Excellence in Instrumentation Solutions for Process Control

CELEBRATING 37 YEARS OF EXCELLENCE

RM CONTROLS,INC

INDUSTRIES

INTEGRATION AND SERVICES

INSTRUMENTATION

www.**rmcontrols**.com

A Measurement And Process Controls Solutions Provider

We Proudly Represent

Badger Meter

Commercial & Industrial Measurement Solutions
AquaCUE, Blancett, Cox, Dynasonics, Flow Dynamics, Hedland, ModMAG, Preso, Recordall
Specific solutions that deliver accurate, timely and dependable flow data and control essential for product quality, cost control, safer operations, and regulatory compliance.

Fuji Electric

Instrumentation Devices for Accuracy and Precision, Every Time.
Fuji Electric provides integration instrumentation solutions including analyzers, transmitters, meters, controllers, and recorders. These devices are suitable for applications ranging from Oil & Gas to Food & Beverage facilities.

DET-TRONICS

Det-Tronics is a global leader in fire and gas safety systems, providing premium flame and gas detection and hazard-mitigation systems for high-risk processes and industrial operations. The company designs, builds, tests and commissions SIL 2 Capable flame and gas safety products.

PR electronics

Specialized in making industrial process control safer, more reliable, and more efficient. From less hazardous industrial conditions like the food and beverage industry to high-risk environments like marine and chemical

SIERRA

Thermal mass flow meters, vortex flowmeters, ultrasonics flow meters, and cal systems

RCV Research Control® | ReCo® Valves

Complete range of precision control valves and accessories to meet the most critical applications. Built for applications two inches or smaller, our globe, angle and sanitary valves are integral components in systems ranging from petrochemical processing to pharmaceutical manufacturing.

REOTEMP INSTRUMENTS

Bimetal thermometers, pressure gauges, diaphragm seals, temperature gauges, RTDs thermocouples

BOREAL

Open Path Laser Gas Detection products for a variety of industrial applications:
Leak Detection
Ambient Monitoring

LAND AMETEK

Specialist in non-contact temperature measurement and combustion monitoring with our products finding applications across diverse industries, such as steel and glass making, power generation and cement manufacture

SIGNALFIRE WIRELESS TELEMETRY

SignalFire Wireless Telemetry was created to answer a need for transferring data wirelessly over vast geographic distances. SignalFire became a part of the TASI Group's Flow Division in 2015, broadening SignalFire's reach into a larger industrial automation market space.

ELPRO Technologies

Industrial Wireless Experts - Supporting industry with secure industrial communications for over 35 years across 180 countries. Our products can be used in a variety of applications, including water/wastewater, oil and gas, mining, environmental, electrical utility and industrial automation.

JFLOW controls

Flow Controls offers the finest quality, highest value flow control products available today. All valve components are inspected to international standards after assembly. The valves are fully tested to API 598.

Neo-Dyn PROCESS CONTROL

Pressure and Temperature switches for the industrial, chemical process, and energy markets

Conoflow

Low Pressure and High Pressure Regulators

AURA GAS CONTROLS

AURA regulators provide primary and secondary pressure control of liquids and gases ranging from high pressure to sub-atmospheric levels in the most challenging analytical applications. AURA products have a lifetime warranty.

RONAN ENGINEERING COMPANY

For more than 50 years, Ronan Engineering has manufactured reliable and leading-edge instrumentation systems. As providers of real-time monitoring and measurements of critical process points, Ronan has kept some of the world's largest plants, factories, hospitals and facilities running safely and efficiently.

ATi ANALYTICAL TECHNOLOGY

Water quality instrumentation.
Available for monitoring chemical components in drinking water, process water, and wastewater to bring better control to the treatment process.
Instruments based on polarographic membrane sensors, potentiometric sensors, and light-based optical sensors are designed for demanding applications requiring the utmost in reliability.

BETA CALIBRATORS

Multifunction calibrators and calibration systems

e one ENVIRONMENT ONE CORPORATION

E/One's focus is on generator applications -- for both hydrogen-cooled and air-cooled units -- and for over 40 years, the company has led the way in the development of condition monitoring and predictive maintenance systems for electric power producers

STANDARD-DD DAMPER DRIVES LLC

High Performance Damper Drives for Precision Damper Control

Integration, configuration, installation, and calibration services

*Not all lines represented in all territories

RM CONTROLS, INC. | WWW. RMCONTROLS.COM
PO BOX 6524, OXNARD, CA 93031 / TEL: 1.800.214.4499 FAX 805.204.4135

Our Products & Solutions

Wireless Telemetry

- LTE-M1 Cellular Products
- 900MHz Radio Frequency
- Industrial Wireless
- Flood Monitoring and Alert Systems
- Industrial Wired Networking
- Industrial Wireless Accesories

Water Quality

- Water Quality Monitors

Switches

- Pressure and Temperature Switches

Intrinsic Safety

- I.S. Interfaces

Damper Control

- Damper Drives

Flow

- Vortex Flowmeter
- Multivariable Mass Flow Meter
- Electromagnetic Flow Meters
- Compound Flow Meters
- Vortex Flowmeters
- Thermal Mass Flowmeters
- Impeller Flow Products
- Pitot Insertion Flowmeters
- Mass Flow Meters
- Ultrasonic Flowmeters
- Compound Flow Meters
- Nutating Disc Flow Meters
- Open Channel Flow Meters
- Oscillating Piston Flow Meters
- Oval Gear Flow Meters
- Turbine Flow Meters
- Variable Area Flow Meters

Temperature

- Bimetal Thermometers
- Dual Mode Thermometers (DMT)
- Remote Reading/Filled Systems
- Digital Thermometers
- Thermocouples
- RTD's
- Temperature Transmitters
- Thermowells
- Compost Instrumentation

Instrumentation Devices

- Blowers, Fans & Pumps
- Distribution & Control
- Drives
- Food & Beverage
- HMI
- Other Instrumentation
- Photoconductors
- Power Supply
- Semiconductors
- Transit Systems
- UPS
- Power Geration

Laser Gas Detection

Boreal Laser

- Open Path
- Remote Point
- Stack/Duct
- Portable Open Path
- Vehicle Based
- Airborne Based

Instrumentation Systems

- Alarm Monitoring
- Signal Conditioning
- Leak Detection
- Density Measurement
- Level Measurement
- Weight Measurement

Fire & Gas Detection

- Certified Systems
- Flame Detection
- Gas Detection
- Smoke Detection

Our Products & Solutions

Valves

- Butterfly Valves
- Ball Valves
- Control Valves
- Research Control® Valves RCV
- EXPVD Diaphragm Valve

Hygrometers

A full range of hygrometers for spot check or continuous monitoring

Vibration Monitoring

Condition Monitoring and Protection

Recorders & Data Acquisition

- Strip Chart Recorders
- Paperless Recorders
- PC Data Acquisition
- PLC Data Acquisition

Controllers

- DIN Controllers
- Process Controllers
- PLC based

Distributed Control Systems

- DCS
- STARDOM

Pressure Regulators

Low Pressure and High Pressure Regulators

Calibrators

- Multifunction calibrators
- Calibration systems

Liquid Analysis

- PH Sensor
- PH Analysers
- Conductivity Sensors
- Conductivity Analysers
- Dissolved Oxygen

Flame Detection

- Portable Non-Contact Thermometers
- Combustion and Environmental Monitoring

Calibrators

- Multifunction calibrators
- Calibration systems

Flow Instrumentation Product Overview

Badger Meter




Flow measurement and control you can count on.

About Us

- Accurate
- Reliable
- Easy to use

Flow measurement and control you can count on.
Badger Meter Flow Instrumentation understands that companies cannot manage what they cannot measure—and leverages more than a century of flow measurement expertise and a technology-rich portfolio to optimize customer applications worldwide.

An industry leader in both mechanical and electrical flow metering technologies, Badger Meter offers one of the broadest flow control and measurement portfolios in the industry—a portfolio that includes eight out of the 10 major flow meter technologies.

Simply put, Badger Meter Flow Instrumentation provides technology to measure and control whatever moves through a pipe or pipeline, including water, air, steam, oil, other liquids and gases. And we apply our expertise to further enhance our products' ease of use, accuracy and effectiveness.

Customers can rely on Badger Meter Flow Instrumentation for application-specific solutions that deliver accurate, timely and dependable flow data and control essential for product quality, cost control, safer operations and regulatory compliance.

Flow Instrumentation Solutions

Badger Meter

Badger Meter provides solutions for a variety of unique flow measurement and control challenges, serving a wide array of industries. Use this chart as a first step in matching our flow technologies with your application.

	Coriolis Mass Meters	Electromagnetic Meters	Impeller Meters	Disc Meters	Turbine Meters	Oval Gear Meters	Control Valves	Ultrasonic Meters	Vortex Meters	Variable Area Meters	Differential Pressure Meters	Hydraulic Diagnostic Products
Drinking Water		✓	✓	✓	✓		✓	✓	✓			
Waste Water		✓	✓				✓	✓			✓	
Irrigation		✓	✓		✓			✓	✓			
Process Water/ Semiconductor		✓	✓	✓	✓		✓	✓	✓	✓	✓	
Chemicals	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Food		✓		✓	✓		✓	✓				
Oil/Automotive Fluids	✓		✓	✓	✓	✓	✓			✓		
Petrol	✓		✓	✓	✓	✓	✓	✓		✓		
Pharmaceutical/ Biotechnology		✓	✓				✓	✓			✓	
HVAC		✓	✓	✓	✓			✓	✓		✓	
Industrial	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Concrete Batching		✓	✓	✓	✓							
Test & Measurement	✓				✓		✓			✓	✓	✓
Oil & Gas	✓				✓		✓	✓		✓	✓	
Petrochem	✓				✓		✓				✓	
Mining					✓		✓	✓		✓		✓
Machine Tools					✓			✓		✓		✓
Power Generation	✓	✓						✓			✓	
Aerospace					✓		✓			✓		✓
Hydraulic/Fluid Power					✓	✓		✓		✓		✓
Saturated Steam									✓		✓	

Blancett® Turbine Flow Meters

Badger Meter

Blancett turbine flow meters feature durable stainless steel designs that are well-suited for applications with high-corrosive, temperature or pressure environments.

Flow monitors and transmitters:

- Digital display of flow rate and total with selectable unit of measure
- Mounting options: meter, remote, swivel, panel and explosion-proof
- Loop, battery and solar-powered options
- Communications options for Modbus RTU

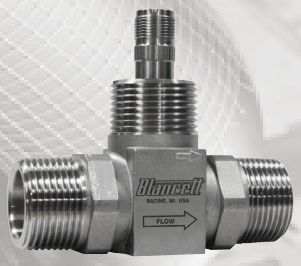
Liquid measurement turbine flow meters:

- Pipe size: 1/2…10 in. (13…254 mm)
- Threaded, flange, wafer and sanitary (3-A) connections
- Operating pressure: up to 5000 psig (344 barg)
- Operating temperature: up to 450° F (232° C)
- Flow range: 0.6…5000 gpm (11.36…18,927 lpm)
- Accuracy: up to ± 1% of reading

Gas turbine flow meters:

- Pipe size: 2 in. (51 mm)
- Wafer mounting provides quick installation and requires minimal space
- Operating pressure: up to 2200 psig (15.3 MPa)
- Operating temperature: up to 330° F (165° C)
- Flow range: 7…350 acfm (12…595 m^3/hr)
- Accuracy: up to ± 2% of reading

- Upstream oil & gas
- Food & beverage
- Semiconductor
- Petrochemical



Vision Turbine Flow Meters

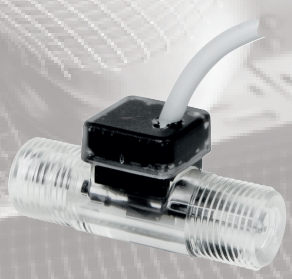
Badger Meter

The Vision turbine is the smallest flow meter from Badger Meter. The meters are designed for flow measurement of low-viscosity and non-aggressive liquids, including demineralized water, alkaline solutions, oils, salad oil, fuel consumption, beverages, water solutions and coolants. Plus, Vision turbine meters comply with NSF standards and the lead-free provision of the Safe Water Drinking Act.

Turbine meters:

- Pipe size: 1/4…3/4 in. (7…19 mm)
- Flow range: 0.026…17.17 gpm (0.1…65 lpm)
- Accuracy: up to ± 3% of reading
- Trogamid operating pressure: up to 360 psig (25 barg)
- Brass operating pressure: up to 2600 psig (179 barg)
- Operating temperature: –4…100° F (–20…212° C)
- Mountable in any orientation
- Bi-directional flow measurement
- Frequency output

- Appliances
- Hospitality
- Food & beverage
- Medical
- Chemical
- Pharmaceutical
- Cooling systems
- Automotive



Cox Precision Turbine Flow Meters

Badger Meter

Cox turbine meters provide highly accurate liquid measurement in a compact package. Designed to measure clean fluids, Cox turbine meters use ceramic ball bearings to virtually eliminate friction, providing highly accurate and repeatable measurements and are available in both single rotor and patented dual rotor configurations. Cox flow monitors and transmitters feature several design configurations, while some use Strouhal-Roshko computations to improve flow meter accuracy by compensating for thermal effects on the meter bore diameter. Custom packaging is available upon factory consultation.

Exact dual rotor meters:
- Pipe size: 1/4…4 in. (6.35…101.6 mm)
- Flow range: 0.025…1500 gpm (0.095…5678 lpm)
- Linearity: ± 0.1% of reading, with a flow processor
- Absolute accuracy: ± 0.10% of reading
- Repeatability: ± 0.02% of reading

Precision single rotor meters:
- Pipe size: 1/4…2 in. (6.35…50.8 mm)
- Flow range: 0.05…310 gpm (0.19…1173.5 lpm)
- Repeatability: ± 0.02% of reading
- Linearity: ± 0.50% (± 0.1% with flow processor)
- Frequency output: 1200…1500 Hz
- Response time: 2…3 ms (at 1.2 cSt)

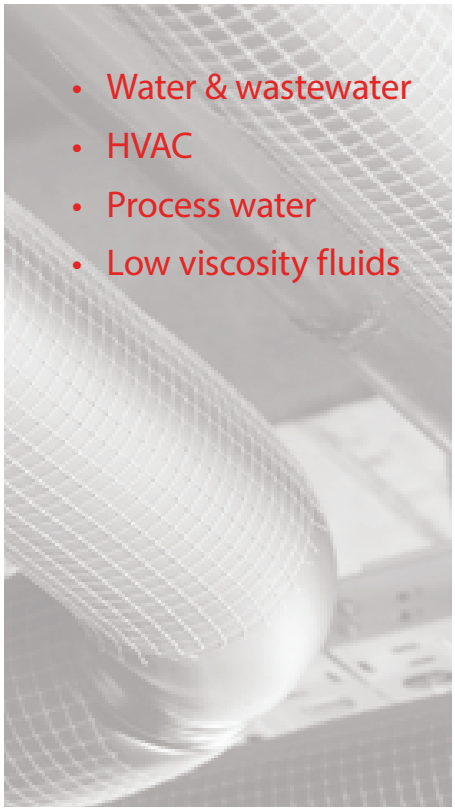
Precision gas meters:
- Pipe size: 1/4…2 in. (6.35…50.8 mm)
- Flow range: 0.40…250 acfm (0.07…424.75 m^3/hr)
- Repeatability: ± 0.25% of reading
- Response time: 20…30 ms or better

Precision LoFlo turbine flow meters:
- Pipe size: 3/8 in. (9.5 mm)
- Flow range: 0.006…1.25 gpm (0.024…4.73 lpm)
- Repeatability: ± 0.25% of reading
- Response time: 20…30 ms or better (at 1.2 cSt)

- Chemical batching
- Fuel measurement & custody transfer
- High-pressure hydraulic fluid measurement
- Test & measurement
- Aerospace

Industrial & Recordall® Turbine Flow Meters

Badger Meter



Turbo
Turbine Flow Meters

Industrial Turbo Meters

Industrial Turbo meters are ideally suited for the toughest flow conditions where continuous service and minimal maintenance are required. They are available in various materials and pressure ratings and can be combined with a large selection of Badger Meter accessories to suit numerous applications.

Specifications:

- Pipe size: 2…6 in. (50.8…152.4 mm)
- Flow range: 8…2000 gpm (3.8…7570 lpm)
- Operating pressure: up to 150 psi
- Accuracy: ± 1.5%
- Repeatability: ± 0.25%
- Temperature range: –30…250° F (–34.4…121.1° C)

Recordall Turbo Series Meters

Recordall Turbo Series meters are ideally suited for any water application, performing with great accuracy over a wide flow range. They also have very low pressure loss, increasing system efficiency.

Specifications:

- Pipe size: 1.5…12 in. (DN 40…500)
- Flow range: 4…8,800 gpm (100% at ± 1.5%)
- Operating pressure: up to 150 psi
- Accuracy: ± 1.5%
- Repeatability: ± 0.25%
- Operating temperature: up to 120° F (49° C)

Industrial Oval Gear (IOG) Flow Meters

Badger Meter

Badger Meter IOG flow meters provide an effective solution for optimizing process operations—even in very low-flow environments—enabling users to match the meter size to their application for utmost accuracy. The meters deliver precise flow measurements to eliminate waste, and thanks to low pressure drop, have minimal impact on system energy requirements to move liquids.

Displays, transmitters and registers:

- Meter-mount, local display registers with choice of no output, scalable pulse output, quadrature/dual pulse output or 4…20 mA output
- Meter-mount, non-scaled transmitters with either a single-reed switch or dual-reed switch
- Meter or remote-mount large display options include models with choice of 4…20 mA output, Modbus RTU or BACnet MSTP

Oval gear meters:

- Pipe size: 1/4…3 in. (6…76 mm)
- Flow range: 0.07…185 gpm (0.26…700 lpm)
- High accuracy and repeatability
- Operating pressure: up to 740 psi
- Liquid viscosity: 5…1000 cP
- Construction: choice of aluminum or 316L stainless steel
- Mountable in any orientation

- Chemical
- Petrochemical
- Oil & gas
- Pulp & paper
- Paints & coatings
- Printing

Recordall® Nutating Disc Flow Meters

Badger Meter

Recordall (RCDL) positive displacement meters are one of the most cost-effective methods in metering industrial fluids. The RCDL meter has a simple, efficient design for high accuracy and repeatability over the entire meter flow range.

Features:

- Wide flow range
- Rugged bronze or thermoplastic housing
- Models 25 and 70—Bronze: 250° F (121° C) option
- Easily maintained without removing from line
- Durable components for minimal maintenance
- Wide range of compatible accessories

Performance:

- Accuracy: ± 1.5%
- Repeatability: ± 0.5%
- Maximum operating pressure: 150 psi
- Maximum operating temperature:
  Plastic housing: 100° F (37.78° C)
  Bronze housing: 120° F (48.89° C)

- Cold & hot water
- Alcohols
- HVAC
- Condensate return
- Boiler feed
- Additive dispensing
- Fuel consumption

Hedland® Variable Area Flow Meters

Badger Meter

The Hedland family of products features over 18,000 inline variable area flow meters for oil, phosphate esters, water, water-based liquids and compressed gases. Capable of operating in any position, Hedland meters are easy to read and built for use in rugged environments.

Variable area flow meters with visual indicator:

- Pipe size: 1/4…3 in. (6.35…76.2 mm)
- Accuracy: up to ± 2% of full scale
- Operating pressure: up to 6000 psig (414 barg)
- Operating temperature: up to 500º F (260º C)
- Also available: ± 5% full scale accuracy model from 1/2…3 in. (12.7…76.2 mm) for systems with lower operating pressure and temperature ratings

Variable area flow meters with outputs and digital display:

- Pipe size: 1/4…1.5 in. (6.35…38.1 mm)
- Accuracy: up to ± 2% of full scale
- Operating pressure: up to 6000 psig (414 barg)
- Operating temperature: up to 240º F (116º C)
- Analog outputs: 4…20 mA, 0…5V DC or 0…10V DC
- Digital display of flow rate and total
- Programmable keypad offers selectable engineering units and in-field linearization

- Fluid power
- Machine tool cooling & lubrication
- Product packaging
- Semiconductor
- Die casting & plastic injection molding
- Mining
- Automotive
- Aerospace

Flo-tech® Hydraulic Diagnostic Products

Badger Meter

Flo-tech products are used extensively in hydraulic testing and analysis. Capable of simultaneous flow, pressure and temperature measurement, typical product applications include:

- Flow measurement
- Test stands with flow, pressure and temperature sensors
- On-site diagnostics and troubleshooting

USB-powered hydraulic system analyzer:

- Captures pressure spikes up to 10,000 psi (0.2 ms response time)
- Logs up to 12 hours and exports data to Microsoft Excel® and other spreadsheet programs
- High and low set point alarms

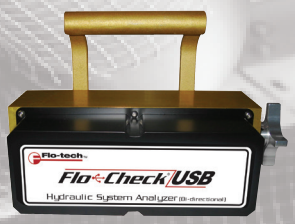
Handheld hydraulic analyzer:

- Hydraulic horsepower calculation
- 2.5 MB data logging storage
- Automatic Sensor Detection
- Five sensor inputs: turbine meter, two pressure sensors, temperature sensor and rpm speed sensor

Inline hydraulic turbine flow sensors:

- Flow range: up to 350 gpm (1324 lpm)
- Accuracy: ± 1% of full scale
- Operating pressure: up to 6000 psig (414 barg)
- Operating temperature: up to 300º F (149º C)
- Frequency pulse, 4…20 mA and voltage outputs

- Agriculture
- Automotive
- Construction
- Forestry
- Marine
- Mining



Data Industrial® Impeller Flow Meters

The Data Industrial impeller flow meters feature a six-blade or a symmetrical four-blade paddle-wheel design with a patented sensing mechanism. Unlike some mechanical metering technologies, impellers can tolerate bursts of air and vibration that would often damage other meters. Impeller solutions are extensible with network and data acquisition options.

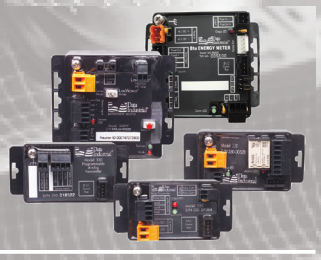
Inline Flow Meters:

- Pipe size: 1/2…4 in. (12.7 to 101.6 mm)
- Accuracy: up to ± 2% of full scale
- Features available:
  - Built-in energy meter
  - Construction for use in super clean water
  - Design for below-grade usage
  - Point-to-point wireless

Insertion Flow Meters:

- One size meter fits a range of pipe diameters
- Available options include:
  - Hot insertion sensors
  - Battery-powered insertion sensors
  - Bi-directional sensors

- Irrigation
- Chemical
- Water & wastewater
- HVAC/Energy monitoring
- Concrete & ready mix



Preso® Differential Pressure Flow Meters

Badger Meter

Preso differential pressure flow meters are precision-engineered to offer exceptional turndown ratios and superior accuracy. Designed to accommodate any manufacturer's pressure transducer, the Preso family offers a complete line of primary flow elements including Pitot tubes, venturi meters and wedge meters.

Ellipse® Pitot tube flow meters:

- Innovative elliptical design offers 17:1 turndown ratios and very low pressure loss
- For liquids, gases or steam
- Pipe size: 2…120 in. (50.8…3048 mm)
- Accuracy: ± 0.75% of reading

COIN® wedge flow meters:

- Fluid viscosity: up to 3000 cP
- Reynolds Number: as low as 300
- Calibrated accuracy: ± 0.5% of reading
- Low pressure losses
- Maintenance free (no moving parts)
- Suitable for abrasive slurries, viscous or dirty fluids such as bitumen or coal tar
- Pipe size: 1/2…48 in. (13…1219 mm)
- Custom designs available

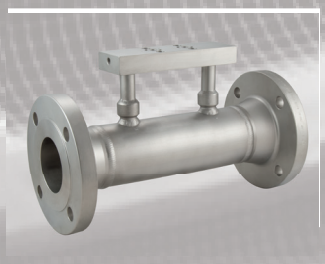
Venturi flow meters and inserts:

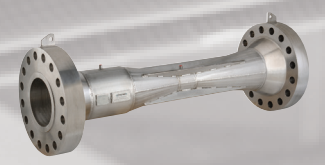
- Three designs for optimal combination of accuracy, repeatability and cost
- Maintenance free (no moving parts)
- Pipe size: 1/2…72 in. (13…1829 mm)
- Calibrated accuracy: up to ± 0.25% of reading
- Maximum pressure loss: 6% of DP
- Custom designs available

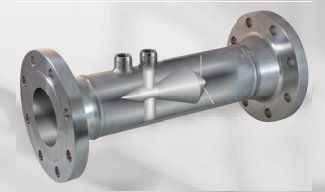
Cone flow meters:

- For liquids, steam, air and industrial gases
- Pipe Size: 1.0 inch (13 mm) and larger
- Flow Range: 10:1 and greater
- Accuracy: ± 0.5% of actual flow
- Standard Beta Ratio: 0.40…0.80, special betas available
- Approvals: CRN
- Little or no straight-run piping requirements

- Oil & gas
- Chemical
- Petrochemical
- Municipal water & wastewater
- HVAC systems







ModMAG® Electromagnetic Flow Meters

Badger Meter

Whether it's improving accuracy, decreasing system maintenance or meeting the demands of challenging liquid conditions, Badger Meter electromagnetic meters deliver the performance and precision that your critical flow measurement applications require.

- Non-intrusive, completely open flow tube design
- Pipe size: 1/4…54 in. (DN6…2000), depending upon model
- Accuracy: up to ± 0.2% ± 1 mm/s
- Corrosion-resistant liners for long life
- Remote or meter mounted amplifier
- LCD display
- SCADA-ready outputs
- NEMA 4X/6P options
- NSF approved

Models available include:

- M1000 for basic general area environments or on-truck applications
- M2000 for general area environments
- M3000 for Class 1, Div. 2 environments
- M4000 for Class 1, Div. 1 environments
- M5000 battery powered for locations without power
- M7600 for basic batching applications

- Water & wastewater
- Well water
- Reclaimed water
- Bi-directional flow
- Chemical
- Pharmaceutical
- Food & beverage
- Concrete production
- Irrigation

Coriolis Mass Flow Meters

Badger Meter

The Badger Meter RCT1000 Coriolis mass flow meter identifies flow rate by directly measuring fluid mass over a wide range of temperatures with a high degree of accuracy. For fluids consisting of two liquids or two gases, the RCT1000 Coriolis system can derive the concentration and mass of each fluid based on the density measurement. Furthermore, the unobstructed, open flow design makes it suitable for a variety of fluids such as slurries and other viscous, nonconductive fluids that are difficult to measure with other technologies.

Advantages:

- Unobstructed open flow design
- Low-maintenance operation with no free-moving parts
- Modbus RTU, Modbus TCP/IP, HART®, and EtherNet I/P network options
- Advanced fluid diagnostic tools
- Batching and PID control

Specifications:

- Pipe size: 1/16...3 in. (1.6...76.2 mm)
- Connection size: 1/4...3 in., DN15-80
- Accuracy:
  - Liquids: up to ± 0.1% of flow rate
  - Density: up to ± 0.0005 g/cm^3
- Zero stability: up to ± 0.025% of full scale
- Repeatability: up to ± 0.05% of flow rate
- Process temperature range: –40…392° F (–40…200° C)
- General area or hazardous location

Simultaneous measurement of

- Mass flow
- Density
- Temperature

Advanced Software

Dynasonics® Ultrasonic Flow Meters

Badger Meter

Dynasonics ultrasonic flow meters are ideal for liquid flow measurement as a permanently installed meter, a temporarily installed meter or as a portable flow verification device. The clamp-on design for closed pipes is non-intrusive and offers fast installation and setup with no need to cut into or drain piping. Some models also offer energy metering and network connectivity.

Transit time ultrasonic flow meters:

- Pipe size: 1/2 in. (12 mm) and larger
- Accuracy: up to ± 0.5% of reading (± 1.5% of reading for inline model)
- Variety of output options: 4…20 mA, frequency pulse and control relay
- Options include BACnet MSTP, Modbus RTU, EtherNet/IP, Modbus TCP/IP, BACnet/IP, energy monitoring and data logging

Doppler ultrasonic flow meters:

- Pipe size: 1/4 in. (6 mm) and larger
- Accuracy: up to ± 1% of full scale
- Fluid velocity: up to 30 feet (9 meters) per second

Portable transit time/Doppler hybrid ultrasonic flow meters:

- Pipe size: 1/2 in. (12 mm) and larger
- Accuracy: ± 1% of reading
- Measures flow and energy
- Full-color display, graphing capabilities, advanced touch-screen interface and wizard-based configuration tools
- 1 GB internal data logging
- Optional dual-mode pipe wall thickness sensor

- Water & wastewater
- HVAC/energy monitoring
- Power generation
- Mining
- Semiconductor
- Food & beverage
- Flow system commissioning & troubleshooting

Vortex Flow Meters

Badger Meter

Vortex flow meters are ideal for accurately measuring liquids, compressed air and saturated steam. Vortex meters have no moving parts and are virtually maintenance-free once installed. Meters are available in wafer, insertion and flange designs.

Corrosion Resistant Inline:

- Liquid Measurement
- Pipe size: 1/4…3 in.
- Accuracy: up to ± 1% of reading
- Repeatability: up to ± 0.25% of actual flow
- Operating pressure: up to 150 psig (10.3 barg)
- Operating temperature: up to 203° F (95° C)
- Available material options include PVC, PVDF, CPVC and polypropylene

Stainless Steel Insertion:

- Liquid, compressed air and saturated steam measurement
- Pipe size: 2…36 in.
- Accuracy: up to ± 1% of reading
- Repeatability: up to ± 0.25% of reading
- Operating pressure: up to 1000 psig (68.9 barg)
- Operating temperature: up to 400º F (204º C)
- Reduced noise interference with dual piezoelectric sensors and filtering

Research Control® Valves & Positioners

Badger Meter

Badger Meter manufactures and markets a complete range of precision control valves and accessories to meet the most critical and demanding applications.

Small control valves:
- RCV, 9000 and 9100 control valves
- Pipe size: 1/4…2 in.
- CV: 0.0000018…70.0
- Multiple trim sizes per valve size
- Precise accurate control
- Operating temperature: –450…1800° F (–267.78…982.22° C)
- Operating pressures: full vacuum to 60,000 psi
- Materials: 316 SST, Hastelloy, Monel, Inconel, Tantalum and other exotics

Actuators:
- Air-to-open
- Air-to-close
- Integral top-mounted positioners
- Stainless steel option available on most models

Electronic actuator SEVA:
- Fast response
- Universal Input Power (24V DC, 115V - 230 VAC)
- Protocols: Ethernet/IP, Modbus RTU, Modbus TCP/IP and Hart
- Manual override
- Standard 4…20 mA; Configurable 0…5/10V DC

Positioners:
- Easy two-step commissioning
- Auto-start with self-calibration
- 4…20 mA, HART®, FOUNDATION™ fieldbus H1 or Profibus® PA communications
- IP66, NEMA 4X and XP enclosures
- SIL3 certification

- Gas & liquid
- Chemical
- Petrochemical
- Bio-tech
- Food & beverage

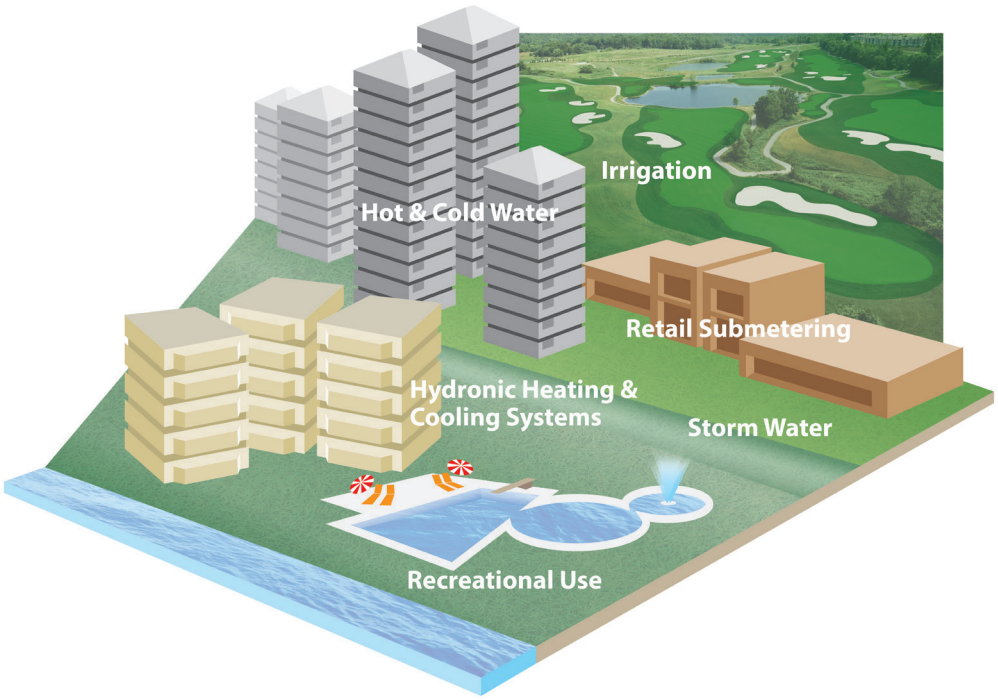
AquaCUE® Flow Measurement Manager

Badger Meter

AquaCUE flow measurement manager combines an intuitive software suite with proven flow measurement technology. It leverages cellular network infrastructure to deliver a simple yet powerful dashboard solution for improving management of the use of water throughout your property, including domestic hot and cold water, irrigation systems, recreational use, tenant sub-metering, HVAC systems and more.

Features:

- Customizable dashboards to deliver information in a format matched to your requirements
- Ability to set unique alert conditions to define and monitor exceptions
- Secure, cloud-based platform—ISO 27001 certified and SCO 2 examined for security, availability and confidentiality
- Automatic software updates



Ideal solution for:

- Universities
- Hotels & resorts
- Commercial properties
- Industrial operations
- Turf irrigation
- Agriculture irrigation
- HVAC systems
- BAS enhancement

Connectivity and Communications Add-Ons

Badger Meter

Displays and Calculations

- Batch controllers
- Displays
- Energy calculators

Network Adapters

- Modbus RTU
- BACnet MSTP
- LonWorks
- Metasys
- Wireless mesh
- Point-to-point wireless

Data Management

- Data acquisition
- Fluid management
- Inventory management
- AquaCUE flow measurement manager

Flow Dynamics® Calibration Services

Badger Meter

Flow Dynamics is a major, independent primary standard flow calibration laboratory, supplying both manufacturers and end users with unparalleled calibration results.

What we provide:

- Calibration and repair of most types of flow meters
- Multiple viscosity liquid calibrations using Strouhal-Roshko analysis
- Calibration history files for future comparisons
- Research and development testing for flow measurement devices
- Variety of inert gas calibrations
- Correlation and extrapolation methods simulating hazardous fluids
- Electronic calibrations for flow computers and signal conditioners
- OEM production calibration service
- NIST-traceable calibrations

- Calibration for most types
- OEM production calibrations
- NIST-traceable primary standards
- NVLAP (Code 200668-0) accredited*

FM 78587
AS9100 Rev. C and
ISO 9001:2008

NVLAP®
CALIBRATION
NVLAP LAB CODE 200668-0

*NVLAP accreditation applies only to the Badger Meter Flow Dynamics calibration Lab, located in Racine, WI.

- Product quality
- Control costs
- Regulatory compliance
- Maintain safety

Rely on Badger Meter Flow Instrumentation

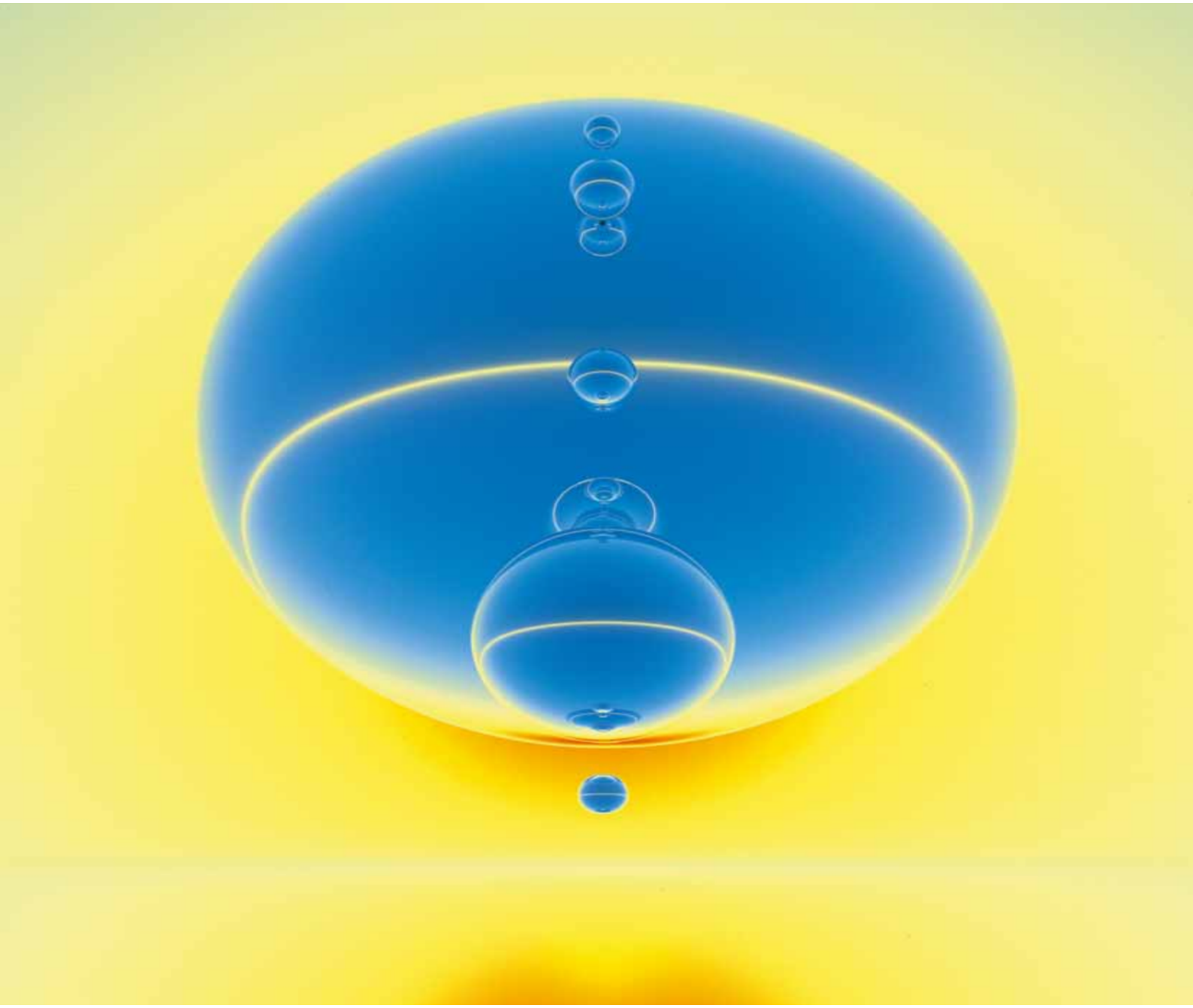
Today's industries face accelerating demands to contain costs, reduce product variability and meet ever-changing safety and regulatory requirements. To address these challenges, they must reap more value from every component in their systems. This system-wide scrutiny has heightened the focus on flow instrumentation in industrial process, manufacturing, commercial fluid, building automation and precision engineering applications where flow measurement and control are critical.

Customers can rely on Badger Meter Flow Instrumentation for application-specific solutions that deliver accurate, timely and dependable flow data and control essential for product quality, cost control, safer operations and regulatory compliance.

Fuji Electric

Innovating Energy Technology

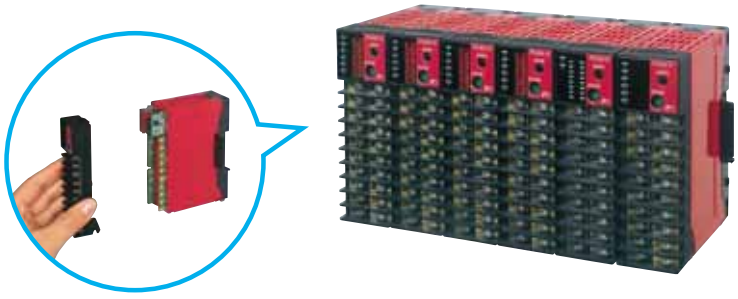
Fuji's Measurement instruments

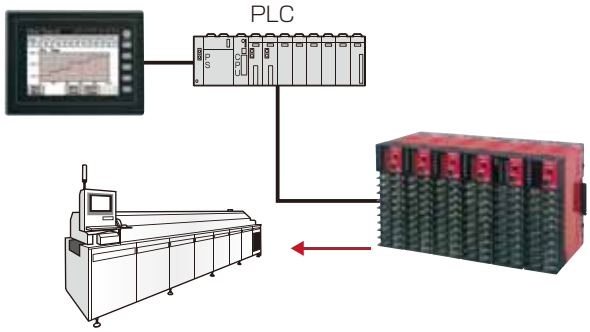


Low End ~ High End Respondent for variant temperature control.

The digital temperature controller that incorporates a wealth of control functions plays a significant role in several fields. This controller features fuzzy control that can withstand the adverse effects of overshoot and external disturbances. This makes it the controller best suited to severe temperature control conditions. In addition to providing a waterproof structure, this controller offers you a broad selection of sizes, thereby allowing you to select the size best suited to your area of application.

Temperature controllers





Perfect Module Type Temperature Controller for Multipoint Control

Multiloop Module Type Temperature Controller has a variety of modules including Control module, Digital I/O module, Analog I/O module, Communication module, PROFIBUS module and Program loader.

This is the controller using our own latest technologies including multi-zone optimum control, high-speed data communication, and high-order programless communication.

Paperless Recorder

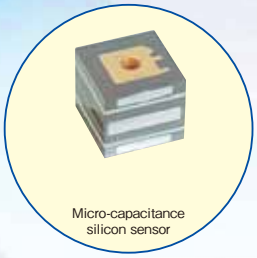
With PC Support Software on Free Charge

PC software for display storage data on CRT of PC and PC loader software for parameter setting for the Recorder is delivered as standard accessory. Root extraction, Subtractions, Integration and Fvalue calculation function are also included as standard. Operation meun with guidance display offer to ease opertion. Ethernet and RS-485 is available.

Microjet recorders

Enjoy clear, continuous six-color inkjet recording — A product of FUJI'S advanced technology

FUJI introduced an inkjet technology that incorporates piezoelements in a microjet recorder for use in industrial applications. The microjet recorder uses six-color channel recording having no apparent phase difference and can print many kinds of symbols, including figures and letters. The PHA model has 12 channel recording and the PHC model has six. A general-purpose, low-end PHE model is also available. The ink cartridges for all models are reusable. The interactive system makes operation easy.



Electronic transmitters

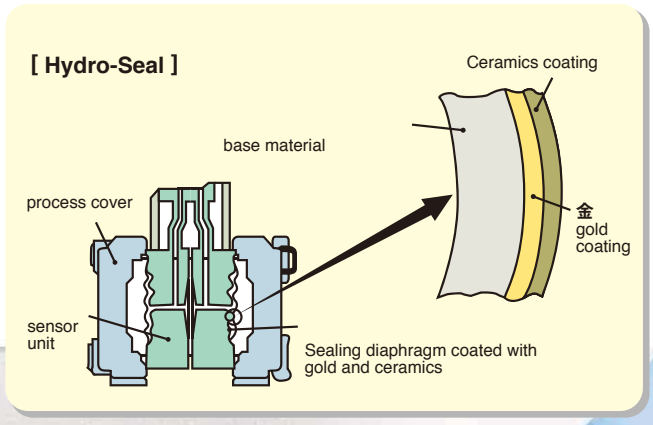
Highly precise differential and other pressure, fluid flow, and liquid level measurements with FUJI'S electronic transmitters.

Over 1,000,000 FCX series electronic transmitters have already been delivered worldwide. The key component of these transmitters is a silicone sensor with a micro level capacitance that we produced with our micro machining technology. These transmitters ensure highly precise measurements of pressure, differential pressure, fluid flow, and liquid levels. A wide-range of models, including compact and low-cost types, are available.

Electronic transmitters

Abundant options corresponding to various applications

In addition to standard 316L SS, exotic materials such as Hastelloy C-276, Monel, Tantalum are available for seal diaphragm. Hydroseal type transmitter which employs double coating of Gold and Ceramics on 316L SS seal diaphragm is optimum for the measurement of liquid and gas including high concentration of Hydrogen. High temperature and high vacuum type remote seal transmitter is also provided.



HART protocol

HART COMMUNICATION FOUNDATION

RM

www.rmcontrols.com

Flowmeters

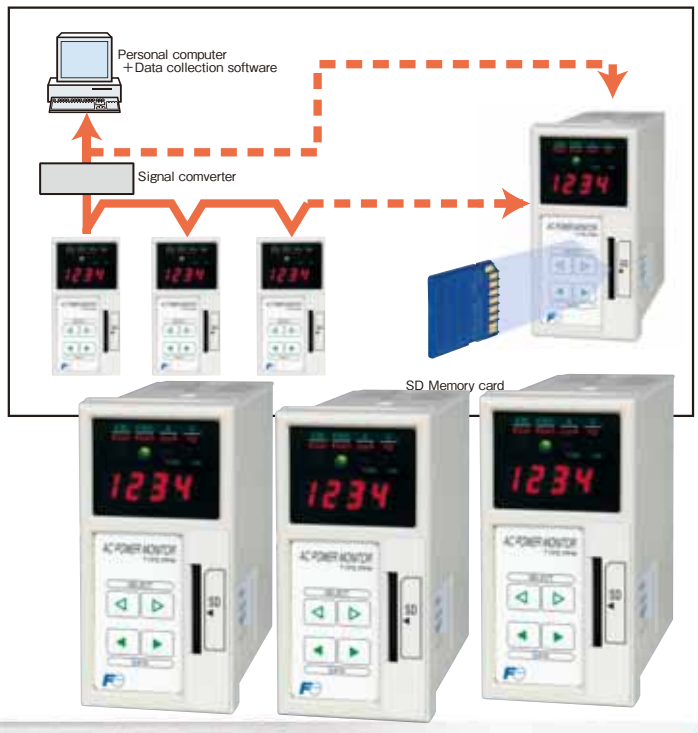
Non-intrusive flow measurement from the outside of piping

Our ultrasonic flowmeter can be easily mounted even on previously existed piping and measure flow rate without contact to liquid directly. The series employ unique measurement systems that minimize the effect of bubbles in the fluid and feature wide measurement ranges. Duosonics is a new concept ultrasonic flowmeter utilizing pulse Doppler method and transit time method as the worldwide first. Both portable and fixed mount types are available.

AC Power moniter

Power Monitor To Help Your Power Consumption Data Control

To save energy resulting better environment, detailed control and recording of power consumption by electric equipment and facilities at plants, factories and offices is required.This monitor is designed to measure voltage and amperage of power supply to electric equipment, calculate and display its operating power, reactive power, and watt-hour power consumption, and store the data in an SD memory card.Being small in size of DIN 48 x 96 mm, it can be easily installed and connected to electric systems. It can be also used for central monitoring and control by PC communications.



Gas analyzers

Mass-flow sensor

Analyzing air pollution is the first step toward preserving a clean atmospheric environment.

FUJI developed the first infrared gas analyzer in Japan to use mass-flow sensors. Since then, We have supplied customers with various types of gas analyzers to support environmental preservation and control efforts. These efforts include measurements of atmospheric pollution and the detection of low density of SOx and NOx, generated by incinerating facilities and boilers. FUJI'S gas analyzers are commonly used to monitor the atmosphere to help maintain a cleaner natural environment.

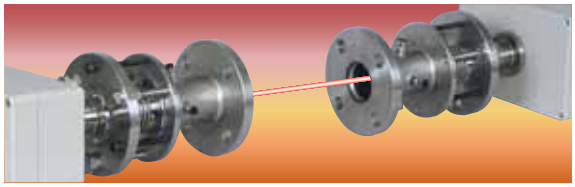
Gas analyzers

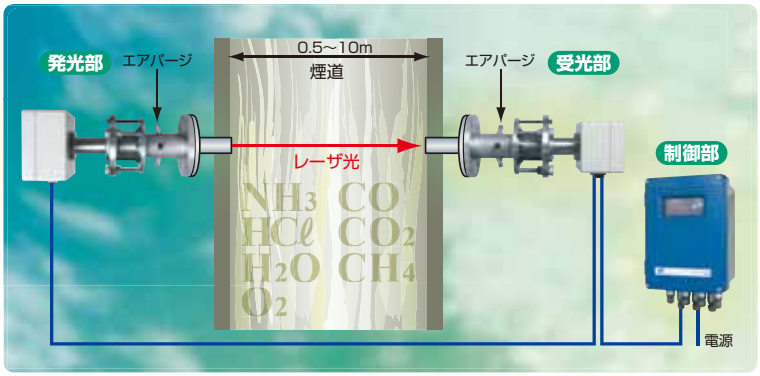
Perfect Zirconia Oxygen Analyzer for Combustion Management

Zirconia Oxygen Analyzer which is inserted into a stack directly has the pressure/explosion-proof structure in addition to IP66/IP67, and it also can be a long life due to the easily replaceable zirconia element and the sensor recovery function. What is more, a paramagnetic type oxygen analyzer performs measurement without affected by combustible gases. We supply two types: "2-sec high-speed response" type and "no auxiliary gas necessary" type.

Easily replaceable zirconia element

Stack gas analyzer





First Laser Gas Analyzer in Japan

First Direct Insertion Type Laser Gas Analyzer in Japan performs high-speed and continuous concentration measurement of HCL, NH_3, H_2O, CO, CO_2, CO_4 and O_2 contained in flue gas. It features excellent stability, high-speed measurement within the range between 1 and 5 seconds, and no interference influence from other gasses.

Stack gas analyzer

Continuous and Simultaneous Measurement of Max. 7 Components: NO_X, SO_2, CO, CO_2, O_2, HCL, and Dust

Based on our abundant actual performance and wide experience, compact lockers for simultaneous concentration measurement of five components, NO_X/SO_2/CO /CO_2 and O_2, contained in flue gas can be maintained from the front side. Therefore it realizes the space saving of installation sites. An analyzing device which stores a laser gas analyzer/dust meter also can perform simultaneous and continuous concentration measurement of seven components, NO_X/SO_2/CO/CO_2/O_2/HCL/Dust.

Flame Detection

Det-Tronics is a global leader in fire and gas safety systems, providing premium flame and gas detection and hazard-mitigation systems for high-risk processes and industrial operations. The company designs, builds, tests and commissions SIL 2 Capable flame and gas safety products ranging from conventional panels to fault-tolerant, addressable systems that are globally certified. Det-Tronics is a part of Carrier Global Corporation, a leading global provider of innovative HVAC, refrigeration, fire, security and building automation technologies.

X3301 Multispectrum Infrared Flame Detector

Prevent unnecessary costly operational shutdowns with the enhanced X3301 Multispectrum Infrared Flame Detector. From refineries to turbines, offshore exploration/production to hangars, FPSOs to fuel storage, let the X3301 protect your personnel, assets and property.Already a well-established and leading flame detector in fire protection, the X3301 is now significantly improved with certification for:
Greatest Field-Of-View (FOV) protection
Longest detection range
Third-party approval for detecting the greatest number of fuel types

X3302 MULTISPECTRUM INFRARED

The X3302 brings state-of-the-art flame detection to the difficult task of detecting invisible hydrogen flames.
With a solid cone of vision for Hydrogen fire detection, coupled with superior false alarm rejection, the X3302 provides protection in applications such as refineries, chemical loading, battery rooms, compressor areas, generators, refrigerants, gas plants.

X5200 Ultraviolet Infrared Flame Detector

Approved to FM 3260 (2000), the X5200 meets the most stringent requirements worldwide with advanced detection capabilities and immunity to extraneous sources, combined with a superior mechanical design.

The mounting arrangement allows the UV and IR sensors to monitor the same hazardous location with a 90-degree cone of vision. When both sensors simultaneously detect the presence of a flame, an alarm signal is generated. The detector has Division and Zone explosion-proof ratings and is suitable for use in indoor and outdoor applications.

X9800 Single Frequency Infrared Flame Detector

Approved to FM 3260 (2000), the X9800 meets the most stringent requirements worldwide with advanced detection capabilities and immunity to extraneous sources, combined with a superior mechanical design. The detector is equipped with both automatic and manual optical integrity test capability. The detector has Division and Zone explosion-proof ratings and is suitable for indoor and outdoor applications.

X2200 Ultraviolet Flame Detector

The evolution continues with the X2200 UV Flame Detector. Approved to FM 3260 (2000), the X2200 meets the most stringent requirements worldwide with advanced detection capabilities and immunity to extraneous sources, combined with a superior mechanical design. The detector is equipped with both automatic and manual optical integrity test capability. The detector has Division and Zone explosion-proof ratings and is suitable for use in a variety of applications.

PM-5MPX Dual Spectrum IR

The Det-Tronics PM-5MPX Dual Spectrum IR flame detector is optimized for the rigorous semiconductor fabrication industry. It is ideal for the detection of hydrogen, silane, and typical materials used in electronics manufacturing. The detector incorporates unique Dual Spectrum infrared sensor technology, which establishes a new standard in flame detection and false alarm immunity. The housing is polypropylene which enables it to be utilized in both solvent or chemical etch wet benches.

Det-Tronics® SmokeWatch™ U5015 Explosion-Proof Smoke Detector

The Det-Tronics® SmokeWatch™ U5015 Explosion-Proof Smoke Detector is a Class I Division 1, 2 and Zone 1 explosion-proof rated smoke detector that is suitable for hazardous, industrial, and commercial applications. This smoke detector has unique design that operates effectively in both smoldering and rapidly growing fires.The photoelectric operation and signal processing features of the SmokeWatch U5015, along with Class I Division 1 and IP44 ingress protection certifications mean that hazardous areas now have crucial safety equipment available in places that previously did not have a choice of such high-standard devices.

xWatch® Industrial Video Surveillance Camera

When combined with a Det-Tronics X-Series flame detector or integrated into an existing detection/surveillance system, the xWatch® camera provides a high-resolution color image with real-time viewing of a monitored area and post-event analysis to determine the root cause of event alarms. This added layer of protection enables a secondary confirmation of a hazardous event, ideal for remote locations and unmanned facilities.

HART Handheld Communicator

his HART Communicator is a portable, intrinsically safe handheld communicator that may be used to configure and test any HART device. As the industry standard, the 475 Field Communicator incorporates unique features that simplify your work on the bench and in the field:

+ Supports Det-Tronics HART-based flame and gas detectors
+ Full-color graphical interface and touch screen
+ Easy-to-read screen in both bright sunlight and normal lighting

+ Diagnostics from field devices
+ Long-lasting lithium-ion power module for days of battery life
+ Quick startup and fast operating time
+ Easy to upgrade via the internet
+ Rugged and reliable design
+ Robust, real-time operating system
+ Large navigation buttons
+ 32 MB application memory

Gas Detection

Our full line of hazardous gas detection configurations range from a variety of fixed gas combustible and toxic gas detectors to a complete line of display transmitters, gas controllers, power supplies, and gas control panels. Det-Tronics delivers the flexibility, functionality, and reliability you can depend on.

FlexSight™ LS2000 Line-Of-Sight Infrared Gas Detector

Line-of-Sight Infrared (LOS IR) Gas Detectors provide continuous monitoring of combustible hydrocarbon gas concentrations in a wide range (typically, 0 to 5 LFL-meters, over a distance of 5 to 120 meters). They must function under the heavy vibration typical of an industrial site and must endure harsh environments.

To meet these requirements while minimizing lifecycle costs can be challenging. The FlexSight™ LS2000 sets a new standard for LOS IR gas detectors with improved optical field of view, an advanced housing design, simplified mount, and breakthrough alignment tolerance.

The FlexSight LS2000 provides easy installation, easy maintenance, and the best protection - it comes with a 5 year full warranty and a 10 year IR lamp source warranty.

FlexSonic Acoustic Leak Detector

The FlexSonic® Acoustic Gas Leak Detector hears gas leaks that others don't – the instant they occur. It is the first non-contact gas leak detector of its kind that recognizes unique sound "fingerprints," analyzing 24 discrete ultrasonic bands, while ignoring nuisance ultrasonic sources. A high-fidelity microphone continuously monitors for the distinct ultrasound emitted by pressurized gas leaks across the widest spectrum of frequencies.

This industrial-quality detector provides another layer of protection in the harshest environments, detecting leaks instantly under virtually all conditions. Place where it is needed, with no need to desensitize. For revolutionary protection in real-world environments, the FlexSonic detector is the proven choice.

PointWatch Eclipse IR Detector Model PIRECL

The PointWatch Eclipse® Model PIRECL IR Hydrocarbon Gas Detector is our most rugged stainless steel, point infrared gas detector. It is approved to be factory calibrated to detect methane, propane, ethylene, and butane.The Eclipse goes above gas detection to life-safety control. Thanks to its onboard relays and tri-colored LED indicator, the Eclipse has earned ANSI/ISA approval (ANSI/ISA-12.13.01: 2000) to annunciate and initiate life-safety executive control functions.

Open Path (OPECL) IR Gas Detector

Det-Tronics offers a line-of-sight gas detector for measurement of hydrocarbon vapors in the lower explosive limit per distance (LFL-meter) detection range. Ideally suited for open path gas detection applications in oil, gas, and petrochemical facilities, the Open Path Eclipse provides a number of unique features and benefits including:

Rock-solid mounting fixture
Line-of-sight protection up to 120 meters
100% Stainless Steel for maximum strength
Integral wiring termination compartment for easy installation
4-20 milliamp analog, HART, and RS-485 Modbus outputs
Tri-Color LED provides external status indication
Routine calibration not required
FM performance approvals and CSA and DEMKO hazardous (classified) locations
Optional Relay Package (2 alarms, 1 fault)

PointWatch (PIR9400) IR Gas Detector

The PointWatch PIR9400 Infrared detector offers the lowest cost of ownership for detection of hydrocarbon combustible gases and vapors. It is virtually maintenance free and will detect gas concentrations within the 0 to 100% LFL range with a corresponding 4-20 mA output signal. Benefits include continuous self-testing, immunity to poisons such as silicone and hydrides, and the ability to perform under harsh conditions.

FlexVu® Universal Display Family

The FlexVu Universal Display is a feature-rich, life-safety display that provides non-intrusive calibration, local event logging, and third-party performance certifications. This FlexVu Display can reduce spare-parts inventory by operating with a wide variety of flame and gas sensors. It is HART and Modbus compatible and can accept a universal selection of toxic and combustible gas sensors.
The FlexVu Display is available in three configurations that vary by application and feature set.

Catalytic Combustible Gas (CGS) Detector

Shown with the FlexVu UD10 Universal Display/Controller, the catalytic combustible gas sensor (CGS) is a globally-approved, stainless steel sensor that is poison-resistant. It provides unmatched detection of almost all combustible gases in harsh industrial environments, and is compatible with the entire line of Det-Tronics combustible gas transmitters and controllers. The CGS must be used with a compatible transmitter to provide proper operation.

HART Handheld Communicator

This HART Communicator is a portable, intrinsically safe handheld communicator that may be used to configure and test any HART device. As the industry standard, the 475 Field Communicator incorporates unique features that simplify your work on the bench and in the field:

+ Supports Det-Tronics HART-based flame and gas detectors
+ Full-color graphical interface and touch screen
+ Easy-to-read screen in both bright sunlight and normal lighting
+ Diagnostics from field devices
+ Long-lasting lithium-ion power module for days of battery life
+ Quick startup and fast operating time
+ Easy to upgrade via the internet
+ Rugged and reliable design
+ Robust, real-time operating system
+ Large navigation buttons
+ 32 MB application memory

DuctWatch (PIRDUCT) IR Gas Detector

The PIRDUCT "DuctWatch" combustible IR gas detector is specially designed to deliver reliable gas detection in enclosed air-handling ductwork applications. Safety engineers have long been aware that duct air monitoring provides the ability to maximize protection of confined spaces in challenging industrial applications.

Volumetric (PIRVOL) IR Gas Monitor

The model PIRVOL IR gas monitor is designed to monitor hydrocarbon vapors in the range of 0-100% by volume, and is ideally suited for oil and gas wellhead mud-logging, hydrocarbon processing, and other extractive sampling applications. The PIRVOL provides superior life-cycle costs over destructive hot-wire measurements such as thermal conductivity and catalytic element sensors. In addition, the PIRVOL can replace expensive gas chromatographs in many gas exploration drilling applications.

Combustible Transmitter (505)

The Model 505 Transmitter provides extremely cost-effective protection and performance. Used exclusively with our model CGS catalytic gas sensor, the 505 provides one-person calibration capability using a standard digital volt meter. The 505's analog 4 to 20 mA output signal is compatible with our model R8471A rack-mount gas controller, or virtually any analog input from a distributed control system or PLC.

PR electronics

PERFORMANCE MADE SMARTER

Signal Conditioning & *Communication Interfaces* *Product Catalog*

Our purpose

is to create market-leading site standard solutions with high signal integrity and simplicity for our customers, concentrating on innovation in six core business areas: Temperature, I.S. Interfaces, Communication Interfaces, Multifunctional, Isolation and Display.

Our products are individually outstanding, but when our point-to-point temperature measurement devices, I.S. interfaces, backplanes, multifunctional signal devices and future-proof communication interfaces are combined, our solutions are truly unrivalled.

We will be

our customer's trusted partner for the best and most innovative signal conditioning solutions in the process and factory automation industries.

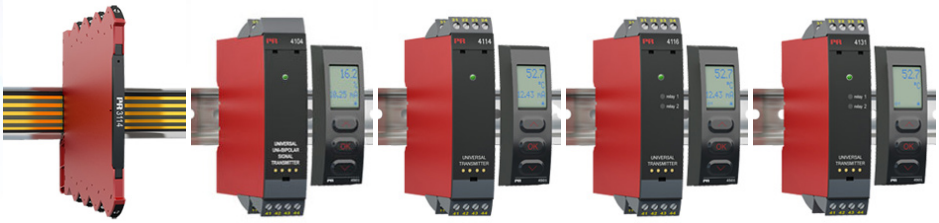
We provide

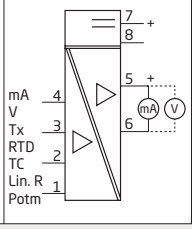
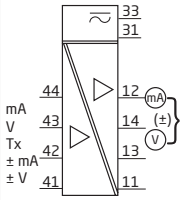
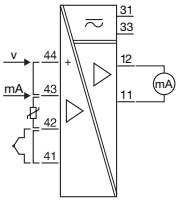
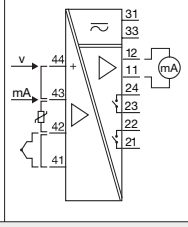
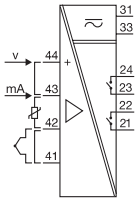
a wide range of benefits to our customers through innovative solutions and close collaboration:

- The highest signal integrity from your measurement point to control system
- Maximum uptime based on our Install and Forget® philosophy
- Easy and cost-effective deployment and monitoring with intuitive communication interfaces
- Site standard devices that are easily programmable to suit your specific application
- Day-to-day delivery

Since 1974, we have been dedicated to perfecting our core competence of innovating high precision technology with low power consumption. With a dedicated R&D center that is integrated with our lean production facility at our headquarters in Denmark, we are today one of the leading companies within signal conditioning.

MULTIFUNCTIONAL TRANSMITTERS



TYPE	3114	4104	4114	4116	4131
	Isolated universal converter	Universal uni-/bipolar signal transmitter	Universal transmitter	Universal transmitter	Universal trip amplifier
INPUT: RTD, TC, linear resistance, mV, mA, V, potentiometer **OUTPUT:** mA, V, relays					
INPUT:					
mA, measurement range / min. span	0...23 mA / 16 mA	-23...+23 mA	0...23 mA / 16 mA	0...23 mA / 16 mA	0...23 mA / 16 mA
V, measurement range / min. span	0...12 VDC / 0.8 V	-12...+12 VDC / 0.8 V	0...12 VDC / 0.8 V	0...12 VDC / 0.8 V	0...12 VDC / 0.8 V
RTD, measurement range / min. span	-200...+850°C / 25°C		-200...+850°C / -	-200...+850°C / -	-200...+850°C / -
Lin. R, measurement range / min. span	0...10000 Ω / -		0...10000 Ω / -	0...10000 Ω / -	0...10000 Ω / -
Potentiometer	10 Ω...100 kΩ		10 Ω...100 kΩ	10 Ω...100 kΩ	10 Ω...100 kΩ
Sensor connection, wires	2 - 3 - 4		2 - 3 - 4	2 - 3 - 4	2 - 3 - 4
TC types	BEJKLNRSTUW3W5Lr		BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5Lr
Cold junction compensation	Internal		Internal / external	Internal / external	Internal / external
Reference voltage / 2-wire supply	- / > 15 V	- / 16 VDC	- / 16 VDC	- / 16 VDC	- / 16 VDC
OUTPUT:					
mA, signal range / min. span	0...23 mA / 16 mA	-23...+23 mA / 16 mA	0...23 mA / 16 mA	0...23 mA / 16 mA	
Load (@ current output)	≤ 600 Ω	≤ 800 Ω	≤ 800 Ω	≤ 800 Ω	
V, signal range / min. span	0...10 VDC / 0.8 VDC	-10...+10 VDC / 0.8 VDC	0...10 VDC / 0.8 VDC	0...10 VDC / 0.8 VDC	
Load (@ voltage output)	≥ 10 kΩ	≥ 500 kΩ			
Relays				2 x SPST, AC: 500 VA	2 x SPST, AC: 500 VA
TECHNICAL SPECIFICATIONS:					
Ambient temperature	-25...+70°C	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C
Supply voltage, universal AC / DC	- / 16.8...31.2 VDC	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V
Max. required power	1.2 W	2.5 W	2.0 W	2.5 W	2.0 W
Isolation voltage, test / operation	2.5 kVAC / 250 VAC	2.3 kVAC / 250 VAC	2.3 kVAC / 250 VAC	2.3 kVAC / 250 VAC	2.3 kVAC / 250 VAC
Response time	0.4 / 1.0 s	< 20 ms	< 400 ms	< 400 ms	< 400 ms
Signal dynamics, input / output	24 bit / 16 bit	20 bit / 18 bit	24 bit / 16 bit	24 bit / 16 bit	24 bit / -
Accuracy	< ±0.1% of span	< ±0.05% of span	< ±0.1% of span	< ±0.1% of span	< ±0.1% of span
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C
NAMUR	NE 21, NE 43	NE 21	NE 21, NE 43	NE 21, NE 43	NE 21, NE 43
Channels	1	1	1	1	1
Programming	4501 / 4590	4501 / 4511	4501 / 4511	4501 / 4511	4501 / 4511

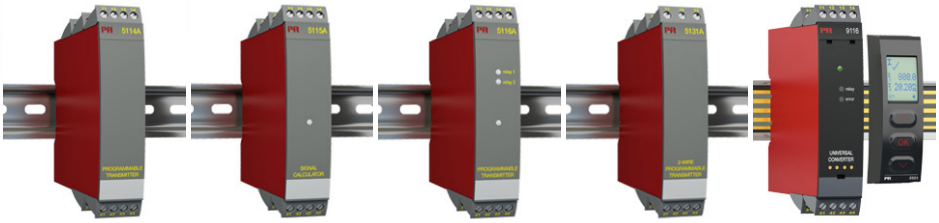
APPROVALS:						
ATEX, Zone 2	✓					
IECEx, Zone 2	✓					
FM, Zone 2 - DIV 2	✓	✓	✓	✓	✓	
CCOE	✓					
UL 61010 / 508	✓ / -	- / ✓	- / ✓	- / ✓	- / ✓	
DNV-GL	✓	✓	✓	✓	✓	
EAC	✓	✓	✓	✓	✓	
SIL 2, Hardware Assessment			✓	✓		

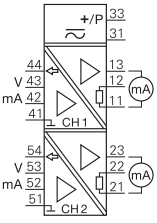
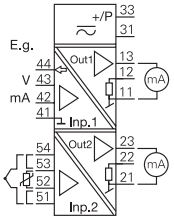
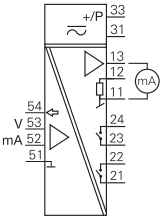
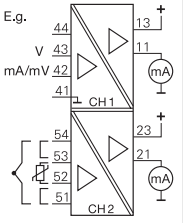
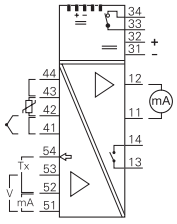
APPLICATION GUIDE:						
mA / V / temperature input	✓ / ✓ / ✓	✓ / ✓ / -	✓ / ✓ / ✓	✓ / ✓ / ✓	✓ / ✓ / ✓	
Bipolar mA / V input		✓ / ✓				
Lin. R / potentiometer input	✓ / ✓		✓ / ✓	✓ / ✓	✓ / ✓	
4...20 mA Tx input	✓	✓	✓	✓	✓	
V-curve function		✓				
Buffered voltage output	✓					
Active / passive current output	✓ / -	✓ / ✓	✓ / -	✓ / -		
Analog / relay output	✓ / -	✓ / -	✓ / -	✓ / ✓	- / ✓	
Custom sensor linearization						
Process signal calibration	✓	✓	✓	✓	✓	
Power rail option	✓					

exida = FMEDA report

Of span = Of the presently selected range

MULTIFUNCTIONAL TRANSMITTERS



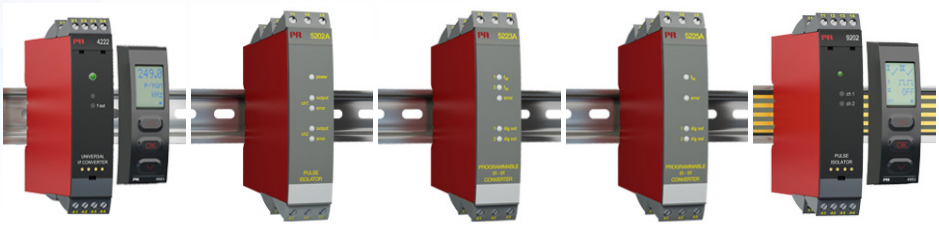
TYPE	5114A	5115A	5116A	5131A	9116A
	Programmable transmitter	Signal calculator	Programmable transmitter w. limit switch	2-wire programmable transmitter	Universal converter
INPUT: RTD, TC, linear resistance, mV, mA, V, potentiometer **OUTPUT:** mA, V, relays					
INPUT:					
mA, measurement range / min. span	0...100 mA / 4 mA	0...100 mA / 4 mA	0...100 mA / 4 mA	0...100 mA / 4 mA	0...23 mA / 16 mA
V, measurement range / min. span	0...250 VDC / 5 mV	0...250 VDC / 5 mV	0...250 VDC / 5 mV	0...250 VDC / 5 mV	0...12 VDC / 0.8 V
mV, measurement range / min. span	-150...+150 mV / 5 mV	-150...+150 mV / 5 mV	-2500...+2500 mV / 5 mV	-150...+150 mV / 5 mV	
RTD, measurement range / min. span	-200...+850°C / 25°C	-200...+850°C / 25°C	-200...+850°C / 25°C	-200...+850°C / 25°C	-200...+850°C / 25°C
Lin. R, measurement range / min. span	0...5000 Ω / 30 Ω	0...5000 Ω / 30 Ω	0...5000 Ω / 30 Ω	0...5000 Ω / 30 Ω	0...10000 Ω / -
Potentiometer	200 Ω...100 kΩ	200 Ω...100 kΩ	200 Ω...100 kΩ		10 Ω...10000 Ω
Sensor connection, wires	2 - 3 - 4	2 - 3 - 4	2 - 3 - 4	2 - 3 - 4	2 - 3 - 4
TC types	BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5Lr
Max. offset	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	
Cold junction compensation	Internal / external	Internal / external	Internal / external	Internal / external	Internal / external
Reference voltage / 2-wire supply	2.5 VDC / > 17.1 VDC	2.5 VDC / > 17.1 VDC	2.5 VDC / > 16.5 VDC		- / > 16.5 VDC
OUTPUT:					
mA, signal range / min. span	0...23 mA / 10 mA	0...23 mA / 10 mA	0...23 mA / 10 mA	3.5...23 mA / 10 mA	0...23 mA / 16 mA
Load (@ current output)	≤ 600 Ω	≤ 600 Ω	≤ 600 Ω	≤ (V_{supply}-7.5)/0.023 [Ω]	≤ 600 Ω
V, signal range / min. span	0...10 VDC / 0.5 VDC	0...10 VDC / 0.5 VDC	0...10 VDC / 0.5 VDC		
Load (@ voltage output)	≥ 500 kΩ	≥ 500 kΩ	≥ 500 kΩ		
Relays			2 x SPST, AC: 500 VA		1 x SPST, AC: 500 VA
TECHNICAL SPECIFICATIONS:					
Ambient temperature	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C
Supply voltage, universal AC / DC	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	- / 7.5...35 VDC	- / 19.2...31.2 VDC
Max. required power, 1 / 2 channels	2.1 W / 2.8 W	2.1 W / 2.8 W	2.4 W / -	0.8 W	≤ 2.1 W
Isolation voltage, test / operation	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	2.6 kVAC / 250 VAC
Response time	250 ms...60 s	250 ms...60 s	250 ms...60 s	1...60 s	0.4 / 1...60 s
Signal dynamics, input / output	22 bit / 16 bit	22 bit / 16 bit	22 bit / 16 bit	22 bit / 16 bit	24 bit / 16 bit
Accuracy	< ±0.05% of span	< ±0.05% of span	< ±0.05% of span	≤ ±0.05% of span	< ±0.1% of span
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C
NAMUR	NE 21, NE 43	NE 21, NE 43	NE 21, NE 43	NE 21, NE 43	NE 21, NE 43
Channels	1 or 2	2	1	1 or 2	1
Programming	5909 + DIP switch	5909 + DIP switch	5909	5909 + DIP switch	4501 / 4511

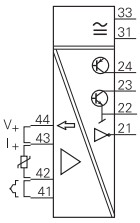
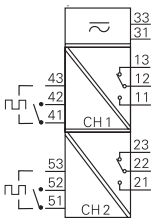
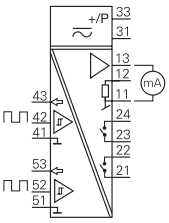
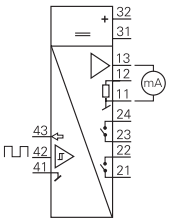
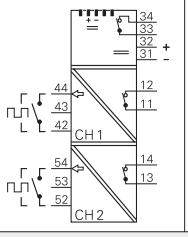
APPROVALS:					
ATEX, Zone 2					✓
IECEx, Zone 2					
FM, Zone 2					
CCOE					
UL 61010 / 508			- / ✓		✓ / -
DNV-GL	✓	✓	✓		✓
EAC	✓	✓	✓	✓	✓
SIL 2 Full Assessment IEC 61508					✓

APPLICATION GUIDE:					
mA / V / temperature input	✓ / ✓ / ✓	✓ / ✓ / ✓	✓ / ✓ / ✓	✓ / ✓ / ✓	✓ / ✓ / ✓
Bipolar mV input	✓	✓	✓	✓	
Lin. R / potentiometer input	✓ / ✓	✓ / ✓	✓ / ✓	✓ / -	✓ / ✓
4...20 mA Tx input	✓	✓	✓	✓	✓
Dual input - math functions		✓			
Buffered voltage output					
Active / passive current output	✓ / ✓	✓ / ✓	✓ / ✓	✓	✓ / ✓
Analog / relay output	✓ / -	✓ / -	✓ / ✓	✓ / -	✓ / ✓
Custom sensor linearization	✓	✓	✓		
Process signal calibration	✓	✓	✓	✓	✓
Power rail option					✓

= Full assessment acc. to IEC 61508

Of span = Of the presently selected range



TYPE	4222	5202A	5223A	5225	9202A
	Universal I/f converter	Pulse isolator	Programmable f/I - f/f converter	Programmable f/I - f/f converter	Pulse isolator
INPUT: Frequency, pulse, V, mA, Pt100, TC, mV **OUTPUT:** mA, V, pulse, relays					
INPUT:					
Sensor type		NAMUR / switch	All standard sensors ⎍	All standard sensors ⎍	NAMUR / switch
Hz, measurement range / min. span		0...5 kHz	0...20 kHz / 0.001 Hz	0...20 kHz / 0.001 Hz	0...5 kHz
Min. pulse width		> 100 µs	25 µs	25 µs	> 100 µs
mA, measurement range / min. span	0...23 mA / 16 mA				
V, measurement range / min. span	0...12 VDC				
RTD, measurement range / min. span	200...+850°C / -				
Lin. R, measurement range / pot.-meter	0 Ω...10 kΩ/10 Ω...100 kΩ				
Sensor connection, wires	2 - 3 - 4				
TC types	BEJKLNRSTUW3W5Lr				
OUTPUT:					
mA, signal range / min. span			0...23 mA / 5 mA	0...23 mA / 5 mA	
V, signal range / min. span			0...10 VDC / 0.25 VDC	0...10 VDC / 0.25 VDC	
Hz, signal range / min. span	0...25000 Hz / 0.001 Hz	0...5 kHz / -			0...5 kHz
Pulse output	NPN / PNP / TTL	NPN / relay	NPN / PNP or relays	NPN / PNP or relays	NPN / relay
Relays		2 x SPDT, AC: 100 VA	2 x SPST, AC: 500 VA	2 x SPST, AC: 500 VA	1 x SPST, AC: 500 VA
Max. output frequency	25 kHz		1000 Hz	1000 Hz	
Sensor supply	> 16 VDC		5...17 VDC	5...17 VDC	
TECHNICAL SPECIFICATIONS:					
Ambient temperature	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C
Supply voltage, AC / DC	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	- / 19.2...28.8 VDC	- / 19.2...31.2 VDC
Max. required power, 1 / 2 channels	2.5 W / -	- / 1.5 W or 1.8 W*	3 W	3.5 W	≤ 1.1...1.3 W/≤ 1.5...1.9 W
Isolation voltage, test / operation	2.3 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	2.6 kVAC / 250 VAC
Response time	< 1 s		60 ms...1000 s	60 ms...1000 s	200 ms
Signal dynamics, input / output	24 bit / -		- / 16 bit	- / 16 bit	
Accuracy	≤ ±0.1% of span		≤ ±0.1% of span	≤ ±0.1% of span	
Temperature coefficient	< ±0.01% of span / °C		< ±0.01% of span / °C	< ±0.01% of span / °C	
NAMUR	NE 21	NE 21			NE 21
Channels	1	2	1	1	1 or 2
Programming	4501 / 4511	DIP switch	5909 + DIP switch	5909 + DIP switch	4501 / 4511

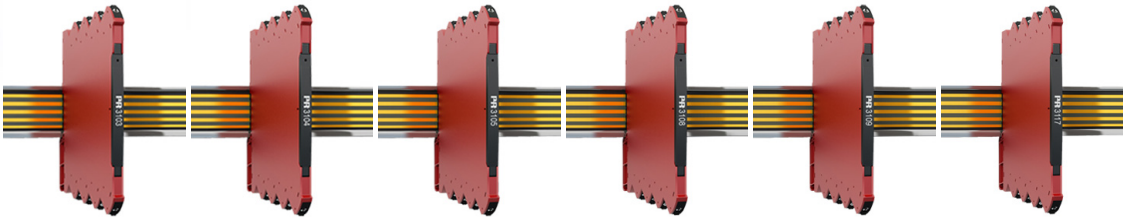
APPROVALS:						
ATEX, Zone 2					✓	
IECEx, Zone 2						
FM, Zone 2 - DIV 2	✓					
CCOE						
UL 61010 / 508	- / ✓	- / ✓			✓ / -	
DNV-GL					✓	
EAC	✓	✓	✓	✓	✓	
SIL 2 Full Assessment IEC 61508					✓	
APPLICATION GUIDE:						
Frequency to analog converter			✓	✓		
Analog to frequency converter	✓					
Lin. R / potentiometer input	✓ / ✓					
Concurrent f/I and f/f				✓		
Pulse converter / scaler			✓	✓		
Pulse isolator 1:1					✓	
Dual input - math functions		✓	✓			
Digital output	✓		✓	✓	✓	
Relay output		✓	✓	✓	✓	
Process signal calibration	✓	✓	✓	✓		
Power rail option					✓	

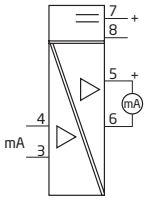
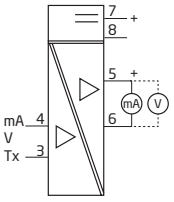
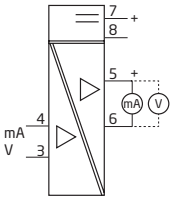
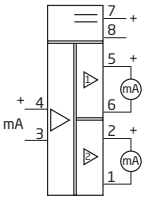
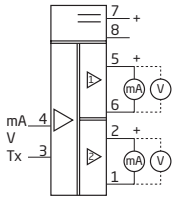
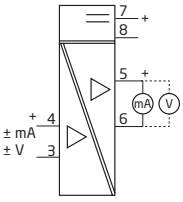
exida = FMEDA report

SIL 2 = Full assessment acc. to IEC 61508

***1.5 W (2 relays) / 1.8 W (4 relays)**

Of span = Of the presently selected range

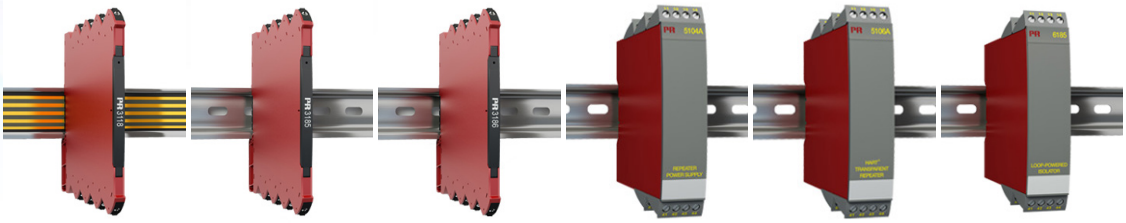


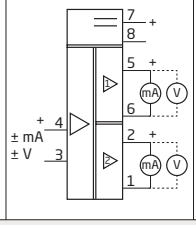
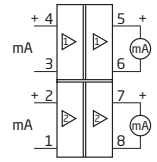
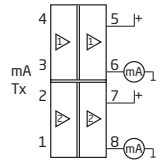
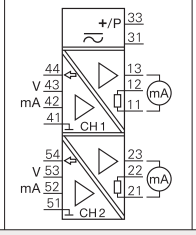
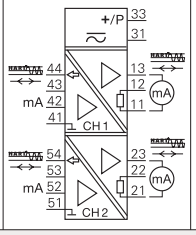
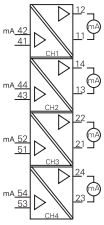
TYPE	3103	3104	3105	3108	3109	3117
	Isolated repeater	Isolated converter	Isolated converter	Isolated repeater / splitter	Isolated converter / splitter	Bipolar isolated converter
INPUT: mA, V, potentiometer **OUTPUT:** mA, V						
INPUT:						
mA, measurement range / min. span	0...23 mA / 1:1	0...23 mA / 16 mA	0...23 mA / 16 mA	0...23 mA / 1:1	0...23 mA / 16 mA	-23...+23 mA
V, measurement range / min. span		0...10.25 VDC / 4 VDC	0...10.25 VDC / 4 VDC		0...10.25 VDC / 4 VDC	±5 and ±10 VDC
Reference voltage / 2-wire supply		- / > 17 V			- / > 17 V	
OUTPUT:						
mA, signal range / min. span	0...23 mA / 1:1	0...23 mA / 16 mA	0...23 mA / 16 mA	0...23 mA / 1:1	0...23 mA / 16 mA	0...23 mA / 16 mA
Load (@ current output)	≤ 600 Ω	≤ 600 Ω	≤ 600 Ω	≤ 300 Ω per channel	≤ 300 Ω per channel	≤ 600 Ω
V, signal range / min. span		0...10 VDC / 4 VDC	0...10 VDC / 4 VDC		0...10 VDC / 4 VDC	0...10 VDC / 4 VDC
Load (@ voltage output)		≥ 10 kΩ	≥ 10 kΩ		≥ 10 kΩ	≥ 10 kΩ
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-25...+70°C	-25...+70°C	0...+70°C	-25...+70°C	-25...+70°C	-25...+70°C
Supply voltage, AC / DC	- / 16.8...31.2 VDC	- / 16.8...31.2 VDC	- / 16.8...31.2 VDC	- / 16.8...31.2 VDC	- / 16.8...31.2 VDC	- / 16.8...31.2 VDC
Max. required power*	0.65 W	1.2 W	0.8 W	0.75 W	1.2 W	0.8 W
Isolation voltage, test / operation	2.5 kVAC / 250 VAC	2.5 kVAC / 250 VAC	2.5 kVAC / 250 VAC	2.5 kVAC / 250 VAC	2.5 kVAC / 250 VAC	2.5 kVAC / 250 VAC
Response time	< 7 ms	< 7 ms	< 7 ms	< 7 ms	< 7 ms	< 7 ms
Signal dynamics, input / output	Analog signal chain	Analog signal chain	Analog signal chain	Analog signal chain	Analog signal chain	Analog signal chain
Accuracy	< ±0.05% of span	< ±0.05% of span	< ±0.2% of span	< ±0.05% of span	< ±0.05% of span	< ±0.05% of span
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.015% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C
NAMUR	NE 21	NE 21	NE 21	NE 21	NE 21	NE 21
Channels	1	1	1	1	1	1
Programming	No	DIP switch	DIP switch	No	DIP switch	DIP switch
APPROVALS:						
ATEX, Zone 2	✓	✓		✓	✓	✓
IECEx, Zone 2	✓	✓		✓	✓	✓
FM, Zone 2 - DIV 2	✓	✓		✓	✓	✓
CCOE	✓	✓		✓	✓	✓
UL 61010 / 508	✓ / -	✓ / -	✓ / -	✓ / -	✓ / -	✓ / -
DNV-GL	✓	✓	✓	✓	✓	✓
EAC	✓	✓	✓	✓	✓	✓
APPLICATION GUIDE:						
Signal repeater	✓			✓		
Signal converter		✓	✓		✓	✓
Signal splitter				✓	✓	
mA / V bipolar input						✓
4...20 mA Tx input		✓			✓	
Buffered voltage output		✓	✓		✓	✓
mA / V output	✓ / -	✓ / ✓	✓ / ✓	✓ / -	✓ / ✓	✓ / ✓
Active / passive mA output	✓ / -	✓ / -	✓ / -	✓ / -	✓ / -	✓ / -
Mounting in Zone 2 / Div 2	✓	✓	✓	✓	✓	✓
Power rail option	✓	✓	✓	✓	✓	✓

* = @ 24 VDC

Of span = Of the presently selected range

HART COMMUNICATION FOUNDATION



TYPE	3118	3185	3186	5104A	5106A	6185
	Bipolar isolated converter / splitter	Loop-powered isolator	2-wire transmitter isolator	Repeater / power supply	HART transparent repeater	Loop-powered isolator
INPUT, DC: mA, mV, V, HART communication						
OUTPUT: mA, V, HART communication						
INPUT:						
mA, measurement range / min. span	-23...+23 mA	0...23 mA / 1:1	3.5...23 mA / 1:1	0...23 mA / 16 mA	3.5...23 mA / 1:1	0...23 mA / 1:1
V, measurement range / min. span	±5 and ±10 VDC			0...10 VDC / 8 VDC		
Max. offset				20% of selec. max. value		
Reference voltage / 2-wire supply			- / V_{loop}-2.5 VDC	- / > 17.1 VDC	- / > 17 VDC	
OUTPUT:						
mA, signal range / min. span	0...23 mA / 16 mA	0...23 mA / 1:1	3.5...23 mA / 1:1	0...23 mA / 16 mA	3.5...23 mA / 1:1	0...23 mA / 1:1
Load (@ current output)	≤ 300 Ω per channel	≤ 600 Ω		≤ 600 Ω	≤ 600 Ω	≤ 600 Ω
V, signal range / min. span	0...10 VDC / 4 VDC			0...10 VDC / 0.8 VDC		
Load (@ voltage output)	≥ 10 kΩ			≥ 500 kΩ		
Max. offset				20% of selec. max. value		
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-25...+70°C	-25...+70°C	-25...+70°C	-20...+60°C	-20...+60°C	-20...+60°C
Supply voltage, AC / DC	- / 16.8...31.2 VDC	≤ 1.25 V + (0.015 x Vout.)	- / 6...35 VDC	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	- / ≤ 1.8 VDC
Max. required power, 1 / 2 channels	*0.8 W / -	30 mW per channel	50 mW per channel	2.0 W / 2.8 W	2.0 W / 2.8 W	40 mW per channel
Isolation voltage, test / operation	2.5 kVAC / 250 VAC	2.5 kVAC / 250 VAC	2.5 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	2 kVAC / -
Response time	< 7 ms	< 5 ms	< 5 ms	< 25 ms	< 25 ms	< 4 ms
Signal dynamics, input / output	Analog signal chain	Analog signal chain	Analog signal chain	Analog signal chain	Analog signal chain	Analog signal chain
Accuracy	< ±0.05% of span	< ±0.1% of span	< ±0.05% of span	≤ ±0.1% of span	≤ ±0.1% of span	≤ ±0.1% of span
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C
NAMUR	NE 21	NE 21	NE 21	NE 21	NE 21	
Channels	1	1 or 2	1 or 2	1 or 2	1 or 2	1, 2 or 4
Programming	DIP switch	No	No	DIP switch	DIP switch	No
APPROVALS:						
ATEX, Zone 2	✓	✓	✓			
IECEx, Zone 2	✓	✓	✓			
FM, Zone 2 - DIV 2	✓	✓	✓			
CCOE	✓	✓	✓			
UL 61010 / 508	✓ / -	✓ / -	✓ / -	- / ✓	- / ✓	
DNV-GL	✓	✓	✓	✓		
EAC	✓	✓	✓	✓	✓	✓
APPLICATION GUIDE:						
Signal repeater		✓	✓		✓	✓
Signal converter	✓			✓		
Signal splitter	✓					
mA / V bipolar input	✓ / ✓					
4...20 mA Tx input			✓	✓	✓	
Buffered voltage output	✓					
Active / passive input signal		✓ / -	✓ / ✓			✓ / -
mA / V output	✓ / ✓	✓ / -	✓ / -	✓ / ✓	✓ / -	✓ / -
Active / passive mA output	✓ / -	✓ / -	- / ✓	✓ / ✓	✓ / ✓	✓ / -
Mounting in Zone 2 / Div 2	✓	✓	✓			
Power rail option	✓					

* = @ 24 VDC

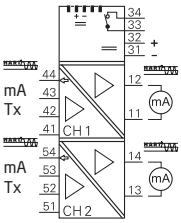
Of span = Of the presently selected range

TYPE 9106A

INPUT, DC:
mA, HART communication

OUTPUT:
mA,
HART communication

HART transparent repeater

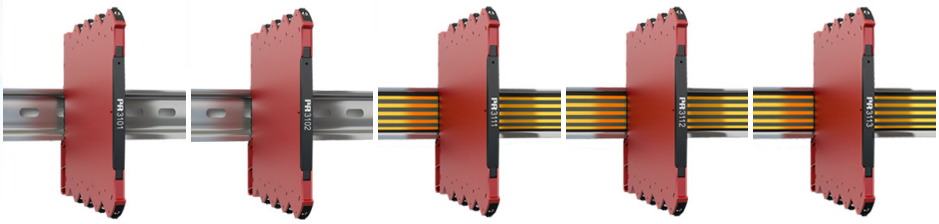


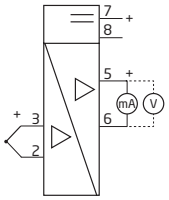
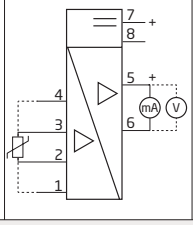
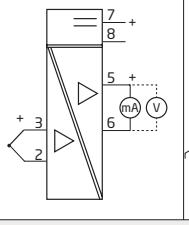
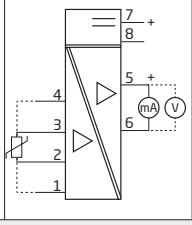
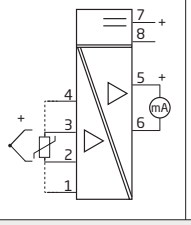
INPUT:						
mA, measurement range / min. span	3.5...23 mA / 16 mA					
V, measurement range / min. span						
Max. offset						
Reference voltage / 2-wire supply	- / > 16 VDC					
OUTPUT:						
mA, signal range / min. span	3.5...23 mA					
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-20...+60°C					
Supply voltage, AC / DC	- / 19.2...31.2 VDC					
Max. required power, 1 / 2 channels	≤ 1.1 W / ≤ 1.9 W					
Isolation voltage, test / operation	2.6 kVAC / 250 VAC					
Response time	< 5 ms					
Signal dynamics,input	Analog signal chain					
Accuracy	≤ ±16 µA					
Temperature coefficient	≤ ±1.6 µA / °C					
NAMUR	NE 21					
Channels	1 or 2					
Programming	4501 / 4511					

APPROVALS:						
ATEX, Zone 2	✓					
IECEx, Zone 2						
FM, Zone 2 - DIV 2						
CCOE						
UL 61010 / 508	✓ / -					
DNV-GL	✓					
EAC	✓					
SIL 2/3 Full Assessment IEC 61508	✓					

APPLICATION GUIDE:						
Signal repeater	✓					
Signal converter						
Signal splitter	✓					
mA / V bipolar input						
4...20 mA Tx input	✓					
Active / passive input signal						
mA / V output	✓ / -					
Active / passive mA output	✓ / ✓					
Mounting in Zone 2 / Div 2	✓					
Power rail option	✓					

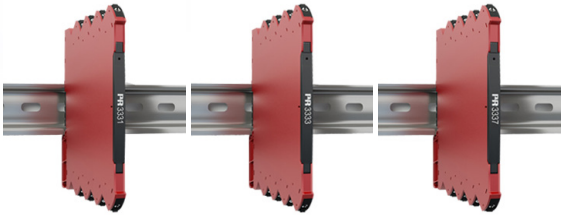
= Full assessment acc. to IEC 61508

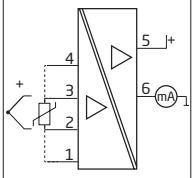
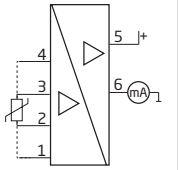
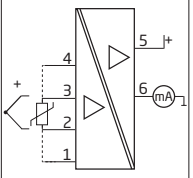


TYPE	3101	3102	3111	3112	3113
	TC converter	Pt100 converter	TC converter - isolated	Pt100 converter - isolated	HART 7 temperature converter
INPUT: RTD, linear resistance, TC, mV, mA, potentiometer **OUTPUT:** mA, HART communication					
INPUT:					
RTD, measurement range / min. span		-200...+850°C / 10°C		-200...+850°C / 10°C	-200...+850°C / 10°C
Lin. R, measurement range / min. span					
Sensor connection, wires		2 - 3 - 4		2 -3 - 4	2 - 3 - 4
TC types	J & K		J & K		J & K
Max. offset					
Cold junction compensation	Internal		Internal / external		Internal / external
OUTPUT:					
mA, signal range / min. span	0...23 mA / 16 mA	0...23 mA / 16 mA	0...23 mA / 16 mA	0...23 mA / 16 mA	0...23 mA / 16 mA
Load (@ current output)	≤ 600 Ω	≤ 600 Ω	≤ 600 Ω	≤ 600 Ω	≤ 600 Ω
V, signal range / min. span	0...10 VDC / 4 VDC	0...10 VDC / 4 VDC	0...10 VDC / 4 VDC	0...10 VDC / 4 VDC	
Load (@ voltage output)	≥ 10 kΩ	≥ 10 kΩ	≥ 10 kΩ	≥ 10 kΩ	
TECHNICAL SPECIFICATIONS:					
Ambient temperature	-25...70°C	-25...70°C	-25...70°C	-25...70°C	-25...70°C
Supply voltage, DC	16.8...31.2 VDC	16.8...31.2 VDC	16.8...31.2 VDC	16.8...31.2 VDC	16.8...31.2 VDC
Max. required power*	0.52 W	0.52 W	0.7 W	0.7 W	0.7 W
Isolation voltage, test / operation			2.5 kVAC / 250 VAC	2.5 kVAC / 250 VAC	2.5 kVAC / 250 VAC
Response time	< 30 ms	< 30 ms	< 30 ms	< 30 ms	< 60 ms
Signal dynamics, input / output	23 bit / 18 bit	23 bit / 18 bit	23 bit / 18 bit	23 bit / 18 bit	23 bit / 18 bit
Accuracy	≤ ±0.1% of span	≤ ±0.1% of span	≤ ±0.05% of span	≤ ±0.05% of span	≤ ±0.05% of span
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C
NAMUR	NE 21, NE 43	NE 21, NE 43	NE 21, NE 43	NE 21, NE 43	NE 21, NE 43
Channels	1	1	1	1	1
Programming	DIP switch	DIP switch	DIP switch	DIP switch	DIP switch / HART
APPROVALS:					
ATEX, Zone 2	✓	✓	✓	✓	✓
IECEx, Zone 2	✓	✓	✓	✓	✓
FM, Zone 2 - DIV 2	✓	✓	✓	✓	✓
CCOE	✓	✓	✓	✓	✓
UL 61010 / 508	✓ / -	✓ / -	✓ / -	✓ / -	✓ / -
DNV-GL	✓	✓	✓	✓	✓
EAC	✓	✓	✓	✓	✓
APPLICATION GUIDE:					
RTD / TC / mV input	- / ✓ / -	✓ / - / -	- / ✓ / -	✓ / - / -	✓ / ✓ / -
mA / V output	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / -
Loop-powered					
Galvanically isolated			✓	✓	✓
HART protocol					✓
Mounting in Zone 2 / DIV 2	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓
Process signal calibration					✓
Power rail option			✓	✓	✓

* = @ 24 VDC

Of span = Of the presently selected range



TYPE	3331	3333	3337			
	Temperature converter, loop-powered - isolated	Pt100 converter, loop-powered	HART 7 temperature converter, loop-powered			
INPUT: RTD, linear resistance, TC, mV **OUTPUT:** mA, V, HART communication						
INPUT:						
RTD, measurement range / min. span	-200...+850°C / 10°C	-200...+850°C / 10°C	-200...+850°C / 10°C			
Lin. R, measurement range / min. span						
Sensor connection, wires	2 - 3 - 4	2 - 3 - 4	2 - 3 - 4			
TC types	J & K		J & K			
Max. offset						
Cold junction compensation	Internal / external		Internal / external			
OUTPUT:						
mA, signal range / min. span	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA			
Load (@ current output)	≤ (V_{supply}-5.5)/0.023 [Ω]	≤ (V_{supply}-3.3)/0.023 [Ω]	≤ (V_{supply}-6.2)/0.023 [Ω]			
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-25...70°C	-25...70°C	-25...70°C			
Supply voltage, DC	5.5...35 VDC	3.3...35 VDC	6.2...35 VDC			
Max. required power	0.8 W	0.8 W	0.8 W			
Isolation voltage, test / operation	2.5 kVAC / 250 VAC		2.5 kVAC / 250 VAC			
Response time	< 30 ms	< 30 ms	< 60 ms			
Signal dynamics, input / output	23 bit / 18 bit	23 bit / 18 bit	23 bit / 18 bit			
Accuracy	≤ ±0.05% of span	≤ ±0.1% of span	≤ ±0.05% of span			
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C			
NAMUR	NE 21, NE 43	NE 21, NE 43	NE 21, NE 43			
Channels	1	1	1			
Programming	DIP switch	DIP switch	DIP switch / HART			
APPROVALS:						
ATEX, Zone 2	✓	✓	✓			
IECEx, Zone 2	✓	✓	✓			
FM, Zone 2 - DIV 2	✓	✓	✓			
CCOE	✓	✓	✓			
UL 61010 / 508	✓ / -	✓ / -	✓ / -			
DNV-GL	✓	✓	✓			
EAC	✓	✓	✓			
APPLICATION GUIDE:						
RTD / TC / mV input	✓ / ✓ / -	✓ / - / -	✓ / ✓ / -			
mA / V output	✓ / -	✓ / -	✓ / -			
Loop-powered	✓	✓	✓			
Galvanically isolated	✓		✓			
HART protocol			✓			
Mounting in Zone 2 / DIV 2	✓ / ✓	✓ / ✓	✓ / ✓			
Process signal calibration			✓			

Of span = Of the presently selected range

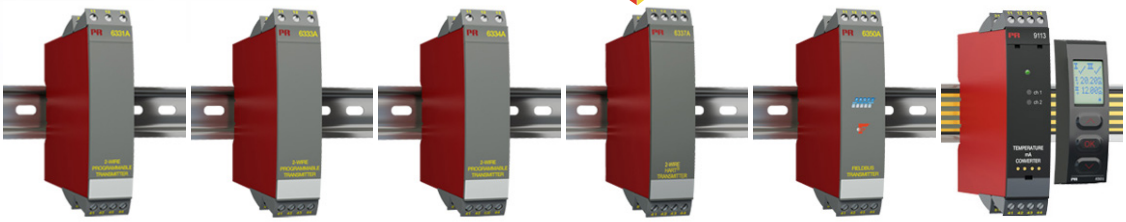
TEMPERATURE TRANSMITTERS

TYPE	5331A	5333A	5334A	5335/7A	5343A	5350A
INPUT: RTD, linear resistance, TC, mV, potentiometer **OUTPUT:** mA, HART communication, Profibus PA, Foundation Fieldbus	2-wire programmable transmitter	2-wire programmable transmitter	2-wire programmable transmitter	2-wire transmitter with HART protocol	2-wire level transmitter	Profibus PA / Foundation Fieldbus transmitter
INPUT:						
mV, measurement range / min. span	-12...800 mV / 5 mV		-12...150 mV / 5 mV	-800...+800 mV / 2.5 mV		-800...+800 mV / -
RTD, measurement range / min. span	-200...+850°C / 25°C	-200...+850°C / 25°C		-200...+850°C / 10°C		-200...+850°C / -
Lin. R, measurement range / min. span	0...5000 Ω / 30 Ω	0...10 kΩ / 30 Ω		0...7000 Ω / 25 Ω		0...10 kΩ / -
Potentiometer					0...100 kΩ / 1 kΩ	0...100 kΩ
Sensor connection, wires	2 - 3 - 4	2 - 3		2 - 3 - 4		2 - 3 - 4
TC types	BEJKLNRSTUW3W5Lr		BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5		BEJKLNRSTUW3W5
Max. offset	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	
Cold junction compensation	Internal / external		Internal	Internal / external	Internal / external	Internal / external
OUTPUT:						
mA, signal range / min. span	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	Profibus PA/Foundation F.
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C
Supply voltage, DC	7.2...35 VDC	8...35 VDC	7.2...35 VDC	8...35 VDC	8...35 VDC	9...32 VDC
Max. required power	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	< 350 mW
Isolation voltage, test / operation	1500 VAC / 50 V		1500 VAC / 50 V	1500 VAC / 50 V		1500 VAC / 50 V
Response time	1...60 s	0.33...60 s	1...60 s	1...60 s	0.33...60 s	1...60 s
Signal dynamics, input / output	20 bit / 16 bit	19 bit / 16 bit	18 bit / 16 bit	22 bit / 16 bit	19 bit / 16 bit	24 bit / -
Accuracy	≤ ±0.05% of span	≤ ±0.1% of span	≤ ±0.05% of span	≤ ±0.05% of span	≤ ±0.1% of span	≤ ±0.05% of MV
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.005% of span / °C	≤ ±0.01% of span / °C	< ±0.002% of MV / °C
NAMUR	NE 21, NE 43	NE 43	NE 21, NE 43	NE 21, NE 43, NE89	NE 43	NE 21, NE 43
Channels	1	1	1	1	1	1
Programming	5909	5909	5909	5909 / HART 5 / HART 7	5909	Profibus PA/Foundation F.
APPROVALS:						
ATEX, Zone 2	✓	✓	✓	✓	✓	✓
IECEx, Zone 2	✓	✓	✓	✓	✓	
CSA, Zone 2 - DIV 2						✓
FM, Zone 2 - DIV 2						✓
CCOE	✓	✓	✓			
INMETRO	✓	✓	✓	✓	✓	
NEPSI						✓
DNV-GL	✓	✓	✓	✓	✓	
EAC	✓	✓	✓	✓	✓	✓
SIL 2, Hardware Assessment				✓		
APPLICATION GUIDE:						
RTD / TC / mV input	✓ / ✓ / ✓	✓ / - / -	- / ✓ / ✓	✓ / ✓ / ✓		✓ / ✓ / ✓
Lin. R / potentiometer input	✓ / -	✓ / -		✓ / -	✓ / ✓	✓ / ✓
Dual sensor input				✓		✓
Custom sensor linearization	✓	✓	✓	✓	✓	✓
mA / V output	✓ / -	✓ / -	✓ / -	✓ / -	✓ / -	
Loop-powered	✓	✓	✓	✓	✓	
Galvanically isolated	✓		✓	✓		✓
HART protocol				✓		
Mounting in Zone 2 / DIV 2	✓ / -	✓ / -	✓ / -	✓ / -	✓ / -	✓ / -
Process signal calibration	✓	✓	✓	✓	✓	✓

exida = FMEDA report

Of span = Of the presently selected range
Of MV = Of the present measurement value

TEMPERATURE TRANSMITTERS



TYPE	6331A	6333A	6334A	6335/7A	6350A	9113A
INPUT: RTD, linear resistance, TC, mV, mA, potentiometer OUTPUT: mA, HART communication, Profibus PA, Foundation Fieldbus	2-wire programmable transmitter	2-wire programmable transmitter	2-wire programmable transmitter	2-wire HART transmitter	Profibus PA / Foundation Fieldbus transmitter	Temperature / mA converter
INPUT:						
mA, measurement range / min. span					-100...+100 mA / -	0...23 mA / 16 mA
mV, measurement range / min. span	-12...800 mV / 5 mV		-12...+150 mV / 5 mV	-800...+800 mV / 2.5 mV	-800...+800 mV / -	
RTD, measurement range / min. span	-200...+850°C / 25°C	-200...+850°C / 25°C		-200...+850°C / 10°C	-200...+850°C / -	-200...+850°C / 25°C
Lin. R, measurement range / min. span	0...5000 Ω / 30 Ω	0...10 kΩ / 30 Ω		0...7000 Ω / 25 Ω	0...10 kΩ / -	
Potentiometer					0...100 kΩ / -	
Sensor connection, wires	2 - 3 - 4	2 - 3		2 - 3 - 4	2 - 3 - 4	2 - 3 - 4
TC types	BEJKLNRSTUW3W5Lr		BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5	BEJKLNRSTUW3W5	BEJKLNRSTUW3W5Lr
Max. offset	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value		
Cold junction compensation	Internal / external		Internal	Internal / external	Internal / external	Internal / external
OUTPUT:						
mA, signal range / min. span	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	Profibus PA/Foundation F.	0...23 mA / 16 mA
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-20...+60°C
Supply voltage, DC	7.2...35 VDC	8...35 VDC	7.2...35 VDC	8...35 VDC	9...32 VDC	19.2...31.2 VDC
Max. required power, 1 / 2 channels	0.8 W / 1.6 W	0.8 W / 1.6 W	0.8 W / 1.6 W	0.8 W / 1.6 W	< 350 mW per channel	≤ 0.8 W / ≤ 1.4 W
Isolation voltage, test / operation	1500 VAC / 50 V		1500 VAC / 50 V	1500 VAC / 50 V	1500 VAC / 50 V	2.6 kVAC / 250 VAC
Response time	1...60 s	0.33...60 s	1...60 s	1...60 s	1...60 s	0.4 / 1...60 s
Signal dynamics, input / output	20 bit / 16 bit	19 bit / 16 bit	18 bit / 16 bit	22 bit / 16 bit	24 bit / -	24 bit / 16 bit
Accuracy	≤ ±0.05% of span	≤ ±0.1% of span	≤ ±0.05% of span	≤ ±0.05% of span	≤ ±0.05% of MV	≤ ±0.1% of span
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.005% of span / °C	< ±0.002% of MV / °C	< ±0.01% of span / °C
NAMUR	NE 21, NE 43	NE 43	NE 21, NE 43	NE 21, NE 43, NE 89	NE 21, NE 43	NE 21, NE 43
Channels	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2
Programming	5909	5909	5909	5909 / HART 5 / HART 7	Profibus PA/Foundation F.	4501 / 4511
APPROVALS:						
ATEX, Zone 2	✓	✓	✓	✓	✓	✓
IECEx, Zone 2	✓	✓	✓	✓	✓	
CSA, Zone 2 - DIV 2					✓	
FM, Zone 2 - DIV 2					✓	
CCOE						
UL 61010 / 508						✓ / -
DNV-GL						✓
EAC	✓	✓	✓	✓	✓	✓
SIL 2, Hardware Assessment				✓		
SIL 2 Full Assessment IEC 61508						✓
APPLICATION GUIDE:						
RTD / TC / mV input	✓ / ✓ / ✓	✓ / - / -	- / ✓ / ✓	✓ / ✓ / ✓	✓ / ✓ / ✓	✓ / ✓ / -
Lin. R / potentiometer input	✓ / -	✓ / -		✓ / -	✓ / ✓	
Dual sensor input				✓	✓	
Custom sensor linearization	✓	✓	✓	✓	✓	
mA / V output	✓ / -	✓ / -	✓ / -	✓ / -		✓ / -
Loop-powered	✓	✓	✓	✓		
Galvanically isolated	✓		✓	✓	✓	✓
HART protocol				✓		
Mounting in Zone 2 / DIV 2	✓ / -	✓ / -	✓ / -	✓ / -	✓ / -	✓ / ✓
Process signal calibration	✓	✓	✓	✓	✓	✓
Power rail option						✓

= Full assessment acc. to IEC 61508 exida = FMEDA report

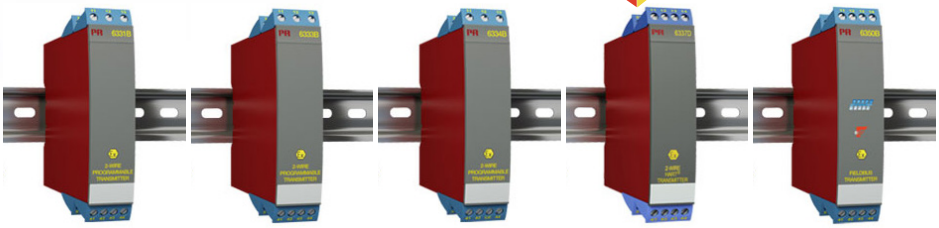
Of span = Of the presently selected range
Of MV = Of the present measurement value

I.S. TEMPERATURE TRANSMITTERS

TYPE	5331D	5333D	5334B	5335/7D	5343B	5350B
INPUT: RTD, linear resistance, TC, mV, potentiometer **OUTPUT:** mA, HART communication, Profibus PA, Foundation Fieldbus	2-wire programmable transmitter	2-wire programmable transmitter	2-wire programmable transmitter	2-wire transmitter with HART protocol	2-wire level transmitter	Profibus PA / Foundation Fieldbus transmitter
INPUT:						
mV, measurement range / min. span	-12...800 mV / 5 mV		-12...150 mV / 5 mV	-800...+800 mV / 2.5 mV		-800...+800 mV / -
RTD, measurement range / min. span	-200...+850°C / 25°C	-200...+850°C / 25°C		-200...+850°C / 10°C		-200...+850°C / -
Lin. R, measurement range / min. span	0...5000 Ω / 30 Ω	0...10 kΩ / 30 Ω		0...7000 Ω / 25 Ω	0...100 kΩ / 1 kΩ	0...10 kΩ / -
Potentiometer					1 kΩ...100 kΩ	0...100 kΩ
Sensor connection, wires	2 - 3 - 4	2 - 3		2 - 3 - 4		2 - 3 - 4
TC types	BEJKLNRSTUW3W5Lr		BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5		BEJKLNRSTUW3W5
Max. offset					50% of selec. max. value	
Cold junction compensation	Internal / external		Internal	Internal / external		Internal / external
OUTPUT:						
mA, signal range / min. span	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	Profibus PA/Foundation F.
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C
Supply voltage, DC	7.2...30 VDC	8...30 VDC	7.2...30 VDC	8...30 VDC	8...30 VDC	9...32 VDC
Max. required power	0.7 W	0.7 W	0.7 W	0.7 W	0.7 W	< 350 mW
Isolation voltage, test / operation	1500 VAC / 50 V		1500 VAC / 50 V	1500 VAC / 50 V		1500 VAC / 50 V
Response time	1...60 s	0.33...60 s	1...60 s	1...60 s	0.33...60 s	1...60 s
Signal dynamics, input / output	20 bit / 16 bit	19 bit / 16 bit	18 bit / 16 bit	22 bit / 16 bit	19 bit / 16 bit	24 bit / -
Accuracy	≤ ±0.05% of span	≤ ±0.1% of span	≤ ±0.05% of span	≤ ±0.05% of span	≤ ±0.1% of span	≤ ±0.05% of MV
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.005% of span / °C	≤ ±0.01% of span / °C	< ±0.002% of MV / °C
NAMUR	NE 21, NE 43	NE 43	NE 21, NE 43	NE 21, NE 43, NE89	NE 43	NE 21, NE 43
Channels	1	1	1	1	1	1
Programming	5909	5909	5909	5909 / HART 5 / HART 7	5909	Profibus PA/Foundation F.
APPROVALS:						
ATEX	✓	✓	✓	✓	✓	✓
IECEx	✓	✓	✓	✓	✓	✓
FM	✓	✓		✓	✓	✓
CSA	✓	✓		✓		✓
CCOE	✓	✓				
INMETRO	✓	✓	✓	✓	✓	✓
DNV-GL	✓	✓	✓	✓	✓	
EAC Ex	✓	✓	✓		✓	✓
NEPSI						✓
SIL 2 Hardware Assessment				✓		
APPLICATION GUIDE:						
RTD / TC / mV input	✓ / ✓ / ✓	✓ / - / -	- / ✓ / ✓	✓ / ✓ / ✓		✓ / ✓ / ✓
Lin. R / potentiometer input	✓ / -	✓ / -		✓ / -	✓ / ✓	✓ / ✓
Dual sensor input				✓		✓
Custom sensor linearization	✓	✓	✓	✓	✓	✓
Bus-powered PA/FF						✓ / ✓
Loop-powered	✓	✓	✓	✓	✓	
Galvanically isolated	✓		✓	✓		✓
HART protocol				✓		
Process signal calibration	✓	✓	✓	✓	✓	✓

exida = FMEDA report

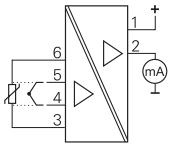
Of span = Of the presently selected range
Of MV = Of the present measurement value



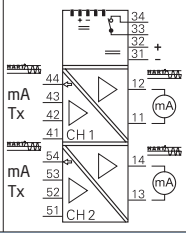
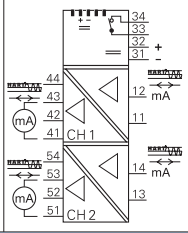
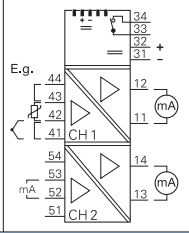
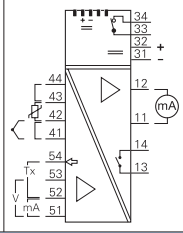
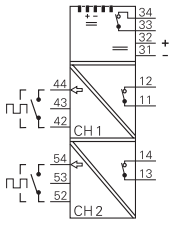
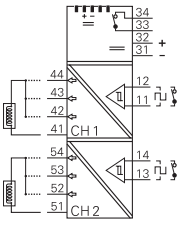
TYPE	6331B	6333B	6334B	6335/7D	6350B
INPUT: RTD, linear resistance, TC, mV, mA, potentiometer OUTPUT: mA, HART communication, Profibus PA, Foundation Fieldbus	2-wire programmable transmitter	2-wire programmable transmitter	2-wire programmable transmitter	2-wire HART transmitter	Profibus PA / Foundation Fieldbus transmitter
INPUT:					
mA, measurement range / min. span					-100...+100 mA
mV, measurement range / min. span	-12...800 mV / 5 mV		-12...+150 mV / 5 mV	-800...+800 mV / 2.5 mV	-800...+800 mV / -
RTD, measurement range / min. span	-200...+850°C / 25°C	-200...+850°C / 25°C		-200...+850°C / 10°C	-200...+850°C / -
Lin. R, measurement range / min. span	0...5000 Ω / 30 Ω	0...10 kΩ / 30 Ω		0...7000 Ω / 25 Ω	0...10 kΩ / -
Potentiometer					0...100 kΩ / -
Sensor connection, wires	2 - 3 - 4	2 - 3		2 - 3 - 4	2 - 3 - 4
TC types	BEJKLNRSTUW3W5Lr		BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5	BEJKLNRSTUW3W5
Max. offset	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	
Cold junction compensation	Internal / external		Internal	Internal / external	Internal / external
OUTPUT:					
mA, signal range / min. span	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	Profibus PA/Foundation F.
TECHNICAL SPECIFICATIONS:					
Ambient temperature	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C
Supply voltage, DC	7.2...30 VDC	8...30 VDC	7.2...30 VDC	8...30 VDC	9...32 VDC
Max. required power, 1 / 2 channels	0.7 W / 1.4 W	0.7 W / 1.4 W	0.7 W / 1.4 W	0.7 W / 1.4 W	< 350 mW per channel
Isolation voltage, test / operation	1500 VAC / 50 V		1500 VAC / 50 V	1500 VAC / 50 V	1500 VAC / 50 V
Response time	1...60 s	0.33...60 s	1...60 s	1...60 s	1...60 s
Signal dynamics, input / output	20 bit / 16 bit	19 bit / 16 bit	18 bit / 16 bit	22 bit / 16 bit	24 bit / -
Accuracy	≤ ±0.05% of span	≤ ±0.1% of span	≤ ±0.05% of span	≤ ±0.05% of span	≤ ±0.05% of MV
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.005% of span / °C	< ±0.002% of MV / °C
NAMUR	NE 21, NE 43	NE 43	NE 21, NE 43	NE 21, NE 43, NE 89	NE 21, NE 43
Channels	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2
Programming	5909	5909	5909	5909 / HART 5 / HART 7	Profibus PA/Foundation F.
APPROVALS:					
ATEX	✓	✓	✓	✓	✓
IECEx	✓	✓	✓	✓	✓
FM	✓	✓		✓	✓
CSA	✓	✓		✓	✓
UL					
DNV-GL					
EAC Ex	✓	✓	✓	✓	✓
SIL 2, Hardware Assessment				✓	
APPLICATION GUIDE:					
RTD / TC / mV input	✓ / ✓ / ✓	✓ / - / -	- / ✓ / ✓	✓ / ✓ / ✓	✓ / ✓ / ✓
Lin. R / potentiometer input	✓ / -	✓ / -		✓ / -	✓ / ✓
Dual sensor input				✓	✓
Custom sensor linearization	✓	✓	✓	✓	✓
Bus-powered PA/FF					✓ / ✓
Loop-powered	✓	✓	✓	✓	
Galvanically isolated	✓		✓	✓	✓
HART protocol				✓	
Process signal calibration	✓	✓	✓	✓	✓

exida = FMEDA report

Of span = Of the presently selected range
Of MV = Of the present measurement value

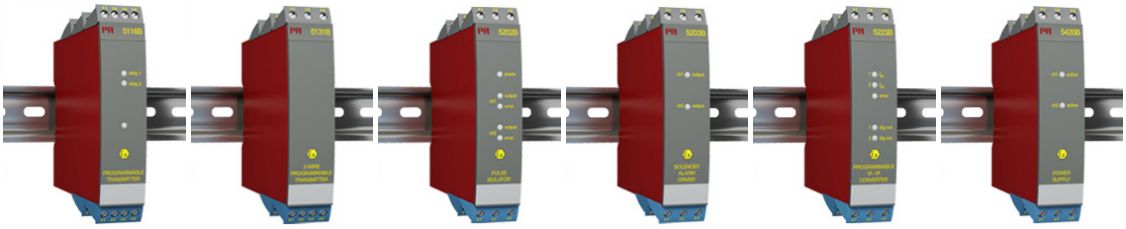
TYPE	7501					
INPUT: RTD, linear resistance, TC, mV, potentiometer OUTPUT: mA, HART communication, Profibus PA, Foundation Fieldbus	Field mounted HART temperature transmitter 					
INPUT:						
RTD, measurement range / min. span	-200...+850°C / 10°C					
Lin. R, measurement range / min. span	0...7000 Ω / 25 Ω					
Sensor connection, wires	2 - 3 - 4					
TC types	BEJKLNRSTUW3W5					
OUTPUT:						
mA, signal range / min. span	3.5...23 mA / 16 mA					
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-40...+85°C					
Supply voltage, DC	10 / 12...30 / 35 VDC					
Max. required power						
Isolation voltage, test / operation	1500 VAC / 50 V					
Signal dynamics, input / output	22 bit / 16 bit					
Response time	1...60 s					
Accuracy	≤ ±0.05% of span					
Temperature coefficient	< ±0.005% of span / °C					
NAMUR	NE 21, NE 43					
Channels	1					
Programming	LOI / HART					
APPROVALS:						
ATEX	✓					
IECEx	✓					
FM	✓					
CSA	✓					
CCOE						
INMETRO	✓					
EU-RO marine	✓					
EAC Ex	✓					
NEPSI	✓					
APPLICATION GUIDE:						
RTD / TC / mV input	✓ / ✓ / ✓					
Lin. R / potentiometer input	✓ / -					
Dual sensor input	✓					
Custom sensor linearization	✓					
Bus-powered PA/FF						
Loop-powered	✓					
Galvanically isolated	✓					
HART protocol	✓					
Process signal calibration	✓					

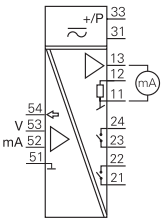
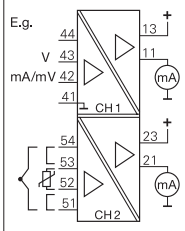
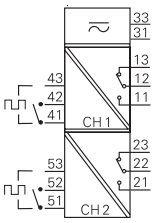
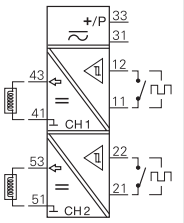
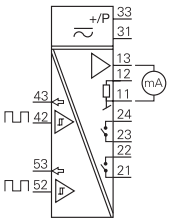
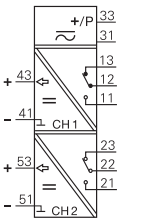
exida = FMEDA report **LOI** = Local Operator Interface **Of span** = Of the presently selected range

TYPE	9106B	9107B	9113B	9116B	9202B	9203B
	HART transparent repeater	HART transparent driver	Temperature / mA converter	Universal converter	Pulse isolator	Solenoid / alarm driver
INPUT: mA, mV, V, potentiometer, RTD, Lin. R, TC, Hz, HART communication OUTPUT: mA, relays, HART communication						
INPUT:						
mA, measurement range / min. span	3.5...23 mA / 16 mA	3.5 ...23 mA / 16 mA	0...23 mA / 16 mA	0...23 mA / 16 mA		
V, measurement range / min. span				0...12 VDC / 0.8 V		
RTD, measurement range / min. span			-200...+850°C / 25°C	-200...+850°C / 25°C		
Lin. R, measurement range / min. span				0...10000 Ω / -		
Potentiometer				10 Ω...10000 Ω		
Sensor connection, wires			2 - 3 - 4	2 - 3 - 4		
TC types			BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5Lr		
Sensor type					NAMUR / switch	NPN / PNP / switch
Hz, measurement range / min. span					0...5 kHz	
Min. pulse width					100 µs	
OUTPUT:						
mA, signal range / min. span	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	0...23 mA / 16 mA	0 ...23 mA / 16 mA		
Pulse output					NPN / relay	Valves etc.
Hz, signal range					0...5 kHz	
Relay				1 x SPST, AC: 500 VA	1 x SPST, AC: 500 VA	
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C
Supply voltage, DC	19.2...31.2 VDC	19.2...31.2 VDC	19.2...31.2 VDC	19.2...31.2 VDC	19.2...31.2 VDC	19.2...31.2 VDC
Max. required power, 1 / 2 channels	≤ 1.1 W / ≤ 1.9 W	≤ 1.0 W / ≤ 1.8 W	≤ 0.8 W / ≤ 1.4 W	≤ 2.1 W / -	≤ 1.1...1.3 W/≤ 1.5...1.9 W	≤ 1.9...2.5 W/≤ 3.1 W
Isolation voltage, test / operation	2.6 kVAC / 250 VAC	2.6 kVAC / 250 VAC	2.6 kVAC / 250 VAC	2.6 kVAC / 250 VAC	2.6 kVAC / 250 VAC	2.6 kVAC / 250 VAC
Response time	< 5 ms	< 5 ms	0.4 / 1...60 s	0.4 / 1...60 s	200 ms	< 10 ms
Signal dynamics, input / output	Analog signal chain	Analog signal chain	24 bit / 16 bit	24 bit / 16 bit		
Accuracy	< ±16 µA	< ±16 µA	≤ ±0.1% of span	≤ ±0.1% of span		
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C		
NAMUR	NE 21	NE 21	NE 21, NE 43	NE 21, NE 43	NE 21	NE 21
Channels	1 or 2	1 or 2	1 or 2	1	1 or 2	1 or 2
Programming	4501 / 4590	4501 / 4511	4501 / 4511	4501 / 4511	4501 / 4511	4501 / 4511
APPROVALS:						
ATEX	✓	✓	✓	✓	✓	✓
IECEx	✓	✓	✓	✓	✓	✓
FM	✓	✓	✓	✓	✓	✓
CCOE	✓	✓	✓	✓	✓	✓
INMETRO	✓	✓	✓	✓	✓	✓
UL 61010	✓	✓	✓	✓	✓	✓
DNV-GL	✓	✓	✓	✓	✓	✓
EAC Ex	✓	✓	✓	✓	✓	✓
SIL 2/3 Full Assessment IEC 61508	✓	✓ / -	✓ / -	✓ / -	✓ / -	✓ / -
APPLICATION GUIDE:						
AI barrier	✓		✓	✓		
AO barrier		✓				
DI barrier					✓	
DO barrier						✓
mA / V / temperature input	✓ / - / -	✓ / - / -	✓ / - / ✓	✓ / ✓ / ✓		
4...20 mA Tx input	✓			✓		
mA / V / relay output	✓ / - / -	✓ / - / -	✓ / - / -	✓ / - / ✓	- / - / ✓	
Active / passive mA output	✓ / ✓	✓ / -	✓ / ✓	✓ / ✓		
HART signal transparent	✓	✓				
Process signal calibration			✓	✓		
Power rail option	✓	✓	✓	✓	✓	

= Full assessment acc. to IEC 61508

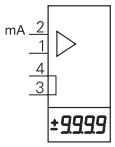
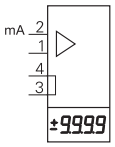
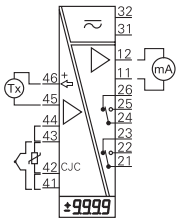
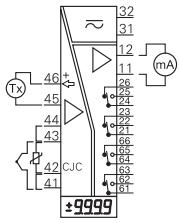
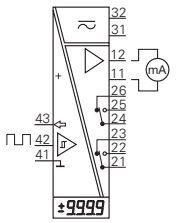
Of span = Of the presently selected range



TYPE	5116B	5131B	5202B	5203B	5223B	5420B
	Programmable transmitter	2-wire programmable transmitter	Pulse isolator	Ex solenoid / alarm driver	Programmable f/I - f/f converter	Ex power supply for 2-wire Tx
INPUT: mA, mV, V, potentiometer, RTD, linear resistance, TC, Hz **OUTPUT:** mA, V, relays						
INPUT:						
mA, measurement range / min. span	0...100 mA / 4 mA	0...100 mA / 4 mA				
V, measurement range / min. span	0...250 VDC / 5 mV	0...250 VDC / 5 mV				
mV, measurement range / min. span	-2500...+2500 mV / 5 mV	-150...+150 mV / 5 mV				
RTD, measurement range / min. span	-200...+850°C / 25°C	-200...+850°C / 25°C				
Lin. R, measurement range / min. span	0...5000 Ω / 30 Ω					
Potentiometer	200 Ω...100 kΩ					
Sensor connection, wires	2 - 3 - 4	2 - 3 - 4				
TC types	BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5Lr				
Sensor type			NAMUR / switch	NPN / PNP / switch	NAMUR / switch	
Hz, measurement range / min. span			0...5 kHz		0...20 kHz / 0.001 Hz	
OUTPUT:						
mA, signal range / min. span	0...23 mA / 10 mA	3.5...23 mA / 10 mA			0...23 mA / 5 mA	
Pulse output			NPN / relay	Valves etc.	NPN / PNP / relay	
Hz, signal range			0...5 kHz		0...1000 Hz	
Relays	2 x SPST, AC: 500 VA		2 x SPDT, AC: 100 VA		2 x SPST, AC: 100 VA	1 x SPDT, AC: 100 VA
Voltage / current						> 18 VDC / 20 mA
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C
Supply voltage, AC / DC	21.6...253 V / 19.2...300 V	- / 7.5...35 VDC	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V
Max. required power, 1 / 2 channels	2.4 W / -	0.8 W / 1.6 W	- / 1.8 W	2.0 W / 2.5 W	3 W / -	- / 2.5 W
Isolation voltage, test / operation	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC
Response time	250 ms...60 s	250 ms...60 s			60 ms...1000 s	
Signal dynamics, input / output	22 bit / 16 bit	22 bit / 16 bit			- / 16 bit	
Accuracy	≤ ±0.05% of span	≤ ±0.05% of span				
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C			< ±0.01% of span / °C	
NAMUR	NE 21, NE 43	NE 21, NE 43	NE 21	NE 21		NE 21
Channels	1	1 or 2	2	1 or 2	1	2
Programming	5909	5909 + DIP switch	DIP switch	DIP switch	5909 + DIP switch	No
APPROVALS:						
ATEX	✓	✓	✓	✓	✓	✓
IECEx						
FM	✓					
CSA						
UL	✓		✓	✓		
DNV-GL	✓					
EAC Ex	✓	✓	✓	✓	✓	✓
SIL 2, Hardware Assessment			✓			
APPLICATION GUIDE:						
AI barrier	✓	✓				
AO barrier						
DI barrier			✓		✓	
DO barrier				✓		
mA / V / temperature input	✓	✓				
4...20 mA Tx input	✓					✓
mA / V / relay output	✓	✓ / - / -				
Active / passive mA output	✓ / ✓	- / ✓				
Process signal calibration	✓	✓			✓	
Power rail option						

exida = FMEDA report

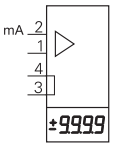
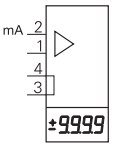
Of span = Of the presently selected range

TYPE	5531A	5531B1	5714	5715	5725
	Loop-powered LCD indicator	Loop-powered LCD indicator in I.S. enclosure	Programmable LED indicator	Programmable LED indicator	Programmable frequency indicator
INPUT: RTD, TC, mV, mA, V, potentiometer, frequency, pulse **OUTPUT:** Display, mA, relays					
INPUT:					
mA, measurement range / min. span	3.6...23 mA / 16 mA	3.6...23 mA / 16 mA	0...23 mA / 16 mA	0...23 mA / 16 mA	
V, measurement range / min. span			0...12 VDC / 0.8 V	0...12 VDC / 0.8 V	
Sensor type					All standard sensors ⎍
Hz, measurement range / min. span					0...50 kHz / 0.001 Hz
Min. pulse width					25 µs
RTD, measurement range / min. span			-200...+850°C	-200...+850°C	
Lin. R, measurement range / min. span			0...10000 Ω / -	0...10000 Ω / -	
Potentiometer			10 Ω...100 kΩ	10 Ω...100 kΩ	
Sensor connection, wires			2 - 3 - 4	2 - 3 - 4	
TC types			BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5Lr	
Cold junction compensation			Internal	Internal	
Reference voltage / 2-wire supply			- / >15 VDC	- / >15 VDC	
Sensor supply					5...17 VDC
OUTPUT:					
Display, digit / type	4-digit / LCD	4-digit / LCD	4-digit / LED	4-digit / LED	4-digit / LED
Display, digit height	16 mm	16 mm	13.8 mm	13.8 mm	13.8 mm
mA, signal range / min. span			0...23 mA / 16 mA	0...23 mA / 16 mA	0...23 mA / 16 mA
Relay			2 x SPDT, AC: 500 VA	4 x SPDT, AC: 500 VA	2 x SPDT, AC: 500 VA
TECHNICAL SPECIFICATIONS:					
Ambient temperature	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C
Supply voltage, universal AC / DC	- / 1.5 VDC	- / 1.5 VDC	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V
Max. required power	<35 mW	<35 mW	3.5 W	3.8 W	3.6 W
Isolation voltage, test / operation			2.3 kVAC / 250 VAC	2.3 kVAC / 250 VAC	2.3 kVAC / 250 VAC
Response time	< 1 s	< 1 s	< 400 ms / < 1 s	< 400 ms / < 1 s	1...60 s
Accuracy	≤ ±0.1% of span	≤ ±0.1% of span	≤ ±0.1% of reading	≤ ±0.1% of reading	≤ ±0.1% of reading
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	≤ ±0.01% of reading / °C	≤ ±0.01% of reading / °C	≤ ±0.01% of reading / °C
NAMUR			NE 43	NE 43	NE 43
Programming	Switch / front keys	Switch / front keys	Front keys	5909 / front keys	Front keys

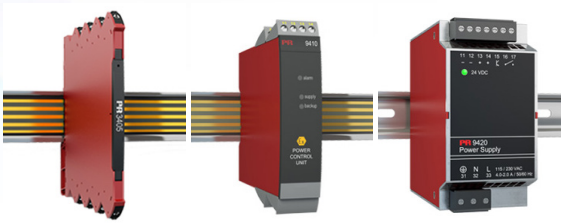
APPROVALS:						
ATEX, Zone 2	✓	✓				
UL 508			✓	✓	✓	
DNV-GL			✓	✓	✓	
EAC	✓	✓	✓	✓	✓	

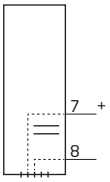
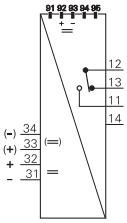
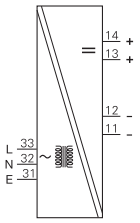
APPLICATION GUIDE:						
mA / V / mV input	✓ / - / -	✓ / - / -	✓ / ✓ / -	✓ / ✓ / -		
Temperature input			✓	✓		
Lin. R / potentiometer input			✓ / ✓	✓ / ✓		
Frequency input					✓	
Custom sensor linearization				✓		
4...20 mA Tx input			✓	✓		
Loop-powered	✓	✓				
mA output			✓	✓	✓	
2 / 4 relay outputs			✓ / -	- / ✓	✓ / -	
Process signal calibration	✓	✓	✓	✓	✓	
Mounting in Zone 2	✓	✓				

Of span = Of the presently selected range

TYPE	5531B	5531B2				
	Loop-powered LCD indicator	Loop-powered LCD indicator in I.S. enclosure				
INPUT: mA OUTPUT: Display						
INPUT:						
mA, measurement range / min. span	3.6...23 mA / 16 mA	3.6...23 mA / 16 mA				
OUTPUT:						
Display, digit / type	4-digit / LCD	4-digit / LCD				
Display, digit height	16 mm	16 mm				
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-20...+60°C	-20...+60°C				
Supply voltage, universal AC / DC	- / 1.5 VDC	- / 1.5 VDC				
Max. required power	<35 mW	<35 mW				
Isolation voltage, test / operation						
Response time	< 1 s	< 1 s				
Accuracy	≤ ±0.1% of span	≤ ±0.1% of span				
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C				
NAMUR						
Programming	Switch / front keys	Switch / front keys				
APPROVALS:						
ATEX	✓	✓				
DNV-GL						
EAC Ex	✓	✓				
APPLICATION GUIDE:						
Loop-powered	✓	✓				
Mounting in Zone 1 / 21	✓	✓				
Field enclosure		✓				

Of span = Of the presently selected range

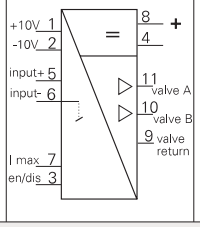
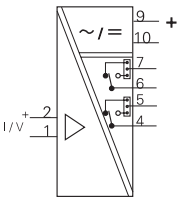
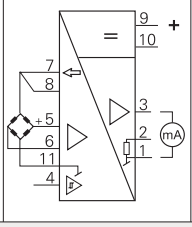


TYPE	3405	9410	9420			
	Power connector unit	Power control unit	Power supply			
INPUT: AC, DC voltage OUTPUT: Stabilized VDC						
INPUT:						
Supply voltage, AC			85...132 VAC or			
			187...264 VAC			
Supply voltage, DC	16.8...31.2 VDC	21.6...26.4 VDC				
Supply voltage, back-up		21.6...26.4 VDC				
OUTPUT:						
Voltage	16.8...31.2 VDC	21.6...26.4 VDC	24 VDC			
Current		4 ADC	4.8 ADC			
Power, max.		96 W	115 W			
Status relay		1 x SPDT, AC: 500 VA				
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-25...+70°C	-20...+60°C	-20...+60°C			
Max. required power		96 W	< 135 W			
Isolation, test		2.6 kVAC	4.3 kVAC			
Short circuit protection	No	Yes	Yes			
Output ripple	Same as input	Same as input	200 mV peak / peak			
Channels	1	1	1			
Programming	No	No	No			

APPROVALS:						
ATEX, Zone 2	✓	✓	✓			
IECEx, Zone 2	✓	✓				
CSA, Zone 2 - DIV 2			✓			
FM, Zone 2 - DIV 2	✓	✓				
CCOE	✓					
UL 61010 / 508	✓ / -	✓ / -	- / ✓			
DNV-GL	✓	✓				
EAC	✓	✓	✓			
INMETRO, Zone 2		✓				
SIL 2 Full Assessment IEC 61508						

APPLICATION GUIDE:						
115 / 230 VAC mains supply			✓			
24 VDC output			✓			
60 W power rail connector unit	✓					
96 W power rail connector unit		✓				
Redundancy power rail function		✓				
Collective status signal monitor		✓				
Internal fuse		✓	✓			
Mounting in Zone 2 / Div 2	✓	✓	✓			

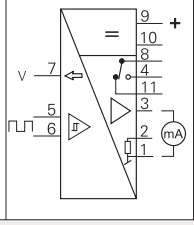
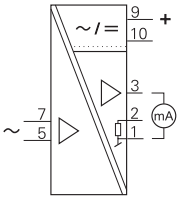


TYPE	2224	2231	2261			
	Valve controller	Trip amplifier	mV transmitter			
INPUT, DC: mA, V, potentiometer, frequency, pulse, joystick, load cell, mV **INPUT, AC:** A, V **OUTPUT:** mA, V, relays						
INPUT:						
mA, DC measurement range / min. span	0...20 mA / 16 mA	0...20 mA / 10 mA				
V, DC measurement range / min. span	-10...+10 VDC / 0.8 VDC	0...250 VDC / 0.5 VDC	-40...+100 mV / 10 mV			
A, AC measurement range / min. span		0...1 ARMS / 0.5 ARMS				
V, AC measurement range / min. span		0...250 VRMS/0.5 VRMS				
Potentiometer	> 1 kΩ					
Digital input	3 x PNP		1 x NPN / 1 x PNP			
Max. offset	20% of selec. max. value		70% of selec. max. value			
Excitation / reference voltage	- / -10...+10 VDC		5...13 VDC / -			
OUTPUT:						
mA, signal range / min. span	3000 mA		0...20 mA / 5 mA			
V, signal range / min. span	Supply-0.5 VDC		0...10 VDC / 0.25 VDC			
Max. offset			50% of selec. max. value			
Relays		2 x SPST, AC: 500 VA				
Display, digit / type	3-digit / LED	3-digit / LED	3-digit / LED			
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-20...+60°C	-20...+60°C	-20...+60°C			
Supply voltage, universal AC / DC		21.6...253V / 19.2...300V				
Supply voltage, DC	12 or 24 VDC	19.2...28.8 VDC	19.2...28.8 VDC			
Max. required power	2.2 W	1.5 W DC / 2 W, UNI	2.2 W / max. 7.2 W			
Isolation voltage, test / operation		3.75 kVAC / 250 VAC				
Response time	< 75 ms	250 ms...60 s	60 ms...999 s			
Signal dynamics, input / output	12 bit / -	16 bit / -	17 bit / 16 bit			
Setpoint adjustment / repetition		0.1% / 0.1%				
Delay / hysteresis		0...99.9 s / 0...99.9%				
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C			
Channels	1 or 2 outputs	1 input, 2 relays	1			
Programming	Switch / front keys	Switch / front keys	Switch / front keys			

APPROVALS:						
DNV-GL		✓				
EAC	✓	✓	✓			

APPLICATION GUIDE:						
mA / V / mV input	✓/ ✓ / -	✓/ ✓ / -	- / - / ✓			
AC signal input		✓				
Digital ON/OFF signal input	✓		✓			
Controller / regulator function	✓	✓				
Load cell applications			✓			
Proportional valve applications	✓					
Frequency / pulse applications						
mA / V output			✓			
Relay output		✓				

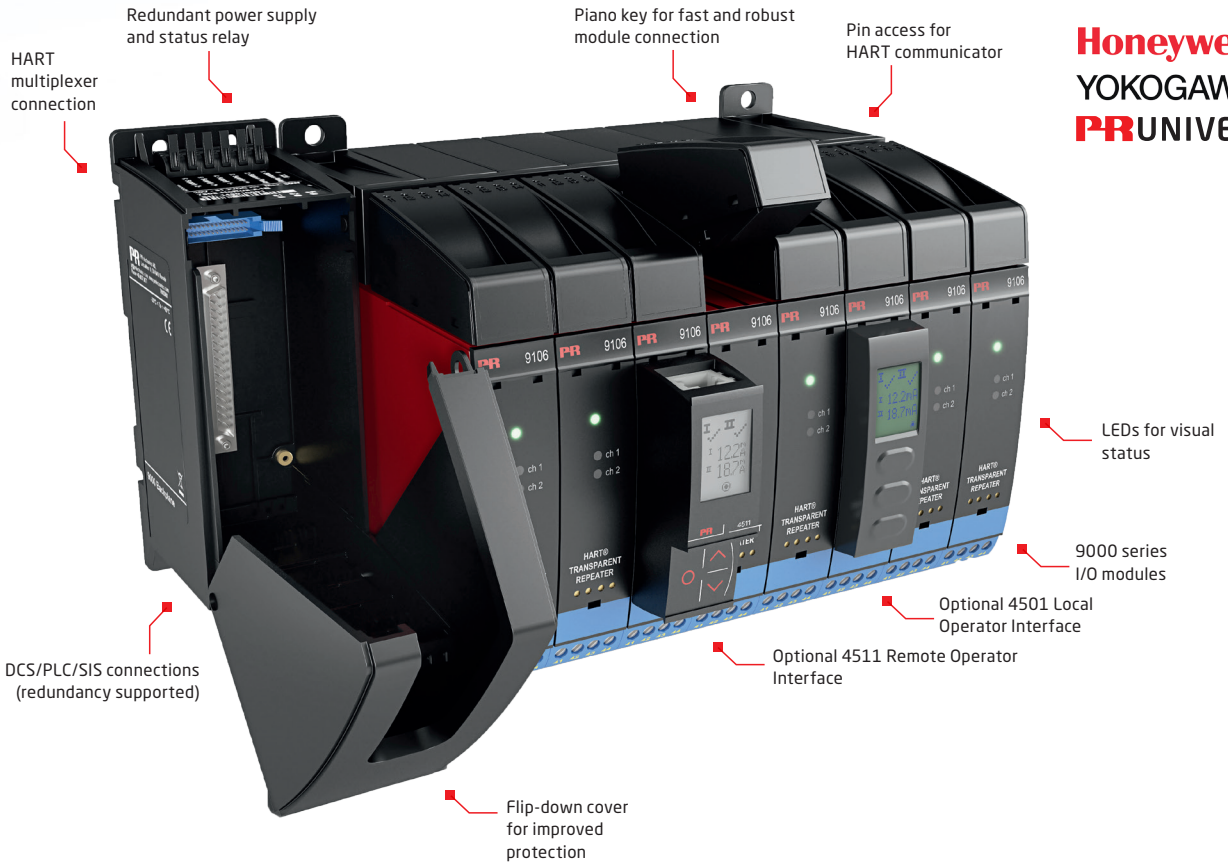
Of span = Of the presently selected range

TYPE	2255	2279				
	f/I - f/f converter	AC / DC transmitter				
INPUT, DC: Frequency, pulse INPUT, AC: A, V OUTPUT: mA, V, relays, pulse						
INPUT: PV / SP						
A, AC measurement range / min. span		0...1 ARMS / 0.5 ARMS				
V, AC measurement range / min. span		0...250 VRMS/0.5 VRMS				
Max. offset		50% of selec. max. value				
Sensor type	All standard sensors ⎍					
Hz, measurement range / min. span	0...20 kHz / 0.001 Hz					
Min. pulse width	25 µs					
Sensor supply	5...15 VDC					
OUTPUT:						
mA, signal range / min. span	0...20 mA / 5 mA	0...20 mA / 4 mA				
V, signal range / min. span	0...10 VDC / 0.25 VDC	0...10 VDC / 0.2 VDC				
Max. offset	50% of selec. max. value	20% of selec. max. value				
Load (@ current output)	≤ 600 Ω	600 Ω				
Pulse output	NPN					
Max. output frequency	1000 Hz					
Relays	1 x SPDT, AC: 300 VA					
Display, digit / type	3-digit / LED					
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-20...+60°C	-20...+60°C				
Supply voltage, universal AC / DC		21.6...253 V / 19.2...300 V				
Supply voltage, DC	19.2...28.8 VDC	19.2...28.8 VDC				
Max. required power	2.4 W	1.3 W / 2.2 W, UNI				
Isolation voltage, test / operation	1.4 kVAC / 150 VAC	3.75 kVAC / 250 VAC				
Response time	60 ms...999 s	< 1.5 s				
Signal dynamics, input / output	- / 16 bit	Analog signal chain				
Accuracy						
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C				
Channels	1	1				
Programming	Switch / front keys	Switch				

APPROVALS:						
EAC	✓	✓				

APPLICATION GUIDE:						
AC signal input		✓				
Frequency / pulse applications	✓					
mA / V output	✓	✓				
Relay output	✓					

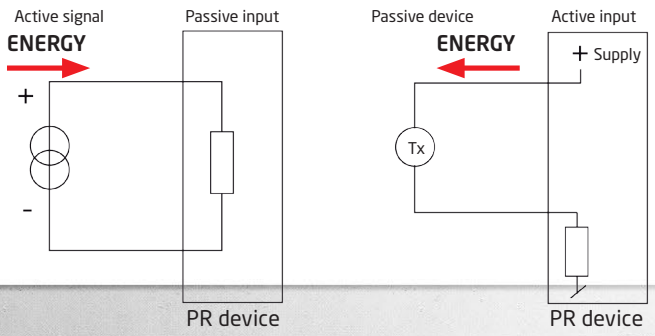
A user-friendly and reliable mounting solution between *the DCS/PLC/SIS system and isolators/I.S. interfaces*



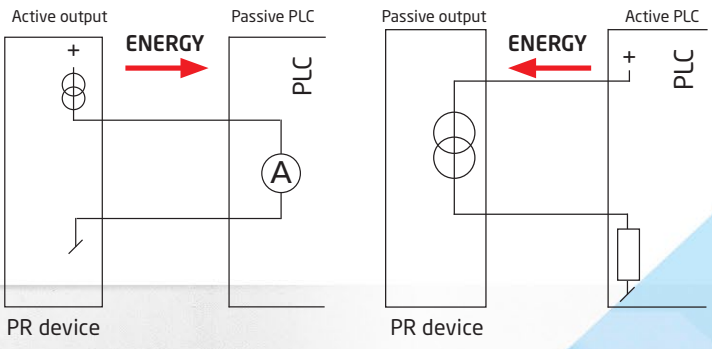
Honeywell
YOKOGAWA
PR UNIVERSAL

SIGNAL TYPES

INPUT



OUTPUT



4501 DISPLAY FRONT

PR 4104, 4114, 4116, 4131, 4222

PR 9106, 9107, 9113, 9116, 9202, 9203

Display / programming front 4501
Communications interface with front keys for modification of operational parameters in the 4000 and 9000 series. The scrolling help text in the display is available in 7 languages and guides the user effortlessly through all the configuration steps. The 4501 is easily moved from one device to another whereby the configuration can be copied to other devices of the same type. When mounted in the process, the 4501 displays process data and device status.

4511 COMMUNICATION ENABLER

PR 4104, 4114, 4116, 4131, 4222

PR 9106, 9107, 9113, 9116, 9202, 9203

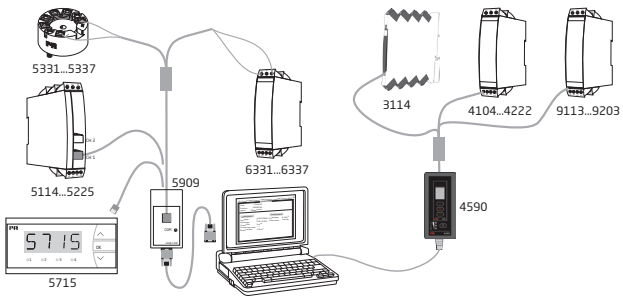
Communication enabler 4511
Wired or wireless, locally or remotely, analog and digital, this advanced device enables easy and cost-effective access to your process values from your existing 4000 and 9000 devices. You can manage processes onsite, connect to Modbus RTU devices, connect to any major communication protocols via gateway or remotely using the PR Process Supervisor (PPS) app. The 4511 offers the same advantages as the 4501 with the added feature of digital communication.

4590 CONFIGMATE

PR 3114
PR 4104, 4114, 4116, 4131, 4222
PR 9106, 9107, 9113, 9116, 9202, 9203

ConfigMate 4590
The 4590 is an adapter unit for the display / programming front 4501. It is used to program the 3114 and connect to this device with a jack plug. The 4590 is battery-driven or driven by the USB port of the PC. It can be used both for programming and as a diagnostic tool to display process parameters, when the 4501 is mounted. The 4590 is easily moved from one device to another.

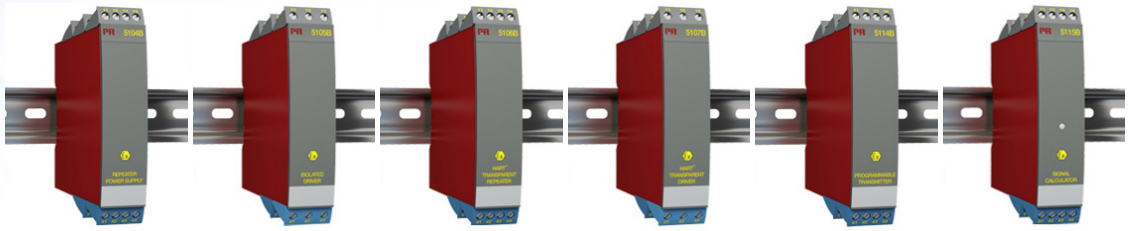
SOFTWARE

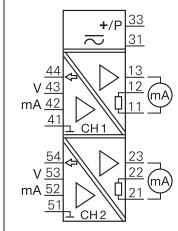
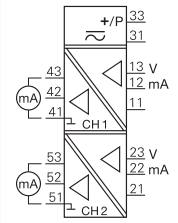
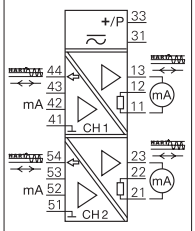
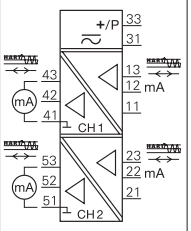
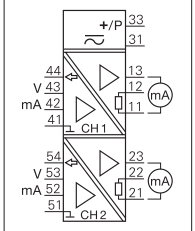
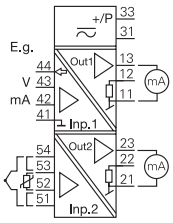


PReset
PReset is an easy-to-use menu-driven software program for set-up of PR products via a standard PC and a programming interface. PReset gives a high degree of flexibility for each product and when the menus are completed, the data is transmitted to the unit which is then ready for operation.

5909 LOOP LINK

Loop Link 5909
Loop Link 5909 is a USB communications interface for configuration and monitoring of PR electronics' PC-programmable devices. PR devices available in the configuration program PReset ver. 5.0 or higher, can be programmed by way of Loop Link 5909.



TYPE	5104B	5105B	5106B	5107B	5114B	5115B
	Ex repeater / power supply	Ex-isolated driver	HART transparent repeater	HART transparent driver	Programmable transmitter	Signal calculator
INPUT: mA, mV, V, potentiometer, RTD, linear resistance, TC, HART communication **OUTPUT:** mA, V, relays, HART communication						
INPUT:						
mA, measurement range / min. span	0...23 mA / 16 mA	0...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	0...100 mA / 4 mA	0...100 mA / 4 mA
V, measurement range / min. span	0...10 VDC / 8 VDC	0...10 VDC / 8 VDC			0...250 VDC / 5 mV	0...250 VDC / 5 mV
mV, measurement range / min. span					-150...+150 mV / 5 mV	-150...+150 mV / 5 mV
RTD, measurement range / min. span					-200...+850°C / 25°C	-200...+850°C / 25°C
Lin. R, measurement range / min. span					0...5000 Ω / 30 Ω	0...5000 Ω / 30 Ω
Potentiometer					200 Ω...100 kΩ	200 Ω...100 kΩ
Sensor connection, wires					2 - 3 - 4	2 - 3 - 4
TC types					BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5Lr
Max. offset	20% of selec. max. value	20% of selec. max. value	20% of selec. max. value	20% of selec. max. value	50% of selec. max. value	50% of selec. max. val.
OUTPUT:						
mA, signal range / min. span	0...23 mA / 16 mA	0...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	0...23 mA / 10 mA	0...23 mA / 10 mA
Load (@ current output)	≤ 600 Ω	≤ 770 Ω	≤ 600 Ω	≤ 770 Ω	600 Ω	600 Ω
V, signal range / min. span	0...10 VDC / 0.8 VDC	0...10 VDC / 0.8 VDC			0...10 VDC / 0.5 VDC	0...10 VDC / 0.5 VDC
Max. offset	20% of selec. max. value	20% of selec. max. value	20% of selec. max. value	20% of selec. max. value	50% of selec. max. value	50% of selec. max. val.
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C	-20...+60°C
Supply voltage, AC / DC	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	21.6...253 V / 19.2...300 V	21.6...253 V/19.2...300 V
Max. required power, 1 / 2 channels	2.0 W / 2.8 W	1.3 W / 2.0 W	2.0 W / 2.8 W	1.4 W / 2.1 W	2.1 W / 2.8 W	2.1 W / 2.8 W
Isolation voltage, test / operation	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC	3.75 kVAC / 250 VAC
Response time	< 25 ms	< 25 ms	< 25 ms	< 25 ms	250 ms...60 s	250 ms...60 s
Signal dynamics, input / output	Analog signal chain	Analog signal chain	Analog signal chain	Analog signal chain	22 bit / 16 bit	22 bit / 16 bit
Accuracy	≤ ±0.1% of span	≤ ±0.1% of span	≤ ±0.1% of span	≤ ±0.1% of span	≤ ±0.05% of span	≤ ±0.05% of span
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C
NAMUR	NE 21	NE 21	NE 21	NE 21	NE 21, NE 43	NE 21, NE 43
Channels	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2	2
Programming	DIP switch	DIP Switch	No	No	5909 + DIP switch	5909 + DIP switch
APPROVALS:						
ATEX	✓	✓	✓	✓	✓	✓
IECEx						
FM						
CSA						
UL	✓	✓	✓	✓		
DNV-GL	✓	✓			✓	✓
EAC Ex	✓	✓	✓	✓	✓	✓
APPLICATION GUIDE:						
AI barrier	✓		✓		✓	✓
AO barrier		✓		✓		
DI barrier						
DO barrier					✓ / ✓	✓ / ✓
RTD / TC input	✓ / ✓ / -	✓ / ✓ / -	✓ / - / -	✓ / - / -	✓ / ✓ / ✓	✓ / ✓ / ✓
mA / V / mV input	✓		✓		✓	✓
4...20 mA Tx input					✓ / ✓	✓ / ✓
Lin. R / potentiometer input	✓ / ✓ / -	✓ / ✓ / -	✓ / - / -	✓ / - / -	✓ / ✓ / -	✓ / ✓ / -
mA / V / relay output	✓ / ✓	✓ / -	✓ / ✓	✓ / -	✓ / ✓	✓ / ✓
Active / passive mA output					✓	✓
Process signal calibration						

Of span = Of the presently selected range

QuadraTherm® - THERMAL MASS / QuadraTherm

- Highest accuracy thermal meter in the world
- Multivariable outputs: Mass flow rate, temperature, pressure
- Patented "QuadraTherm" 4-Sensor thermal technology
- Patented no-drift DrySense™ sensor, lifetime warranty
- Inline version has built-in flow conditioning
- No moving parts, low pressure drop, high 100:1 turndown
- Free user software
- Change gas in the field
- Change pipe size in field (insertion version)
- Validate in field for in-situ calibration
- Certified for GHG measurement meeting EPA (40 CFR Part 98)
- Hazardous-area location approvals
- Buy online, next day shipment

SteelTrak® / SteelMass®- THERMAL MASS SteelTrak & SteelMass

- Insertion, Inline and multi point configurations
- Patented no-drift DrySense™ sensor, lifetime warranty
- No moving parts, low pressure drop, high turndown 100:1
- Insertion and inline, totalizing gas mass flow
- Inline version built-in flow conditioning for only 3-diameters up, zero downstream
- Free user software
- Validate in field for in-situ calibration
- Economical NEMA 4X enclosure available
- High temperature to 800°F (430°C) available
- Axial and purge designs for dirty gases
- Certified for GHG measurement meeting EPA (40 CFR Part 98)
- Hazardous-area location approvals

BoilerTrak TM- THERMAL MASS BoilerTrak & FastFlo

- Increase efficiency with fast response time within 200 milliseconds
- No moving parts, low pressure drop, high turndown 100:1
- BoilerTrak optimized for methane, propane and natural gas
- FastFlo optimized for air, nitrogen, and inert gas measurement
- Free user software
- Validate in the field for easy in-situ calibration
- Certified for GHG measurement meeting EPA (40 CFR Part 98)
- Easily install in the field or retrofit
- Buy online, next day shipment

SmartTrak® 100 - DIGITAL / SmartTrak 100

- Highest performance multi-gas MFC
- Flagship mass flow meter & controller
- Navigate easily with large multi-function display interface
- Free user software
- Primary Standard calibration & NIST traceability
- Make adjustments in the field
- Configure up to 10 gasses
- Proprietary frictionless-hovering, direct-acting control/shut-off valve
- User-friendly pilot module display

SmartTrak® 50 - DIGITAL / SmartTrak 50

- Economical digital mass flow meter and controler
- Powerful digital high-performance at OEM pricing
- Save money with volume discounts
- Navigate easily with large display
- Free user software
- Choice of aluminum or 316 stainlesssteel construction
- Compact size makes drop-in replacement easy
- Local display and digital setpoint
- Optional analog setpoint/output signals
- Field adjustable zero and span
- Primary Standard calibration & NIST traceability

Specialty MFCs- DIGITAL / Specialty MFCs

- Digital MFC's engineered forchallenging applications
- Ultra-low flow rates down to 0.1 sccm (smlm)
- Ultra-low pressure drop ΔP of 4.5 psid (310 mBard)
- Industrial approval ratings of NEMA 6 & IP67 ratings
- High pressure up to 5000 psig (345 barg)
- Many other versions available, consult factory
- Leak integrity 5 x 10-9 smL/sec of helium
- Free user software

SmartVOTM Valve - CONTROL VALVES / SmartVO

- Fast-response control valve
- Proprietary frictionless-hovering direct-acting control valve
- Operate over a wide pressure differential range
- Many choices of fitting and elastomers
- Valve designed with positive shut off
- Aluminum and 316L stainless steel construction
- Single sided 10-30 VDC input power reduces installation cost and complexity
- Leak integrity 5 x 10-9 smL/sec of helium
- CE Approved
- Buy Online, next day shipment

SideTrak® - ECONOMICAL MFC / SideTrak

- Dependable analog mass flow control for over 30 years
- Cleanable sensor tube for dirty gases
- Precision control with low pressure drop
- Count on durability with rugged construction
- Available in wide variety of enclosures, process connections, input/output options and control electronics
- Leak integrity 1 x 109 smL/sec of helium
- CE Approved

TopTrak® - ECONOMICAL MFC / TopTrak

- Proven flow measurement with affordable OEM pricing
- Choice of nylon, aluminum or stainless-steel construction
- Save money with volume discounts
- Large, tiltable display readout
- Compact size makes drop-in replacement easy
- Precision measurement with low pressure drop
- CE Approved

FloBox™- DIGITAL CONTROL FloBox

- Feature packed digital performance for analog MFC's
- Large digital display with pushbuttons
- Power one to four units
- Master-slave ratio control
- Independent totalizers and alarms

CalTrak® - GAS FLOW CALIBRATORS CalTrak

- Quick, easy to use, automatic data capture using free software
- Portable and battery operated
- Results directly traceable to NIST
- Highest accuracy primary standard for labs & industry (compare at ± 0.15% of reading)
- Innovative – 100:1 turndown ratio
- Proven dimensionally-based primary standard accuracy backed by a rigorous uncertainty analysis
- Manufactured to ISO 17025 Standards at a NVLAP accredited lab

Badger Meter

Patented accurate linkage system for the SRD positioner.

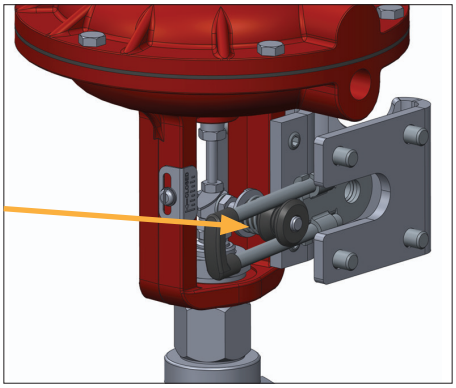
Research Control® Valve Patented Accurate Linkage System

Description

We have designed a cutting-edge linkage system for Research Control valves that provides a high level of accuracy while managing the expectations of demanding applications. The patented linkage system ensures accuracy and longevity by avoiding position erosion by use of a spring-loaded dual contact guide.

Compact Package

The small and durable combination of the RCV valve, RCV positioner and our new patented mounting linkage will provide the highest level of performance for your most demanding applications.

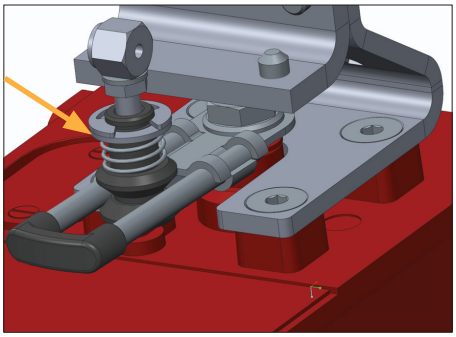


Improved Accuracy

The self-adjusting spring loaded beveled guide provides constant contact and improved accuracy. The dual contact rolling guide eliminates the slop associated with standard brackets.

No Cross Forces

The sliding bolt eliminates cross forces or side loads to extend the life of your packing and trim.



Patent Pending: Application Number—14097989

Control. Manage. Optimize.

www.badgermeter.com

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China | Badger Meter | 7-1202 | 99 Hangzhong Road | Minhang District | Shanghai | China 201101 | +86-21-5763 5412

POS-BR-00931-EN-01 (May, 2014)

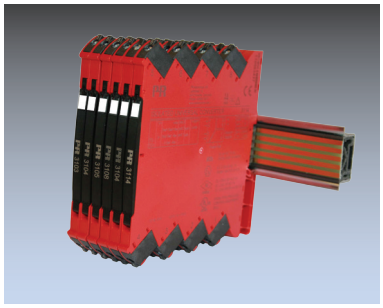
POWER RAIL

The data sheet specifies the maximum required power at nominal operating values, e.g. 24 V supply voltage, 60°C ambient temperature, 600 Ω load, and 20 mA output current.
In typical applications, the devices are not running at worst-case conditions, specifically when many devices are located together. For engineering purposes, 70% (P70%) of maximum required power is often used.

3000 power rail
The number of 3000 devices that can be powered from different power sources is listed in the table below:

	Using a PR converter device as power feed-in	3405 power feed-in	9410 power feed-in
P70%	Up to 25 devices	Up to 160 devices	Up to 250 devices
P100%	Up to 18 devices	Up to 115 devices	Up to 184 devices

The devices can be stacked vertically or horizontally.



9000 power rail
The number of 9000 devices that can be powered from the 9400 power sources is listed in the table below:

	9410 power feed-in
P70%	Up to 150 devices
P100%	Up to 120 devices

ENVIRONMENTAL SPECIFICATIONS

	PR 2200 series	PR 3000 series	PR 4000 series	PR 5000 series	PR 5300 series
Specifications range	-20°C to +60°C	-25°C to +70°C (3105: 0°C to +70°C)	-20°C to +60°C	-20°C to +60°C	-40°C to +85°C
Relative humidity	< 95% RH (non-cond.)	< 95% RH (non-cond.)	< 95% RH (non-cond.)	< 95% RH (non-cond.)	< 95% RH (non-cond.)
Protection degree	IP50	IP20	IP20	IP20	IP68 / IP00

	PR 5500 / 5700 series	PR 6300 series	PR 7500 series	PR 9000 series
Specifications range	-20°C to +60°C	-40°C to +85°C	-20 / -40°C to +85°C	-20°C to +60°C
Relative humidity	< 95% RH (non-cond.)	< 95% RH (non-cond.)	0...100% RH (cond.)	< 95% RH (non-cond.)
Protection degree	IP65 from front (5500) IP65 / Type 4X, UL50E	IP20	IP54 / IP66 / IP68 / type 4X	IP20

ENCLOSURE SPECIFICATIONS

Dimensions (mm)	PR 2200 series	PR 3000 series	PR 4000 / 6000 / 9000 series	PR 5000 series	PR 5300 series	PR 5500 / 5700 series	PR 7500 series
Height	80.5	113	109	109	20.2	48	109
Width	35.5	6.1	23.5	23.5	Ø44	96	145
Depth	84.5+socket	115	104	130		120	125.5
Panel cut-out						44.5 x 91.5	
Material	Cycoloy/Noryl	Cycoloy	Cycoloy	Cycoloy	Cycoloy	Noryl	Aluminum

→ Bimetal Thermometers Std. Lead time 3-5 days

Back Connect

Bottom Connect

Adjustable Angle

- All stainless steel
- Hermetically sealed
- 1% accuracy full scale

→ Transmitters

Z-Temp (Exp. Proof w/display)

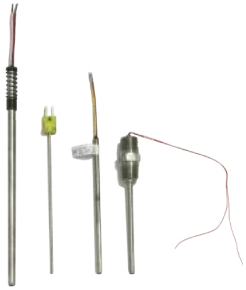
Slim Line

- 4-20mA
- HART
- Fieldbus
- Profibus

→ Thermcouples & RTDs Std. Lead Time: 5-7 days

- Standard and custom assemblies

Head Assemblies



Stem Only Assemblies

Protection Tubes

Dual Mode

Weld Pads

→ Sanitary Products Std. Lead Time: 3-5 days

Bimetal Thermometers

RTD Assemblies

ReoClick

→ Thermowells

Threaded

Flanged

Sanitary

→ ReoCal

Sensor SRT

Calibration

→ OTHERS

- Threaded
- Flanged Sanitary

→ Services Expedites available

- NIST Calibration
- Certifcation
- Repair
- Design Improvement

Pressure Gauges


Process


All Welded SS


Low Pressure


Precision Test


Dials


Differential


Commercial

Diaphragm Seals


Threaded


Flanged


Annular


Mini


Flush Face


Transmitter Assembly


MS8 Seal Gauge

Sanitary Products


Pressure Gauges


Transmitters

Transmitters


General Purpose


Explosion Proof

Accessories

- Snubbers
- Siphons
- Cooling Towers

Switches


Mechanical

Services


NIST Traceable Calibration


Transmitter Assembly

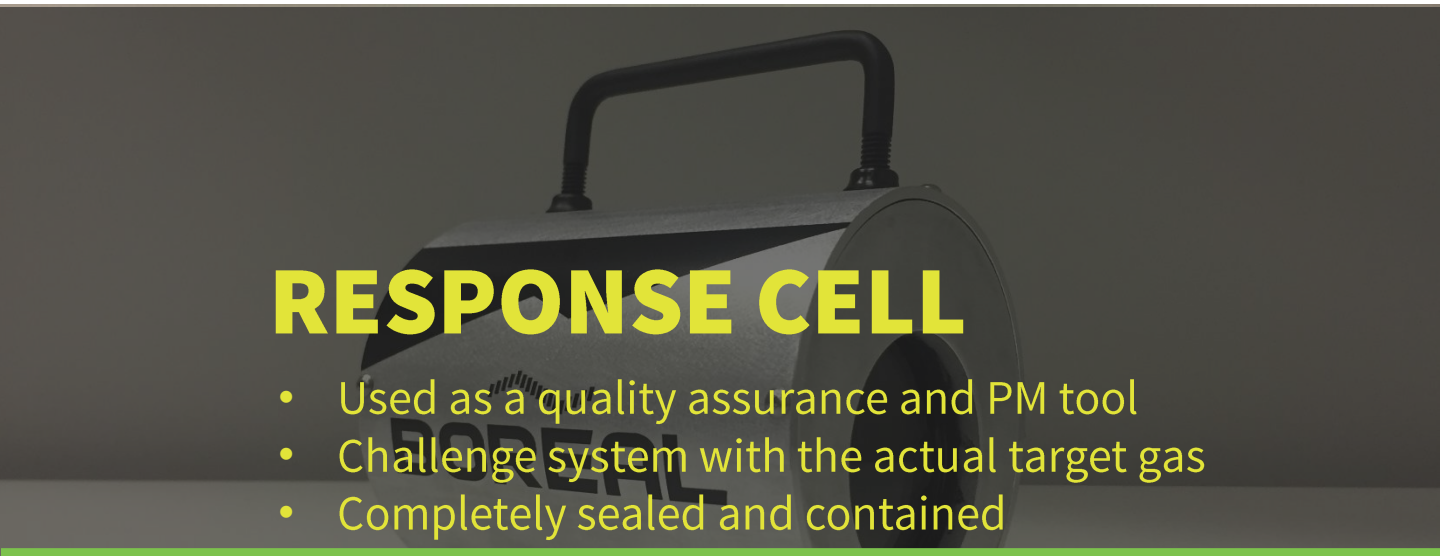

Repair

- Certi cates of Material
- Conformance
- Oxygen Cleaning

and more....

Certification

BOREAL



RESPONSE CELL

- Used as a quality assurance and PM tool
- Challenge system with the actual target gas
- Completely sealed and contained

SET **FORGET** **DETECT**

boreal-laser.com REMOTE PRECISION. SURE DECISION.

BOREAL

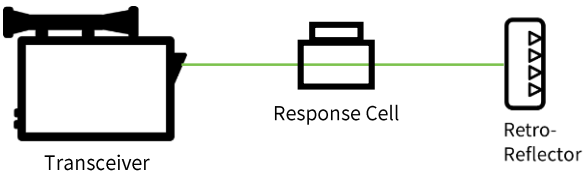
RESPONSE CELL

WHAT IT DOES

- The response cell is typically used in **leak detection** installations that are monitoring for a gas that is **not present in the ambient atmosphere**.
- Response cells are used for **quality assurance** purposes to validate that the GasFinder instruments is **responding appropriately to a nominal concentration of the target gas**
- The validation using a response cell is **NOT a field calibration**

PROCEDURE + PLACEMENT

- To "bump" or "challenge" the system, **the response cell needs to be placed in the active measurement path**
- The active measurement path is between the **transceiver** and the **retro-reflector**
    - The Response Cell also has **a flap with a Grey Tape Retro-Reflector attached** to complete the active measurement path if the path length is to long or if there isn't not enough returned laser light



WARNING

- If the GasFinder instrument is connected to Safety Instrumented System (SIS) it is important **to follow your facilities testing/bypass procedure** so that you do not inadvertently execute an unwanted shutdown procedure
- Care should be taken in handling as **to not damage/break the glass** inside of the Response Cell.
- While some of the target gases are combustible or toxic, it is important to remember that the **volumes used are quite small** and if the glass is broken, **the gas concentration should disperse quickly**

HOW IT WORKS

- The response cell is a **completely sealed unit that contains the specific target gas** that the GasFinder Instrument has been configured to detect
- The OP-TDL GasFinder instruments are designed **to "count" the number of molecules** of the target gas in the active measurement path
- Since the response cell has a concentrated number of molecules within the cell it **can replicate or simulate a release of gas that would be similar to a loss of containment**
- The small amount of gas contained in response cell **does not present a health hazard to the user**

REPEATABILITY

- **One cannot expect identical readings** from the response cell every time it is put into the path as it has an anticipated **repeatability around +/- 20%**
- Repeatability of the response cell is effected by two factors:
    - Depending on how the response cell is held in the active measurement path, **the path length through the response cell (and number of counted molecules) can change and therefore so will the indicated reading**
    - **Optical effects from the response cell windows**

DETECTABLE GASES

- **Select one gas** from the list of gases detectable by OP-TDL for use inside of the Response Cell:
    - Methane **(CH_4)**
    - Carbon Monoxide **(CO)**
    - Carbon Dioxide **(CO_2)**
    - Hydrogen Sulfide **(H_2S)**
    - Hydrogen Chloride **(HCl)**
    - Ammonia **(NH_3)**
    - Hydrogen Cyanide **(HCN)**
    - Acetylene **(C_2H_2)**
    - Ethylene **(C_2H_4)**
    - Oxygen **(O_2)**

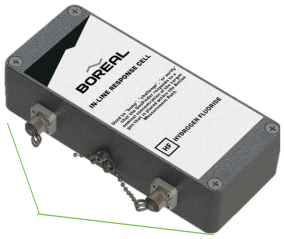
Note: The exact gas specifications are to be confirmed at the time of an application engineering review.

SPECIFICATIONS

- **Response Cell:**
    - Enclosure Dimension: 118 x 146 mm (4.625 x 5.75 in)
    - Aperture (Window Size): 64 mm (2.5 in)
    - Weight: 1 kg (2.2 lbs.)
- **Carrying Case (w/ Response Cell):**
    - Dimensions: 355 x 266 x 152 (14 x 10 x 6 in)
    - Weight: 3.2 kg (7 lbs.)

BOREAL

IN-LINE RESPONSE CELL



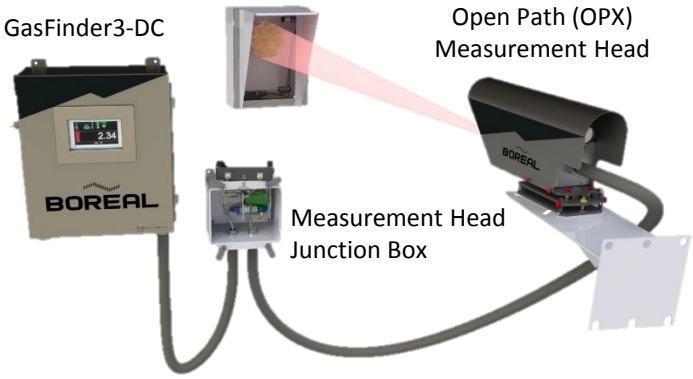
FC/APC Fibre Connections

WHAT IT DOES

- The response cell is typically used in **leak detection** or **ambient monitoring** installations that:
  - are monitoring for a gas that is **not present in the ambient atmosphere**
  - **Difficult, challenging, or not safe to access** the active measurement path
- Response cells are used for **quality assurance** purposes to validate that the GasFinder instruments is **responding appropriately to a nominal concentration of the target gas**
- The validation using a response cell is **NOT a field calibration**

PROCEDURE + PLACEMENT

- To "bump" or "challenge" the system, **the response cell needs to be placed in the active measurement path**
- This In-Line Response Cell is placed within the active measurement path by installing it in-line through the fibre optic cabling between either the GasFinder , Measurement Head Junction Box, or the Measurement Head

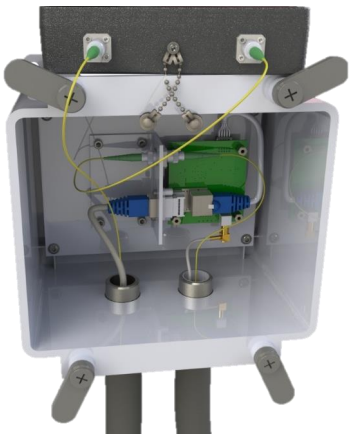


HOW IT WORKS

- The In-Line Response Cell is a **completely sealed unit that contains the specific target gas** that the GasFinder Instrument has been configured to detect
- The OP-TDL GasFinder instruments are designed **to "count" the number of molecules** of the target gas in the active measurement path
- Since the response cell has a concentrated number of molecules within the cell it **can replicate or simulate a release of gas that would be similar to a loss of containment**
- The small amount of gas contained in response cell **does not present a health hazard to the user**

WARNING

- If the GasFinder instrument is connected to Safety Instrumented System (SIS) it is important **to follow your facilities testing/bypass procedure** so that you do not inadvertently execute an unwanted shutdown procedure
- Care should be taken in handling as **to not damage/break** the Response Cell.
- While some of the target gases are combustible or toxic, it is important to remember that the **volumes used are quite small** and if the glass is broken, **the gas concentration should disperse quickly**



SPECIFICATIONS

- **Response Cell:**
  - Dimension: 150 x 63 x 38 mm (5.875 x 2.5x 1.5 in)
  - Weight: 0.4 kg (1 lbs.)
- **Carrying Case (w/ Response Cell):**
  - Dimensions: 355 x 266 x 152 (14 x 10 x 6 in)
  - Weight: 2.4 kg (5.5 lbs.)

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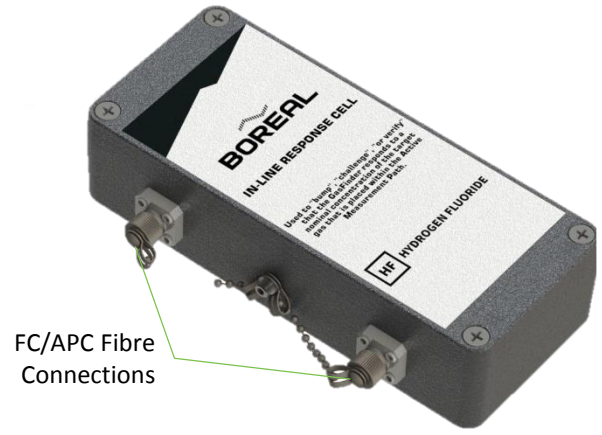
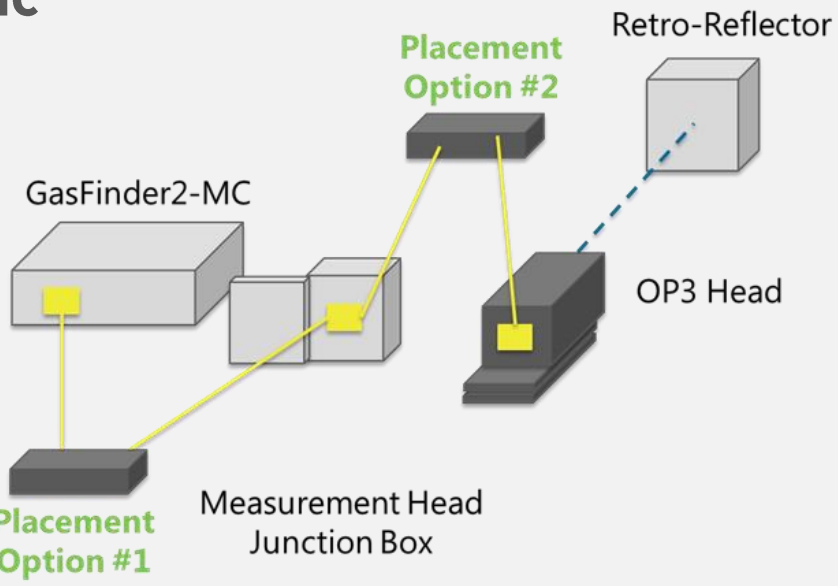
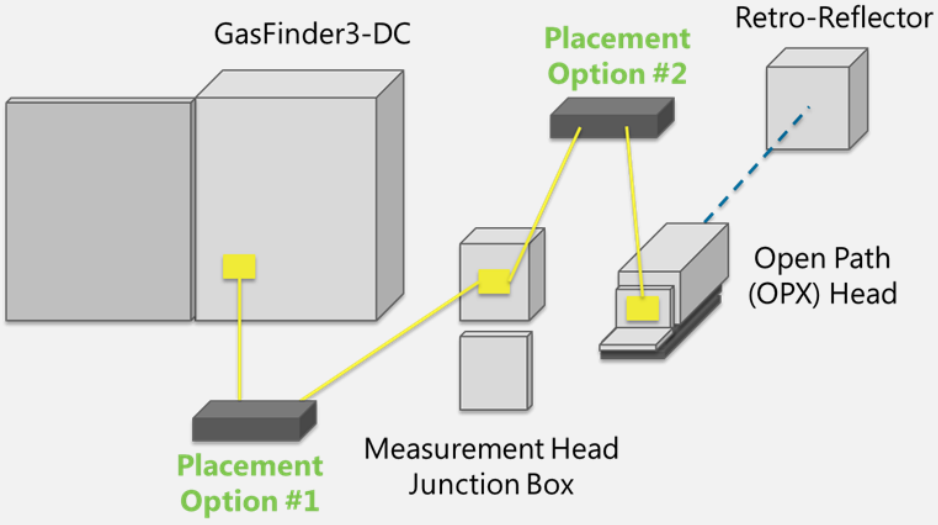
IN-LINE RESPONSE CELL



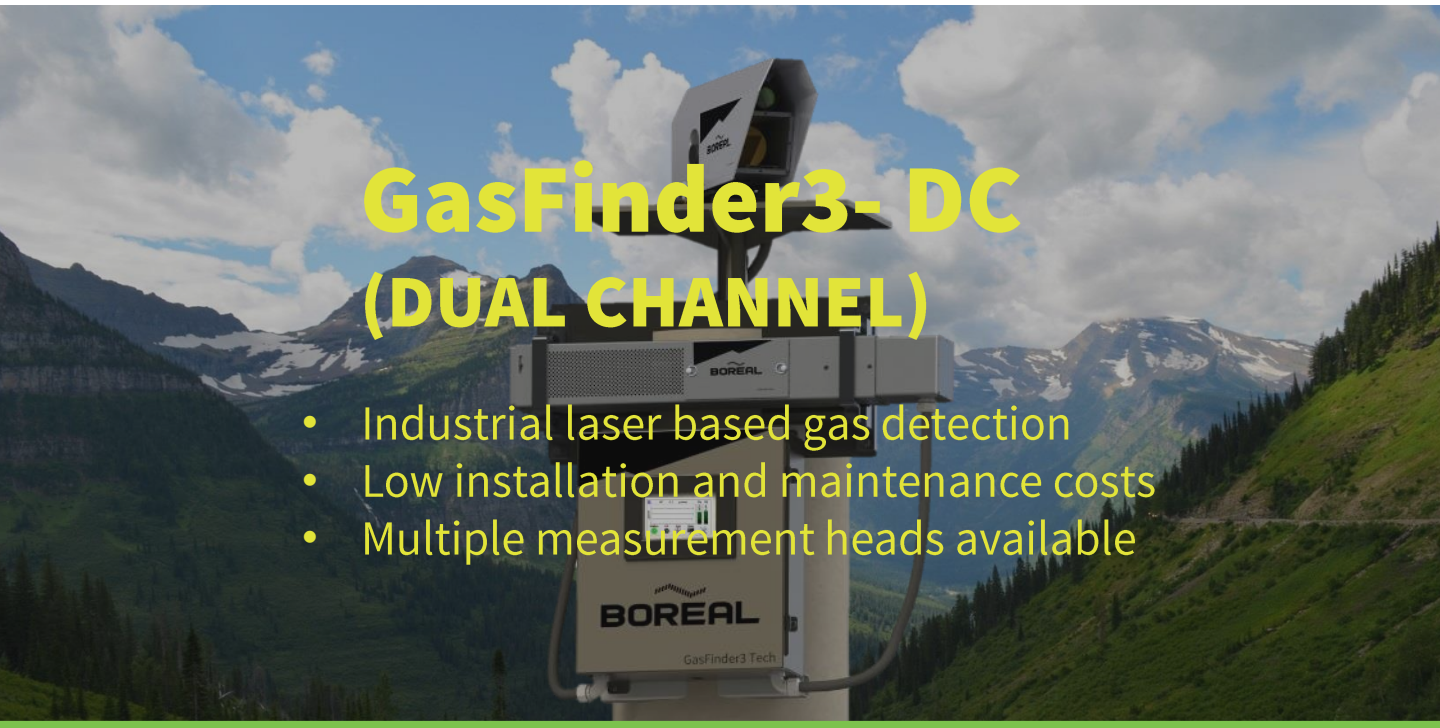
GasFinder2-MC



GasFinder3-DC



BOREAL



GasFinder3- DC
(DUAL CHANNEL)

- Industrial laser based gas detection
- Low installation and maintenance costs
- Multiple measurement heads available

SET **FORGET** **DETECT**

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GasFinder3-DC
(DUAL CHANNEL)

OPX Head:
Open-Path Measurement Head

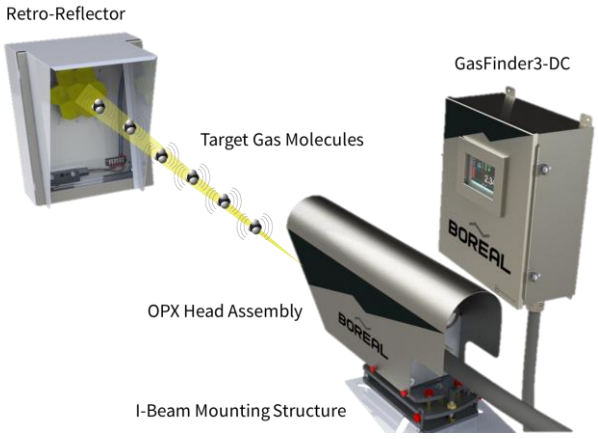
RPX Probe:
Remote Point Measurement Probe

GasFinder3-DC:
GasFinder3-DC (OP-TDL Analyzer)

WHAT IT DOES

- The GasFinder3-DC and associated Measurement Heads make a field deployable **Open-Path Tunable Diode Laser (OP-TDL)** based gas analyzer system that is primarily used for:
  - **Leak Detection:** provides immediate and unambiguous detection of fugitive gas releases in safety applications
  - **Ambient Monitoring:** Continuously monitors gas concentrations over open area and/or point sources for environmental monitoring applications

HOW IT WORKS



- Boreal's GasFinder3-DC via a Measurement Head (e.g. OPX Head) **counts every target gas molecule** in the measurement path to give a path integrated **ppm-m** concentration or path average **ppm** concentration
- This analyzer utilizes a **mono-static configuration** with the OPX Head being a **transceiver** and having a passive **retro-reflector** to return the laser light
- This system has the ability **to monitor one (1) or two (2) measurement heads** with one (1) GasFinder3-DC analyzer.
- Measurement Head Options: **OPX Head** (Open-Path Head), **RPX Probe** (Remote Point Probe), **SDX Probe** (Stack/Duct Probe), **EMX Cell** (Extractive Measurement Cell), **ILX Probe** (In-Line Probe), and **IPX Probe** (Insertible Probe)
- Boreal Laser has a patented internal reference cell that **does not require routine intervention or zero/span gas** to eliminate drift as this is done automatically and once a minute
- **Measure only the target gas and all of the target gas.** Boreal analyzers do not suffer from cross interference and are not affected by humidity

GASFINDER3 TECHNOLOGY

- All new **digital electronics** based platform
- Analyzer can easily be **updated through USB port**
- **Practically no temperature related reading drift** over an ambient range of -40C to +50C
- Significantly **increased dynamic light level range**
- Significantly increase **data logging capabilities** (~20 years)
- Reliable and stable operation in **light levels down to 5% of ideal conditions**
- Available real-time **Pressure and Temperature compensation**
- User friendly **touchscreen interface with graphic displays**

OP-TDL BENEFITS

- **Cannot be poisoned** or mechanically **over ranged**
- **No interference** with other gases
- **No memory effects** as each sample is independent from the last
- **Data collection** and **interpretation** is simple and intuitive
- Built for ambient **winter** and **summer** conditions
- **Minimal maintenance** and **intervention**
- Sophisticated **self-diagnostics** and **data validation**
- Can provide **an independent sample or reading every second**

DETECTABLE GASES

- The GasFinder3-DC only "sees" the one gas it is meant to detect, which makes it perfect for **leak detection (no false alarms)** and **ambient monitoring (no cross interferences)**
- Select one gas from the list of gases detectable by OP-TDL:
  - Methane **(CH_4)**
  - Carbon Monoxide **(CO)**
  - Carbon Dioxide **(CO_2)**
  - Hydrogen Sulfide **(H_2S)**
  - Hydrogen Chloride **(HCl)**
  - Hydrogen Fluoride **(HF)**
  - Ammonia **(NH_3)**
  - Hydrogen Cyanide **(HCN)**
  - Acetylene **(C_2H_2)**
  - Ethylene **(C_2H_4)**

Note: The exact gas specifications are to be confirmed at the time of an **application engineering review**. Some gases have multiple absorption lines from which to choose in order to optimize analysis for a specific application.

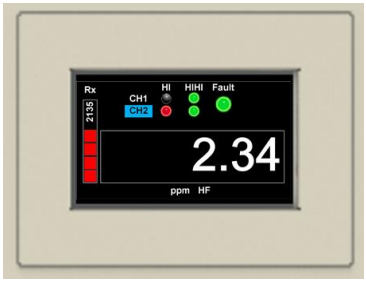
EASE OF INSTALLATION

- The **rugged industrial enclosure** of the GasFinde3-DC can be mounted on a fixed pedestal or wall
- The Measurement Head can be **mounted up to 100m** from the GasFinder3-DC via Fibre Optic and CAT6 cable run
- **Only power** and **communication** cables required

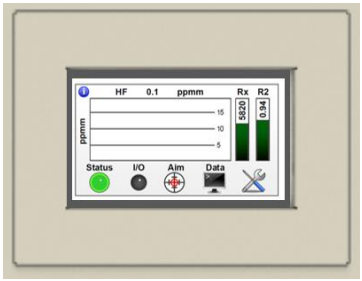
Note: For additional details see **General Arrangement Drawings**

BOREAL

UNIQUE FEATURES



Numerical Display

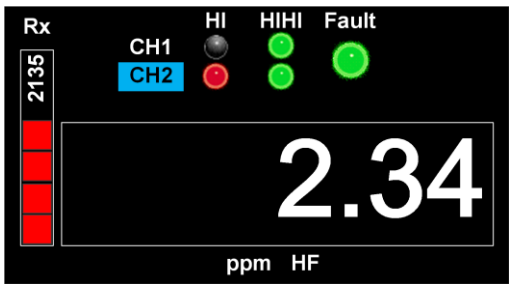


Graphical Display

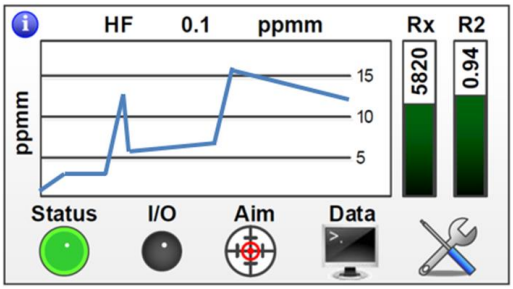
HMI DISPLAY

- The HMI Touchscreen provides operators and technicians with valuable information at a quick glance such as:
  - **Concentration Measurement**
  - Key diagnostic information such as **Light Level (Rx) and Confidence Factor (R2)**
  - **Status/Fault Indication**

Numerical Display:



Graphical Display:

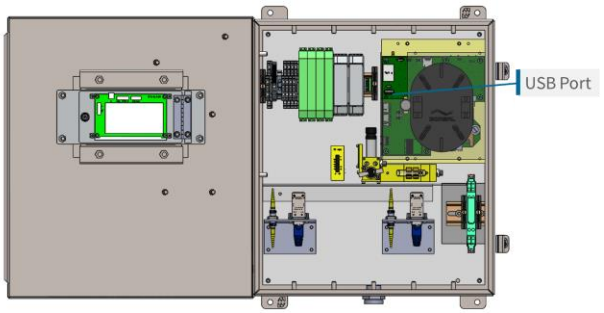


ACTIVE STATUS

- Technicians can easily have the specific status indicated to determine the **current state** of the analyzer

USER ACCESSBLE LOGFILES

- All data generated by the GasFinder3-DC is stored internally and is **user accessible via the internal USB port**



Note: There is also a USB Port inside the Termination Junction Box (optional accessory).

ALARM PARAMETERS

- Via the HMI Touchscreen, the end-user can program/define:
  - **Analog ranges** and specific **Hi & Hi-Hi Alarm Thresholds**
  - Specific **time delay** for Alarm Threshold Parameters on the **I/O Modules:**
    - Analog: **Low Light Alarm** (2.7mA)
    - Discrete: **Hi Alarm & Hi-Hi Alarm**

Note: System faults (3.6mA) will override the channel specific time delays on Low Light Alarm and Hi (-Hi) Alarm thresholds

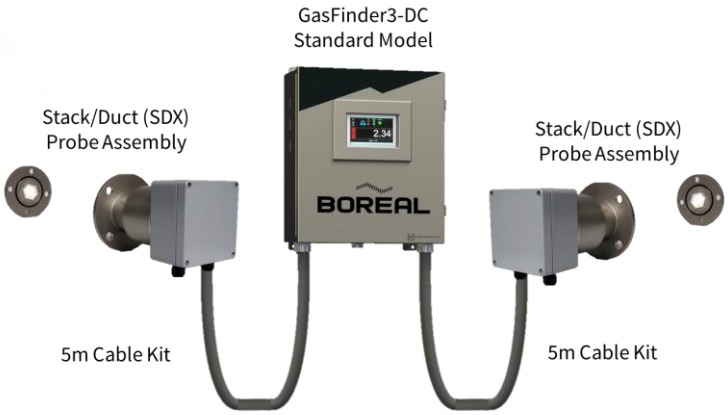
P+T COMPENSATION

- **Static:** Manually input a static pressure and temperature
  - User can post process the P+T Data
- **Internal:** P+T Module makes measurements within the enclosure
  - Good for diurnal or seasonal relative rates of change
- **External:** P+T Input can take external analog inputs
  - Able to make compensations for changes in Active Measurement Paths

Note: The External P+T Inputs are only available on the Enhanced GasFinder3-DC Model

Note: Internal P+T measurements come from a module that is surface mounted on the PCB. Pressure sensor is Piezo Resistive and Temperature sensor is MEM

GasFinder3-DC (DUAL CHANNEL)



SELF TEST / VALIDATION

- Boreal Laser's GasFinder technology makes use of on-board diagnostics to **ensure the system is functioning properly, responds to real target gas and does not drift.**
- Boreal's Self Test and On-Board Diagnostics will:
  - Determine if it gets a **proper response from a real sample** via the **Internal Reference Cell**
  - Make any adjustments necessary to **eliminate drift** (Line-Centre)
  - **Collect additional diagnostic information** to ensure the analyzer is operating within required parameters.
  - All of the generated data, including the self test results, are automatically stored and recorded

NO INHERENT CALIBRATION

- There is no Boreal Laser requirement for any periodic re-calibration **and if the GasFinder unit continues to operate without fault codes, the system is still within calibration** and will continue to provide accurate and reliable data
- It is recommended that the equipment be returned to the factory every five (5) years. In addition to check-up and calibrations, **there may be hardware, software, firmware, or analysis algorithms updates available** to improve the performance of the analyzer that can only be performed at the factory or with a re-calibration.

LONG LIFESPAN

- In Boreal Laser's GasFinder3-DC OP-TDL, there **are no moving parts**.
- Since laser light is used as the measurement sensor there are **no consumables**.
- Boreal Laser uses high grade **tele-communication lasers** and they're guaranteed to **operate for at least 15 years**
- To give an idea of the longevity of the instruments, the original systems **sold to customers back in the 90's are still in operation today**.
- Long life span combined with no periodic calibrations make the GasFinder3-DC a cost-effective option against almost any gas detection technology, especially if the asset **is amortized over 5,10, or 15 years**

INTERFACE (HMI) DISPLAYS

- For enhanced **security and anti-tampering purposes**, the HMI Touchscreen is covered by glass on the GasFinder3-DC
- By opening the GasFinder3-DC's enclosure the HMI Touchscreen is accessible for **modifying user configurable settings**

QUANTITATIVE ADVANTAGE

- Boreal Laser analyzers actively compensate for both the **Universal Gas Law (Physical)** and **Absorption Line Strength Changes (Spectroscopic)**
- The greatly improved internal laser temperature stability (controlled to +/-0.0001°C) means that there is **practically no temperature related drift over an ambient temperature range from -40 to 50°C**
- This means that the GasFinder3-DC provides the **most accurate and representative Raw Uncorrected Results in the industry**
- External Pressure + Temperature (P+T) Inputs can be used to read **real-time pressure and temperature values from the active measurement path for dynamic P+T compensation**

DESIGNED TO BE MODULAR

- Boreal Laser has designed the GasFinder3-DC to be modular, which means that end-users can **easily design, install, commission, and support** the equipment.
- The GasFinder3-DC has been designed so that at any time **customers may expand or upgrade the capabilities** of the analyzer by moving-up to the next model, adding an additional measurement head, and increasing the measurable path length
- Certain implementations of firmware, software, analysis algorithm **upgrades are possible through a USB stick**

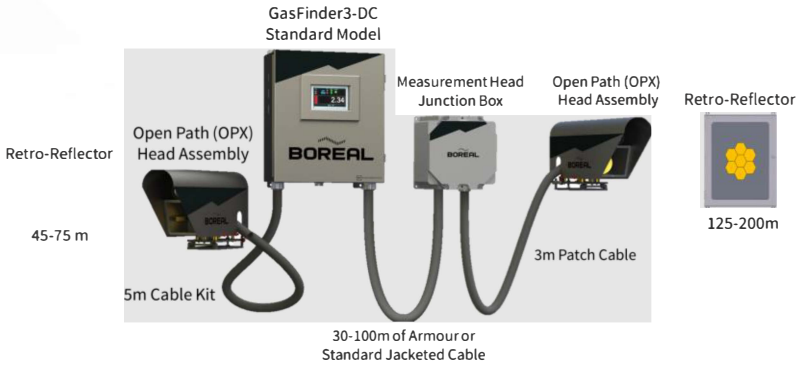
SPECIFICATIONS

- **Technology Name:** OP-TDL or "Laser"
- **Detection Principle:** TDLAS with WMS
- **Response Time:** 1 second per path
- **Accuracy: +/-**2% of reading
- **Data Output Options:** up to 3x 4-20mA & Dry Contact Relays per channel with Enhanced Model
- **User Interface Mediums:** HMI Touchscreen or GasView Software
- **Interface Protocols:** Serial (RS-232 & Micro-USB), Ethernet (TCP/IP: FTP or Telnet) and MODBUS (RS-485)
- **GF3-DC Weight:** 14.6 kg (32.2 lbs)
- **GF3-DC Dimensions:** 495x368x160mm (19.5x14.5x6.25in)
- **Power Requirement:** 24 VDC @ 20 Watts (120-220 VAC Optional)
- **Ambient GF3-DC Temperature:** -40°C to +50°C (-40°F to 122°F)
- **Ingress Protection:** IP 66 & NEMA 4x
- **Light Source:** Semiconductor Diode Laser w/ ~10mW output
- **Eye Safety:** Class I AEL under IEC 60825-1
- **Area Classification (GF3-DC):** NA Class 1, Zone 2, IIC, T4
- **Area Classification (Head):** NA Class 1, Zone 1, ib, IIC, T4 Gb
- **Safety Integrity Level:** SIL2 Suitable

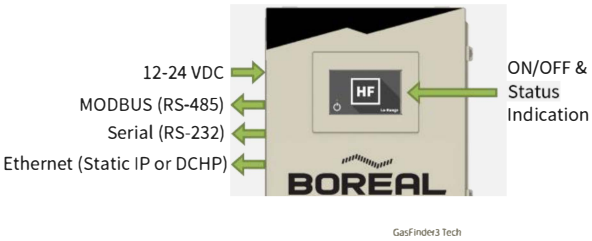
Note: For additional details see **Instrument Data Sheets**

BOREAL

GasFinder3-DC
MODEL OPTIONS



BASIC MODEL (GOOD)



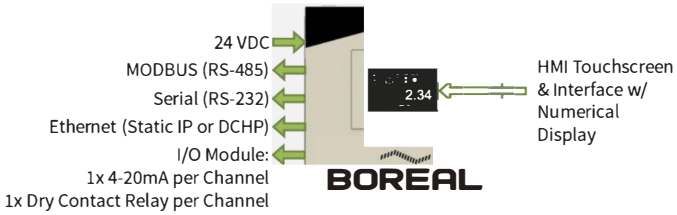
Ability to monitor 1 or 2
Measurement Heads

The GasFinder3-DC-B model is a **no-frills configuration** and only performs the function it needs to - quickly and reliably detect the presence of gas.

The Basic GasFinder3-DC Model has the ability to display **the Local Status Indication (ON/OFF and Fault) with a LED indicator**. The customer can interface with the analyzer by using the included GasView Software. The GasFinder3-DC has internal data logging capabilities to collect and store all the GasFinder generated data for around 20 years.

The Basic GasFinder3-DC model has three output options: **MODBUS** (RS-485), **Ethernet** (TCP/IP: FTP or Telnet) and **Serial** (RS-232).

STANDARD MODEL (BETTER)



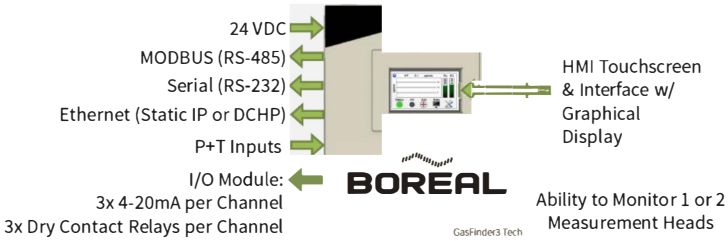
Ability to Monitor 1 or 2
Measurement Heads

No other open path vendor has a **local touchscreen display** that enables field personnel to see **ppm(-m) concentrations, light level, and active status** in real-time.

This model can be **interfaced locally by the userwith the GasView Software or via the HMI Touchscreen**. The added functionality of the HMI Touchscreen allows the user to set configurable alarm levels for the outputs, to view real-time GasFinder3-DC serial string data and view de-bug statements.

This model has one (1) I/O Module that enables **one (1) 4-20mA Loop and Dry Contact Relay per Channel** along with one additional Analog and Discrete Loop.

ENHANCED MODEL (BEST)



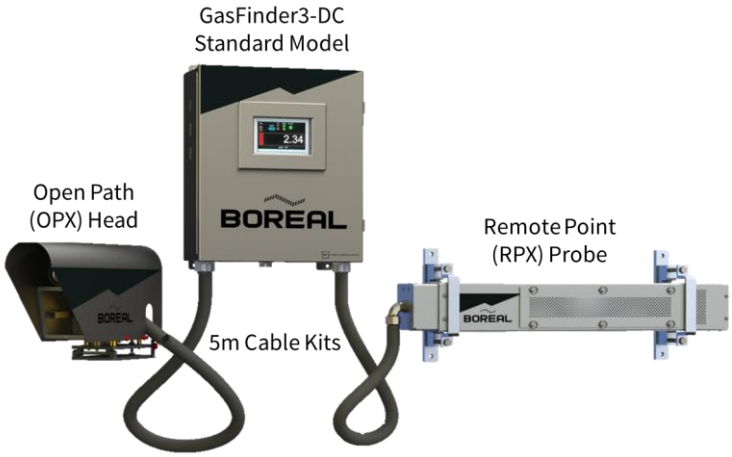
Ability to Monitor 1 or 2
Measurement Heads

The GasFinder3-DC-E is the top-of-the-line analyzer model which enables the end-user to have **three (3) analog loops and three (3) dry contact relays per channel** with the use of two (2) I/O Modules**.** The user configurable outputs allow for easily customizable functionality to suit the exact needs of the application.

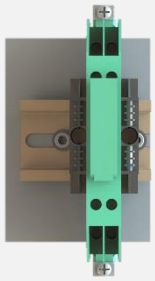
The Enhanced model accepts external **Pressure + Temperature (P+T) Inputs** from the active measurement path to enable dynamic P+T compensation.

BOREAL

GasFinder3-DC
MODEL OPTIONS



AREA CLASSIFICATION

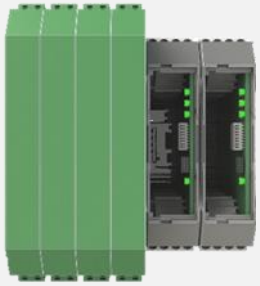


Zener Barrier

GasFinder3-DC (Analyzer):
- Area Classification – Class 1 Zone 2, IIC (Groups A,B,C,D), T4
- Method of Protection – Non-Arcing/Non-Incendive
  - As per: UL 121201, CSA C22.2 No. 213

OPX Head or RPX Probe (Measurement Head):
- Area Classification – Class 1 Zone 1, IIC (Groups A,B,C,D), T4
- Method of Protection – Intrinsic Safety “ib” & “Gb”
  - As per: IEC 60079-11

ANALOG LOOP OPTIONS



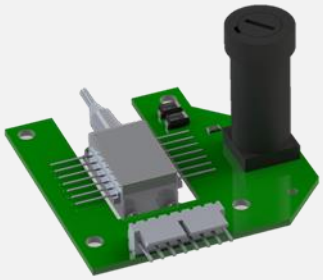
Isolators I/O Modules

The I/O Modules analog loops are **Non-Isolated** and **Active** (loop is powered by the GasFinder3-DC).

One (1) to six (6) Analog Loop Isolators are used to eliminate grounds loops, reduce noise, block transient signals, and enable passive loops (loop is field powered).

Note: The isolator can be wired in the field to be either active or passive.

TARGET GAS (LASER) SELECTION



Tunable Diode Laser

While the lasers are “tunable”, they’re tunable over a very narrow wavelength range. Typically, **a laser is only suitable for one target gas and one measurement range** making it specific for certain applications.

When a target gas and range is determined, a specific **laser**, **reference cell**, **photodiodes**, and l**aser handling** components (e.g. fibre or splitter/switch) are selected.

Which gases do you need your Open Path Gas Detection solution to quickly and reliably detect?

BOREAL

INCIPIENT LEAK DETECTION

If a leak is to occur, then concentrations in the 10's to 1,000's of ppm are expected to be present and detected.

H_2S Hydrogen Sulphide
Lo-Range: 0-100,000 ppm-m

CO_2 Carbon Dioxide
Hi-Range: 0-80,000 ppm-m

HF Hydrogen Fluoride
Lo-Range: 0-250 ppm-m
Hi-Range: 0-1,000 ppm

HCN Hydrogen Cyanide
Range: 0-5,000 ppm-m

NH_3 Ammonia
Lo-Range: 0-5,000 ppm-m
Hi-Range: 0-15,000 ppm-m

HCl Hydrogen Chloride
Range: 0-2,500 ppm-m

CH_4 Methane
Lo-Range: 0-2,500 ppm-m

C_2H_2 Acetylene
Range: 0-2,000 ppm-m

CO Carbon Monoxide
Lo-Range: 0-8,500 ppm-m

C_2H_4 Ethylene
Range: 0-5,000 ppm-m

DISCRETE LEAK DETECTION

If a leak is to occur, then percent (%) level concentrations are expected to be present and detected.

H_2S Hydrogen Sulphide
Hi-Range: 0-500,000 ppm-m

CO_2 Carbon Dioxide
Hi-Range: 0-500,000 ppm-m

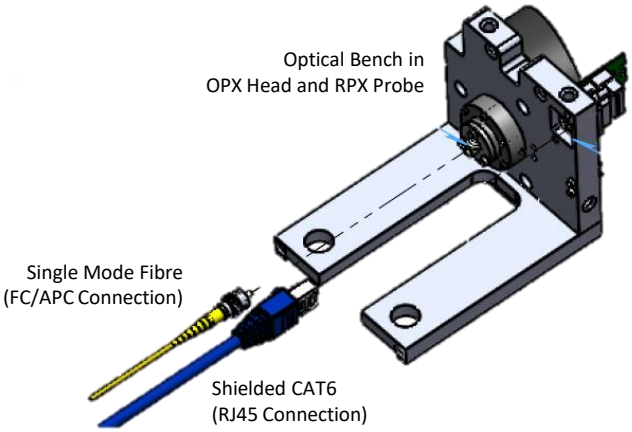
CH_4 Methane
Hi-Range: 0-500,000 ppm-m

O_2 Oxygen
Hi-Range: 0-350,000 ppm-m

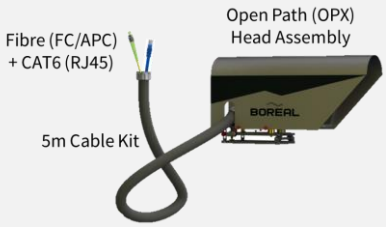
CO Carbon Monoxide
Hi-Range: 0-500,000 ppm-m

BOREAL

CONNECTING THE MEASUREMENT HEAD TO THE GASFINDER3-DC

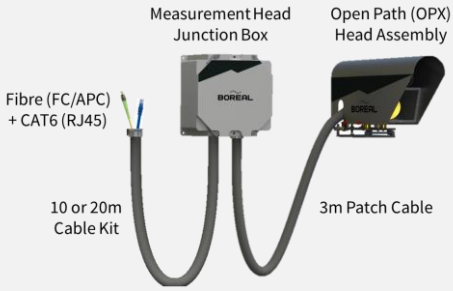


5m CABLE KIT



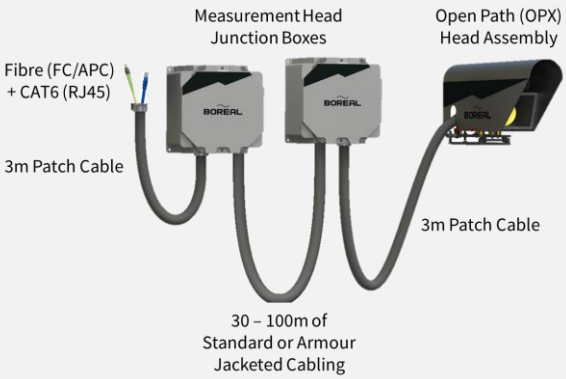
Kit includes: Includes 5m of Single Stand Fibre Optic and CAT6 Cabling ran in Liquid Tight Flex to connect the Measurement Head(s) to the GasFinder3-DC.

10 or 20m CABLE KIT



Kit includes: Two (2) Measurement Head Junction Boxes, one (1) 3m Patch Cable (Single Strand Fibre Optic and CAT6 Cabling ran in Liquid Tight Flex), and 10 or 20m of Patch Cable (Single Strand Fibre Optic and CAT6 Cabling ran in Liquid Tight Flex).

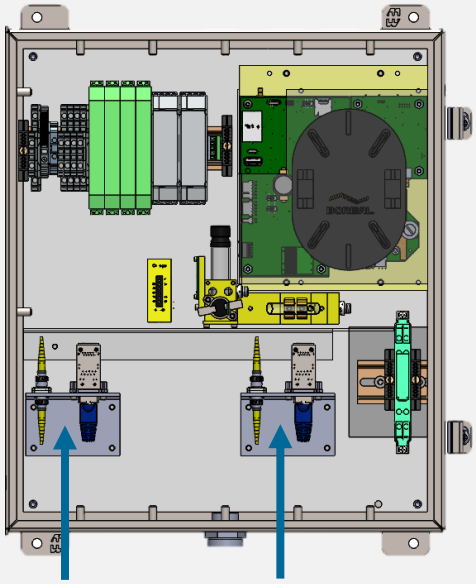
30-100m CABLE LENGTHS



Standard Jacketing: Two (2) Measurement Head Junction Boxes, two (2) 3m Patch Cables (Single Strand Fibre Optic and CAT6 Cabling ran in Liquid Tight Flex), and 30-100m of Standard Jacketed Multi-Stand Fibre Optic and CAT6 cables to be ran in end-user supplied conduit or other mechanical protection.

Armour Jacketing: Two (2) Measurement Head Junction Boxes, two (2) 3m Patch Cables (Single Strand Fibre Optic and CAT6 Cabling ran in Liquid Tight Flex), and 30m of Armour Jacketed Multi-Stand Fibre Optic and CAT6 cables.

TERMINATIONS IN ANALYZER



Channel #1:
Fibre (FC/APC)
+ CAT6 (RJ45)

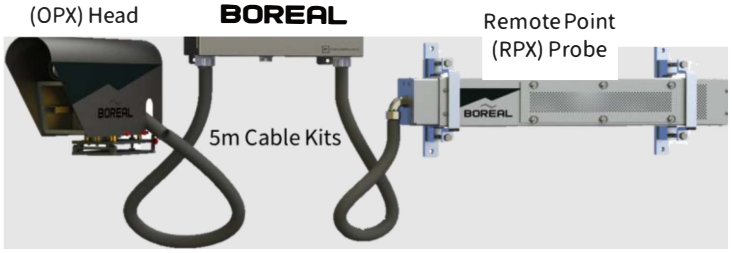
Channel #2:
Fibre (FC/APC)
+ CAT6 (RJ45)

BOREAL

MEASUREMENT HEAD OPTIONS

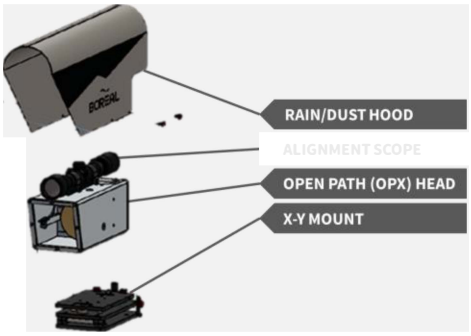
GasFinder3-DC
Standard Model

Open Path
(OPX) Head



Remote Point
(RPX) Probe

OPEN PATH (OPX) HEAD



What it does: The Open Path (OPX) Head is a transceiver assembly for GasFinder3-DC analyzers that provides a path integrated (or path average) gas concentration in the active measurement path through the ambient atmosphere. This measurement head is suitable for use in Hazardous Areas: Class 1, Zone 1, IIC (Groups A,B,C,D).

How it works: The GasFinder3-DC analyzer can be mounted locally or remotely. Fibre optic cable carries the laser light from the analyzer to the remotely mounted OPX Head (Transceiver). The maximum cable distance between the GasFinder3-DC and the OPX Head is 100m. The active measurement path is formed by the laser passing through the ambient atmosphere and being returned by the retroreflector. The returning laser light is then collected on a photodiode and the signal is carried back to the analyzer via CAT6 cable.

REMOTE POINT (RPX) PROBE

What it does: The RPX Probe is a measurement head for GasFinder3-DC analyzers that provides a path average concentration in the 0.5 m active measurement path (ambient atmosphere). The RPX Probe can be used with the GasFinder3-DC in Hazardous Areas: Class 1, Zone 1, IIC (Groups A,B,C,D).

How it works: The analyzer can be mounted locally or remotely up-to a maximum of 100m cable length. Fibre optic cable carries the laser light from the analyzer to the remotely mounted RPX Probe's Transceiver. The active measurement path is formed by the laser passing through the ambient atmosphere and being returned by the heated retroreflector. The returning laser light is then collected on a photodiode and the signal is carried back to the analyzer via CAT6 cable.

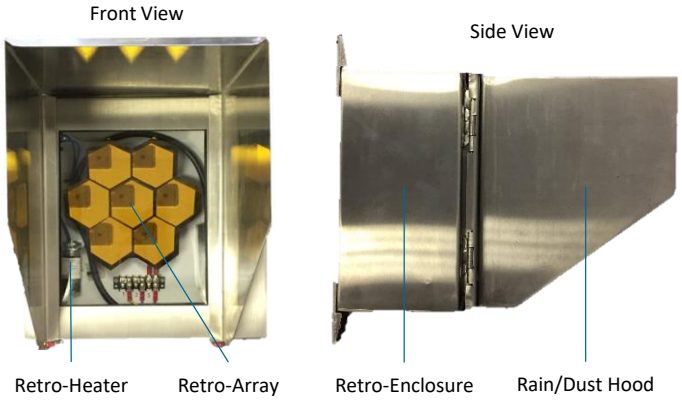
STACK/DUCT (SDX) PROBE

What it does: The Stack/Duct (SDX) Probe enables GasFinder3-DC analyzers to monitor the path average concentration inside a stack or duct with typical path lengths of 0.5 to 20m.

How it works: The analyzer can be mounted locally or remotely up-to a maximum of 100m cable length. Fibre optic cable carries the laser light from the GasFinder3-DC to the remotely mounted stack/duct probe (Transceiver). The active measurement path is formed by the laser light passing through the stack/duct and being returned by a retroreflector mounted on the opposite side of the duct. The laser light is then collected on a photodiode and the signal is carried back to the analyzer via CAT6 cable.

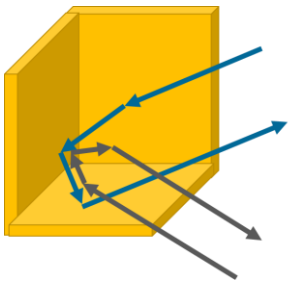
BOREAL

RETRO-REFLECTORS



HOW IT WORKS

- Boreal Laser uses a **Mono-Static (Transceiver/Retro-Reflector) configuration** with the OPX Head being **a transceiver** and a passive **retro-reflector** returning the laser light to the OPX Head
- A retro is like a section through a cube and has **three faces that form the inside corner of a cube**
- Regardless of the angle of incidence of the incoming beam, the laser light **is always reflected at 180 degrees back to the OPX head**.

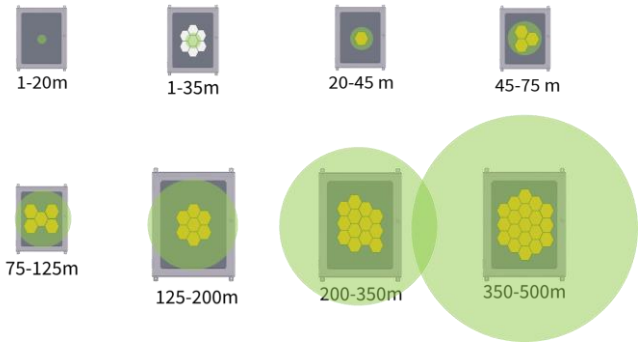


WHY USE A RETRO?

- **Mono-Static (Transceiver/Retro-Reflectors)** provides the following benefits over Bi-Static (Transmitter/Receiver):
  - **Provides larger target**
  - **Only the Transceiver** needs to be precisely aligned
  - Easier to **obtain and maintain** optical alignment
  - **Enable Longer Path Lengths**
  - Allow for **lower detectable limits**
- The Retro-Reflector configuration **handles vibration better** than the Transmit/Receive configuration
- The distance between the transceiver (OPX Head) and the Retro-Reflector forms the **physical path length** and **active measurement path**

RETRO-ARRAY

- The table below provides the **recommended minimum array size** for approximate path length ranges that aim to return optimal/enough laser light:



Note: The "typical" laser dot size (shown in green in the above chart) shows how the class 1 (eye-safe conforming to IEC-60825-1) laser beam diverges with distance. The beam diameter can be calculated as follows: path length (m) x 3.5mrad = beam diameter in mm

Important: If the stability of the OPX mounting structure is in doubt with the recommended arrays, then the Retro-Reflector Arrays can easily be oversized to ensure sufficient alignment stability

KEEPING THE WINDOW CLEAR

- **Rain/Dust Hoods** come standard on all Retro-Enclosures to keep debris from building up on the Retro Window. The design of the Rain/Dust Hood minimizes the requirement for routine window cleaning which can scratch the window material
- **Retro-Heaters** prevent water vapour from condensing on the Retro-Window. Retro-Heaters are recommended if the mounting location of the Retro-Enclosure is outside in either hot (humid) or cold weather (ice, sleet, or snow) climates

SPECIFICATIONS

Retro-Reflector	19	Retro Enclosure Material	304 Stainless Steel or FRP Fiberglass
	20	Retro Enclosure Window Material	Lexan or Mylar (Gas/Application Dependent)
	21	Retro Enclosure Heater	24 VDC @ 20W (110-240 VAC Available)
	22	Retro Enclosure Cable Entry	None
	23	Retro Enclosure Cable Glands	Supplied by others (as per local electrical standards)
	24	Retro Heater Termination	Mounted with flying leads (to be installed as per local electrical standards)
	25	Retro Array	2.5" Cornercube at 30 arc-seconds
	26	Path Length Ranges (Retro-Array)	1-45m (1), 45-75m (3), 75-125m (5), 125-200m (7), 200-350m (12), 350-500m (19)

BOREAL

BUILD YOUR OWN ANALYZER ASSEMBLY

GasFinder3-DC
Standard Model

Model Selection

The GasFinder3-DC is available in **three (3) different model configurations** to best suit the feature and budgetary needs of the application.

Basic Model (GF3-DC-B)
Standard Model (GF3-DC-S)
Enhanced Model (GF3-DC-E)

Area Classification

The GasFinder3-DC can be configured for use in **General Purpose or Hazardous Area** applications.

General Purpose Use (GP)
Class 1 Zone 2 Groups A B C,D (IIC), T4 (NA)

Analog Isolation

The GasFinder3-DC comes **standard with an Active 4-20mA Non-Isolated Loop**.

Non-Isolated Active Loops (NI)
One (1) Isolated Active/Passive Loop (I1)
Two (2) Isolated Active/Passive Loops (I2)
Three (3) Isolated Active/Passive Loops (I3)
Four (4) Isolated Active/Passive Loops (I4)
Five (5) Isolated Active/Passive Loops (I5)
Six (6) Isolated Active/Passive Loops (I6)

Target Gas

Select one (1) target gas per GasFInder3-DC unit.

"Lo-Range" Options:
Hydrogen Sulphide (H2SL)
Hydrogen Fluoride (HFL)
Ammonia (NH3L)
Methane (CH4L)
Carbon Monoxide (COL)
Carbon Dioxide (CO2L)

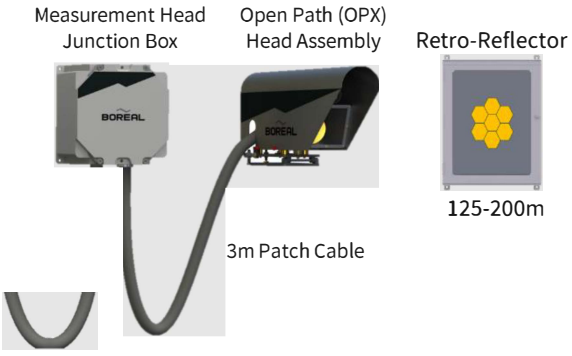
"Hi-Range" Options:
Hydrogen Sulphide (H2SH)
Hydrogen Fluoride (HFH)
Ammonia (NH3H)
Methane (CH4H)
Carbon Monoxide (COH)
Carbon Dioxide (CO2H)

Single Range Options:
Hydrogen Cyanide (HCN)
Oxygen (O2)
Ethylene (C2H4)
Hydrogen Chloride (HCl)
Acetylene (C2H2)

BL-GF3-DC-__ __ __ ____

Model
Area Classification
Analog Isolation
Target Gas

Tell us what you need



BOREAL

BUILD YOUR OWN MEASUREMENT HEAD ASSEMBLY

Cable Connection

The Measurement Head Assembly is connected to the GasFinder3-DC via **Single Mode Fibre Optic Cable and Shielded CAT6 cabling**.

5m Cable Kit (CK)
10 or 20m Cable Kits (L1 or L2)
30-100m of Standard Jacketed Cabling (S3-S10)
30-100m of Armour Jacketed Cabling (A3-A10)

Measurement Head Assembly

There are a number of measurement heads available for use with the GasFinder3-DC, **select which measurement heads** work best for your application.

Open Path Head (OPX)
Remote Point Probe (RPX)
Stack/Duct Probe (SDX)
Extractive Measurement Cell (EMX)
In-Line Probe (ILX)
Insertible Probe (IPX)

Retro Array (OPX Head)

A recommended retro array configuration is based on the **required path length of the active measurement path.**

1-20m Path Length– Grey Tape Array (G)
1-35m Path Length – 7 IMOS Array (M)
20-45m Path Length – One Cornercube Array (1)
45-75m Path Length – 3 Cornercube Array (3)
75-125m Path Length – 5 Cornercube Array (5)
125-200m Path Length – 7 Cornercube Array (7)
200-350m Path Length – 12 Cornercube Array (12)
350-500mPath Length – 19 Cornercube Array (19)

Retro Enclosure (OPX Head)

You have the chose as to **what material the retro enclosure will be made of.** Each enclosure comes standard with a Retro Heater and Rain/Dust Hood.

Heated Stainless Steel: 12 VDC (S12)
Heated Stainless Steel: 24VDC (S24)
Heated Stainless Steel: 120-220 VAC (SAC)
Non-Heated Stainless Steel (SN)

Heated Fibreglass: 12 VDC (F12)
Heated Fibreglass: 24 VDC (F24)
Heated Fibreglass: 120-220 VAC (FAC)
Non-Heated Fibreglass (FN)

Tell us what you need

BL-___ ___ __ ___

Ca e Connection
Measurement Head
Retro Array
Re Enclosure

BOREAL

HIGHLIGHTED ACCESSORIES

Alignment Kit

ALIGNMENT KIT

The Alignment Kit is used for the **installation, commissioning, and alignment** of primarily the **OPX and SDX Measurement Heads**. The components within the alignment kit include: Laser Power meter/Visible laser module, Remote Light Meter, variable fibre attenuator, IR Card, fibre cleaning tape.
Note: The Alignment Kit is a useful accessory for OPX and SDX heads but it is **highly encouraged for OPX Head applications path lengths beyond 50m**. For more information please see the Alignment Kit Brochure.

I-BEAM MOUNT FOR OPX HEAD

The **OPX Mounting Structure is available for mounting one (1) OPX Head Assembly.** The X-Y Mount can directly mount onto the I-Beam Mounting Structure with the included hardware.
Note: The maximum path length that can be accommodated by the mounting structure depends on the stability of the primary structure on which the GF3-DC is mounted. See **Technical Note 02-3 – Stability of Support Structures** for more information.

RESPONSE CELL

This is typically used in leak detection installations where the target gas is not normally present in the ambient atmosphere. Response cells are used for quality assurance purposes to **validate that the GasFinder instrument is responding appropriately to a nominal concentration of the target gas**. **HF Response Cells are not currently available** in this configuration. For more information please see the Response Cell Brochure.
Note: The validation using a response cell is NOT a field calibration.

IN-LINE RESPONSE CELL

Is typically used in leak detection installations where the Measurement Head might be difficult to access. Response cells are used for quality assurance purposes to **validate that the GasFinder instrument is responding appropriately to a nominal concentration of the target gas.** For more information, please see the “In-Line Response Cell Brochure”.
Note: The validation using a response cell is NOT a field calibration.

HIGHLIGHTED ACCESSORIES

Retro-Reflector

GasFinder3-DC

OPX Head Assembly

I-Beam Mounting Structure

RAIN/DUST ENCLOSURE

For scenarios where **extreme deluge or dust** are expected to be present, the Rain/Dust Enclosure is a recommended accessory to **keep the OPX window clean**. The Rain/Dust Enclosure greatly reduces the build up of dust, condensation and frost on the OPX window.
Note: Includes base plate, pan-tilt mount, and hardware kit for X-Y Mount so **the OPX Assembly can be mounted inside the OPX enclosure**.

TILT-PAN SCANNER

There are two main uses for the Tilt-Pan Scanner with the OPX Head. The first is to enable a **single OPX Head to measure multiple (up to 8) paths** by successively targeting different retro-reflectors. The second is **to maintain optimal alignment by using the Auto Light Optimization algorithm**.
Note: When quoting a Tilt-Pan Scannereither **the Power + Control Centre OR the Remote Monitoring + Control Centre must be selected.**

TERMINATION JUNCTION BOX

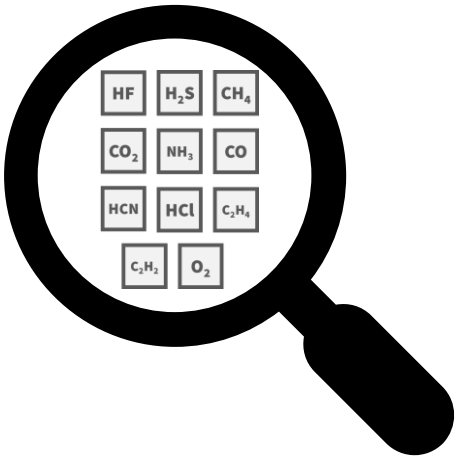
While this accessory is optional, it is **strongly encouraged that the Termination Junction Box be included** along with the GasFinder3-DC. The Termination Junction Box includes the din rail and termination terminals required for the power, interface protocols, inputs, and outputs.
Note: In the scenario that the end-user requires **a 120 -220 VAC power supply within Hazardous Area locations**, the AC power supply will be **mounted inside the Termination Junction Box** and not within the GasFinder3-DC.

SUNSHADE

The Sunshade for the GasFinder3-DC is used in applications where **high ambient temperatures** are expected and the GasFinder3-DC will have **direct exposure to sunlight**.
Note: The Sunshade has mounting holes in the same location as on the GasFinder3-DC's enclosure so same mounting hardware can be used (hardware not included).

BOREAL

APPLICATION ENGINEERING REVIEW QUESTIONS



Gas Specifications

- **Which Target Gas** do you want to detect or monitor?
- **What type of measurement** are you looking to make?
  - e.g. Line-of-Sight/Open-Path, In-Situ, Extractive?
- Besides atmospheric gases, are there **any other gases** likely to be present? If so, **which gases** and in **what concentrations?**
- What is your **desired path length**?
- Do you know the **min./avg./max. concentrations** of the target gas?
- What are your **expected detection or alarm limits**?
- Is there an **estimated plume size**?
- **What is driving the need** for obtaining gas detection or monitoring equipment?

Temperature + Pressure

- **Temperature @ (Min./Avg./Max.):**
  - GasFinder3-DC:
  - Measurement Head:
  - Active Measurement Path:
- **Pressure @ (Min./Avg./Max.):**
  - GasFinder3-DC:
  - Measurement Head:
  - Active Measurement Path**:**

Static: Manually input a static pressure and temperature
- User can post process the P+T Data

Internal: P+T Module makes measurements within GF3-DC
- Good for diurnal or seasonal relative rates of change

External: P+T Input can take external analog inputs
- Dynamic compensation from Active Measurement Path(s)

Environmental Conditions

- During normal operating conditions, will you be able to **visually see the Retro-Reflector from the Measurement Head**?
- Will there be conditions (e.g. particulates, rain, snow, fog, steam, etc.) that **can completely block the visual line-of-sight** between the Retro-Reflector?
- What is the **relative humidity (min./avg./max.)** in the proposed measurement path location?
- Do anticipate **installing the GasFinder3-DC within the same environment as the Measurement Head**? If not, what will be the distance between the two?
- Will either the GasFinder3-DC or any of the Measurement Heads be installed in **a Hazardous Environment**? If so, what is the certification requirement?

Additional Services

Below are **additional services that either Boreal Laser or our network of Authorized Local Business Partners** can perform:
- Education Session/ Application Engineering Review
- Site Visit/Assessment
- Equipment Rental
- Equipment Leasing
- Extended Warranty
- Design and Integration Support
- Acceptance Tests
- Commissioning
- Factory Training
- On-Site Training
- Quarterly Data Review Package
- Preventative Maintenance Contracts
- Remote Service Contacts
- On-Site and Factory Technical Services
- Factory Upgrades and Calibrations

For more information, please ask for the **"BLI Additional Services.pdf"** document.

BOREAL

ALIGNMENT KIT

- Used as a commissioning tool
- Useful for maintenance personnel
- All-in-one weather tight carrying case

SET **FORGET** **DETECT**

BOREAL

ALIGNMENT KIT

WHAT IT IS

- The Alignment Kit is used for the **installation, commissioning, and alignment** of primarily the **OPX and SDX Measurement Heads**
- The Alignment Kit is a useful accessory for OPX and SDX heads but it is **strongly encouraged for OPX Head applications path lengths beyond 100m**

ALIGNMENT ORDER

Below is the suggested order to use the alignment tools:

1. **Scope:** Rough Alignment Tool
2. **Visible Laser:** Rough Alignment Tool
3. **Remote Light Meter:** Fine Alignment Tool
4. Once the Measurement Head has been aligned, the scope can be adjusted to provide quick visual alignment.

INCLUDED COMPONENTS

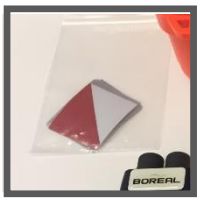
RLM

Visible Laser

Fibre Tape

CAT6 Patch

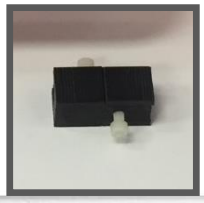
Fibre Patch



Grey Tape

IR Card

Caps & Couplings



Attenuator

VISIBLE LASER/ POWER METER

- The hand-held unit is used to inject a beam of light along a fiberoptic cable **and emits a red (625nm) visible laser beam at 20mW** through an FC/APC receptacle
- The visible laser and the optical power meter is used to **check for damage/continuity, trace individual fibres, and aid in the alignment of the Measurement Heads**

Note: Avoid looking directly into the output connector or fibres when the visible laser is energized

REMOTE LIGHT METER (RLM)

- The Remote Light Meter (RLM) is a battery powered (9V) unit **which measures the strength of the returning electrical signal** in the CAT6 cable (RJ45 connector)
- The **display is a relative indication of signal strength** and will not match the returned laser light (Rx) value on the GasFinder
- The RLM is used along with the X-Y Aiming Mount **to find the highest Rx value on both the X and Y axis**.
- The RLM can also be used at the GasFinder3 unit to verify the **CAT6 cable integrity**

FIBRE CLEANING TAPE

- **Cleanliness is of paramount importance** when dealing with fiberoptic cables
- The Fibre Cleaning Tape enables the technician to **clean the FC/APC connector face** before inserting it into the bulkhead

IR CARD

- Because the infrared (IR) laser light is not visible, **a special card (5x8cm) can be used to detect the presence of IR light** having a wavelength of 1200 to 1600 nm
- To use the card, **hold it where the IR beam is expected to be**
- When the IR beam hits the card**, a blurry red spot will appear**
- To increase the intensity of the spot, **expose the card to a bright spot for a few seconds**.

FIBRE ATTENUATOR

- The fibre attenuator is **used in scenarios where there is too much laser light** being returned by the retro-reflector
- **Rather than bending the fibre** to lessen the intensity of returned laser light a Variable Fibre Attenuator can be used
- The Variable Fibre Attenuator operates by bending the fibre optic cable and **there is a loss of signal as the beam tries to negotiate the two bends**
- The attenuation level can vary **from zero to total**

CONTACT US

CHOOSING THE BEST SOLUTION FOR YOUR APPLICATION IS CRITICAL. LET US HELP.

LOCAL DISTRIBUTION:

THE NEXT STEP:

Contact us for an **Application Engineering Review:**

- Select which configurations of **Analyzers, Measurement Heads, and Accessories** are most suitable for your application.
- Answer the Applications Engineering Review questions
- By providing us with the desired configurations and application information, Boreal Laser or our local distributors can **provide you with a quotation**.
- If you require **on-site/factory training, installation, and commissioning support** from Boreal Laser or a Boreal Laser Authorized Distributor this service is available at our standard charge-out rates

Specifications Subject to Change
June 2019

LAND
AMETEK
PROCESS & ANALYTICAL INSTRUMENTS

AMETEK LAND HAS BEEN BUILDING PRECISION MEASUREMENT INSTRUMENTATION SINCE 1947.

We are specialists in non-contact temperature measurement and combustion monitoring with our products applied across diverse industries such as steel and glassmaking, electricity generation and cement manufacture.

As part of AMETEK Process & Analytical Instruments Division since 2006, our customers benefit from the worldwide AMETEK sales and service team.

PRODUCT KEY

- Fixed Spot Thermometers
- Portables
- Calibration Services
- Linescanning
- Process Imaging
- Combustion & Emission Monitoring

ALUMINUM

APPLICATION DEDICATED

Single spot non-contact thermometers designed for specific applications. For extruders, the ABTS for billets, the ADTS for die preheating, the AETS at the extruder exit and the AQTS for the quench exit. In the strip mill, the ASTS at the mill entry and mill exit, and the ASPS for the Coiler.

ARC

Low temperature, rugged process thermal imager. Used in the cold rolling mill.

LANCOM 4

Portable gas analyzer featuring up to 9 sensors for emissions measurement and combustion optimization. Generally used on steam boilers.

PLASTICS

LSP-HD

High speed linescanner providing detailed thermal images. LSP-HD 60 used for thermoforming; LSP-HD 61 used for extruders and PET Preforms; and LSP-HD 71 used for thin plastics.

STEEL

APPLICATION DEDICATED

Single spot non-contact thermometers designed for specific applications. Systems used: Stove Dome, Ladle Safety, Ladle Monitoring, Spray Chamber Probe, Furnace Temperature System, Understrip Temperature System, Roll Nip System, Galvanneal Strip Thermometer, Slag Detection System (outside of the US).

IQ SERIES/SOLONET

Single spot thermometers with high accuracy and are cost efficient. IQ R and IQ 1 used at the caster exit, crop shear, rougher and finisher; IQ 2 used for continuous annealing lines.

SYSTEM 4

Single spot non-contact thermometers with high accuracy and quick response. M05 model is used for the blast furnace tap measurement; M1, R1, U1, V1 used for the caster exit, crop shear, rougher and finisher; M2 and M3 used at the coiler; M2 and U2 used at the continuous annealing line; and the M1 Target Orbiter used at the Stelmor coiler.

CYCLOPS L

Handheld non-contact spot thermometers with high accuracy.
- C100L used in coke oven battery flues;
- C055L used for the blast furnace iron stream;
- C390L used for the reheat furnace using dirty fuels.

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LSP-HD

High speed linescanner providing detailed thermal images. LSP-HD 11 used at the caster exit; LSPHD 10 used at the crop shear, rougher, and finisher; LSP-HD 21 used at the coiler, continuous annealing and hot dip galv line snout; LSP-HD 61 used at the top roll.

NIR-b

Short wavelength non-contact borescope thermal imager with high resolution images and through-the-wall design to provide a wide 90 degree view. Used in natural gas fired reheat furnaces.

ARC

Low temperature, rugged process thermal imager. Used for ladles, refractory wear and safety.

4200

Accurate and stable opacity monitor for non-compliance applications. Used for stack gas emissions.

FTI-Eb

A Process thermal imager used in the reheat furnace using dirty fuels.

4500 MkIII

The best opacity monitor for compliance measurements to PS-1 and ASTM D6216. Installed on the stack or on a duct leading to the stack.

NIR

High temperature process imager providing high resolution images. Used at the caster exit and crop shear.

LANCOM 4

Portable gas analyzer featuring up to 9 sensors for emissions measurement and combustion optimization. Used for stack gas emissions.

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PRODUCT KEY

- Fixed Spot Thermometers
- Portables
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"THE CYCLOPS L FAMILY IS THE INDUSTRY LEADING STANDARD FOR HIGH QUALITY PORTABLE NON-CONTACT THERMOMETERS."

GLASS

APPLICATION DEDICATED

Single spot non-contact thermometers designed for specific applications. Model FG for forehearths; FLT5A for floatline lehrs; Glass Mold Thermometer
- GMT; Vapor Deposition Monitoring - VDT.

IQ SERIES/ SOLONET

Single spot thermometers with high accuracy and are cost efficient. IQ 5 used at the tin bath.

SYSTEM 4

Single spot non-contact thermometers with high accuracy and quick response. M1 is used in the melt tank; M1 Fiberoptic
is used at the refiner, canal and gob; M5 and U5 used at the tin bath.

CYCLOPS L

Handheld non-contact spot thermometers with high accuracy. C100L used for the melt tank port arch and bridge wall.

LSP-HD

High speed linescanner providing detailed thermal images. LSP-HD 50 used on the lehr and for tempering operations.

NIR-b

Short wavelength non-contact borescope thermal imager with high resolution images and through-the-wall design to provide a wide 90 degree view.
Used in the melt tank.

4200

Accurate and stable opacity monitor for non-compliance applications. Used for stack gas emissions.

4500 MkIII

The best opacity monitor for compliance measurements to PS-1 and ASTM D6216.
Used for stack gas emissions.

LANCOM 4

Portable gas analyzer featuring up to 9 sensors for emissions measurement and combustion optimization.
Used for stack gas emissions.

WDG 1200-1210

Insitu oxygen probe for combustion optimization, featuring integrated control and display electronics.
Installed on the stack.

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POWER GENERATION

APPLICATION DEDICATED

Single spot non-contact thermometers designed for specific applications. CDA used for coal fired boilers.

FGA 900 SERIES

Compact CEMS for gas-fired and other low-sulphur applications. Used for stack gas emissions monitoring.

HotSpotIR

High speed linescanner which detects small, hot objects; high speed alarms. Used for detecting small hot inclusions on coal conveyors.

LANCOM 4

Portable gas analyzer featuring up to 9 sensors for emissions measurement and combustion optimization. Used on the stack.

FTI-Eb

A process thermal imager used for coal fired boilers to check boiler tube and refractory deterioration and burner performance.

LANCOM 200

A portable sulphuric acid dewpoint temperature analyzer used to minimize acid corrosion in the stack or downstream of the air preheater in oil-fired boilers.

4200

Accurate and stable opacity monitor for non-compliance applications. Used in ducts leading to the stack.

MILLWATCH/ SILOWATCH

Carbon monoxide monitors for early warning of possible fires in coal mills and storage silos.

4500 MkIII

The best opacity monitor for compliance measurements to PS-1 and ASTM D6216. Installed on the stack or on a duct leading to the stack.

WDG 1200-1210

Insitu oxygen probe for combustion optimization, featuring integrated control and display electronics. Mounted on the stack or downstream of particulate removal equipment.

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PRODUCT KEY

- Fixed Spot Thermometers
- Portables
- Calibration Services
- Linescanning
- Process Imaging
- Combustion & Emission Monitoring

"THE LATEST TECHNOLOGIES UTILIZED IN SPOT MAKE NON-CONTACT TEMPERATURE MEASUREMENT ACCURATE, FLEXIBLE AND EASY TO USE." – SPOT R100

FORGING/HEAT TREATMENT

IQ SERIES/ SOLONET

Single spot thermometers with high accuracy and are cost efficient. IQ 1 used at the forging press.

SPOT R100

Single spot non-contact thermometers with multiple operating modes and outputs. Used at the forging press.

SYSTEM 4

Single spot non-contact thermometers with high accuracy and quick response. M1 and R1 thermometers used at the forging press; the R1 and U1 used in the reheat furnace.

CYCLOPS L

Handheld non-contact spot thermometers with high accuracy. The C100L is used at the forging press and reheat furnace.

NIR-b

Short wavelength non-contact borescope thermal imager with high resolution images and through-the-wall design to provide a wide 90 degree view. Used in natural gas fired reheat furnaces.

MINERALS

4200

Accurate and stable opacity monitor for non-compliance applications. Used for stack gas emissions.

4500 MkIII

The best opacity monitor for compliance measurements to PS-1 and ASTM D6216.

APPLICATION DEDICATED

The Critical Vessel Monitoring System detects rapidly developing hot areas for plant safety.

LANCOM 4

Portable gas analyzer featuring up to 9 sensors for emissions measurement and combustion optimization. Used for gas stack emissions.

MILLWATCH/ SILOWATCH

Carbon monoxide monitors for early warning of possible fires in coal mills and storage silos.

PAPER/NON WOVENS

4200

Accurate and stable opacity monitor for non-compliance applications. Used in the stack

4500 MkIII

The best opacity monitor for compliance measurements to PS-1 and ASTM D6216. Used for stack gas monitoring.

FGA 900 SERIES

Compact CEMS for gas-fired and other low-sulphur applications. Used for stack emissions measurement.

LANCOM 4

Portable gas analyzer featuring up to 9 sensors for emissions measurement and combustion optimization. Used for stack emission monitoring.

WDG 1200-1210

Insitu oxygen probe for combustion optimization, featuring integrated control and display electronics. Can be installed on the stack or downstream of particulate control equipment.

CEMENT

HotSpotIR

High speed linescanner which detects small, hot objects; high speed alarms. Used Clinker on conveyors.

NIR-b

Short wavelength non-contact borescope thermal imager with high resolution images and through-the-wall design to provide a wide 90 degree view. Used in the kiln burning zone.

SYSTEM 4

Single spot non-contact thermometers with high accuracy and quick response. R1 and M1 models used in the kiln burning zone. RT8A model used for Clinker measurement on conveyors.

4500 MkIII

The best opacity monitor for compliance measurements to PS-1 and ASTM D6216.

MILLWATCH/ SILOWATCH

Carbon monoxide monitors for early warning of possible fires in coal mills and storage silos.

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POLYSILICON

SYSTEM 4

Single spot non-contact thermometers with high accuracy and quick response. The R1 Fiberoptic used for monitoring ingot growth.

NIR

High temperature process imager providing high resolution images. Used for monitoring ingot growth.

INCINERATORS

APPLICATION DEDICATED

Single spot non-contact thermometers designed for specific applications. The CDA Thermometer is durable and long-lasting for furnace atmosphere measurements.

FTI-Eb

A process thermal imager used to see through combustion products inside the furnace atmosphere.

PETROCHEMICALS

NIR-b

Short wavelength non-contact borescope thermal imager with high resolution images and through-the-wall design to provide a wide 90 degree view. Used for tube measurement in heaters and reformers.

CYCLOPS L

Handheld non-contact spot thermometers with high accuracy. Cyclops 390L used in heaters and reformers for tube measurement.

FTI-Eb

Process thermal imager. Used for tube measurement in heaters with dirty fuels.

APPLICATION DEDICATED

The Critical Vessel Monitoring System detects rapidly developing hot areas for plant safety.

PAPER/NON WOVENS

(CONTINUED ON NEXT PAGE)

HotSpotIR

High speed linescanner which detects small, not objects; high speed alarms. Used for supercalender roll cover monitoring.

LSP-HD

High speed linescanner providing detailed thermal images. LSP-HD 60 used at the dryer exit and for supercalender roll cover monitoring.

SIGNALFIRE
WIRELESS TELEMETRY

SIGNALFIRE PRODUCT CATALOG

Reliable, User-Friendly & Versatile Wireless Solutions for Sensing & Monitoring

Oil & Gas | Water & Wastewater| Processing | Agriculture | Transportation

GATEWAY

Integrated Gateway and High-Gain Antenna

CLASS 1 DIVISION 2 CERTIFIED

RUGGED OIL FIELD PROVEN

LONG RANGE OF 3+ MILES

LOW POWER CONSUMPTION

Gateway-In-a-Stick

Gateway DIN Mount

FEATURES

- Modbus interface (RS485 RTU or Modbus TCP with optional Ethernet Gateway Interface Module)
- Long range: 3+ miles
- Stores all sensor data in Modbus format
- Manages outbound communications
- Low power consumption
- Integrated high-gain omnidirectional antenna and gateway electronics
- Supports wireless configuration of remote nodes and HART devices via PACTware or Radar Master
- Automatically configures as star or mesh network
- Designed for rugged outdoor environments
- Times out readings from off-line sensors

INTERFERENCE MODULES

Connector Breakout Board for use with Gateway-in-a-Stick. Provides DIN mounted connection point for wiring and configuration.

Analog /Relay Output Module maps any type of sensor reading to an analog or relay output, ideal for retrofit applications.

Ethernet Interface Module provides Modbus-TCP connection and diagnostic interface for remote configuration.

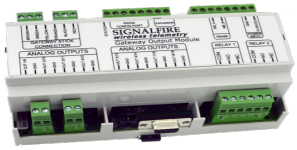
MODELS

Gateway DIN Mount

Compact DIN mount gateway module with external RP-SMA antenna connection.

Gateway-In-a-Stick

Encapsulated electronics, high-gain antenna, and multi-mount aluminum base all contained in a high-impact polycarbonate “Stick”.



GATEWAY

Integrated Gateway and High-Gain Antenna

TECHNICAL SPECIFICATIONS

Operating Temp
-40ºC to 85ºC

Humidity
0% – 100% condensing

Power
6-36 VDC

Data Interface
RS-485 Modbus RTU, or Modbus-TCP, RS 232 for configuration. All readings are converted to Modbus registers and stored in the gateway.

Radio Power
500 mW

Antenna Type
Omnidirectional

Antenna Gain
5dB

Receive Sensitivity
-105 dB

Frequency
902-928 MHz license-free ISM band compliant with FCC Part 15

Range
3 miles (typical) much farther with careful placement

Networks
Up to 64 separate networks

Enclosure
Weather-tight, integrated electronics and antenna, NEMA 3R (GW Stick)

Safety Rating
Nonincendive, Class 1 Division 2 Groups C and D, T5

Internal Diagnostics
Line voltage, signal strength, error conditions, internal event logging

STANDARD CONFIGURATION ORDER CODES

INTERFACE	IO OUPUTS	ORDER CODE
RS 485 (Gateway-in-a-Stick)	None	GWS-CBBL
Modbus-TCP (Gateway-in-a-Stick)	None	GWSSTATICIP
RS 485 (Gateway-in-a-Stick)	8 Analog (4-20 mA/1-5V) and 2 Relays	GWS-8AO2DO
RS 485 (DIN Mount Gateway)	None	GW-DIN
Modbus-TCP (DIN Mount Gateway)	None	GW-DIN-STATICIP

DIN GATEWAY V2

Wireless 900MhZ Gateway with Integrated I/O

CONNECTIVITY TO WIRELESS & WIRED SENSORS

INTEGRATED ETHERNET

LONG RANGE OF 3+ MILES

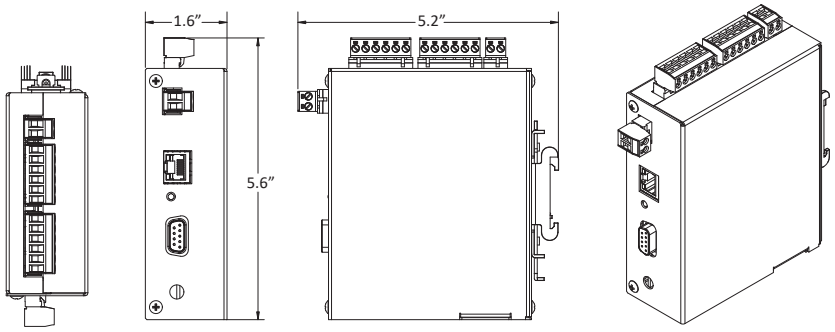
BUILT-IN AUTOMATION

CLASS 1 DIVISION 2 CERTIFIED (PENDING)

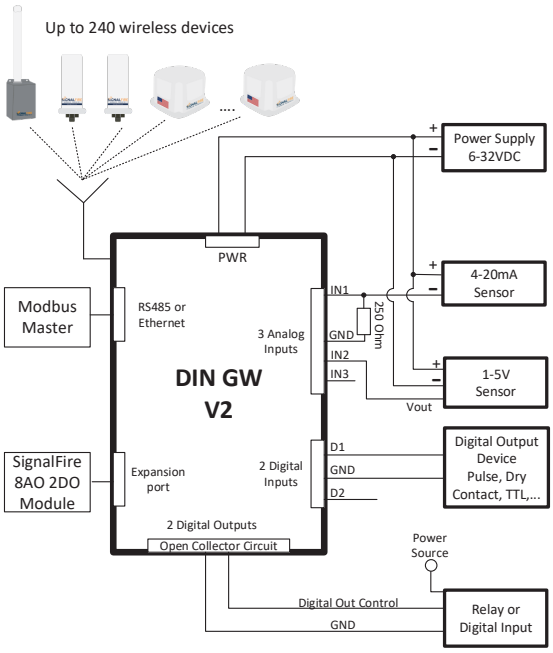
FEATURES

- Modbus interface RS485 RTU or Modbus TCP
- Long range: 3+ miles
- Wired inputs/outputs: 2DI, 2DO, 3AI
- Manages outbound communications
- Low power consumption
- External high-gain omnidirectional antenna
- Supports wireless configuration of remote nodes and HART® devices via PACTware® or Radar Master
- Automatically configures as star or mesh network
- Easy to program internal logic for control applications

DIMENSIONS



WIRELESS AND WIRED SENSOR CONNECTIVITY



DIN GATEWAY V2

Wireless 900MhZ Gateway with Integrated I/O

TECHNICAL SPECIFICATIONS

Operating Temp
-40°F to 185°F
-40°C to 85°C

Humidity
0% – 95% non-condensing

Power Requirements
6-36 VDC

Average Power Consumption
Modbus RS485 Version
25mA @ 12Vdc
16mA @ 24Vdc

Modbus TCP
85mA @ 12Vdc
50mA @ 24Vdc

Data Interface
RS-485 Modbus RTU, or Modbus-TCP, RS 232 for configuration. All readings are converted to Modbus registers and stored in the gateway.

Radio Power
500 mW

Antenna Type
Omnidirectional

Antenna Gain
- Panel Mounted: +2dB
- W Pole Type: +5dB

Receive Sensitivity
-105 dB

Frequency
902-928 MHz license-free ISM band compliant with FCC Part 15 and Industry Canada

Range
Up to 3 miles

Enclosure
- Powder coated metal
- Metal DIN connector

End Nodes
Up to 240 SignalFire end nodes

Safety Rating
Nonincendive, Class 1 Division 2 Groups C and D, T5 (pending)

Internal Diagnostics
Line voltage, signal strength, error conditions, internal event logging, Modbus communications

Inputs & Outputs
- Two (2) digital input
- Two (2) digital output (open collector pull down)
- Three (3) 1-5Vdc / 4-20mA analog input
- Expansion port for SignalFire Gateway output module (8 analog outputs / 2 relay outputs)

Weight
2 lbs (0.8kg)

STANDARD CONFIGURATION ORDER CODES

INTERFACE	TOTAL I/O & TYPES	ORDER CODE
RS 485	2 DI, 2DO, 3AI	GWDINV2-RS485
Modbus-TCP	2 DI, 2DO, 3AI	GWDINV2-ENET
RS 485 (with expansion port module)	2 DI, 4DO, 3AI, 8AO	GWDINV2-RS485/8AO2DO
Modbus-TCP (with expansion port module)	2 DI, 4DO, 3AI, 8AO	GWDINV2-ENET/8AO2DO

Sample Order Code: GWDINV2-RS485/8AO2DO-ANT-WP-RPSMA-30

ANTENNA OPTIONS
-EXT Panel Mounted RPSMA Antenna with 1 m Cable
-ANT-WP-RPSMA-20 Remote mount antenna, 20ft RG58 cable, RP-SMA connector
-ANT-WP-N-20 Remote mount antenna, 20ft RG58 cable, N-Male connector
-ANT-WP-RPSMA-30 Remote mount antenna, 30ft RG58 cable, RP-SMA connector
-ANT-WP-N-30 Remote mount antenna, 30ft RG58 cable, N-Male connector

SENTINEL

Intrinsically Safe Modules for Hazardous Areas

CLASS 1 DIVISION 1 CERTIFIED

RUGGED OIL FIELD PROVEN

WIRELESS PACTWARE™ AND RADARMATER™ SUPPORT

TRUE WIRELESS - POWERS SENSOR AND RADIO

WIRELESS CONFIGURATION

FEATURES

- Powers sensor and radio for years with an internal battery
- Class 1 Division 1 Intrinsically safe system
- Optional Class 1 Division 1 solar module with integrated charger, battery panel, and mounting bracket
- Costs less than 60ft of installed conduit
- Rugged design for demanding outdoor environments
- Up to 1/2 mile range
- Sensor independent
- 1/2” NPT conduit interface
- Automatically configures as a star or mesh network
- Simple to install and maintain

MODELS

Sentinel HART
Connects to a single HART sensor

Sentinel Analog
Connects to a single 4-20 mA/1-5v sensor

Sentinel Digital
2 digital inputs
2 KHz frequency response

Sentinel Modbus
RS-485 Modbus interface

Sentinel Turbine
Connects directly to the Magnetic Pickup of the Turbine Sensor

Sentinel Thermocouple
Connects directly to Thermocouple sensors (J, K other)

Sentinel RTD
Connects directly to P100 RTD sensors

HART Model supports wireless PACTware, IDT compliant and Wireless RadarMaster

SENTINEL

Intrinsically Safe Modules for Hazardous Areas

TECHNICAL SPECIFICATIONS

Operating Temp
-40°C to 60°C (-40°F to 140°F)

Humidity
0% – 100% condensing

Power
3 X D Lithium battery pack. Field replaceable. Class 1 Division 1 certified when used with SignalFire system. In situ replacement does not require a work ticket. Optional Class1 Division 1 solar/ battery module

Sensor Power
True wireless: powers both the radio system and the sensor/transmitter. User configurable for 18 Vdc and 12.5 Vdc. Barriers and external power not required.

Battery Life
1–10 years depending on the type of sensor and reporting frequency

Data Interface
Wireless – available as Modbus registers at Gateway

Data Update Rates
User-selectable. 5 seconds to 1 hour, typical.

Supported Sensor Interfaces
HART™, 4-20 mA current loop, 1-5 Vdc, Digital input (state, counter, totals, frequency), RS-485/Modbus, Thermocouple and RTD temperature sensors.

Radio Power
40 mW

Receive Sensitivity
-109 dB

Security
128 AES Encryption

Radio Frequency
902–928 MHz, FHSS, license-free ISM Band Compliant with FCC Part 15

Range
Up to 1/2 mile

Networks
Up to 65,520 separate networks

Intrinsically Safe
Class 1 Division 1, Temp Code T3, Groups C&D. Conforms to UL Std. 913, Certified to Can/CSA Std C22.2 No. 157

Internal Diagnostics
Battery voltage, signal strength, error conditions

Potentiometer Input
Variable resistance

STANDARD CONFIGURATION ORDER CODES

SENSOR TYPE	POWER SOURCE	ORDER CODE
HART	Internal Lithium Battery Pack	Sentinel-Hart-3BIS
HART	Solar/Battery System	Sentinel-Hart-Solar
Analog (1-5V or 4-20 mA)	Internal Lithium Battery Pack	Sentinel-Analog-3BIS
Analog (1-5V or 4-20mA)	Solar/Battery System	Sentinel-Analog-Solar
Modbus	Internal Lithium Battery PackModbus	Sentinel-485-3BIS
Modbus	Solar/Battery System	Sentinel-485-Solar
Digitial Inputs (2)	Internal Lithium Battery PackModbus	Sentinel-DI-3XBIS
Digitial Inputs (2)	Solar/Battery System	Sentinel-DI-Solar

A2 LONG RANGE

Long-range, multiple-input modules for sophisticated data transmission over distances of up to three miles between nodes.

POWERS SENSOR AND RADIO FOR YEARS WITH A BATTERY

RUGGED DESIGN FOR DEMANDING OUTDOOR ENVIRONMENTS

UP TO A 3-MILE RANGE

AUTOMATICALLY CONFIGURES AS A STAR OR MESH NETWORK

SIMPLE TO INSTALL AND MAINTAIN

FEATURES

- Powers sensor and radio for years with an internal battery
- Optional solar power package
- Costs less than 60ft of installed conduit
- Rugged design for demanding outdoor environments
- Up to 3-mile range
- Sensor independent
- 1/2” NPT conduit interface
- Automatically configures as a star or mesh network
- Simple to install and Maintain

MODELS

A2

Monitor two analog sensors and one digital input:

- 4-20 mA current loop sensor
- 1-5 V sensor
- Digital input/counter

HART

Monitor one HART® loop and one digital input:

- HART (1-4 sensors)
- Digital input/counter

Modbus

Monitor one or more Modbus sensors

Thermocouple/Digital Input

Monitor one thermocouple and one digital input

A2 LONG RANGE

Long-range, multiple-input modules for sophisticated data transmission over distances of up to three miles between nodes.

TECHNICAL SPECIFICATIONS

Operating Temp
-40ºC to 85ºC

Humidity
0% – 100% condensing

Power
3 X D Lithium battery pack. Field replaceable.

Sensor Power
12.5 or 18V Jumper selectable for 4-20mA current loop, 1-5V, or HART sensors. Sensor power is provided from the system, no need for external sensor power

Battery Life
1–10 years depending on the type of sensor and reporting frequency

Data Interface
Wireless – available as Modbus registers at Gateway

Data Update Rates
User Selectable Rotary Switch from 5 sec to 2 hours

Supported Sensor Interfaces
Analog (4-20mA/1-5V)
Digital input
HART
RS485 Modbus RTU
K-Type Thermocouple

Radio Power
300 mW

Antenna Type
External Weather Resistant, Omnidirectional

Receive Sensitivity
-105 dB

Frequency
902-928 MHz License Free ISM Band
Compliant with FCC Part 15

Range
Up to 3 Miles (Line of Sight)

Networks
Up to 65,520 separate networks

Enclosure
Aluminum, NEMA 4X Rated

Internal Diagnostics
Battery voltage, signal strength, error conditions

STANDARD CONFIGURATION ORDER CODES

SENSOR TYPE	POWER SOURCE	ORDER CODE
2 Analog (1-5V or 4-20 mA)	Battery	A2-A2D1-3B
HART	Battery	A2-HART-3B
RS-485/Modbus	Battery	A2-485-3B
K Type Thermocouple	Battery	A2-KTHERM-3B

REMOTE SHUT DOWN (RSD)

Gateway-controlled asset monitoring and shutdown.
PLC-controlled asset monitoring and shutdown

NO PLC PROGRAMMING REQUIRED

SIMPLE TABLE-BASED CONFIGURATION LOGIC

CONFIGURABLE FAILSAFE FEATURES

LONG RANGE: 3+ MILES

TOPOLOGIES

Gateway-Controlled

- May be configured to monitor and control as a standalone system
- A PLC may be used to offload sensor data

PLC-Controlled

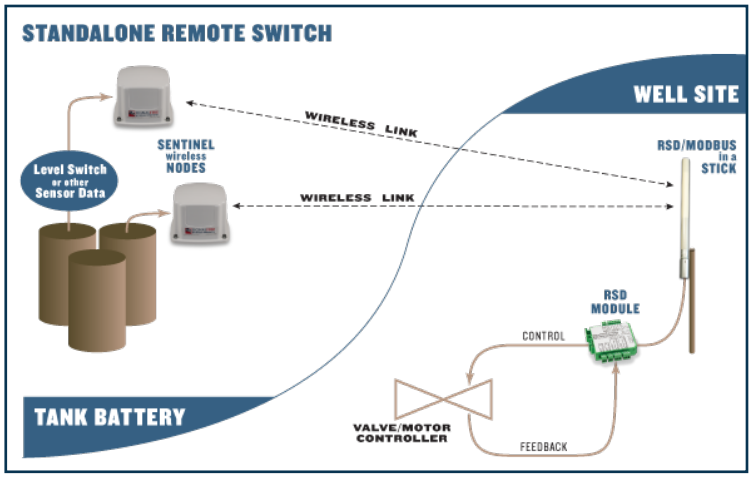
- A PLC monitors and controls remote assets through a Gateway, which relays data to the remote assets

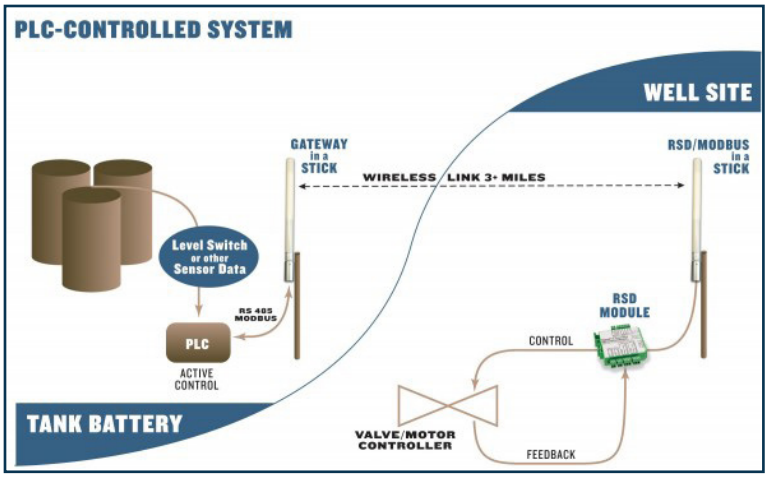
Standalone Remote Switch Mode

- No Gateway required, remote sensor data is sent directly to a RSD-Stick
- The RSD-Stick uses its internal configuration logic to trigger shutdowns based on remote sensor data

STANDARD CONFIGURATION ORDER CODE

ORDER CODE	DESCRIPTION
MBS-RSD	RSD-Stick with DIN mounted RSD Module. 2 relays, 2 digital inputs





REMOTE SHUT DOWN (RSD)

TECHNICAL SPECIFICATIONS

Operating Temp
-40ºC to 70ºC

Power
6-36 VDC

Relay Outputs
2A, 30V, SPDT

Digital Inputs
Dry contact or 30 volts max (push-pull)

Radio Power
500 mW

Antenna Gain
5 dB

Receive Sensitivity
-105 dB

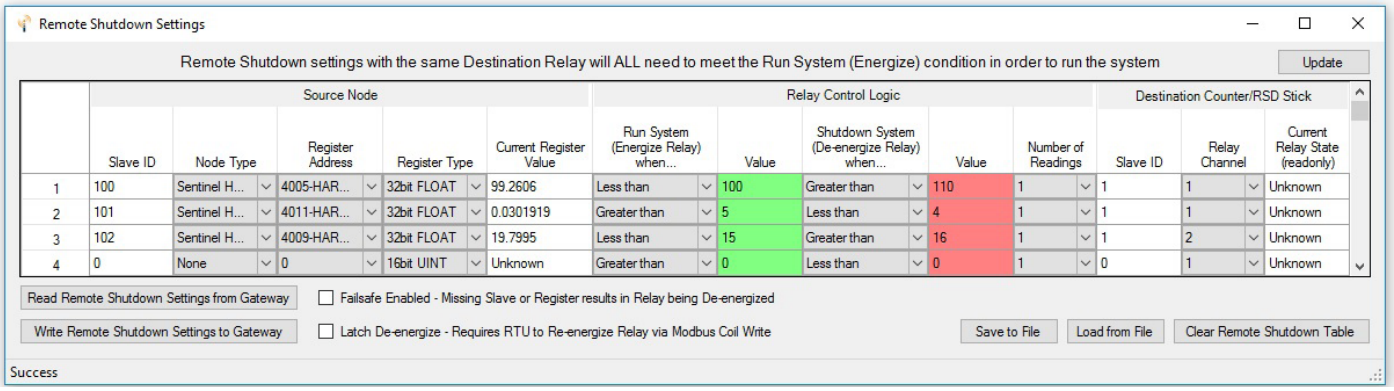
Frequency
902-928 MHz license-free ISM band, FHSS, FCC part 15 compliant

Range
3+ miles (line of sight)

Internal Diagnostics
Supply voltage, signal strength, error conditions

Failsafe Operation
Multiple configurable failsafe timers. Relay fault monitoring.

SIMPLE TABLE-BASED CONFIGURATION LAYOUT



MODBUS STICK

Potted electronics, a high-gain antenna, and a multi-mout aluminum base all contained in a high-impact polycarbonate "Stick".

LONG RANGE 3+ MILES

PROVIDES A WIRELESS INTERFACE TO A MODBUS DEVICE

MESSAGE-FORWARDING CAPABILITY

LOW POWER CONSUMPTION

SIMPLE TO INSTALL AND MAINTAIN

FEATURES

- Potted electronics, a high-gain antenna, and a multi-mount aluminum base all contained in a high-impact polycarbonate "Stick."
- Provides a wireless interface to remote Modbus sensors
- RS485 Modbus RTU interface (RS232 also available)
- Supports multiple Modbus devices
- Automatically reads and transmits sensor registers at user-definable intervals
- Outbound capability for sensor Modbus register updates
- Writes Modbus registers
- Message-forwarding / mesh-networking capability
- Rugged design for demanding outdoor industrial environments
- Range up to 3 + miles
- Simple to install and maintain
- Class 1 Division 2, Temp Code T5, Groups C&D. Conforms to ISA 12.12.01 and UL 916, Certified to CSA C22.2 No. 142 and CSA C22.2 No. 213

MODELS

Multi-IO Module (MIOM)

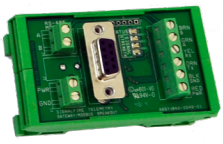
- 8 Analog Inputs
- 6 Digital Inputs
- 4 Relay Outputs

Modbus

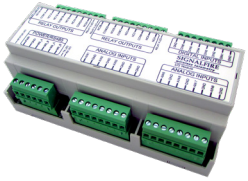
- RS485 interface (RS232 available)
- Automatically reads and transmits sensor registers at user-definable intervals
- Writes modbus registers

Mirroring

- Mirrors the configured data-registers from gateway
- Gateway data available to be read by RTU device



SignalFire Breakout Board connects easily for modbus applications.



Multi-IO Module (MIOM)

MODBUS STICK

Potted electronics, a high-gain antenna, and a multi-mout aluminum base all contained in a high-impact polycarbonate "Stick".

TECHNICAL SPECIFICATIONS

Operating Temp
-40°C to 70°C

Humidity
0% – 100% condensing

Power
6-36 VDC

Data Interface:
Modbus RS485

Data Update Rates:
User configurable with configuration utility

Radio Power:
500 mW

Antenna Type:
Omnidirectional

Antenna Gain:
5dB

Receive Sensitivity:
-105 dB

Frequency:
902-928 MHz license-free ISM band compliant with FCC Part 15

Range:
3+ miles (line of sight)

Networks:
Up to 65,520 separate networks

Enclosure:
Weathertight integrated electronics and antenna. Integrated cable (25' standard)

Internal Diagnostics:
Line voltage, Signal strength, Error conditions

Safety Rating:
Class 1 Division 2 Certified, Groups C&D, Temperature Code T5. Certified to CSA C22.2 No. 213, Conforms to ISA 12.12.01

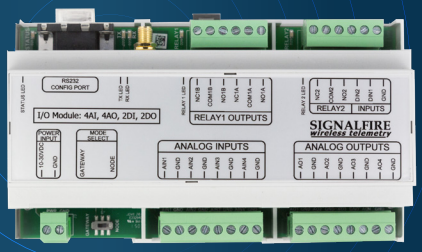
STANDARD CONFIGURATION ORDER CODES

INTERFACE	ORDER CODE
RS485	MBS-CBBL
MIOM	MBS-MOIM-CBBL

WIRELESS I/O MODULE

Din Mounted Node for Wireless Network.

- RUGGED OIL FIELD PROVEN
- INTEGRATED RADIO WITH ANTENNA KIT
- ANALOG AND DIGITAL SIGNAL REPLICATION

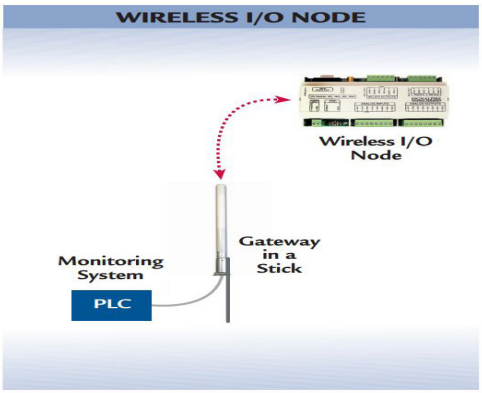


DESCRIPTION

The SignalFire Wireless I/O System can interface to analog (4-20mA/1-5V) inputs and outputs, digital inputs and has relay outputs. There are two modes of operation, the first utilizes two modules and acts as a wire replacement that replicates analog and digital signals over a wireless link between the pair of Wireless I/O Modules. The second mode of operation is as a standard node that sends the data (via the SignalFire wireless mesh network) to a SignalFire Gateway where the data is available via a Modbus RTU or Modbus-TCP interface. The modules are DIN rail mounted and designed to be easy to use.

Point to Point I/O Mirroring Configuration: the analog/digital inputs on one module are replicated on the other module (and vice versa)-ideal for stand alone valve control or simple retrofit applications.

Standard SignalFire Configuration: Operates as a remote node with a standard SignalFire Gateway. All IO data is available at the Gateway as Modbus registers. Supports Modbus writes to control the analog and relay outputs. SignalFire node in a SignalFire network, providing longer-range as well as more sophisticated monitoring and control.



FEATURES

- 4 Analog Inputs (0-20mA or 0-5V)
- 4 Analog Outputs (0-20mA or 0-5V)
- 2 Digital Inputs
- 2 Relay Outputs (1 DPDT, 1 SPST)
- Acts as a repeater for other SignalFire wireless devices
- Wide Range DC Power Input (10-30VDC)
- Low Power Consumption
- DIN Rail Mount with pluggable screw terminal blocks
- Status LEDs

WIRELESS I/O MODULE

Din Mounted Node for Wireless Network.

TECHNICAL SPECIFICATIONS

Operating Temp
-40°C to 65°C

Power
10-30 VDC (25mA average @12V no relays energized, additional 15mA max for each energized relay, plus any analog output current)

Analog Ouputs
0-20 mA, 0-5 Volts

Digital Inputs
Dry contact or 30 volts max (push-pull)

Radio Frequency
902-928 MHz ISM band, FHSS radio, RP-SMA connector

Relay Outputs
2A, 60W

Networks
Up to 65,520 separate networks

Safety Rating
Class 1 Division 2 Certified, Groups C&D, Temperature Code T5. Certified to CSA C22.2 No. 213, Conforms to ISA 12.12.01

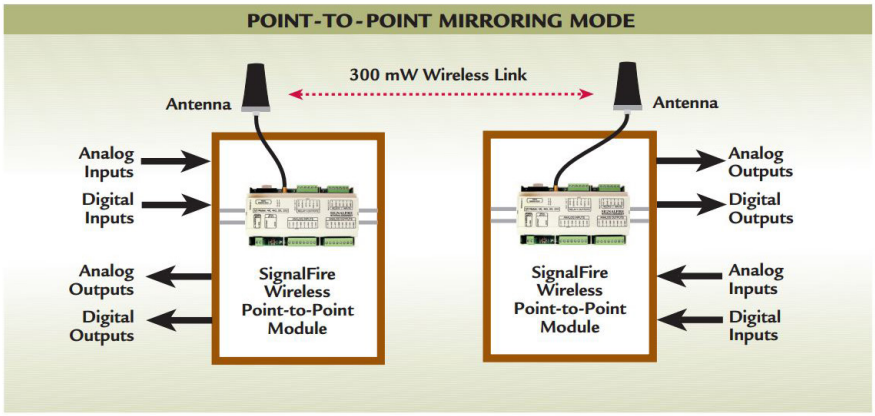
Radio Power
300 mW

Range
Up to 3 miles line of sight (depending on antenna)

Internal Diagnostics
Supply voltage, signal strength, error conditions

STANDARD CONFIGURATION ORDER CODES

I/O MODULE TYPE	ORDER CODE
Wireless IO System with 300 mW Radio and RP-SMA whip antenna. For use with plastic or fiberglass enclosures.	Wireless IO-IA
Wireless IO System with 300 mW Radio with external enclosure mount antenna kit.	Wireless IO-EXA



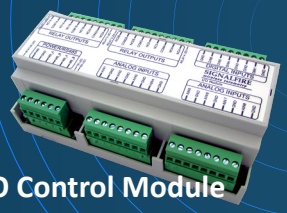
MULTI-I/O STICK SYSTEM

Designed to connect to a Modbus Stick and provide sophisticated wireless I/O control and monitoring at remote locations.

ULTRA -LOW POWER OPERATION

EASY TO USE

HAZARDOUS AREA SAFE



Multi-I/O Control Module

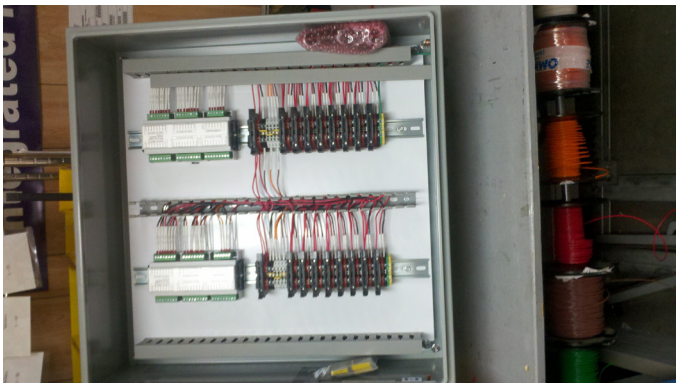
Modbus-In-A-Stick

FEATURES

- 8 Analog inputs. 4-20mA / 1-5V switch selectable (16 bit) with units of measure scaling and threshold monitoring
- 6 Digital Inputs with report on state change and totalizing
- 2 Single Pole and 2 Double Pole relays with direct and programmable pulse control
- Up to 8 units may be daisy chained to one Modbus-In-A-Stick
- 6-36VDC input voltage rage
- Ultra-low power operation
- Class 1 Division 2, Temp Code T4, Groups C&D. Certified to CSA C22.2 No. 213, UL 61010-1, and CSA C22.2#61010-1, Conforms to ANSI/ISA 12.12.01
- Easy to use table driven configuration interface

STANDARD CONFIGURATION ORDER CODES

ORDER CODE	DESCRIPTION
MBS-MIOM-CBBL	Modbus-in-A-Stick with Multi Input/Output Module. 8 Analog, 6 Digital inputs, 4 Relay Outputs, 25 Ft Cable, CBBL Interface Board.
MIOM	Multi Input/Output Module. 8 Analog, 6 Digital inputs, 4 Relay Outputs.



ETHERNET INTERFACE MODULE

DIN mounted module Ethernet enables the Gateway-In-a-Stick or DIN-Gateway.

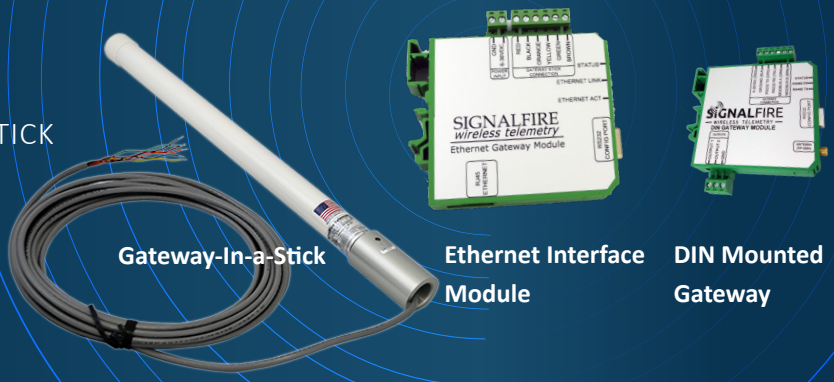
PROVIDES A MODBUS-TCP INTERFACE AND REMOTE CONFIGURATION CAPABILITIES

EASY INTEGRATION WITH GATEWAY-IN-A-STICK OR DIN MOUNTED GATEWAY

CONFORMAL COATED ELECTRONICS

RUGGED OIL FIELD PROVEN

LOW POWER CONSUMPTION



Gateway-In-a-Stick | **Ethernet Interface Module** | **DIN Mounted Gateway**

FEATURES

- Direct connection to the SignalFire Gateway-in-a-Stick or the DIN mounted gateway
- Modbus TCP access to all data, supports up to 16 simultaneous server connections
- Allows remote configuration/diagnostics using the SignalFire ToolKit
- Supports remote configuration of HART devices using PACTware or Radar Master
- Power Over Ethernet (PoE) support with auto switchover to DC power supply
- Wide input voltage range of 6-36VDC
- Industrial Temperature range of -40 to +85C
- Easy web page configuration
- DB9 port for local connection to gateway
- Small form factor DIN mount enclosure
- Ethernet 10/100 base TX with Auto Negotiation, and HP Auto MDIX. RJ45 Connector

MODELS

Ethernet Interface Module

The Ethernet Interface Module permits direct connection of the SignalFire Wireless Mesh Network to an Ethernet Network. The Ethernet Interface Module has 2 TCP addressable ports and is designed to connect to a standard SignalFire Gateway-in-a-Stick or DIN mounted Gateway with little or no configuration necessary.

STANDARD CONFIGURATION ORDER CODE

ORDER CODE	DESCRIPTION
ENET-DIN	Ethernet Interface Module for use with a Gateway-In-a-Stick or a DIN Mounted Gateway
GWS-STATICIP	Gateway-in-a-Stick with 25' cable with DIN Mounted Ethernet Interface Module
GW-DIN-STATICIP	DIN Mounted Gateway with SMA Antenna Connection with DIN Mounted Ethernet Interface Module

COUNTER STICK

Potted electronics, a high-gain antenna, and a multi-mout aluminum base all contained in a high-impact polycarbonate "Stick".

LONG RANGE 3+ MILES

PROVIDES A WIRELESS INTERFACE TO DESCRETE

DIGITAL SIGNALS

MESSAGE-FORWARDING CAPABILITY

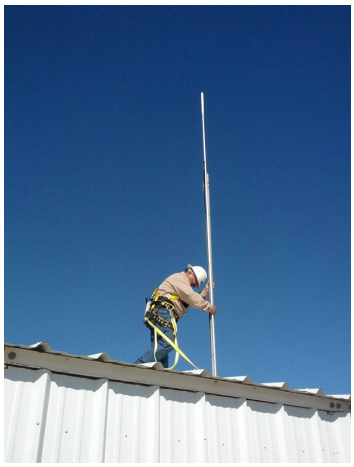
LOW POWER CONSUMPTION

FEATURES

- Provides a wireless interface to remote counting sensors such as
- flow meters
- Two digital interfaces, dry contact, open collector and other
- interfaces
- Calculates:
  - Total Counts
  - Instantaneous Frequency
  - Frequency Since Last Read
  - State
- Measures to 2 kHz
- Rugged design for demanding outdoor environments

MODELS

Counter/Totalizer
2 counter input channels



COUNTER STICK

Potted electronics, a high-gain antenna, and a multi-mout aluminum base all contained in a high-impact polycarbonate "Stick".

TECHNICAL SPECIFICATIONS

Operating Temp
-40°C to 70°C

Humidity
0% – 100% condensing

Power
6-36 VDC

Data Interface
2 digital inputs

Data Update Rates
User configurable with configuration utility

Radio Power
500mW

Antenna Type
Omnidirectional

Antenna Gain
5 dB

Receive Sensitivity
-105 dB

Frequency
902–928 MHz, FHSS, License Free ISM Band Compliant with FCC Part 15

Range
3 miles (typical) much farther with careful placement

Networks
Up to 65,520 separate networks

Enclosure
Weathertight intergrated electronics and antenna

Internal Diagnostics
Line voltage, signal strength, error conditions

Safety Rating
Non-insendive, Class 1 Division 2 groups C and D, T5

STANDARD CONFIGURATION ORDER CODES

INTERFACE TYPE	ORDER CODE	DESCRIPTION
Frequency Input	CTRS-CBBL	Counter-in-a-Stick, 2Di, 25 Ft Cable, with DIN mounted CBBL Interface Board

PRESSURE SCOUT

Intrinsically Safe Wireless Pressure Sensor

PRESSURE ALARM REPORTING

CLASS 1 DIVISION 1 CERTIFIED

EASY TO INSTALL

LOW COST ALTERNATIVE

HIGH PERFORMANCE & LONG BATTERY LIFE

WIRELESS CONFIGURATION

FEATURES

- Powers integrated pressure sensor and radio for years with an internal battery
- Class 1 Division 1 Intrinsically safe system
- Rugged design for outdoor environments
- Up to ½ mile range
- ½" NPT Process connection standard
- Rapid pressure sampling with configurable alarms and report by exception
- Extremely low power and long battery life
- Compact and simple to install and maintain
- Available in standard pressure ranges
- Pushbutton or remote zeroing

PRESSURE SENSOR

PERFORMANCE AT 77˚F/25˚C

Accuracy: <±0.25% BFSL
Stability (1 year): ±0.25% FS, typical
Over Range Protection: 2X Rated Pressure, Minimum
Burst Pressure: 5X or 40,000 PSI (whichever is less)
Pressure Cycles: >100 Million
Process Connection: 1/2" NPTM 316L Stainless Steel Standard
F250C Autoclave for pressure >10,000 psi
Other process connections/material available

THERMAL LIMITS

Operating Range: -40 to +176°F (-40 to +80°C)
Compensated Range: 32 to +131°F (0 to 55°C)

TC Zero: <±1.5% of FS
TC Span:<±1.5% of FS

Standard Pressure Ranges: 0-50 psi, 0-100 psi, 0-300 psi, 0-500 psi, 0-1000 psi, 0-3000 psi, 0-5000 psi, 0-7500 psi, 0-10,000 psi, 0-15,000 psi, 20,000 psi

Low Pressure Ranges: 0-1 psi, 0-2 psi, 0-5 psi, 0-7.5 psi 0-10 psi, 0-15 psi, 0-20 psi

PRESSURE SCOUT

Intrinsically Safe Wireless Pressure Sensor

TECHNICAL SPECIFICATIONS

Operating Temp: -40 to +176°F (-40°C to 80°C)

Humidity: 0% – 100% condensing

Power: "D" Cell Lithium battery pack. Field replaceable. Class 1 Division 1 certified when used with SignalFire system. Optional Class1 Division 1 solar/battery module.

Battery Life: 1–10+ years depending on reporting frequency *Battery Life Example: 5-second pressure sample interval with a 1-minute reporting interval = 6.5 years.*

Data Interface: Wireless – available as Modbus registers at Gateway

Report by Exception: Configurable alarm pressure thresholds, pressure sample rate 5 seconds minimum.

Data Update Rates: User-selectable. 5 seconds to 1 hour, typical.

Radio Power: 40 mW

Receive Sensitivity: -109 dB

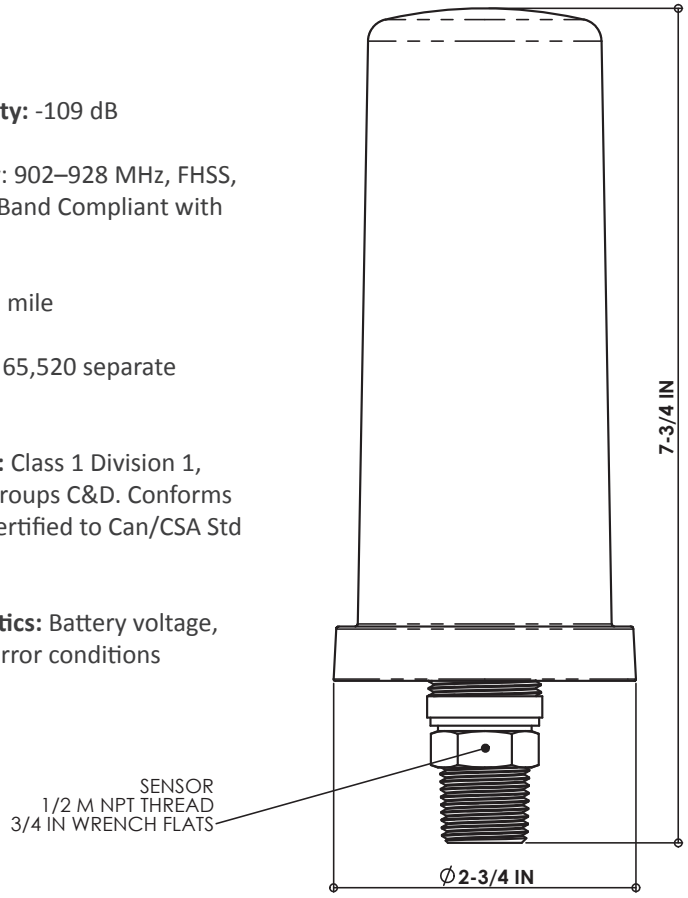
Radio Frequency: 902–928 MHz, FHSS, license-free ISM Band Compliant with FCC Part 15

Range: Up to 1/2 mile

Networks: Up to 65,520 separate networks

Intrinsically Safe: Class 1 Division 1, Temp Code T3, Groups C&D. Conforms to UL Std. 913, Certified to Can/CSA Std C22.2 No. 157

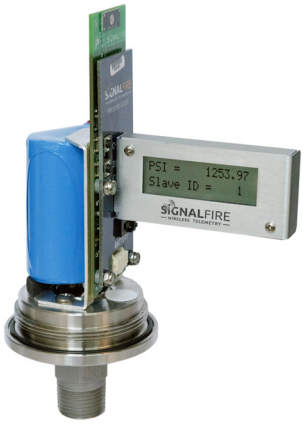
Internal Diagnostics: Battery voltage, signal strength, error conditions



OPTIONAL FIELD CALIBRATION DISPLAY

Simply open the Scout cover and plug this display into the configuration port. The display will show the following information:

- Current pressure reading in PSI
- Modbus Slave ID
- Radio connection status and RF signal strength
- Battery voltage



FLOAT SCOUT

Intrinsically Safe Wireless Tank Level Monitoring

RUGGED OIL FIELD PROVEN

COMPLETE WIRELESS TANK LEVEL MONITORING SOLUTION

WIRELESS CONFIGURATION

DESCRIPTION

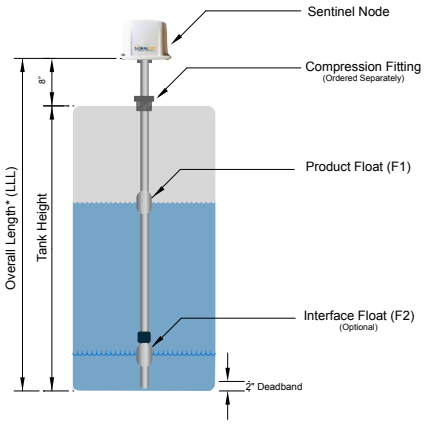
The SignalFire Float Scout consists of a magnetostrictive level probe mated with a Sentinel wireless node which creates a wireless link between the sensor and the Gateway. The Sentinel will take level and temperature readings, and send the data (via the SignalFire wireless mesh network) to the Gateway where the data is available via a Modbus RTU or TCP interface. The system is powered by internal lithium batteries or optional C1D1 rated solar package. Sensor data along with node-diagnostic information is available at the Gateway.

FEATURES

- Available with flexible or rigid magnetostrictive level probe with single or dual floats for level and interface measurements
- Integrated temperature sensor to measure fluid temperature
- Class 1 Division 1 intrinsically safe
- Rugged design for demanding outdoor environments
- Up to 1/2 mile range
- 1” NPT mounting interface
- Automatically configures as a star or mesh network

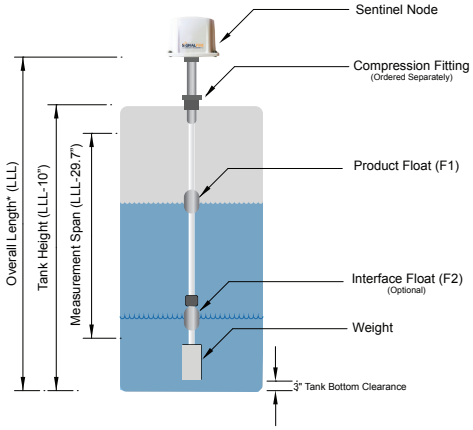
RIGID FLOAT SCOUT

Intrinsically safe wireless tank level monitoring



FLEXIBLE FLOAT SCOUT

Intrinsically safe wireless tank level monitoring



FLOAT SCOUT

Intrinsically Safe Wireless Tank Level Monitoring

TECHNICAL SPECIFICATIONS

Operating Temp
-40ºC to 60ºC

Power
3 X D Lithium battery pack. Field replaceable. Class 1 Division 1 certified.

Battery Life
1 min. check-in: 5+ years,
5 min. check-in: 10+ years

Data Interface
Wireless - Modbus data available at GW

Reported Values
Product level, interface level, temperature, status.

Data Update Rate
User selectable - 5 seconds to 1 hour

Radio Power
40 mW

Antenna Type
Internal weather resistant, omnidirectional.

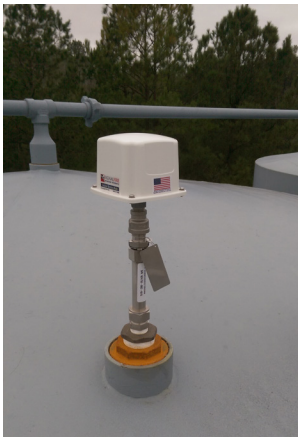
Receive Sensitivity
-109 dB

Frequency
902-928 MHz, FHSS license-free ISM band, FCC part 15 compliant.

Range
Up to 1/2 mile

Networks
Up to 65520 separate network

Diagnostics
Battery voltage, signal strength, error conditions, Faults



LEVEL PROBE

Measurement resolution
0.0001”

Repeatability
Equal to Resolution

Linearity
± 0.01% of span or ± 0.039”, whichever is greater.

Material
Flexible: PVDF. Rigid: 316 Stainless

Dead Band
Flexible: 6”-17” depending on sensor length.
Rigid: 2”

Length
Flexible: 65” to 600”. Rigid: 20” to 288”.
Available in 1” increments

TILT SCOUT

Intrinsically Safe Wireless Inclinometer Sensor

PATENT PENDING HATCH DETECTION MODE

EASY TO INSTALL/MAGNETIC MOUNTING

THIEF HATCH MONITORING

PUMP JACK MOTION MONITORING

LOCAL ZEROING AND LED STATUS

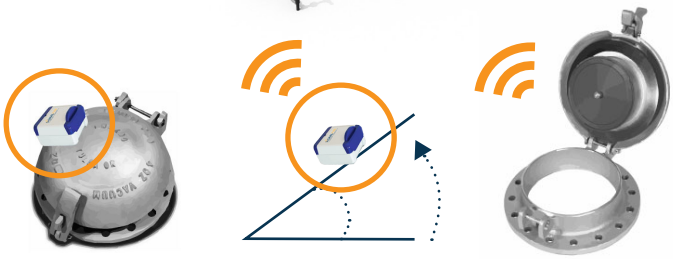
CERTIFIED FOR HAZARDOUS LOCATIONS

DESCRIPTION

The Tilt Scout is a wireless solid state inclinometer that measures an angle from horizontal with two modes: Hatch detection and Pump Jack detection. The Hatch detection mode enables monitoring of the opening condition (closed, cracked open, opened) of a hatch for environmental and safety concerns. The Pump Jack detection mode detects and reports if it is operating or moving. The Tilt Scout can also be applied to a variety of other applications where there's a need to detect an angle from horizontal.

FEATURES

- 3 Axis Accelerometer constantly monitors angle and reports status. Will report on state change.
- Hazardous Location Certified – Class 1 Division 1
- Rugged design for outdoor environments
- Magnetic mounting or with built-in installation holes
- Pushbutton zeroing
- Long battery life (greater than 5 years)
- Up to ½ mile range
- Built-in 900mHz radio and antenna
- Operates as a standard wireless node in the SignalFire network



BENEFITS

- Environmental and safety compliance
- Maintenance free non contact sensing
- Fast installation and setup. No tools required
- SignalFire wireless radio sends status to the Gateway
- Modbus or digital output alarming at Gateway available

What is a solid state accelerometer:

A semi-conductor capable of detecting the effects of gravity and acceleration. We use the same sensor included in most modern phones to detect its orientation.

TILT SCOUT

Intrinsically Safe Wireless Inclinometer Sensor (patent pending)

TECHNICAL SPECIFICATIONS

Operating Temp: -40 to +176°F (-40°C to 80°C)

Humidity: NEMA 4X Enclosure

Resolution: <0.1 degree

Power: Internal battery pack. Field replaceable.

Battery Life: Greater than 5 years

Data Interface: Wireless – available as Modbus registers at Gateway

Reporting: Will report every 10 minutes or immediately after a state change.

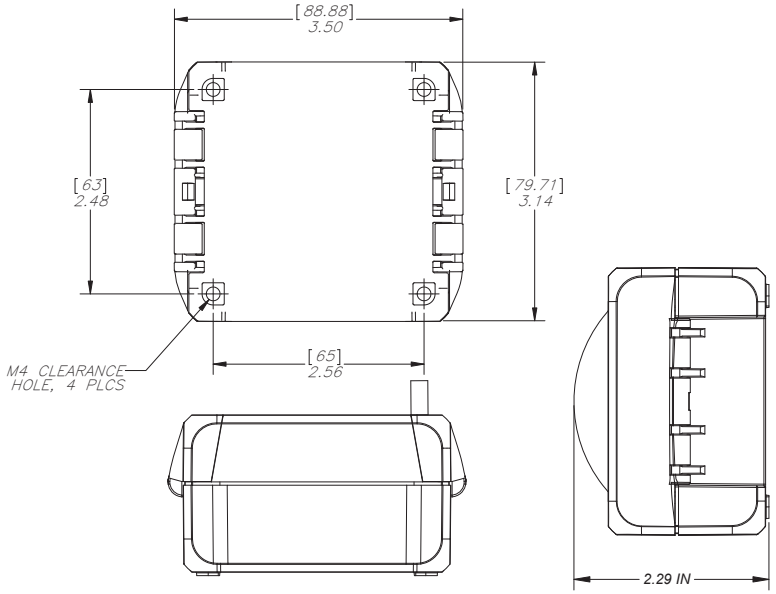
Radio Specifications:

- **Power:** 40 mW
- **Receive Sensitivity:** -109 dB
- **Encryption:** AES 128 bit
- **Frequency**: 902–928 MHz, FHSS, license-free ISM Band Compliant with FCC Part 15

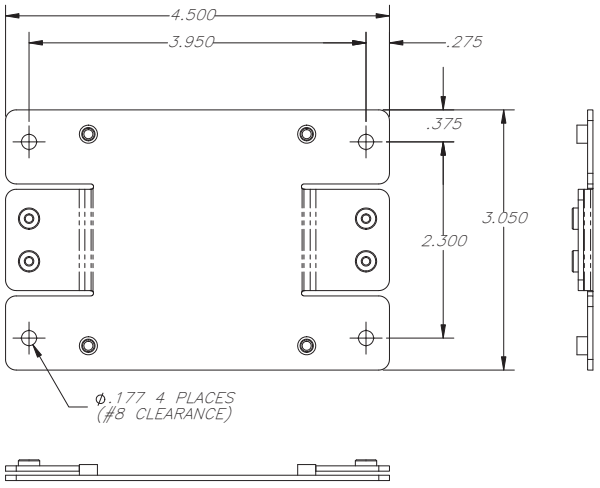
Range: Up to 1/2 mile

Intrinsically Safe: Hazardous Location Certified – Class 1 Division 1 is Temp Code T3, Groups C&D. Conforms to UL Std. 913, Certified to Can/CSA Std C22.2 No. 157

Internal Diagnostics: Battery voltage, signal strength, error conditions



BUILT-IN INSTALLATION HOLES AND OPTIONAL MAGNETIC MOUNTING BRACKET



SIGNALFIRE WIRELESS REMOTE SENSING SYSTEM™

The SignalFire system is a robust, authenticated, secure mesh network designed to give asset managers access to valuable process data. Easy to install and sensor-agnostic, it can interface with many sensor types such as flow, level, pressure, and temperature, and can control devices such as pumps, valves, heaters, fans, and lighting.

LINK SCOUT

HART to Wireless Adapter

WIRELESS CONNECTIVITY TO HART INSTRUMENTS

CLASS1 DIV 1 RATED (PENDING) FOR HAZARDOUS LOCATIONS

NO IMPACT ON THE 4-20MA LOOP RELIABILITY

CONNECTIVITY WITH ASSET MANAGEMENT SOFTWARE

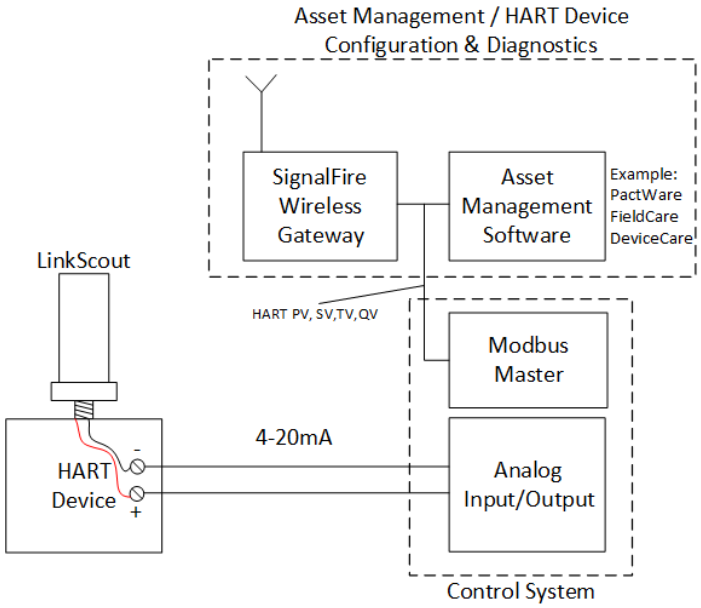
FEATURES

- Long wireless distance of 2640ft (800m)
- Supports four (4) HART® instruments in multi-drop mode
- Can be installed on a live instrument while in service
- Excellent battery life
- Transmits to gateway as Modbus registers HART PV, SV, TV, QV & HART diagnostic flag
- Tunnels all HART data to software like PactWare, DeviceCare, FieldCare
- 1/2” NPT male connection with potted wiring

PRODUCT OVERVIEW

The Link Scout is a wireless adapter for loop powered 4-20mA HART instruments allowing HART connectivity with asset management software like PactWare, FieldCare, DeviceCare and most FDT based software. The Link Scout is powered from an internal intrinsically safe battery and wired in parallel to not interfere with the existing 4-20mA loop. It will poll the HART instrument for its dynamic variables and alarm status to then transmit to the SignalFire gateway as Modbus registers. The Link Scout tunnels also all the HART traffic to an asset management software allowing full configuration, calibration and troubleshooting using the manufacturers DTM software.

SETUP DIAGRAM



LINK SCOUT

HART to Wireless Adapter

TECHNICAL SPECIFICATIONS

Operating Temp: -40 to +185°F (-40 to 85°C)

Humidity: 0% – 100% condensing

Power: One (1) 3.6Vdc D side size Lithium Thionyl Chloride battery

Output: 900Mhz - SignalFire protocol with HART passthrough

HART Support:
1 device in point-to-point
4 devices in multi-drop
HART PV, SV, TV, QV & Status
All parameters available from asset management software using SignalFire Virtual Com Port

Battery Life:
1 HART device:
- 5 sec update rate: 1.1 years
- 15 sec update rate: 2.8 years
- 60 sec update rate: 8.3 years
- 2 min update rate: 10+ years

Radio Power: 40 mW

Antenna Type: Integrated

Receive Sensitivity: -109 dB

Radio Frequency: 900 MHz

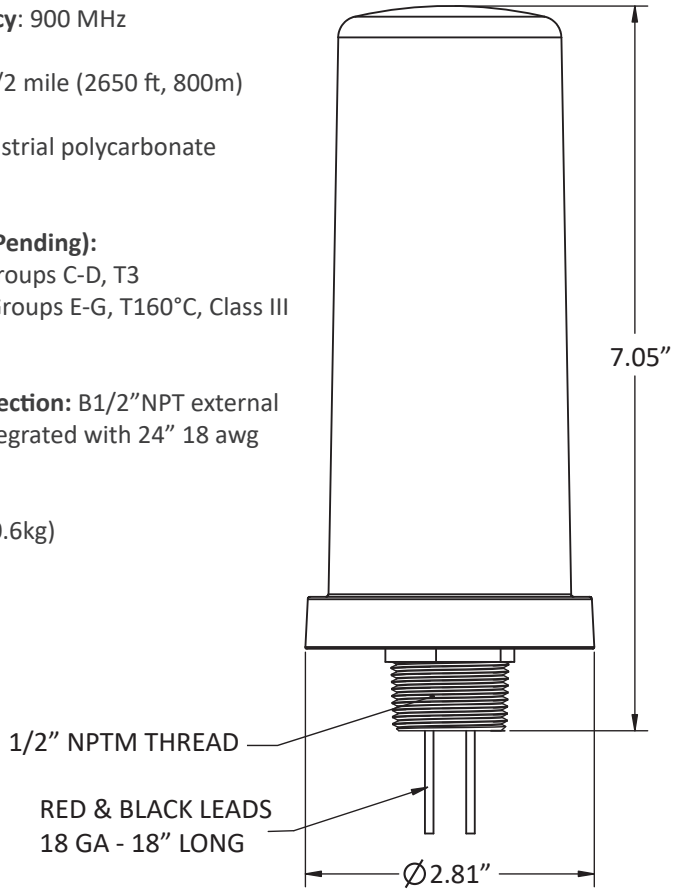
Range: Up to 1/2 mile (2650 ft, 800m)

Enclosure: Industrial polycarbonate UV Rated; IP64

Safety Rating (Pending):
Class I, Div 1, Groups C-D, T3
Class II, Div 1, Groups E-G, T160°C, Class III
Ex ia IIB T3 Ga

Electrical Connection: B1/2"NPT external connection; integrated with 24" 18 awg potted wires

Weight: 1 lbs (0.6kg)



HOW TO ORDER

Model: LinkScout-1BIS-HART

ModQ SENTRY

C1D2 Non-Incendive Modbus Flow Totalizer

ENHANCE EXISTING TURBINE METERS WITH DIGITAL READOUT & MODBUS CONNECTIVITY

QUICK SETUP FROM LOCAL LCD AND PUSH BUTTONS

BATTERY POWERED FOR STANDALONE OPERATIONS

DAILY MANAGEMENT FOR FLOW & TOTALS

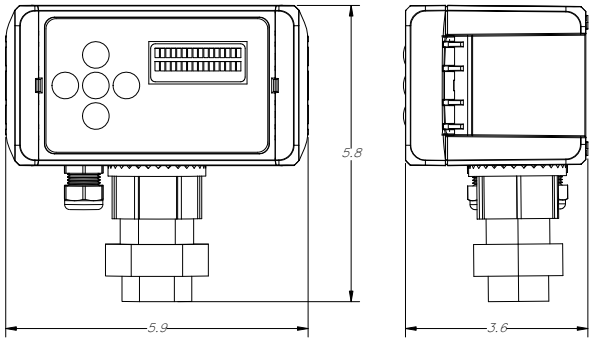
FEATURES

- Local display with, flow rate, totalizer and modbus settings
- Integrates with industry standard turbine meters
- Hazardous location classified for Class1 Div2 Non-Incendive (pending)
- Local pushbuttons for configuration
- Modbus serial (RS485) output to integrate with PLC/SCADA/DCS
- Externally and/or battery powered with auto switch over
- Real-Time-Clock with battery backup
- 1” female NPT standard swivel coupling with 2 pin connector inductive type turbine meters
- Configurable contract hour with real-time clock & battery backup
- 32 day built-in local data historian/backup storage
- Settable K Factor from local interface
- Weathertight rugged enclosure for outdoor operation
- Easy to install and maintain
- Configurable volume and time units

INDUSTRIES

- Oil and Gas
- Water & Wastewater
- Gas Utility
- Chemical
- Power
- Food & Beverage
- Aerospace
- Pharmaceutical
- Metals and Mining
- Pulp & Paper

DIMENSIONAL DRAWING



ELECTRICAL CONNECTIONS

ModQ SENTRY

C1D2 Non-Incendive Modbus Flow Totalizer

TECHNICAL SPECIFICATIONS

Operating Temp
-40ºC to 80ºC (-40°F to 176°F)

LCD Display:
-20ºC to 70ºC (-4°F to 158°F)

Input
Magnetic pickup, pulsed input

Sensitivity selector for magnetic pickup
2kHz response high gain mode (5mV sensitivity)
4kHz response low gain mode (20mV sensitivity)

Dry contact pulsed input

LCD & Pushbuttons
32 character display with pushbuttons

Settable K factor, contract hour, etc.

Displays totals, flow rate, and status information

Output
Modbus RTU RS485 serial 2 wires
Pulse output (open collector/pull down)

Real Time Clock
Battery backed up real time clock with coin size battery model 2032

Mechanical Specifications
Connection Fitting:
316SS, 1" NPT Swivel Union
Mating union for direct mount to turbine meter

Enclosure:
High strength & flame retardant Polycarbonate

Magnetic pickup connector:
Standard 2-pin circular connector

Humidity
0% – 100% condensing

Power
Battery: "D" cell lithium battery
Field replaceable Class 1 Div 2
OR
External: 6-36Vdc, 1mA current draw

Battery Life
(standalone operations w/o Modbus)
LCD ON: 4 years
LCD OFF: 6.5 years

Modbus Mapping
Flow totals (today, yesterday, 32 day log)

Instantaneous flow rate

Weight
2lbs (0.9kg) - Without a turbine

Non-Incendive Approval (pending)
Class 1 Division 2, Temp Code T3, Groups C&D. Conforms to UL Std. 913, Certified to Can/CSA Std C22.2 No. 157

Internal Diagnostics
Battery voltage, error conditions

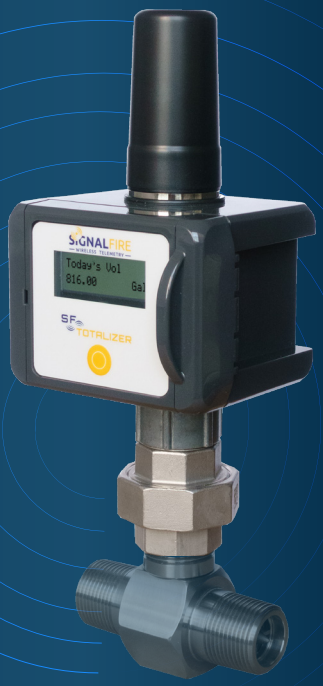
2 Pin Military Connector

STANDARD CONFIGURATION ORDER CODES

ORDER CODE	DESCRIPTION
ModQ-1BIS-CABLE:	Modbus flow meter with battery, 2 pin connector, RS485 serial & pulse output

FLOW TOTALIZER WITH DISPLAY

C1D1 Intrinsically Safe Wireless Flow Totalizer



ENHANCE EXISTING TURBINE METERS WITH DIGITAL READOUT & WIRELESS CONNECTIVITY

BEST OVERALL TOTAL COST OF OWNERSHIP

ROBUST AND RELIABLE OPERATIONS IN INDUSTRIAL APPLICATIONS

DAILY MANAGEMENT FOR FLOW & TOTALS

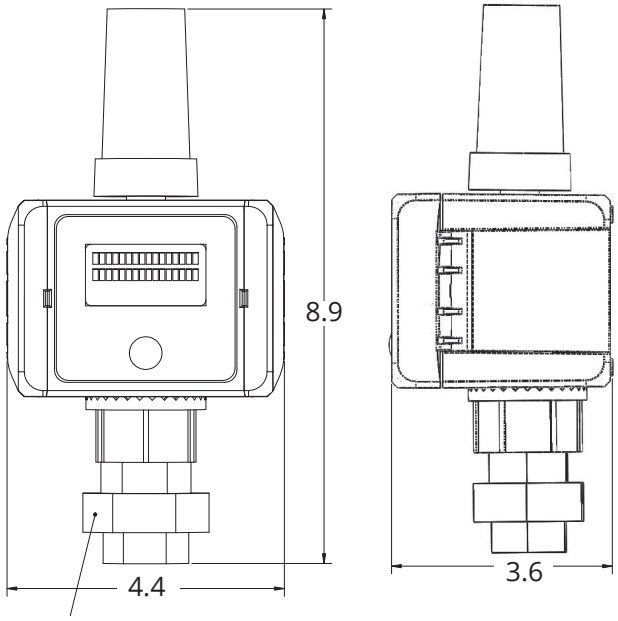
FEATURES

- Local display with, flow rate, totalizer and diagnostics
- Integrates with industry standard turbine meters
- Hazardous location classified for CL1 DIV1 Intrinsically Safe
- Robust 900mHz authenticated wireless protocol
- 0.5 mile range
- Battery powered electronically optimized for long life (5 years+)
- Real-Time-Clock with battery backup
- 1” female NPT standard coupling with 2 pin connector inductive type turbine meters
- Configurable contract hour with real-time clock & battery backup
- 30 day built-in local data historian/backup storage
- Wireless data interface to SignalFire’s standard protocol
- Weathertight rugged enclosure for outdoor operation
- Easy to install and maintain

INDUSTRIES

- Oil and Gas
- Water & Wastewater
- Gas Utility
- Chemical
- Power
- Food & Beverage
- Aerospace
- Pharmaceutical
- Metals and Mining
- Pulp & Paper

DIMENSIONAL DRAWING



1” NPT Female Thread Union Coupling STD 2-PIN Pickup Connector Included

FLOW TOTALIZER WITH DISPLAY

C1D1 Intrinsically Safe Wireless Flow Totalizer

TECHNICAL SPECIFICATIONS

Operating Temp
-40ºC to 80ºC (-40°F to 176°F)

LCD Display:
-20ºC to 70ºC (-4°F to 158°F)

Input
Magnetic pickup
4 KHz Maximum Frequency
20 mV Minimum amplitude

LCD Display
32 character display with push button activation

Displays totals, flow rate, and status information

Security
AES 128bit Encryption

Real Time Clock
Battery backed up real time clock

Mechanical Specifications

Connection Fitting:
316SS, 1" NPT Mating Union for direct mount to turbine meter

Enclosure:
High Strength Polycarbonate

Magnetic Pickup connector:
Standard 2-pin circular connector

Humidity
0% – 100% condensing

Power
"D" Cell Lithium battery pack. Field replaceable Class 1 Div 1.

Battery Life
$7^{1/2}$ years of battery life at 5 minute check-in

Data Interface
Wireless – Data and Diagnostics available as Modbus registers at GW

Radio Power
40 mW

Receive Sensitivity
-109 dB

Radio Frequency
902-928 ISM FHSS, FCC part 15 Compliant

Range
1/2 mile

Intrinsically Safe
Class 1 Division 1, Temp Code T3, Groups C&D. Conforms to UL Std. 913, Certified to Can/CSA Std C22.2 No. 157

Internal Diagnostics
Battery voltage, signal strength, error conditions

STANDARD CONFIGURATION ORDER CODES

ORDER CODE
SFTotalizer-1BIS

POWERPAK

On-Demand Power Source for Field Instrumentation

INDUSTRIAL BATTERY-POWERED POWER SUPPLY

SMALL FACTOR THAT SCREWS INTO INSTRUMENT

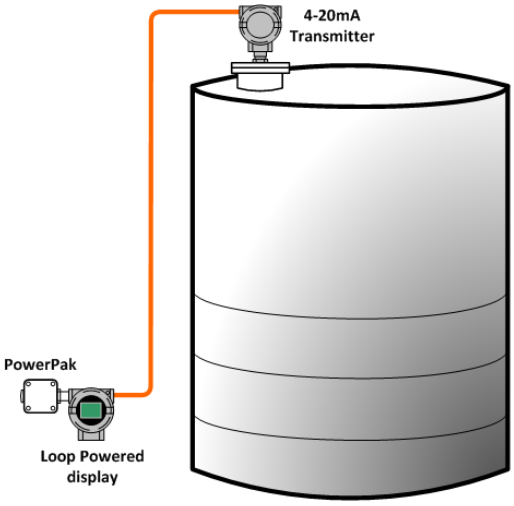
CLASS 1 DIVISION 1 CERTIFIED (PENDING)

NO SOFTWARE REQUIRED TO SETUP

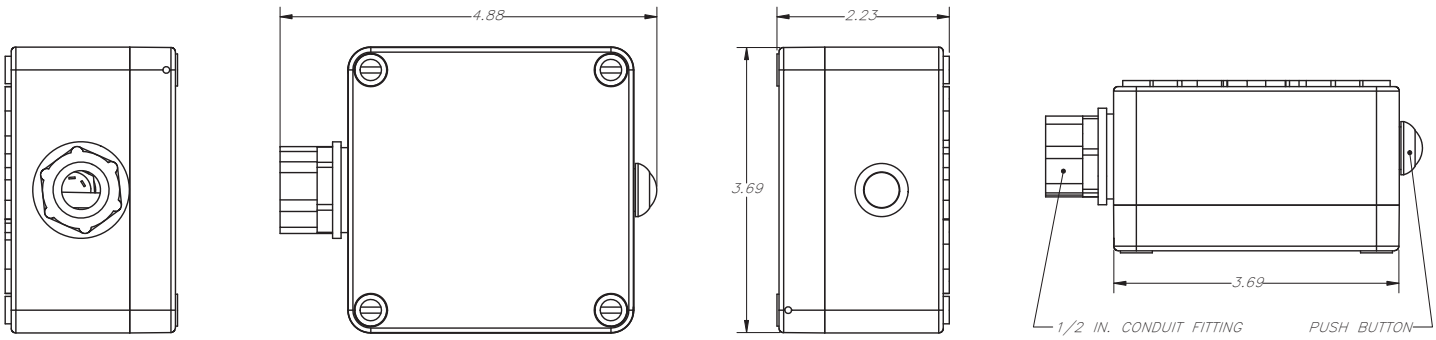
FEATURES

- External on-demand push-for-power button
- Class 1 Division 1 certified for hazardous locations (pending)
- Industrial enclosure for outdoor use
- Settable on-time power with dip switches
- Powers 4-20mA field devices and loop-powered external display
- Replaceable battery easily replaceable
- Long battery life (350 hours @ 4mA)

TYPICAL APPLICATION



DIMENSIONS



POWERPAK

On-Demand Power Source for Field Instrumentation

TECHNICAL SPECIFICATIONS

Operating Temp
-40 to 185°F (-40°C to 85°C)

Humidity
0% to 100% condensing

Power
One (1) 3.6Vdc D side size Lithium Thionyl Chloride battery

Output
18.9Vdc @ 4mA
15.7Vdc @ 20mA
See chart below

Settable On Time
Field selectable from dip switches:
1 min, 2 min, 5 min, 10 min, Always On
No software required

Battery Life
- 350 hours @ 4mA
- 100 hours @ 12mA
- 50 hours @ 20mA

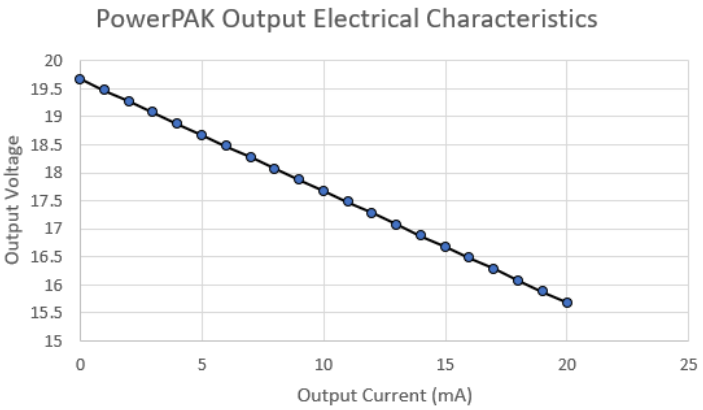
Safety Rating (Pending)
Class I, Division 1, Groups C-D, T3
Class I Zone 0 AEx ia IIB T3 Ga
Ex ia IIB T3 Ga; –40°C ≤ Tamb ≤ +50°C

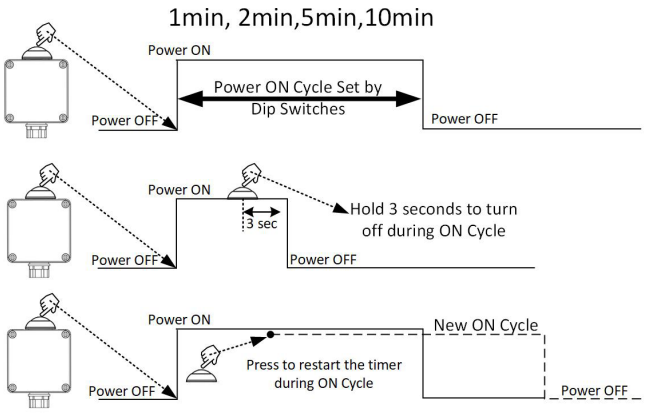
Enclosure
IP64 Industrial polycarbonate
UV rated

Electrical Connections
1/2" NPT external connection
16 awg internal screwed terminals

Weight
1lb (0.6kg)

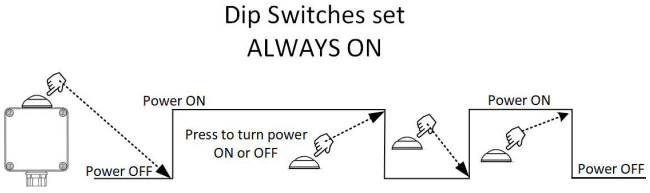
Dimensions
4.9" x 3.7" x 2.2"
12.4cm x 9.1cm x 5.7cm





HOW TO ORDER

Model:
PowerPak-1BIS



FIELD MONITOR

Provides in-field access to any gateway data without the need for a laptop computer or other I/O visual device.

IN-FIELD READOUT OF ANY GATEWAY DATA

BATTERY POWERED DISPLAY

PERFECT FOR LOCAL DISPLAY OF TANK LEVELS OR OTHER FIELD DATA

FEATURES

- Local display of data from network sensors
  - Math functions for tank volume calculations
  - Feet and inch conversion
  - Multiple pages
- Rugged design for demanding outdoor environments
- Up to 3+ mile range
- Simple to install, maintain and can also act as the Gateway for display only applications.

STANDARD CONFIGURATION ORDER CODES

ORDER CODE	DESCRIPTION
Field Monitor	Field Monitor, Battery Powered, Sleeping Client Node
Field Monitor-GW -Solar	Field Monitor, IQ4XLD Solar Powered, Gateway
Field Monitor-GW-IQ	Field Monitor, With IQ Smart Battery, Gateway. For external 10-30V power

TECHNICAL SPECIFICATIONS

Operating Temp
-40°C to 70°C

Humidity
0% – 100% condensing

Power
3 X D Lithium battery pack. Field replaceable.

Battery Life
2–5 years depending on update rate

Data Interface
SignalFire toolkit configuration utility

Radio Power
300 mW

Antenna Type
External weather resistant, omnidirectional

Antenna Gain
5 dB

Receive Sensitivity
-105 dB

Frequency
902-928 MHZ, license-free ISM band compliant with FCC Part 15

Range
Up to 3+ miles (line of sight)

Networks
Up to 65,520 separate networks

Enclosure
NEMA 4X rated

Internal Diagnostics
Battery voltage, signal strength, error conditions

Display
High contrast 13x26 character Monochrome LCD

ACCESSORIES

BATTERIES

3XD Replacement Battery Pack
For use with the A2 and HART® battery powered systems.

Intrinsically Safe Replacement Battery Pack
For use with the C1D1 Hazardous Area Multiple Input Module.

Solar Battery Power IQ Smart - Battery Pack
For use with the A2 and HART modules

ADAPTER CABLES

Configuration Cable
For use with the A2, HART®, Multi Input, and D2. Connectors from board-mounted 4-pin header to USB for code loads and configurations.

USB-to-Serial Adapater
Our recommendation for best plug-and-play performance with SignalFire products.

ACCESSORIES

NODE CHECKER

Node Checker

A setup and network-health tool — recommended for all installers

- Queries the status of any network node
- Provides signal information
- Available for wireless PACTware support to HART® sensors.

SIGNALFIRE CONFIGURATION AND DIAGNOSTIC TOOLKIT

The SignalFire ToolKit is a free, easy to use PC application for configuration and diagnostics for all SignalFire products.

- Configures all settings in nodes and Gateway
- NodeChecker utility interfaces with NodeChecker hardware module to get detailed information about network performance and node data
- Diagnostics and troubleshooting information built into node-configuration window
- Automatically updates itself on startup and downloads latest node firmware versions
- Loads firmware into all nodes and prompts user to push updates when local disk has a newer version than the currently connected node
- Downloads and displays current configuration data from node

SOLAR POWERED REPEATER

- Automatically configures as part of the SignalFire mesh network
- Forwards messages from all SignalFire nodes
- 300mW radio with high gain antenna
- Range up to 3 miles
- Internal rechargeable battery pack with integrated high efficiency solar charger
- Solar panel and all mounting hardware/brackets included
- Rugged design for demanding outdoor industrial environments
- Simple to install and maintain

ELPRO Technologies - Secure Industrial Communications

For over 35 years, ELPRO Technologies wireless business has helped companies around the world improve the man-agement of their assets by offering a full range of secure and reliable communications systems. ELPRO's wireless business has a full range of products to help your facility safely and re-liably use wireless technology to accomplish even your most critical needs. Our products can be used in a variety of ap-plications, including water/wastewater, oil and gas, mining, utility, solar, flood and environmental and industrial automa-tion.

We specialize in connectivity solutions for long-haul data communication in both licenced and licence free bands in-cluding IoT technologies.

We offer scalable solutions from basic point-to-point con-nections to large scale mesh deployments. Our solutions also cover both machine-to-machine and field instruments to control rooms for SCADA and DCS connectivty.

Comprehensive solutions - ELPRO's industrial wireless solutions can provide the most fundamental improvement in industrial applications. Innovative customers use wireless and IoT technologies to raise their overall equipment effectiveness, enhance safety and improve produc-tion quality. Coupled with far lower capital deployment costs, wireless infrastructure has moved beyond a convenience to a competitive advan-tage and an essential block for industrial applications.

Gain flexible control to stream-line operations for greater quality and improved information man-agement. We offer solutions that extend the boundary of monitor-ing and control into the most chal-lenging and remote environments.

Integrate critical processes and manage the growing diversity of automation technologies. We support the integration into ex-isting systems and environments controlled by SCADA, DCS, PLC or PC-based automation, enabling you to choose the best solution for your needs.

Safe and secure industrial wireless products include features to help customers build applications that provide a high level of data integ-rity and protection against mali-cious attacks. The built-in security features of ELPRO industrial mod-ules include advanced encryption and filtering, multi-level authenti-cation with user access and event logging.

Increase productivity at produc-tion startup, meet compliance deadlines and resolve ongoing maintenance problems. We help you gain insight into local and re-mote sites, conserving your re-sources and budget.

Improve safety by reducing or eliminating the need to expose workers to existing or potential hazards. Our solutions service critical applications ranging from mine slope wall detection, Flood warning and public safety net-works to safety shower alerts.

Reduce total costs with simple to complex wireless architectures, and over small or large sites. We provide wire-free economics while delivering wire-like reliability.

ELPRO Technologies

Wireless I/O

ELPRO offers a full range of wireless I/O modules that can transmit both digital and analog signals over the wireless network. Cutting edge meshing capabilities provide industry leading reliability to ensure devices always stay within network. Expansion I/O is available to support even the largest of networks.

Bidirectional - Mesh I/O

- 148 - 174MHz: 415U-2
- 340 - 520MHz: 415U-2

Bidirectional - Mesh I/O

- 868/869MHz: 915U-2
- 900MHz: 915U-2

Bidirectional - Mesh I/O

- 2.4GHz: 215U-2

Unidirectional - Battery Powered I/O

- 148 - 174MHz: 415U-1 (2020 Release)
- 340 - 520MHz: 415U-1 (2020 Release)
- 148 - 174MHz: ERT-A2 (2020 Release)

Bidirectional - I/O

- 148 - 512MHz: 105U-1
- 868/869MHz: 105U-1
- 900MHz: 905U-1

Unidirectional - I/O

- 868/869MHz: 105U-L-T/R
- 900MHz: 905U-L-T/R

Unidirectional - I/O

- 868/869MHz: 505U-K
- 900MHz: 905U-K

Expansion I/O - I/O to serial

- 115S-11, 12, 13

I/O to Ethernet

- 115E-2

Wireless Fieldbus Gateways

ELPRO offers gateways available in common industrial and environmental protocols, allowing your new wireless network to seamlessly communicate with any existing network infrastructure, making implementation of wireless solutions simple and reliable.

Modbus TCP/RTU and DNP3

- 148 - 174MHz: 415U-2
- 340 - 512MHz: 415U-2

Modbus TCP/RTU

- 868/869MHz: 915U-2
- 900MHz: 915U-2
- 2.4GHz: 215U-2

Modbus TCP/RTU and DNP3

- 115E-2

ALERT/ALERT2™, Modbus and DNP3

- 115E-2-ERT

PROFIBUS® DP (Master/Slave)

- 148 - 512MHz: 105U-G-PR1/2
- 868/869MHz: 105U-G-PR1/2
- 900MHz: 905U-G-PR1/2

EtherNet IP, Modbus TCP

- 148 - 512MHz: 105U-G-MD1
- 868/869MHz: 105U-G-MD1
- 900MHz: 905U-G-MD1

EtherNet IP, Modbus TCP

- 148 - 512MHz: 105U-G-ET1
- 868/869MHz: 105U-G-ET1
- 900MHz: 905U-G-ET1

Wireless Ethernet and Cellular

Ethernet is increasing in capability and importance in today's world. ELPRO is on the forefront of this technology, offering Ethernet data solutions in several radio frequency bands that provide users flexibility of selecting a technology matching their own unique application requirements. Full product portfolio includes licenced and licence free frequencies of Ethernet networking solutions and modems.

Licence / Licence Free - Mesh

- 148 - 174MHz: 415U-E
- 340 - 520MHz: 415U-E

Licence-free Mesh 2.4GHz

- 2.4GHz: 215U-2

Redundant Base Station and Repeater

- 148 - 174MHz: 415U-BSR-DC
- 340 - 520MHz: 415U-BSR-DC

Licence-free 900MHz

- 900MHz: 945U-E

Licence / Licence Free

- 360 - 512MHz: 450U-E
- 928 - 960MHz: 950U-E

802.11a at 5.8GHz

- 5.8GHz: 245U-E-A1

802.11b/g at 2.4GHz

- 2.4GHz: 245U-E-G1

Licence Free - Narrow Band

- 868/869MHz: 805U-E
- 900MHz: 905U-E

Cellular & WiFi

- 645M-4

IIoT - Battery Powered I/O

- 415U-1-IoT (2020 Release)
- ERT-A2-IoT (2020 Release)

Ethernet Switches

- Unmanaged: 1050/1080E-T
- Managed: 2080E-T

Wireless Serial

ELPRO's serial products are available in both licenced and licence free options. They connect to PLC's, SCADA, DCS and other intelligent serial devices and are highly scalable from simple point to point to large networks.

60MHz

- 455U-D-60

148 - 512MHz

- 455U-D

Licence Free

- 868/869MHz: 805U-D
- 900MHz: 905U-D

J FLOW CONTROLS

CONDENSED CATALOG

2 & 3 piece valves
3 & 4 way valves
Control Valves
Top Entry Valves
Trunnion Ball Valves
Floating Ball Valves
Metal Seated Valves
Flanged Ball Valves

JFLOW™ controls

JFLOWCONTROLS.COM

SERIES 2000

Globe Single Seated Top Guide Valve
Flow characteristics: linear, equal % & modified %, MTRs available

- Size: 3/4" - 10"
- Body Material: A216, WCB, 304, 316, Alloys
- Trim Material: 304, 316, Alloys
- Cv Ratio: 50:1
- End Connections: Flanged, BW, SW, 150-1500
- Temperature: -22° to +1049° F
- Seat Materials: Soft, Metal

SERIES 3500

Globe 3 Way Mixing & Diverting Valve
Single seated top guide, bolted bonnet, flow characteristics: linear, equal % & modified %, MTRs available

- Size: 1" - 16"
- Body Material: A216, WCB, 304, 316, Alloys
- Trim Material: 304, 316, Alloys
- Cv Ratio: 50:1
- End Connections: Flanged, BW, SW, 150-600
- Temperature: -22° to +1049° F
- Seat Materials: Soft, Metal

CONTROL VALVES

SERIES 4000

Globe Heavy Duty Cage Balanced Valve
Low noise and anti-cavitation trims, flow characteristics: linear, equal %, modified %, semi-throttled, MTRs

- Size: 1/2" - 24"
- Body Material: A216, WCB, 304, 316, Alloys
- Trim Material: 304, 316, Alloys
- Cv Ratio: 30:1 (Tendril), 50:1 (Reduced Cage), 100:1 (Full Cage)
- End Connections: Flanged, BW, SW, 150-2500
- Temperature: -22° to +1049° F
- Diaphragm actuators enclosed, piston-style actuators available

DM9900F

Direct Mount Segmented V Control Valve
Spring loaded, removable seat, replaces globe valves and general ball valves, high Cv flow rate, MTRs available, US Patent #: US8,398,055B2

- Size: 1-1/2" - 30"
- Body Material: WCB, 316, 316L, Alloys
- Trim Material: 316, Alloys
- Port: Full port and reduced trim
- End Connections: ANSI 150-900, Wafer
- Options: 60° segmented ball
- Temperature: -20° to +1000° F
- Seat Materials: TFM, TFM 4215, Metal Seat

DM4800

3600 PSI, Direct Mount, Three Piece Ball Valve, API 608 Fire -safe to API 607, 6th Edition, live loaded packing, encapsulated seat with locking handle, B16.34, MTRs

- Size: 1/4" - 3"
- Body Material: WCB, 316, Alloys
- Trim Material: 316, Alloys; Stellite Ball
- Port: full port
- End Connections: Threaded, SW, BW, ESW, Flanged ANSI 150-900
- Temperature: -20° to +1000° F
- Seat Materials: PEEK, Delrin, Metal, TFM4215
- Options: chainwheel, fusible link, extended bonnet

DM4600 Full Port

2000 PSI High Performance Valve, B16.34, fire safe to API 607 6th edition, Direct mount, live-loaded packing, blow-out proof stem, anti-static, silicone-free, MTRs available

- Size: 1/4" - 4"
- Body Material: WCB, 316, Alloy 20, Duplex, Alloys
- Trim Material: 316, Alloy 20, Duplex, Hastelloy C
- Port: Full port
- End Connections: NPT, SW, BW, Flanged 150-600, metric threads
- Temperature: -50° to +650° F
- Seat Materials: TFM1600, TFM4215, UHMPWE, Vespel, Metal Seated
- Options: cryogenic and fugitive emission bonnets

THREE PIECE VALVES

DMCF7300

1000 PSI, Tri-Clamp Valve with 10Ra Interior Finish Direct mount, blow-out proof stem, cavity filled, sanitary 3 piece valve, live-loaded packing, MTRs available

- Size: 1/4" - 4"
- Body Material: 316, Alloy 20, Duplex, Monel
- Trim Material: 316, Alloy 20, Duplex, Monel
- Port: Full port
- End Connections: Tri-clamp, BW, Tube
- Temperature: -20° to +600° F
- Seat Materials: Teflon, TFM
- Options: CIP/SIP self-flushing, non-cavity filled

OB60DM4600 Full Port

Direct Mount V Ball, B16.34, Fire Safe to API 607 6th Ed. Direct mount, live-loaded packing, characterized control valve, 2000 PSI (WOG) silicone free, blow-out proof stem, anti-static, MTRs available

- Size: 1/4" - 4"
- Body Material: WCB, 316, Alloys
- Trim Material: 316, Alloys
- Port: Full port
- End Connections: NPT, SW, BW, Flanged 150-600, DIN Flanged, Metric Threads
- Temperature: -50° to +650° F
- Seat Materials: Teflon, Carbon, others
- Options: 15°, 30°, 60°, 90°, slotted v-ball

9500F

Double Block & Bleed, Seal Welded Ball Valve
API 6D, blow-out proof stem, NACE certified, fire safe to API 607, 4th Edition, B16.34, B16-10, MTRs available

- Size: 2" - 60"
- Body Material: 304, WCB, 316, LCB, LF2, F316, A105
- Trim Material: 316, 17-4 stem, chrome, SS410
- Port: Full port and reduced port
- End Connections: NPT, SW, ANSI 150-2500
- Temperature: -50° to +1000° F
- Seat Materials: Nylon, RPTFE, TFM, Metal Seated, PEEK, Carbon PEEK, Tungsten Carbide, Stellite
- Options: locking handle, gear operator

9800F

Metal Seated Valve
API 6D, blow-out proof stem, fire safe to API 607, 4th Edition, NACE certified, B16.34, B16.10, MTRs available

- Size: 2" - 60"
- Body Material: WCB, 316, LCB, LF2, F316, A105
- Trim Material: 316, 17-4 stem, chrome, SS410
- Port: Full port and reduced port
- End Connections: NPT, SW, ANSI 150-2500
- Temperature: -50° to +1000° F
- Seat Materials: Metal Seated, Stellite, Tungsten Carbide, Inconel
- Options: locking handle, gear operator

TRUNNION VALVES

SERIES 9700F

Double Block & Bleed Valve
API 6D, blow-out proof stem, fire safe to API 607, 4th Edition, NACE certified, B16.34, MTRs available

- Size: 2" - 60"
- Body Material: WCB, 316, LCB, LF2, F316, A105
- Trim Material: 316, 17-4 stem, chrome
- Port: full port and reduced port
- End Connections: NPT, SW, ANSI 150-2500
- Temperature: -50° to +1000° F
- Seat Materials: Nylon, RPTFE, TFM, PEEK, Carbon PEEK, Carbon TFM 4215
- Options: locking handle, gear operator

SERIES 3L/3T2A00 Series

Trunnion 3 Way High Pressure Valve
API 6D, blow-out proof stem, NACE certified, B16.34, MTRs available

- Size: 2" - 16"
- Body Material: WCB, 316, LCB, LF2, F316, A105, Alloys
- Trim Material: 316, 17-4 stem
- Port: full port and reduced port
- End Connections: ANSI 150-900
- Temperature: -50° to +1000° F
- Seat Materials: RPTFE, TFM, TFM4215, Metal, PEEK
- Options: locking handle, gear operator

FSLD3900F

3000 PSI Valve, Firesafe to API 607, 5th Edition
Adjustable packing, seal-welded body, silicone-free, blow-out proof stem, MTRs available

- Size: 1/4" - 3"
- Body Material: WCB, 316, Alloys
- Trim Material: 316, 17-4 stem, Alloys
- Port: Full port
- End Connections: NPT, metric
- Temperature: -50° to +650° F
- Seat Materials: Delrin, PEEK

FSLD3500

2000 PSI Valve, Firesafe to API 607, 5th Edition
Adjustable packing, seal-welded body, silicone-free, blow-out proof stem, ISO mounting pad, MTRs available

- Size: 1/4" - 3"
- Body Material: WCB, 316
- Trim Material: 316, 17-4 stem
- Port: Full port
- End Connections: NPT, metric
- Temperature: -29° to +650° F
- Seat Materials: TFM, TFM4215
- Options: locking handle, stem extension, limit switch

ONE & TWO PIECE VALVES

FSLD1100

2000 PSI valve, 1 piece, fire safe to API 607, 4th Edition
Adjustable stem packing, no leakage paths through body, blow-out proof stem, MTRs available

- Size: 1/4" - 2"
- Body Material: 316, WCB
- Trim Material: 316, WCB
- Port: Reduced port
- End Connections: NPT
- Temperature: -20° to +300° F
- Seat Materials: RPTFE

DM3800F

1000 PSI Valve, Two Piece
Direct Mount, live loaded packing, silicone-free, blow-out proof stem, MTRs available

- Size: 1/4" - 3"
- Body Material: 304, 316, 316L
- Trim Material: 304, 316
- Port: Full port
- End Connections: NPT, Metric
- Temperature: -29° to +300° F
- Seat Materials: Teflon
- Options: locking handle, stem extension, limit switch

KE/KS

Through Conduit, Slab Gate Valves
API 6FA fire safe design, double block & bleed, self-relieving seat, top entry bonnet, complies with API 6D/ API 6D SS, MTRs available

- Size: 2" - 60"
- Body Material: WCB, 316S, Alloy materials
- Trim Material: Chrome, 316S, Stellite
- Port: Reduced port, Full port
- End Connections: ANSI 150 - ANSI 1500
- Temperature: -100°F TO +1000°F
- Seat Materials: RPTFE, Metal

6800

Spring Check Valve
High capacity, soft seated for bubble-tight shutoff, spring loaded for fast sealing action, MTRs available

- Size: 1/4" - 3"
- Body Material: Stainless Steel
- Trim Material: Stainless Steel
- Port: Full port
- End Connections: NPT
- Temperature: +10° to +450° F
- Seat Materials: Teflon, TFM, TFM 4215

SPECIALTY VALVES

DBDM2500

Two Piece Flanged, Fire Safe API 607, 5th Edition
Direct mount, three piece, full port, live-loaded packing, encapsulated seat with locking handle, MTRs available

- Size: 1/2" - 4"
- Body Material: WCB, 316, Alloy 20, Hastelloy C, Super Duplex, Monel
- Trim Material: 316, Duplex, Allo 20, Hastelloy C, Monel
- Port: full port
- End Connections: ANSI 150#, Flanged 300#
- Temperature: -100° to +650° F
- Seat Materials: Metal seated, PEEK, Super Teflon, Carbon Super Teflon, Carbon PEEK
- Options: locking handle, stem extension, limit switch

DBDM4600/DBDM4800 Full Port

2000 & 3000 PSI, Three Piece, Double Block & Bleed Valve
Blow-out proof stem, ISO5200 direct mounting pad, fire safe to API 607 6th edition, high performance valve, MTRs available

- Size: 1/4" - 3"
- Body Material: WCB, 316, Alloys
- Trim Material: 316, 17-4 stem, Alloys
- Port: Full port
- End Connections: NPT, metric, SW, Flanged, ANSI 150-900
- Temperature: -50° to +1000° F
- Seat Materials: TFM 4215, PEEK, Carbon PEEK, TFM, Metal
- Options: locking handle, stem extension, limit switch

DM2500

ANSI 150 & 300 Direct Mount
Firesafe to API 607, 5th Edition, blow-out proof stem, silicone-free, anti-static, live loaded packing, MTRs available

- Size: 1/2" - 12"
- Body Material: WCB, 316, LCB, Alloys
- Trim Material: 304, 316, Alloys
- Port: Full port and reduced port
- End Connections: ANSI 150 & 300, DIN flanges
- Temperature: -50° to +1000° F
- Seat Materials: TFM, Carbon TFM, PEEK, Metal seated
- Options: cryogenic and fugitive emission bonnets, locking handle, gear operator

DM4500FTMTMF150

Direct Mount ANSI 150 & 300
1000 PSI three piece, direct mount, live loaded packing, blow-out proof stem, silicone free, MTRs available

- Size: 1/4" - 4"
- Body Material: WCB, 316, Alloy 20, Duplex, Alloy
- Trim Material: 316, Alloy 20, Duplex, Alloy
- Port: Full port
- End Connections: ANSI 150 - 300, NPT, SW, BW, metric threads
- Temperature: -50° to +450° F
- Seat Materials: TFM1600
- Options: oval handle, SR handle, limit switch, automation

FLANGED VALVES

OB-DM2500

ANSI 150 Flanged V-Ball Control Ball
Firesafe to API 607, 5th Edition, Direct mount, live-loaded packing, self-adjusting packing, blow-out proof stem design, MTRs available

- Size: 1/2" - 12"
- Body Material: WCB, 316, Alloys
- Trim Material: 316, 17-4
- Port: Full port and reduced port
- End Connections: ANSI 150 - 300
- Temperature: -50° to +1000° F
- Seat Materials: TFM, Carbon TFM, PEEK, Carbon PEEK, Metal Seated Plate, TFM 4215
- Options: chainwheel, 15°, 30°, 60°, 90°, slotted v-ball, locking handle, gear operator

9600

Floating Ball, Fire Safe to API 607, 4th Edition
API 6D certified, B16.34, B16.10, ISO 5211 mounting pad, NACE certified, MTRs available

- Size: 1/2" - 10"
- Body Material: WCB, 316, A105, 304, LF2, LCB
- Trim Material: 304, 316, Chrome
- Port: Full port and reduced port
- End Connections: ANSI 150-600, RF, 600 RTJ, SW, BW, DIN flanges
- Temperature: -50° to +650° F
- Seat Materials: Teflon, RPTFE, TFM, TFM 4215
- Options: fusible link, extended bonnet, chainwheel, locking handle, gear operator

DM2600

Top Entry, ANSI 150, Direct Mount
Silicone-free, anti-static, face-to-face interchangeability, locking handle, MTRs available

- Size: 2" - 4"
- Body Material: WCB, 316, 316L, 317, Alloys
- Trim Material: WCB, 316, 316L, 317, Alloys
- Port: Reduced port
- End Connections: ANSI 150
- Temperature: -20° to +600° F
- Seat Materials: Super Teflon, Carbon TFM, TFM4215
- Options: Chainwheel, fusible link, extended bonnet

DM2700

One Piece, Top Entry Direct Mount
Convenient in-line repairable, one piece valve, live-loaded packing, silicone-free, anti-static, MTRs available

- Size: 1/2" - 4"
- Body Material: WCB, 316, Alloys
- Trim Material: WCB, 316, Alloys
- Port: Reduced port
- End Connections: SW, BW, Threaded, NPT
- Temperature: -50° to +600° F
- Seat Materials: Super Teflon, Carbon, Carbon TFM

TOP ENTRY VALVES

5400

Double Block & Bleed Plug Valve, Rising Stem
Soft or metal seated options, hand or power operation, bi-directional sealing with zero leakage, little maintenance

- Size: 2" - 24"
- Body Material: WCB, WCC, Stainless Steel, Alloy materials
- Trim Material: WCB, 17-4
- Port: Full port
- End Connections: ANSI 150-2500
- Temperature: -20° to +800° F
- Seat Materials: Soft or metal
- Options: Handwheel extension, limit switch, thermal, jacket and custom painting

9400

Top entry, Fire Safe to API 607 4th Edition Valve
Meets ASME B16.34, B16.5, & B16.10, seats compensate for wear, fluctuations of pressure/temp., MTRs available

- Size: Full: 1/2 - 10"; Reduced: 1/2" -12"
- Body Material: A105, WCB, 316, F316, LF2, LCB, Alloys
- Trim Material: 316, chrome, Alloys
- Port: full port and reduced port
- End Connections: NPT, metric, BW, SW, ANSI 150-2500
- Temperature: -50° to +1000° F
- Seat Materials: TFM, RPTFE, UHMPWE, PEEK, Carbon PEEK, Metal Seated, Carbon TFM 4215

DMCF3L/T2A33FTTKE

T-Port and L-Port Direct Mount
Cavity-filled, positive shut-off, in-line repairable, blow-out proof stem, 10Ra interior finish, 800 WOG, MTRs available

- Size: 1/2" - 4"
- Body Material: 316, Alloys, WCB
- Trim Material: 316, Alloys
- Port: Full port
- End Connections: Tri-clamp, BW, Tube, Flanged
- Temperature: -50° to +650° F
- Seat Materials: PTFE, TFM, TFM 4215
- Options: automation, limit switch, locking handle

DM3L/T2A33FTT

ANSI 150 & 300, T Port and L Port, Direct Mount
Self-adjusting packing, blow-out proof stem, silicone-free, four seats, positive shutoff, 800 WOG, MTRs available

- Size: 1/2" - 16"
- Body Material: WCB, 316, 304, Alloys
- Trim Material: 316, 17-4
- Port: Full port
- End Connections: Npt, SW, BW, ANSI 150-300, DIN Flanges
- Temperature: -20° to +1000° F
- Seat Materials: Super Teflon, Carbon, Carbon PEEK, UHMWPE, Metal Seated, TFM 4215
- Options: 45° handle, automation with accessories,

THREE, FOUR, FIVE WAY VALVES

DM4LL/T-2A33FTTF150

X Port, Double L, 4-Way, 5-Way, Direct Mount
Self-adjusting packing, blow-out proof stem, 800 WOG, silicone-free, four seats, positive shutoff, MTRs available

- Size: 1/2" - 16"
- Body Material: WCB, 316, Alloys
- Trim Material: 316, 17-4 stem
- Port: Full port
- End Connections: NPT, SW, BW, ANSI 150 & 300, DIN Flanges
- Temperature: -20° to +1000° F
- Seat Materials: Super Teflon, Carbon, Carbon PEEK, Metal Seated, UHMPWE
- Options: 45° handle, automation with accessories

DM5400/5300

Side Entry, T Port, L Port, Direct Mount
Four seat design, positive shutoff, silicone-free, in-line repairable, live-loaded packing, 800 WOG, MTRs available

- Size: 2-/2" - 4"
- Body Material: WCB, 316, Alloys
- Trim Material: 316, Alloys
- Port: Full port
- End Connections: NPT, metric, BW, SW
- Temperature: -20° to +1000° F
- Seat Materials: Super Teflon, Carbon, Carbon PEEK, UHMPWE, Metal Seated
- Options: 45° handle, automation with accessories

MB1.2

1 and 2-Way Manifold
Male-Female connections, metal-to-metal shutoff, easy 2 mounting holes, 100% tested

- Size: 1/2"
- Body Material: Carbon Steel, Stainless Steel AISI-316, Special Alloys, Barstock
- Max Pressure: 6000 psi
- Temperature: -4° to +752° F
- Option: Movable stem tip, graphoil packing for high temperatures

MBT2.5

2-Way Five Valve Manifold
Metal to metal shutoff, easy packing external adjustment, PTFE packing, 100% tested

- Size: 1/2"
- Body Material: Carbon Steel, Stainless Steel AISI-316, Special Alloys, Barstock
- Max Pressure: 6000 psi
- Temperature: -4° to +752° F
- Option: Movable stem tip, graphoil packing for high temperatures, four screws M10 instead of 7/6" UNF

MANIFOLD VALVES

MBT2.3DA

2 & 3-Way Valve Transmitter Direct Coupling Manifold
High strength body, Stainless Steel non-rotating ball shut-off, PTFE packing, 100% tested

- Body Material: Carbon Steel, Stainless Steel AISI-316, Special Alloys, Barstock
- Max Pressure: 6000 psi
- Temperature: -4° to +752° F
- Option: Movable stem tip, graphoil packing for high temperatures, four screws M10 instead of 7/16" UNF, two bleed screws in outflow

MBT2.3DT

2 & 3-Way Valve Transmitter Direct Coupling Manifold
High strength body, Stainless Steel non-rotating ball shut-off, PTFE packing, 100% tested

- Size: 1/2"
- Body Material: Carbon Steel, Stainless Steel AISI-316, Special Alloys, Barstock
- Max Pressure: 6000 psi
- Temperature: -4° to +752° F
- Option: Movable stem tip, graphoil packing for high temperatures, four screws M10 instead of 7/16" UNF, two bleed screws in outflow

JFC

Pneumatic Spring Return and Double Acting Actuators

- High cycle life
- Field reversible rotation
- Dual piston rack & pinion design for compact construction
- ISO 5211 - Namur mounted
- DA: 32 in/lbs - 76,791 in/lbs
- SR: 52 in/lbs - 22,745 in/lbs

JFE

Electric Actuators

- Compact and light weight
- ISO 5211
- 24 VDC/VAC
- 120 VDC/VAC
- 220 VAC
- NEMA 4/7
- 4-20mA in and out
- 100 in/lbs - 27,000 in/lbs
- Manual Override available

ACTUATORS & ACCESSORIES

JFD

Spring and Diaphragm Actuators

- ISO 5211
- Namur accessory mounting
- High cycle design
- Low maintenance
- Field reversible
- Corrosion resistant
- Wide range of springs
- 135 in/lbs - 7,095 in/lbs

Accessories

A wide range of accessories

- Spring handles
- Stem extensions
- Fugitive emission/cryogenic bonnets
- Switches (NEMA 4/7)
- Positioners (4-20, 3-15, smart)
- Solenoids (NEMA 4/7)
- Custom brackets

Pressure Switches including Low Pressure Switches, High Pressure Switches and Pneumatic Switches from NeoDyn.

NeoDyn Pressure switches are snap acting devices, designed to actuate when a specific pressure, of a gas or liquid being monitored, is sensed. When the set point pressure is detected, the switch works to open or close a circuit. This allows for enhanced alarm and control which in turn improves the dependability and safety of the workplace. Neo-Dyn's standard design features a snap acting Belleville spring that ensures improved cycle life, repeatability, and vibration resistance. Pressure switches are designed to suit many applications with variations in the interface, set point capabilities, media types, material compatibilities, temperature variations, size, and environmental conditions.

When it comes to general purpose pressure switches, NeoDyn's standard product lines are used in a wide range of industries and offer the variety necessary to meet the different requirements. If the pressure switch you are looking for is not listed, please submit your request. Our customersupport and engineering staff are ready and able to provide you with a switch customfitted to your application.

Pressure Switches General Purpose

100P NEMA 4 & 13

Series Pressure Switch/Internal Adjustment. The 100P (diaphragm sensor) for pneumatic and low impulse hydraulics up to 3,000 psig system pressure. Enclosure 3.

101P NEMA 4 & 13

Series Pressure Switch/External Adjustment. The 101P (diaphragm sensor) is for pneumatic and low impulse hydraulics up to 3,000 psig. Enclosure 3.

105P/105PP NEMA 1 & 2

Series Tamper Proof Pressure Switch. These all purpose miniature switches are of extremely light weight and durable construction. Small size improves vibration and shock resistance. Enclosure 2 or 5.

110P NEMA 4 & 13

Series Pressure Switch/Internal Adjustment This weatherproof design for low pressure applications. Enclosure 3.

115P/115PP NEMA 4 & 13

Series Pressure Switch/Tamper Proof. This compact and versatile pressure switch with built to order set points is fully tamper proof. Excellent set point stability and vibration resistant design for weather proof application. Enclosure 3.

125P NEMA 4 & 13

Series Pressure Switch/Tamper Proof. Designed for high pressure pneumatic or low impulse hydraulic applications requiring a narrow deadband. Suited to weather proof application. Enclosure 3.

130P NEMA 4 & 13

Series Pressure/Vacuum Switch is a compact versatile pressure/vacuum switch is suitable for numerous applications serving low to midrange pressure applications. Enclosure 3.

131P NEMA 4X & 13

Series Pressure/Internal Switch (Weather Proof) is a compact adjustable pressure switch for high pressure pneumatic and low impulse hydraulic process applications. Enclosure 3.

132P NEMA 4 & 13

eries Pressure Switch/Internal Adjustment. Compact adjustable switch for pneumatic or low impulse hydraulic process applications. Excellent set point stability and vibration resistance. Enclosure 3.

142P NEMA 4 & 13

Series Ultra Low Vacuum/Pressure Switch. Ultra low pressure and vacuum to pressure crossover (142P) and features many applications with a wide range of internal wetted materials that replace the necessity for diaphragm seals. Enclosure 3.

200P NEMA 4 & 13

Series Pressure Switch/Internal Adjustment. 200P (piston sensor) is for hydraulic system pressures up to 10,000 psig. Enclosure 3.

201P NEMA 4 & 13

Series Pressure Switch/External Adjustment. The 201P (piston sensor) is for hydraulic system pressures up to 10,000 psig.

225P NEMA 4 & 13

Series Pressure Switch/Tamper Proof. Incorporates a sealed piston sensor for high impulse hydraulic applications. Suited to weather proof application. Enclosure 3.

231P NEMA 4X & 13

Series Pressure Switch/Internal Adjustment. Compact, adjustable pressure switch for high pressure hydraulic process applications. Enclosure 3.

232P NEMA 4 & 1

Series Pressure Switch/Internal Adjustment. Compact adjustable switch for high pressure hydraulic process applications. Excellent set point stability and vibration resistance. Enclosure 3.

→ GFH45 Series Airpak® Filter Regulators

Conoflow's GFH Series Airpak® Filter Regulators are widely used to provide clean, regulated air pressure to instruments and controls, automatic machinery and other pneumatic devices.

These ruggedly built units are available in either brass or stainless steel construction affording versatility in meeting today's instrument and industrial applications. The brass model has a maximum pressure rating of 300 PSI (2068 kPa) (GFH45).

Buna "N" elastomers are standard for the GFH45 and incorporate a 35 micron polypropylene filter. Cellulose (10 micron) and stainless steel (40 micron) filters are available. Consult the factory for details. Three regulated pressure ranges of 0-25, 0-60, 0-125 (0-172, 0-414, and 0-862 kPa) are available with adjustments made by means of a wrench knob. Handwheel adjustment. Preset and tamperproof versions are available.

The unit incorporates four ¼" NPT connections. The additional porting allows installation of a gauge for monitoring output pressure. Brass, steel and stainless steel case gauges are available.

The GFH45 is designed for reliability with an absolute minimum of maintenance. The characteristics are a result of Conoflow's high standards of manufacturing and years of experience as a leading producer of pneumatic instrumentation.

GFH45

Options:

Pressure Gauges

2" Diameter – Steel, Brass or Stainless Steel Case

Ranges: 0-30, 0-60, and 0-160 PSI (0-207, 0-414, 0-1103 kPa)

Mounting

Line – All Variations

Wall – GFH45 (Standard)

Flush-back panel mounted (3-hole) (Optional)

Adjustment

Knob – Optional

Handwheel – Standard

Preset – Factory output setting CAN be field adjusted

Tamperproof – Factory output setting CANNOT be field adjusted

Dimensional Data – Advertising Drawings

GFH45: A17-83

→ GFX02/GFX04 Series Filters

Conoflow's GFX Series Filters are used to provide clean air to instruments and other pneumatic devices. The 35 micron filter removes foreign particles from the air allowing intermediate and final control devices to operate at peak efficiency.
Available in either brass or aluminum construction, the GFX Series Filters cover most of today's instrument and industrial applications. Each filter has a maximum supply pressure rating of 300 PSI (2068 kPa).
These units have two ¼" NPT connections with an arrow on the cap denoting air flow direction. An optional center port is available.
Designed for reliable, almost maintenance-free service, these filters are backed by Conoflow's high standards of manufacture and years of experience as a producer of precision instruments.

Options:

Mounting: Bracket for wall mounting
Connection Port: Center ¼" NPT

→ GH04 Series Cushion Loading Regulator

Conoflow's GFX Series Filters are used to provide clean air to instruments and other pneumatic devices. The 35 micron filter removes foreign particles from the air allowing intermediate and final control devices to operate at peak efficiency.
Available in either brass or aluminum construction, the GFX Series Filters cover most of today's instrument and industrial applications. Each filter has a maximum supply pressure rating of 300 PSI (2068 kPa).
These units have two ¼" NPT connections with an arrow on the cap denoting air flow direction. An optional center port is available.
Designed for reliable, almost maintenance-free service, these filters are backed by Conoflow's high standards of manufacture and years of experience as a producer of precision instruments.

→ G10 Series Regulators

Manual Loading Regulators and Manual Loading Stations

Conoflow's GH10 Manual Loading Regulators are precision units designed for use in laboratory environments, remote loading of pneumatic devices, speed changers and other general purpose applications.

Available in brass, aluminum or stainless steel construction and combinations of the same, the GH10 Regulators cover a wide variety of applications. Maximum supply pressure ratings on the brass units are 200 PSI (1379 kPa) and the stainless steel models are rated at 300 PSI (2068 kPa). The brass units use Buna "N" diaphragms with Teflon/Buna "N" diaphragms with Teflon/Buna "N" sandwich type diaphragms used in the stainless steel models. Other diaphragm materials are available upon request. Regulated pressure ranges of 0-3, 5, 15, 25, 35, 50, and 125 PSI (0-21, 35, 103, 172, 241, 345, and 862 kPa) are standard.

For precise and accurate regulation the diaphragms incorporate a relief and constant bleed feature. The constant bleed is an engineered orifice to increase sensitivity by keeping the nozzle plug in a dynamic state, nullifying hysteresis and deadband. For applications with corrosive and/or toxic media, the regulators are available with a no bleed/no relief diaphragm which maintains the medium heat in the system. Tapped bonnets are available for remote venting of the exhaust gas.

Each unit has two ¼" NPT connections and can be line, wall or flush-back panel mounted. The easily adjustable handwheels are standard with wrench knob, preset and tamperproof options available.

These products are guaranteed by Conoflow's high standards of manufacture and years of experience as a leading producer of precision instruments.

Options:

Mounting

Line – All Variations

Wall – Bracket required

Panel – All Variations (Standard)

Flush-back panel mounted (3-hole)

Adjustment

Knob (Wrench Style) – Optional

Handwheel – Standard

Preset – Factory output setting CAN be field adjusted

Tamperproof – Factory output setting CANNOT be field adjusted

Dimensional Data – Advertising Drawings

GH10: A17-2

→ GH20/GH40 Series Regulators

Service and Pressure Reducing Regulators

Conoflow's Service (GH20 Series) Regulators are rugged units with flow capabilities and performance characteristics which allow the units to operate in both instrument and industrial applications. For applications where positive shut-off and minimum air consumption are required, the soft-seated nozzle GH40 versions are available.

The GH20/40 Series units are available in brass/aluminum combinations, all brass or all stainless steel constructions. Maximum supply pressure ratings for the GH20 Series are 200 PSI (1379 kPa), 300 PSI (2068 kPa) for stainless steel models and the diaphragms are standard in the brass and aluminum units with Teflon/Buna "N"/Teflon sandwich diaphragms used in the stainless steel models. Other diaphragm materials are available. Consult the factory.

Connections for the GH20/40 Series are ¼" NPT. Each unit has an easily adjustable wrench knob with handwheels, tamperproof and preset versions available.

These units are manufactured to Conoflow's high standards and are backed by years of experience as a leading producer of precision built instruments.

Options:

Mounting

Line – All Variations

Flush-back panel mounting

GH20/40 – 3 Hole (Refer to Drawing A17-2)

Adjustment

Knob: Standard GH20/4- (Optional GH20/40)

Handwheel: (Optional GH20/40)

Dimensional Data – Advertising Drawings:

GH20/40: A17-3

→ GH21 and GDH21 Series Regulators

Differential Pressure Regulators

Conoflow's Differential Pressure Regulators are used to maintain a constant pressure differential across a variable or fixed orifice, providing a constant flow rate regardless of variations in upstream or downstream pressure. Various forms of differential pressure regulators are available.

The GH21XT maintains a fixed differential of 3 PSI (21 kPa) across the bonnet connection and body outlet. Adjustment of the flow rate is made downstream of the system. These units are normally used with flow rate indicators having built in needle valves.

These units are available in brass and aluminum construction, (GH21XTXM), all stainless steel (GH21XTXKXK, GH21XTXKXKS) or all aluminum construction (GH26/27XFXM). The GH21 Series has ¼" NPT connections and is rated for a 200 PSI (1379 kPa) maximum supply pressure, 300 PSI (2068 kPa) for stainless steel models. The GH26XF has 3/8" NPT connections with the GH27XF having ½" NPT (Signal Port ¼" NPT). Both units (GH26/27) are rated for 100 PSI (1379 kPa) maximum supply pressure.

The GH21F maintains a fixed differential of 3 PSI (21 kPa) across the bonnet connection and the body outlet, plus an integral needle valve is provided to allow flow rate adjustment within the regulator. This unit is normally used with flow rate indicators without needle valves. Construction of this unit is brass. The maximum supply pressure rating is 200 PSI (1379 kPa) and connections are ¼" NPT.

The GH21At provides an adjustable differential pressure across the bonnet connection and body outlet within the limits of the regulator range. The flow rate is controlled by adjusting the range spring to vary the pressure drop across a fixed orifice instead of using a needle valve.

These units are available in brass (GH21ATXEXXX_) or stainless steel (GH21ATXKXKX_, GH21ATXKXSX_) construction. The brass units have a maximum supply pressure rating of 200 PSI (1379) with the stainless steel units being rated at 300 PSI (2068 kPa). The body connections are ¼" NPT with an 1/8" NPT signal port connection. Regulated ranges are 0-5, 15, 25, 35, 50 and 0-125 PSI (0-35, 103, 172, 241, 345 and 862 kPa).

The GH31XT provides a 3 PSI (21 kPa) upstream differential pressure across a needle valve or other orifice to maintain a constant flow rate independent of line pressure variations. These units are also available in brass (GH31XTCM) or stainless steel (GH31XTXKXK, GH31XTXKXS) construction. Connections are ¼" NPT and both are rated at a maximum supply pressure rating of 100 PSI (690 kPa).

The brass or brass/aluminum combination units use Buna "N" diaphragms as standard with the stainless steel units having Teflon/Buna "N"/Teflon sandwich type diaphragms. Other diaphragm materials are available.

For purging systems using air, water or gas, the Conoflow GDH21 Differential Purge Assemblies are available. These units incorporate a GH21XT Regulator, needle valve and flow rate indicator, completely piped and ready for installation. A variety or ranges and styles of flow rate indicators are available. Refer to Charts 1 and 2 on Page 37using a needle valve.

Options:

Dimensional Data	AdvertisingDrawings:
GH21F:	A17-7
GH21/31/41:	A17-18
GH21AT:	A17-19
GDH21 1 and 2:	A13-4
GDH21 5 and 6:	A13-5
GDH21 7 and 8:	A13-8
GDH21 9 and 10:	A13-7
GDH21 11 and 12:	A13-9
GDH214:	A13-10
GDH213:	A13-11

→ GH20VT/GH28VT Series Vacuum Regulator

Conoflow's Vacuum Regulators are designed to accurately regulate the sub-atmospheric pressure of a vessel being evacuated. These units are especially suited for laboratory work and test standards for simulation of high altitude conditions.
Standard construction of the Model GH28VT is aluminum with Buna "N" diaphragms. The GH20VT Series is available in either brass or stainless steel construction. The brass units are supplied with Buna "N" diaphragms
and the stainless steel versions utilize Teflon/Buna "N"/Teflon sandwich diaphragms. Regulated vacuum ranges of 0-15" and 0-30" Hg (38.1 and 76.2 cm Hg) are standard.
Connections for the GH20VT Series are ¼" NPT with the bonnet sensing port having an 1/8" NPT connection. The Model GH28VT has four ¼" NPT
connections (this unit has no bonnet sensing port). An easily adjustable handwheel or knob (wrench style) is available.
These units are backed by Conoflow's high standards of manufacture and years of experience as a leading producer of precision instrumentation.

Options:

Adjustment
Screwdriver Slot (Optional)
Dimensional Data – Advertising Drawings:
GH20VT: A17-5
GH28VT: A17-90

→ GH22 Series Ratio/Flow Boosting Relay

The Conoflow GH22 Series Relay is used to boost, amplify or reduce the pneumatic signal of a controller or similar instrument in a predetermined ratio. Using an independent supply of pressure for greater flow volume, the unit relays an instrument signal to a final control element such as a valve actuator.
The GH22 is supplied in a brass/aluminum combination and has a maximum
supply pressure rating of 200 PSI (1379 kPa). Buna "N" diaphragms are standard. Connections are ¼" NPT. Maximum signal pressures are 150 PSI (1034 kPa) (ratio 3:1, 2:1, 1:1), 75 PSI (517 kPa) (ratio 1:2) and 50 PSI (345 kPa) for ratio 1:3.
A large selection of ratios, 1:1 (flow boosting), 1:2 and 1:3 (multiplying) and a 2:1 and 3:1 (dividing), meets a wide range of application requirements.
These units are backed by Conoflow's years of experience as a leading manufacturer of precision built instruments.

→ GH30 Series Back Pressure Regulator

The Conoflow Series GH30 Back Pressure Regulator is used to maintain a constant upstream pressure of gas, vapor or liquid. Designed for accurate regulation under low flow conditions, these units are widely used for protection of analysis instrumentation or as a relief valve in supply pressure lines to control devices.

The GH30 Regulator is available in brass/aluminum combinations or all stainless steel construction. Buna "N" diaphragms are standard with Teflon/ Buna "N"/Teflon used in the stainless steel models for corrosive services. Regulated pressure ranges are 0-3, 5, 15, 25, 35, 50 and 125 PSI (0-21, 35, 103, 241, 345 and 862 kPa). Connections are ¼" NPT.

These units are backed by Conoflow's years of experience as a leading manufacturer of precision built instruments.

Options:

Adjustment

Handwheel (Standard)

Wrench Knob

Dimensional Data – Advertising Drawings:

GH30: A17-2

→ HP300 Series

Turning the control knob clockwise will increase the force on the range spring and, in turn, the outlet set pressure. Conversely, turning the control knob counter-clockwise will decrease the force on the range spring and decrease the outlet set pressure. In equilibrium, the force exerted by the range spring is balanced by the outlet pressure.

An unbalance between the outlet pressure and the set pressure causes a corresponding reaction on the sensor and valve. If the outlet pressure rises above the set pressure, the piston sensor with lift allowing the main valve to seat. This action causes the relief valve to open relieving the excess pressure to atmosphere until equilibrium is reached.

If the outlet pressure falls below the set pressure, the range spring will push the sensor down and unseat the main valve. This allows supply pressure to flow through the main valve to the downstream port increasing the set pressure. At equilibrium, the valve plug assumes a position which supplies the required flow while maintaining the outlet pressure at the set pressure.

→ HP400 Regulator

Pressure Reducing - Piston Type

Conoflow's HP400 is a piston-sensing, self-contained pressure reducing regulator.
High inlet and outlet pressures allow use of this regulator in component testing, calibration systems, manufacturing processes and other applications that require
an economical regulator having reliable and safe operating characteristics.
The brass constructed HP400 Regulator has a maximum supply pressure rating of 3500 PSIG (24.2 MPa). Control setting range for this unit is 20 to 2500 PSIG (0.138-17.25 MPa). Adjustments within the range are made with a large handwheel furnished with the standard unit. Optional adjustment devices include
a wrench style knob with a locking device or a "T" bar handle.
This unit is supplied with ¼" NPT inlet and outlet connections. Inlet and outlet gauge ports (¼" NPT) are standard. The regulator is non-relieving with a captured
bonnet.

Feature Summary
High inlet pressure 3500 PSIG (24.2 MPa)
6000 PSIG (41.40 MPa) inlet pressure available
High outlet pressure 2500 PSIG (17.25 MPa)
Piston sensing for safe and reliable service life
Economical brass construction
Captured bonnet - standard
Mounting nuts available for optional panel mounting
Regulator cleaned to ITT Conoflow Specification (ES8A 01 294)
CGA cylinder connections available

Dimensional Data – Advertising Drawings:
HP400-C1: Standard unit
HP400-C2: "T" bar handle
HP400-C3: Wrench Knob with locking device

HP400 Maintenance Kit
80400-11, 12, 13, 14, 15, 16, 17, 18 - For all control setting ranges
HP400 Overhaul Kit
81400-11, 12, 13, 14, 15, 16, 17, 18 For all control setting ranges

Options:

Mounting
Line – All variations (Supplied with plain bonnet)
Panel – (2 Panel mounting nuts) Optional
Adjustments
Handwheel (Large)
Knob (Wrench style - with locking device) – Optional
"T" bar handle – Optional
Cylinder Connections
CGA connections are available

→ HP500 Regulator

Pressure Reducing - Diaphragm Type - High Purity

The HP500 Regulator is a self-contained, diaphragm sensing high purity regulator. A broad offering of materials of construction and five control pressure ranges allow use of this unit in applications that include the regulating of specialty gases, gas chromatography, research labs as well as the regulation of corrosive and non-corrosive gases and liquids. Material options include brass, 316 stainless steel and 316L stainless steel. N.A.C.E.,
Monel and Hastelloy constructions are available upon request. The brass units are rated for a maximum supply pressure of 5,000 PSIG (34.5 MPa) and the stainless steel units are rated to 6,000 PSIG (41.40 MPa). Optional 15 Ra microinch wetted surfaces are available.
This high purity, pressure regulator is designed to accurately control pressure ranges of 4-25, 4-50, 5-100, 6-250 and 10-500 (0-0.173, 0-0.345, 0-0.690, 0-1.73 and 0-3.45 MPa). The HP500 has ¼" NPT inlet and outlet connections. Gauge ports are optional. To suit high purity applications, Vacuseal, VCR and Ultra Seal welded fittings are available. Adjustments within each range are made with a standard large handwheel. A wrench style knob with a locking device and a "T" bar handle are optional adjustments. These products are guaranteed by Conoflow's high standards of manufacture and years of experience as a leading producer of precision instruments.

Feature Summary
Relieving and non-relieving diaphragms offered
Brass, 316 Stainless Steel, 316L Stainless Steel, N.A.C.E., Monel and Hastelloy constructions available
Design leak rate 2 x 10-8 atm cc/sec of helium
High purity internal connections optional
Vacuseal, VCR, Ultra Seal welded fittings optional
Five regulated outlet ranges from 4-25 PSIG to 10-500 PSIG (0.03-0.173 MPa to 0.069-3.45 MPa)
15 Ra microinch wetted surfaces available
Optional ¼" gauge ports
Metal-to-metal diaphragm to body seal
Line and rear mountings are standard
Panel mounting is optional
Regulator cleaned to ITT Conoflow Specification (ES8A 01 294)
CGA cylinder connections available

Dimensional Data – Advertising Drawings:
HP500-C1: Standard Unit (Large Handwheel)
HP500-C2: "T" Bar Handle
HP500-C3: Wrench Knob with Locking Drive

Options:

Mounting
Line – All variations (Supplied with plain bonnet)
Panel – (2 Panel mounting nuts) Optional
Rear Mounting – Standard
Adjustments
Handwheel (Large) – Standard
Knob (Wrench style - with locking device) – Optional
"T" bar handle – Optional
Gauges
2" and 2½" diameters
Brass, steel and stainless steel construction
Cylinder Connections
CGA Cylinder connections are available

→ HP600 Regulator

Pressure Reducing - Tied Diaphragm Type - High Purity

The HP600 High Purity model is a self-contained, pressure reducing regulator which incorporates a tied diaphragm design.

This style of mechanical link between the diaphragm and main valve assists in preventing pressure "creep" even when media accumulation has occurred on the valve seat. Applications for this regulator are high purity gas handling, regulation of HCL, silane, phosphine and ammonia, semiconductor manufacturing, research labs, and regulation of corrosive and specialty gases.

The 316 Stainless Steel constructed unit has a maximum supply pressure rating of 3000 PSIG (20.7 MPa). The convoluted 316 Stainless Steel diaphragm provides accurate and reliable regulation over four control setting ranges from 2-25, 3-50, 3-100 and 4-150 PSIG (0.014-0.173, 0.021-0.345, 0.021-0.690 and 0.028-1.04 MPa)

Pressure adjustments are made with a large handwheel or by an optional wrench style knob with a locking device or an optional "T" bar handle.

The HP600 has ¼" NPT inlet and outlet connections. Inlet and outlet gauge ports are standard. High purity internal connections and VCR, Vacuseal and Ultra Seal welded fittings are available upon request. Line and rear mounting are standard for this regulator.

Feature Summary

316 Stainless Steel, 316L Stainless Steel and N.A.C.E. constructions available
High purity internal connections - optional
VCR, Vacuseal, Ultra Seal welded fittings - optional
Leakage to 2 x 10-8 atm cc/sec helium
Multiple control ranges available
In-line and rear mounting are standard
Non-Relieving, positionable captured bonnet (Standard)
Regulator cleaned to ITT Conoflow Specification (ES8A 01 294)
CGA cylinder connections available
5,000 PSIG (34.50 MPa) inlet pressure available

Dimensional Data – Advertising Drawings:

HP600-C1: Standard unit

Options:

Mounting

Line – All variations
Rear Mounting (Standard)

Adjustments

Handwheel (Large)
Knob (Wrench style - with locking device) – Optional
"T" bar handle – Optional

Cylinder Connections

CGA connections are available

Gauges

2" and 2½" diameters
Brass, steel and stainless steel construction

→ HP610 Regulator

Pressure Reducing - Diaphragm Type - High Purity

The HP610 is a high purity, self-contained, spring-loaded, pressure reducing regulator. This unit is designed for use in applications requiring high flow rates and the ability to relieve outlet media pressure. Non-relieving models are also available.

The 316 Stainless Steel constructed unit has a maximum supply pressure rating to 250 PSIG (1.73 MPa). The convoluted 316 Stainless Steel diaphragm provides accurate and reliable regulation over a control setting range of 0 - 50 PSIG (0 - 0.35 MPa).

The HP610 has one ¼" NPT inlet connection and two ¼" NPT outlet connections. Both outlet ports provide the same flow capacity with the central port generally being used as a gauge port.

Feature Summary

Relieving style diaphragm provides accurate regulation in dead-ended applications
Internal finish on wetted components is 20 Ra
Inboard leakage to 2 x 10-8 atm cc/sec helium
High flow rate capability
Non-relieving model available
Regulator cleaned to ITT Conoflow Specification (ES8A 01 294)

Dimensional Data – Advertising Drawings:

HP610-C: Standard unit

Options:

Mounting

Line – All variations
Panel – 1 nut - Standard

Adjustments

Handwheel (Large)

Gauges

2" and 2½" diameters
Brass, steel and stainless steel construction

→ HP700 Regulator

Two Stage - Diaphragm Type - High Purity

Conoflow's HP700 Series regulator is a two stage, high purity unit designed to provide constant outlet pressure regardless of inlet pressure fluctuations. This unit is available in either brass or stainless steel construction. Maximum supply pressure rating for either material is 3500 PSIG (24.2 MPa). To provide optimum performance in specific applications, this unit is offered with relieving, non-relieving, and tied (non-relieving) diaphragm options.
Typical applications for the HP700 regulator are gas chromatography, calibration systems, cylinder gases, and precise regulation of corrosive and non-corrosive media. Adjustment within each of five available ranges is made with a standard large handwheel. A wrench style knob with a locking device and a "T" bar handle are available as optional adjustments.
This unit is supplied with ¼" inlet and outlet connections. Inlet and outlet gauge ports (¼" NPT) are standard. High purity internal connections and VCR, Vacuseal and Ultra Seal welded fittings are optional.
Captured bonnets for both stages are standard.
This regulator is designed for reliability with an absolute minimum of maintenance. The characteristics are a result of Conoflow's high standards of manufacturing and years of experience as a leading manufacturer of pneumatic instrumentation.

Feature Summary
Maximum rated inlet 3500 PSIG (24.2 MPa)
6000 PSIG (41.40 MPa) inlet pressure available
Captured bonnets (Standard)
Leak rate 2 x 10-8 atm cc/sec helium
Brass and stainless steel construction
Optional - VCR, Vacuseal and Ultra Seal welded fittings or high purity internal connections
Control pressure ranges: 4-25, 4-50, 5-100 and 6-250 PSIG (0.03-0.173, 0.03-0.345, 0.04-0.690, 0.04-1.04 and 0.04-1.73 MPa)
In-line mounting is standard. Panel mounting hardware is optional.
CGA cylinder connections available

Dimensional Data – Advertising Drawings:
HP700-C1: Standard Unit (Large Handwheel)
HP700-C2: "T" Bar Handle
HP700-C3: Wrench Knob with Locking Device

Options:

Mounting
Line - All variations
Panel Mounting - No panel mounting nuts
Panel Mounting - 2 nuts - Optional
Adjustments
Handwheel (Large)
Knob (Wrench style - with locking device) - Optional
"T" Bar Handle - Optional
Cylinder Connections:
CGA cylinder connections are available
Gauges
2" and 2½" diameters
Brass, steel and stainless steel construction

GT210 Series Transducers

Miniature I/P - E/P Transducers

Conoflow's Electro-pneumatic Transducers accept a variety of electrical input signals and convert them to proportional pneumatic output signals. The miniature transducer is available with two different circuit boards. One board accepts current inputs of 4-20/10-50 mA DC and the other accepts inputs of 0-5 or 1-9 VDC input, respectively.

Connection of electrical source is made through a ½" NPSM conduit connection in two different manners. One unit is offered with a metal cover having a removable top access cover for direct connection to the internal terminal block. The second option is made through connection to 2 leads which are 20" long (#18 GA. wire - 20" long/positive red - negative black). All operation adjustments (zero and span adjustments) are accessible from the front of the transducer. As an added feature, the conduit connection is optionally available equipped with a Hirschmann connector.

These units are available with output signals of 3-15, 3-27, or 6-30 PSIG (21-103, 21-186, or 41-207 kPa). Special output signals are available, consult the factory. The unit can be mounted in any position and output signals are field reversible. Supply pressure up to 40 PSI (276 kPa) can be used. Optional gauge ports are available for monitoring the output signal.

Intrinsically Safe approvals are listed for both incendive and non-incendive barriers.

The GT210 (with metal cover) Series Transducer, when purchased with an EMI-RFI Adaptor (6386522), conforms to SAMA PMC33.1-1978 for Classes 1 and 2, Bands A, B and C with less that 0.25% error.

Typical applications for these units include controllers, relays, HVAC systems, energy management systems, valve actuators and control room applications.

Dimensional Data – Advertising Drawings:

GT210: A28-45 Metal cover with top access cover
GT210: A28-46 Metal cover with 20" leads
GT210: A28-50 2" Pipe Mounting Bracket

GT 8 Series Milliampere Transducers

Conoflow's Electro-pneumatic Transducers accept a variety of electrical input signals and convert them to proportional output signals of 3-15, 3-27 or 6-30 PSIG (21-103, 21-186 or 41-207 kPa) The GT_8 Series Transducers incorporate low impedance circuitry and a range selector jumper switch which can be positioned to accept 4-20 or 10-50 mADC current inputs. The selector feature permits stocking only one unit that can be used in various locations throughout the plant. For easy field adjustment these units are equipped with an external zero setting and a built-in potentiometer on the circuit board for span adjustment. Optional input signal of 0-20 mA is available on the GT-8 Series.
These transducers are available in either high or low capacity configurations (Maximum Air Delivery Rate). The high capacity models incorporate a booster relay which eliminates the need for additional boosters or relays when operating air actuated valves. The low capacity versions use a fixed orifice and are utilized for input signals to pneumatic positioners. NEMA 3R housing requirements are optional.
The GT_8 Series Transducer, when purchased with an EMI-RFI Adaptor (6386522), conforms to SAMA PMC-33.1-1978 for Classes 1 and 2, Bands A, B and C with less than 0.25% error.
The GT_8 Series Transducers are approved intrinsically safe by Factory Mutual, Canadian Standard Association, and CENELEC.
For explosionproof models, refer to Pages 114-117.

Dimensional Data – Advertising Drawings:
GT Series - High Capacity: A28-7
GT Series - Low Capacity: A28-9
GT Series - 2" Pipe Mounting Bracket

→ GB50 Series

Pneumatic Piston Actuators

Conoflow's Pneumatic Piston Actuators are compact units designed to function in today's high performance instrument systems.
Piston diameters of 3" to 8" are available with standard strokes up to 10" (for stroke lengths greater than 10", consult the factory). Integral positioners are standard for modulating service.
Force produced is a function of the supply pressure which can be varied from 20 to 100 PSI (138 to 690 kPa). Fast stroking speeds are made possible through the use of a high capacity positioner coupled with a unique cushion-loading regulator. The GB50 Series Piston Actuators are designed for use in corrosive atmospheres or adverse weather conditions.

Optional Accessories:

1. Model FR95XBKEX(C,F,G) Airpak® (Filter Regulator) with gauge.
Specify 0-60 or 0-125 PSI (0-414 or 0-861 kPa) range.
(Bracket mounting is standard).

2. I/P or E/P Transducer. Specify range. (See Transducer Data Sheets).

3. Airlock Feature, Solenoid Valve, Limit Switch and other accessories are available, consult the factory.

Dimensional Data – Advertising Drawings:
GB50: A7-107, 108, 108 and 110
GB51: A7-114, 115, 116, and 117
GB50 Series (Yoke Type): A7-100, 101, 102 and 103
GB50 Series (On/Off): A6-41 and 113
Piping: A50-48

→ GB52SC - GB53SC Series

Pneumatic Lever Actuators

Conoflow's Pneumatic Lever Actuators are rugged and powerful units used to automatically position dampers, louvers, variable pitch fans and to make various mechanical adjustments to process machinery. Low profile (only 18" high) requires less headroom.
A sturdy ductile iron yoke with large mounting base provides rigid mounting. The steel lever arm has eight take-off positions for stroke flexibility.
The Lever Actuator is a combination piston actuator and lever mechanism. These actuators are available in piston diameters of 6" and 8" with a maximum lever travel of 12". Force produced is a function of the supply pressure which may be varied from 20 to 100 PSI (137 to 690 kPa) and the lever take-off position.
The actuator assembly is completely enclosed to protect all moving parts from corrosive atmospheres and adverse weather conditions. All exterior parts are coated with a corrosion-resistant paint.

Optional Accessories:

Model FR95 Airpak® (Filter Regulator) with gauge, specify 0-60 or 0-125 PSI (0-414 or 0-861 kPa) range. (Bracket mounting is standard).

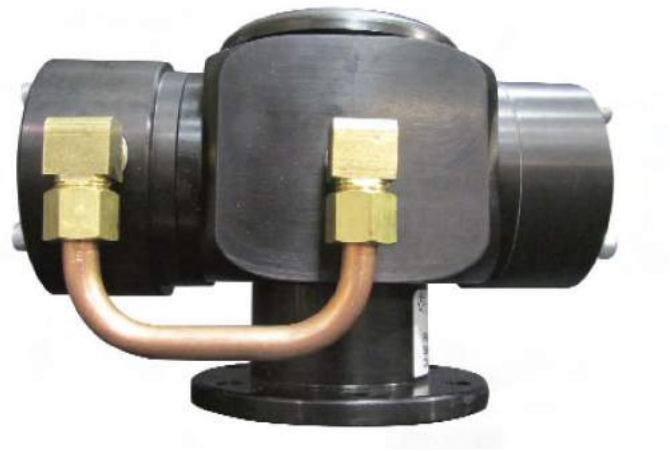
2. I/P or E/P Transducer. Specify range. (See Transducer Data Sheets).

3. Airlock Feature, Solenoid Valve, Limit Switch and other accessories are available, consult the factory.

Dimensional Data – Advertising Drawings:
GB52SC - GB53SC: A7-111
Piping: A50-48

GC31/GC34 Commandaire® Positioners

The Commandaire® Positioner is a top mounted, integral positioner used with piston or spring and diaphragm actuators. Utilizing a force balance principle this unit provides proportional positioning of an actuator with stroke lengths up to 10". The completely enclosed design eliminates exposed levers or linkages making the Commandaire® Positioner rugged and reliable.
This unit has a single-stage pilot which affords a high degree of stability and excellent positioning accuracy. This high capacity 5 SCFM (0.14 m3/min) at 100 PSI (690 kPa) pilot valve exhausts or feeds supply pressure 20 to 100 PSI (138 to 690 kPa) to the actuator producing fast response. Small changes in the instrument signal are amplified by the high volume pilot assuring fast, stable and precise positioning of the actuator stem.
Available in four versions, the Commandaire® Positioner can be top or bottom loading, direct or reverse acting. Refer to chart below for details:



Dimensional Data – Advertising Drawings:
Fail Safe Schematic: A50-48
GC31: A50-49
GC32: A50-50
GC33: A50-51
GC34: A50-52

Airlock Fail-Safe System

Today's systems demand ultimate performance from all components in the system. These include not only the primary instruments, but also the final control element, an integral part of the control loop. To meet these demands the actuator positioning the final control element must provide true proportional control in response to a signal regardless of the stem load and stuffing box friction. Without precise actuator positioning, the critical function of the final control element is reduced. In many applications, spring and diaphragm actuators, due to their inherent lack of power, cannot offer precise positioning performance. Adding a positioner will improve this performance, but it is restricted by the power-absorbing spring. Conversely, a springless actuator such as Conoflow's Pneumatic Piston Actuator, which utilizes air pressures up to 100 PSI (690 kPa), can deliver thrusts in excess of 12,000 pounds, and strokes up to 10". (For stroke lengths greater than 10", consult the factory.) Positioning accuracy meets the requirements of modern day instrumentation.

The springless Piston Actuator utilizes a cushion of air under the piston whose pressure is maintained by a loading regulator. Output from an integrally mounted positioner determines the position of the piston. A differential pressure across the piston determines the direction and speed of motion. Balance is achieved by an equalization of forces as determined by stem position and instrument signal pressure.

To provide a fail-safe system (extend or retract the stem in the event of air supply failure), Conoflow offers their Airlock Fail-Safe System. Integrally mounted on the actuator, this compact unit provides positive action to open or close a valve.

Principle of Operation

Designed for pneumatic systems, Conoflow Series GVB Snap-Acting Relays change ports to switch or lock in secondary air source when the main supply pressure falls below a predetermined set point. In the event of supply or pilot pressure failure, the positive action relay with one common and two inlet or outlet ports will automatically:

- Switch from main to auxiliary supply pressure
- Lock an actuator in its last position
- Extend or retract an actuator stem
- Divert flow or pressure from one device to another

The Series GVB Snap-Acting Relays have an integral pilot which eliminates the extra piping and connections required with other lock-up valves. Compact and lightweight, the relays are easily piped and mounted.

Principle of Operation (GVB11)

The pressure at which the relays will actuate can be adjusted at any point between 25 PSI (172 kPa) and 85 PSI (586 kPa). Signal or pilot pressure acting in the upper diaphragm overcomes the force of the spring in the bonnet and permits air to flow into the lower chamber. This pressure buildup forces the spring-loaded spool valve to open common Port "A" to "B". When the pressure drops below the preset point, the exhaust port opens and common Port "A" is switched from "B" to "C" be releasing the spring loaded spool valve.

The spool valve will return to its original position ("A" to "B" when the pressure to the pilot is less than or equal to 20% greater than the set point. For example, if the set pressure is 50 PSI (345 kPa), the units will return to its original position when the pressure to the pilot builds up to approximately 60 PSI (414 kPa).

Model GVB12 Relay has two spool sections mounted in tandem with the lower ports designated as "A1", "B1" and "C1".

→ Principle of Operation

The purpose of the GH232T is to reduce the cushion load to the actuator in proportion to the positioner output pressure. This effectively provides the advantage of a full reversal positioner by providing full differential pressure across the actuator piston if necessary.
There are three active pressure chambers in the GH232T. The chambers are labeled S, B and C on the sectional drawing. The supply pressure is connected to the port marked "IN". Note that this port is also connected to the chamber designated "S". The positioner output pressure is connected to the middle port marked "B". The output of the GH232T is ported to chamber "C".
The operation of the GH232T can be explained by evaluating the balance of forces on the diaphragm assembly. In equilibrium, the upward forces must balance the downward forces. Note that there are two sizes of diaphragm area in this device. The effective area of the larger diaphragm is equal to two times the area of the smaller diaphragm.
Let the various pressures in each chamber be designated by the letter assigned to each. The smaller diaphragm area will be designated as "A", and the larger area will therefore be equal to 2A. Balancing the resulting upward and downward forces provides the following result:
(S•A) + (B•A) = (B•2A) + (C•A)
Dividing through by the area "A" are rearranging yields: C = S - B
In other words, the output of the GH232T, "C", is equal to the supply pressure minus the positioner output pressure. Therefore, as the positioner output pressure increases, the cushion load pressure provided by the GH232T decreases accordingly. As the positioner output reaches its maximum which is the full differential pressure, the output of the GH232T goes to zero providing the full differential pressure across the actuator piston. At intermediate positioner output pressures, the cushion load is adjusted as necessary to provide the actuator force required.

Installation

Caution:
Maximum Supply Pressure is 100 PSI.

Unit has two ¼" NPT connections. Port "B" is 1/8" NPT.
It is recommended that a filtered air supply be used.

Check all connections for leakage after installation.

Critical processes demand precise controls. AURA regulators provide primary and secondary pressure control of liquids and gases ranging from high pressure to sub-atmospheric levels in the most challen analytical applications. Manufactured and assembled in the United States, each device is backed by an exclusive Lifetime Warranty and decades of industry experience. Innovative designs, superior performance and robust technology define the AURA advantage.

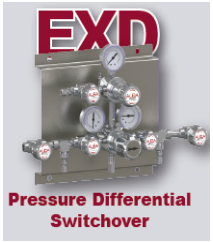
PERFORMANCE GUARANTEED FOR LIFE

The AURA EX1 provides primary pressure control of gases and liquids where minor fluctuations in outlet pressure due to variable inlet pressure are accepted. Available with multiple porting options, peripherals and end connections, the EX1 is a reliable general purpose regulator designed to fulfill a wide variety of applications such as instrument panels, skid-mounted systems and line pressure control.

The AURA EX2 is designed to provide steady and precise outlet pressure control of gases and liquids regardless of changes in inlet pressure. The EX2's dual surface diaphragm provides sensitive pressure control and the encapsulated seat design eliminates impurities. The EX2 is ideal for systems requiring constant outlet pressure such as instrument calibration, compressed gas cylinders and distribution systems.

The AURA EXC enables accurate and reliable pressure control of gases and liquids in a single stage where space is at a premium. The ultra-compact design minimizes weight and footprint to allow the EXC to be integrated into numerous systems with ease.

The AURA EXB provides adjustable relief of excess pressure in closed loop systems caused by spikes in inlet pressure. Unlike standard relief devices that only provide open/close functions, the EXB allows the end user to throttle excess pressure. The EXB is a versatile solution for applications such as analytical instrumentation and processing skids.



The AURA EXD is an automatic switchover system designed to provide a continuous supply of high purity gas for inlet pressures up to 3000 psig. Fully configurable with multiple inlet fittings, purges, panels, and delivery ranges up to 350 psig, the EXD allows for superior flexibility and functionality in applications requiring uninterrupted flow of gas, such as refinery stack analysis, sampling systems and laboratory applications.

The AURA EXF provides primary pressure control of high flow gases and liquids. AURA's dual surface diaphragm provides sensitive pressure control while the EXF's large orifice size and ½" process ports allow for maximum flow. The EXF is an ideal solution for applications such as pharmaceutical sample blanketing, point of use gas systems and chemical pipelines.

The AURA Advantage

Encapsulated Seat Design

- Consolidated internal parts allow easy maintenance
- 10-Micron 360° filter eliminates impurities from all inlet ports
- Orifice size and seat material options ensure ideal performance

Precision Manufacturing

- Metal to metal seals enable $1x10^{-9}$ cc/sec helium leak integrity
- 4-25 Ra surface finishes reduce corrosion
- Low internal volume minimizes dead space

Lifetime Warranty

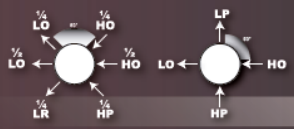
- All products are guaranteed free from manufacturing defect for life
- Minimal number of components eliminates failure points
- Rugged construction increases life cycle in harsh environments

Rigorous Assembly and Testing

- Class 100 cleanroom assembly
- Cleaning for oxygen service standard
- 100% Helium leak check on every product
- Multiple flow and function tests as a complete assembly with peripherals installed

Superior Service

- Made-to-order products meet any user's specification
- Lead times in days with same-day expedited shipping available
- Applications assistance and local training provided by industry experts
- Online access to CAD files, literature, and technical resources



Customized Product Design

- Wide array of standard configurations
- Products engineered from scratch to specific application needs
- Experienced design team knowledgeable in global regulatory requirements

LumiShield Inert and Anti-Corrosive

- Superior corrosion resistance compared to stainless steel and exotic alloys
- Inert surface eliminates absorption of corrosive compounds and moisture
- Reliable in both caustic and acidic applications up to 450°C

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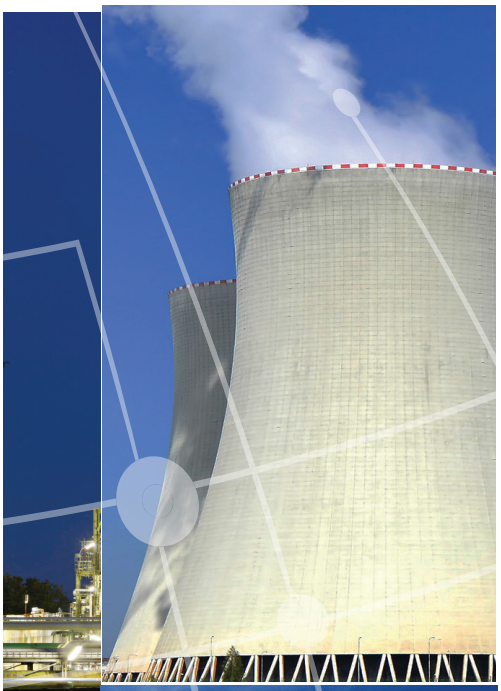
ENGINEERING COMPANY



DISPLAY SYSTEMS | SIGNAL CONDITIONING
DENSITY | LEVEL | WEIGHT | RADIOMETRICS

Your Global Partner in Process
Monitoring and Measurement

ALARM DISPLAY

DATA ACQUISITION | ALARM STATUS DISPLAYS | SIGNAL SYSTEMS FOR HAZARDOUS AREAS

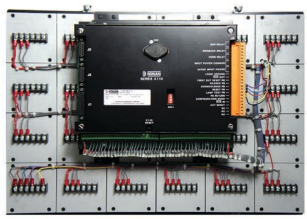
RONAN manufactured the first solid-state integrated circuit-type annunciator on the market, assuring virtually unlimited system life. Continuous research and development have added the following outstanding products to the Ronan line.

LED Light Boxes

Ronan's LED light boxes are the clear choice for fixed window application. Rear terminal screws allow direct external connection or factory wiring to multipin connectors. Redundant window capability is available. Systems are available with 1 to 4 windows and various LED color arrays.

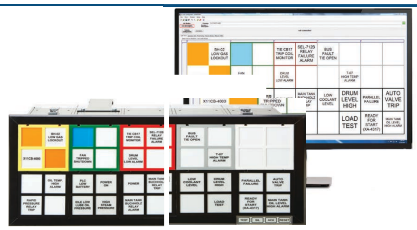
X110 Serial Input Visual Annunciator

With the X110, plant distributed process contacts are multiplexed and the status information transferred via serial link to the X110 controllers. This approach eliminates long runs of multiconductor cables from the field contacts to the annunciator logic and displays.



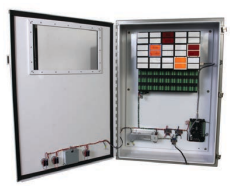
X11CB Event Recording Annunciator

The X11CB Event Recording Annunciator is an advanced integral display system that handles local and remote networking with multiplexing and event time stamping.



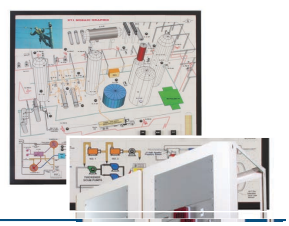
X11CA Computer Annunciator

The X11CA Computer Annunciator has the same capabilities as all Ronan legacy annunciators with the addition of software-based configuration and ability to communicate with an external host device. The X11CA meets the IEEE and ATEX design requirements.



X71 Mosaic Graphic Display

Ronan's Series X71 Mosaic Graphic System is ideally suited for display of industrial processes, power distribution networks, security and fire alarm networks.



X500F Events Recorder

Ronan's X500F Sequence of Events Recorder (SER) is a special purpose multi-microprocessor based contact status acquisition system. These systems monitor the status at electrical power generation, distribution systems and industrial process systems.

SIGNAL CONDITIONING

SAFE AREA ISOLATION BARRIERS | TEMPERATURE AND VIBRATION MONITORING | PRESSURE TRANSDUCERS | MOTION DETECTION | PROCESS SIGNAL CALIBRATION

Ronan's signal conditioning products provide plant operators with engineering solutions to applications where accuracy of signals and robust design is essential to keeping process equipment on line with trouble-free maintenance.

Process signal inputs that are typically supported by Ronan products include DC and AC voltage, frequency and sensor inputs.

X57 Intrinsic Safety Barriers

X54 Loop-Powered Indicator

X55 Pressure Transducers

Explosion Proof

Weather Proof

General Purpose

X25 Loss of Motion Detector

A Ronan best seller, the Loss of Motion Detector X25 can save you money in operation's cost that are critical to material movement by quickly detecting the loss or reduction of motion.

X87 Transmitter

Features continuous monitoring of temperature, vibration, displacement and engineering unit parameters.

X88 Calibrator

The lightweight portable X88 Calibrator provides the accuracy needed for a laboratory-grade-type standard calibration. The X88 is equipped with the same stability as previous calibrators while giving the user additional pre-set memory functions.

LEAK DETECTION

HYDROSTATIC TESTING | CHEMICAL/FUEL SUPERVISION | OIL/WATER SENSORING

RONAN's Leak Detection line includes high accuracy level sensors with proprietary software that allow for continuous real-time leak detection and high accuracy for custody transfer and inventory management.

X76CTM Continuous Tank Monitoring System

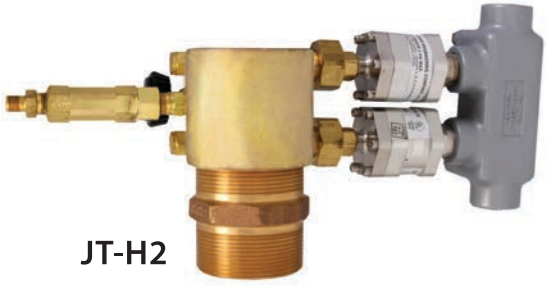
Ronan's X76CTM provides state-of-the art and highly reliable supervision for hydrocarbon fuels, chemicals and other liquids stored in underground tanks (USTs) and above ground tanks (ASTs).

Probes and Sensors

- Inventory Gauging
- Oil/water level sensor
- Pressure/vacuum sensor
- Hydrostatic reservoir sensor

Line Leak Input Module

Ronan's JT-H2 is used in conjunction with the X76DM-4B and does not require the use of a mechanical flow regulator. Together, the products eliminate the "slow flow" condition commonly associated with mechanical leak detectors in cold temperatures.



JT-H2

X76DM-4B

Vertical Liquid Sensors

Ronan's vertical liquid sensors are designed to detect changes in liquid level within reservoirs or the intrusion of liquid in dry containment zones and caisson compartments.

RADIOMETRICS

CONTINUOUS LEVEL | POINT LEVEL | DENSITY | MASS FLOW | CONTINUOUS WEIGHT

Ronan Measurement products are focused on helping you solve your most complex process measurement challenges. Ronan is a leader in in the industry with leading-edge systems that provide non-contact measurement solutions.

X96S Density System

Each system consists of a gamma source, detector and microprocessor. The detector measures the level of energy being emitted from the source and sends a proportional signal to the microprocessor. The entire system is mounted external to the pipe via clamps and can be easily installed while the process is running.

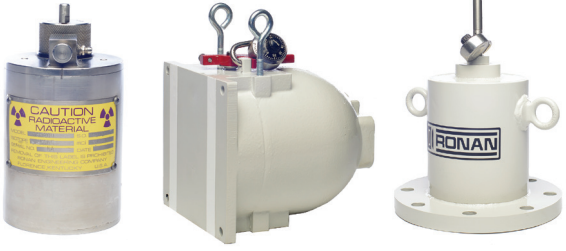
Microprocessor

Source and Source Holders

All gauges meet ALARA guidelines and are customizable depending on vessel and process parameters. Ronan is the only manufacturer to offer the revolutionary Radiation Low Level (RLL) source holder.

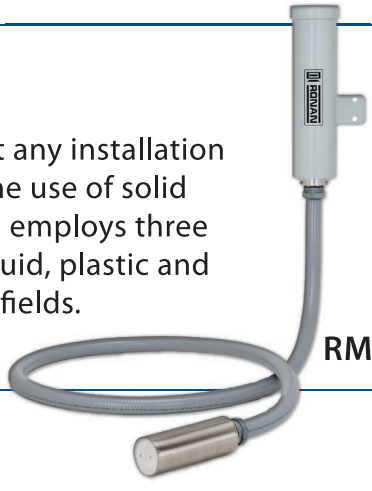
RLL Low Level Source Holder

More Ronan Source Holders



Detectors

Wide variety of detectors to meet any installation requirement. Ronan pioneered the use of solid crystal scintillation detectors and employs three types of scintllation crystals: fill fluid, plastic and sodium iodide for ultra low-level fields.



RM Flex

RM Scintillator

Transmitter

Ronan's X96SI/R Transmitter is compatible with all Ronan scintillation detectors. The integrally mounted transmitter includes a patented optical coupling that allows the transmitter and detector electronics assembly to be easily mounted to any detector configuration.

RM Transmitter

Compatible with any I/O including:

- Ethernet
- HART
- Fieldbus
- USB Port
- 4-20 mA or 0-10 vdc
- Relay(s) Output

INDICATORS AND LAMP CABINET ACCESSORIES

X1D3 Trilight

The very first Ronan product, the Tri-Colored Indicators combine craftsmanship with convenience to be quickly and easily applied to your specific needs such as production testing, process instrumentation, control panels, alarm indicators, graphic displays and more.

X18 Indicators

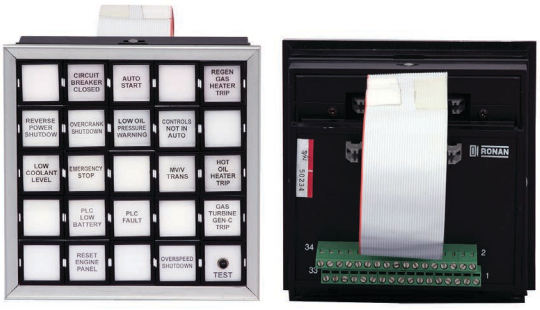
Models X18 Compact Indicators are full voltage and have dual lamp indicators. There is no need for resistors or transformers on 115 VAC services. Both models are suitable for mounting in groups either vertically or horizontally.

LB1, LB2, LB3, LB4 LED Displays

These models are single cabinet module indicators based on the popular Ronan Lamp Box Series.

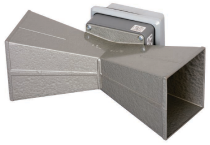
LB-5500 LED Display Cabinet

The LB-5500 is available in multiples of the basic 5 windows high and 5 windows wide arrays. The basic assembly provides test facilities and ribbon cable extension for remote termination.



X36 Horns

The X36 Horn is a high-volume horn with various adjustable sounds, GP and NEMA 4, 80 db.



X17 Field Terminal Assemblies

Ronan Field Terminal Assemblies (FTA) are screw compression terminals for fast connect. These are available with Elco connectors and disconnect isolation switches.

LEGACY PRODUCTS

X3 Relay Alarm System

This relay logic based alarm annunciator system is preferred in applications where extreme environmental conditions are encountered.

X9 Explosion Proof Alarm System

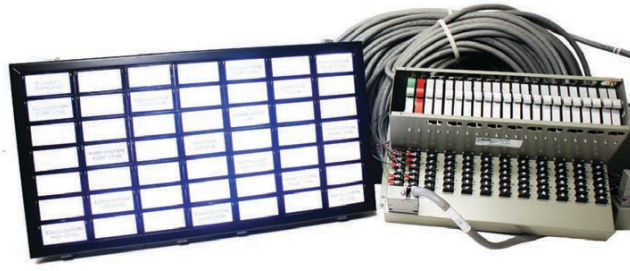
Ronan Explosion Proof Alarm Systems provide maximum flexibility for use under specified operating conditions, supplying single point as well as multipoint units handling up to 20 individual points for hazardous locations.

X11SN Solid State Annunciator

The X11SN is designed for the process and power industries' basic requirements, providing the most economical approach while maintaining Ronan's high quality and performance standards.

X16 Split Architecture Annunciator

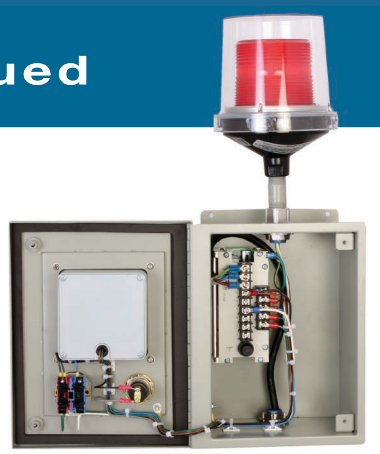
The Visual Annunciator System architecture, configured where the electronic modules are remote from the window display, is ideally suited for large systems in power plants and process plant control rooms.



X15 Explosion Proof Alarm System

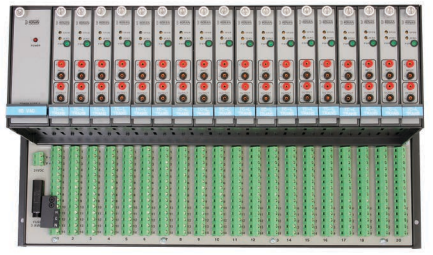
The Explosion Proof X15 Self-Contained Alarm unit provides complete annunciation capability for Class I, Division 1, Group C & D – Explosion Proof Applications.

X19 Self-Contained Alarm Unit



The X19 units provide complete annunciation capability for NEMA 4X or NEMA 12 applications. Each alarm unit contains the necessary logic, status indicator and pushbutton switch for single point monitoring of normally open or normally closed field contacts.

X51N Signal Conditioner



Ronan's X51N Series is suitable for today's space-limited control rooms. The product design offers an ultra-high density combination of transmitter and alarm trip contained in the same module.

Water Quality Monitors

Water quality instrumentation is available for monitoring chemical components in drinking water, process water, and wastewater to bring better control to the treatment process.

Instruments based on polarographic membrane sensors, potentiometric sensors, and light-based optical sensors are designed for demanding applications requiring the utmost in reliability.

Simplicity of operation, ease of maintenance, and low operating cost are key features of every ATi monitor.

- Free Chlorine
- Combined Chlorine
- Turbidity
- Fluoride
- Ammonia
- Filter Backwash Control
- Ozone
- Chlorine Dioxide
- Hydrogen Peroxide
- Peracetic Acid
- Permanganate
- Ortho-Phosphate
- Dissolved Oxygen
- Total Chlorine
- Residual Sulfite
- Sludge Blanket Monitor
- Suspended Solids
- pH/ORP
- Dissolved Sulfide
- UV254
- Resistivity
- Conductivity
- Total Dissolved Solids
- Nitrite

Water Quality Monitors

MetriNet Water Distribution Monitor

MetriNet provides a robust package of up to eight different parameters for potable water distribution monitoring.

- **Low Power Consumption**
- **Wireless Data Transfer Option**
- **Modbus, Ethernet/IP, Profibus DP**

Ammonia Monitor

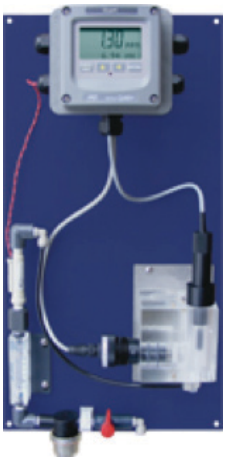
The Q46N measures free ammonia, total ammonia, and monochloramine in potable water.

- **Electrochemical Sensing Method**
- **Low Cost Reagents**
- **Easy Maintenance**

Residual Chlorine Monitor

"Reagentless" residual chlorine monitors that measure free chlorine, combined chlorine, or total chlorine using a direct measuring sensor.

- **Outputs for Chlorine, pH, and Temperature**
- **No Reagent Cost**
- **Long Service Life**



Portable Monitor/Data Loggers

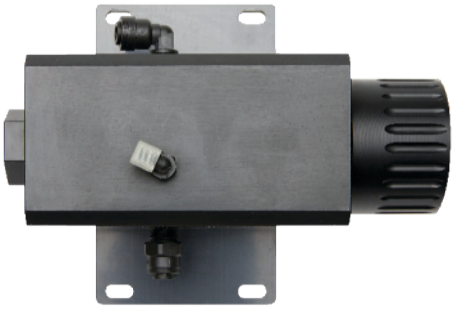
A portable monitor with built in data logger for use in temporary measurement applications.

- **Free Chlorine**
- **Combined Chlorine**
- **Total Chlorine**
- **Nitrite**

Turbidity Monitor

Monitor for raw water, filter effluent, wastewater effluent and other process water applications.

- **EPA 180.1 / ISO 7027 Compliant**
- **Solid Calibration Verification Standard**
- **Easy Calibration Method**



UV254 Monitor

UV254 absorption measurement provides real-time indication of organic carbon content.

- **UV254 and Turbidity Measurement**
- **Multiple Detection Ranges**
- **Optional Q-Clean Autocleaner**

Water Quality Monitors

Fluoride Monitors

Continuous monitoring of final fluoride concentrations ensures the proper amount of fluoride is added.

- **Low Cost Buffer Ensures Accuracy**
- **Automatic 2-Point Calibration**
- **Direct Measuring ISE Method**

Portable Water Quality Systems

Fast and easy setup to provide short term data on residual chlorine and pH in the same package.

- **Battery or Solar Cell Powered**
- **30 Day Operation with 2 C-Cells**
- **Dual Analog Outputs**

Water Quality Panels

On-line monitoring of multiple parameters In municipal water distribution systems and potable water treatment facilities.

- **User Specified Parameters**
- **Custom Panel Features**
- **Multiple Data Transmission Options**

Residual Oxidant Monitor

Reliable electrochemical measurement systems for many oxidants used in disinfection/treatment systems.

- **Ozone**
- **Chlorine Dioxide**
- **Hydrogen Peroxide**
- **Peracetic Acid**

Permanganate Monitor

Continuous water quality monitoring of permanganate in pre-treatment prevents discoloration issues.

- **Eliminates Sensor Fouling Problems**
- **Low Cost Reagents**
- **Easy Maintenance**

o-Phosphate Monitor

Ensure proper corrosion control with online monitoring of ortho-Phosphate chemical feed.

- **Automatic Zero Drift Compensation**
- **Low Reagent Level Alarms**
- **No External Calibration Required**

Water Quality Monitors

Dissolved Oxygen Monitors

Controlling air flow eliminates excess aeration, which translates into significant energy savings.

- **Luminescence Sensor**
- **Unique Q-Blast Auto-Cleaner**
- **Low Maintenance**

Total Chlorine "Air Stripping" Unit

Wastewater effluent monitoring using iodometric method for Total Chlorine detection.

- **EPA Compliant for Effluent Reporting**
- **Gas Phase Sensing Prevents Fouling**
- **Measurement Sensitivity to PPB Level**

Sulfite Monitor

Provide Operations with a reliable tool for reducing chemical feed costs in dechlorination process.

- **Eliminate Costly Chemical Overfeed**
- **Gas Phase Sensing Prevents Fouling**
- **Automatic Sample Line Cleaning**

Suspended Solids Monitor

Monitoring solids in aeration basin assists in process control and provides alarming of unusual conditions.

- **Real Time Monitoring**
- **Maintain Optimal MLSS Level**
- **Q-Blast Autocleaner Option**

Sulfide Monitor

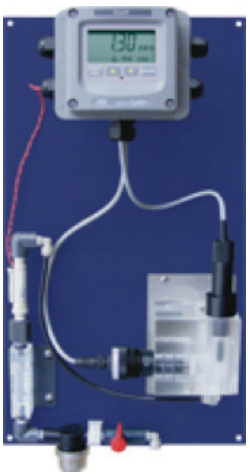
"Air-Stripping" technology removes sensor from contact with process, eliminating potential contamination issues.

- **Low Cost Reagent**
- **Gas Phase Sensing Prevents Fouling**
- **Automatic Sample Line Cleaning**

Nitrite Monitor

Collect accurate data with a novel nitrite sensor for early warning of nitrification in potable water distribution systems.

- **10 ppb Detection Limit**
- **No Costly Reagents**
- **Low Maintenance Cost**



Water Quality Monitors

Conductivity Monitors

Resistivity, conductivity, total dissolved solids, and chemical concentration monitors in multiple configurations.

- **2-Electrode Resistivity / Conductivity**
- **4-Electrode General Purpose**
- **Toroidal Sensors for Anti-Fouling**

pH/ORP Monitors

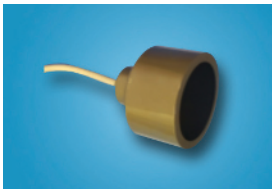
Differential and combination style pH sensors in multiple mounting styles for long term operation.

- **Sealed Sensor Reference System**
- **Optional Q-Blast Autocleaner**
- **Low Maintenance Operation**

Filter Backwash/Sludge Blanket Monitors

FilterSmart allows water managers to "see" into their backwash process with media level and turbidity measurements in one sensor.

- **Minimize Wash Water Usage**
- **Maximize Filter Run-Time**
- **24/7/365 Sludge Blanket Monitoring**
- **Use to run WAS and RAS pumps**



Pressure Calibrators

Martel's line of portable pressure calibrators combine state-of-the-art features with full digital precision and extreme accuracy. Our entire line of BetaGauge pressure calibration equipment allows for maximum flexibility for all of your pressure calibration needs with single or dual sensors and ultimate portability.

BetaGauge PI-PRO and PIR Reference Class digital test gauges offer easy, low cost and reliable pressure measurement for process verification as well as pressure calibration jobs.

All Martel calibrators come from the factory ready to go to work with batteries installed, NIST traceable calibration certificate, test leads, connection hose, fittings, deluxe carrying case and user manual.

BetaGauge 330-300E

Fingertip Pressure Calibration with Integral Electric Pressure Pump

The BetaGauge 330 is a revolution in pressure calibration technology for the process industries. With the 330, technicians have a small, lightweight calibrator that generates from high vacuum to 300 PSI using a high performance integral electric pump.

BetaGauge 321A/311A

Highest Precision and Accuracy Available in a Hand-Held Instrument

Whichever you choose, the single sensor BetaGauge 311A, or the dual sensor BetaGauge 321A, you'll have everything you need for calibrating pressure anywhere. Gas custody transfer is the ideal application for the accuracy and capabilities of the BetaGauge 321A. Select from two standard configurations: 15 psi/1500 psi, or 30 psi/3000 psi, or create a custom configuration by selecting between any two ranges. The BetaGauge 311A can be configured by selecting from any range from 0.4, 1, 5, 7, 15, 30, 50, 100, 150, 300, 500, 1000, 1500, 3000, 5000, or 10000 psi.

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BETA CALIBRATORS

BetaGauge 311A-EX/321A-EX
Intrinsically Safe Pressure Calibrator

Whichever you choose, the single sensor BetaGauge 311A-EX, or the dual sensor BetaGauge 321A-EX, you'll have everything you need for calibrating pressure anywhere. Gas custody transfer is the ideal application for the accuracy and capabilities of the BetaGau––ge 321A-EX. Create a custom configuration by selecting from any two ranges.

BetaGauge PI PRO Digital Test Gauge
Digital accuracy with the simplicity of analog gauge

Digital Test Gauge takes the concept of an analog test gauge, and brings it to a new level. The BetaGauge PI PRO combines the accuracy of digital technology with the simplicity of an analog gauge and achieve performance, ease-of-use, and a feature set unmatched in the pressure measurement world.
Setup of the BetaGauge PI PRO is fast and straightforward, through a menu-driven display, that is simple enough to allow the gauge to used anywere in the world.

BetaGauge PIR-PRO Reference Class Digital Test Gauge

DWhen accuracy really counts, the BetaGauge PIR-PRO Reference Class digital test gauge is the one to count on. With best in the business accuracy of ±0.04% of reading ±0.01% of full scale, nothing beats it for the money.
It's the same rugged, easy to use package as the standard BetaGauge PI-PRO with fast and intuitive keypad controls and a big bright display. Available in 8 ranges from 30 psi full scale to 10,000 psi full scale, the BetaGauge PIR-PRO can display readings in the user's choice of any of 18 standard engineering units plus 1 custom user-defined unit.

DPC-300A Dual System Pneumatic Calibrator
Portable Pressure Calibration Powerhouse

The Martel BETA DPC-300A isn't just a replacement for the old "box" calibrator. With full digital precision and accuracy, a dual pressure system and a built-in loop calibrator function, it's a pressure calibration powerhouse in a portable format.
A dual pressure system means you can use regulated plant air or internally generated pressure sources for calibration. The internal pump goes up to 300 psi with pushbutton ease. Exact values are set using the fine vernier control knob.

BETA CALIBRATORS

BetaGauge 301 Single Sensor Pressure Calibrator

Great performance at an excellent price point

The Martel BETA DPC-300A isn't just a replacement for the old "box" calibrator. With full digital precision and accuracy, a dual pressure system and a built-in loop calibrator function, it's a pressure calibration powerhouse in a portable format.
A dual pressure system means you can use regulated plant air or internally generated pressure sources for calibration. The internal pump goes up to 300 psi with pushbutton ease. Exact values are set using the fine vernier control knob.

Martel T-140 Pressure Calibrator

Laboratory grade accuracy in a rugged, easy-to-use instrument

The Martel T-140 Pressure Calibrator is available in several ranges; 10″ H2O, 200″ H2O, and 30, 100, 300, and 3,000 psi. Operation of this calibrator is made easy through the use of a sealed membrane keypad with simple controls. When combined with a Martel MECP100, MECP500, or MECP10K pump, the T-140 kit makes a great package to handle your pneumatic or hydraulic calibration requirements.

DPC-30 & DPC-100 Digital Calibrators

Precision pneumatic calibration system small, lightweight, and accurate - take your test bench to the field!

The Martel DPC-30 & DPC-100 digital calibrators are designed to test pneumatic field instrumentation, including valve actuators, P/I transmitters, controllers, gauges, switches, and recorders. It is especially suitable for checking 3 to 15 psi systems. Its dual precision regulators enable output of set and variable pressure to control devices, while the switching manifold allows fast selection among the pressure ports. The unit simultaneously displays pressure either mA or VDC, and has a built-in loop power supply. Accuracy is 0.035% of full scale for all ranges.

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Multifunction Calibrators

Work better and get better work with Martel's BETA TEN series multifunction calibrators. This family of 5 models scale up to do any size job you need when calibrating process instrumentation.

This innovative series features the introduction of a new, high contrast ClearBrite™ graphic display. The display features a vivid white backlight that makes the display easy to read in all light conditions. From a super loop calibrator up to a full documenting calibrator, these cover the gamut of calibration tasks.

DMC-1410 Documenting Multifunction Calibrator

Perform automated calibrations on the fly and upload results with a simple easy-to-use software package thats included with the calibrator!

he Martel DMC-1410 documenting multifunction calibrator measures and sources electrical and physical parameters. It's versatile providing access to a complete range of calibration functions including the following:

Dual Display. The upper display is used for the measurement of volts, current, and pressure. The lower display can be used to measure volts, current, pressure, resistance temperature detectors (RTD's), thermcouples (TC's), frequency, resistance, and to source pulse trains.
A thermocouple (TC) input/output terminal with automatic reference-junction temperature compensation
Setpoint in each range for quickly increasing/decreasing output
Complete serial interface for remote control
Isolated read back for transmitter calibrations
Documenting capability for up to 50 tags

MC-1210 Multifunction Calibrator

A precision dual display multifunction calibrator with unmatched accuracy and feature set

The MC-1210 is a rugged and reliable universal multifunction calibrator. It's dual display and isolated readback circuit allows it to power a transmitter under test while reading its milliamp output. Truly an all-in-one calibrator. The MC-1210 Multifunction Calibrator also has a wide range of switch test features for both pressure and temperature switches.

Go Back To Our Line Card

-Dual Display. The upper display is used for the measurement of volts, current, and pressure. The lower display can be used to measure volts, current, pressure, resistance temperature detectors (RTD's), thermcouples (TC's), frequency, resistance, and to source pulse trains.
-A thermocouple (TC) input/output terminal with automatic reference-junction temperature compensation
-Setpoint in each range for quickly increasing/decreasing output
-Complete serial interface for remote control
-Isolated read back for transmitter calibrations
Switchtest capability

MC-1010 Multifunction Calibrator

Multifunction calibrator and all around great value

The Martel MC-1010 multifunction process calibrator provides a high level of functions and features at easy to swallow price for the less demanding user who does not require the isolated read-back circuit found on the DMC-1410 or MC-1210. The calibrator has the following features and functions:

A graphics display. The display can be used to source and measure volts, current, pressure, resistance temperature detectors (RTDs), thermocouples, frequency, and resistance, and to source pulse trains
A thermocouple (TC) input/output terminal with automatic reference-junction temperature compensation
Setpoints in each range for quickly increasing/decreasing output
An interactive menu
Complete serial interface for remote control

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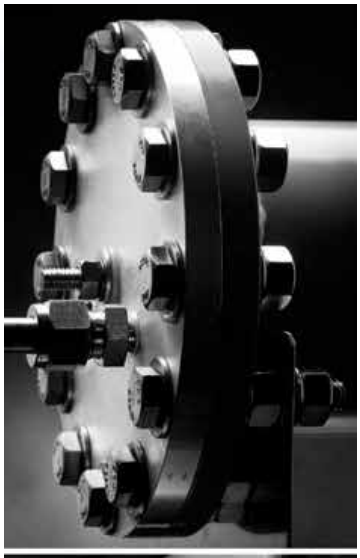
SAFETY - INCREASED EFFICIENCY - RISK MITIGATION

From New Builds to Life Extension & Upgrades



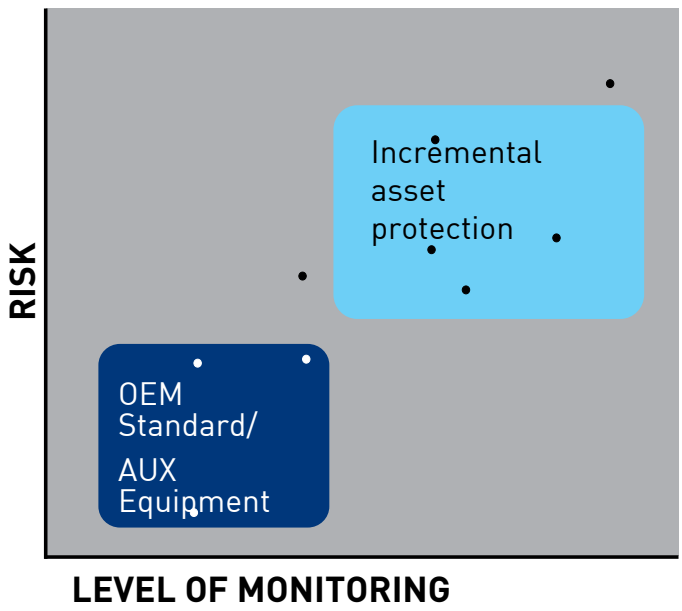
E/One's involvement spans the life cycle of the generator, and often begins as part of an OEM's original scope of supply to the plant. Our critical gas auxiliary systems are designed for use with scavenging or vacuum-type seal oil configurations and E/One has earned a primary-source status with the industry's leading manufacturers. Safety and unit efficiency are at the core of these applications.

Upon start-up and commissioning of the plant, and throughout the OEM warranty period, E/One delivers application and field service support, and supplies risk mitigation technologies aligned to asset protection. These systems may similarly be offered as part of the OEM's original scope, and enable owners to better respond to today's challenges

– inc eased cycling, reductions in experienced plant personnel, aging fleet and prolonged periods between outages.

Extending the life – and efficiency – of a generating asset requires a broad perspective, including not only the machine itself, but the auxiliary systems and predictive maintenance systems that support it. During this phase of the generator's life, E/One assists owners by supplying upgrades that meet evolving safety standards for hazardous areas, and by integrating technologies into cost-effective packages that allow installation work to be accomplished within the more dominant, critical-path boiler and turbine outage periods.

WHERE DO YOUR GENERATORS FALL?



Regard the points as individual generators in your fleet, or at your plant, and consider the risk factors (age, experience, cycling, megawatts, design, etc.) they are exposed to. Are the asset protection strategies in place effectively mitigating risk and optimizing unit availability?

GGD III

GENERATOR GAS DRYER

E/One's GGD III is a dual-chamber system that continuously dries and recirculates generator cooling gas – even when the generator is on turning gear, which is a critical time to maintain low dew point.

GGA

GENERATOR GAS ANALYZER

The GGA is a triple-range sensor/analyzer that provides continuous monitoring of gas purity during all phases of generator operation. The GGA is an extremely accurate, robust and stable system that eliminates the issues of drift and need for frequent recalibration seen in other thermal conductivity systems.
A range of configurations, including a portable design, are available.

Gas Station

The E/One Gas Station is a modular approach that combines monitoring and control systems into a single, integrated platform, customized to meet specific site requirements and budget parameters.

GCM-X

GENERATOR CONDITION MONITOR

The GCM-X provides early warning of generator verheating, potentially saving hundreds of thousands – or even millions – of dollars in costly downtime.

HCC II

HYDROGEN CONTROL CABINET

The HCC II was designed specifically for monitoring and controlling hydrogen purity in generators that utilize scavenging-type seal oil systems (GE bleed and feed). The HCC contains two independent analyzers that monitor hydrogen purity from both the turbine-end seal drain enlargement and the collector-end seal drain enlargement. Configurations for vacuum-type seal oil systems are available as well.

Wireless Ethernet and Cellular

Ethernet is increasing in capability and importance in today's world. ELPRO is on the forefront of this technology, offering Ethernet data solutions in several radio frequency bands that provide users flexibility of selecting a technology matching their own unique application requirements. Full product portfolio includes licenced and licence free frequencies of Ethernet networking solutions and modems.

Licence / Licence Free - Mesh

- 148 - 174MHz: 415U-E
- 340 - 520MHz: 415U-E

Licence-free Mesh 2.4GHz

- 2.4GHz: 215U-2

Redundant Base Station and Repeater

- 148 - 174MHz: 415U-BSR-DC
- 340 - 520MHz: 415U-BSR-DC

Licence-free 900MHz

- 900MHz: 945U-E

Licence / Licence Free

- 360 - 512MHz: 450U-E
- 928 - 960MHz: 950U-E

802.11a at 5.8GHz

- 5.8GHz: 245U-E-A1

802.11b/g at 2.4GHz

- 2.4GHz: 245U-E-G1

Licence Free - Narrow Band

- 868/869MHz: 805U-E
- 900MHz: 905U-E

Cellular & WiFi

- 645M-4

IIoT - Battery Powered I/O

- 415U-1-IoT (2020 Release)
- ERT-A2-IoT (2020 Release)

Ethernet Switches

- Unmanaged: 1050/1080E-T
- Managed: 2080E-T

Wireless Serial

ELPRO's serial products are available in both licenced and licence free options. They connect to PLC's, SCADA, DCS and other intelligent serial devices and are highly scalable from simple point to point to large networks.

60MHz

- 455U-D-60

148 - 512MHz

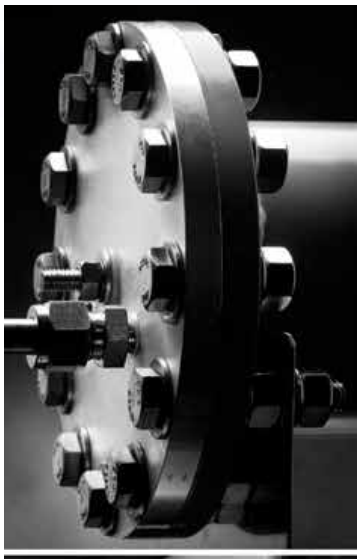
- 455U-D

Licence Free

- 868/869MHz: 805U-D
- 900MHz: 905U-D

SAFETY - INCREASED EFFICIENCY - RISK MITIGATION

From New Builds to Life Extension & Upgrades



E/One's involvement spans the life cycle of the generator, and often begins as part of an OEM's original scope of supply to the plant. Our critical gas auxiliary systems are designed for use with scavenging or vacuum-type seal oil configurations and E/One has earned a primary-source status with the industry's leading manufacturers. Safety and unit efficiency are at the core of these applications.

Upon start-up and commissioning of the plant, and throughout the OEM warranty period, E/One delivers application and field service support, and supplies risk mitigation technologies aligned to asset protection. These systems may similarly be offered as part of the OEM's original scope, and enable owners to better respond to today's challenges

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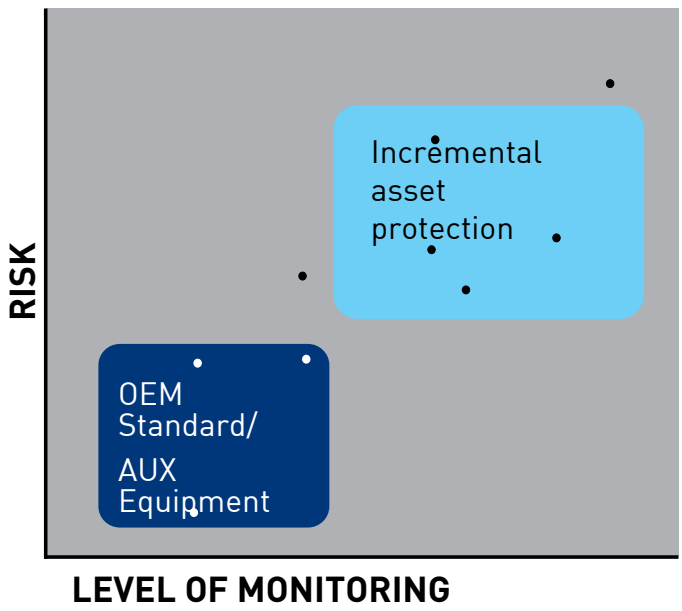

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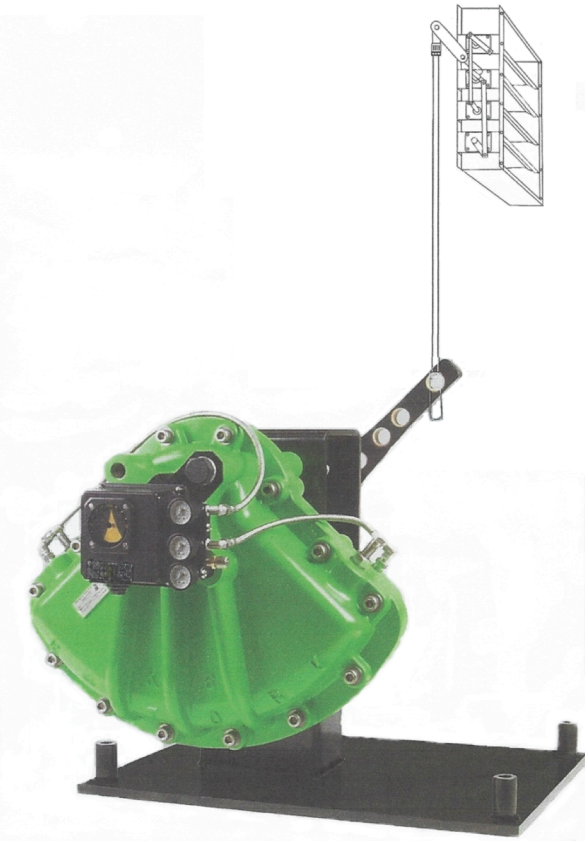
STANDARD-DD
DAMPER DRIVES LLC

STANDARD-DD
Damper Drives

Your Path to Performance and Peace of Mind

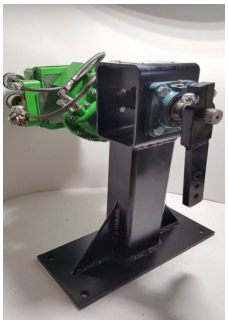


SERIES "FS"
Floorstand Mount Drives

- **High Performance Damper Drives for Precision Damper Control**
- **"Drop in Place" for Easy Retrofit Solutions of Existing Damper Drives**
- **Wide Range of Torque Ratings available in seven (7) sizes from 90 to 10,416 ft. lbs. (122 to 14,131 Nm)**
- **Quarter-turn (90 deg.) rotation is standard. Other degrees of rotation are available**
- **Conventional or Smart Digital Positioner (with HART Communication, Fieldbus or Profibus) options**
- **Control Options for Fail-Safe or Fail-in-Place on loss of Input Signal or Air Supply**
- **Wide Range of Options available:**
  NEMA 4X (IP66) Enclosures, Position Transmitters, Alarm/Travel Limit Switches, Air Failure Lock-up, Air Reservoir for Fail OPEN/CLOSE, Manual Operation shifts easily from Automatic to Manual Control
- **Suitable for High Temperature Environments to 300°F (149°C)**
- **Linear Stroke Cylinder Drives are also available**

- ***The Right Choice for New Installations. The Perfect Solution for Retrofit.***

RETROFIT
with . . .
STANDARD-DD
Damper
Drives



INDUSTRIES:

STANDARD-DD DRIVES ARE DESIGNED FOR THE FOLLOWING INDUSTRIES FOR PRECISE AND RELIABLE POSITIONING OF DAMPERS.

- Electric Power Utilities
- Oil & Gas Refineries
- Chemical/Petrochemical
- Steel, Aluminum and other metals
- Pulp & Paper Mills
- Pharmaceuticals
- Food and Beverage
- Water and Wastewater Treatment
- Co-Generation
- Fluidized Bed Boilers
- Glass Manufacturing
- Cement and Lime


Electric Power Utility

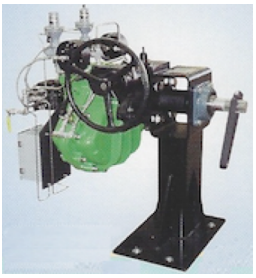

Oil & Gas Refinery

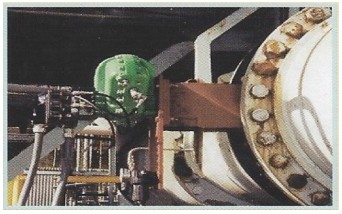

Petrochemical Plant

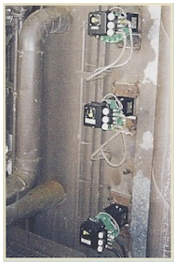

Steel Mill

STANDARD-DD Damper Drive Applications
Flow Modulation of Combustion Air and Flue Gas

- Forced Draft (FD) Fan
- Induced Draft (ID) Fan
- Primary Air (PA) Fan
- Gas Recirculating (GR) Fan
- Booster Fan
- Seal Air Fan
- Primary Air to Mills
- Mill Hot Air Control
- Mill Tempering (Cold) Air
- Mill Velocity/Volume Air
- Mill Shut-off
- Mill Burner Shut-off
- Mill Seal Air
- CE Windbox Fuel & Aux Air Dampers
- CE Burner Nozzle Tilt Drives
- SOFA BOX Dampers
- SOFA BOX Nozzle Tilt
- Secondary Air Windbox
- Cyclone Burner Secondary Air
- Cyclone Burner Primary Air
- Air Heater Inlet
- Air Heater Outlet
- Air Heater Bypass
- Superheat Pass Dampers
- Reheat Pass Dampers
- Main Pass Dampers
- Bypass Dampers
- Gas Recirc Tempering
- Gas Recirc Bypass
- Baghouse Cell Isolation
- SCR System Dampers
- Scrubber Module Isolation
- Flop Gate Coal Diverter
- Bottom Ash Hopper
- Fly Ash Handling Systems
- Oxidation System Dampers
- Fluid drive Coupling Control: F.D., I.D., P.A., G.R. Fans, Boiler Feed Pumps
- Turbine Governors
- Stoker Speed Control
- Gas Turbine Exhaust Bypass


Floorstand Mount


Mount Direct


Alstom CE Boiler Windbox. Secondary Air Control

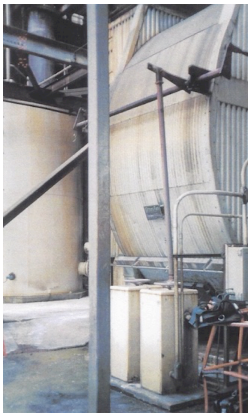
STANDARD-DD High Performance Damper Drives are the solution for Control of Combustion Air and Flue Gas thru a boiler.

STANDARD-DD is dedicated to assist our customers in providing resolutions.

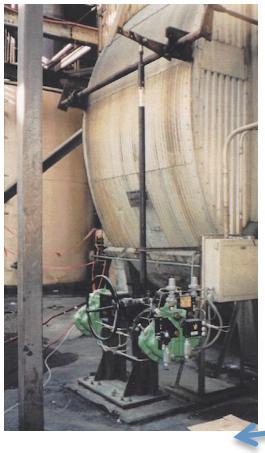
Engineered for precise, accurate, dependable control for a wide variety of damper applications.

- **Rotary vane actuator – one moving part**
  Most reliable, efficient actuator design
- **Linear constant torque output for full 90° stroke**
  Output torques range from 90 ft. lbs. to 10,416 ft. lbs. (122 to 14,131 Nm)
  Master-Slave actuator option provides torque to 20,832 ft. lbs. (28,262 Nm)
- **Compact Rugged Design**
  Maximum environmental protection
- **Wide range of input control and feedback options**
  Characterizable high-gain positioner with versatile signal conditions to interface with customers existing demand signal and feedback signals
- **Durable corrosion resistant internal and external finish**
- **High immunity to shock and vibration**
- **STANDARD-DD Damper Drives provide 100% duty cycle**
  Rated 3600 starts per hour without overheating
- **High speed stroke times of three (3) seconds is available for full damper travel**
- **No internal levers or gearing**
  Eliminates dead-band for fast response and sensitive control
- **No dangerous external moving parts**
  Safe for operating and maintenance personnel
- **Designed for maintenance-free service**
  For operation in harsh high temperature environments up to 300°F (149°C)
- **STANDARD-DD WARRANTY:**
  Three (3) years or two (2) million cycles (4 million strokes), whichever occurs first, after date of shipment

I.D. Fan Radial Vane Inlet Damper Drive



2 each Existing Drives



2 each Retrofit Drives

Before

After

HEART of the STANDARD-DD Drive System – *The Inside Story*

Rotary Vane Actuator is standard. Other actuator types are available.

1. **Dual Opposed Lip Seals**
   Provides effective, air-assisted seal for low friction and long, maintenance-free life

2. **Steel Travel Stops**
   On both sides of steel vane

3. **Corrosion-Resistant Finish**
   Durable TGIC-Polyester Epoxy powder-coat finish inside and outside of actuator surfaces

4. **Steel Side-Plate Seal Retainer**
   Located on both sides of steel vane. Provides the strength to assure accurate Open and Close stop positions

5. **Integral Namur Manifold**
   For direct-mount solenoid valve, eliminating fittings and tubing

6. **Alloy Steel Drive Shaft**
   High tensile output shafts for strength and durability. ENP finish for corrosion-resistance. Wrench Manual Override and Vane Position Indicator

7. **Integral Vane / Shaft Casting**
   Cast as a single piece; only one moving part. Eliminates all "slop", hysteresis or lost motion

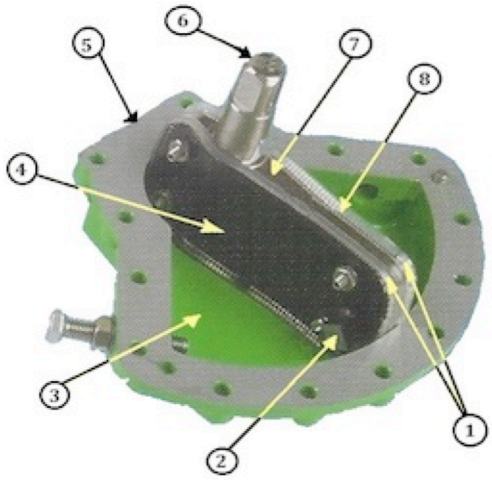
8. **Stainless Steel Seal Expanders**
   Located on both sides of steel vane. Ensures long-term lip seal-to-case contact. Excellent in both high-cycle and low-cycle applications

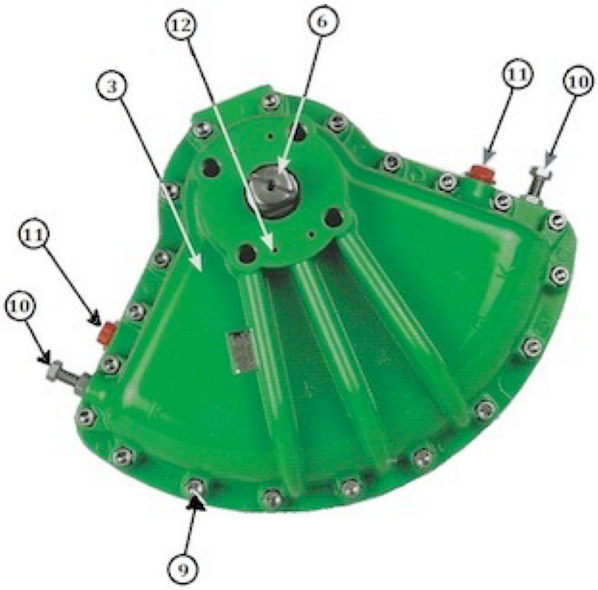
9. **Stainless Steel Bolting Hardware**
   For long-term corrosion resistance

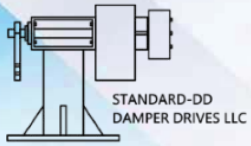
10. **Bi-directional Travel Stops**
    80° to 100° standard adjustments are stainless steel. Extended travel stops available for reduced travel as low as 30° rotation

11. **Large Air Inlet Ports on both sides of Actuator for Fast Operation**
    Provides for high-cycle speed of operation with no restrictions

12. **Integral Namur Accessory Mount on outside top of Actuator Surface meets VDI/VDE 3485 accessory mount standards for positioners, limit switches and indicators**







STANDARD-DD DRIVE CONTROL OPTIONS

- **Conventional Positioner**
  - Standard Linear Cam with square or square root cams available
  - Input Signals
    3-15, 3-27, 6-30 PSI
    4-20 mAdc
    1 to 5 VDC or 0 to 10 VDC or -10 to +10 VDC
- **Smart "Intelligent" Digital Positioner**
  - 4-20 mAdc Signal
  - HART Protocol
  - Analog/Digital Communications
  - Microprocessor based
  - Auto stroke calibration with diagnostics
  - Configured via local pushbuttons, PC with IBIS software and FSK modem or handheld programmer
  - Profibus or Foundation Fieldbus
  - Explosion-Proof Positioner option
  - Low air bleed 0.0003 SCFM in Null state
  - Remote Mounted Positioner
  - CE Conformity
- **Feedback Signals**
  - 4-20 mAdc Position Feedback
  - 1K Potentiometer Feedback
- **Adjustable Alarm/Travel Switches**
  - 2 or 4 SPDT or DPDT Microswitches
  - Proximity Sensors
- **Failure Modes**
  - Fail OPEN or CLOSED with Air Reservoir
  - Hold last position on loss of signal
  - Hold last position on loss of supply air
- **Electrical Components**
  - Nema 4X, (IP66) watertight, dust tight
  - Explosion-proof electrical ratings
- **ON-OFF for Isolation Service**
  Solenoid Valves, single or dual coil
  - 120, 240 VAC 60/50 Hz
  - 24, 125, 250 VDC
- **Manual Override**
  - Hand lever with locking bolt
  - Declutchable Gearbox with Handwheel
  - Pneumatic Regulator
- **Manual Speed Control Valves**
- **Booster Relays for Fast Drive Rotation**
- **Air Failure Alarm Pressure Switch**
- **Combo Particulate/Coalescing Air Filter**
- **Air Pressure Regulator with gauge**

STANDARD-DD Damper Drive Models

Air Pressure in PSIG (Bar) at the Drive	Drive Torque Output Ft. Lbs. (Nm)						
	DD-1	DD-2	DD-3	DD-4	DD-5	DD-6	DD-7
40 (2.8)	32 (43)	68 (92)	155 (210)	379 (514)	883 (1198)	1850 (2510)	3958 (5370)
50 (3.4)	41 (56)	87 (118)	200 (271)	483 (655)	1116 (1514)	2358 (3199)	5000 (6784)
60 (4.1)	50 (68)	106 (144)	241 (327)	583 (791)	1341 (1819)	2875 (3901)	6083 (8253)
70 (4.8)	60 (81)	127 (172)	286 (388)	691 (937)	1566 (2125)	3441 (4668)	7208 (9779)
80 (5.5)	70 (95)	148 (201)	330 (448)	800 (1085)	1800 (2442)	4000 (5427)	8333 (11305)
90 (6.2)	80 (109)	168 (228)	373 (506)	900 (1221)	2025 (2747)	4541 (6161)	9291 (12605)
100 (6.9)	90 (122)	190 (258)	416 (564)	1000 (1357)	2250 (3053)	5000 (6784)	10416 (14131)
110 (7.6)	99 (134)	209 (284)	457 (620)	1100 (1492)	2475 (3358)	5500 (7462)	11485 (15582)
120 (8.3)	108 (147)	228 (309)	499 (677)	1200 (1628)	2700 (3663)	6000 (8140)	12500 (16959)
130 (9.0)	117 (159)	247 (335)	540 (733)	1300 (1764)	2925 (3968)	6500 (8819)	N/A
140 (9.7)	126 (171)	266 (361)	582 (790)	1400 (1899)	3150 (4274)	7000 (9497)	N/A
150 (10.3)	135 (183)	285 (387)	624 (847)	1500 (2035)	3375 (4579)	7500 (10175)	N/A
Displaced Volume cubic in. Full-scale Stroke	21	44	105	250	511	1153	2306
*Adjustable	1-60 sec.	1-60 sec.	1-90 sec.	1-90 sec.	3-120 sec.	3-180 sec.	3-180 sec.

* Full-Scale Stroke Time 0-90 degree rotation, no load, can vary based on control components selected.

RETROFIT AILING DAMPER DRIVES WITH STANDARD-DD
using Rotary Vane Actuators as standard. Other actuators are available.

- Replace any existing brand of Electric or Pneumatic Damper Drives
- Easy *"Drop-in"* installation
- **STANDARD-DD** Series FS Floorstand drives are provided with the same footprint mounting dimensions and output shaft location as the existing drives
- Existing connecting rod linkage is inspected and reused or replaced by **STANDARD-DD**

ON-SITE FIELD SERVICES

STANDARD-DD offers field services at your facility for the following:

- Supervision of retrofit procedure when replacing an old tired damper drive with a new **STANDARD-DD** Damper Drive
- Our Technicians are familiar with the time and effort necessary for proper on-site installation and maintenance
- Our Field Service Teams will help you save time and energy with our expertise to get the job done right the first time
- Contact your local Representative or our factory office Sales Team for more information

Electric Power Utility Plant Coal Fired Boilers

On-Site Certification

RM CONTROLS INCORPORATED

PO Box 6524
Oxnard, CA 93031

Phone:
(800) 214-4499
Fax:
(805) 204-4135

sales@rmcontrols.com
www.rmcontrols.com