Industrial Automation

IMI Norgren

21D Pressure Switch
Robust, flexible and accurate mechanical pressure switches for the rail industry

Breakthrough engineering for a better world

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Breakthrough engineering for a better world

We create solutions for our customers which enable smarter, safer, more productive and sustainable factories, production lines and warehouse operations. Our pneumatic and electric motion systems help machine builders and end users around the world automate and optimise manufacturing and warehousing processes.

We have partnered with customers in industrial automation for over a century, applying our experience and innovation to create lasting value for their businesses. Our solutions support critical industries such as automotive, food and beverage, pharmaceuticals and even the space industry. We support the automation of precision manufacturing, product assembly, testing and packaging.

We use the latest digital technologies in our automation products and constantly innovate in close partnership with our customers. By applying our deep expertise, we can solve their toughest automation challenges, today and tomorrow. Through increased productivity, efficiency and safety, our customers can serve their own customers better, creating sustainable competitive advantage and delivering growth.

Our world-class product portfolio includes IMI Norgren, IMI Bimba, IMI Bahr and IMI Buschjost.

Breakthrough engineering you can count on.

NOTE: *Due to our policy of continuous development, we reserve the right to change specifications without prior notice.*

Delivering Expertise, Solutions and Value to the Rail Sector

For over 45 years, we have delivered robust, reliable and bespoke solutions to the rail sector.

Our products continue to give millions of miles of reliable service across the world's most challenging environments, from the cold of China and Eastern Europe to Australian outback heat.

With a true understanding of the daily issues faced by rail operators and original equipment manufacturers, we design for the precise needs of the rail industry, including:

- Temperatures ranging from -40°C (-40°F) to +85°C (+176°F)
- Voltage tolerances of +/- 30%
- EN 61373 category 1 class A and B vibration resistance
- EN 61373 category 2 vibration resistance
- EN 45545-2 Fire and Smoke
- EN ISO 9227 - Corrosion tests in artificial atmospheres — Salt spray tests

We talk extensively to maintenance professionals and work closely with rail engineers to ask the questions they ask. That means we can offer customised, practical solutions to the metro, intercity, high-speed, freight and permanent-way rail industries, covering:

- Air preparation equipment
- Brake sub-systems and components
- Coupling control systems
- Door and step systems
- Pantograph control systems
- Water control systems
- Freight control and actuation
- Suspension control
- HVAC systems
- Sanding systems

By listening and responding to your specific challenges, we help you make significant improvements and savings in terms of cost of ownership, energy efficiency, reduced weight, reduced maintenance and more.

All-fluid pressure switch
for rail applications

21D Pressure Switch

The IMI Norgren 21D electro mechanical all-fluid pressure switch has been designed to monitor pressure levels in a variety of rail system applications, such as rail vehicle brakes, pantographs, shoe gear, air suspension, horn operation and many others.

The 21D is manufactured from carefully selected high-performance materials, including gold plated or silver alloy contacts, which address varying accuracy and current draw ratings up to 10A, as well as hard wearing silicone for the diaphragm – to maximise performance and component life-span.

The 21D has an IP65 rating to EN 60529 to maintain the integrity of the system against contamination or damage from fluids and solids. It also offers a high number of switching cycles, with optimum accuracy and repeatability of +3% of the final pressure value which is maintained over the whole life of the product.

The modular design allows for different mounting options and electrical interfaces as well as a wide choice of single pole and double pole switching logics. The micro switches used provide a long life, high accuracy and have been approved by UL/CSA.

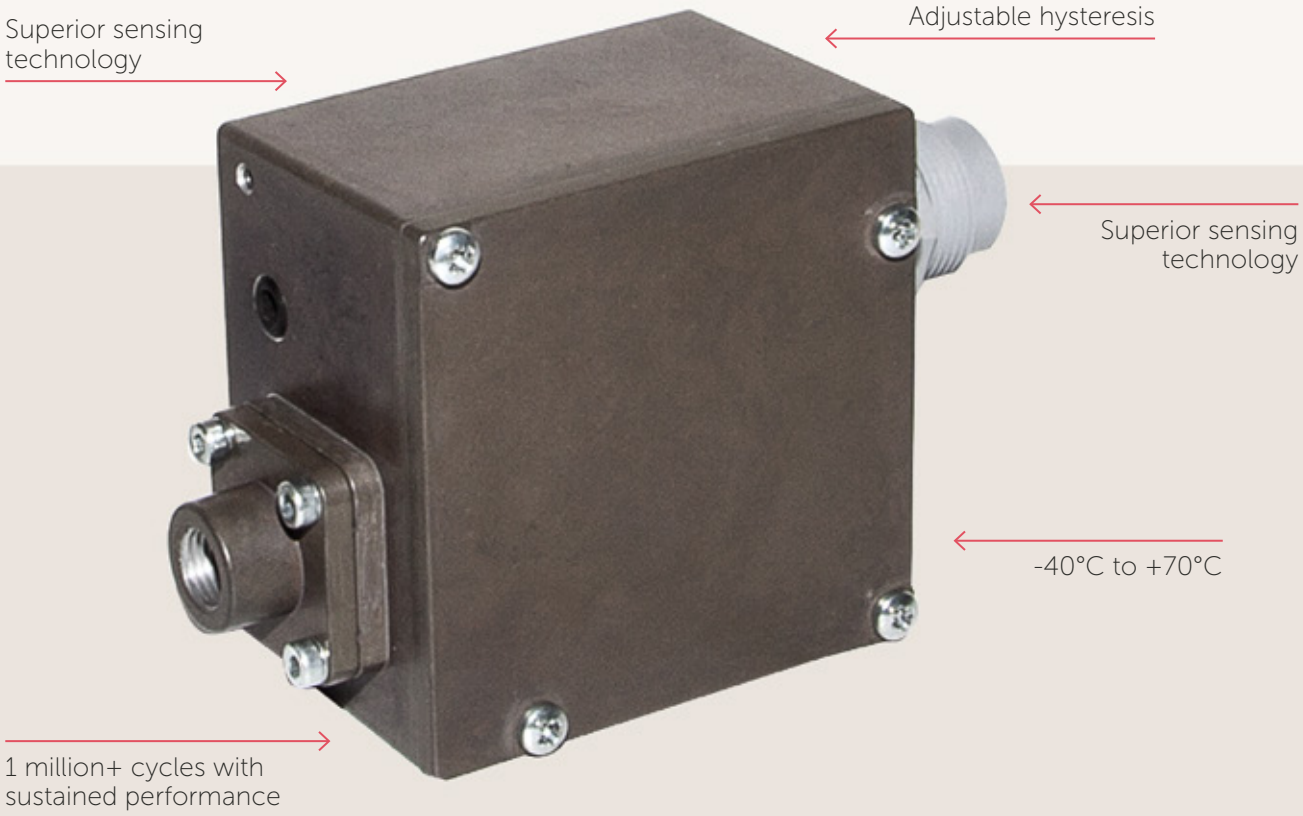
Rail system applications

Product Highlights:

- High accuracy
- Minimal drift over lifetime (1,000,000 cycles)
- Robust design
- Ease of adjustment
- High technology production cell
- Designed specifically for Rail Sector
- On request:
  - Customised labelling
  - Customised part numbering and serial number control
  - Factory pre-setting
- Special adaptations
- Direct replacement for many existing switches
- Global sales and technical support

Technical Specification:

- Temperature Range: -40°C to +70°C
- Pressure Range: 0.1 to 10 bar
- Min. switching pressure difference: 0.25 bar
- Max. switching pressure difference: 5 bar
- NO/NC switching logic
- Protection Class: IP65
- Repeatability; + 3% of final pressure
- Max. current draw: 3A at 24 VDC; 0.7A at 110 VDC (Higher current ratings on request depending on application)
- Min. current draw: 5mA at 5 VDC



Robust, flexible and accurate mechanical pressure switches for the rail industry

Validation

We fully understand the challenges, standards and specifications that matter to the daily operations of the rail industry. We are well used to designing high-quality products with close regard to temperature range, voltage tolerance, vibration resistance, and safety requirements.

Able to operate across a pressure range of 0.1 to 10 bar and temperatures of -40°C to +70°C, the 21D pressure switch has been designed to operate in harsh environments and has undergone extensive testing to exceed relevant industry standards.

- Fully compliant with railway standards
- Fully compliant to product specification

Validation summary table

Standard	Description	Date
EN 60077-1	Railway Applications – Electrical Equipment for Rolling Stock: General Service Conditions and General Rules	2002
EN 60068-2-1	Environmental testing – Part 2: Test Ad: Cold	2007
EN 60068-2-2	Environmental testing – Part 2: Test Bd: Dry heat	2007
EN 60068-2-30	Environmental testing – Part 2: Test Db: Damp heat cyclic	2005
EN ISO 9227	Corrosion tests in artificial atmospheres – Salt spray tests	2006
EN 60529	Degree of protection provided by enclosures (IP code)	1992
EN 61373	Railway applications – Rolling stock equipment – Vibration and shock test	2010
NFF 11-600	Air tightness test for pneumatic and electro-pneumatic equipment	1994

Rail Pressure Switch Applications

The 21D pressure switch makes or breaks electrical circuits based on input pressure thresholds, and provides an adjustable hysteresis which allows falling and rising switching set points to be set individually, providing safe and reliable switching for a wide range of applications, such as railway air brakes, pantographs, pneumatic tool turrets, marine drive control systems and many others.

Main Air Compressor Governor

- Air Compressors on trains typically driven either by the engine or electrically
- The pressure switch monitors the air pressure in the main receiver line (MRL)
- The pressure switch will make or break contacts to the compressor relay
- Typical MRL pressure range: 7.0 bar – 8.0 Bar
- If the air pressure falls to 7.0 bar the pressure switch will make the contacts and the compressor will go "On Load"
- When the pressure reaches 8.0 Bar the pressure switch will break contacts and the compressor will "Off Load"

Brake Pressure Monitoring

- In this application the pressure switch is monitoring the available air pressure in the brake airline and receivers
- Brake line pressure is usually maintained between 5 and 8 Bar
- Release and application of the service brakes are via the drivers brake control valve
- The pressure switch will make or break contacts to the compressor relay and demand more air pressure
- If the air pressure is allowed to fall to a low pressure then this will result in abnormal or unauthorised braking

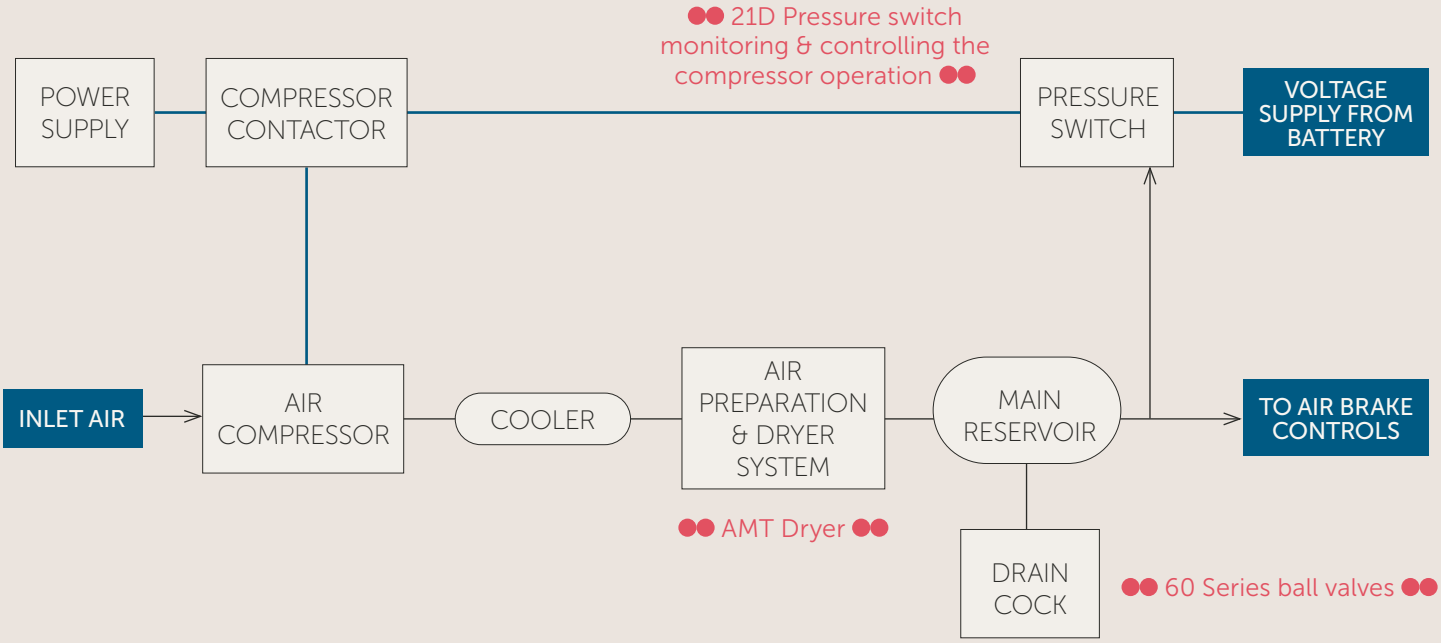
Parking Brake Release Pressure Monitoring

- In this application the pressure switch is monitoring the Parking brake release detection
- Rising pressure setting is typically 4.5-5 Bar
- Falling pressure is set low typically 0.5 Bar
- Release and application of the Parking brakes are via the drivers brake control valve
- Contacts making and breaking on the pressure switch confirm the position of the parking brake

Pantograph Compressor Governor

- In this application the pressure switch is monitoring the available air pressure maintaining the pantograph lift
- Rising pressure setting is typically 4.5-5 Bar
- Falling pressure is set low typically 0.5 Bar
- Contacts making and breaking on the pressure switch control the (pantograph) compressor relay which either demands air "On load" or switches the compressor off when the required air pressure is reached "Off load"

Typical train air supply system



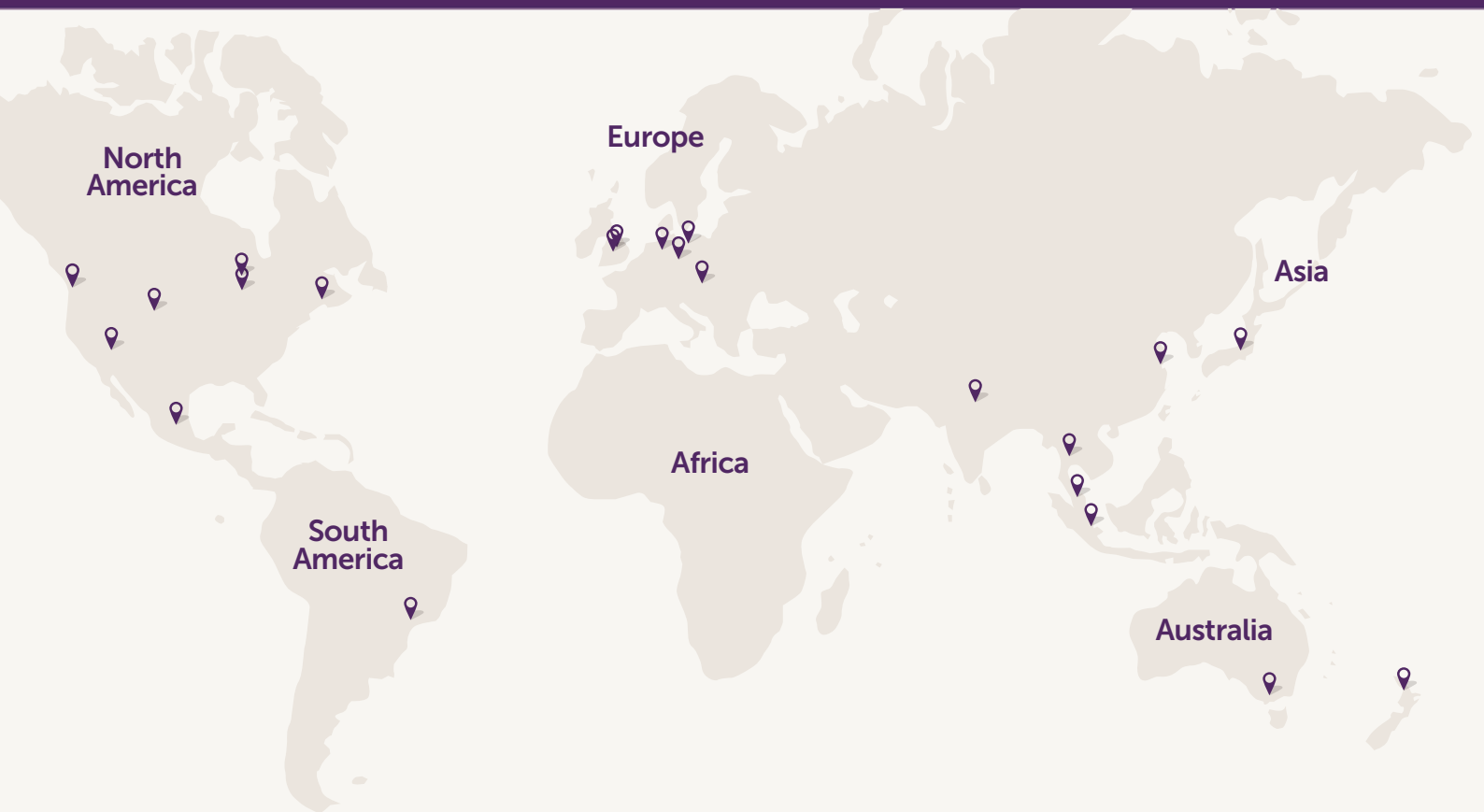
21D is also suitable for

- Low Main Reservoir Governor
- Low Brake Supply Governor
- Parking Brake Governor
- Shoegear Governor
- Emergency Pressure Switch
- Brakes Release Pressure Switch
- Brake Isolation Pressure Switch
- Air Suspension Pressure Switch
- Safety Brake Pressure Switch
- Tripcock Reset Monitoring Pressure Switch
- Pantograph “up” Command
- Brake Proving Pressure Switch
- Whistle (horn) operation pressure switch

Global support

We help you achieve your goals by working with you as a partner, not just a supplier. Our dedicated rail team is connected worldwide to ensure close, continuous support no matter what the size and extent of your organisation. We have the reach and capability to work alongside you on complex, global projects or to simply offer local spare part supply.

●● Across manufacturing, sales, innovation centres and offices ●●



Global testing and validation

We help you achieve your goals by working with you as a partner, not just a supplier. Our dedicated rail team is connected worldwide to ensure close, continuous support no matter what the size and extent of your organisation. We have the reach and capability to work alongside you on complex, global projects or to simply offer local spare part supply.

We work closely with our customers to achieve tailored solutions. During development and testing, the focus is placed on designing products that can withstand anticipated loads and consistently perform their tasks. It is this thorough and detailed testing and validation in accordance with the relevant standards that reduces early failure of components. In addition, a comprehensive valuation under realistic conditions helps avoid high consequential costs caused by failures of components in the end application.

Complete product testing and valuation is done in our state of the art testing centres.

The laboratories have an extensive range of test equipment, operated by a neutral expert team working independently of the development departments. Their experience and expertise enables quick implementation of tests, the design of test programs tailored to the needs of real applications and operating conditions in the various sectors, and a guarantee of the neutrality and accuracy of test results.

We have extensive experience in the field of environmental simulation, with a focus on climate, temperature, thermal shock, corrosion, vibration and mechanical shock.

Prototyping and material laboratories are additional, important resources that contribute to our targeted and rapid product development.

Specific tests we undertake for the rail sector include:

- EN 45545
- EN 50155
- EN 50121-3-2
- DIN 5510-2
- EN 61373
- NFPA 130
- EN 60068
- ISO 9227

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