pulsar MEASUREMENT

PulsarGuard 201x Series

Instruction Manual

PulsarGuard 201x Series (NINTH EDITION REV 1)

February 2025

Part Number M-201x-009-1P

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WARRANTY AND LIABILITY

Pulsar Measurement guarantees for a period of 2 years from the date of delivery that it will either exchange or repair any part of this product returned to Pulsar Measurement if it is found to be defective in material or workmanship, subject to the defect not being due to unfair wear and tear, misuse, modification or alteration, accident, misapplication, or negligence.

DISCLAIMER

Pulsar Measurement neither gives nor implies any process guarantee for this product and shall have no liability in respect of any loss, injury or damage whatsoever arising out of the application or use of any product or circuit described herein.

Every effort has been made to ensure accuracy of this documentation, but Pulsar Measurement cannot be held liable for any errors.

Pulsar Measurement operates a policy of constant development and improvement and reserves the right to amend technical details, as necessary.

The PulsarGuard shown on the cover of this manual is used for illustrative purposes only and may not be representative of the actual device supplied.

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CHAPTER 1: START HERE...

Congratulations on your purchase of a ***PulsarGuard*** sensor. This quality product has been developed over many years and represents the latest in ultrasonic monitoring technology.

It has been designed to give you years of trouble-free performance, and a few minutes spent reading this operating manual will ensure that your installation is as simple as possible.

About this Manual

It is important that this manual is referred to for correct installation and operation. There are various parts of the manual that offer additional help or information as shown.

Tips

TIP: Look for this icon throughout your Pulsar Measurement manual to find helpful information and answers to frequently asked questions.

Additional Information

Additional Information

At various parts of the manual, you will find sections like this that explain specific things in more detail.

References

See Also

References to other parts of the manual.

About the PulsarGuard 201x Series

Functional Description

The 201x series sensor uses state of the art soundwave technology to detect changes in structure borne acoustic emissions from equipment and materials in motion. The sensor 'listens' to the high frequency sound generated by impacts, cavitation and friction within a system.

The high frequency detection of the sensor (100 to 600 kHz Bandwidth) allows it to be used where there is a high volume of machinery vibration or audible noise, without any interference to the readings obtained from the application it is monitoring.

There is an instant reaction to any process variation and provides a change in output level to alert the user that an abnormal or different condition has been detected.

Overall, the device has outstanding stability, accuracy and repeatability.

The ***PulsarGuard*** has been designed to provide maintenance free performance.

Benefits

There are many benefits to the ***PulsarGuard*** series of sensors:

- Non contacting.
- Robust design.
- Prevent Unplanned Downtime
  - Detects Blockages, Pump Cavitation, Bearing Failures and Valve Leakage early.
  - Reduction of Costly Production Stoppages.
- Improve Maintenance Efficiency
  - Help enable Predictive maintenance by detecting issues before any equipment failure.
  - Reduces the need for routine manual inspections.
  - Reduces maintenance costs by replacing parts when only necessary.
- Increase Safety & Reduce risk
  - Early detection of failures or breaches posing a risk to health.
  - Reduce exposure to staff in hazardous areas by limiting manual inspections.
- Easy Installation & Non-Intrusive Measurement
  - Clamp on design- Quick and easy installation.
  - No disruption to production process
- Reduces Energy Consumption & Waste
  - Identifies inefficiencies such as valve leakage that result in wasted energy.
  - Prevent loss of raw materials due to blockages.
- Reduce Pollution & Environmental Impact
  - Detects Burst Filter bags, preventing harmful dust and particles being released into the atmosphere.
  - Comply with environmental regulations by ensuring proper filtration.
  - Helps support Sustainability initiatives by minimizing waste and Emissions.

Product Specification

PHYSICAL	
Dimensions	125 (L) x 31 (H) x 65mm (W) (4.92 x 1.22 x 2.56")
Weight	Nominal 0.5 kg (1.1lbs) Excluding cable
Enclosure Material/Description	Type 316 Stainless steel (investment casting)
Mounting	14mm hole in tab, suitable for 12mm or 0.5" threaded fixing.
ENVIRONMENTAL	
IP Rating (Fascia)	IP68, NEMA 4X
Max. & min. temperature (electronics)	-40 ºC to +85 ºC (-40ºF to 185ºF)
CE approval	See EU Declaration of Conformity
HAZARDOUS AREA APPROVAL	
ATEX IS	**II 1 G and I M1,** EEx ia IIC T6 (Tamb= -20°C to+40°C) EEx ia IIC T5 (Tamb= -20°C to+75°C) EEx ia IIC T4 (Tamb= -20°C to+92°C) Cert No. Sira04ATEX2121X
Max. & min. temperature (electronics)	-40 ºC to +85 ºC (-40ºF to 185ºF)
CE approval	See EU Declaration of Conformity
OUTPUTS	
Analogue Output	0 – 10V DC
SUPPLY	
Power Supply	Standard and HT version 23 - 30VDC 2011Z or G (Hazardous area versions) 24 to 26V via suitable 28V DC galvanic or Zener barriers
Current Consumption	Typically, 15mA

Pulsar Measurement operates a policy of constant development and improvement and reserve the right to amend technical details, as necessary.

Product Construction

- Rugged two-part housing in cast Type 316 stainless steel.
- Cap casting is polyester powder coated orange. On older versions of sensors, the standard PulsarGuard coating was green and 2011 was light blue.
- Neoprene O-ring (Viton in PulsarGuard 2010HT*)*.
- Electronics on a double-sided Surface Mount PCB encapsulated in an epoxy potting compound inside cap casting.
- Piezo-electric transducer assembly (alumina wear plate, PZT disc & copper cap) bonded to base casting using a structural adhesive. (A special high temperature rated adhesive used on PulsarGuard 2010HT*)*.
- Polycarbonate reverse printed badge bonded to cap casting.
- 4 metres screened; PVC jacketed 4 core PVC insulated cores cable assembly. OD 6 mm nominal. (High temperature jacket and polyolefin insulated cores used on PulsarGuard 2010HT*)*.

EU Certificate of Conformity

EU DECLARATION OF CONFORMITY

P U L S A R PulsarGuard 2011.

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

Relevant directive(s)	2014/35/EU - Low Voltage directive and its amending directives. 2014/30/EU - EMC directive and its amending directives. 2014/34/EU - ATEX directive and its amending directives. 2011/65/EU - RoHS directive and its amending directives.
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 acoustic sensor.
Models	PulsarGuard 2011G & 2011Z.
Type of equipment	Measurement and process control.
Standards applied	EN 61010-1:2010+A1:2019 Safety requirements for electrical equipment for measurement, control and laboratory use. EN 61326-1:2013 EMC, equipment class industrial. EN 60079-0:2012+A11:2013 ATEX general requirements. EN 60079-11:2012 Intrinsic safety (Ex ia).
Notified body	CSA Group Netherlands B.V., #2813.
Role	Issue of ATEX EU type examination certificate.
Auditing body	CSA Group Netherlands B.V., #2813.

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

Signed for and on behalf of:		Date: 7th April 2021 Rev. 2.1
Name & function:	Tim Brown, electronics engineer.	Pulsar Process Measurement Ltd.

Product Range

There are different types of ***PulsarGuard 201x*** sensors, to suit a variety of applications:

PRODUCT NAME	DETAILS
2010	Standard sensor. Temp Range: -40 °C to +85 °C (-40 °F to +185 °F).
2015	High Temperature environment sensor. Temp Range: -40 °C to +125 °C (-40 °F to +257 °F).
2011G	Galvanically isolating barriers only. Intrinsically safe earth is not required. Identified by "G" stamped on the mounting tab. -40 °C (-40 °F) to +40 °C/+104 °F (EEx ia IIC T6) / to +92 °C/+197.6 °F (E Ex ia IIC T4).
2011Z	Zener barriers only. Intrinsically safe earth connection required. Identified by "Z" stamped on the mounting tab. -40 °C (-40 °F) to +40 °C/+104 °F (EEx ia IIC T6) OR to +92 °C/+197.6 °F (EEx ia IIC T4). 24-26V DC.

Options

OPTION	DETAILS
Additional cable for standard sensor	This version of sensor comes with 4m cable, if a different length is required, please specify this when ordering. The additional cable is charged per meter.
Additional cable for Hi Temp sensor	This version of sensor comes with 4m cable, if a different length is required, please specify this when ordering. The additional cable is charged per meter.
Flexible Conduit	Includes 4m flexible steel armoured conduit including all glands (M16) connected to the sensor by means of an adaptor (PG7 to M16), other lengths available on request.

Approvals

- CE approval on all versions PulsarGuard 201x series sensors (Certificate of Conformity available on request).
- PulsarGuard 201x series sensor housing rated to IP68 / NEMA 4.
- ATEX Intrinsically safe certificates held for PulsarGuard 2011 sensors to:

  EEx ia IIC T6 Tamb -20°C to 40°C or

  EEx ia IIC T5 Tamb = -20°C to 75°C or

  EEx ia IIC T4 Tamb -20°C to 92°C

This sensor is also approved for Group I (mining approval) applications. Certifying body SIRA Certification Services. Certificate No. Sira 04ATEX2121X.

Construction

- Rugged two-part housing in cast Type 316 Stainless steel.
- Cap casting is polyester powder coated, in Orange.
- Neoprene O-ring (Viton on 2010 HT version).
- Electronics on a double-sided surface mount PCB encapsulated in an epoxy potting compound inside cap casting.
- Piezo-electric transducer assembly (alumina wear plate, PZT disc & copper cap) bonded to base casting using a structural adhesive. (A special high temperature rated adhesive used on ***PulsarGuard*** 2010HT).
- Polycarbonate reverse printed badge bonded to cap casting.
- 4 meters screened, PVC jacketed 4 core PVC insulated cores assembly. OD 6mm nominal. High temperature jacket and Polyolefin insulated cores used on the ***PulsarGuard*** 2010HT.

CHAPTER 2 INSTALLATION

Unpacking

Important Information

All shipping cartons should be opened carefully. When using a box cutter, do not plunge the blade deeply into the box, as it could potentially cut or scratch equipment components. Carefully remove equipment from each carton, checking it against the packing list before discarding any packing material. If there is any shortage or obvious shipping damage to the equipment, report it immediately to Pulsar Process Measurement Limited.

Sensor positioning

It is important that the sensor is sited correctly for each application. The sensor must be installed near to where the acoustic energy is being generated.

The stainless-steel housing has a tab with a 14mm hole through it, this is for mounting the 201x, but it is also to hold the transducer in intimate contact with the process being monitored. Good contact will maximise the voltage output. To make the contact as good as possible try to fit on a flat clean surface, if necessary, remove any rust or paint prior to fitting. A coupling compound such as silicon grease will also help to make a more reliable coupling.

If you are looking for particles in a liquid or solids travelling in a pipe, then fit the transducer near a bend on the side of the pipe where the impact of material against the pipe will occur.

If you are listening to a bearing, then fit the sensor near the bearing mount. It may be necessary to experiment with the sensor position to obtain optimum results.

Power Supply Requirements

The ***PulsarGuard*** 201X series can operate from a DC supply of 23 to 30V). The 2011Z or G units, are a hazardous area product and certified to be used in Zone 0, therefore it must be supplied via a suitable 28V DC barrier, either Zener or Galvanic. In all cases the unit typically draws 15mA.

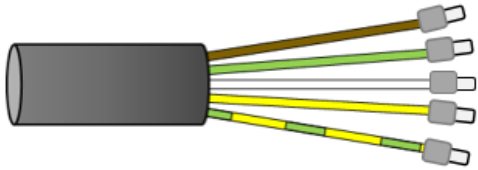
Wiring Detail

The 201x is supplied with a captive cable, 4m long, if other cable lengths are required then specify when placing an order. The 4-core cable is connected as follows for all ***PulsarGuard 201x*** series sensors:

COLOUR		DESCRIPTION
Model: Standard + IS	**Model:** High Temp	
Brown	1	Power IN (24V DC nominal)
Green	2	Power GND
White	3	Voltage Signal output (0 - 10 VDC)
Yellow	4	Signal Ground
Green/Yellow	Green/Yellow	Cable Screen

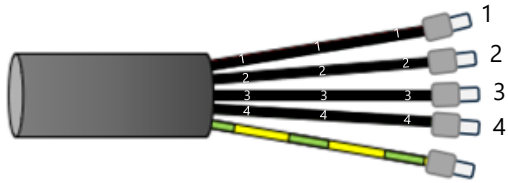
Wiring Diagram

Standard and IS Versions:



Brown: Power in (24V DC nominal)
Green: 0V (Ground)
White: Voltage Output (0–10V DC)
Yellow: Signal Ground
Yellow/Green: Cable Screen

Hi Temp Version:



1: Power in (24V DC nominal)
2: 0V (Ground)
3: Voltage Output (0–10V DC)
4: Signal Ground
Yellow/Green: Cable Screen

Important Information
Cable identifying numbers are located on the cables of the Hi Temp version.

Hazardous Area Installation Instructions

(Reference European ATEX Directive 2014/34/EU, Annex II, 1.0.6.)

The following instructions apply to equipment covered by certificate number Sira 04ATEX2121X:

1. The equipment may be used with flammable gases and vapours with apparatus groups IIC, IIB, and IIA with temperature classes; T1, T2, T3, T4 maximum ambient temperature range -20°C to +92°C, T5 maximum ambient temperature range -20°C to +75°C, and T6 maximum ambient temperature range -20°C to +40°C, and Group I maximum ambient temperature -20°C to +92°C.
2. The equipment is only certified for use in ambient temperatures in the range -20°C to +92°C and should not be used outside this range.
3. Installation shall be carried out in accordance with the applicable code of practice by suitably trained personnel.
4. Repair of this equipment shall be carried out in accordance with the applicable code of practice.
5. Certification marking as detailed in drawing number D-804-0599-A.
6. If the equipment is likely to encounter aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

   Aggressive Substances - e.g. acidic liquids or gases that may attack metals or solvents that may affect polymeric materials.

   Suitable Precautions: e.g. regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.
7. The certificate number has an 'X' suffix that indicates that the following special condition of certification applies:

   When the equipment circuits are earthed (screen connected version, Type 'G'), it shall only be supplied from galvanic isolating barriers.

Because non-conductive plastic materials are used on the surface of the equipment (i.e. the label is >4cm^2 in area), under certain extreme circumstances, these non-metallic parts may generate an ignition capable level of electrostatic charge. Therefore, when it is used in applications that specifically require group II, category 1 equipment, 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. Additionally, the equipment shall only be cleaned with a damp cloth.

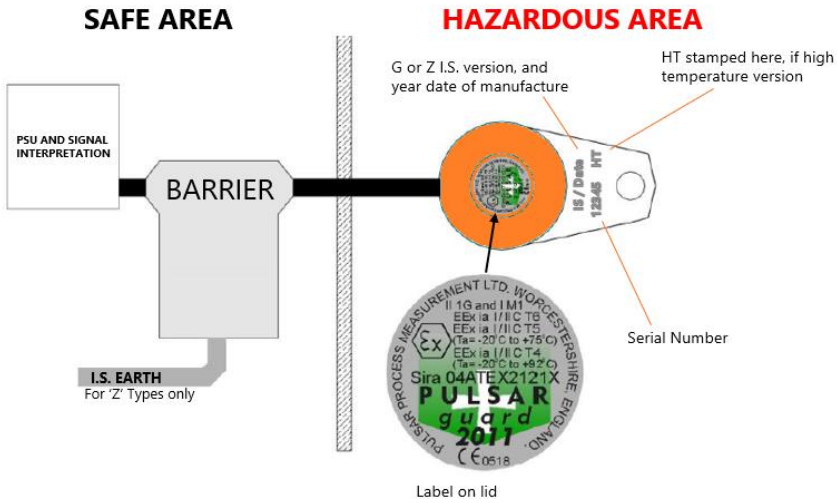
8. The manufacturer should note that, on being put into service, the equipment must be accompanied by a translation of the instructions in the language or languages of the country in which the equipment is to be used and by the instructions in the original language.

Identification:

The hazardous area versions 2011G and 2011Z have labels bearing the Certificate No. Sira 04ATEX2121X.

Another distinguishing feature is that the serial number on the tab of the transducer is stamped with a suffix 'G' (for use with galvanic isolators) or 'Z' (for use with Zener barriers).

Hazardous Area Installation



BARRIER PARAMETERS		SENSOR LABELLING
Power Supply	**Signal Supply**	ZONE 0: CERT No.
Uo = 28V	Uo = 18V	EEX ia I/IIC T6 (Tamb = -20°C to +40°C)
Io = 93.3mA	Io = 15.3mA	EEX ia I/IIC T5 (Tamb = -20°C to +75°C)
Po = 0.635 W	Po = 0.07W	EEX ia I/IIC T4 (Tamb = -20°C to +92°C)

CHAPTER 3 DISPOSAL

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

Remove power, disconnect the Transducer, 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.

NOTES

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