Excellence in Instrumentation Solutions for Process Control

Celebrating 35 YEARS OF EXCELLENCE

RM Controls

INDUSTRIES

INTEGRATION AND SERVICES

INSTRUMENTATION

www.**rmcontrols**.com

RM Controls, Inc. 2363 Teller Rd. #111 Newbury Park, CA 91320 Tel: 1.800.214.4499, Fax 805.499.6616

We Proudly Represent:

YOKOGAWA

Data acquisition systems, paper & video recorders, pH, conductivity & gas analyzers, vortex & magnetic flowmeters, pressure temperature and differential pressure transmitters, DCS systems, single and multiloop controllers.

Waltron

Waltron offers a wide range of industrial application instrumentation and supporting chemicals for clean water chemistry management. The company integrates a variety of technologies into a comprehensive line of electronic analyzers.

Varec

Varec provides completely integrated automatic tank gauging systems for bulk liquid petroleum storage facilities, such as float and tape, Radar and servo tank gauging as well as Fuels manager inventory management, SCADA control and terminal automation software.

STANDARD-DD Damper Drives

High Performance Damper Drives for Precision Damper Control.

SIERRA

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

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 control points, Ronan has kept some of the world's largest plants, factories, hospitals and facilities running safely and efficiently.

RM

Integration, configuration, installation, and calibration services

REOTEMP

Bimetal thermometers, pressure gauges, diaphragm seals, tempe-rature gauges, RTDs thermocouples.

PR electronics

They specialize 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.

LAND AMETEK PROCESS & ANALYTICAL INSTRUMENTS

AMETEK Land is the world's leading manufacturer of monitors and analysers for industrial infrared non-contact temperature measurement, combustion efficiency and environmental pollutant emissions.

***Not all lines represented in all territories**

RM Controls, Inc. 2363 Teller Rd. #111 Newbury Park, CA 91320 Tel: 1.800.214.4499, Fax 805.499.6616

We Proudly Represent:

Neo-Dyn® PROCESS CONTROL

Low Pressure and High Pressure Regulators.

Conoflow

Manufactures a full line of precision hygrometers

ELPRO Technologies

ELPRO Technologies wireless business offeris a full range of reliable and secure wireless communication systems.

eone UTILITY SYSTEMS

Power generator monitoring equipment and systems.

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 ranging from conventional panels to fault-tolerant, addressable systems that are globally certified.

BOREAL

Boreal Laser develops and manufactures Open Path Laser Gas Detection products for variety of industrial applications:

- Leak Detection
- Ambient Monitoring

BETA CALIBRATORS

Multifunction calibrators and calibration systems.

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. A Lifetime Warranty and decades of industry experience.

***Not all lines represented in all territories**

RM Controls, Inc. 2363 Teller Rd. #111 Newbury Park, CA 91320 Tel: 1.800.214.4499, Fax 805.499.6616

Our Products & Solutions:

Recorders & Data Acquisition

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

Tank Gauging Systems

Measurement, Data Collection & Transmission, Software & Systems

Power Generation

Monitoring Equipment and Systems

Hygrometers

A full range of hygrometers for spot check or continuous monitoring

Tank Gauging Systems

Measurement, Data Collection & Transmission, Software & Systems

Power Generation

Monitoring Equipment and Systems

Hygrometers

A full range of hygrometers for spot check or continuous monitoring

Flow

- Coriolis Flowmeters
- Multivariable Mass / Sierra
- Multivariable Mass / Yokogawa
- Vortex Flowmeters / Yokogawa
- Vortex Flowmeters / Sierra
- Thermal Mass Flowmeters / Sierra
- Rotameter Flowmeters
- Pitot Insertion Flowmeters / Sierra
- Magnetic Flowmeters
- Ultrasonic Flowmeters

Gas Analysis

- Oxygen
- Hydrogen Purity/ Density
- **Tunable Diode Laser Spectrometer**
  - TDLS 220
  - TDLS 500
  - TDLS 8000
- **Gas Chromatograph**
  - GC8000

Controllers

- DIN Controllers
- Process Controllers
- PLC based

Pressure

- Gauge Pressure
- Differential Pressure
- Absolute Pressure
- Wireless solutions

Vibration Monitoring

Condition Monitoring and Protection

Vibration Monitoring

Condition Monitoring and Protection

Temperature

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

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Our Products & Solutions:

Distributed Control Systems

- DCS
- STARDOM

Instrumentation Systems

Ronan

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

Fire & Gas Detection

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

Liquid Analysis

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

Flame Detection

- Portable Non-Contact Thermometers
- Combustion and Environmental Monitoring

Switches

- Pressure and Temperature Switches

Calibrators

- Multifunction calibrators
- Calibration systems

Laser Gas Detection

Boreal Laser

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

YOKOGAWA

→ Industrial Automation Solutions for Process Manufacturing, Oil & Gas, Energy, Natural Resources, and Environmental Industries.

YOKOGAWA

Together with the founding principles that we have honored for 100 years, our corporate brand (trademark) and the Yokogawa Philosophy are key elements that identify the Yokogawa Group, and express the type of company that we wish to be.

→ FIELD INSTRUMENTS

RotaMASS Coriolis Flowmeters

- Unique "box- in-box" design decouples the measuring tubes from pipeline stresses and vibration guaranteeing reliability and easy installation.
- New high accuracy density calibrations for your most demanding density applications

EJA & EJX Pressure Transmitters

- Digital sensor technology provides simultaneous measurement of DP and static pressure
- Class leading total accuracy and long-term stability up to 10 years
- Fast response time of 90ms
- Built-in compliance to IEC61508 as standard

digitalYEWFLO Vortex Flowmeters

- LDSP technology automatically selects the optimum settings and eliminates the need for start-up tuning
- Multi variable option provides mass o calculations for saturated steam and mass ow of liquids
- Dual elements, high temperature and high pressure options available

Go Back To Our Line Card

AXF Magnetic Flowmeters

- Enhanced dual frequency excitation method with selectable 165 Hz component ensures quicker response and greater stability in high concentration slurries
- Newly designed ow converter permits the measurement of uids with conductivity as low as 1 µS/ cm
- Diagnostics to detect the build-up of insulating coatings on the electrodes

AXR 2-wire Magnetic Flowmeters

- Premium performance from eld proven dual frequency excitation with electric noise immunity comparable to 4-wire meters
- Reduced installation costs by avoiding the extra AC power supply and wiring. Lifetime power savings due to 1-4% of power usage compound to typical 4-wire Magnetic meters

YTA Temperature Transmitters

- Microprocessor-based sensing technology ensures high accuracy and reliability
- Sensor input is user-selectable: thermocouple (T/C), RTD, ohm or DC millivolt
- Continuous self-diagnostics

•ISA100.11a is a wireless networking protocol developed by the International Society of Automation (ISA) for the purpose of Industrial Automation and Process Control.

•The flexibility of wireless solutions enables less investment in infrastructure, while enabling greater process insights wirelessly into plant operations, where measurements may have previously been difficult or uneconomical to implement.

•The ISA100.11a robust security mechanism provides continuously ensured safety in various system operations.

•The combination of an ISA100.11a wireless solution and wired solution advances the Field Digital evolution within Yokogawa's "VigilantPlant" ideal plant concept.

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YOKOGAWA

NETWORK SOLUTIONS

DXAdvanced Data Acquisition and Display Station

- Built-in standard Ethernet interface
- Web server, E-mail messaging, MODBUS TCP client/server, SNTP, DHCP, Ethernet/IP, PROFIBUS-DP and more
- On-board data storage and trending for up to 348 channels. FDA regulation 21 CFR Part 11 compliant
- High-resolution, customizable display
- Universal inputs accept any input combination

UTAdvanced and YS1000 Series Industrial Controllers

- Advanced PID control, ladder sequence control and fuzzy logic
- Function block programming
- Bright and easy to read color LCD displays with scrolling text
- Multiple communications protocols, Ethernet,
- Modbus, PROFIBUS, CCLink, DeviceNet. 3 Year warranty and NEMA 4 face

DAWN Wireless.

- I/O and data radios
- Self organizing, self healing mesh network
- 2.4 GHz and 900MHz frequencies
- Run MODBUS and I/O in one radio

GM10

•The Modular GM10 is a product to the Yokogawa SMARTDAC+ Data Acquisition and Control product line. The SMARTDAC+ is a fresh approach to data acquisition and control, with smart and simple touch operation as a design priority. Through smart architecture, the GM10 enables a scalable data acquisition system.
•Expand one, or multiple module at a time
•Unique design houses modules in linked module bases
•Module base ensures linkage (slide locks and mounting screws also available)
•Modules can be inserted and removed from the front panel for easy maintenance

µR10000 & µR20000 Chart Recorders

•Industrial 100 and 180mm intelligent strip chart recorders
•Ethernet and serial communications interface options
•Large, bright, multi-function data displa
and user interface

Go Back To Our Line Card

YOKOGAWA

→ ANALYTICAL

Liquid Analyzers & Sensors

- pH, conductivity, inductive conductivity, dissolved oxygen, and ORP measurements
- HART®, FOUNDATION eldbusTM, PROFIBUSTM
- On-line sensor diagnostics

Model GD402 Gas Density Analyzer and Detector

- Highly responsive
- Outstanding, stability and resistance to vibration
- Simple, user- friendly interface
- General purpose and explosion- proof

Model GC8000 Process Gas Chromatograph

- TCD, FID and/or FPD detectors
- Custom column design to t a wide variety of applications
- User friendly interface
- Enhanced maintenance via PC interface
- High Sensitivity Thermal Conductivity detector (HTCD) capable of measuring down into the low parts-per-million ranges often replacing Flame Ionization Detectors (FID) and/ or Flame Photometric Detectors (FPD)
- High Speed Ethernet based Analyzer Communications
- Intuitive 12" touch screen interface
- Single or Multiple ovens available with multiple system clocks
- GC module (GCM) concept for intuitive, modular parallel chromatography
- User de ned functions using Y-Basic Flexibility with one to three ovens

Zirconia Oxygen Analyzers and Detectors

- Single point and multi- point analyzers
- HART®, FOUNDATION eldbusTM
- Long-life, highly reliable Zirconia sensor
- Field replaceable probe heater assembly
- Remote and integral converters

Go Back To Our Line Card

YOKOGAWA

→ ANALYTICAL

Model TDLS200 Tunable Diode Laser Spectroscopy Analyzer

- Process gas measurement
- In situ analysis
- Interference free

→ SYSTEMS

CENTUM VP

- Integrated production control system; CENTUM VP is an extremely reliable, highly available process automation system that utilizes rugged Class 1 Division 2 controllers and I/O subsystems combined with Windows Vista/XP based operation
- Highly Coupled with Yokogawa Solution Based packages to improve a single integrated real- time database
- Designed for mission-critical applications, this scalable and expandable architecture combines with open system connectivity to ensure seamless technology migration

ProSafe-RS

- SIL 3 TUV Approved Safety Integrated System (SIS)
- Integrated operation with CENTUM VP for one process, one network, one window with separate engineering environment
- Risk reduction: a single safety system, from a single vendor
- Highly scalable architecture
- SIL 3 capability on a single module

STARDOM

- Network-based control system ideally used in SCADA environments with FAST / TOOLS SCADA HMI.
- JAVA/ Web enabled.
- Smart SCADA RTU/ Autonomous Controller.
- Fieldbus enabled with integration to Yokogawa´s Device Asset Maintenance and Management system- Plant Resource Manager (PRM)

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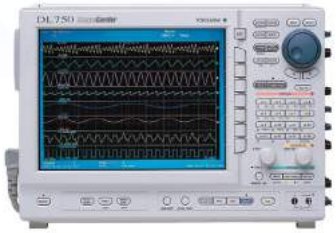
YOKOGAWA

→ TEST & MEASUREMENT



DL 850 ScopeCorder.

- 17 unique plug-in modules offer sensor connectivity, high accuracy, and low noise
- 2 GPts memory with up to 30 days recording, plus streaming to disk
- Simultaneous high and low speed recording
- Web server, FTP, and e-mail functions via Ethernet
- Extensive math and waveform analysis functions

USB, GPIB, Ethernet, and IRIG interface options

AQ7275 Optical Time Domain Re ectometer

- High speed measurement, easy to operate, full feature set for installation & maintenance
- Short dead-zone: ←0.8m Fast boot-up: ←10sec
- Fiber Type: SMF, MMF, both, multi- wavelength
- PON option tests 1x32 splitters with no undershoot

DD Direct Handheld Hart® Communicator

- Simultaneous measurement of power, harmonics, voltage uctuations and waveforms
- Supports a wide range of current and voltage inputs from 1p2w to 3p4w
- Accurate measurements and customized reports for power quality management in your plant or facility

DD Direct Handheld Hart® Communicator

- Reads manufacturers' DDs in their native format without the need for translations
- HART®-compliant modem communicates with any registered or unregistered HART® device
- Features an ergonomic, handheld design
- Enhanced 4.3" diagonal anti-glare touchscreen with color graphic display (no stylus required)
- Full QWERTY keyboard for commissioning new transmitters

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Waltron

EXPERTS IN
WATER CHEMISTRY
SINCE 1903

ON-LINE WATER QUALITY ANALYZERS

Waltron produces the most advanced online analyzers for continuous measurement of specific contaminants in ultra-pure, industrial, and drinking water systems worldwide. We supply a full range of precisely manufactured reagents and standards that are ready to use, with no end user preparation or mixing required.

Benefits of Waltron Analyzers

- Low reagent/standard consumption
- Minimal maintenance
- Long service life, low total cost of ownership

PARAMETER	MODEL	RANGE(S)	TECHNOLOGY
Ammonia	3046	0-1ppm, 0-5ppm	Colorimetric
Chlorine / Ozone	3052	0-5ppm	Colorimetric
	9092 / 9093	0-1000 µg/L (ppb), 0-10mg/L (ppm)	Potentiostatic
Conductivity, Degassed	9096	0-10 µS/cm, 0-100 µS/cm	Cationic Exchange
Conductivity, MultiCon & pH	9095	0-10 µS/cm, 0-100 µS/cm	Cationic Exchange
Copper	3045	0-100ppb, 0-3000ppb	Colorimetric
Ethylene/ Propylene Glycol	3049	0-15ppm	Colorimetric
Hardness	3051	0-1000ppb	Colorimetric
	6051 / 6051M	0.4-3.6, 2.7-26.8, 16.1-160.7, 53.6-535.7ppm	Titrimetric
Hydrazine	3044	0-100ppb, 0-500ppb	Colorimetric
	9072	0-1000ppb	Potentiostatic
Hydrogen, Dissolved	9091 **9091C** portable	0-1000 µg/L, 0-10 mg/L, 0-100cc/kg	Potentiostatic
Iron	3048	0-100ppb	Colorimetric
Oil in Water	2410	0-99ppm	Nephelometric
Oxygen, Dissolved	9065 **9065C** portable	0-2000ppb, 0-45ppm	Luminescent
Phosphate	3042	0-5ppm, 0-20ppm, 0-150ppm*, 0-300ppm*	Colorimetric
Silica	3041	0-500ppb, 0-5ppm, 0-150ppm, 0-300ppm*	Colorimetric
Sodium	**9031CX** compact **9033X** auto cal	0.1ppb-10ppm	Ion Selective

9096

3040 Series

9065 (Dual Channel)

9033X

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Other parameters and additional ranges are available upon request.
* External dilution module

CHEMICALS

READY-TO-USE REAGENTS AND STANDARDS PROGRAM

- No additional preparation or mixing required
- Specially formulated for Waltron and other brand analyzers
- Produced from the highest grade raw materials
- Pre-purchase discounts and hassle-free scheduled release programs

WHO WE ARE

Established in 1903 as a laboratory to test boiler water chemistry, Waltron is a customer-focused organization dedicated to manufacture the highest-quality, lowest total cost of ownership line of instrumentation for the water quality industry. We are dedicated as a team to achieve sustainable and profitable growth.

As Water Chemistry Experts, we show our commitment and dedication every day through the quality of our relationships with our Suppliers, with our Representatives, and most importantly, with our Customers. We strive to provide the most relevant water chemistry solutions for today's concerns.

LOCATIONS

Waltron Bull & Roberts, LLC (Flemington NJ): Our Group headquarters is located about mid-way between New York City and Philadelphia; here we manufacture certain water quality instruments, as well as reagents and standards for all of our products.

Waltron BV (Groningen, Netherlands): Located in northeast Netherlands, this is the site of our European Sales and Support Centre. From here, we arrange shipments of parts and supplies for customers throughout the Europe - Middle East - Africa (EMEA) Region.

Waltron China (Gaobeidian, China): Our newest member of the group, this is the representative office for Waltron's sales and service activities in China.

Varec Float & Tape - Automatic Tank Gauging

www.tankgauging.com

The Varec® brand of automatic tank gauges are often referred to as 'float and tape devices' due to the manner in which the product level is measured (or gauged). This simple design has changed very little over the years due to its reliability and industry-wide acceptance. It provides continuous level measurement and allows the gauge to perform with minimal maintenance throughout its operating life.

Simple Mechanics - Complete Solutions

Varec has maintained all the options and accessories you would expect, including:

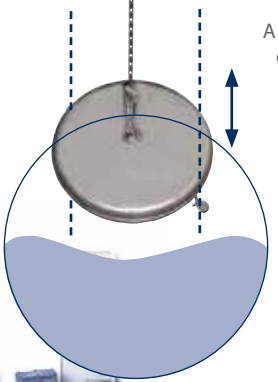
- Installation kits and accessories for product compatibility and tank conditions
- Spare parts and maintenance kits to keep your gauge operating smoothly
- Tank gauge transmitters for level and temperature measurement integration and inventory control applications
- Additional support services, such as preventative maintenance programs and training classes

Inventory Grade Level Accuracy Meets API Chapter 3.1B

The 2500, 2520 and 6700 offer a level accuracy of 0.2-1" (4-25 mm). The 2500 and 2520 display the measured level using a dial and counter in increments of 1/16th inch (1.58 mm) and the 6700 uses a gaugeboard with 1" (25 mm) increments.

The 2500/2520 Automatic Tank Gauges utilize a dial and counter with the gaugehead to display the level of product in your tank.

The gauge board of the model 6700 can easily be seen from long distances and provides the simplest form of tank gauging.



A large float follows the level of the product as it moves up and down in the tank. The float is connected to a tape or wire that in turn is connected to an indicator on the outside of the tank.

2500 Automatic Tank Gauge (ATG)

2520 High Pressure Automatic Tank Gauge (ATG)

6700 Liquid Level Gauge

Go Back To Our Line Card

Varec

"Providing the first steps to inventory management and control - Level and temperature measurement data is encoded by a tank gauge transmitter and output via industry standard communications to the control room."

Tank Gauge Transmitters

Tank gauge transmitters vary in capabilities and application, from float & tape driven switches for the indication of alarms or relays, to level and temperature transmitters that can be mounted to all standard float gauges. When a tank gauge transmitter is used, communications and power are required at the gauge head.

Transmitters convert the measurement parameter (rotation, resistance, etc.) to an electrical signal for transmission over an instrumentation field bus or communications loop to the control room.

Temperature Corrected Volumes

Throughout the oil and gas industry, spot temperature sensors are used for float & tape tank gauging systems, while average temperature devices are generally associated with radar or servo tank gauges due to the increased accuracy obtained from the level device.

Temperature sensors connected to a transmitter allow the inventory system, such as FuelsManager® Oil & Gas software, to calculate volumes that are temperature corrected. Using FuelsManager's standard displays, operators can react quickly to changing conditions, alarms or events within your facility.

Do I Need a Transmitter?

If you have a stand alone float and tape gauge, such as a 2500 ATG, currently installed and can answer yes to any of the following requirements - you need a Varec tank gauge transmitter.

- Visualize gauge data using your control room computer system?
- Integrate temperature measurement?
- Use standard net volume or mass calculations for accounting?
- Integrate gauge data into PLC or DCS systems?
- Require a status indication using inputs and outputs to meters, alarm lights, horns, etc.

FuelsManager Oil & Gas obtains inventory data from a Varec Float & Tape Transmitter connected to an automatic tank gauge (ATG) at the tank side.

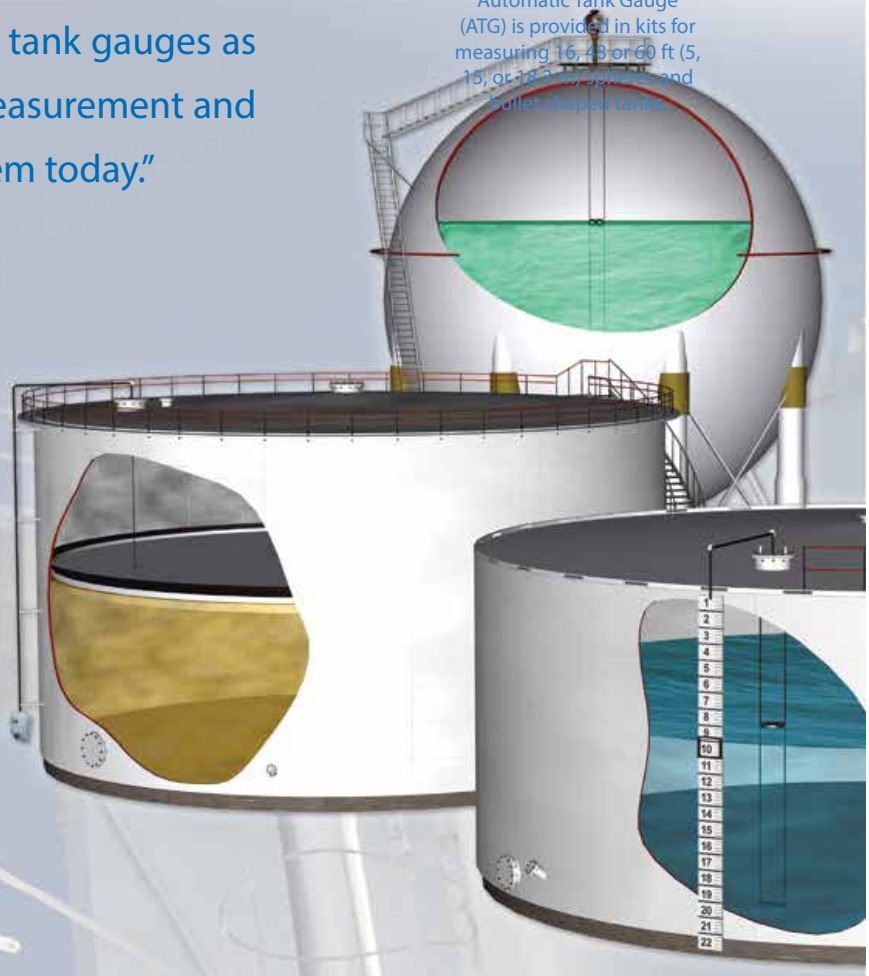
www.fuelsmanager.com

Go Back To Our Line Card

Varec

"Over 50 years ago, the oil and gas industry quickly adopted both the API Standard and Varec float and tape tank gauges as the standard for level measurement and continues to support them today."

2520 High Pressure Automatic Tank Gauge (ATG) is provided in kits for measuring 16, 43 or 60 ft (5, 15, or 18.3 m) spheres and bullet shaped tanks.



The 2500 ATG extended range kits, for use on large tanks, provide a measuring range up to 97 ft (30 m).

Installation - Suitable for almost all product applications and tank types

The 6700 is available with a half-travel kit for tanks up to 97 ft (30 m) in height.

FM APPROVED

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Varec

Tank Type

For float and tape tank gauge applications, the most important question by far is "what type of tank installation is required?" Varec can recommend gauge solutions based on various tank requirements, including:

- Roof or ground reading
- External floating roofs
- Internal floating roofs (pans)
- Floatwells
- Stillingwells
- Extreme pressures
- Bolted tanks

Float Guidewires

Guidewires provide stability for the float during turbulent conditions and increased accuracy by reducing the horizontal movement of the float across the surface of the product. Accessories are available to allow in-service installations, such as weighted anchors that maintain tension in the guidewires without the need for welding inside the tank.

Product Type

Due to the float and tape measurement technique, the following are just some of the products suitable for level measurement using a float and tape device:

- Crudes
- Gasoline
- Jet fuel
- AV (aviation) gas - high octane gas for small aircraft
- Diesel
- Chemicals
- Additives
- Solvents
- Water

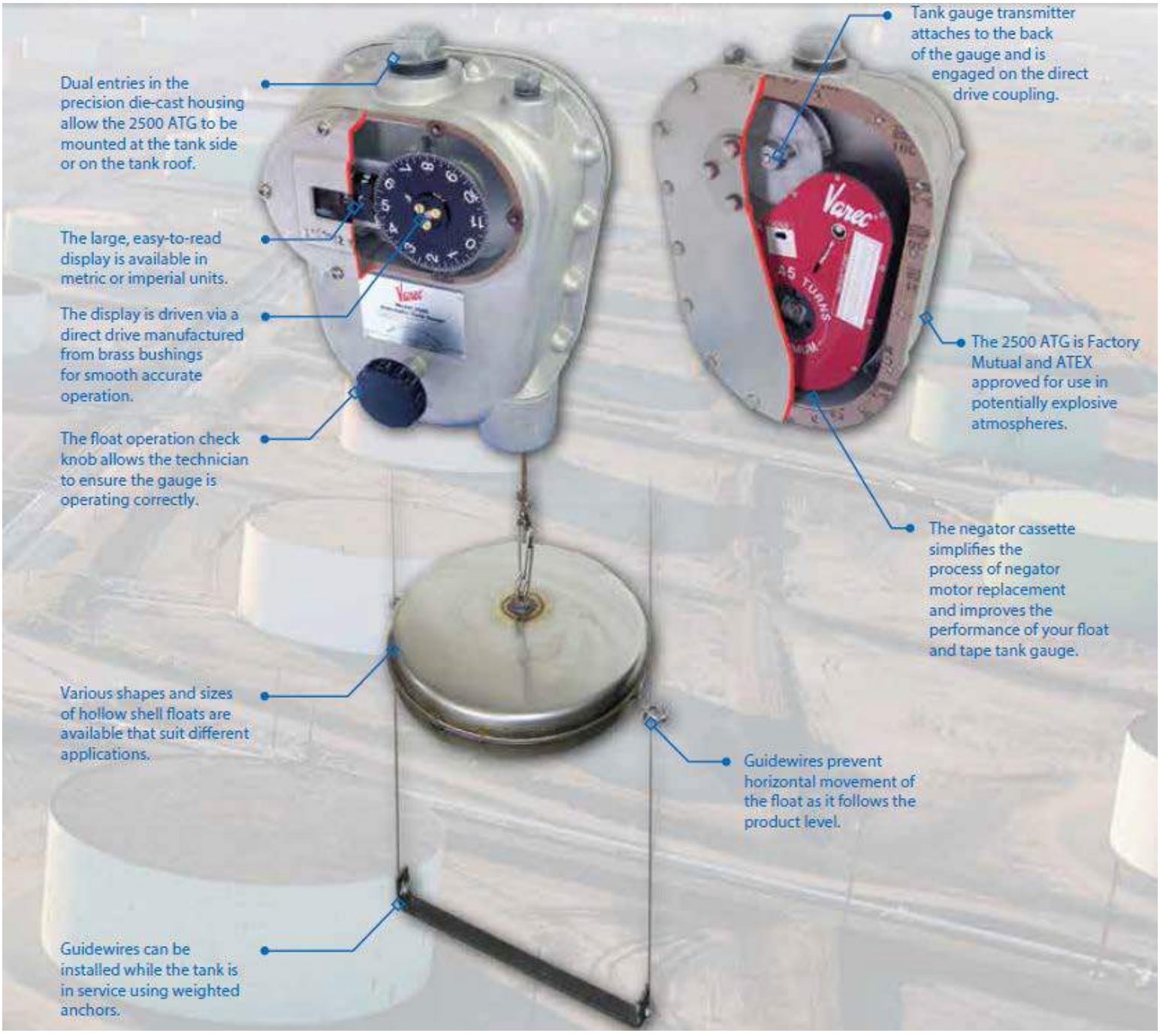
Special Materials

Standard, moderate, severe and extreme service kits are available for applications involving extreme temperatures, pressures or aggressive products. These kits include material options for specific parts that make contact with the product in the tank, tape piping or gaugehead, such as:

- Steel
- Aluminum
- Stainless steel
- Fiber reinforced vinyl ester
- Carpenter 20 steel
- Monel

Go Back To Our Line Card

"Our aim is to optimize the quality and performance of your tank gauging and measurement system, allowing you to get the most from your operations, now and in the future. That is why we offer the most comprehensive range of services all backed by a 24x7 technical and application support center.



Operation - Keep your gauge operating at peak performance for years to come

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Maintenance & Service

As with all instruments, a regular schedule of maintenance is recommended. The frequency of such inspections depends on the specific environmental conditions and operations involved. Due to the various conditions, even from tank to tank on the same site, installations should be studied and a routine of inspection and maintenance should be planned that is best suited to individual needs.

We can provide a multi-step maintenance program for your specific facility with a single aim - to improve the operations of your business by restoring and maintaining your ATGs to their original level of quality and performance.

Our programs include a full site survey and report. After the program has been implemented, we guarantee the operation of your gauges for two years (parts and labor).

Spare Parts

We are the only manufacturer of genuine Varec spare parts. In addition to single spare parts, we have used our experience to create a number of spare parts kits for specific maintenance tasks from basic maintenance to an overhaul kit for a gauge on a tank undergoing an API 653 inspection.

To assist your technicians, we have created a complete set of documents that are available from our website or sales representatives. Each document will help you identify the part you require and simplify the order process.

www.tankgauging.com/spareparts/spareparts.html

Replacing parts in a Varec product with parts that are manufactured by third parties will reduce the effectiveness of your instrument and may void the hazardous area approval certification.

Accessories

Varec manufactures a complete range of accessories to help reduce wear from the float and tape to the gaugehead components, thereby simplifying and reducing the maintenance required for specific applications.

- Inspection and manhole cover
- Negator cassette
- Conduit vent
- Oil seal
- Condensate reservoir
- Tape wipe
- Float connector

Training

If you have your own service technicians, we can provide factory-certified training. These classes are very effective for anyone that maintains the operation of float and tape gauges. The classes can be conducted at your facilities, in your time frame by a certified instructor with over 15 years Varec field service experience.

- Learn how to correctly align all parts to prevent a tape breakage and eliminate gauge hang-ups
- Learn which parts should be lubricated and which lubricants to use
- Learn other tips and tricks that will keep your gauge running smoothly year after year

Our You Tube channel provides basic how to videos for many installation, operation and maintenance procedures

www.youtube.com/user/varectankgauging

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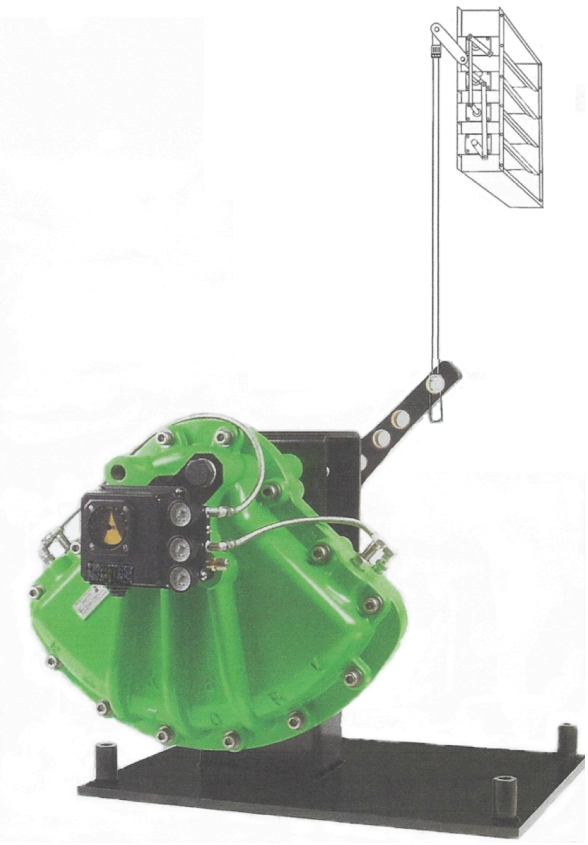
STANDARD-DD
DAMPER DRIVES LLC

STANDARD-DD
Damper Drives

Your Path to Performance and Peace of Mind

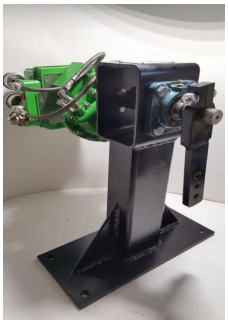


SERIES "FS"
Floorstand Mount Drives

- **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



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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

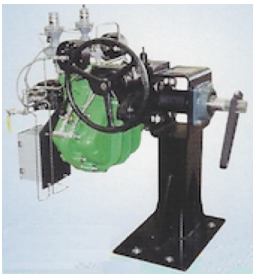

Oil & Gas Refinery

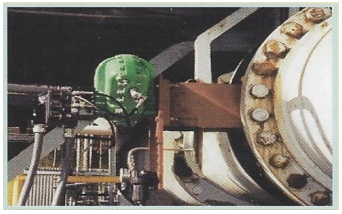

Petrochemical Plant


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

Go Back To Our Line Card

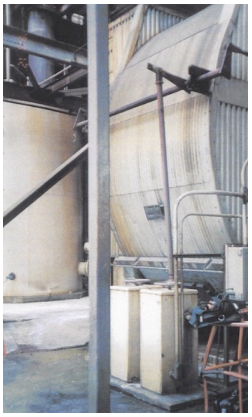
STANDARD-DD High Performance Damper Drives are the solution for Control of Combustion Air and Flue Gas thru a boiler.

STANDARD-DD is dedicated to assist our customers in providing resolutions.

Engineered for precise, accurate, dependable control for a wide variety of damper applications.

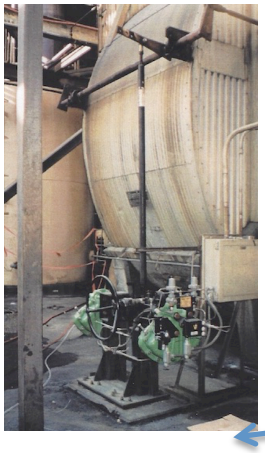
- **Rotary vane actuator – one moving part**
  Most reliable, efficient actuator design
- **Linear constant torque output for full 90° stroke**
  Output torques range from 90 ft. lbs. to 10,416 ft. lbs. (122 to 14,131 Nm)
  Master-Slave actuator option provides torque to 20,832 ft. lbs. (28,262 Nm)
- **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

Before



2 each Retrofit Drives

After

Go Back To Our Line Card

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

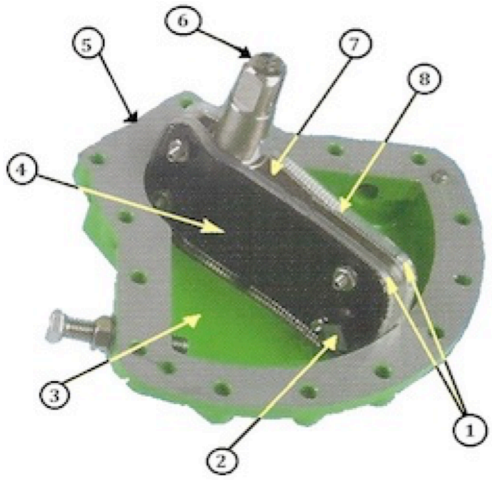
8. **Stainless Steel Seal Expanders**
   Located on both sides of steel vane. Ensures long-term lip seal-to-case contact. Excellent in both high-cycle and low-cycle applications

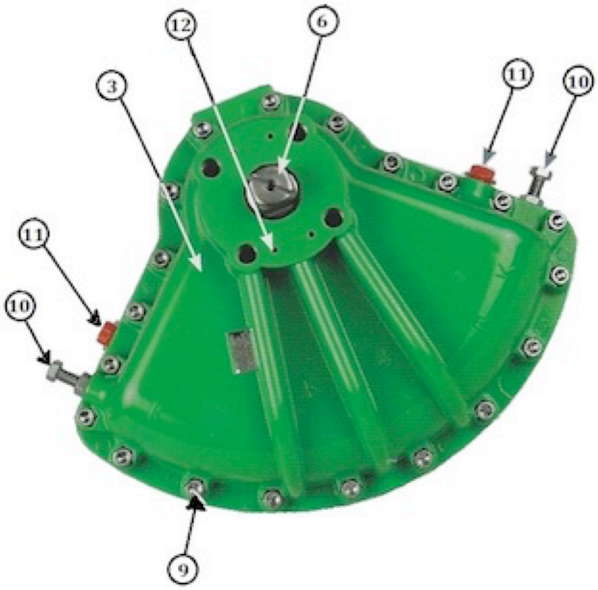
9. **Stainless Steel Bolting Hardware**
   For long-term corrosion resistance

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**





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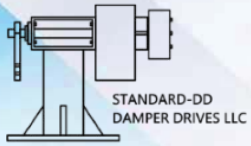

STANDARD-DD DRIVE CONTROL OPTIONS

- **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.	21	44	105	250	511	1153	2306
Full-scale Stroke *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

Go Back To Our Line Card

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

Go Back To Our Line Card

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

Go Back To Our Line Card

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

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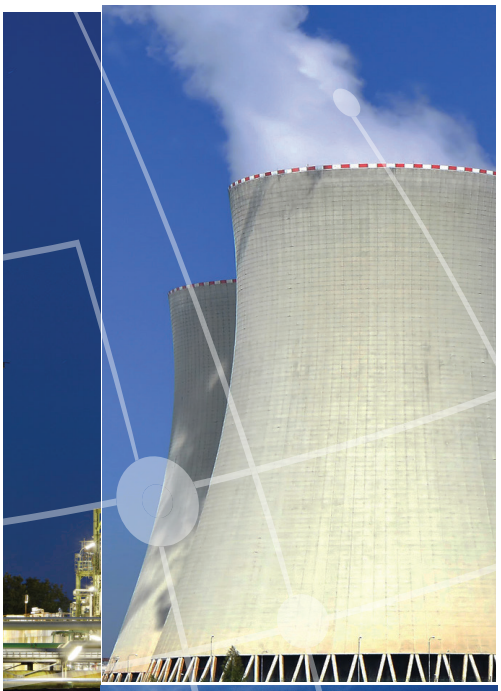
RONAN
ENGINEERING COMPANY



DISPLAY SYSTEMS | SIGNAL CONDITIONING
DENSITY | LEVEL | WEIGHT | RADIOMETRICS

Your Global Partner in Process
Monitoring and Measurement

Go Back To Our Line Card

ALARM DISPLAY

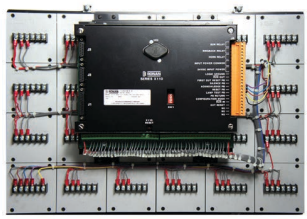
DATA ACQUISITION | ALARM STATUS DISPLAYS | SIGNAL SYSTEMS FOR HAZARDOUS AREAS

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

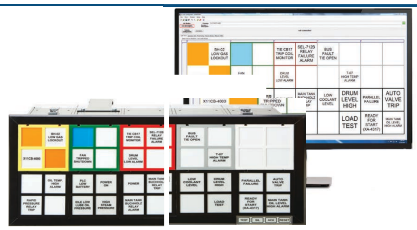
Ronan's LED light boxes are the clear choice for fixed window application. Rear terminal screws allow direct external connection or factory wiring to multipin connectors. Redundant window capability is available. Systems are available with 1 to 4 windows and various LED color arrays.

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

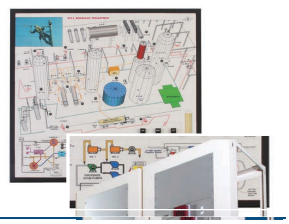


The X11CB Event Recording Annunciator is an advanced integral display system that handles local and remote networking with multiplexing and event time stamping.

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.

Go Back To Our Line Card

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

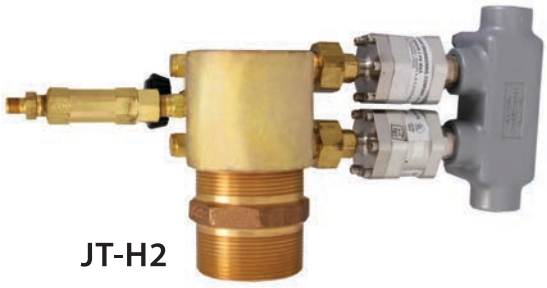
Ronan's X76CTM provides state-of-the art and highly reliable supervision for hydrocarbon fuels, chemicals and other liquids stored in underground tanks (USTs) and above ground tanks (ASTs).

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.

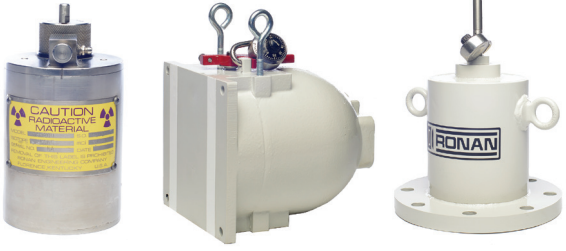
Microprocessor

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.

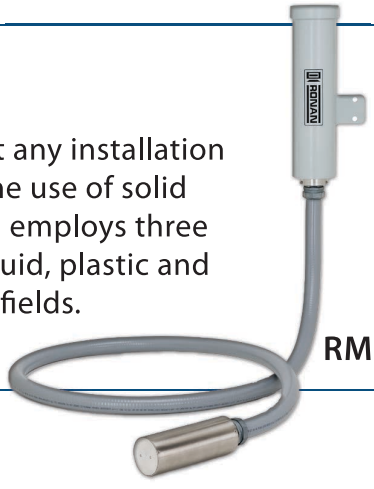
RLL Low Level Source Holder

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.

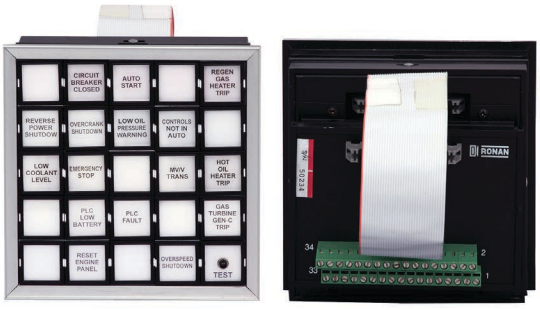
X18 Indicators

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

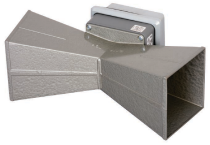
These models are single cabinet module indicators based on the popular Ronan Lamp Box Series.

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

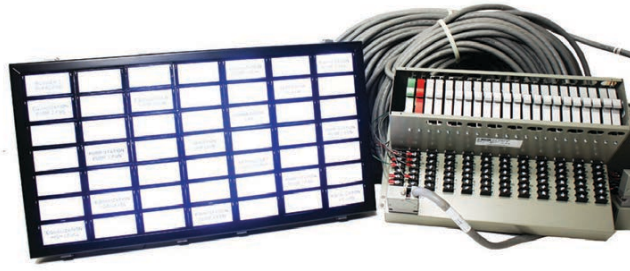
Ronan Explosion Proof Alarm Systems provide maximum flexibility for use under specified operating conditions, supplying single point as well as multipoint units handling up to 20 individual points for hazardous locations.

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.

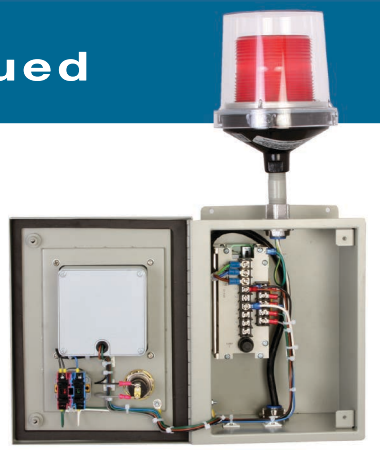


X15 Explosion Proof Alarm System

The Explosion Proof X15 Self-Contained Alarm unit provides complete annunciation capability for Class I, Division 1, Group C & D – Explosion Proof Applications.

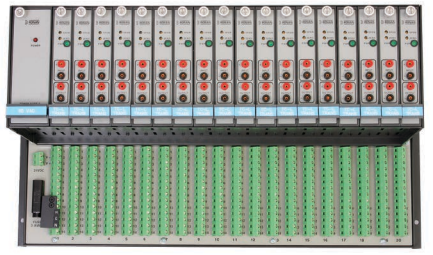
X19 Self-Contained Alarm Unit

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.



→ 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)

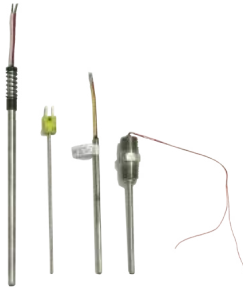
Slim Line

- 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

Go Back To Our Line Card

→ Thermowells

Threaded

Flanged

Sanitary

→ ReoCal

Sensor SRT

Calibration

→ OTHERS

- Threaded
- Flanged Sanitary

→ Services Expedites available

- NIST Calibration
- Certifcation
- Repair
- Design Improvement

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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

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PR electronics

PERFORMANCE MADE SMARTER

Signal Conditioning & *Communication Interfaces* *Product Catalog*

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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.

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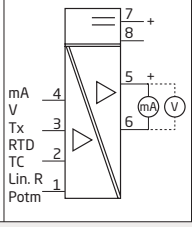
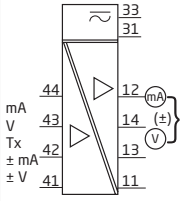
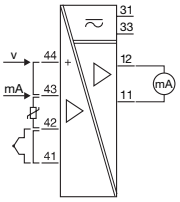
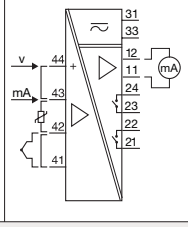
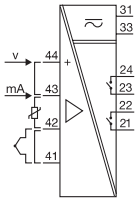
MULTIFUNCTIONAL TRANSMITTERS

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

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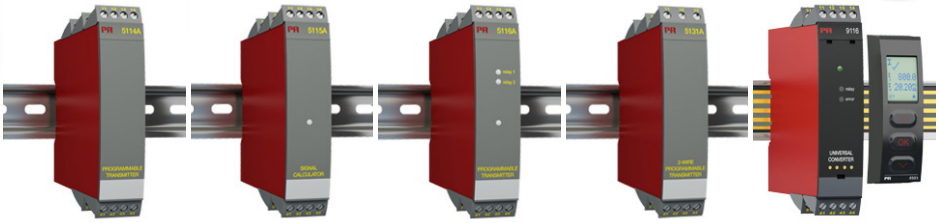
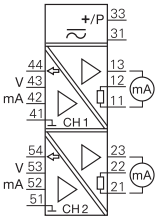
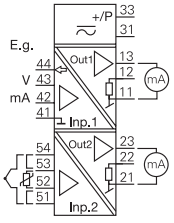
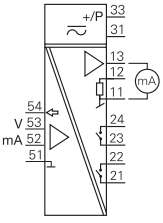
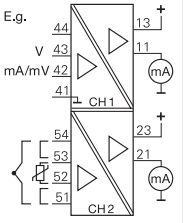
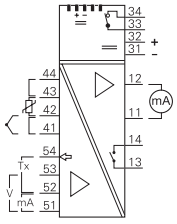


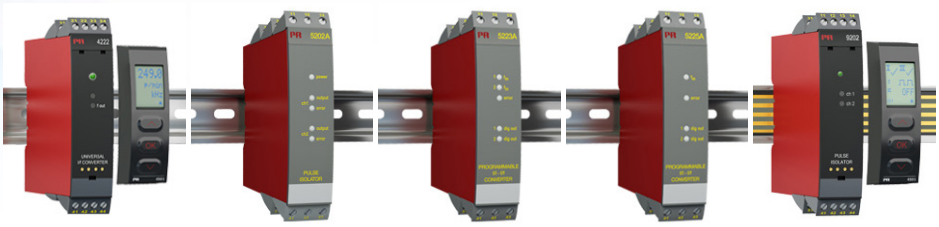
TYPE	5114A	5115A	5116A	5131A	9116A
	Programmable transmitter	Signal calculator	Programmable transmitter w. limit switch	2-wire programmable transmitter	Universal converter
INPUT: RTD, TC, linear resistance, mV, mA, V, potentiometer **OUTPUT:** mA, V, relays					
INPUT:					
mA, measurement range / min. 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

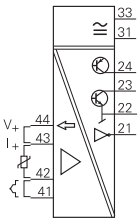
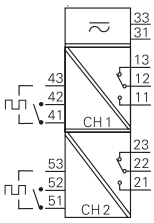
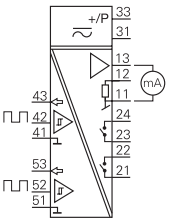
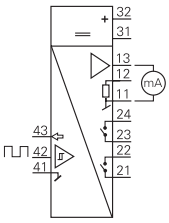
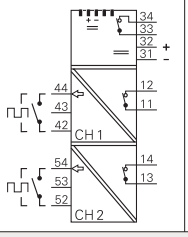
APPROVALS:					
ATEX, Zone 2					✓
IECEx, Zone 2					
FM, Zone 2					
CCOE					
UL 61010 / 508			- / ✓		✓ / -
DNV-GL	✓	✓	✓		✓
EAC	✓	✓	✓	✓	✓
SIL 2 Full Assessment IEC 61508					✓

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

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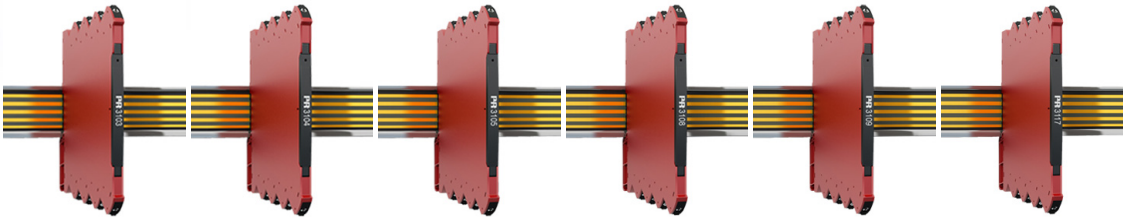

TYPE	3103	3104	3105	3108	3109	3117
	Isolated repeater	Isolated converter	Isolated converter	Isolated repeater / splitter	Isolated converter / splitter	Bipolar isolated converter
INPUT:						
mA, V, potentiometer						
OUTPUT:						
mA, V						
INPUT:						
mA, measurement range / min. span	0...23 mA / 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	✓	✓	✓	✓	✓	✓

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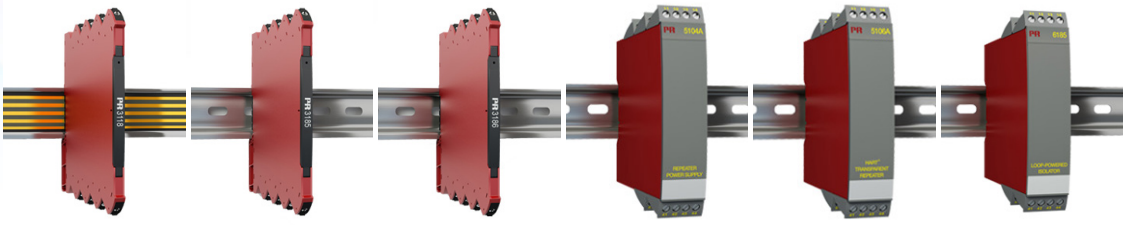
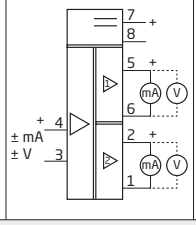
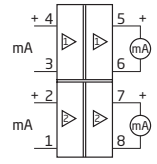
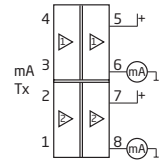
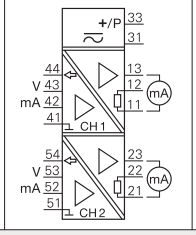
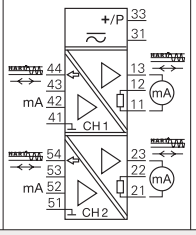
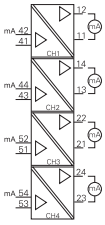
* = @ 24 VDC

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

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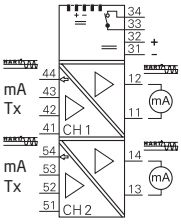
Of span = Of the presently selected range

TYPE 9106A

HART transparent repeater

INPUT, DC:
mA, HART communication

OUTPUT:
mA,
HART communication



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

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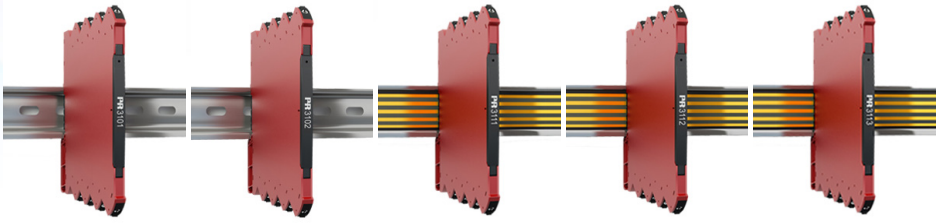
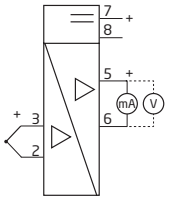
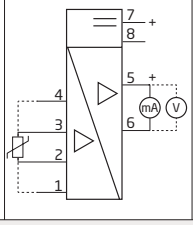
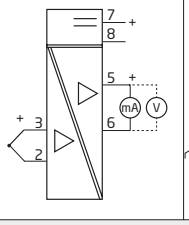
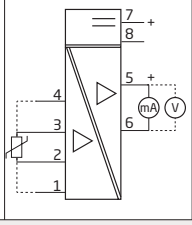
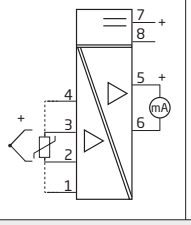


TYPE	3101	3102	3111	3112	3113
	TC converter	Pt100 converter	TC converter - isolated	Pt100 converter - isolated	HART 7 temperature converter
INPUT: RTD, linear resistance, TC, mV, mA, potentiometer OUTPUT: mA, HART communication					
INPUT:					
RTD, measurement range / min. span		-200...+850°C / 10°C		-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

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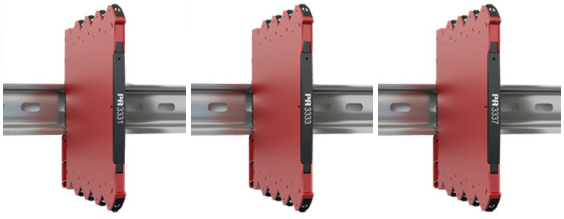
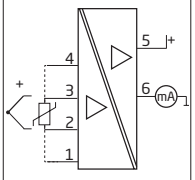
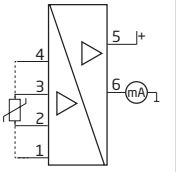
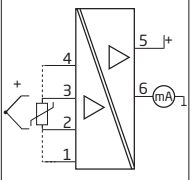
Of span = Of the presently selected range



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			✓			

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Of span = Of the presently selected range

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	✓	✓	✓	✓	✓	✓

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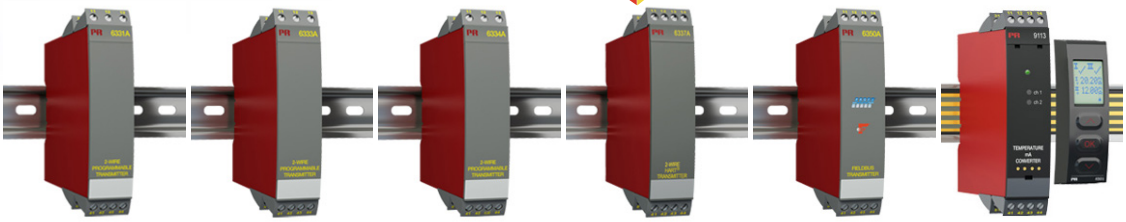
exida = FMEDA report

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	✓	✓	✓	✓	✓	✓
						✓

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= Full assessment acc. to IEC 61508 = 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	✓	✓	✓	✓	✓	✓

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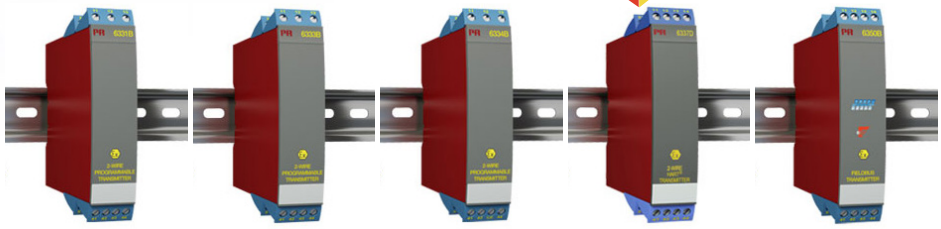
exida = FMEDA report

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

I.S. TEMPERATURE TRANSMITTERS



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	✓	✓	✓	✓	✓

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Of span = Of the presently selected range
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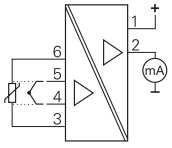
TYPE	7501					
INPUT: RTD, linear resistance, TC, mV, potentiometer OUTPUT: mA, HART communication, Profibus PA, Foundation Fieldbus	Field mounted HART temperature transmitter 					
INPUT:						
RTD, measurement range / min. span	-200...+850°C / 10°C					
Lin. R, measurement range / min. span	0...7000 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	✓					

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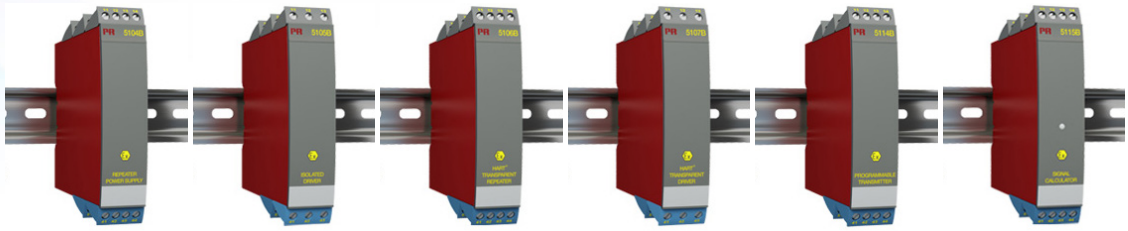
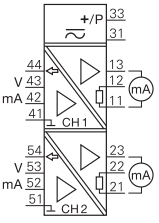
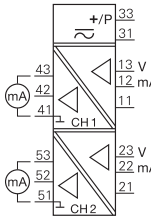
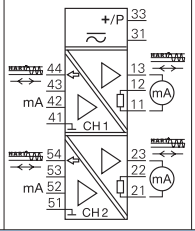
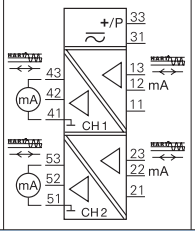
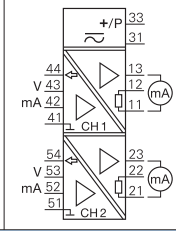
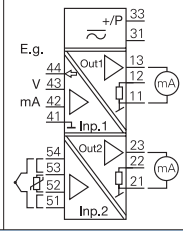
exida = FMEDA report

LOI = Local Operator Interface

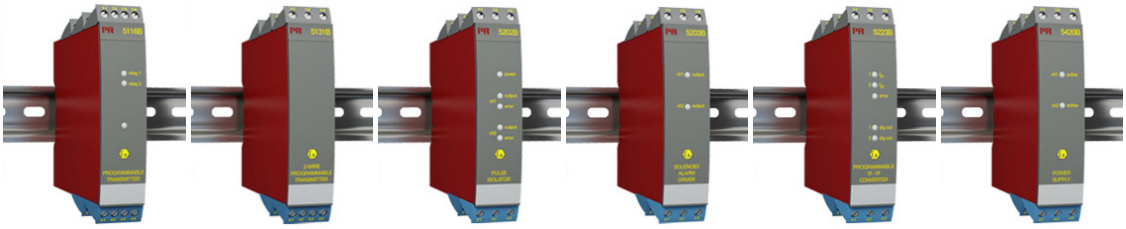
Of span = Of the presently selected range

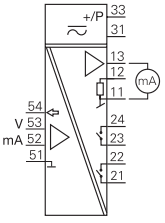
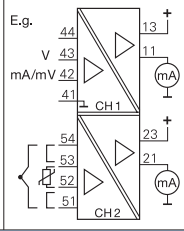
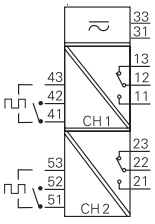
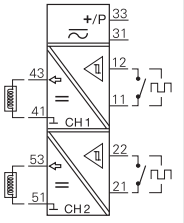
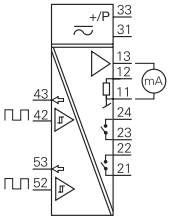
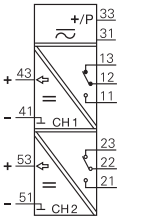
TYPE	9106B	9107B	9113B	9116B	9202B	9203B
	HART transparent repeater	HART transparent driver	Temperature / mA converter	Universal converter	Pulse isolator	Solenoid / alarm driver
INPUT:						
mA, mV, V, potentiometer, RTD, Lin. R, TC, Hz, HART communication						
OUTPUT:						
mA, relays, HART communication						
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	✓	✓	✓	✓	✓	✓



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



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

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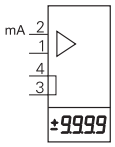
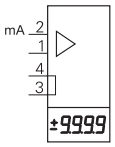
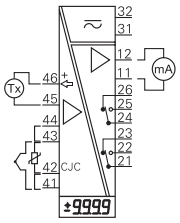
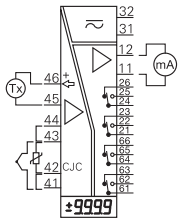
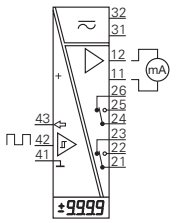
Of span = Of the presently selected range

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	✓	✓				

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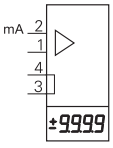
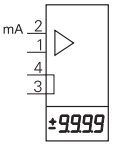
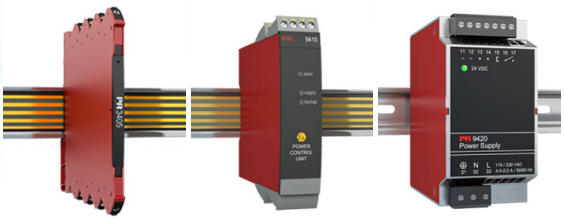
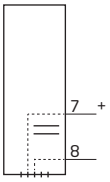
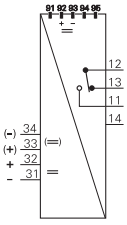
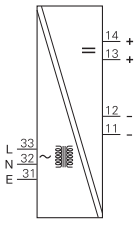
Of span = Of the presently selected range


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		✓				

Go Back To Our Line Card

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	✓	✓	✓			

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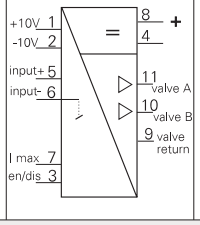
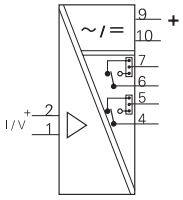
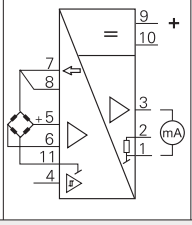
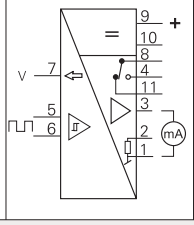
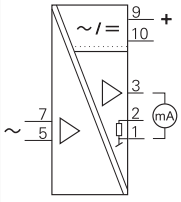
TYPE	2224	2231	2261			
	Valve controller	Trip amplifier	mV transmitter			
INPUT, DC: mA, V, potentiometer, frequency, pulse, joystick, load cell, mV **INPUT, AC:** A, V **OUTPUT:** mA, V, relays						
INPUT:						
mA, DC measurement range / min. span	0...20 mA / 16 mA	0...20 mA / 10 mA				
V, DC measurement 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	✓					

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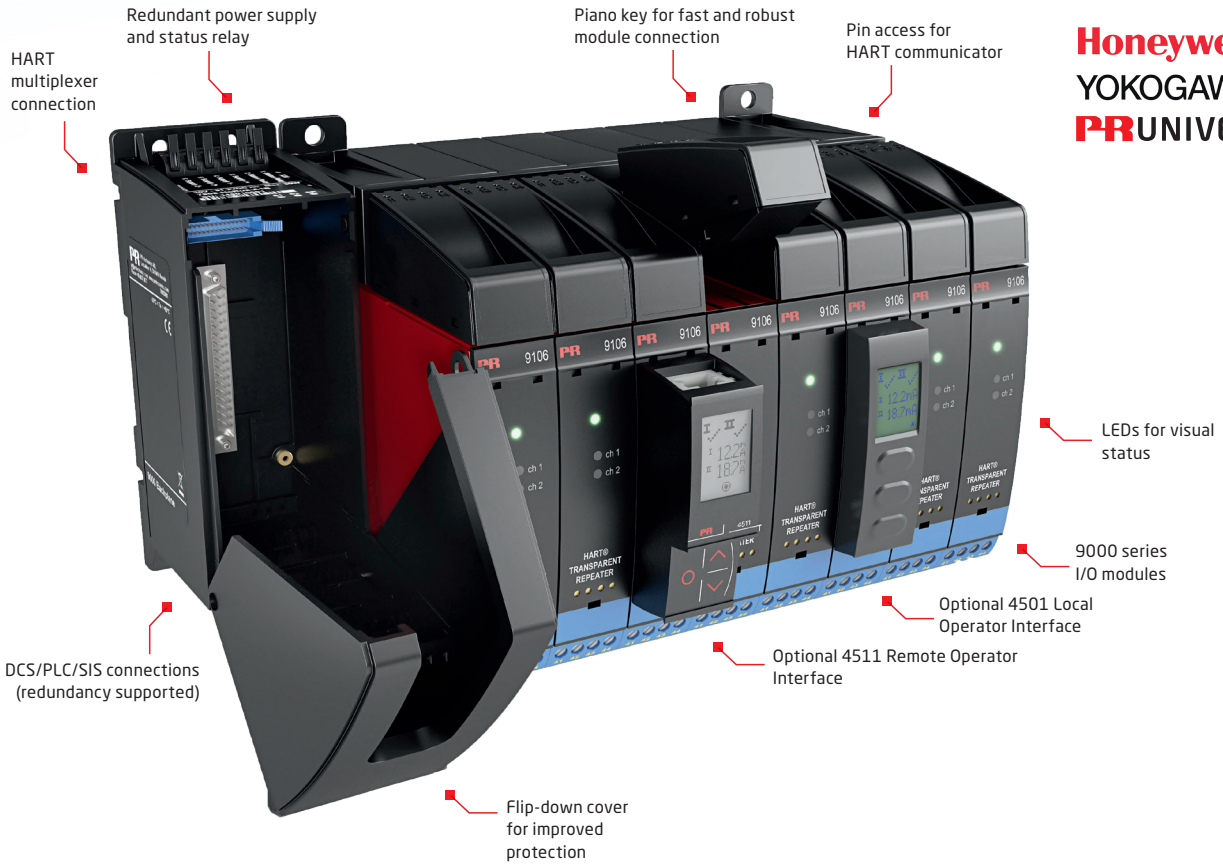
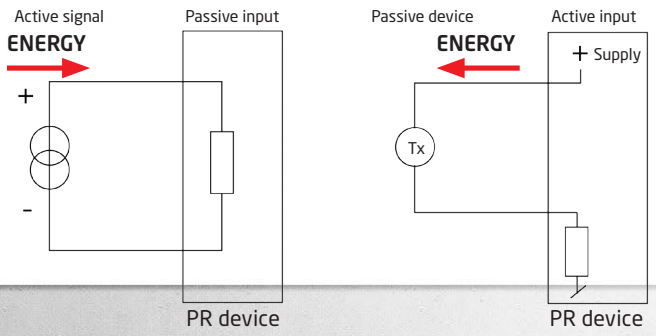
A user-friendly and reliable mounting solution between *the DCS/PLC/SIS system and isolators/I.S. interfaces*



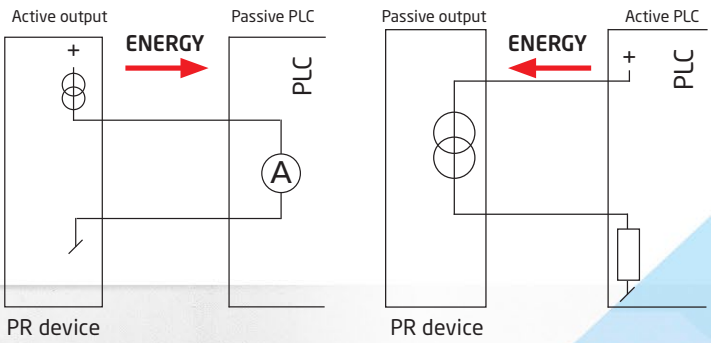
Honeywell
YOKOGAWA
PR UNIVERSAL

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

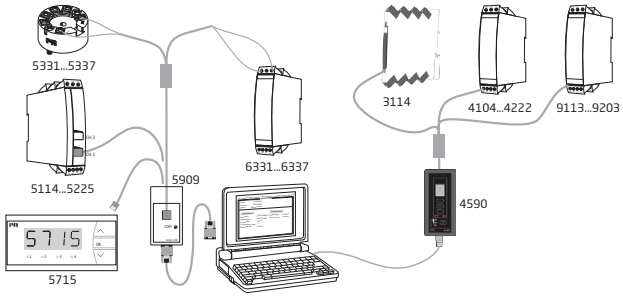
Communication enabler 4511
Wired or wireless, locally or remotely, analog and digital, this advanced device enables easy and cost-effective access to your process values from your existing 4000 and 9000 devices. You can manage processes onsite, connect to Modbus RTU devices, connect to any major communication 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.

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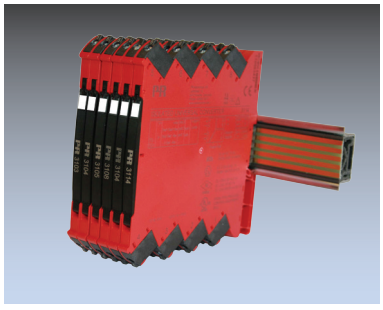
POWER RAIL

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

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 emissi...

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PRODUCT KEY

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

"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.

Go Back To Our Line Card

LAND
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PROCESS & ANALYTICAL INSTRUMENTS

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.

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PROCESS & ANALYTICAL INSTRUMENTS

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.

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PROCESS & ANALYTICAL INSTRUMENTS

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.

Go Back To Our Line Card

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.

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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.

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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.

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→ 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

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→ 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.

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→ 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

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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

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→ 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

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→ 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.

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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.

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→ 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

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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

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→ 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

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→ 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

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→ 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

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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

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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

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→ 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

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→ 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

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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

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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.

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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".

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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.

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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

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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

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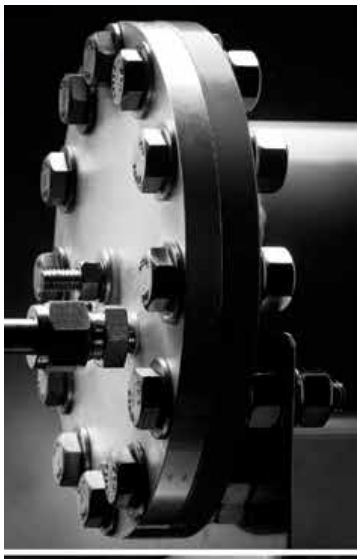
SAFETY - INCREASED EFFICIENCY - RISK MITIGATION

From New Builds to Life Extension & Upgrades



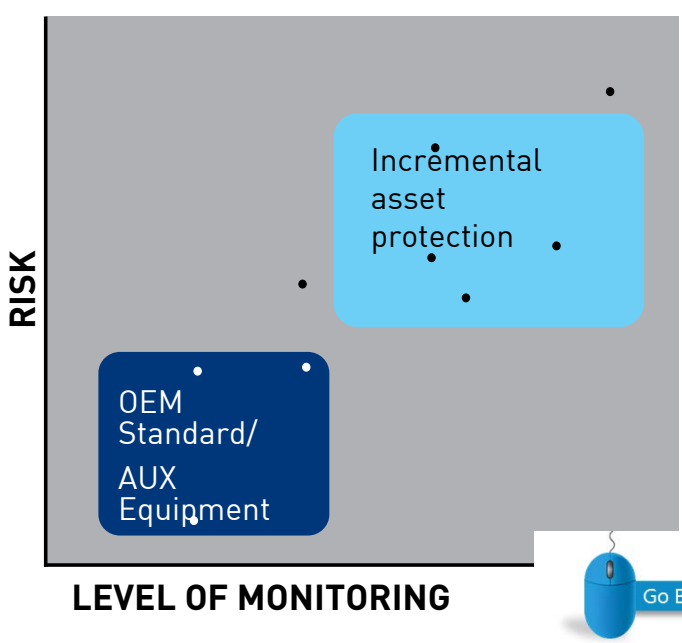
E/One's involvement spans the life cycle of the generator, and often begins as part of an OEM's original scope of supply to the plant. Our critical gas auxiliary systems are designed for use with scavenging or vacuum-type seal oil configurations and E/One has earned a primary-source status with the industry's 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?

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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.

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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.

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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.

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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.

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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

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+ 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.

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DET-TRONICS

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:

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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.

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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

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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.

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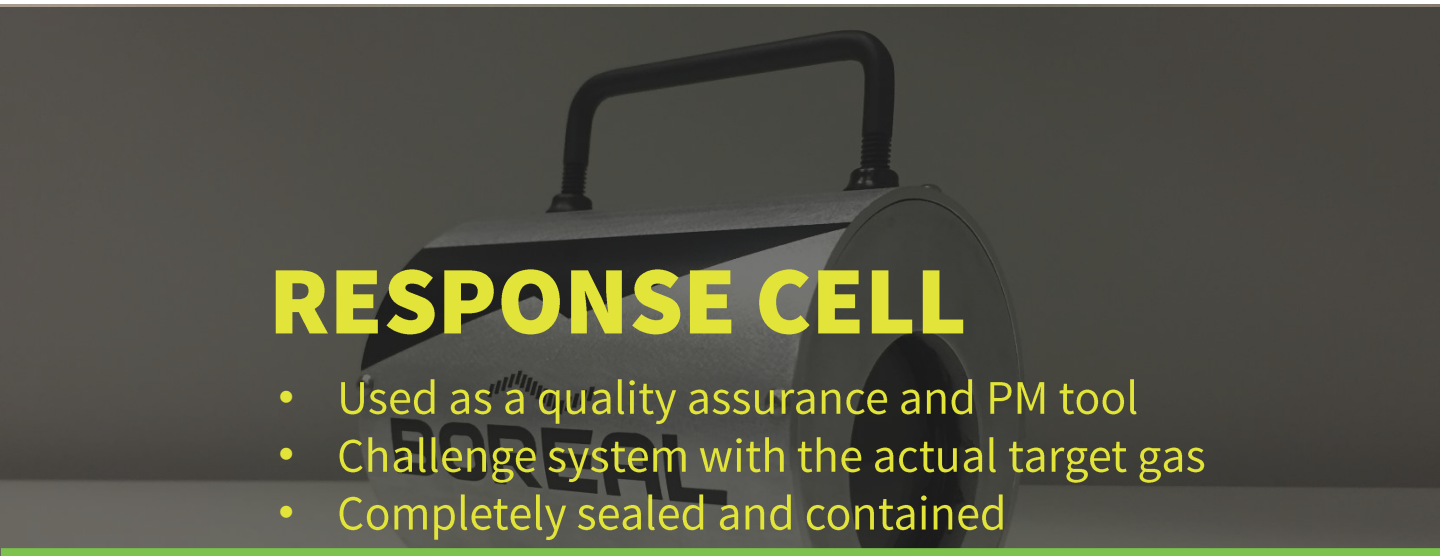

RESPONSE CELL

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

SET **FORGET** **DETECT**

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BOREAL

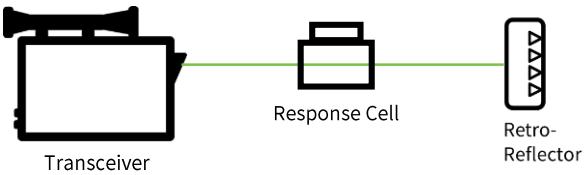
RESPONSE CELL

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.)

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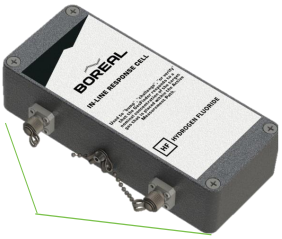
IN-LINE RESPONSE CELL



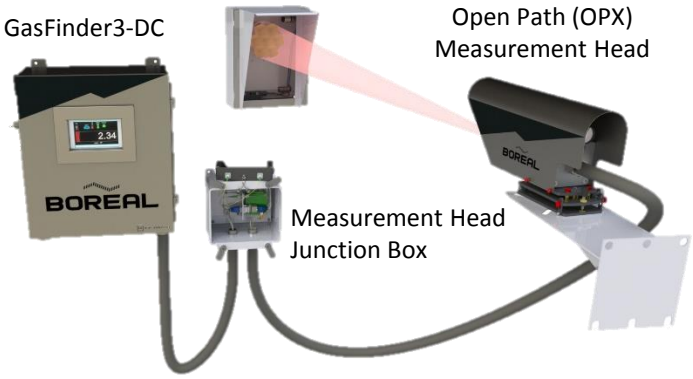
FC/APC Fibre Connections

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

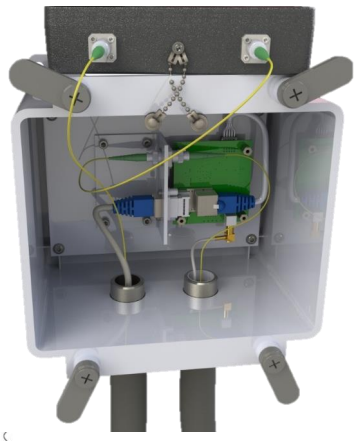


HOW IT WORKS

- 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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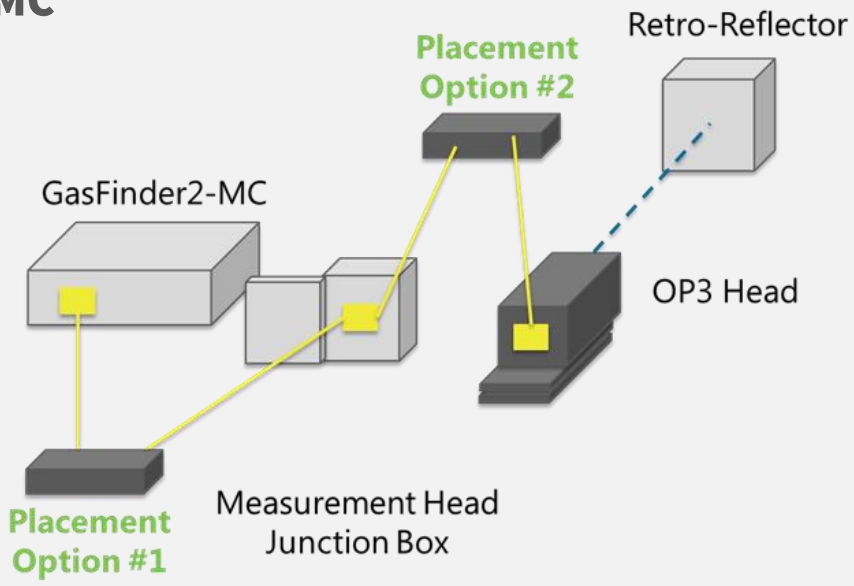
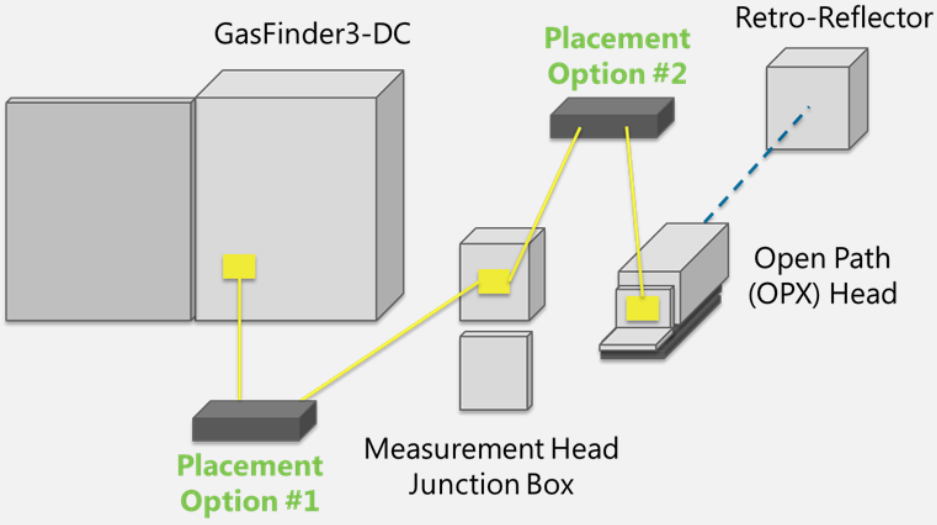
IN-LINE RESPONSE CELL

GasFinder2-MC



GasFinder3-DC



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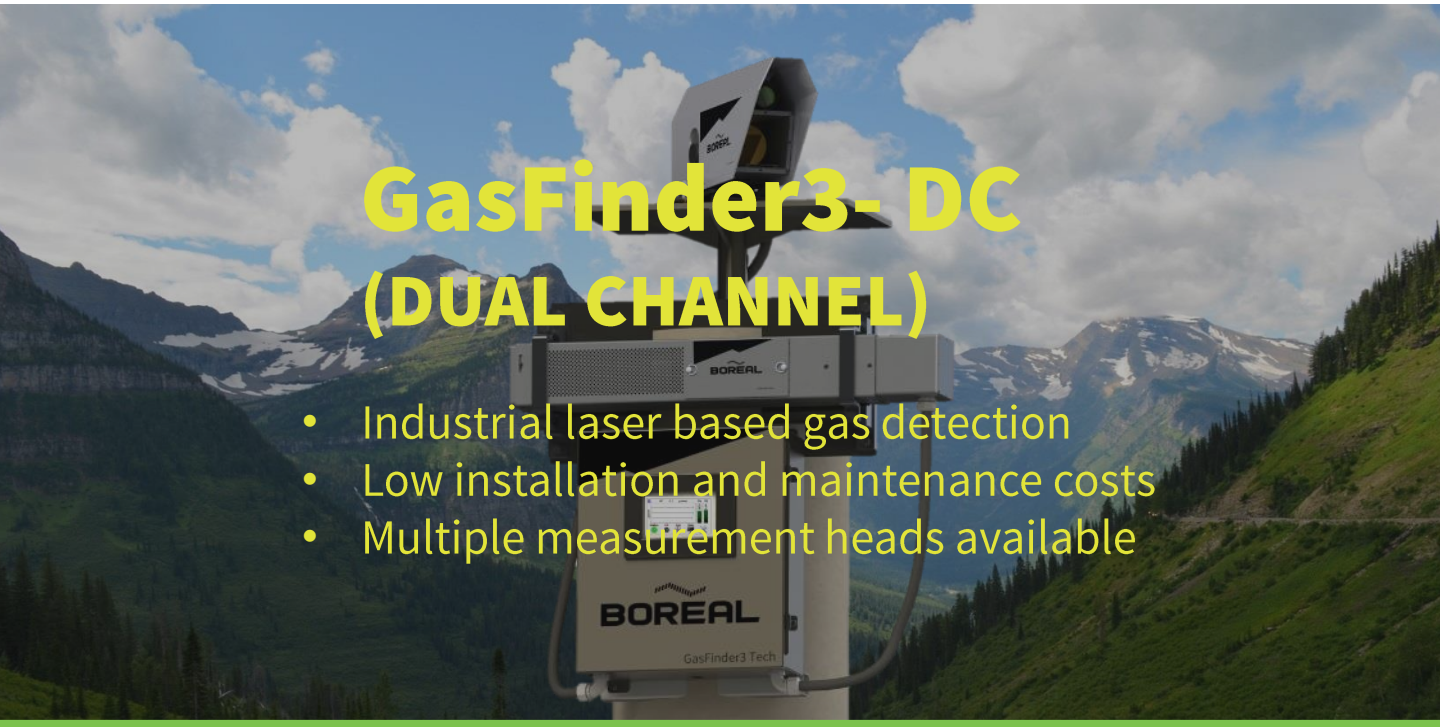

GasFinder3- DC
(DUAL CHANNEL)

- 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

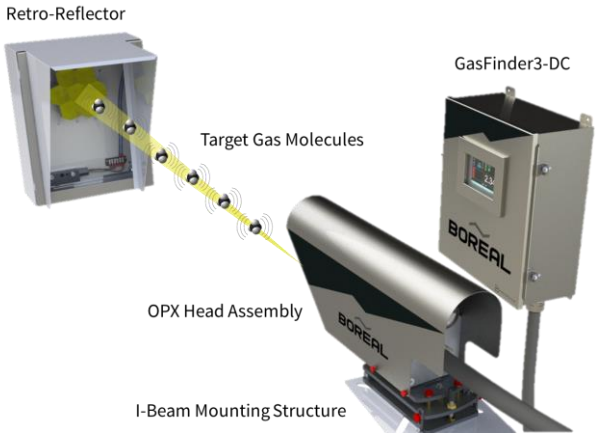
RPX Probe:
Remote Point Measurement Probe

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**

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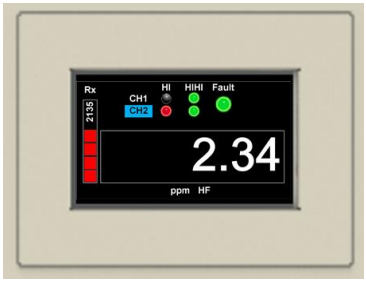
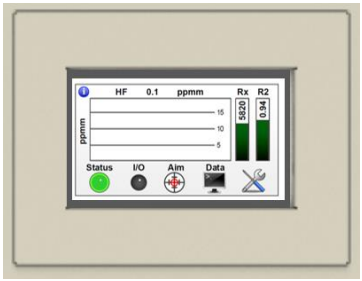
UNIQUE FEATURES



Numerical Display

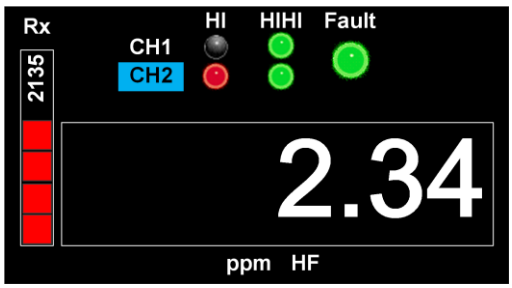


Graphical Display

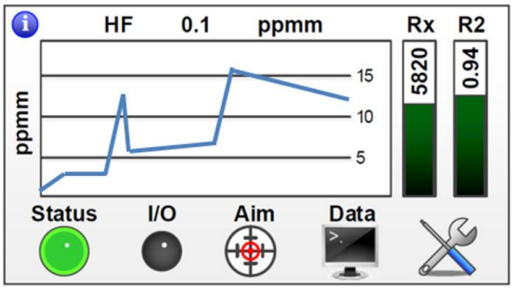
HMI DISPLAY

- 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:

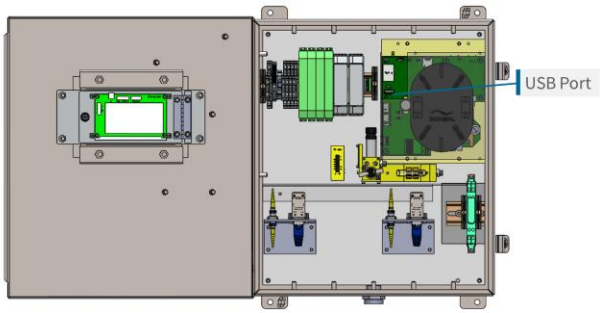


ACTIVE STATUS

- 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

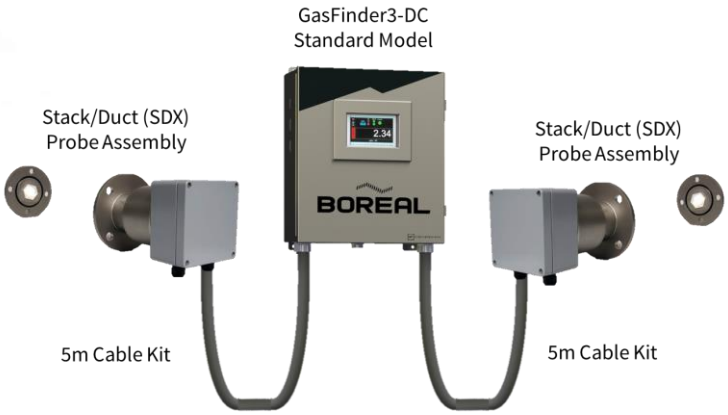
P+T COMPENSATION

- **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**

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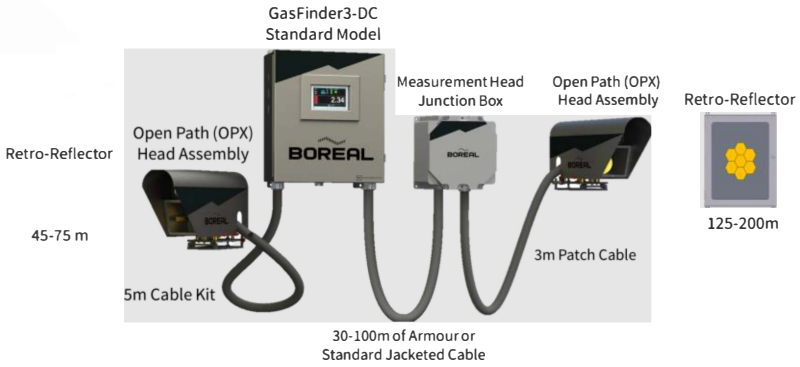
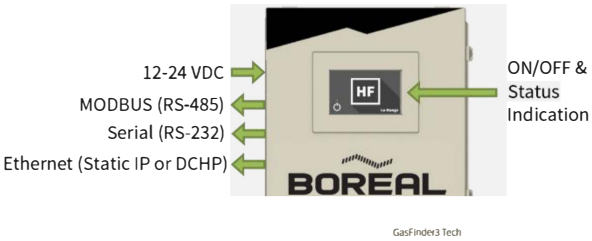
GasFinder3-DC
MODEL OPTIONS



BASIC MODEL (GOOD)



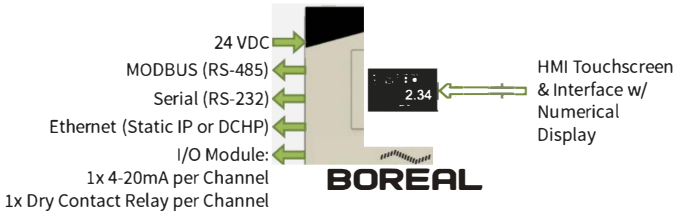
Ability to monitor 1 or 2
Measurement Heads

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)



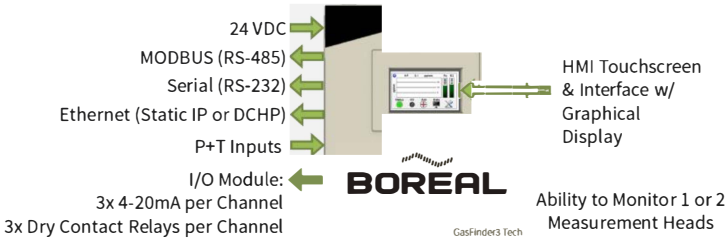
Ability to Monitor 1 or 2
Measurement Heads

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.

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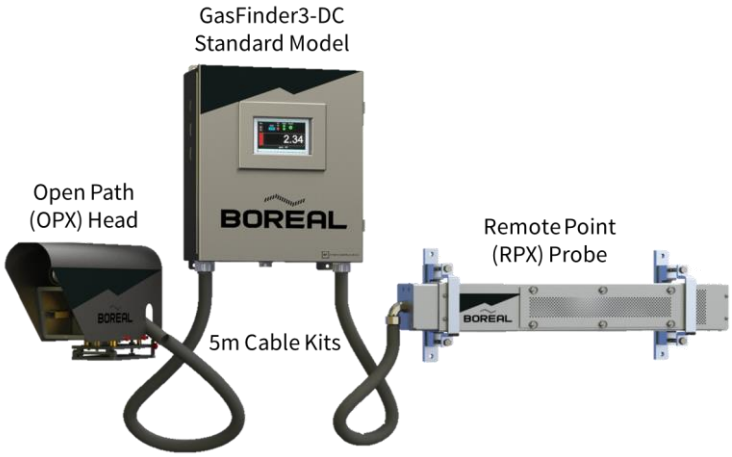
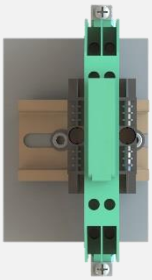
GasFinder3-DC
MODEL OPTIONS



AREA CLASSIFICATION

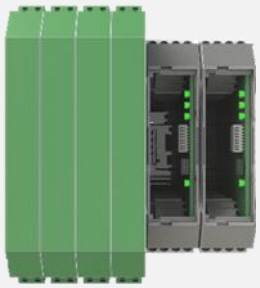


Zener Barrier

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



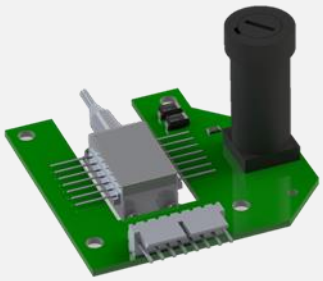
Isolators I/O Modules

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

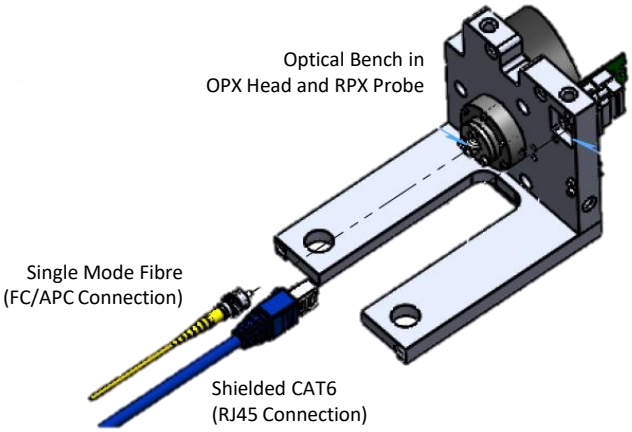
CH_4 Methane
Hi-Range: 0-500,000 ppm-m

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

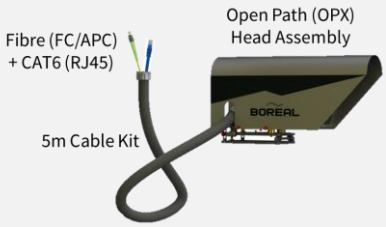
CO Carbon Monoxide
Hi-Range: 0-500,000 ppm-m

BOREAL

CONNECTING THE MEASUREMENT HEAD TO THE GASFINDER3-DC

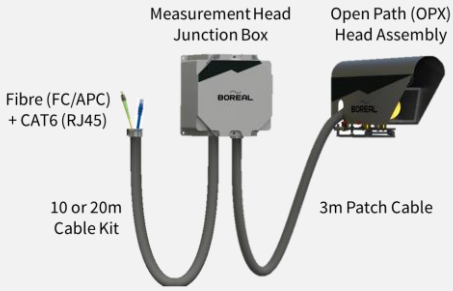


5m CABLE KIT



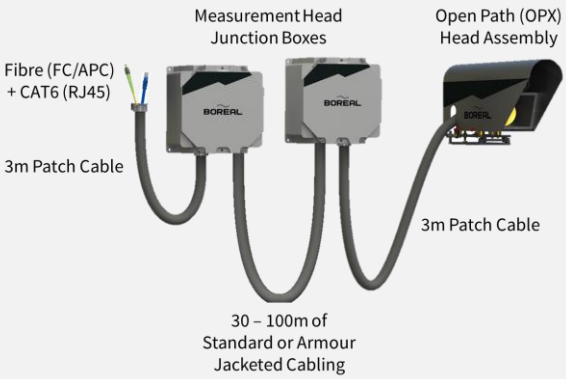
Kit includes: Includes 5m of Single Stand Fibre Optic and CAT6 Cabling ran in Liquid Tight Flex to connect the Measurement Head(s) to the GasFinder3-DC.

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).

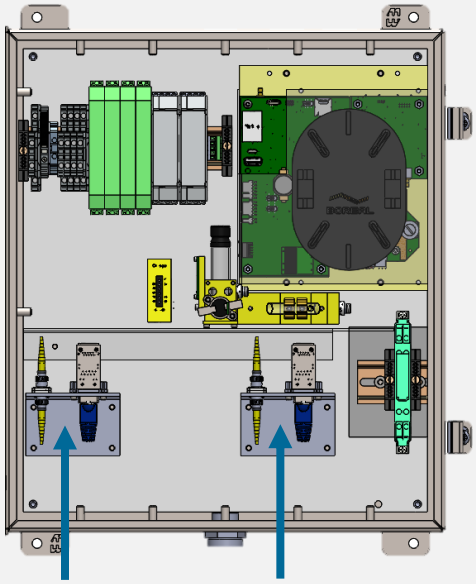
30-100m CABLE LENGTHS



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)

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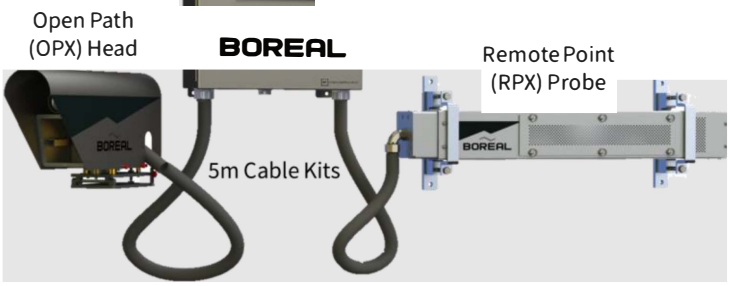
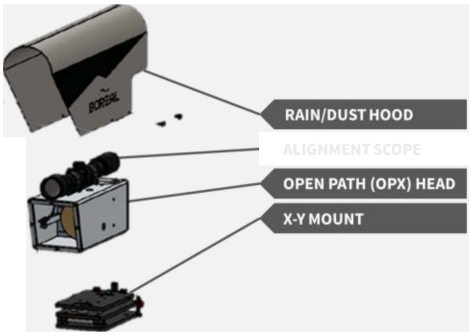
BOREAL

MEASUREMENT HEAD OPTIONS

GasFinder3-DC
Standard Model



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.

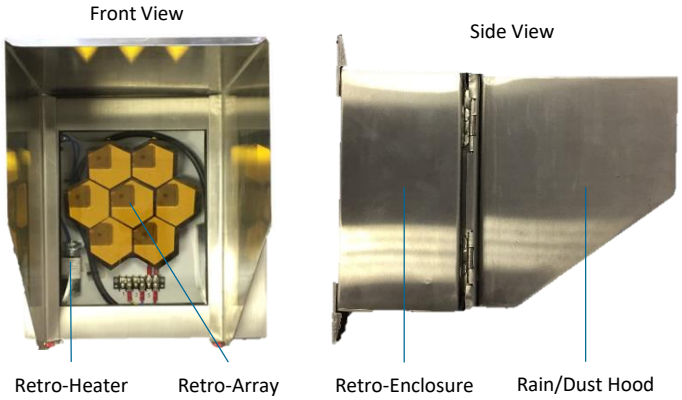
STACK/DUCT (SDX) PROBE

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.

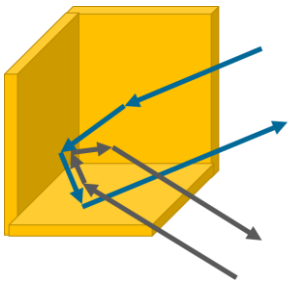
BOREAL

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**.

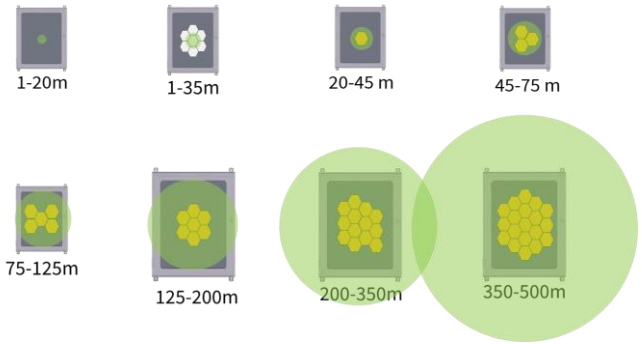


WHY USE A RETRO?

- **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)

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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)

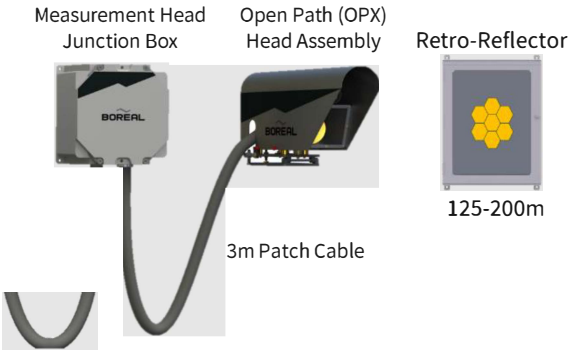
"Hi-Range" Options:
Hydrogen Sulphide (H2SH)
Hydrogen Fluoride (HFH)
Ammonia (NH3H)
Methane (CH4H)
Carbon Monoxide (COH)
Carbon Dioxide (CO2H)

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.

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BOREAL

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).

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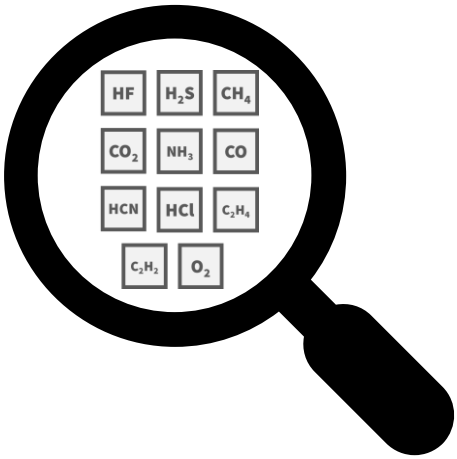
BOREAL

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.

Go Back To Our Line Card

BOREAL

ALIGNMENT KIT

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

SET **FORGET** **DETECT**

Go Back To Our Line Card

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

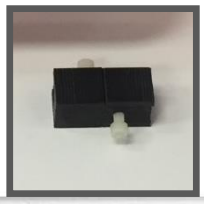
CAT6 Patch

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

BOREAL

Specifications Subject to Change
June 2019

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.

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-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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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

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EX2

Dual Stage Regulator

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.

EX1

Single Stage Regulator

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.

EXC

Compact Regulator

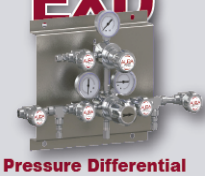
The AURA EXC enables accurate and reliable pressure control of gases and liquids in a single stage where space is at a premium. The ultra-compact design minimizes weight and footprint to allow the EXC to be integrated into numerous systems with ease.

EXB

Back Pressure Regulator

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.

EXD



Pressure Differential Switchover

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.

EXF

High Flow Regulator

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.

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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

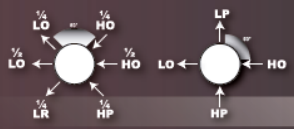
- All products are guaranteed free from manufacturing defect for life
- Minimal number of components eliminates failure points
- Rugged construction increases life cycle in harsh environments

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

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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