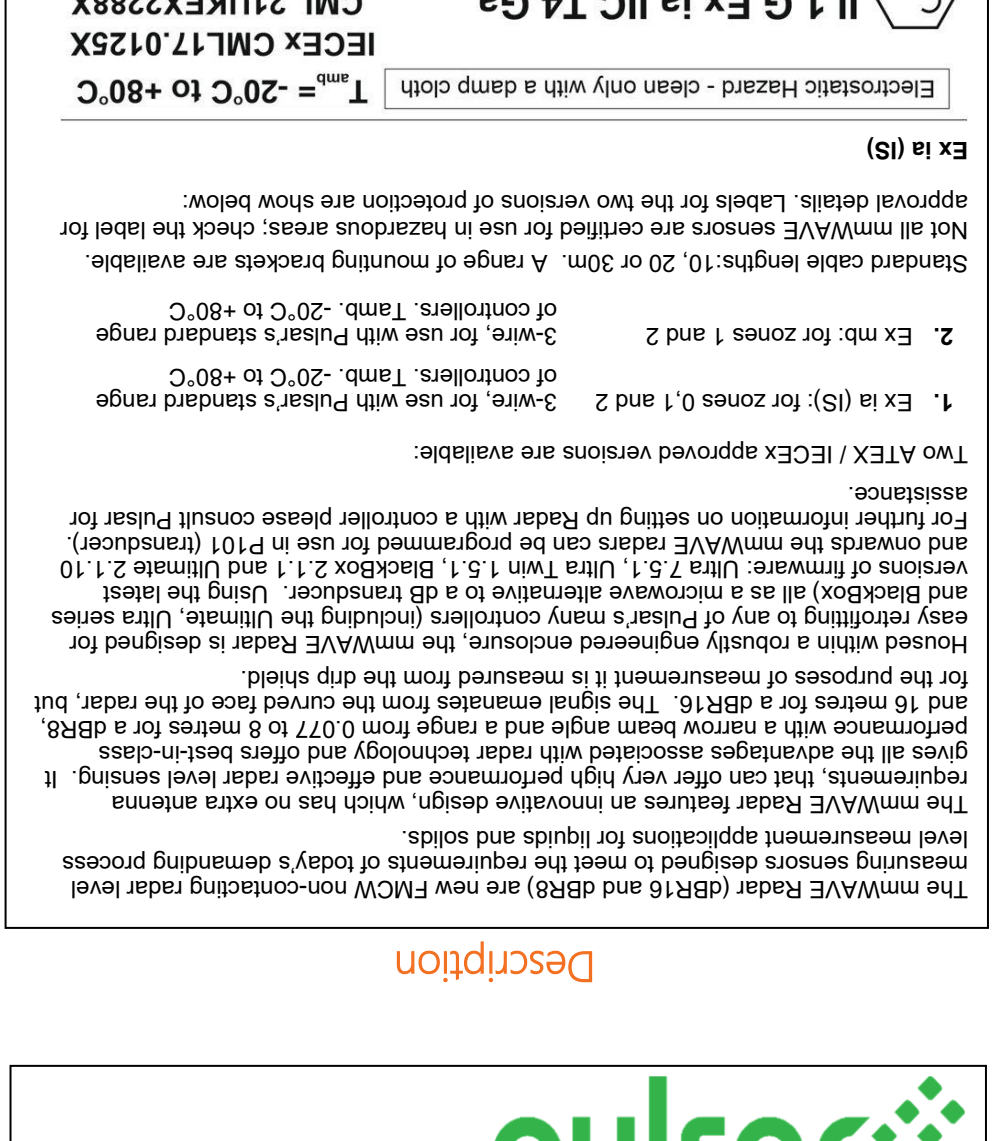

mmWAVE Radar (Ex mb)
mmWAVE-is Radar (Ex-ia)
ATEX/IECEx Installation Guide

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

M-dBR-0-004-2P

Description

The mmWAVE Radar (dBR16 and dBR8) are new FMCW non-contacting radar level measuring sensors designed to meet the requirements of today's demanding process level measurement applications for liquids and solids.

The mmWAVE 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 and a range from 0.077 to 8 metres for a dBR8, and 16 metres for a dBR16. 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 mmWAVE Radar is designed for easy retrofitting to any of Pulsar's many controllers (including the Ultimate, Ultra series and BlackBox) all as a microwave alternative to a dB transducer. Using the latest versions of firmware: Ultra 7.5.1, Ultra Twin 1.5.1, BlackBox 2.1.1 and Ultimate 2.1.10 and onwards the mmWAVE radars can be programmed for use in P101 (transducer). For further information on setting up Radar with a controller please consult Pulsar for assistance.

Two ATEX / IECEx approved versions are available:

1. Ex ia (IS): for zones 0,1 and 2 — 3-wire, for use with Pulsar's standard range of controllers. Tamb. -20°C to +80°C
2. Ex mb: for zones 1 and 2 — 3-wire, for use with Pulsar's standard range of controllers. Tamb. -20°C to +80°C

Standard cable lengths:10, 20 or 30m. A range of mounting brackets are available.
Not all mmWAVE sensors are certified for use in hazardous areas; check the label for approval details. Labels for the two versions of protection are show below:

Ex ia (IS)

Electrostatic Hazard - clean only with a damp cloth	T_{amb}= -20°C to +80°C
II 1 G Ex ia IIC T4 Ga	IECEx CML17.0125X CML 21UKEX2288X
II 1 D Ex ia IIIC T135°C Da	CML 17ATEX2227X

Ex mb

Electrostatic Hazard - clean only with a damp cloth	T_{amb}= -20°C to +80°C
Um= 28V power, 6V signal. Pros. S/C current 1500A.	IECEx CML17.0126X
II 2 G Ex mb IIC T4 Gb	CML 21UKEX5287X
II 2 D Ex mb IIIC T135°C Db	CML 17ATEX5228X

The 'X' in the certification numbers indicates that certain special conditions apply:
See the EU declaration of conformity in this document for more information.

Specification

Enclosure material	Valox 357U (PBT+PC).
Enclosure protection	IP68 / NEMA 6P.
Mounting connection	Via 1" BSP or NPT mounting thread.
Dimensions	130x90mm (0.42x0.29 ft.) maximum.
Weight	1.1kg (2.4lbs).
Measurement range	dBR16: 0.077 to 16m (0.25 to 52.49 ft.). dBR8: 0.077 to 8m (0.25 to 26.25 ft).
Cable extensions	3-core screened.
Maximum separation	Exmb: 500m (1,640 ft.), Exia: 300m (984 ft.)
Frequency	V-Band.
Accuracy	±2mm.
Repeatability	±1mm.
Radio approval	EN302-729:2016 (Level Probing Radar). FCC part 15, FCC ID: QO6-MMWAVEDBR.
Minimum distance between targets	0.15m (0.49 ft.).
Min / Max temperature (electronics)	-20°C to +80°C (-4°F to 176°F).
Supply voltage	28V DC max.
Power	Typically, 0.6W.

Key Advantages of mmWAVE 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.
- Direct retrofit to Pulsar controllers.
- No extra antenna selections required no matter what the application.

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.

Controllers

Remove power, disconnect the controller, and remove battery (if fitted). Dispose of Controller in accordance with regional environmental regulations for electrical / electronic products.

Dispose of batteries in accordance with regional environmental regulations for batteries.

EU WEEE Directive Logo

This symbol indicates the requirements of Directive 2012/19/EU regarding the treatment and disposal of waste from electric and electronic equipment.

Pulsar Measurement Contact Information

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Toll Free: 888-473-9546
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website: www.pulsarmeasurement.com

General Installation

The mmWave Radar should be installed directly above the material to be measured, at a 90° angle. Avoid positioning near the process filling or emptying areas. Check there are no obstructions between the sensor and the material. The mmWAVE Radars can be installed via the 1" BSP/NPT thread on the sensor, or with the supplied 1" BSP to M20 adapter. Installing the mmWAVE Radar outside of a closed vessel, the following must be adhered to:

- The mmWave Radar must be directed vertically downwards.
- Special permission must be granted by the appropriate national authority, to mount the mmWAVE Radar closer than 4km from any radio astronomy stations.
- The mmWAVE Radar must not be installed higher than 15m from the ground when installed within 4-40km of a radio astronomy station.
- The following table depicts the geographical location of Europe's radio astronomy stations (in alphabetical order):

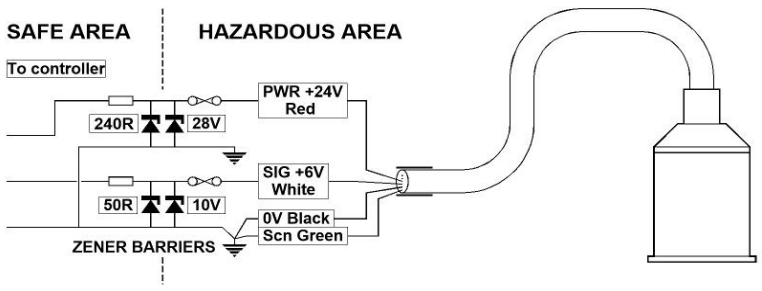
Country	Station Name	Geographic Latitude	Geographic Longitude
Finland	Metsâhovin	60˚13'04" N	24˚23'37" E
	Tuaorlan	60˚24'57" N	22˚26'40" E
France	Plateau de Bure	44˚38'02" N	05˚54'26" E
	Floirac	44˚50'07" N	00˚31'33" W
Germany	Effelsburg	50˚31'32" N	06˚52'58" E
Hungary	Penc	47˚47'23" N	19˚16'53" E
Italy	Medicina	44˚31'26" N	11°38'46" E
	Noto	36˚52'36" N	14˚59'20" E
	Sardinia	39˚29'35" N	09˚14'42" E
Poland	Krakow—Fort Skala	50˚03'13" N	19˚49'27" E
Russia	Kalyazin	57˚13'22" N	37˚54'01" E
	Pulkovskoe	59˚46'20" N	30˚19'34" N
	Pushchino	54˚49'14" N	37˚37'41 E
	Zelenchuksaya	43˚49'33" N	41˚35'13" E
Spain	Pico Veleta	37˚03'46" N	03˚23'09" W
	Robledo	40˚49'53" N	04˚14'57" W
Switzerland	Bleien	47˚25'38" N	08˚06'44" E
Sweden	Onsala	57˚23'45" N	11˚55'35" E
UK	Cambridge	52˚09'59" N	00˚02'20" E
	Darnhall	53˚09'22" N	02˚32'03" W
	Jodrell Bank	53˚14'10" N	02˚18'26" W
	Knockin	52˚47'24" N	02˚59'45" W
	Pickmere	53˚17'18" N	02˚26'38" W

Hazardous Area Installation

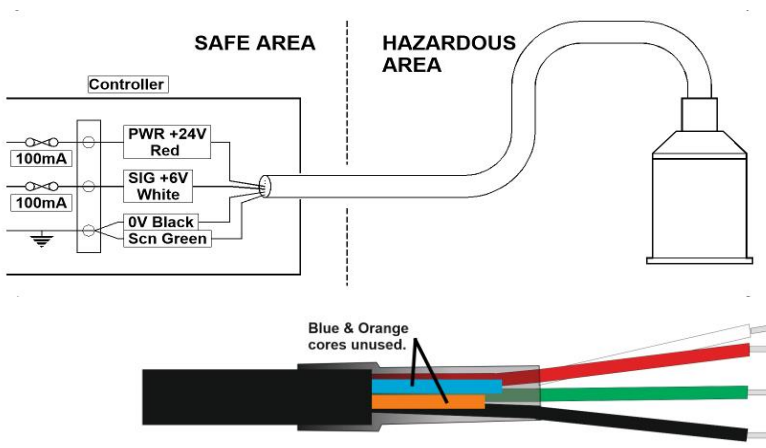
Ex ia version: This model must be connected via resistive barriers as described below:

Entity parameters are:
Power: Ui = 28V, Ii = 120mA, Pi = 0.83W. RS ≥ 234Ω
Signal: Ui = 10V, Ii = 200mA, Pi = 0.5W. RS ≥ 50Ω

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

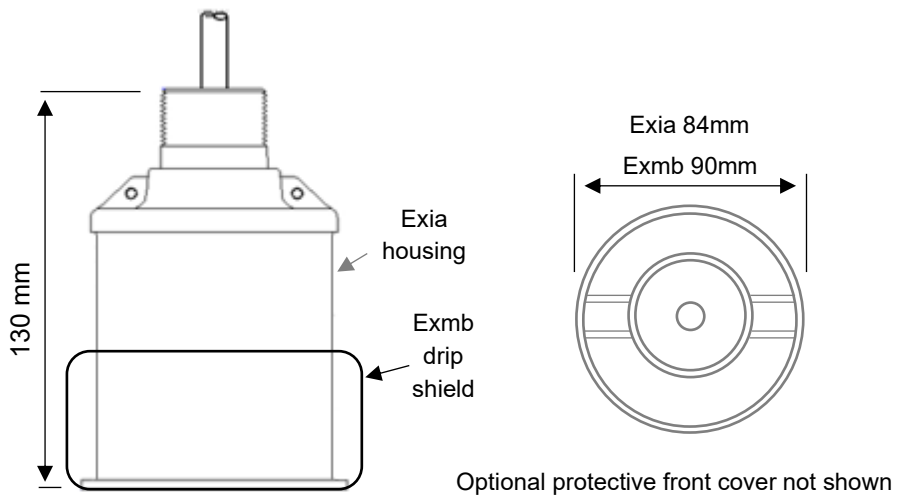


Ex mb version: This model must be supplied from apparatus that provides protection from prospective short circuits ≥ 1500A.



Colour	Description	Comments
Red	DC Power +Ve	+28V DC max.
White	Signal	
Black	DC 0V / ground	Connect to same point.
Green	Cable Screen	
Blue	Not used.	Hidden within cable sheath.
Orange	Not used.	Hidden within cable sheath.

Dimensions



Optional protective front cover not shown

X Limitations on use

1. The sensor must be routinely inspected to avoid build-up of dust layers if installed in zones 20, 21 & 22 (Ex ia) and zones 21 & 22 (Ex mb).

2. 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.

3. The outer enclosure is made from Valox 357U, a polyester / polycarbinate blend; consider the performance of this material with respect to chemicals that may be present.

4. The sensor must not be used if there are any cracks or damage to the enclosure.

5. (Ex ia) 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.

6. (Ex ia) The sensor shall only be connected via resistive barriers with the following specifications: Power ≥ 234Ω, Signal ≥ 50Ω (TX & RX ≥ 50Ω).

7. (Ex mb) Only use fuses listed: Littlefuse 0242 100mA (blue band) ≥ 1500A breaking. Fuses must be located in a safe area.

8. (Exmb) The equipment shall only be installed in areas where there is a low risk of mechanical danger.

EU & UK Declaration of Conformity

This declaration is issued under the sole responsibility of the manufacturer.

2014/35/EU	2016/1101	EN 61010:2010+A1:2019	Electrical safety.
2014/30/EU	2016/1091	EN 61326:2013	EMC regulations.
2014/53/EU	2017/1206	EN 302729 v2.1.1:2016	Radio, level probing radar.
2014/34/EU	2016/1107	EN 60079-0:2012+A11:2013	Ex.atmospheres, general.
		EN 60079-11:2012	Ex.atmospheres, intrinisic safety.
		EN 60079-18:2015+A1:2017	Ex.atmospheres, encapsulation.
2011/65/EU	2012/3032		Restriction, hazardous substances.

Manufacturer's Name	Pulsar Process Measurement Ltd
Manufacturer's address	Cardinal Building, Enigma Commercial Centre, Sandy's Road, Malvern, Worcestershire, WR14 1JJ, UK.
Apparatus	DC powered level measurement sensor utilising radar technology.
Models	dBR-8, dBR-16.
Type of equipment	Measurement and process control.
Notified body	CML B.V. Hoogoorddreef 15, 1101 BA, Amsterdam, Netherlands. Notified Body No. 2776

I declare that the apparatus named above has been tested and complies with the relevant sections of the above referenced standards & legislation.

Signed for and on behalf of;

Rev 1.3

Name & function: Tim Brown, electronics engineer. Date: 20th April 2021

CE