

**Improve reliability, efficiency and  
safety of railway applications**



**Fluid control and pneumatic solutions for the rail industry**  
Proven automation solutions and local expertise to help you overcome your toughest challenges.





Advanced technology for rolling stock and rail infrastructure must meet the industry's need for greater operational efficiency, increased reliability and greater passenger comfort and safety.

## You need solutions that provide reliability, efficiency and uncompromised safety

Growing passenger numbers and demand for increased freight capacity is driving reliability, efficiency and safety improvements from rail networks around the world. The rail industry must continue to innovate and embrace new technology, working closely with manufacturers to create solutions that provide step-change improvements, extended life cycles, lower operating costs and meet the demanding operating environments of rail applications. Pneumatics technology used for the control, regulation and safe movement on trains must meet the challenges of extreme temperatures, high voltage tolerances, demanding railway standards, and the shift to condition-based monitoring.

Important parts of the holistic passenger train concept are the integration of higher-performance technologies for command-control and cabin environment applications, and flexible, reliable and safe design and production solutions.

– Shift2Rail, 2020



“Future trains should be more energy-efficient, lighter, more reliable, have more capacity, cost less over their life cycle, be connected and be more comfortable and attractive.”

– European Commission, 2020



“Maintenance is a significant cost driver, accounting for about 40% of the total life cycle cost of rolling stock and thus contributing to expensive fares”

– Boston Consulting Group, 2020



# Assured performance and reliability for greater efficiency and safety

As a specialist provider of pneumatic systems and rail technology, Emerson understands the challenges faced by the industry, with our innovative solutions designed to not only meet the demands of these applications, but also deliver the performance improvements you need. Emerson has supported the rail industry ever since pneumatic brakes were invented for trains. Today, we offer an extensive range of products that not only set standards for quality, reliability and functionality, but also provide lower life cycle costs and maintenance requirements. A global team of industry experts is supporting these class-leading products, collaborating with you to ensure successful outcomes.



## Meet your performance and regulatory compliance goals

- Get rail industry-certified products and solutions designed for challenging applications
- Implement pneumatics products tailored to your specific application
- Simplify integration with compact plug-and-play manifold and panel solutions

Emerson's customized electronic leveling valve for controlling air suspension of the Desiro City train enabled quicker train-height-to-platform-level adjustment, ensuring faster boarding, and lower air consumption and operating costs.



## Reduce your lifecycle costs and maintenance requirements

- Maximize maintenance intervals to reduce costs
- Extend product lifetime and provide lower total cost of ownership
- Increase reliability with IoT-based condition based maintenance solutions

A European pantograph manufacturer is using pre-assembled control manifolds from Emerson to maintain contact with the overhead line. The accurate control performance allows for virtually wear-free performance, preventing damage and reducing maintenance costs.

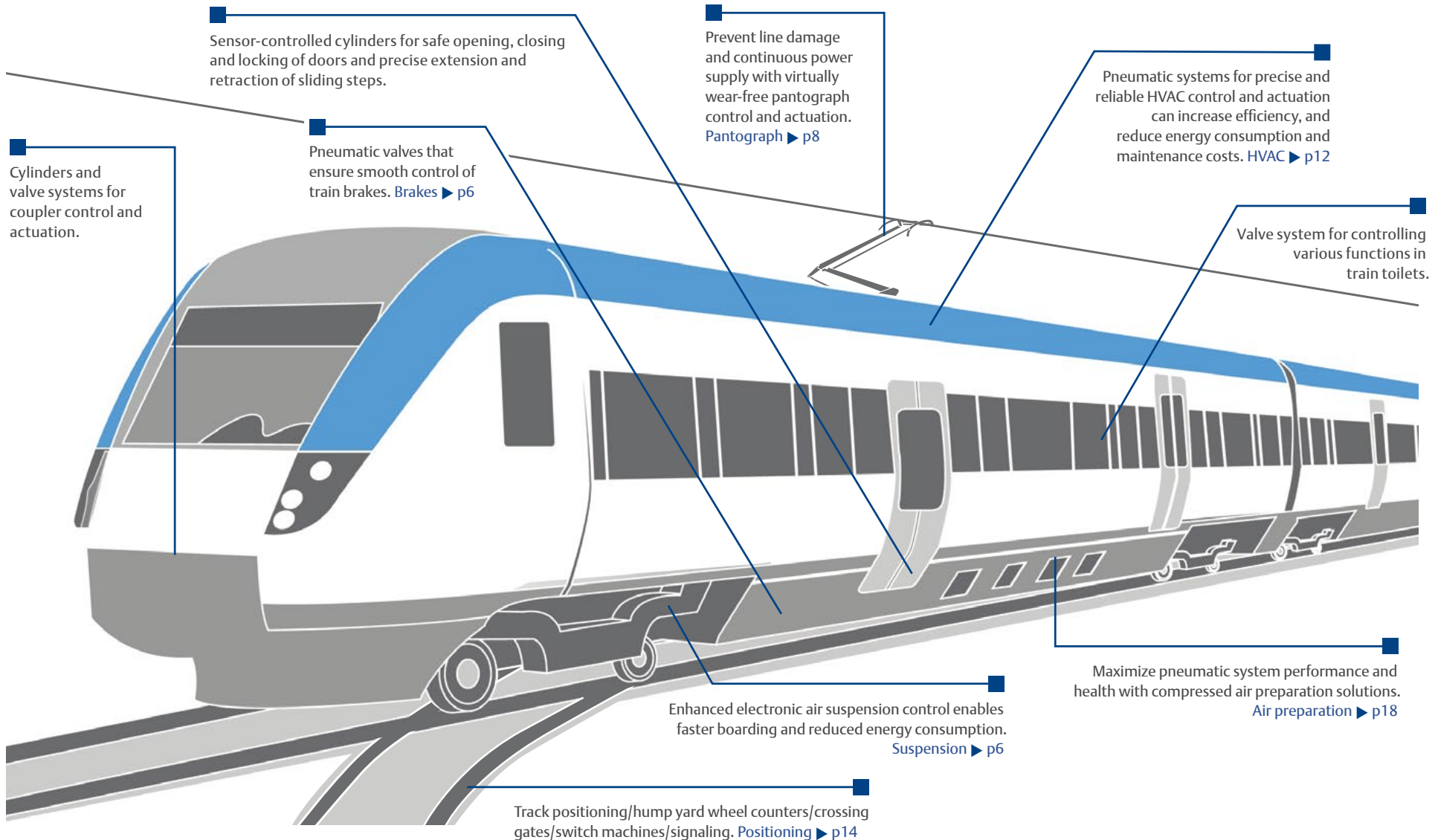


## Get global service and support from local application and industry experts

- Access pneumatic experts with industry expertise to solve your unique challenge
- Get application support and service anywhere around the world

Problematic valves on the coal cars of a large US rail freight company created the possibility of accidental dumping of loads onto tracks. Emerson's patented railcar valve eliminated the issue, reducing losses and preventing operational delays and risk of derailments.

# With Emerson, you can overcome your rolling stock and rail infrastructure challenges





## Suspension and brake control

With advanced pneumatic systems from Emerson you can improve the efficiency of train leveling control and ensure consistent precise and safe braking. ▶ p6

## Pantograph control

Virtually wear-free pneumatic solutions for pantograph control can maintain reliable and continuous power supply while preventing damage and wear, for reduced maintenance costs. ▶ p8

## Freight car unloading

Extremely robust pneumatic solutions can withstand the demands of freight car environments to ensure reliable and efficient unloading and secure transportation of bulk goods. ▶ p10

## HVAC systems

Leak-free compressors using ecological refrigerants, advanced sensing technology and fast acting pneumatic valves and actuators ensure your HVAC systems meet the latest efficiency and refrigerant regulations. ▶ p12

## Position detection

Reduce planned and unplanned maintenance by implementing extremely robust sensors that monitor the functions and condition of infrastructure points, crossings, signaling devices and rolling stock applications, such as pantograph and brake. ▶ p14

## Hydrogen powered trains

By using high pressure regulators and shut-off valves specifically designed for mobile hydrogen applications, you can enhance reliability and safety of a hydrogen drive system. ▶ p16

## Compressed air preparation

Prevent wear and damage to your pneumatic system components with air preparation technology that avoids contamination and water in downstream components. ▶ p18

## Pneumatic solutions for general rail applications

An extensive range of standard and customizable rail-certified cylinders and valves, air preparation units, advanced sensors and auxiliaries meet the requirements of your unique applications. ▶ p20

# Pneumatic solutions for suspension and brake control

Pneumatics provides reliable, secure, long-lasting and cost-effective solutions for controls and drives in brakes and chassis suspension systems. Emerson provides individual pneumatic systems that are designed to fit together perfectly within the available installation envelope, including our ready-to-install control manifolds for controlling the pneumatic service brake and actuating the emergency and park brake. Our electronically controlled air suspension systems ensure fast and precise leveling of the vehicle at station platforms, not only guaranteeing an optimal boarding process, but also reducing air consumption, creating energy savings of up to 50 percent.



## Increase train boarding efficiency

Using Emerson's valve technology to control air suspension on trains helps to reduce energy consumption and enables faster leveling of the train at stations helping to minimize passenger waiting time to exit and board safely.



## Services offered...

- Onsite analysis
- Accelerated procurement
- Maintenance services

## Featured pneumatic solutions for suspension and brake control

### Pneumatic Control Units for Brake Systems



Safe, precise brake controls require systems that are extremely reliable, ensuring low-maintenance continuous operation. Pneumatics systems from Emerson, including overflow valves, pressure switches and pressure sensors are preassembled and tested, enabling direct installation of the complete control unit.

- High level of functional integration
- Latest sensor technology and electronics
- Accurate proportional control technology

### Pneumatic Control of Air Springs



The entire electropneumatic leveling valve corresponds to protection class IP66 and is designed for an operating temperature range of -40 to 70°C (-40 to 158°F).

- Integrated electronics and software, with built-in diagnostics, provide an interface to the train management system via advanced bus interfaces

### AVENTICS Series ED05-Rail Proportional Control Valve



Robust proportional valve for dynamic pressure control in applications such as pantograph, brake and suspension control systems.

- Complies with all relevant railway standards
- Operating temperature range -40 to 70°C (-40 to 158°F)
- High repeatability and small hysteresis
- Integrated diagnostics

### AVENTICS Electropneumatic Leveling Valve



Electropneumatic leveling valve for accurate train height control under all load conditions to adjust trains to different platform heights.

- Consists of a proportional valve, two switching valves and control electronics with contactless hall sensors for height detection
- Control electronics optimize the switching behavior of integrated valves and minimize air consumption
- Field bus connectivity provides control and enables condition monitoring

### AVENTICS Series 614 SentronicPLUS Proportional Valves



Digitally operated proportional valve that accurately adjusts force, speed, and linear or angular positions via pneumatic pressure and flow control.

- Complies with all relevant railway standards
- User adjustable control parameters
- Wide range of flows and orifice sizes from DN 3 to DN 20
- Operating temperature -40 to 60°C (-40 to 140°F)



For further information on these or any other Emerson rail product, visit [Emerson.com/Rail](https://www.emerson.com/Rail)

## Pneumatic solutions for pantograph control

The complex control electronics in rail vehicles require a continuous power supply, which means pantographs must operate reliably at any speed and in all conditions. It is essential to maintain the contact between the pantograph's carbon strip and the catenary, but not push against the catenary line too hard which may cause wear or even ripping. Pneumatics with accurate pressure control solve this challenge. With smart and robust pneumatic components tailored to rail applications, Emerson's electropneumatic valves, precision regulators, bellows actuators and air preparation solutions push the carbon strip against the catenary with the right pressure. Tailored to a wide range of pantograph applications, including speeds up to 400km/h, curves, different voltages and pantograph widths, our extremely reliable pneumatic components are designed to meet your most demanding application needs.



### Prevent pantographs causing potential overhead line damage

Using Emerson's industry-proven pre-assembled pneumatic control manifolds you can create a virtually wear-free pantograph that always maintains ideal contact with the overhead line to avoid damage, leading to a reduction in maintenance costs.



### Services offered...

- Comprehensive product portfolio
- Online selection tools
- Fast delivery of prototypes



## Featured pneumatic solutions for pantograph controls

### AVENTICS Series ED05 Rail Proportional Valve



Electropneumatic regulator that provides precise and repeatable control of pressure and flow with dynamic regulation.

- Proportional control of high flow rates and pressure
- Extremely robust and durable
- High repeatability across a wide temperature range
- Compliant to all relevant railway standards

### AVENTICS Series PR1-RGP Pressure Regulators



High performance and flexible pneumatic precision regulators used extensively in pantographs, providing extremely fast response to slightest fluctuation in compressed air pressure.

- High repeatability
- High flow capacity
- Small hysteresis
- Outstanding reliability

### AVENTICS Series BCR Bellow Actuators



Emerson's bellows cylinders are available in a range of sizes and versions such as single, double and triple bellows.

- Stroke lengths from 15 mm to 354 mm
- Bellow diameters from 8" to 12"
- Meets fire and smoke requirements to EN 45545
- Customized interfaces on request
- Wide temperature range down to -55°C (-67°F)

### AVENTICS Series CD07-LT Spool Valves



The AVENTICS Series CD07-LT valve series is designed to meet the requirements of a broad range of rail applications, such as brake control, coupler control and pantographs.

- Flow capacity up to 1400 l/min (50 ft<sup>3</sup>/min)
- Temperature range -40 to 70°C (-40 to 158°F)
- Nominal voltages from 24 to 110VDC
- Voltage tolerance 25/-30%
- Sub-base and inline mounted options

### ASCO Series 531 Spool Valve



The compact and robust ASCO Series 531 valve has proven its reliability and robustness in many rail applications.

- 3/2, 5/2 and 5/3 options
- Flow rates up to 860 l/min (30 ft<sup>3</sup>/min)
- Wide temperature range of -40 to 60°C (-40 to 140°F)
- Voltages from 24 to 110VDC
- Sub-base and inline mounted options

### ASCO Series X353 (ADD) 2/2 Diaphragm Valve



The ASCO Series X353 is the market leading Automatic Drop Down (ADD) valve for pantographs and has proven its reliability over the last 30 years.

- Robust diaphragm design and reliable function
- Different bleed orifice sizes to meet performance requirements
- Wide temperature range from -50 to 85°C (-58 to 185°F)



For further information on these or any other Emerson rail product, visit [Emerson.com/Rail](https://www.emerson.com/rail)

## Freight car unloading

Bulk freight unloading is a very harsh environment in which only the toughest equipment can operate reliably. Emerson's products are designed and tested for these demanding applications, with extremely robust constructions that ensure trouble-free continuous operation and very long maintenance intervals. This applies to our actuators, valves and valve systems, key accessories, including tubing, fittings, filters and regulators. Our sturdy and powerful actuators can be customized to your specific application and are available with various stroke lengths and diameters while our valve components are designed for temperatures up to 85°C (158°F) and offer advantages such as integrated diodes for easy installation and replacement and a manual operator that also acts as a "door open" indicator.



### Increase the reliability of your freight car door mechanism

Using Emerson's large-dimension cylinders that are designed to withstand extreme conditions, and with barrels constructed of lightweight fiberglass material that offers natural lubricity and greater protection from stray ballast or aggregate, you can maximize the longevity and reliability of your freight car door mechanisms.



### Services offered...

- Global manufacturing, sales and technical support
- Customized solutions
- Comprehensive maintenance services

## Featured pneumatics solutions for freight car unloading

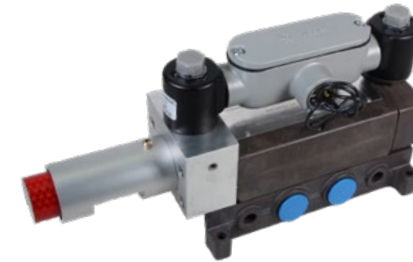
### AVENTICS Series RCV-IV 3 Station Manifold



2 to 4 station custom valve manifolds allow the control of hopper doors simultaneously or independently.

- Internal diodes and circuitry allow hot shoe or touch pad operation
- Push-pull knob allows for manual operation
- Patented indicator shows when door is open
- Manual and piloted versions available
- Separate main valve, electrical section and sub-base reduces maintenance time and cost

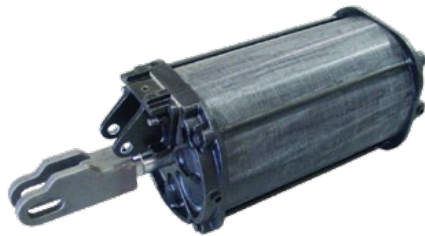
### AVENTICS Series RCV-V Pneumatic Spool Valve



Spool valve with a very robust and durable design for external freight car applications such as bottom door discharge (hopper doors) control.

- High flow rate of Cv 7.88
- Patented “door open” indicator
- Manual override is connected directly to the spool

### AVENTICS Railcar Cylinder



Specifically developed pneumatic cylinders for rail environments to operate the bottom discharge doors of rail freight cars.

- Long rod bearing area for extended life
- Temperature ratings for both high and low extremes
- Special latching mechanisms available for custom door locks
- End covers made of hard die-cast material, chrome-plated steel or stainless steel piston rods
- Tubes made of special lightweight highly resistant fiberglass material

### Auxiliaries



Auxiliary components built to match the ruggedness of our rail valves and cylinders.

- Shuttle valves up to 1/2"
- Quick exhaust valves up to 1"
- Check and flow control valves up to 1"
- Filters available up to 1"



For further information on these or any other Emerson rail product, visit [Emerson.com/Rail](http://Emerson.com/Rail)

## Pneumatic HVAC solutions

HVAC systems on board railcars must be extremely efficient and trouble-free to ensure comfortable air conditioned environments for passengers. Emerson is not only the market leading provider of fluid control for HVAC solutions, but also has a long history of developing solutions specifically for installation in railway vehicles. Our wide product range supports various HVAC system functions and includes leak-free refrigeration compressors and valves, sensing technology, and fast acting pneumatic valves and actuators for pressure protection. When developing HVAC and refrigeration systems Emerson is your ideal partner.



### Maximize the efficiency and reliability of HVAC systems

Developing HVAC and refrigeration systems that meet new efficiency and refrigerant regulations can present complex challenges. Using Emerson's next generation compressor technology means you can easily integrate a regulation-ready solution that will maximize performance and efficiency of your system.



### Services offered...

- Technical support provided by local experts and product specialists
- Comprehensive portfolio
- Online support tools
- Rapid repair services

## Featured solutions for HVAC systems

### Copeland™ Compressors



Compact, reliable and lightweight range of fully hermetic leak-free compressors for multiple low-GWP refrigerants that address the specific needs of rail transport air-conditioning.

- Wide operating range for cooling and heat pump applications
- Large capacity modulation range for precise control and increased seasonal performance
- Suitable for natural R290 and low-GWP R513A/1234yf/R454C refrigerants

### AVENTICS Series CD07-LT Spool Valve



Quick acting valves for HVAC damper control or fast closing of the ventilation system during a pressure protection event when entering tunnels at high speed or passing other high-speed trains.

- Provides high dynamics and allows fast actuator operation
- Improved spool dynamics and low friction seals
- Wide operating temperature range from -40° to 70°C (-40 to 158°F)

## Related products

### AVENTICS Electric Butterfly Valve



This fast responding universal actuator combines HVAC damper control and pressure protection in one plug-and-work solution.

- Very wide temperature range from -40° to 120°C (-40 to 248°F)
- IP69 ingress protection class
- Control via analogue signals or bus communication
- Integrated diagnostics and position feedback

### Alco Controls Refrigeration Equipment



Broad range of expansion valves, filter driers, solenoid valves, oil management products, pressure transducers and thermostats.

- Wide range of products for the refrigeration circuit of an HVAC system to maximize efficiency and reliability and optimize system performance

### AVENTICS Actuator/Valve Unit



Compact pneumatic actuator/valve unit for pressure protection control on high-speed trains, that provides a very fast response time due to direct attachment of the valve to the actuator and removal of pipe work.

- Resistance to shock and vibration
- Meets challenging EMC Railway requirements and copes with temperatures down to -40°C
- Integrated limit switch for position feedback



For further information on these or any other Emerson rail product, visit [Emerson.com/Rail](https://www.emerson.com/Rail)

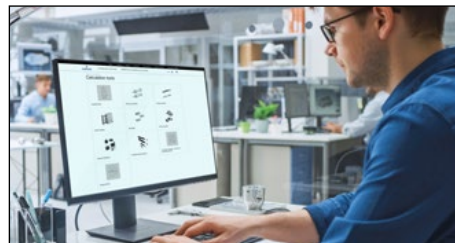
## Position detection solutions

More robust and long lasting products used onboard trains and for network infrastructure help reduce planned and unplanned maintenance requirements. Sensors and diagnostic systems that monitor the functions and condition of rail infrastructure, such as points, crossings, bridges and signaling devices as well as brake pad and pantograph positions on rolling stock, must be extremely robust, long lasting and able to withstand the harsh operating environment. The Emerson position and proximity sensors are designed to operate in the toughest environments and provides rail operators with the reliable data they need to increase the efficiency of rail network operations and maintenance activities.



### Proximity sensing within critical applications

For application such as braking systems, pantographs and crossing gates, proximity and position sensors must operate without failure. Emerson's technology and industry expertise can help you design and implement solutions that provide outstanding reliability in environments with high levels of vibration, water and other harsh operating conditions.



### Services offered...

- Extensive rail expertise
- Rapid spare parts service
- MyEmerson personalized digital experience

## Featured position detection products

TopWorx™ GO™ Switch models 11 and 81 are the ideal replacements for traditional mechanical limit switches. A simple design, rugged housing, sealed contacts, long sensing range and global approvals make this switch the ideal reliable proximity sensing replacement for traditional mechanical limit switches in rolling stock, infrastructure and maintenance of way equipment applications.

### TopWorx GO Switch Model 11

Features sealed gold flashed contacts, no-touch sensing and snap action response in a square switch design with a 3/8" sensing range.

- Single Pole Double Throw (SPDT) 5A/240VAC, 10A/120VAC, 3A/24VDC
- 10 mm (3/8 in) sensing distance (ferrous metal)
- -50°C to 105°C (-58°F to 221°F) operating temperature



### TopWorx GO Switch Model 81

Offers end sensing and an optional DPDT contact arrangement, with a 1/4" sensing range, and AC, DC, N/O or N/C wiring options.

- Double Pole Double Throw (DPDT) 5A/240VAC, 10A/120VAC, 3A/24VDC
- 6 mm (1/4 in) Sensing Distance (Ferrous metal)
- End Sensing
- -50°C to 105°C (-58°F to 221°F) operating temperature



With all stainless steel construction, flexible AC/DC, NO/NC, and SPDT/DPDT contact configurations, superior corrosion resistance and global certifications for all hazardous areas, the TopWorx GO Switches Model 73 and 7J outperform inductive proximity switches in the toughest applications.

### TopWorx GO Switch Model 73

The world's most commonly used and widely trusted leverless limit switches, with no external moving parts, springs, cams or reed element to wear or fail.

- Single Pole Double Throw (SPDT) 2A/240VAC, 4A/120VAC, 3A/24VDC
- 2.5 mm (0.100 in) Sensing Distance (Ferrous metal)
- -50°C to 105°C (-58°F to 221°F) operating temperature



### TopWorx GO Switch Model 7J

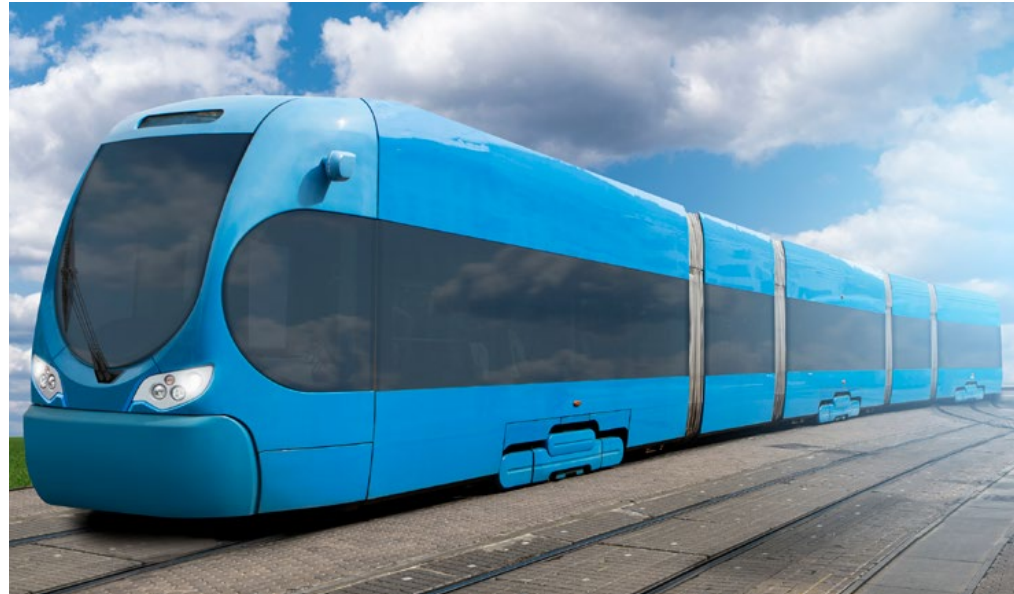
A combined proximity sensor and junction box assembly that allows you to terminate directly to the sensor, reducing rewiring time.

- Single Pole Double Throw (SPDT) 2A/240VAC, 4A/120VAC, 3A/24VDC
- 2.5 mm (0.100 in) Sensing Distance (Ferrous metal)
- -50°C to 105°C (-58°F to 221°F) operating temperature



## Solutions for hydrogen powered trains

Green transportation is at the forefront of government environmental sustainability strategies and efforts to meet decarbonization targets. Electric powered trains using green energy will minimize greenhouse emissions. Hydrogen powered trains are replacing diesel locomotives on non-electrified lines or to extend the reach of electric trains without building new electric overhead lines. Hydrogen storage and supply creates very specific demands for measurement and control equipment. Emerson's automation technology is used within the entire hydrogen fuel chain to ensure safe and efficient operations and we are ideally placed to advise on the right solution for your rail application.



### Maximize the safety and reliability of hydrogen fuel supply

It is essential to regulate the pressure of the hydrogen fuel supply. Emerson's fluid control solutions are specifically designed for hydrogen applications and provide assured reliability and tightness to prevent leaks in high-pressure systems. This enables them to maintain consistent pressure and increase safety.



### Services offered...

- Dedicated experts trained in rail applications
- Complete portfolio for hydrogen fuel chain
- Global support from local experts
- Training programs



## Solutions for hydrogen powered trains

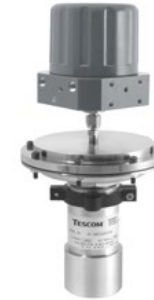
### TESCOM™ Pressure Control



TESCOM pressure reducing regulators are designed for hydrogen powered train applications and are extremely compact and lightweight, making them ideal for pressure reduction of fuel from a hydrogen train's storage tank to the fuel cell stack.

- Ensures gas purity and integrity
- Can be used for inlet pressures up to 700 bar (10,150 psig)
- High flow and minimal flow drop
- Balanced valve design minimizes supply pressure effect
- Wide variety of pre-set outlet pressures available

### TESCOM™ ER5000 controller



The ER5000 electro-pneumatic controller can be paired with high pressure regulators and provides precise, reliable and consistent algorithmic pressure control of the hydrogen fuel supply.

- Pressure control from vacuum to 1380 bar (20,000 psig)
- Analog and serial setpoint control
- Free TESCOM ERTune™ tuning and interface software

### ASCO™ Flow Control



The very easy to mount ASCO flow control solenoid and check valves provide precise control of fuel, supporting greater fuel cell efficiency and preventing high pressure from damaging the membrane.

- Ideal for controlling flow of fuel from a vehicle's storage tank to the fuel cell stack.
- Highly reliable, with resilient materials providing long lifetime
- Pressure rating up to 30 bar (1885 psig)
- Available with optional heating module for cold start-up environment

### Hydrogen Control Manifold



Bespoke control panel for hydrogen fuel dispensing application incorporating filtration, pneumatic control valves, pressure regulator, relief valve and pressure transducer.

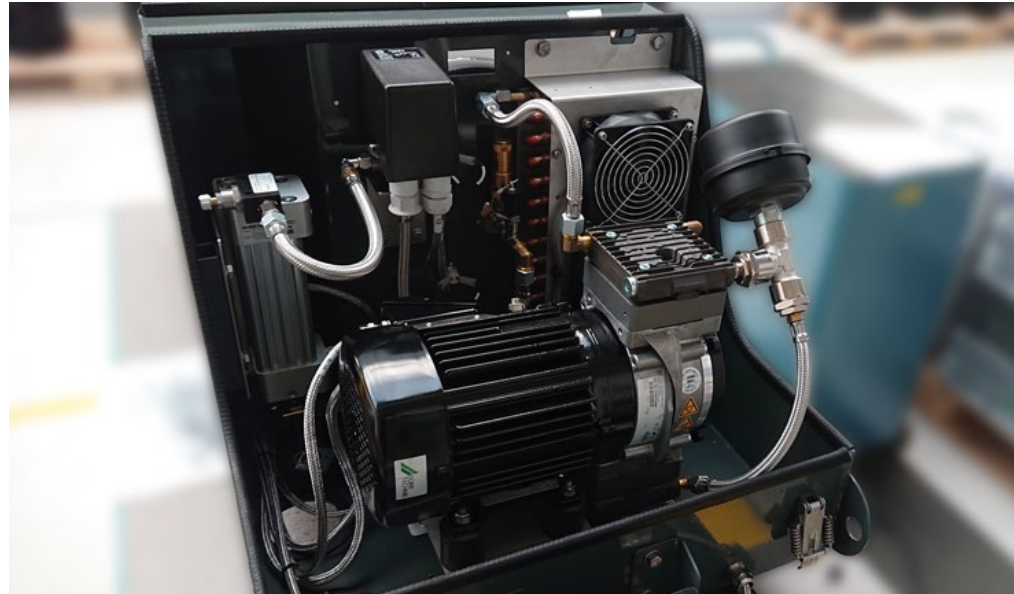
- Small size due to manifold design
- Reduced leakage risk by eliminating fittings
- 35 bar (5075 psig) to 700 bar (10,150 psig) nominal pressure



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## Compressed air preparation

Safe, trouble free and cost-effective pneumatic systems require a reliable supply of dry compressed air. Excessive volumetric flow increases the water loading in the air dryer and results in condensation that causes component and sub-system malfunctions. Component life is reduced due to grease and oil being washed away, while at low temperatures, the water in components will freeze and they become blocked. Hence air dryers are used right behind the compressor to ensure dry air for downstream components. Not only do traditional adsorption beads, used as a drying material, break down in these scenarios, but under typical railway shock and vibration loads adsorption beads also degrade, due to loss of volume by settling and abrasion. As a result of the degradation, beads typically need to be replaced every 1-2 years, leading to increased maintenance costs and downtime. Emerson offers a revolutionary drying technology that addresses these issues and provides significantly improved drying performance and much longer maintenance cycles of up to 10 years.



### Simplify the maintenance of compressed air system dryers

A stable and high dew point suppression prevents condensation and ensures downstream pneumatics system components function reliably. Emerson's air dryers not only provide improved performance and extended maintenance cycles, but the integrated cartridge design enables easy replacement of the drying material, reducing maintenance time.



### Services offered...

- Extensive rail industry experience
- Online store
- Onsite maintenance services
- Broad product offering

## Featured compressed air preparation solutions

### AVENTICS Air Dryer RDD



The robust and compact AVENTICS RDD Air Dryers provide superior humidity removal within compressed air preparation systems helping to improve availability of pneumatic systems in rail vehicles.

- Resistant to shock and vibration
- Orientation does not influence drying performance
- Stable drying performance for up to 10 years
- Easy-to-replace drying medium cartridge
- Up to 50% smaller than conventional desiccant dryers
- Various sizes covering a flow of up to 5000 l/min (175 ft<sup>3</sup>/min)

### AVENTICS Air Dryer RDDmini



The compact AVENTICS RDDmini dryer is a single column dryer for compressor loads up to 60% used on auxiliary applications on trains, such as sanding, wheel flange lubrication, driver seat and pantograph lifting.

- Regenerates using dry air fed back through the dryer from a downstream reservoir while compressor is off
- Only requires timer for purge control
- Integrated maintenance-free particle and oil removal filtration
- Flow range of 30 – 600 l/min (1 – 21 ft<sup>3</sup>/min)

### AVENTICS Air Dryer RDDmini Twin



The compact AVENTICS Air Dryer RDDmini twin is a double column dryer used on auxiliary air applications requiring a continuous air flow and operating as a standard pressure swing adsorption dryer.

- Uses an external control unit to operate inlet/outlet valves
- Integrated maintenance-free particle and oil removal filtration
- Flow range 30 – 600 l/min (1 – 21 ft<sup>3</sup>/min)

## Featured accessories

### Bulk Water, Particle and Oil Filters



Inlet air filtration solutions for appropriate inlet air to RDD dryer or separate usage on other applications

- Maintenance-free bulk water and particle removal filter
- Advanced oil removal filter (coalescing filter)
- ISO 8573-1 Class 2 filtration for oil and Class 1 for particles
- Available for temperatures down to -60°C (-76°F)

### Control Unit



Flexible control unit to operate the inlet and outlet valves of the RDD dryer and perform advanced diagnosis and condition monitoring.

- Operates optional heaters for the inlet/outlet and filter drain valves directly, no additional relays required
- Reads signals from sensors integrated into the RDD dryer for diagnosis, monitoring and health checks
- Multiple digital and analogue I/O's
- Optional bus interface for train management communication



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## Pneumatic solutions for general rail applications

### Cylinders

Extensive range of robust and compact, rail-certified cylinders and actuators designed to meet the most challenging application and operational environmental demands. ▶ p21

### Valves

Proportional valves, poppet valves, spool valves, diaphragm valves, high and low pressure valves. ▶ p22

### Auxiliaries

Non-return valves, shuttle valves, ball valves and huge range of pneumatic fittings and tubing to ensure correct installation and performance of your pneumatics and fluid control systems. ▶ p24

### Air Supply

Compressed air dryers, FRL units, pressure sensors and switches designed to maximize the efficiency and reliability of your pneumatic systems. ▶ p25

## Featured cylinders

### AVENTICS ISO Series PRA/TRB Rail Cylinder



Profile and tie rod cylinders for linear actuation, with Integrated end of stroke cushioning.

- Many variants, strokes and accessories
- Piston diameter: 25 – 125mm
- Operating pressure: 1.5 – 10 bar (21 – 145 psig)
- Temperature: -40 to 70°C (-40 to 158°F)
- Directives: ISO 15552, ISO 9227 (500h), EN 61373 (Cat. 1, cl. B), EN 45545 (HL3)

### AVENTICS Series CCI Rail Cylinder



Compact cylinder for restricted envelopes, available with optional sensors.

- Many variants, strokes and accessories
- Piston diameter: 25 – 100mm
- Operating pressure: 1.5 – 10 bar (21 – 145 psig)
- Temperature: -40 to 70°C (-40 to 158°F)
- Directives: ISO 15552, ISO 9227 (500h), EN 61373 (Cat. 1, cl. B), EN 45545 (HL3)

### AVENTICS Freight Car Cylinder



Cylinder for freight car bottom door discharge (hopper doors) with large bore sizes up to 14".

- Reinforced composite, flexible cylinder barrels to protect against ballast strike
- Piston diameter: 8 – 14"
- Operating pressure: 1 – 10 bar (14 – 145 psig)
- Temperature: -40 to 100°C (-40 to 212°F)

### AVENTICS Series RTC-TD Cylinder



Rodless cylinder with optional integrated control valves for internal and external train door operation.

- Pre-set cushioning and speed control based on door weight and kinematics
- Piston diameter: 32 to 50mm
- Operating pressure: 4 – 8 bar (58 – 116 psig)
- Temperature: -30°C to 60°C (-22 to 140°F)
- Directives: EN 61373 (Cat. 1, cl. B)

### AVENTICS Bellow Actuator



Our bellows actuators are available in many sizes and versions, as single, double and triple bellows.

- Stroke lengths from 15 mm to 354 mm
- Bellow diameters from 8 to 12"
- Meets fire and smoke requirements to EN 45545
- Customized interfaces on request
- Wide temperature range down to -55°C (-67°F)



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## Featured valves

### AVENTICS Series ED05 Rail Proportional Control Valve



Direct acting poppet valve with proportional solenoid for precise dynamic pressure control in pantograph, brake and suspension control systems.

- Nominal flow: Qn 1200 l/min (42 ft<sup>3</sup>/min)
- Operating pressure: max. 11 bar (160 psig)
- Temperature: -40 to 70°C (-40 to 158°F)
- Directives: EN 50155, ISO 9227 (240h), EN 61373 (Cat. 1, cl. B), EN 50121-3-2, EN 45545 (HL3)

### AVENTICS Series 579 Rail Valve



Robust, stackable 3/2 direct acting poppet valve for cost-efficient control of toilet systems.

- Compact and lightweight design through polymer valve body (EN 45545 compliant)
- Nominal flow: Qn 600 l/min (21 ft<sup>3</sup>/min)
- Temperature: -25°C to 55°C (13 – 151°F)
- Directives: EN 61373 (Cat. 1, cl. B), EN 45545 (HL3)

### AVENTICS Series 563, 565 and 567 Poppet Valves



Robust 3/2-poppet valve, resistant to contaminated air, suitable for demanding operating conditions and high flow.

- Sub-base or pipe mounted design with base plate
- Nominal flow: Qn 1350 – 13620 l/min (48 – 481 ft<sup>3</sup>/min)
- Temperature: -25 °C to 50°C (13 to 122°F) optional -40 to 70°C (-40 to 158°F)
- Directives: EN 61373 (Cat. 1, cl. B), EN 45545 (HL3), EN 50155, ISO 9227 (500h)

### AVENTICS 32mm Pilot Valve



Robust 3/2 quick acting, direct operated poppet valve for applications such as door, coupler, HVAC and auxiliary control.

- Sub-base, CNOMO and pipe mounted options
- Nominal flow: up to Qn 140 l/min (5 ft<sup>3</sup>/min)
- Temperature: -40 to 70°C (-40 to 158°F)
- Directives: EN 50155, EN 61373 (Cat. 1, cl. B), EN 45545 (HL3), ISO 9227 (500h)

### AVENTICS Series CD07-LT Valve Sub-base



3/2 and 5/2 sub-base mounted spool valve for various rail applications, offering a long life and low leakage at sub-zero temperatures.

- Pilot valves located on top or at each side of the valve for flexible mounting and integration
- Nominal flow: Qn 1200 – 1400 l/min (42 – 49 ft<sup>3</sup>/min)
- Temperature: -40 to 70°C (-40 to 158°F)
- Directives: EN 50155, EN 61373 (Cat. 2), EN 45545 (HL3), ISO 9227 (250h)

### AVENTICS Series CD07-LT Valve Inline



3/2 and 5/2 pipe-mounted spool valve for various rail applications, offering a long service life and low leakage at sub-zero temperatures.

- Pipe connection via G1/4 threads
- Nominal flow: Qn 1200 – 1400 l/min (42 – 49 ft<sup>3</sup>/min)
- Temperature: -40 to 70°C (-40 to 158°F)
- Directives: EN 50155, EN 61373 (Cat. 2), EN 45545 (HL3), ISO 9227 (250h)

## Featured valves

### AVENTICS Series CD12-LT Valve Inline



Robust 3/2 and 5/2 high flow spool valve for various rail applications, with a durable design and low leakage at sub-zero temperatures.

- Pipe connection via G1/2 threads
- Nominal flow: Qn 3800 – 4100 l/min (134 – 145 ft<sup>3</sup>/min)
- Temperature: -40 to 70°C (-40 to 158°F)
- Directives: EN 50155, EN 61373 (Cat. 2), EN 45545 (HL3), ISO 9227 (250h)

### AVENTICS Series CD12-LT Valve Sub-base



3/2 and 5/2 high flow sub-base mounted spool valve for various rail applications, offering a long life and low leakage at sub-zero temperatures.

- ISO2 sub-base mounted design with pilot valves located on top for easy access
- Nominal flow: Qn 3000 l/min (106 ft<sup>3</sup>/min)
- Temperature: -40 to 70°C (-40 to 158°F)
- Directives: EN 50155, EN 61373 (Cat. 2), EN 45545 (HL3), ISO 9227 (250h)

### ASCO Series 531 Valve



Compact 3/2 and 5/2 inline and sub-base mounted spool valve for various rail applications.

- Nominal flow: Qn 860 l/min (30 ft<sup>3</sup>/min)
- Temperature: -40 to 70°C (-40 to 158°F)
- Directives: EN 61373 (Cat. 1, cl. B), ISO 9227 (200h), EN 50155

### AVENTICS Series RCV-V Spool Valve



Very robust 5/2 spool valve for harsh environments like freight cars with a combined position indication/manual override.

- Nominal flow: Qn 7400 l/min (261 ft<sup>3</sup>/min)
- Temperature: -30 to 70°C (-22 to 158°F)

### ASCO Series 327 Solenoid Valve Inline



SIL-proven 3/2 fast acting solenoid valve with a robust and reliable poppet design for various rail applications, especially for brake control.

- Nominal flow: 480 l/min and 1650 l/min (17 ft<sup>3</sup>/min and 58 ft<sup>3</sup>/min)
- Temperature: -40 to 70°C (-40 to 158°F) options for -60°C and up to 100°C (-76°F and up to 212°F)
- Directives: EN 50155, EN 61373 (cat. 1, cl. B), EN 45545 (HL3), ISO 9227 (500h)

### ASCO Series 327 Solenoid Valve Sub-base



Very reliable 3/2 direct-acting poppet valve for use in quick acting and safety critical rail applications.

- Different sub-base mounted options
- Nominal flow: 480 l/min and 1650 l/min (17 ft<sup>3</sup>/min and 58 ft<sup>3</sup>/min)
- Temperature: -40 to 70°C (-40 to 158°F) options for -60°C and up to 100°C (-76°F and up to 212°F)
- EN 50155, EN 61373 (cat. 1, cl. B), EN 45545 (HL3), ISO 9227 (500h)

### ASCO Series MPV Valve



Minimum pressure valve that opens at adjustable minimum pressure. Often used on brake control applications.

- Pipe connection via G1/2 threads or sub-base mounted option
- Nominal flow: 1300 l/min (46 ft<sup>3</sup>/min)
- Operating pressure: 0 – 15 bar (0 – 217 psig)
- Set pressure: 2 – 9 bar (29 – 130 psig)
- Temperature: -40°C to 80°C (-40 to 176°F)
- Directives: EN 61373 (cat. 1, cl. B), EN 45545 (HL3)

### ASCO Series X353 2/2 Diaphragm Valve



The ASCO Series X353 is the market leading Automatic Drop Down (ADD) valve for pantographs and has proven its reliability over the last 30 years.

- Robust diaphragm design and reliable function
- Different bleed orifice sizes to meet customer-specific performance requirements
- Wide temperature range from -50°C to 85°C (-58 to 185°F)
- Directives: EN 61373 (cat. 1, cl. A), EN 45545 (HL3), ASTM B-117 (600h)



For further information on these or any other Emerson rail product, visit [Emerson.com/Rail](http://Emerson.com/Rail)

## Featured auxiliaries

### AVENTICS Tubing



Pneumatic tubing for rail applications, offering improved flexibility for easy installation.

- Complies to EN45545 (HL2)
- Tube sizes (outer diameter): 6, 8, 10 and 12mm
- Temperature: -40 to 70°C (-40 to 158°F)
- Material: PA12 based
- Directives: EN 61373 (Cat. 1, cl. B), EN 45545 (HL2)

### AVENTICS Non-return Valves and Shuttle Valves



Robust non-return valves for logic functions on railway systems with low leakage at sub-zero temperatures.

- Pipe and sub-base mounted options
- Nominal sizes: 3, 6, 12, 19, 25mm
- Cracking pressure <0.2 bar
- Temperature: -40°C to 80°C (-40 to 176°F)
- Directives: EN 61373 (Cat. 1, cl. B), ISO 9227 (500h), EN 45545 (HL3)

### AVENTICS Ball Valves



Pipe and sub-base mounted ball valves offering low leakage at sub-zero temperatures and optional position feedback.

- Different sizes available
- Temperature: -40°C to 80°C (-40 to 176°F)
- Optional electric position feedback
- Directives: EN 61373 (Cat. 1, cl. B), ISO 9227 (240h), EN 45545 (HL3)

### AVENTICS Fittings Series NU2



Easy to assemble push-on fittings for pneumatic components that are secured by a gland nut.

- Wide temperature range and low leakages
- For tube sizes 6, 8, 10 and 12mm (polymer tubes)
- Temperature: -40 to 70°C (-40 to 158°F)
- Directives: EN 61373 (Cat.1, cl. B), EN 45545 (HL3)



## Feature compressed air supply products

### AVENTICS RDD Main Air Dryer



Dryer used on train main air supply systems using a patented drying technology for advanced performance over life.

- Provides up to 10 years of service without maintenance
- Flow range: 600 to 5000 l/min (21 to 176 ft<sup>3</sup>/min)
- Temperature: -40 to 70°C (-40 to 158°F)
- Pressure dew point suppression: > 40°C (104°F)
- Purge flow: < 15%
- Directives: EN 61373 (Cat. 1, cl. B), EN 50155, ISO 9227 (1000h), MIL-STD-810, EN 45545 (HL3)

### AVENTICS RDDmini Auxiliary Air Dryer



Compact air dryer using patented drying technology providing stable performance over life, used on auxiliary air supply systems

- Flow range: 30 to 600 l/min (1 to 21 ft<sup>3</sup>/min)
- Temperature: -40 to 70°C (-40 to 158°F)
- Double column continuous flow and single column design for <60% compressor duty
- Pressure dew point suppression: > 40°C (104°F)
- Purge flow: < 18%
- Directives: EN 61373 (Cat. 1, cl. B), EN 50155, ISO 9227 (1000h), MIL-STD-810, EN 45545 (HL3)

### AVENTICS Series PR1-RGP Pressure Regulator



Fast and precise pressure regulator for air bellow pressure control on pantograph systems and other rail applications.

- Pipe and sub-base mounted option
- Nominal flow: Qn 3000 l/min (106 ft<sup>3</sup>/min)
- Input pressure from 0.5 – 16 bar (7 – 232 psig)
- Output pressure from 0.05 – 10 bar (0.7 – 145 psig)
- Temperature: -40 to 60°C (-40 to 140°F)
- Directives: EN 61373 (Cat. 1, cl. B), ISO 9227 (240h), EN 45545 (HL3)

### AVENTICS PE9 Series Pressure Sensor



Pressure transducer for various applications in rail with demanding requirements for accuracy and robustness.

- Electrical connection via M12 or Form A connector according to DIN EN 175301-803
- Operating pressure: 0 – 25 bar (0 – 362 psig)
- Temperature: -40°C to 125°C (-40 to 257 °F)
- Output signal: 4 to 20mA
- Directives: EN 50155, EN 61373 (Cat. 1, cl. B), ISO 9227 (500h), EN 50121-3-2, EN 45545 (HL3)

### AVENTICS PM7 Series Pressure Switch



Pressure switch for demanding environmental conditions providing high life and repeatability.

- Pipe and sub-base mounted options
- Operating pressure: -1 – 12 bar (-14 – 174 psig)
- Temperature: -50°C to 85°C (-58 to 185°F)
- Directives: EN 50155, EN 61373 (Cat. 1, cl. B), EN 60068-2-52 (670h), EN 45545 (HL3)

### AVENTICS Series 645 Pressure Regulator



Precision pressure regulators for demanding railway applications, high repeatability and stable set point.

- Nominal flow: two sizes, up to 500 and 1500 l/min
- Input pressure: up to 16 bar (232 psig)
- Output regulator pressure: 0.5 – 10 bar (7– 145 psig)
- Temperature: -40 to 70°C (-40 to 158°F)
- Interface: Inline (G1/4") or sub-base
- Directives: EN 61373 (Cat. 1, cl. B), EN 45545 (HL3), EN 60068, ISO 9227 (250h)



For further information on these or any other Emerson rail product, visit [Emerson.com/Rail](http://Emerson.com/Rail)

# Enhance your rail application performance with expert support

Emerson's extensive experience within the rail industry, combined with our robust and intelligent fluid control technologies, makes us the ideal partner for your demanding onboard and trackside applications. Our engineers have the rail industry expertise needed to understand your challenges and help you achieve the performance gains your desire, while our solutions meet all railway-specific directives and standards worldwide providing you with peace of mind.



## Custom engineered solutions

Integrated, custom-made solutions from Emerson help rail equipment manufacturers accelerate the fluid handling design and engineering phase of new product development. Our global team of experts work directly with your engineers to simplify and optimize the fluidic path design, maximize efficiencies and reduce size and costs. A comprehensive portfolio of industry-proven and tested 'standard catalog' valves support fast qualification and testing. We excel in designing and manufacturing customized solutions and fully functional prototypes tailored to the exact specifications of your device at unprecedented speeds.



## Maintenance support

Emerson is a global automation leader, with maintenance support across the world. Our global presence and scale enables us to maintain, repair, overhaul or replace equipment faster.



With locations all over the world, we're always nearby to help solve your fluid control and pneumatic challenges – no matter where you are. Contact us today.





## Get started



Emerson provides robust industry certified fluid control and pneumatic solutions that increase the reliability, safety and efficiency of a broad range of rail applications. Contact us now to discuss how our class-leading technologies and global support services can help increase operational performance and reduce maintenance and life cycle costs. Getting started is easy.

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