



NORIS Automation –
Solutions for Transport Technology



Our profession are customer-specific solutions



High speed trains - Measuring bearing and stator temperature

In addition to the **specific flange design**, the sensor heads of the temperature sensors are **360° pivoted sensors** (prevention of torsional forces) and the cable harnesses are equipped with **textile-reinforced special protection hose** for harsh environmental conditions.



High speed trains - Measuring bearing temperature of traction motors

Sensor assembly with **three temperature sensors** and one **customer-specific connection**. The sensor heads are **360° pivoted sensors** and are protected against torsional forces. A **special protection hose** is used for the **extreme application area** and provides excellent protection of the wiring against stone and ice impact.



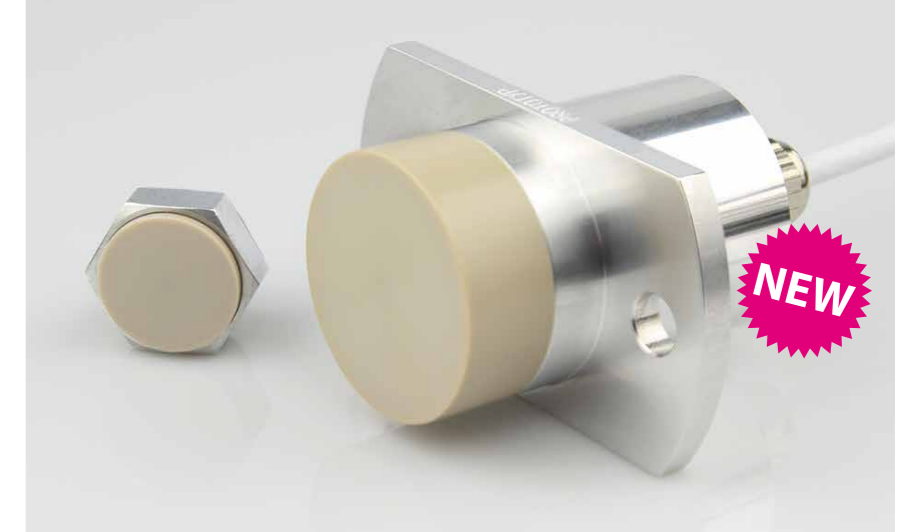
Locomotives - Measuring of engine speed

Speed sensor with **two signal outputs** in a **customer-specific flange design** (retrofit) for acquisition of speed and rotational direction.

We develop for your application and according to your requirements

High speed trains, locomotives, metros, trams - Wireless measuring of temperature on rotating parts

The sensor system NORIFID is **integrated into customer-specific application** and fulfils acquisition and **wireless transmission** of temperature values on **rotating parts** (e. g. planetary gearbox or rotor temperature of an electric motor).



Passenger and travelling waggons - Measuring bearing temperature

Sensor assembly with **two temperature sensors** in **customer-specific design** and with **customer-specific connector plug**. Cable outlets are **angled, 360° pivoted** and, thus, protected against torsional forces.



High speed trains Measuring of speed, temperature and acceleration

Multi sensor for measuring **speed, temperature and acceleration** in **one flange housing**. The connection cable is protected by a **silicone sheath** for application under **extreme conditions**.



Sensors, Signal Processing, Visualisation – the right solution for your application

1. Speed sensors

For measuring the speed on the traction motor, gearbox and wheelset (see page 6/7).

2. Temperature sensors

For measuring temperatures on the traction motor, gearbox, wheelset, in compressor units or air conditioning (see page 8).

3. Customer-specific sensor combinations

For the complete acquisition of measured data (speed, temperature and acceleration (vibration)) on the motor, gearbox, wheelset and bogie (see page 2/3).

4. Multi sensors

Multiple sensor types in one housing for measuring acceleration (vibration), temperature and speed on the motor, gearbox and/or wheelset (see page 9).

5. Signal processing devices

Limit value switches and measuring transducers for signal processing of the signals acquired under 1., 2., and 4. (see page 10).

6. Analogue indicators

For the visualisation of speed, temperature, pressure, brake force etc. in driver's cabs (see page 11).



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Speed sensors

Traction motor | gearbox | bogie



The acquisition of measured data on the traction motor, gearbox and wheelset of rail vehicles is subject to special requirements. Extreme heat and strong electromagnetic fields on the traction motor, extreme temperature fluctuations and strong vibrations on the wheelset and gearbox require robust, reliable and durable sensors. Our speed sensors are designed in such a way that they operate smoothly and continuously under these extreme conditions, meet current railway standards and even exceed these. Special designs enable a particularly vibration-resistant fixing of the integrated electronics.

Features

- Reliable, contactless sensing of ferromagnetic or aluminium gearwheels
- Magnetic and non-magnetic scanning systems available
- High frequency range of 0 ... 20,000 Hz
- As 1-channel, 2-channel or 4-channel sensors, e.g. for detecting speed and rotational direction
- Optional with pulse multiplication, galvanically isolated channels, integrated standstill detection and detection of rotational direction
- Large operating temperature range -40 ... +120 °C (standard; more on request)
- Gearwheel modules m1 to m3 (standard; more on request)
- Compact and extremely robust designs, e. g. flange and thread sensors
- On request with particularly durable, protected wiring by means of special protective sheathing structure against extreme heat, stone and ice impact
- Customer-specific sensor combinations



Application examples

- Acquisition of measured data on the traction motor or gearbox for traction control of the drive system
- Acquisition of the engine speed for motor control
- Acquisition of measured data on the wheelset for anti-skid protection and wheel spin protection
- Acquisition of measured data for bogie monitoring

Speed sensor for non-magnetic scanning (eddy current principle)

The speed sensor type FAW is a powerful eddy current sensor that is used for scanning any electrically conductive materials, whether they are ferromagnetic or non-ferromagnetic. Thanks to its compact and robust design as well as its resistance to temperature and soiling, the sensor is particularly suitable for use in extremely harsh environments such as traction control of rail vehicles.

Features

- Suitable for scanning conductive materials, e. g. aluminium gearwheels
- Compact design with robust measuring area
- Available as thread or flange sensor type
- Non-magnetic scanning for maintenance-free use under harsh environmental conditions: the sensor head is unaffected by ferromagnetic particles
- On request with particularly durable, protected wiring by means of special protective sheathing structure against extreme heat, stone and ice impact
- Customer-specific sensor combinations



Multi-channel speed sensor with up to four galvanically isolated sensor systems

Type FAHU52 speed sensors are multi-channel speed sensors with up to four output signals. The signals can be easily adapted to customer requirements. Thus, the sensor is ideally suitable for space-saving applications, if e. g. several processing devices have to be provided with measurement signals or if a rotational direction detection is additionally needed. The output signals can be galvanically isolated on request.

Features

- Speed sensor with up to four customer-specific galvanically isolated sensor systems
- Compact design with robust measuring area
- Various signal combinations
- Only one sensor for multiple applications, e. g. traction control, brake control
- Cost-saving concerning purchase and service
- Space-saving when mounting the multi-channel speed sensor
- Minimises wiring effort
- On request with particularly durable, protected wiring by means of special protective sheathing structure against extreme heat, stone and ice impact
- Customer-specific sensor combinations



Temperature sensors

Traction motor | gearbox | wheelset | compressor unit | air conditioning



NORIS is your experienced specialist for the acquisition of temperatures in particularly adverse conditions. Housing and wiring of temperature sensors on the traction motor, gearbox and wheelset of rail vehicles are often weak points, as they are exposed to permanent high temperatures and mechanical stresses. You benefit from our experience from other industries, where the demands placed on the sensors are equally high. Our temperature sensors are designed in such a way that they withstand these extreme stresses in the long run.



Features

- Broad temperature range from -40 °C ... 250 °C
- Versions with standard industry signal outputs:
0 ... 20 mA, 4 ... 20 mA, 0 ... 10 V_{DC}, 2 ... 10 V_{DC}
- Pt100/Pt1000 as two-wire, three-wire or four-wire version
- Compact and extremely robust designs
- Flange with straight, 45° or 90° cable outlet
- Thread sensors different pipe lengths, different materials
- On request with particularly durable, protected wiring by means of special protective sheathing structure against extreme heat, stone and ice impact
- Customer-specific sensor combinations



Application examples

- Acquisition of the bearing or stator temperature on the traction motor and gearbox
- Acquisition of the bearing temperature on the wheelset for hot box detection
- Temperature acquisition for bogie monitoring
- Acquisition of the cooling water and lubricating oil temperature on motor and gearbox
- Acquisition of the vehicle interior temperature for controlling the air conditioning
- Acquisition of the temperatures in the cooling circuit of the air conditioning
- Temperature acquisition in the compressor unit



Multi sensors

Traction motor | gearbox | bogie



Multi sensors are particularly used for the condition monitoring, where either several measured values are to be recorded in one place, and/or only one sensor can be used for reasons of space. This minimises procurement costs as well as assembly and installation costs, and the reduced cabling means a smaller area exposed to environmental influences. Our multi sensors include up to three sensors for the acquisition of acceleration (vibration), temperature and/or speed in one housing.

Features

- Any combination of acceleration, temperature and/or speed sensor can be realised
- Space-saving design and mechanical compatibility by means of integration into standard designs
- With analogue or digital interfaces on request
- On request with particularly durable, protected wiring by means of special protective sheathing structure against extreme heat, stone and ice impact
- Customer-specific sensor combinations
- Technical properties of speed sensors see page 6/7
- Technical properties of temperature sensors see page 8
- Acceleration sensor: One measuring axis, 70 g or 250 g

Application examples

- Combined acquisition of measured data of acceleration (vibration), temperature and speed on the wheelset for bogie monitoring (condition monitoring)



Signal processing devices

Compressor unit | air conditioning | door control | control | wheelset



In the area of signal processing, our product portfolio ranges from simple control devices like for example measuring transducers and limit value switches up to isolation amplifiers. For applications on the wheelset we provide devices with special functions such as a measuring transducer with integrated error correction for railway wheel wear.

Features

- Measuring transducers for frequency and temperature with industry standard signal outputs 0 ... 20 mA, 4 ... 20 mA, 0 ... 10 V_{DC}, 2 ... 10 V_{DC}
- Limit value switches for frequency, temperature and all industry standard signals 0 ... 20 mA, 4 ... 20 mA, 0 ... 10 V_{DC}, 2 ... 10 V_{DC}
- Large operating temperature range -20 ... +70 °C
- Compact and robust housing design
- Measuring transducer and limit value switch for mounting side by side on G or top-hat rail

Application examples

- Measuring transducer of frequency signals for several galvanically independent systems
- Measuring transducer for correcting tyre wear
- Limit value monitoring for temperatures within the air conditioning
- Limit value monitoring for bearing temperatures of the drive system



Analogue indicators for visualisation

Driver's cab



Analogue indicators are used where a cost-effective solution for visualisation of speed, temperature, brake force etc. is needed. Compared to display indicators they are more cost-effective and durable and provide an accurate display at any time of day and from any perspective, even in strong sunlight. Furthermore, the electronics are more robust and they are mostly resistant to harsh environmental conditions and thermal extremes. Another benefit of our analogue indicators is the modular design, with which the dials can be easily customised for your requirements. You select graduation, scale colour, graphic scale imprints, pointer colour, lighting as well as other useful functions.

Features

- In stepper motor technology or as cost-effective moving coil indicator
- For all conventional analog industry standard signals or frequency and temperature signals
- Bright, dimmable LED scale illumination, optional pointer lighting by means of innovative lighting concept
- Extremely robust to withstand high mechanical stress
- Available in various scales, colours, housing designs and sizes:
round: Ø 80/100/130 mm;
square: 72 x 72 mm, 96 x 96 mm, 144 x 144 mm

Additional functions

(stepping-motor technology)

- Zero position centre (detection of rotational direction) or scale spreading
- Optionally with integrated signal LED for limit or status display
- Optionally with pointer blinking for limit display
- Optionally with LC display e. g. as trip odometer or operating hours counter
- Optionally with limit value switch output
- Optionally with two independently controlled pointers (e. g. for V nominal / V actual)
- Control function for sensor and auxiliary power outage (live zero)
- Min-max display for storing and subsequent display of critical measurement values
- Pointer position feedback

Application examples

- Speed display of trams and metros
- Brake force display of freight locomotives
- Display of the oil temperature of locomotive engines
- Display of the foam content of fire engines





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