



## SENTRY GB-300

### WIRELESS TEMPERATURE MONITORING

The KONGSBERG SENTRY GB-300 is a unique product developed for temperature monitoring of crank pin/crosshead bearings in diesel engines and other rotating machinery.

#### Features

- Fast and reliable temperature response.
- By providing an early warning the consequence of bearing seizure is reduced to a minimum.
- The sensor is passive, has no battery and does not need an external power source.
- Flexible mounting, compact and simple installation.
- Approved by classification societies as an alternative to traditional oil mist detectors.
- Approved for hazardous area.

#### Functional description

Figure 1 shows the arrangement of the SENTRY Wireless Temperature Monitoring System installed on a 4-stroke diesel engine.

- A wireless sensor is fitted to the moving part (e.g. the connecting rod of an engine)
- A Stationary Antenna is fitted to a bracket inside each cylinder compartment in a position so that the sensor will pass nearby as the engine runs.
- Coaxial cables connect the stationary antennas with the Signal Processing Unit fitted outside. The bulkhead penetration is made by use of a special, high IP-grade cable gland in which the coaxial cable shield is terminated to ground.
- The Signal Processing Unit calculates the temperature and transmits the result to the engine control system.

The SENTRY GB-300 system is based on Surface Acoustic Wave (SAW) -and radar technology. The sensors are passive, have no battery and are in no need of an external power source.

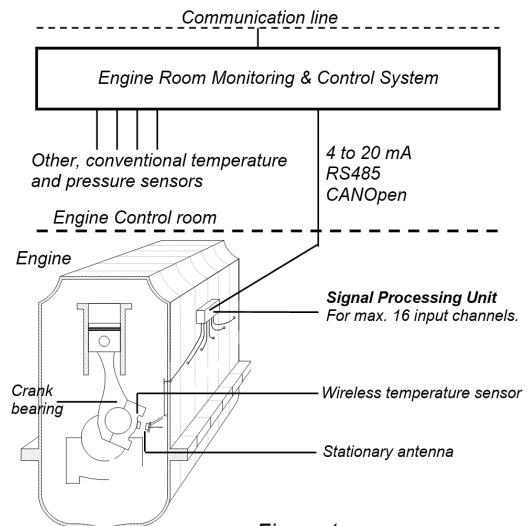


Figure 1

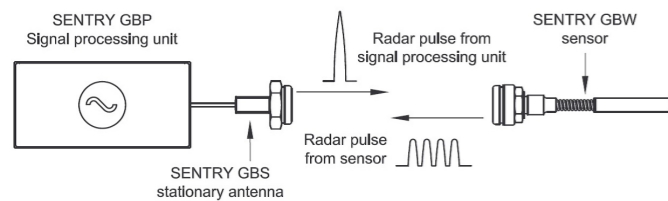
**Technical description**

Low energy, high frequency radar pulses are generated by the Signal Processing Unit (SPU) and transmitted via coaxial cables to the Stationary Antennas installed inside each cylinder compartment.

The antenna transmits the signal further into the open space of the crankcase. When the sensor passes the antenna, the radar pulse is picked up. The SAW element at the tip of the sensor then reflects the signal which is picked up by the stationary antenna and sent back to the processing unit for interrogation.

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 working principle of the SENTRY GB-300 system.



**Figure 2**

The SPU uses a multiplexer to monitor up to 16 channels in sequence. Calculation time for each channel is appr. 25 ms. Installed on a 10 cylinder engine running at 600 rpm all 10 channels are up-dated in less than one second.

The multiplexing and low signal strength reduces noise and removes any danger of overhearing from one cylinder to another. All sensors and antennas can therefore be similar. This reduces number of variants and represents a huge benefit in terms of keeping spares.

**Mechanical design and installation**

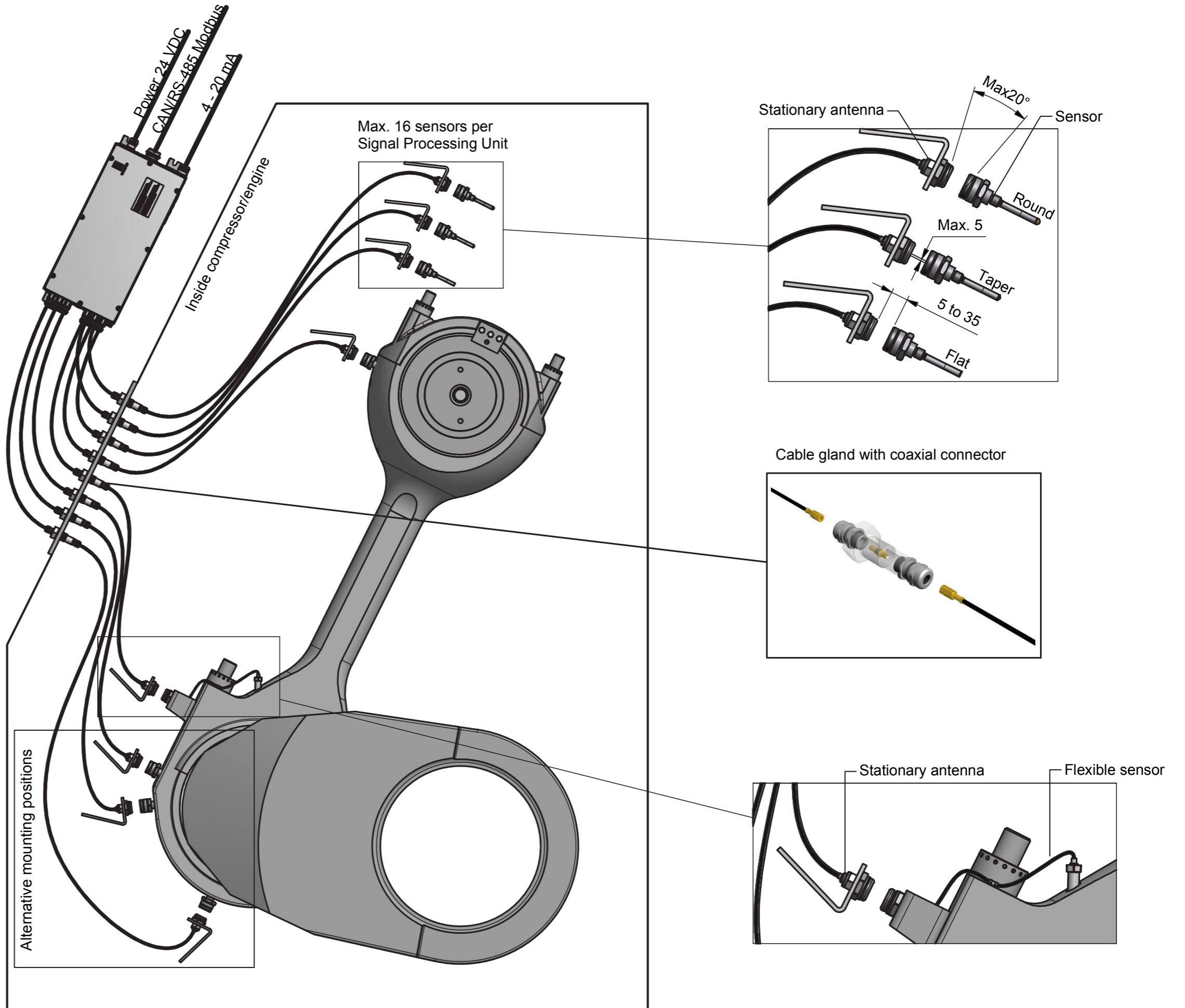
Design of diesel engines and other rotating equipment varies with type and make. KONGSBERG therefore always involve the equipment maker when planning a SENTRY installation. All SENTRY installations are approved by the equipment maker and supported by their specific installation instructions and drawings.

A hole for the SENTRY Wireless Temperature Sensor is drilled in the connecting rod or in the bearing cap. Different designs of this sensor are available; fixed or adjustable length (spring load) and with flat tip or angled tip. Diameters are from 5 to 10mm. The sensors are normally fixed by threads of various types, but can also be fixed by use of glue. Surface mounted sensors are also available. The sensor designs thus vary with the application.

At a suitable place inside the cylinder compartment, the SENTRY Stationary Antenna is installed in such a way that the wireless temperature sensor passes the antenna at recommended maximum distance and angle. See figure 4.

The antenna coaxial cable is connected to a plug inside a gland penetrating the engine wall. An outside coaxial cable connects the gland to the the SENTRY GBP300 Signal Processing Unit which can be fitted on bobbins directly onto the monitored equipment. (e.g. engine wall)

A screened cable for power supply (24 VDC) and signal (CAN, RS485, 4 to 20 mA) is connected to the SENTRY GBP300 Signal Processing Unit. The other end of the cable is connected to the monitoring and control system.



# TECHNICAL SPECIFICATIONS

## Overall system specifications:

Measuring range:	0 to 160 °C
Ambient operating temperature:	- 25 to 85 °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:	Maximum displacement ±5 mm
Angle between sensor and stationary antennas:	Maximum 20 degrees
Maximum cable length between SPU and stationary antenna:	5 to 35 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 GBP300 Signal Processing Unit:

Power-supply:	24 VDC (18 to 32 VDC)
Power consumption:	< 9W, Maximum 450 mA during normal operation
Number of input channels:	10 and 16
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
Protection:	IP66
Electrical connections:	Cable through EMC glands
4 to 20 mA output module:	
Number of output channels:	Max 16
Mode:	Passive/Active set by slide
Output range:	0 - 160°C default , set by SW
Output signal when error condition:	3.5 mA default, set by SW
Maximum load/loop resistance:	350 ohm
Electrical connection:	Cable through EMC glands

## 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, M14x2,1/2 -20UNF
Sensor length min.	30 mm min, dep. on type
Maximum temperature sensor tip:	200 °C
Maximum temperature sensor head:	130 °C (Grivory)
Protection:	IP67
Weight:	70 to 100 gram dep. on type
Material antenna body:	AISI316
Sealing material:	Epoxy
Spring load:	Approximately 175 Nm
Depth of machined hole:	L ±1.0 mm

## The SENTRY GBS series Stationary Antenna:

Antenna head Diameter:	30 mm
Maximum ambient temperature:	130 °C (Grivory)
Threads type:	M12x1,5
Length of bolt:	25 and 45 mm
Protection:	IP67
Weight:	Approximately 90 gram
Material antenna body:	AISI316
Material coaxial cable Ø4.8 mm:	Teflon FEP
Sealing material:	Epoxy

Specifications subject to change without any further notice.

