



More than **sensors + automation**



Railway Technology

Innovative solutions for your success





Walter Wüest

Market Segment Manager
Railway Industry
Phone: +49 661 6003-2722
Email: walter.wueest@jumo.net

Dear Reader,

A large number of people use rail vehicles every day. But only the manufacturers of these vehicles or their components know the extreme demands to which they are exposed.

Regardless of whether high-speed traffic, local passenger services, or freight transport is involved, JUMO – your reliable partner – is at your side. JUMO quickly provides solutions for all your temperature and pressure measurement technology requirements in the vehicles.

How do we accomplish that? By applying years of experience and professional expertise. JUMO has been a leading manufacturer of measurement and control systems for more than 60 years. This has helped us become an accomplished partner for the railway industry.

We place special importance on regular new development cycles, on constantly improving existing products, and on continually making production methods more economical. This is the only way that we can achieve the highest level of innovation.

In the field of railway technology JUMO also only offers you the best – a wide variety of products that have been checked according to relevant railway standards for a wide variety of solutions for the most varied applications.

This brochure provides an overview of JUMO products and systems for railway technology. Of course we would also be happy to develop individual solutions that are completely customized to your requirements.

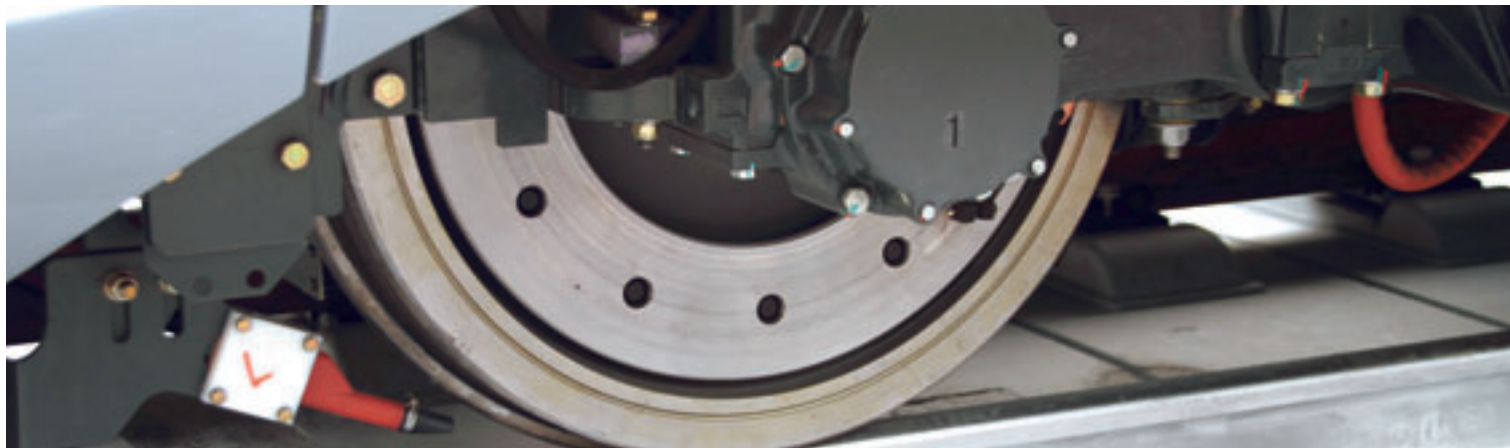
Yours,
Walter Wüest

PS: For detailed information about our products arranged by type and product group number please visit www.industry.jumo.info.

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Drive technology

In rail vehicles, generating movement by means of power transmission imposes some extreme loads on the components of the drive system. This occurrence produces high temperatures for some mechanical components that have to be constantly monitored. Reliable measurement technology from JUMO helps you monitor temperature and pressure in drive systems.



Electric traction

Temperature-dependent control of transformer cooling with AMTHF series surface-mounted thermostats

The electric driving motors of locomotives or railcars are designed for a far lower voltage than that present in the overhead contact wires of the traction lines. So transformers are used to transform the voltage down to a value that the motor can take. The temperature of an oil-filled transformer will vary, depending on the power consumption during vehicle operation. To counteract overheating, a temperature-dependent cooling system that can incorporate the different power levels is used. The exact switching point of the cooling system is highly significant, particularly when there are vast fluctua-

tions in ambient temperature (e.g. when traveling through a tunnel). AMTHF series surface-mounted thermostats monitor the oil temperature of the transformer and reliably operate the individual power levels of the cooling system.

A further option is to use a temperature sensing element to regulate the motor power in accordance with the oil temperature. In other words, the driving performance is adjusted to the maximum operating temperature of the transformer. The pressure in the cooling system can be measured with the JUMO MIDAS S19R or the JUMO MIDAS S06.

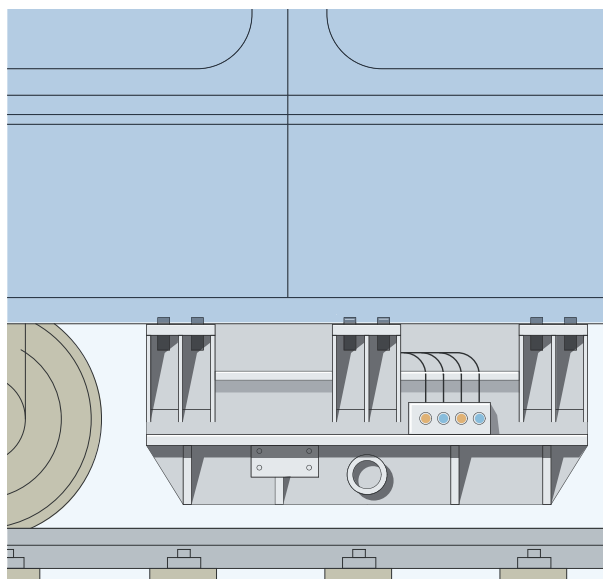
JUMO surface-mounted thermostat

AMTHF series
Type 603051



JUMO screw-in RTD temperature probe

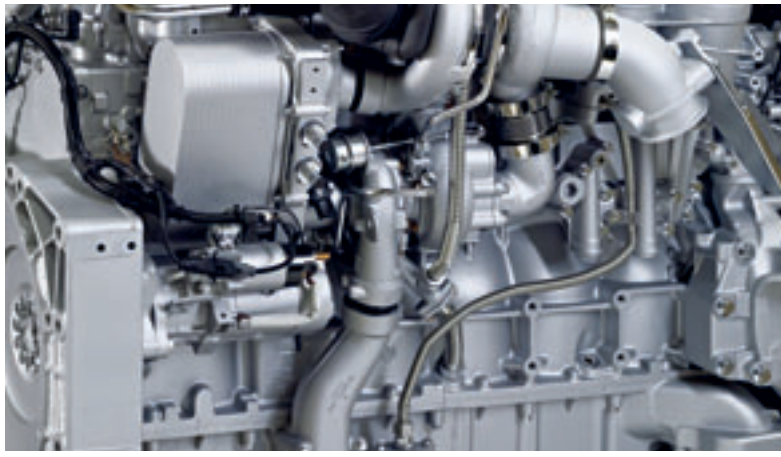
with terminal head form J
Type 902030



JUMO MIDAS S19R

Pressure transmitter
Type 401008





Diesel traction

Monitoring temperature in diesel engines

To achieve optimum drive power and best possible efficiency the heat balance in modern diesel engines has to be appropriate. Precise temperature measurement is imperative, as tight restrictions are imposed on temperature. The screw-in RTD temperature probe stands out because of its robustness in demanding installation situations. It provides accurate temperature values for the engine and lubricating oil as well as for the engine control charge-air. Data is also transmitted from the main cooling circuit to the controller for engine cooling management.

Fuel, lubricating oil, and charge-air pressure measurement in diesel engines with the JUMO MIDAS S19R

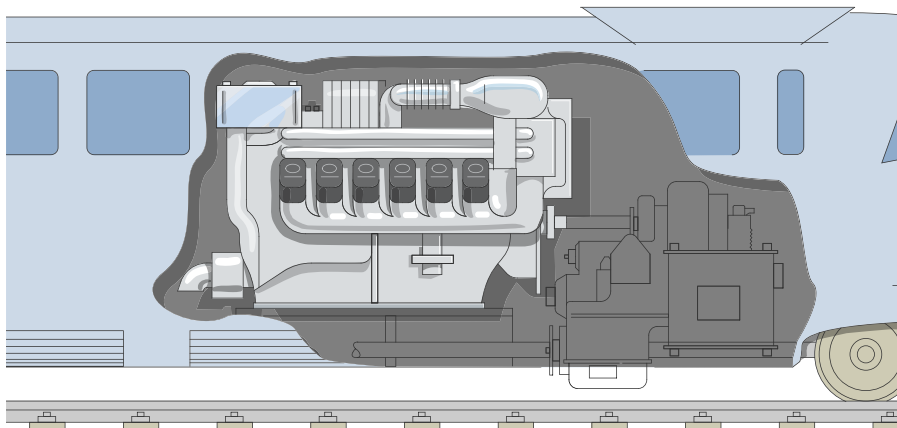
Common rail technology is increasingly being relied on as the method of fuel injection for diesel engines. Other than temperature measurement, pressure monitoring is primarily imperative for perfect engine operation.

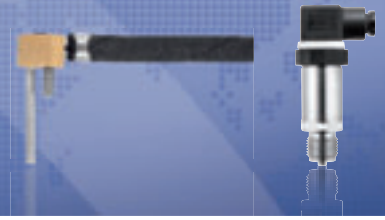
With the JUMO MIDAS S19R pressure transmitter you can monitor the feed pressure and rail pressure of the fuel, the pressure of the lubricating oil, and the charge-air pressure of the turbocharger.

JUMO screw-in RTD temperature probe
for the railway industry
Type 902815



JUMO MIDAS S19R
Pressure transmitter
Type 401008





Hydraulic power transfer

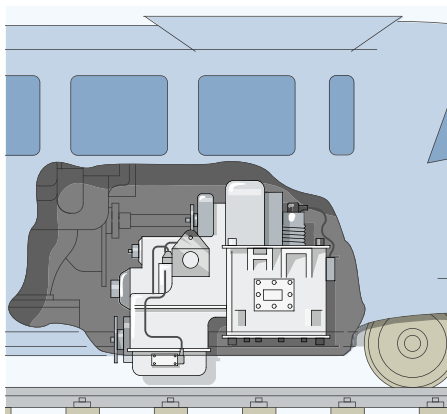
Monitoring of the oil temperature in hydrodynamic transmission

Hydrodynamic gear units are a combination of torque converters and fluid couplings that convert the mechanical energy of the diesel engine into the fluid energy of a liquid, which is usually oil. The oil temperature must be continuously monitored to prevent an admissible maximum temperature value being exceeded. Use the particularly robust RTD temperature probe – the JUMO VIBROtemp – for measuring the temperature of the transmission oil.

Retarder monitoring with the JUMO MIDAS S19R and screw-in temperature probes

You can use the JUMO MIDAS S19R pressure transmitter and the screw-in RTD temperature probe to monitor hydrodynamic braking (retarder), the brake force of which acts on the vehicle drive shaft via a rotor by filling the retarder with oil.

JUMO MIDAS S19R
Pressure transmitter
Type 401008



JUMO screw-in RTD temperature probe
for the railway industry
Type 902815



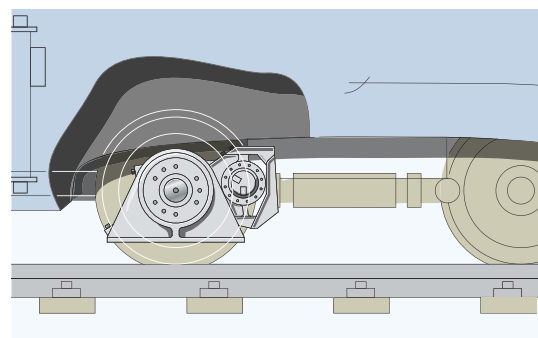
Wheelset transmission

Monitoring the bearing temperature in final drives

Wheelset gears transfer the drive force to the drive wheelset. In diesel-powered vehicles the drive force is transferred from the main transmission whereas in electric-powered vehicles the drive force is transferred from the traction motor.

The enormous loads on the bearings and the gear tooth flanks generate heat and are made manageable by lubricating with oil. For safety reasons temperature monitoring is essential to ensure reliable transmission operation. The bearing temperature is measured by a temperature probe that has been specifically developed and certified for this demanding measurement task. An example of such a probe is the JUMO wheelset RTD temperature probe (patent pending).

JUMO wheelset RTD temperature probe
Type 902150





Climate control

To provide passengers with the most comfortable journey possible, all modern railroad cars are now fitted with powerful air conditioners. High-quality measuring devices from JUMO are the ideal solution to ensure that air conditioners perform their heating and cooling functions perfectly regardless of whether the outside temperatures are extremely high or low.



Air conditioning system

Monitoring temperature and pressure in an air-conditioning system

Modern air-conditioning systems are responsible for generating both hot and cold temperatures in passenger compartments. As a result, the monitoring of pressure and temperature is particularly important. Sensor technology from JUMO ensures that every air-conditioning system runs smoothly. Other than RTD temperature probes you can also use JUMO thermostats to monitor and control the temperature. Air heating, hot-water heating, and convection heating are often used to assist the air-conditioning system. Here, too, JUMO can provide reliable devices for you to monitor and control your heating system.

JUMO panel-mounted thermostat

EM/EMF series
Type 602021



JUMO MIDAS S19R

Pressure transmitter
Type 401008



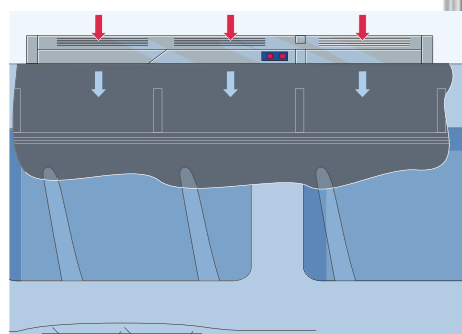
JUMO screw-in RTD temperature probe for the railway industry

Type 902815



JUMO surface-mounted thermostat

AMTHF series
Type 603051



Climate monitoring

Indoor temperature monitoring with sensor technology from JUMO

For optimum control and regulation of air conditioning systems, reliable data about the climatic conditions inside the railroad cars or driver's cabs must be available. JUMO's RTD temperature probes provide reliable temperature values to help you maintain a pleasant ambient temperature.

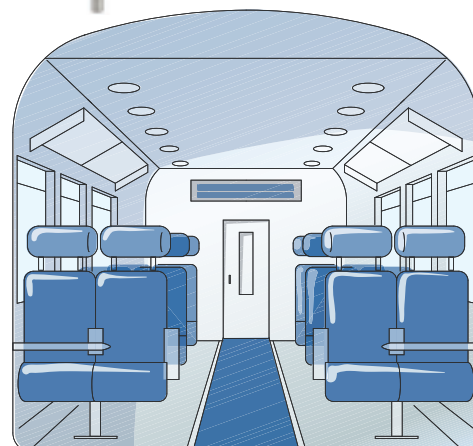
JUMO screw-in RTD temperature probe for the railway industry

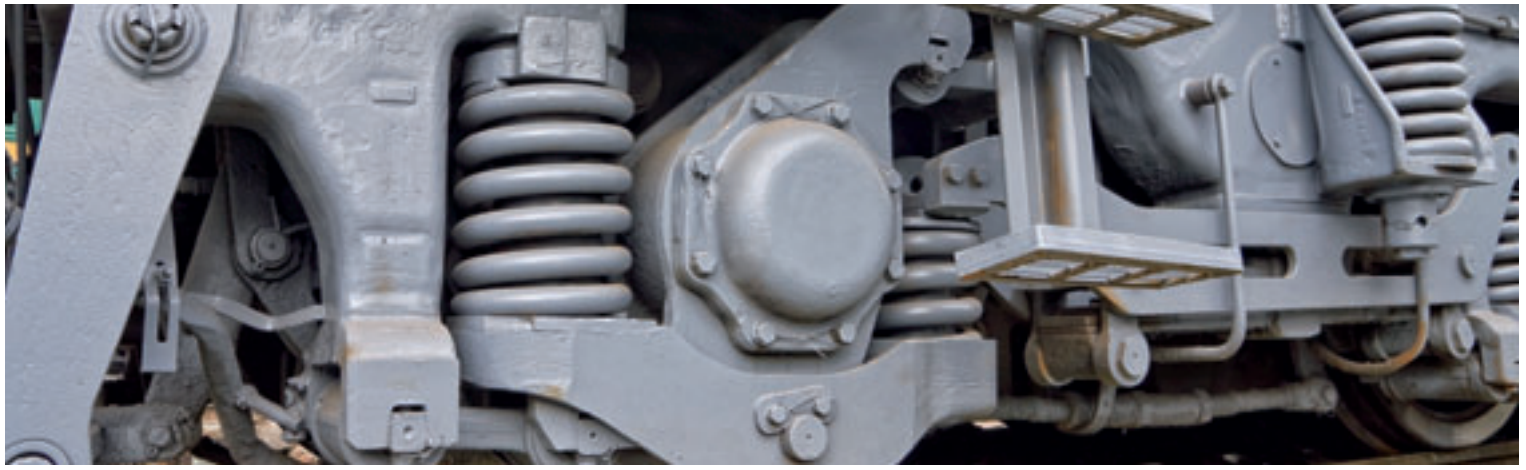
Type 902815



JUMO push-in RTD temperature probe

with connecting cable for the railway industry
Type 902150





Pneumatics

In virtually all rail vehicles, compressed air is the most important source of energy (along with electric current) because compressed air is responsible for many of the basic functions of a train. Reliable pressure monitoring throughout the system is vital in the generation, distribution, and use of the compressed air. Pressure transmitters from JUMO can help you in this task.



Compressed-air system

Temperature and pressure monitoring in the compressor

Compressors supply the compressed-air systems of rail vehicles with the compressed air they require. Regardless of whether you use screw or piston compressors as your main or auxiliary compressor, you can reliably monitor the pressure and temperature inside the compressor with JUMO sensor technology.

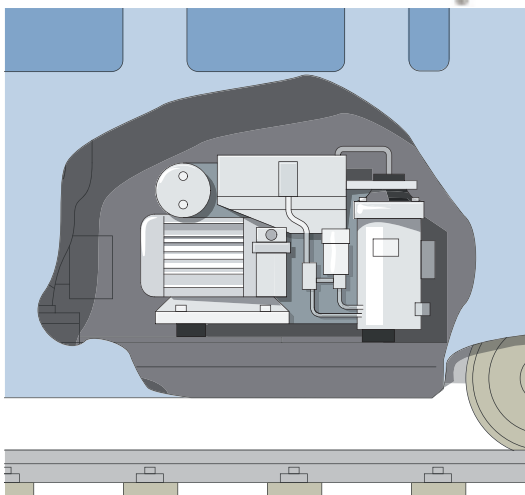
Monitoring the compressed-air system with the MIDAS S19R

The pressure in the main air reservoir line and in the storage tanks can also be monitored using the JUMO MIDAS pressure transmitter. If the pressure falls below a certain value the compressor is switched on and switched off again once a maximum value is reached. This maintains a constant pressure in the storage tanks.

JUMO MIDAS S19R
Pressure transmitter
Type 401008



JUMO screw-in RTD temperature probe
for the railway industry
Type 902815



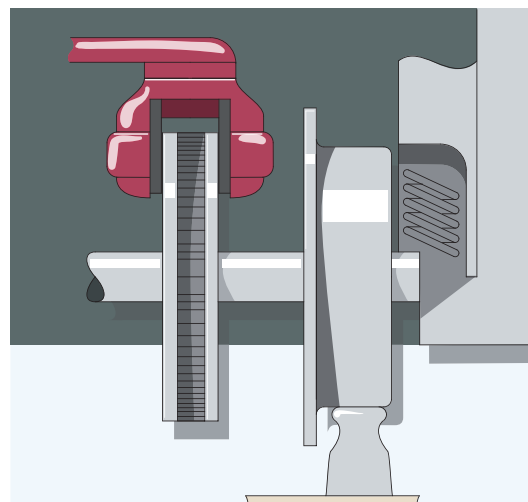
Brake

Pressure monitoring in the brake circuit with the JUMO MIDAS S19R

In rail vehicles, pneumatic wheel brakes take the form of block brakes or disc brakes. Both these design types have in common that when the brake system operates, compressed air flows into the brake cylinder and acts on the piston via a brake linkage to push the brake blocks against the wheels or the brake shoes against the brake disc.

To monitor pressure in the brake circuit, use the JUMO MIDAS S19R which has been specifically developed and certified for the harsh ambient conditions found in rail vehicles.

JUMO MIDAS S19R
Pressure transmitter
Type 401008





Process, waste, and fire-fighting water tanks

Vacuum toilets as an example of pressure condition monitoring with the JUMO MIDAS S06

The toilet systems in modern rail vehicles are cut off from the surrounding environment. In these airtight systems, a vacuum brings the wastewater and feces to the wastewater tank.

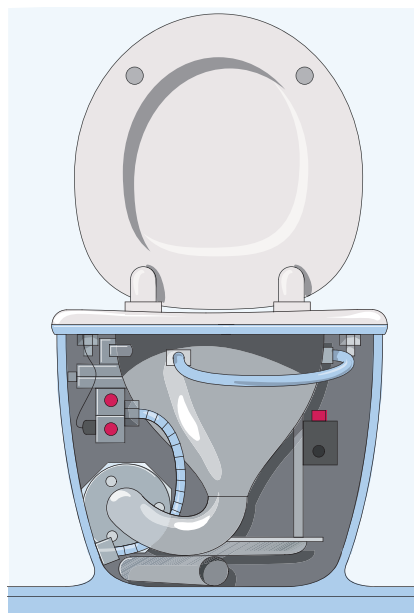
When flushing the vacuum pump generates a vacuum in an intermediate tank, the inlet valve opens, and the contents of the toilet bowl are sucked into the tank. The inlet valve then closes, excess pressure builds up in the intermediate tank, the outlet valve opens, and the content of the intermediate tank is pushed into the wastewater tank.

To ensure trouble-free flushing you can measure the system operating pressure in the compressed air supply line and the vacuum as well as excess pressures in the intermediate tank during the flush cycle with the JUMO MIDAS S06.

Anti-freeze protection monitoring in process water, wastewater, and fire-fighting water tanks

To protect rail vehicle water tanks against frost damage during the cold season, the heating systems in the tanks are switched on when the outdoor temperatures are low. JUMO thermostats ensure accurate and reliable temperature monitoring and heating element operation here. Temperature values can also be recorded by RTD temperature probes and processed accordingly in the electronic controller.

JUMO surface-mounted thermostat
ATH-SW series
Type 603035

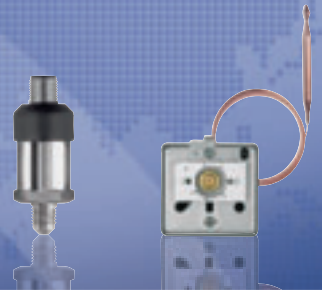


JUMO MIDAS S06
Pressure transmitter
Type 401011



JUMO panel-mounted thermostat
EM/EMF series
Type 602021





Other compressed air consuming units

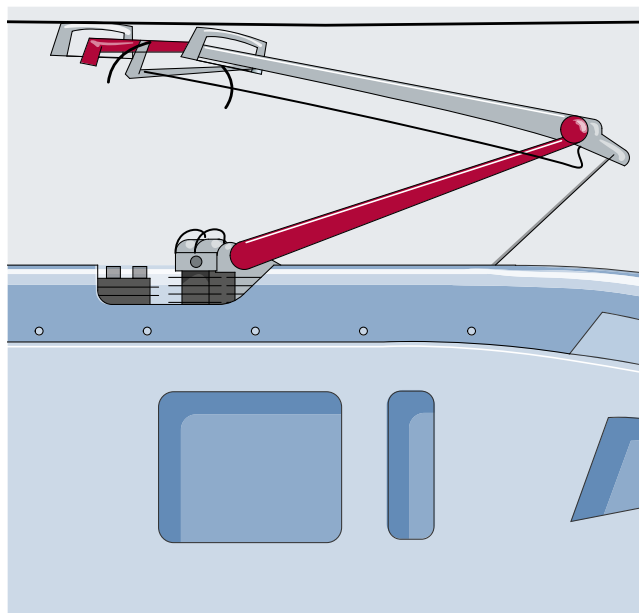
Pressure monitoring on compressed air consuming units with the MIDAS S19R

Other than the pneumatic braking system and the toilet systems there are other basic devices in a rail vehicle that are operated by compressed air. These include the current collector, the entry and intermediate doors, the pneumatic suspension, the wheel flange lubrication system, and the sander. All these consuming units can be monitored with JUMO

pressure transmitters. The JUMO MIDAS S19R with its distinctive long-term stability and excellent price-performance ratio is very suitable for this task. The JUMO MIDAS S19R has been specifically developed and certified for the special requirements in railway technology.

JUMO MIDAS S19R

Pressure transmitter
Type 401008





Infrastructure

JUMO does not only provide devices for actual automotive technology applications in the field of railway technology, it also provides devices to be used outside the rail vehicles. Wherever temperatures have to be measured or pressure patterns monitored, JUMO – your professional partner – is at your side.



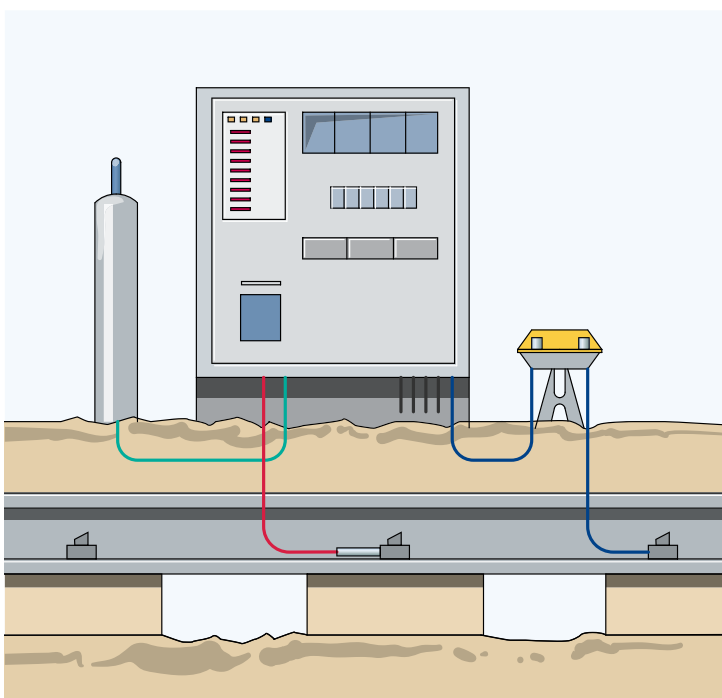
Point heating

Measuring the outdoor and rail temperatures with JUMO temperature probes

Cold outdoor temperatures as well as snowfall can cause the individual elements of the railway switches to freeze together if the railway switches are not heated.

In cold weather, heating comes into play to clear the ice and snow from between the switch rails and the stock rails or the movable point frog. They allow the railway switches to continue to operate, thus preventing disruptions to the service.

Modern electrical railway switch heating design types now work fully automatically. For this task the system control unit needs reliable data about the local climatic conditions in the railway switch environment. Temperature sensors from JUMO provide measured values for the ambient and rail temperatures to ensure optimum control of the timing for switching the heating on and off.



**JUMO push-in
RTD temperature probe**
with connecting cable
Type 902150



JUMO product highlights for railway technology at a glance



JUMO surface-mounted thermostat

with two, three, or four single-pole snap-action switches

- Protection type IP65
- Operating temperature (ambient temperature) -50 to $+80^{\circ}\text{C}$
- Tested according to DIN EN 61373 category 1B as well as further relevant railway standards such as DIN EN 50155
- Microswitch with snap-action system
- Robust, versatile, and reliable
- Outstanding long service life through more than 5.3 million switching cycles



JUMO MIDAS S19R

Pressure transmitter for railway applications

- Measuring ranges:
 - 1.6 to 60 bar relative
 - 1.6 to 40 bar absolute
- Welded measuring system
- Tested according to DIN EN 61373 category 1B as well as further relevant railway standards such as DIN EN 50155
- Vibration and shock resistant
- Tested acc. to railway standards
- Highly resistant to overload
- For maximum EMC requirements



JUMO wheelset temperature probe

Push-in RTD temperature probe with connecting cable

- For temperatures between -60 to $+180^{\circ}\text{C}$
- Tested according to DIN EN 61373 category 3 as well as further relevant railway standards such as DIN EN 50155
- As single and double RTD temperature probes
- Vibration and shock resistant
- Tested acc. to railway standards
- In two, three, or four-wire circuit
- Halogen-free connecting cable
- Patent pending



JUMO screw-in RTD temperature probe

for railway applications

- For temperatures between -50 to $+270^{\circ}\text{C}$
- Tested according to DIN EN 61373 category 1B as well as further relevant railway standards such as DIN EN 50155
- Vibration-resistant construction
- Connection locking ensures contact reliability, protection type IP67 (IP69K)



Extract from the reference list:



Our portfolio includes even more products and services

JUMO provides you with the entire measuring chain from sensor to automation solution for temperature, pressure, liquid analysis, flow, level, and humidity. Our goal is always to offer our worldwide customers the optimum solution in matters of process reliability, energy efficiency, and cost optimization.

We therefore rely on our perfectly functioning after-sales service for an extensive range of services.

Do you still have questions or would you like to know more about our products? If you do, please contact us.

Other industry brochures

If you are interested in one of the other industries we cover you can now order a related brochure. Simply call +49 661 6003-0 or send an email to mail@jumo.net.

A selection

- Food technology
- Chemical engineering
- Pharmaceuticals and biotechnology
- Water and wastewater engineering
- Dairy technology
- Meat processing
- Wind power plants
- Plastics and packaging technology
- Heating and air conditioning
- Industrial furnace construction

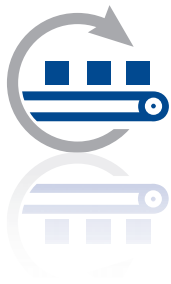


Services & Support

It is the quality of our products that is responsible for such a high level of customer satisfaction. But our reliable after-sales service and comprehensive support are also valued. Let us introduce you to the key services we provide for our innovative JUMO products. You can count on them – anytime, anywhere.

JUMO Services & Support – so that it all comes together!

Manufacturing Service



Are you looking for a competitive and efficient system or component supplier? Regardless of whether you seek electronic modules or perfectly fitting sensors – either for small batches or mass production – we are happy to be your partner. From development to production we can provide all the stages from a single source. In close cooperation with your business our experienced experts search for the optimum solution for your application and incorporate all engineering tasks. Then JUMO manufactures the product for you. As a result you profit from state-of-the-art manufacturing technologies and our uncompromising quality management systems.

Customer-specific sensor technology

- Development of temperature probes, pressure transmitters, conductivity sensors, or pH and redox electrodes according to your requirements
- A large number of testing facilities
- Incorporation of the qualifications into application
- Material management
- Mechanical testing
- Thermal test



Electronic modules

- Development
- Design
- Test concept
- Material management
- Production
- Logistics and distribution
- After-sales service



Metal technology

- Toolmaking
- Punching and forming technology
- Flexible sheet metal machining
- Production of floats
- Welding, jointing, and assembly technology
- Surface treatment technology
- Quality management for materials





Information & Training



Would you like to increase the process quality in your company or optimize a plant? Then use the offers available on the JUMO website and benefit from the know-how of a globally respected manufacturer. For example, under the menu item "Services and Support" you will find a broad range of seminars. Videos are available under the keyword "E-Learning" about topics specific to measurement and control technology. Under "Literature" you can learn valuable tips for beginners and professionals. And, of course, you can also download the current version of any JUMO software or technical documentation for both newer and older products.

Product Service



We have an efficient distribution network on all continents available to all of our customers so that we can offer professional support for everything concerning our product portfolio. Our team of professional JUMO employees is near you ready to help with consultations, product selection, engineering, or optimum use of our products. Even after our devices are commissioned you can count on us. Our telephone support line is available to give you answers quickly. If a malfunction needs to be repaired on site our Express Repair Service and our 24-hour replacement part service are available to you. That provides peace of mind.

Maintenance & Calibration



Our maintenance service helps you to maintain optimum availability of your devices and plants. This prevents malfunctions and downtime. Together with the responsible parties at your company we develop a future-oriented maintenance concept and are happy to create all required reports, documentation, and protocols. Because we know how important precise measurement and control results are for your processes we naturally also professionally calibrate your JUMO devices – on site at your company or in our accredited DAkkS calibration laboratory for temperature. We record the results for you in a calibration certificate according to EN 10 204.



www.jumo.net