 250V rms or 250V DC.
INSTALLATION MUST BE IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES.