SENTRY GB-200

Wireless Temperature Monitoring

KONGSBERG

A unique product especially developed for temperature monitoring of crank pin / crosshead bearings in diesel engines

Features

- No active electronics in sensor, no battery, no slip rings.
- Immediate and reliable temperature response.
- Significantly reduced false alarm rate and risk of engine breakdown.
- Flexible mounting, compact and easy installation.
- Approved by classification societies as an alternative to traditional oil mist detectors.

Description

Application and general description

Crank pin bearings and crosshead bearings in diesel engines can experience rapid temperature changes during damage development. SENTRY is designed to monitor the temperature in these bearings, and to give immediate temperature response to the monitoring system, avoiding fatal damaging of the engine.

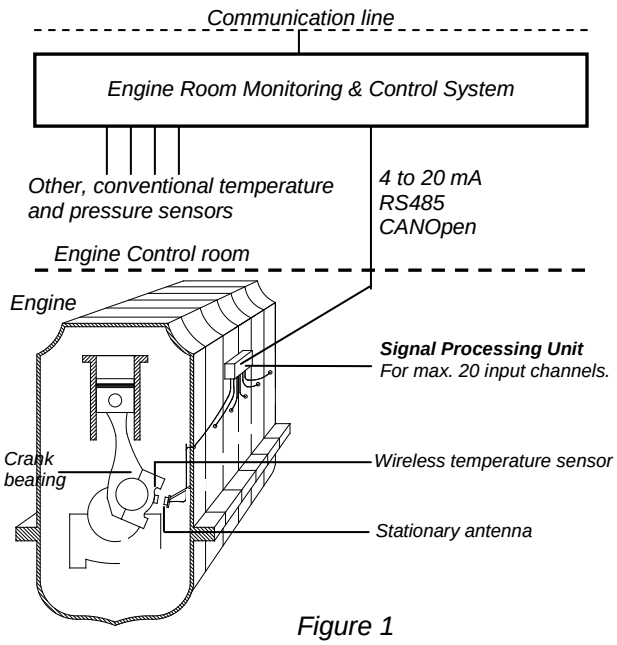

Figure 1

Functional description

Figure 1 shows the arrangement of the SENTRY Wireless Temperature Monitoring System. There is great flexibility in arranging sensor and antenna both with respect to gap, angle and lateral position between sensor and antenna.

The measurement system is based on radar technology with passive sensors without need of an external power source. A low energy and high frequency radar pulse is transmitted to a SENTRY GBW series Wireless Sensor via a SENTRY GBS series Stationary Antenna. When the sensor passes the antenna, the radar pulse is picked up and reflected back to the SENTRY GBP200 Signal Processing Unit. The shape and characteristics of the reflected pulse determine the temperature of the sensor, i.e. the bearing temperature. The processing unit software calculates the temperature and transmits this to the engine control and monitoring system. *Figure 2* shows the principle design of the SENTRY system.

ATEX
Related Document

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Electrical description

The system is based on radar technology. This enables the possibility of using high quality wireless passive sensors with no need for external power sources.

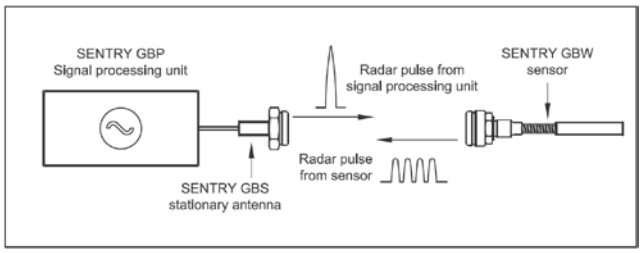


Figure 2

The signal-processing unit generates a low energy and high frequency radar pulse, which is transmitted to the wireless sensor via the stationary antenna. When the wireless sensor passes the stationary antenna it is hit by this radar pulse and immediately reflects a pulse back to the signal-processing unit. The temperature of the sensor uniquely determines the shape and characteristics of this reflected pulse. A software algorithm then calculates the temperature and transmits this to the engine monitoring and control system.

Mechanical design and installation

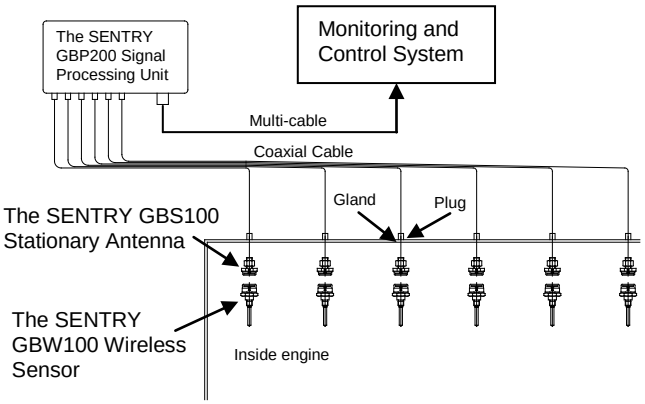


Figure 3

Diesel engines have different design and no. of cylinders and the engine builder must approve the installation method. Therefore each installation will have their specific installation instruction and drawing.

This data sheet contains figures showing installation in general. *Figure 1* and *3* shows the main parts.

A hole is drilled in the bearing for the SENTRY GBW100 Wireless Temperature Sensor. Different versions of this sensor can be delivered; fixed or adjustable length (spring load) and with flat tip or angled tip.

On a suitable place inside the engine, the SENTRY GBS100 Stationary Antenna is installed in such a way that the wireless temperature sensor passes the antenna with a maximum distance of 35 mm.

From the antenna a coaxial cable is plugged to a plug in a gland in the engine wall. An outside coaxial cable is connected to the SENTRY GBP200 Signal Processing Unit. The cabling outside the engine will be designed in co-operation with the engine builder and the customer.

A screened multi-cable containing power supply (24 VDC) and signal (CAN, RS485, 4 to 20 mA) is connected to the SENTRY GBP200 Signal Processing Unit. The other end of the cable is connected to the monitoring and control system.

Mechanical relations

The installation of the stationary antenna related to the internal antenna of the wireless temperature sensor is extremely flexible and non-critical. The figures below clearly indicate the broad installation flexibility of the SENTRY system.

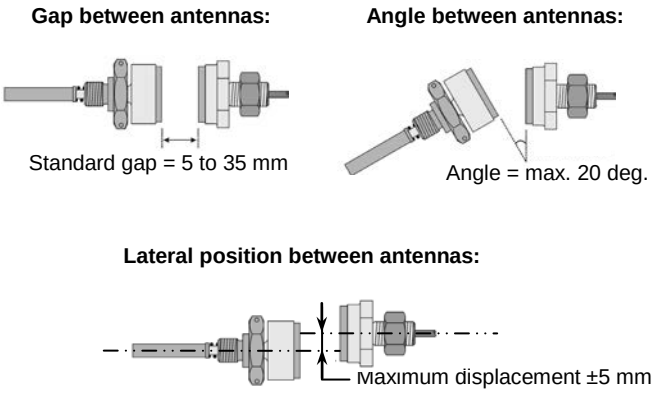
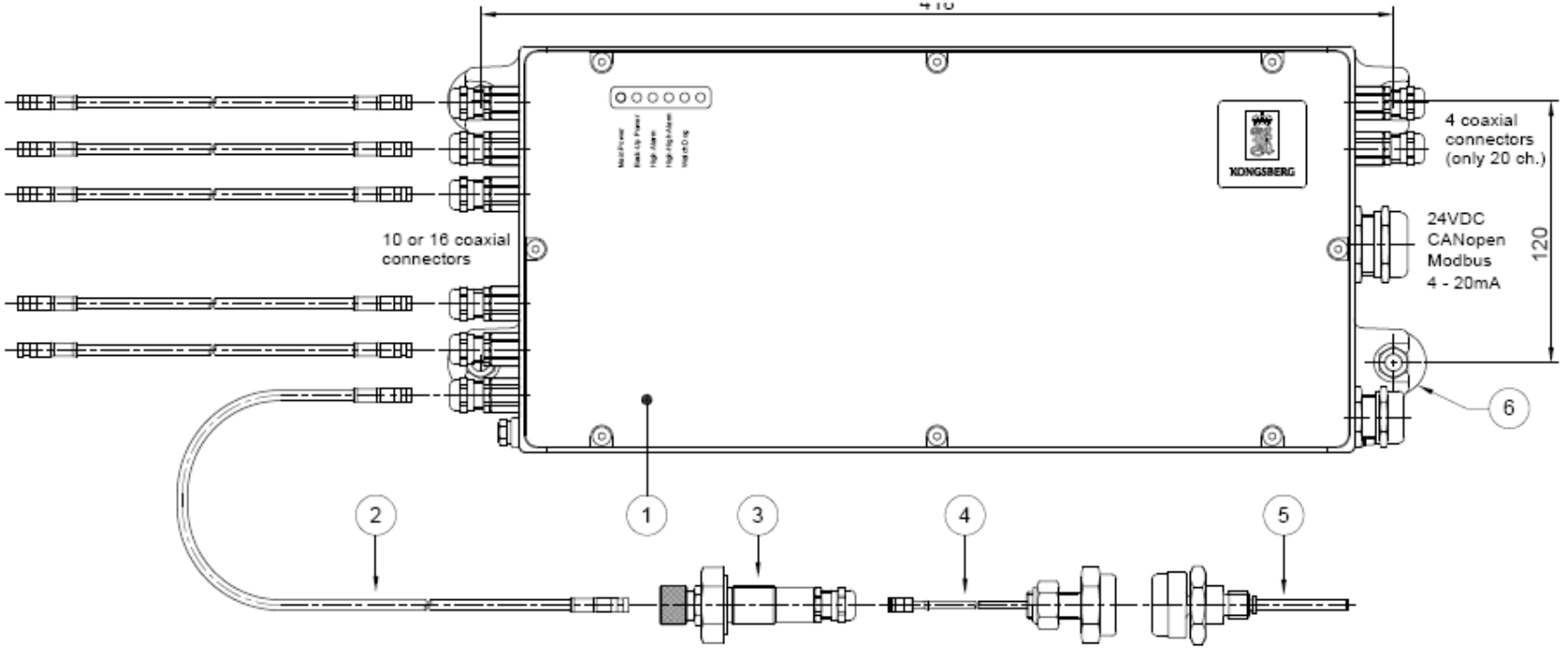
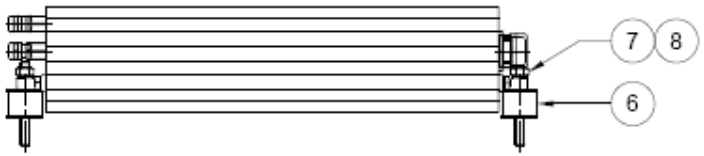


Figure 4



M1:2



Qty.	Pos.	Name, Type, Dim	Article no., spec.	Remarks
4	8	Lock washer		Yard supply
4	7	Nut, M8		Yard supply
4	6	Vibration damper	6480-013.2530	UT-445
	5	Wireless temp. sensor	GBW---	
	4	Stationary antenna	GBS1--	
	3	Cable gland with connector		GB-981
	2	Coax cable	GB-717/--	
1	1	Signal processing unit	GBP200/--	

Technical specifications

Overall system specifications:

Measuring range:	0 to 160 °C
Ambient operating temperature:	- 25 to 85 °C
Ex Zone 1:	- 25 to 60 °C
Ex Zone 2/Div 2:	- 25 to 70 °C
Storage temperature range:	- 25 to 85 °C
Accuracy *):	±2 °C
Sensor and antenna relative passage speed:	Maximum 80 m/sec.
Gap between temperature sensor and antenna:	5 to 35 mm
Lateral position between sensor and stationary antennas:	Max. displacement ±5 mm
Angle between sensor and stationary antennas:	Maximum 20 degrees
Maximum cable length between SPU and stationary antenna:	5 to 25 m dependent on gap between antennas
Generic EMC Standard	
Emission:	EN 61000-6-4
Immunity:	EN 61000-6-2
Maximum error during immunity test:	±2 °C

**) Accuracy incl. non-linearity, hysteresis and repeatability with ambient temperature from 0 to 85 °C*

The SENTRY GBP200 Signal Processing Unit:

Power-supply:	24 VDC (18 to 36 VDC)
Power consumption:	Maximum 450 mA during normal operation Maximum 500mA during power-up
Number of input channels:	10, 16 and 20
Material housing:	Aluminium alloy
Communication outputs:	CANOpen RS485 Modbus
Size housing:	382 x 186 x 90 mm
Digital alarm output:	3 Max.150mA/24 VDC High, High High and Fault WD
Protection:	IP66
Electrical connection:	Cable through glands
Nemko Certificate:	08ATEX1414, Zone 1 08ATEX1333, Zone 2
Ex-Class Zone 1:	CE 0470 Ex II 2(1)GD Ex d[ia]IIC T5 -25°C to 60°C
Ex-Class Zone 2:	CE 0470 Ex II 3(1)GD Ex nA[ia]IIC T5 -25°C to 70°C

The SENTRY GBW series Wireless Temperature Sensor:

Sensor tip diameter:	Std 5.0/6.0/7.0 and 10.0 mm ±0.2 mm
Sensor head:	6-edge, 30 mm
Threads type:	M12 x 1
Maximum temperature sensor tip:	200 °C
Maximum temperature sensor head	100 °C (Pom-C)
Maximum temperature sensor head	130 °C (Semitron)
Protection:	IP67
Weight:	70 to 100 gram dep. of type
Material antenna body:	AISI316
Sealing material:	Epoxy
Spring load:	Approximately 100 Nm
Depth of machined hole:	L ±1.5 mm
Nemko Certificate:	03ATEX016X, Zone 0,1,2
Ex-Class:	CE 0470 Ex II 1 GD EEx ia IIC T6/T5/T4 Ta:85/95/100°C

The SENTRY GBS series Stationary Antenna:

Antenna head Diameter:	30 mm
Maximum ambient temperature:	100 °C (Pom-C)
Maximum ambient temperature:	130 °C (Semitron)
Protection:	IP67
Weight:	Approximately 90 gram
Material antenna body:	AISI316
Material coaxial cable Ø3.2 mm:	Teflon FEP
Sealing material:	Epoxy
Nemko Certificate:	03ATEX016X, Zone 0,1,2
Ex-Class:	CE 0470 Ex II 1 GD EEx ia IIC T6/T5/T4 Ta:85/95/100°C

Other Ex approvals:

CSA Certificate No (Div 2):	1428603
Gost R Certificate No (Zone 1/2):	0522493
Kosha Certificate No (Zone 2):	12-AV4BO-0483 GBP200 12-AV4BO-0484 GBW/GBS

4 to 20 mA output module:

Number of output channels:	Max 16 with common ground
Mode:	Passive load
Output range:	0 - 160°C (0 - 100°C)
Output signal when error condition:	3.0 to 4.0 mA set by SW
Maximum load resistance:	350 ohm
Electrical connection:	Cable through gland
Safety Data Ex:	Vi=0 Li=0 Ci=2.4nF@ L=25 Li=0 Pi=0

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