

Case study

Precise pressure for safe tracks

The highly automated railway construction machines from system7 rail technology place high demands on the reliability of their safety-relevant systems. For the continuous monitoring of the pneumatic brake system, precise pressure transmitters and pressure switches from Trafag are used. The robust and compact sensors for railway applications ensure reliable pressure measurement even under vibrations, shocks, and large temperature fluctuations.

Reliable brake monitoring at system7 railtechnology

The railway system, and thus the safe, fast, and climate-friendly transport of people and goods, depends on the good condition of its track, rails, and switches. Creating and maintaining these is the task of the highly automated railway construction machines from system7 railtechnology. As with all rail vehicles, the brake system is one of the safety-relevant subsystems. Its operational readiness is therefore constantly monitored. For this, the railway construction machine manufacturer uses precise, robust, and durable pressure transmitters and switches from Trafag.

Rail transport is particularly energy efficient, because when the steel wheels roll on the steel rails, little friction is generated. A track consists of two rails, usually mounted on sleepers, and the track ballast. Since the ballast can shift under the weight of passing trains, sleepers occasionally need to be replaced and the ballast tamped again. Until the mid-20th century, the construction and maintenance of tracks was extremely physically demanding and labor-intensive. Since the 1950s, hydraulic tamping machines have enabled mechanized, fast, and efficient track construction.

Automated track maintenance with high precision

Since 2017, the system7 railtechnology GmbH, founded in 2013 in Laakirchen (Upper Austria), has been supplying in-house developed automated track construction machines to customers worldwide. Their patented fully hydraulic tamping drives, unlike the mechanical eccentric drives of conventional tamping machines, require no manual calibration. The fact that their components only move during actual tamping work saves energy and CO_2 emissions and reduces noise pollution for track workers and residents. In addition, the fully digitalized railway construction machines from system7 railtechnology automatically optimize tamping time, pressure, and vibration frequency based on the continuously measured ballast density.

About system7 railtechnology GmbH

System7 railtechnology GmbH is an Austrian manufacturer of innovative special machines and solutions for track maintenance for worldwide export. Together with system7 railsupport GmbH, the company founded in 2013 is part of system7 railholding GmbH. The approximately 250 employees of the private company at the Laakirchen (Upper Austria) site generate annual sales of around 35 million euros.

More information at:
system7 railtechnology GmbH



«Railway construction machines are exposed to all weather conditions as well as vibrations and shocks during tough construction site operations. Their deployments are usually scheduled year-round and planned to the hour.»

This ensures highly precise track geometry and extends the durability of the tamping by up to 30 percent. In addition, they identify fasteners and sleepers with high precision; an important basis for the automation of work processes.

The flagship of the system7 railtechnology product range is the *«Continuous Tamping Robot 4.0»*. This fully digitalized tamping robot tamps two sleeper axes simultaneously in each cycle. It processes tracks and switches continuously without stopping for individual tamping cycles. The automatic tamping mode detects the condition of the existing ballast bed and automatically adjusts the tamping parameters. This reduces noise and dust pollution as well as maintenance effort. The long-term development goal of system7 is fully automatic and ultimately autonomous track maintenance.

Fluid technology under the toughest operating conditions

The Tamping Robots from system7 railtechnology are fully digitalized, but essentially a domain of fluid technology. Both their highly complex tamping drives with eight divisible, independently movable units for 32 tamping tines and the drive units of the approximately 25 to 40 meter long machines are hydraulic. Some auxiliary units and the brake system operate pneumatically.

The brake system is considered safety-critical in rail vehicles and is subject to the strictest requirements of the approval authorities. At the same time, it represents a relevant cost factor in maintenance. Railway construction machines are exposed to all weather conditions as well as vibrations and shocks during tough construction site operations. Their deployments are usually scheduled year-round and planned to the hour.



The automated track construction machines from system7 railtechnology GmbH are particularly energy-efficient, CO_2-saving, and quiet thanks to their patented fully hydraulic tamping drives and the continuous measurement of ballast density.



The Tamping Robots from system7 railtechnology are a domain of fluid technology. Both their tamping drives and drive units are hydraulic. Some auxiliary units and the brake system operate pneumatically.

«Unplanned failures due to sudden brake defects have serious consequences for the progress of construction sites, can extend track closures, and are therefore not acceptable»

Ing. Otto Gastberger, Head of Fluid Technology at system7 railtechnology GmbH

Comprehensive monitoring of the brake system

«Unplanned failures due to sudden brake defects have serious consequences for the progress of construction sites, can extend track closures, and are therefore not acceptable», emphasizes Ing. Otto Gastberger, Head of Fluid Technology at system7 railtechnology. *«That is why we rely on comprehensive, structured monitoring of the entire brake system.»*

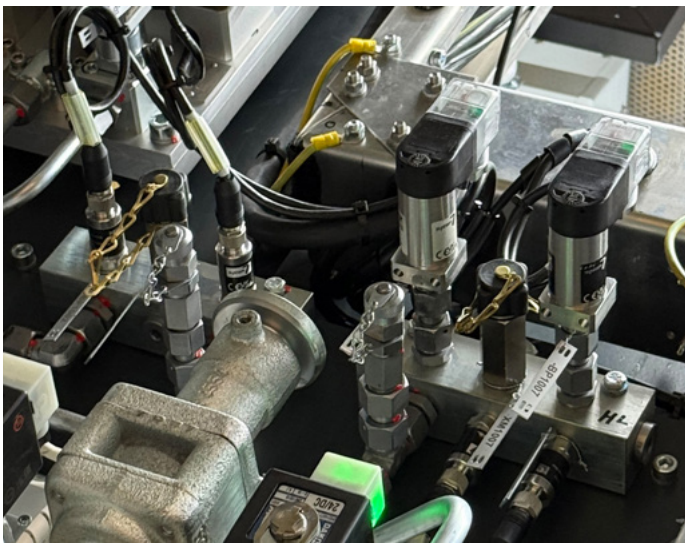
Per machine, two mechanical pressure switches monitor the limit values in the main air line. In addition, the brake supply line of each of the up to ten brakes in the vehicle is monitored. For redundancy, two pressure transmitters each take over this monitoring. For some brakes, a third transmitter monitors the restoration of brake pressure after each interruption of the air supply. This interruption is necessary to ensure smooth operation and high precision during cyclic tamping.

More compact sensors for tight installation spaces

The design of all fluid technology components of the railway construction machines from system7 railtechnology is carried out in the in-house fluid technology department using state-of-the-art software. For their production, the machine manufacturer relies on proven suppliers of components and subsystems. In the case of hydraulics, the preferred partner supplies the units already fully equipped with all sensors.

This was also the case in the past with the components for the pneumatic systems in the machines, though not always to the satisfaction of the fluid experts at system7 railtechnology. *«The pressure transmitters used by the previous supplier met the requirements, but they were not up to date in terms of design,»* reports Otto Gastberger. *«Therefore, they were quite large, which made their integration into the often very tight installation situations difficult.»*

In addition, their price was significantly higher than that of comparable products from other manufacturers. Therefore, Otto Gastberger started looking for a suitable railway-certifiable pressure transmitter.



system7 railtechnology relies on comprehensive, structured monitoring of the entire brake system with pressure transmitters and pressure switches from Trafag.



Per machine, two railway pressure switches Picostat 9R5 from Trafag monitor the limit values in the main air line.

«With a media and ambient temperature range from –40 to +85°C and triple overpressure safety, the railway pressure transmitter NAR 8258 is predestined for the tough daily operation of railway construction machines.»

Markus Degasperi, Managing Director of Trafag Austria GmbH

Developed for railway use: NAR 8258

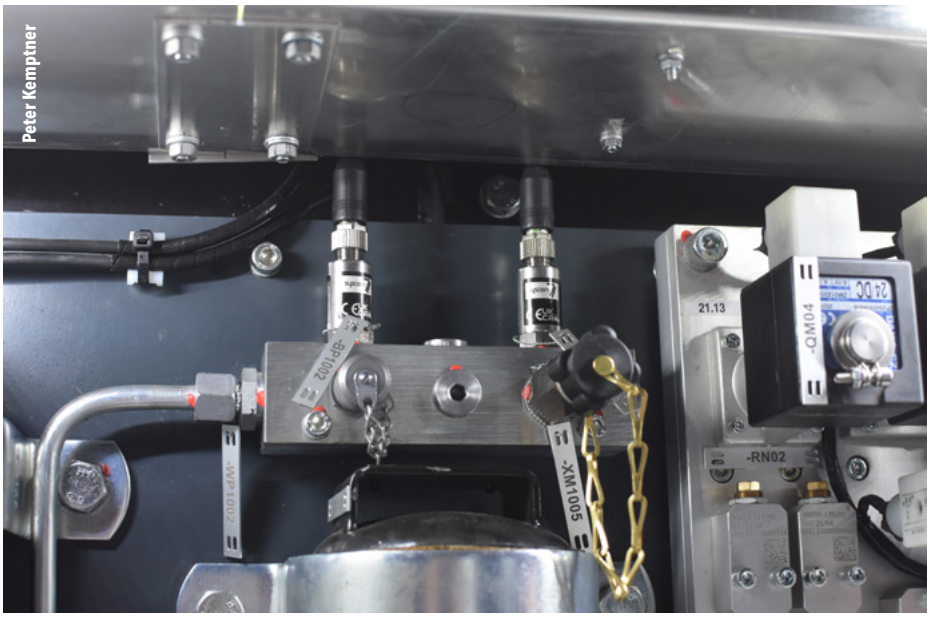
The fluid technology expert found what he was looking for at Trafag, a world-leading manufacturer of sensors for pressure, temperature, and gas density headquartered in Switzerland. The selected product is the railway pressure transmitter NAR 8258 with a measuring range of 0 to 10 bar and increased accuracy of 0.3%. The device was specially developed for rail vehicles and complies with EN 50155. This standard for electronic equipment installed in rail vehicles assumes that the systems must operate in the vehicles for 30 years around the clock or about 250,000 hours without failure.

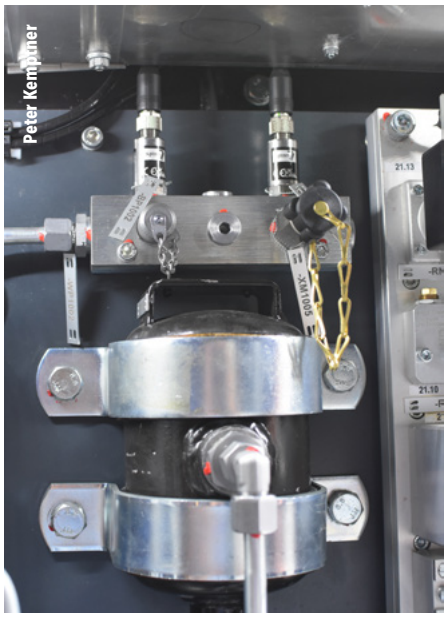
«The railway pressure transmitter features a long-term stable thin-film-on-steel sensor cell,» says Markus Degasperi, Managing Director of Trafag Austria GmbH. *«With a media and ambient temperature range of -40 to +85 °C and triple overpressure safety, it is predestined for the tough everyday operation of railway construction machines.»*

The areas of application range from coastal regions and ports to high alpine locations. This must not affect the pressure measurement on the brake lines. The NAR 8258 reliably provides correct values of the current pressure in the brake lines regardless of altitude. It complies with the AX altitude class according to EN 50125-1 (2,000 m above sea level) as standard.



Railway
Pressure Transmitter
NAR 8258





Two to three railway pressure transmitters NAR 8258 with increased accuracy monitor the brake supply line of each individual brake in the vehicle.

«The pressure switches and transmitters from Trafag fully live up to their reputation as robust, reliable, and precise 'Swiss Made' products.»

Ing. Otto Gastberger, Head of Fluid Technology at system7 railtechnology GmbH

Easy integration and long-term standardization

Not only the measurement parameters, but also the pressure connection and the electrical connection of the selected version correspond exactly to those of the previously used product. Therefore, system7 railtechnology can use the Trafag pressure transmitter without design modifications instead of the replaced model. The resulting standardization is a significant advantage, especially in spare parts management for such long-lasting machines. Another advantage is that the NAR 8258, with a diameter of 18.8 mm and an overall length of 59.6 mm, is significantly smaller than the previously used transmitter.

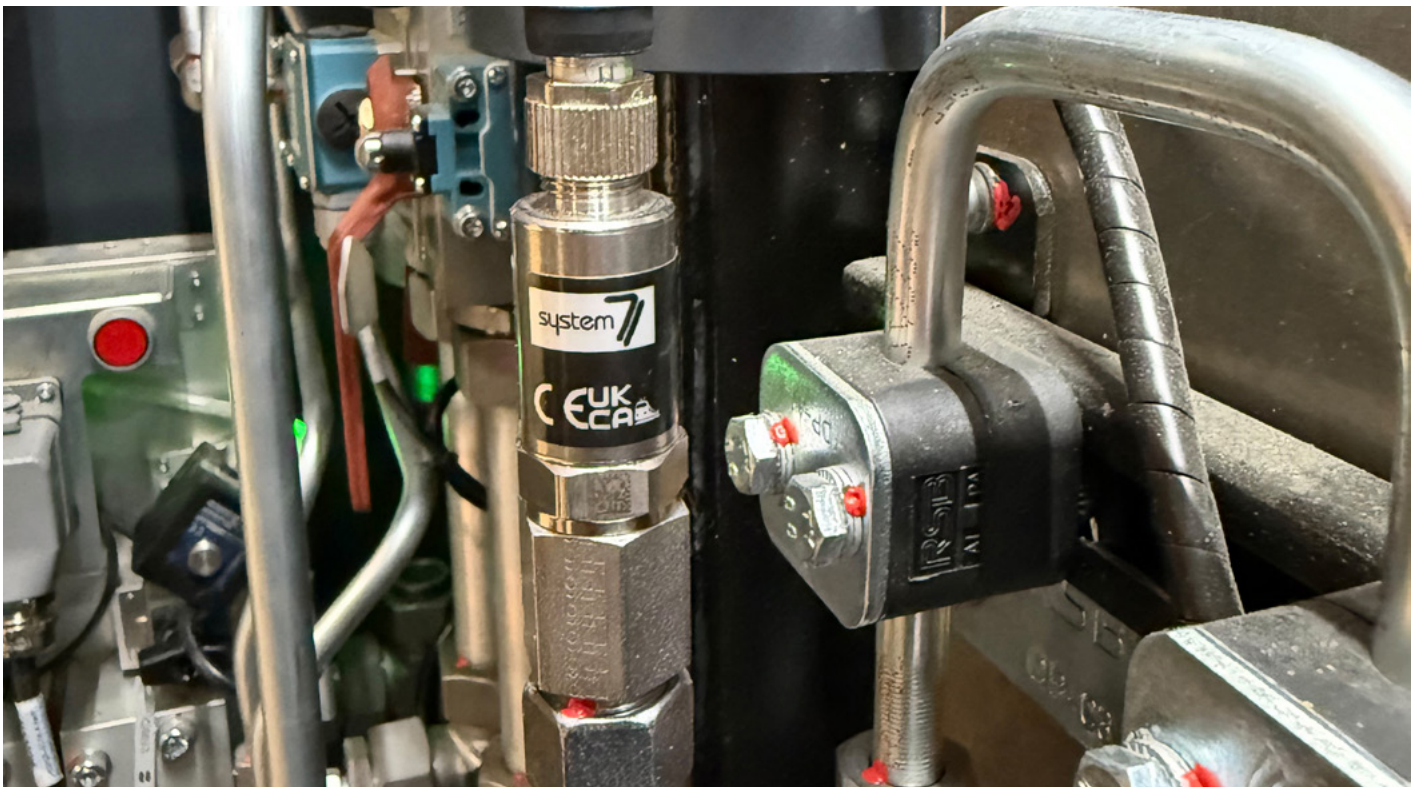
«To protect against unauthorized maintenance interventions with part replacement by customers or third parties, we exclusively install sensors labeled with the system7 railtechnology brand,» adds Otto Gastberger. *«Trafag not only supplies the pressure transmitters in brand-label versions, but also the pressure switches, despite the significantly lower quantities.»*

These are railway pressure switches of the Picostat 9R5 type. This also meets EN 50155 and, with the extended media and ambient temperature range from -40 to +85°C, is suitable for all weather conditions.

Proven in daily railway operation

The conversion of pressure measurement technology in pneumatics at system7 railtechnology took place a few years ago, so reliable experience values are now available.

«The pressure switches and transmitters from Trafag fully live up to their reputation as robust, reliable, and precise 'Swiss Made' products,» reports Otto Gastberger. *«The NAR 8258, due to its significantly smaller design, is much easier to integrate into the often very confined installation spaces, and it is also significantly more cost-effective than the previously used product.»*



To protect against unauthorized maintenance interventions with part replacement, Trafag supplies the pressure transmitters and pressure switches in brand-label versions.

Go to the NAR 8258 product brochure

Scan the QR code and download it

Technical data

Railway
Pressure Transmitter
NAR 8258



Data sheet	www.trafag.com/H72307
Measurement principle	thin-film-on-steel
Measuring range	0 ... 6 to 0 ... 700 bar, 0 ... 100 to 0 ... 10000 psi
Output signal	4 ... 20 mA, Switch output: 1 or 2 PNP
Accuracy @ 25°C typ.	± 0.3 % F.S. typ.
Media temperature	–40°C ... +85°C
Ambient temperature	–40°C ... +85°C (EN 50155: OT6)

Trafag AG – the high-tech sensor company

Trafag is one of the world's leading developers and manufacturers of sensors and monitoring solutions for the precise and reliable measurement of pressure, temperature, level, and gas density. Founded in 1942 and headquartered in Bubikon, Switzerland, the company serves demanding industrial applications worldwide with a broad portfolio of standardized, configurable, and customized solutions.

The product range includes pressure transmitters and pressure switches, temperature transmitters and thermostats, level sensors, and gas density monitoring devices. Trafag solutions are used wherever reliability, safety, and long-term performance are crucial – including in high-voltage switchgear, shipbuilding, large engine construction, hydraulics, railway technology, mechanical engineering, and the process industry.

By combining Swiss engineering, application expertise, and robust product design, Trafag develops solutions for the specific requirements of OEMs, system integrators, and operators. In this way, Trafag helps customers reliably meet demanding quality, safety, and operational requirements even under extreme conditions.

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