Railway Technology

Innovative solutions for your success

Contact
Phone: +49 661 6003-0
Email: bm-railway@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 public transport, or freight transport is involved, JUMO – your reliable partner – is at your side. JUMO quickly provides solutions for all your temperature, level, and pressure measurement technology requirements in the vehicles.

So how do we do it? By applying years of experience and professional expertise. JUMO has been a leading manufacturer of measurement and control systems for more than 70 years. This has helped us become an expert partner for the railway industry.

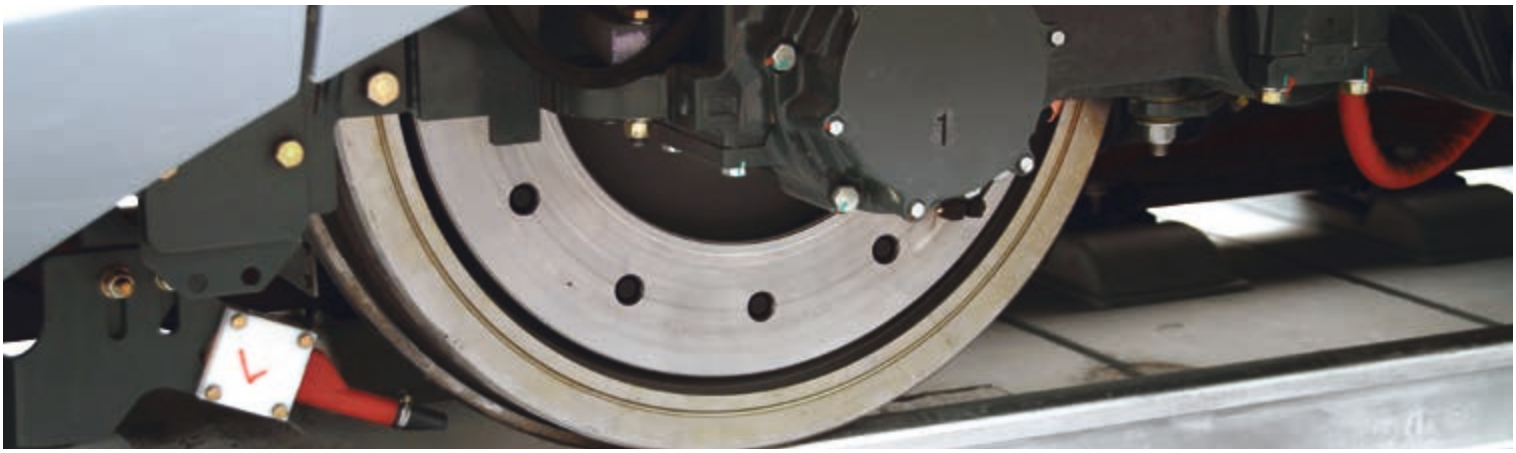
We place great value on steady new developments, continuous improvement of existing products, and on production methods that are always becoming more economical. Only this path allows us to achieve the highest degree of innovation for you.

In the field of railroad technology, we also offer you only the best – a wide variety of products that have been approved according to relevant railway standards and therefore a wide range of solutions for the most diverse 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.

PS: Detailed information about our products can be found under the product group number at http://industry.jumo.info.

Table of contents



Drive technology

In rail vehicles, generating movement by means of power transmission imposes some extreme loads on the components of the drive system. As a result, some mechanical components are exposed to high temperatures 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 and monitoring of transformer cooling with surface-mounted thermostats of the AMTHF series

The electric drive motors of locomotives or railcars are designed for a far lower voltage than what is available in the overhead contact lines. As a result, transformers are applied to transform the voltage down to a value that the motor can process.

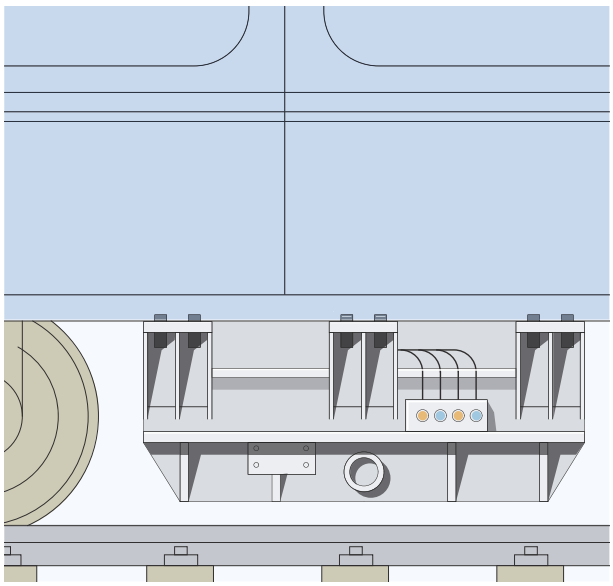
The temperature of an oil-filled transformer will vary, depending on the power consumption during vehicle operation. Overheating is counteracted by a temperature-dependent cooling system, which can include different power levels. The exact switching point of the cooling system is highly significant, particularly when vast fluctuations in ambient temperature occur (e.g. when traveling through a tunnel).

Surface-mounted thermostats of the AMTHF series monitor the oil temperature of the transformer and reliably switch the individual power levels of the cooling system.

A further option is to use a temperature sensor 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 S19 R or the JUMO MIDAS S06.

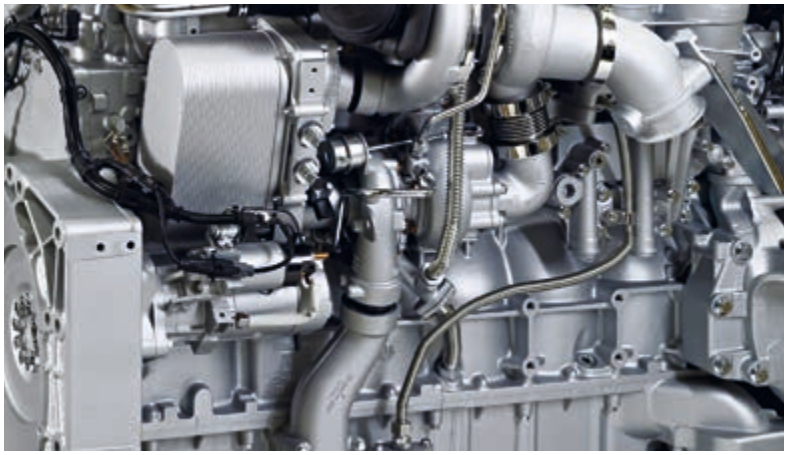
JUMO surface-mounted thermostat
AMTHF series
Type 603051

JUMO screw-in RTD temperature probe
With terminal head form J
Type 902030



JUMO MIDAS S19 R
Pressure transmitter
Type 401008

JUMO eTRON T100
Electronic thermostat
Type 701052



Diesel traction

Monitoring temperature in diesel motors

Optimum drive power and the best possible efficiency can only be achieved if the heat balance in modern diesel motors is optimized. Precise temperature measurement is imperative, as a narrow temperature range must be maintained. The screw-in RTD temperature probe distinguishes itself due to its robustness in demanding installation situations. It provides accurate temperature values for the motor or lubricating oil as well as charge-air to the motor control. Data is also transmitted from the main cooling circuit to the controller for motor cooling management.

Pressure measurement of the fuel, lubricating oil, and charge-air in diesel motors with JUMO MIDAS S19 R

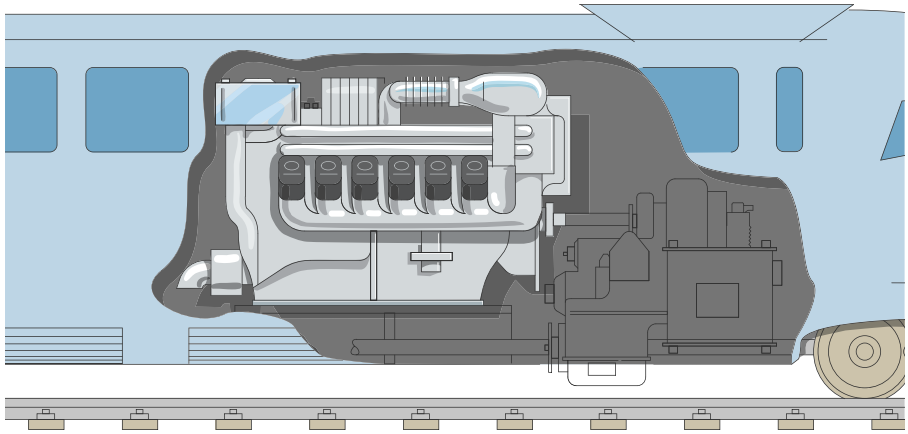
Common rail technology is increasingly being relied upon as the fuel injection method for diesel motors. Other than temperature measurement, pressure monitoring in particular is essential for perfect motor operation. The JUMO MIDAS S19 R pressure transmitter allows you to monitor the feed pressure and rail pressure of the fuel, the pressure of the lubricating oil, and the charge-air pressure of the turbocharger. The air filters are monitored with the JUMO MIDAS DP10 differential pressure transmitter.

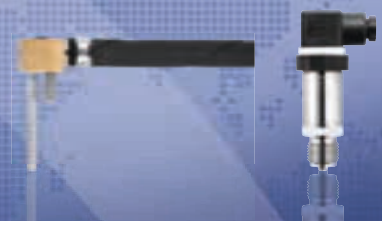
JUMO eTRON T100
Electronic thermostat
Type 701052

JUMO screw-in RTD temperature probe
For railway applications
Type 902815

JUMO MIDAS DP10
Differential pressure transmitter
Type 401050

JUMO MIDAS S19 R
Pressure transmitter
Type 401008





Hydraulic power transfer

Monitoring of the oil temperature with JUMO VIBROtemp in hydrodynamic gearboxes

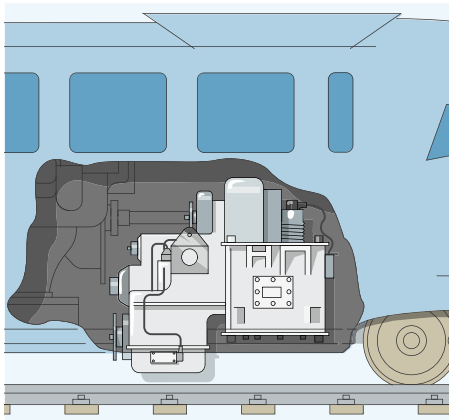
Hydrodynamic gearboxes are a combination of torque converters and fluid couplings that convert the mechanical energy of the diesel motor into the fluid energy of a liquid, which is usually oil. Here, the oil temperature must be continuously monitored to prevent an admissible maximum temperature value from being exceeded. Use the particularly shock and vibration resistant RTD temperature probe JUMO VIBROtemp for measuring the temperature of the gearbox oil.

Retarder monitoring with the JUMO MIDAS S19 R and a screw-in RTD temperature probe

The force of hydrodynamic brakes acts by filling the retarder with oil via a rotor on the drive shaft of the vehicle. You can monitor retarders with the JUMO MIDAS S19 R pressure transmitter and with the screw-in RTD temperature probe.

JUMO MIDAS S19 R
Pressure transmitter
Type 401008

JUMO screw-in RTD temperature probe
For railway applications
Type 902815



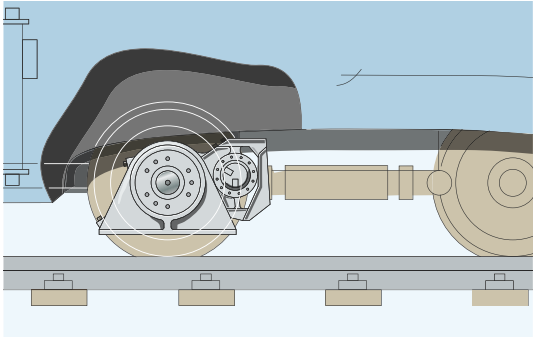
Wheelset gearboxes and axle bearings

Monitoring the bearing temperature in wheelset gearboxes

Wheelset gearboxes transfer the drive force to the drive wheelset. In diesel-powered vehicles the drive force is transferred from the main gearbox whereas in electric-powered vehicles the drive force is transferred from the drive motor.
The enormous loads on the bearings and the tooth flanks of the gearbox generate heat and are made manageable through lubrication with oil. For safety reasons, temperature monitoring is essential to ensure reliable gear operation. The bearing temperature is measured by a temperature probe that has been specifically developed and qualified for this demanding measurement task – the JUMO RTD temperature probe for wheelset gearboxes.

JUMO eTRON T100
Electronic thermostat
Type 701052

JUMO RTD temperature probe
For wheelset gearboxes
Type 902150



Climate control

To provide passengers with the most comfortable journey possible, all modern railroad cars are now equipped with powerful air conditioners. High-quality measurement and control technology from JUMO is used to ensure that these can provide a comfortable temperature in the passenger compartment at both very high and extremely low outside temperatures.

Air conditioning system

Monitoring of temperature, level, and pressure

Modern air-conditioning systems are responsible for heating and cooling in passenger compartments. As a result, the monitoring of level, pressure, and temperature is particularly important. Float switches and sensors from JUMO ensure that every air-conditioning system runs smoothly. Other than RTD temperature probes you can also use JUMO thermostats to monitor and control the temperature.

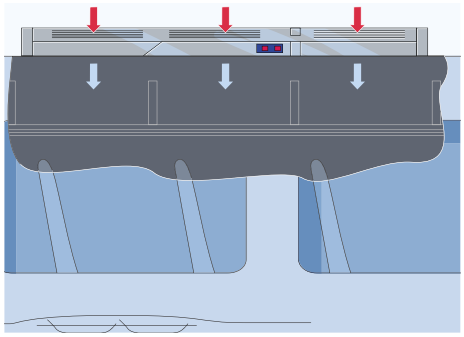
Air heating, hot-water heating, and convection heating are often used to assist the air-conditioning system. Here, too, JUMO can provide reliable devices for you to monitor and control your heating system.

JUMO panel-mounted thermostat
EM/EMF series
Type 602021

JUMO MIDAS S19 R
Pressure transmitter
Type 401008

JUMO screw-in RTD temperature probe
For railway applications
Type 902815

JUMO surface-mounted thermostat
AMTHF series
Type 603051



JUMO eTRON T100
Electronic thermostat
Type 701052

Climate monitoring

Indoor temperature monitoring

Reliable data on the climatic conditions inside railroad cars or driver's cabs is required for optimum control and regulation of air-conditioning systems. JUMO's RTD temperature probes provide reliable temperature values to help you maintain a pleasant ambient temperature.

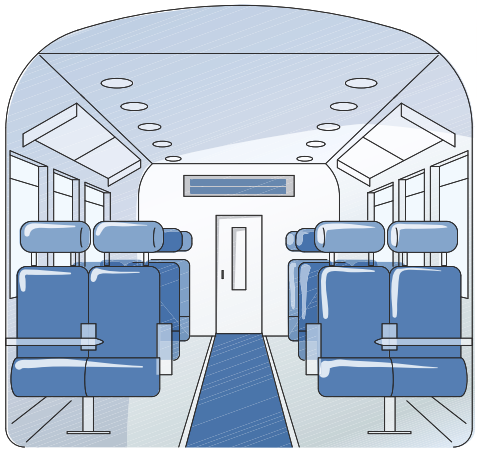
The electronic thermostat JUMO eTRON T100 is perfect for this application. It monitors and controls the interior temperatures in railroad cars and complies with the standards and specifications for use in rail vehicles according to DIN EN 50155, DIN EN 50121, and DIN EN 45545.

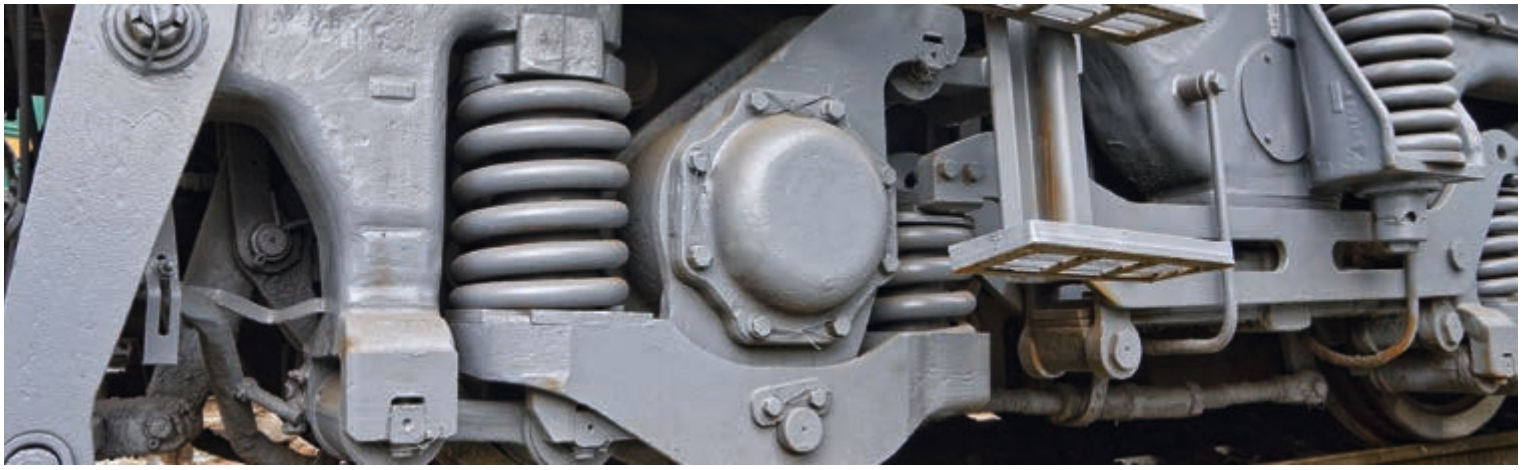
JUMO MIDAS S06
Pressure transmitter for low pressure applications
Type 401011

JUMO MIDAS DP10
Differential pressure transmitter
Type 401050

JUMO push-in RTD temperature probes
With connection line for railway applications
Type 902150

JUMO NESOS R02 LS
Standard version of float switch
Type 408302





Pneumatics

In almost all rail vehicles, compressed air is the most important energy source besides electrical current, as it is responsible for many elementary functions in a train. Reliable pressure monitoring throughout the system is vital for 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.

Inspecting the compressed air system with JUMO MIDAS S19 R

The pressure in the main air reservoir line and in the storage tanks is controlled using the JUMO MIDAS S19 R pressure transmitter. Here, 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 consistent pressure in the storage tanks.

Brake

Pressure monitoring in the brake circuit with JUMO MIDAS S19 R

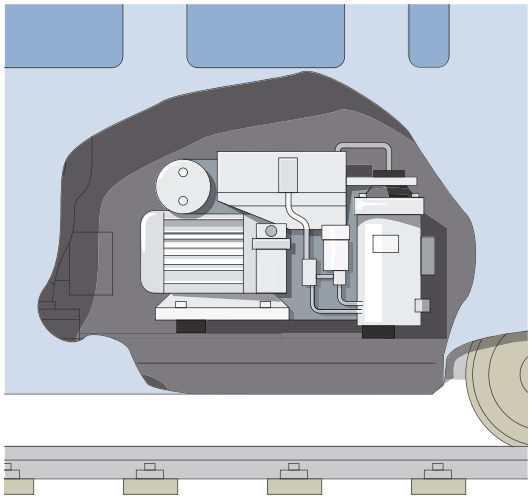
In rail vehicles, pneumatic wheel brakes take the form of block brakes or disc brakes. Both these design types have in common that when the brake system operates, compressed air flows into the brake cylinder and acts on the piston via a brake linkage to push the brake blocks against the wheels or the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

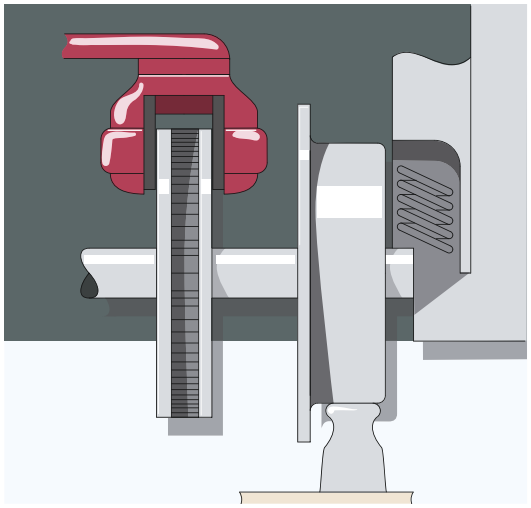
To control pressure in the brake circuit, you can use the JUMO MIDAS S19 R which was specifically developed and qualified for the harsh ambient conditions found in rail vehicles.

JUMO MIDAS S19 R
Pressure transmitter
Type 401008

JUMO eTRON T100
Electronic thermostat
Type 701052

JUMO screw-in RTD temperature probe
For railway applications
Type 902815





Service water, wastewater, and extinguishing water tanks

Monitoring the pressure conditions of vacuum toilets with JUMO MIDAS S06

The toilet systems in modern rail vehicles are cut off from the surrounding environment. In these airtight systems, negative pressure 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 a smooth rinsing process, the operating pressure of the system in the air pressure supply line and the negative pressure as well as overpressure in the intermediate tank can be measured during the flush cycle with the JUMO MIDAS S06.

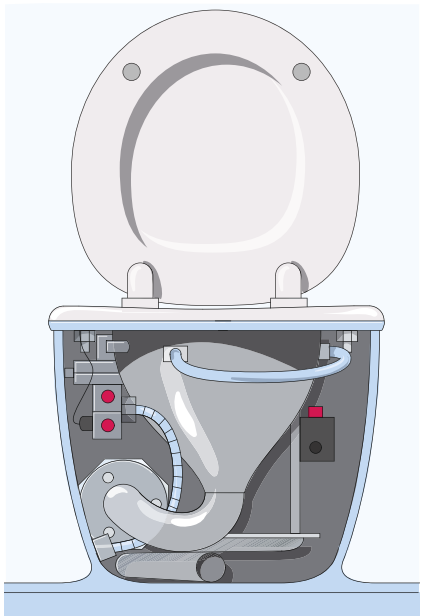
Frost protection monitoring in service water, wastewater, and extinguishing water tanks

Thermostats from JUMO are used to protect the water tanks in a rail vehicle from frost damage during the cold season. They ensure reliable temperature monitoring and switch the heating systems in the tanks when required. In addition, the temperature values can be acquired by RTD temperature probes and processed accordingly in the electronic controller. The level of the water tanks can be monitored either with the JUMO NESOS R01 float switch or a differential pressure transmitter. JUMO MIDAS DP10 or JUMO MIDAS S06, which is predestined for low pressures, are the devices of choice here. The JUMO eTRON T100 electronic thermostat is used to monitor the level and water temperature in the individual tanks.

JUMO eTRON T100
Electronic thermostat
Type 701052

JUMO MIDAS DP10
Differential pressure transmitter
Type 401050

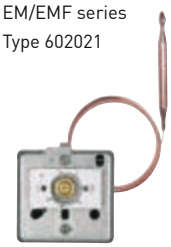
JUMO surface-mounted thermostat
ATH-SW series
Type 603035

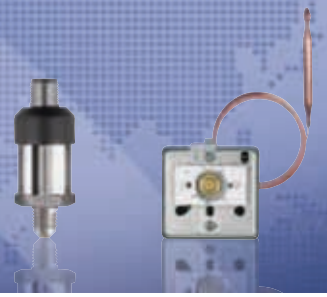


JUMO MIDAS S06
Pressure transmitter
Type 401011

JUMO NESOS R01
Float switch in miniature version
Type 408301

JUMO panel-mounted thermostat
EM/EMF series
Type 602021





Other compressed air consuming units

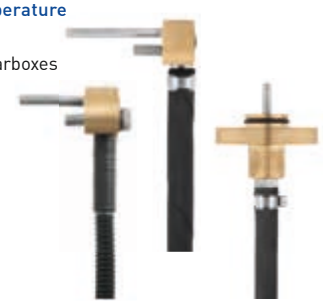
Pressure monitoring on compressed air consuming units with JUMO MIDAS S19 R

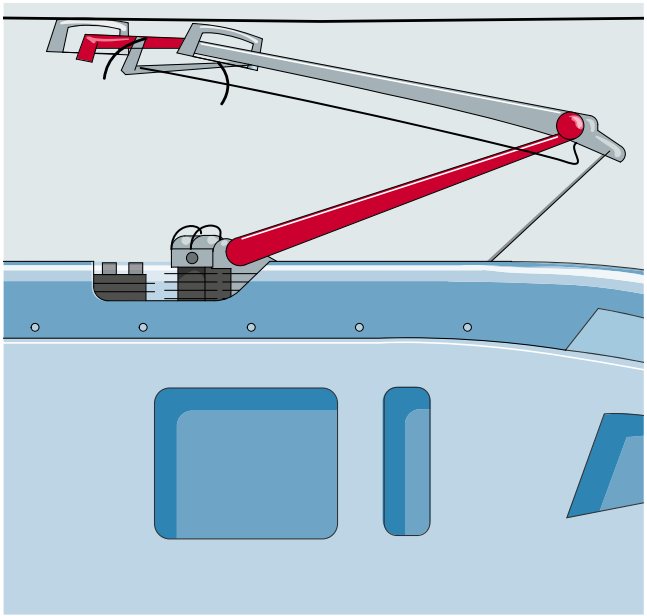
In addition to the pneumatic braking system and the toilet system, a rail vehicle contains other basic equipment that is operated with compressed air. This includes the current collector, the entry and intermediate doors, the air suspension, the wheel flange lubrication system, and the sand spreading device.

All these loads can be monitored with JUMO pressure transmitters – especially with the JUMO MIDAS S19 R. It is characterized by its long-term stability and excellent price-performance ratio. In addition, it was developed and qualified for the special requirements of the railroad technology field.

JUMO MIDAS S19 R
Pressure transmitter
Type 401008

JUMO RTD temperature probe
For wheelset gearboxes
Type 902150





Infrastructure

JUMO not only provides devices for vehicle technology application in the railway technology field, but also for use in areas that do not include rail vehicles. Wherever temperatures have to be measured and wherever level or pressure processes have to be monitored, JUMO is at your side as your professional partner.

Railway switch heaters

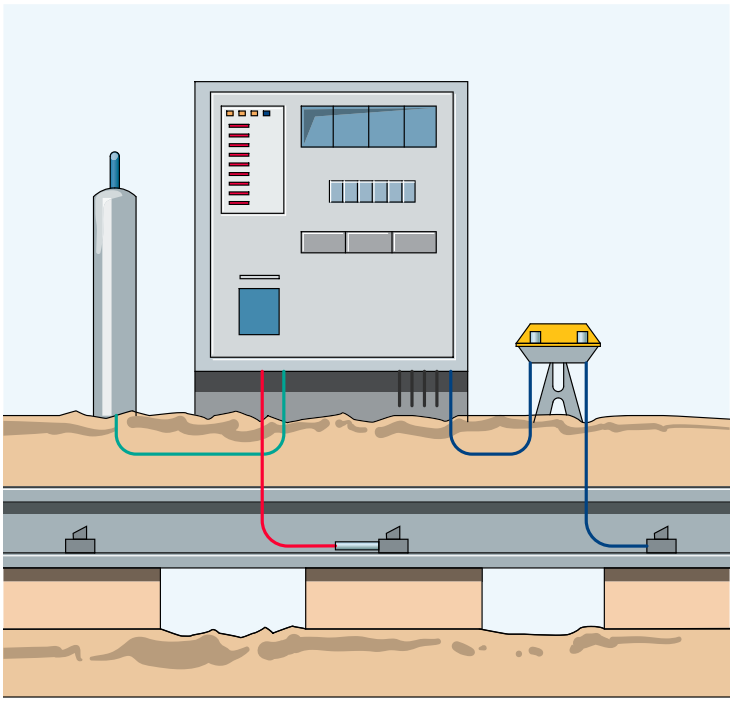
Measuring the outdoor and rail temperatures with JUMO temperature probes

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, heaters clear the ice and snow from between the switch rails and the stock rails or the movable centerpiece. They allow the railway switches to continue to operate, thereby preventing disruptions to the service.

Today, modern design types of electric railway switch heaters operate 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.

The JUMO eTRON T100 electronic thermostat is suitable for monitoring the temperature.



JUMO panel-mounted thermostat
EM/EMF series
Type 602021

JUMO eTRON T100
Electronic thermostat
Type 701052

JUMO push-in RTD temperature probe
With connection line
Type 902150

Product highlights for railway technology at a glance

JUMO surface-mounted thermostat

With 2, 3, or 4 single-pole snap-action switches

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

JUMO panel-mounted thermostat

EM/EMF series

- Tested according to DIN EN 61373 category 1B as well as other relevant railway standards such as DIN EN 50155
- Robust, versatile, and reliable
- Outstanding long operating life through more than 5.3 million switching cycles
- 1, 2, 3, or 4 single-pole snap-action switches possible
- Self-monitoring in the event of a pressure drop
- Safety switch-off at -20 °C

JUMO MIDAS S19 R

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 other relevant railway standards such as DIN EN 50155
- Vibration and shock resistant
- Tested according to railway standards
- Highly resistant to overload
- For maximum EMC requirements

JUMO MIDAS DP10

Differential pressure transmitters

- Measuring ranges: 0 to 400 mbar – 0 to 16 bar differential pressure
- Silicon sensor with stainless steel separating diaphragm
- Tested according to DIN EN 61373 category 1B as well as other relevant railway standards such as DIN EN 50155
- Compact design: as of 78 mm in length
- Parts in contact with media: PBT plastic, option with full stainless steel
- Overload pressure up to 30 bar on one side

JUMO MIDAS S06

Pressure transmitter for low pressure applications

- Measuring range as of 0 to 100 mbar relative
- High degree of process reliability due to a welded measuring system with no seals
- Tested according to DIN EN 61373 category 1B as well as other relevant railway standards such as DIN EN 50155
- Robust and maintenance-free measurement technology thanks to extreme overload resistance
- Parts in contact with media are made of stainless steel
- Compact design: as of 58 mm in length

JUMO RTD temperature probe for wheelset gearboxes

Push-in RTD temperature probe with connection line

- For temperatures from -60 to +180 °C
- Tested according to DIN EN 61373 category 3 and other relevant railroad standards such as DIN EN 50155
- Available as single and double RTD temperature probe
- Vibration and shock resistant
- In two-wire, three-wire, or four-wire circuit
- Halogen-free connection line

JUMO screw-in RTD temperature probe

For railway applications

- For temperatures from -50 to +270 °C
- Tested according to DIN EN 61373 category 1B as well as other relevant railway standards such as DIN EN 50155
- Vibration-resistant construction
- Plug connection locked to ensure contact, protection type IP67 (IP69K)
- Temperature probe with J head with suitable transmitter 4 to 20 mA

JUMO eTRON T100

Electronic thermostat

- Meets the standards and specifications for use in rail vehicles according to DIN EN 50155, DIN EN 50121, and DIN EN 45545
- Fast acquisition of the process status through plain text information on the display
- Relay output with 10 A change-over contact for switching high-performance loads
- Fast and reliable wiring through the use of PUSH IN terminals
- Simple startup and operation through plain text support
- Space-saving mounting in control cabinets and in sub-distribution boards

Reference list
Service & Support

Excerpt from the reference list:

Our portfolio includes even more products and services

JUMO provides 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 customers around the world the optimum solution in matters of process reliability, energy efficiency, and cost optimization.

As a result, we rely on our perfected after-sales service as well as an extensive range of services.

Do you still have questions or would you like to know more about our products? If so, please don't hesitate to contact us.

Other industry brochures

If you are interested in one of the other industries that we supply you can now order the respective brochure. Simply call (0)661 6003-0 or send an email to mail@jumo.net.

A selection

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

Information & training courses

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 expertise of a world-renowned manufacturer. For example, under the menu item "Support & Services" you will find a broad range of seminars. Videos are available under the keyword "E-Learning" about topics specifically dealing with 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 5 continents available to all of our customers so that we can offer expert 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 put to use you can count on us. You will receive fast responses from our telephone support team. 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 and calibration

Our maintenance service helps you to maintain optimum availability of your devices and plants. This prevents malfunctions and downtimes. Together with the responsible parties in your company, we develop a farsighted 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 calibrate your JUMO devices in a professional manner – 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 DIN EN 10204.

www.jumo.net

PR 00068 EN/00588538/V3