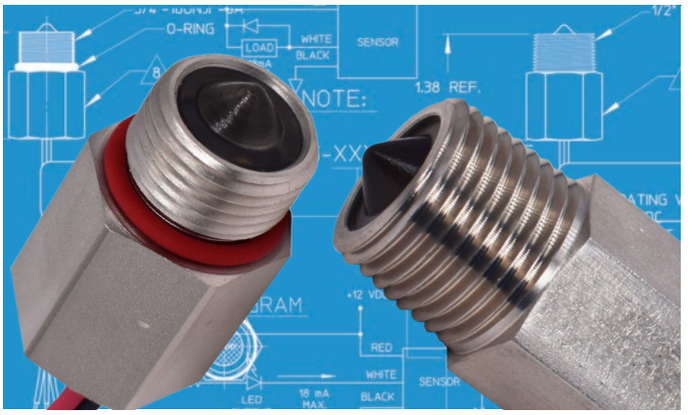
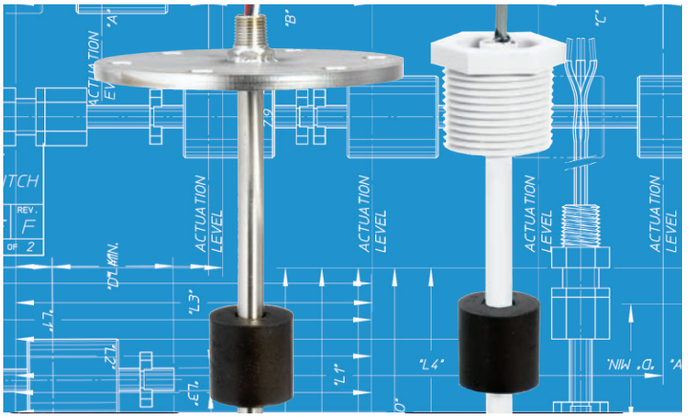
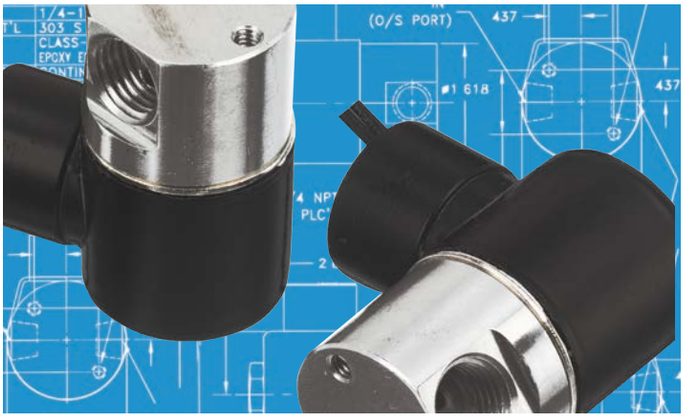
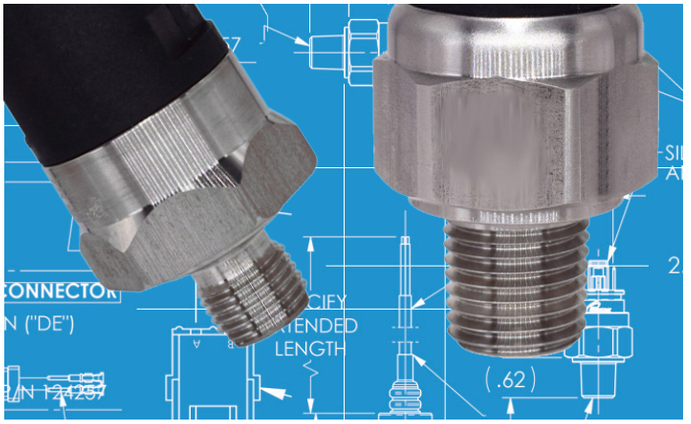
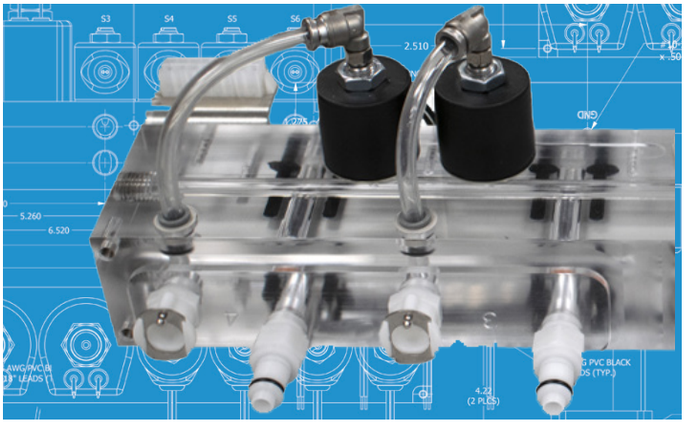










PRODUCT & SOLUTION
OVERVIEW

Gems™
Sensors & Controls

LEVEL | FLOW | PRESSURE | TEMPERATURE | SOLENOID VALVES | FLUIDIC SYSTEMS

Your Solution Partner

Gems Sensors & Controls is a leading manufacturer of liquid level, flow, and pressure sensors, miniature solenoid valves, solid-state electronics and fluidic systems. Decades of application engineering experience has given Gems Sensors the knowledge required to deliver custom solutions that measure up to today's most sophisticated and critical applications. Working around the world with global resources, and to exact customer application and manufacturing requirements, products from Gems Sensors are used in almost every industry from medical to waste water treatment, semiconductor fabrication to off-highway vehicles and HVACR to food and beverage.

Supporting our customers with the best possible product while reducing time to market is our One Goal. To achieve it we apply a wealth of tools and global resources that include:

A dedicated team of application engineers, with over 400 years of combined professional service on staff, who specialize in developing custom solutions to meet unique customer needs

An extensive portfolio of thousands of proven designs that reduce the time required to successfully deliver your solution when it's needed

A global distribution network and a global direct sales team of experts in fluid level, flow and pressure sensors, controls, solenoid valves and associated fluidic systems

A deep commitment to quality, lean manufacturing, and ISO certification—with facilities in North America, Europe and Asia

Dedicated tools and processes that eliminate product and process variation at every stage of manufacturing, including:

- Design Failure Mode Effect Analysis (DFMEA)
- Process Failure Mode Effect Analysis (PFMEA)
- Process Capability Studies
- Gauge Capability Studies
- Design Verification and Validation
- Corrective and Preventative Action (CAPA)
- Lean Tools
- 8D Problem Solving Methodology

Our Application Specialists are ready to discuss your system requirements. Contact us today at one of our global offices listed on the back cover. Full product details are available at www.GemsSensors.com

Custom Solutions & IoT

ENGINEER TO ENGINEER PROBLEM SOLVING

This brochure provides a broad overview of Gems Sensors products and solutions. We offer thousands of variations of the fluid sensors and controls seen within, and many more not included here. We're proud of the wide array of these products, yet we know that no matter how many variations we manufacture, sometimes a "standard" product may not be exactly what you need.

Whether you need a simple modification to a standard sensor or a fully engineered fluid management solution, our Sales, Engineering and Manufacturing groups have you covered. Our broad range of custom solutions include: Basic Modifications, Value Added Sub-Assemblies, Simple Manifolds, Integrated Sensors and Fluidic Systems.

Basic modifications

Includes custom operating voltage, wire lengths, color or cable changes, electrical connector or port changes and custom seal material for media compatibility.

Integrated Solutions and Fluidic Systems

Eliminates excess mass and leak points, minimizes hardware and dead volume and embeds the sensor directly inside plugs for unused ports.

Value-Added Modifications and Sub-Assemblies

Helps ease your assembly process. Customizations include adding an alternate connector or bracket and multi-component assemblies that can help with size and space reductions.

Simple Manifolds

Eliminate redundant or complex plumbing and interconnects. Manifolds include: variety of O-Ring seal materials, a spanner tool for easy installation and blank plugs for unused ports.

CONDITION BASED MONITORING

The Gems Sensors Condition Monitoring System is a powerful hardware and software solution that combines flexibility and ease of integration to provide real-time machine condition alerts. Oil condition, tank level, and remote pressure and temperature monitoring are among the many items detectable through our condition monitoring analytics software. Critical system alerts can be established for warning and key system parameters can be analyzed to improve equipment performance and uptime while reducing operating costs. The solution utilizes sensors to monitor the status of operation assets over time and track performance to identify developing faults in machinery.

Install a Gems Sensors Condition Monitoring Sensor

Connect to Gems Condition Based Monitoring Gateway

Monitor Condition on Real-Time Dashboard

Advantages of Condition Monitoring

- **Asset reliability and uptime**
- **Optimized service intervals**
- **Minimized maintenance downtime due to unplanned equipment failures**
- **Early detection of machine abnormalities in real time**

Level Sensors

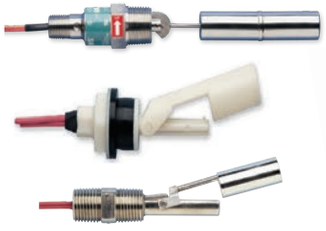
FLOAT

Gems Sensors offers the broadest selection of float-type level switches anywhere. Using a proven reed switch design, float type switches deliver long, trouble-free service with precise repeatability. Available in single point and multi-point configurations for monitoring up to six levels with a single unit.

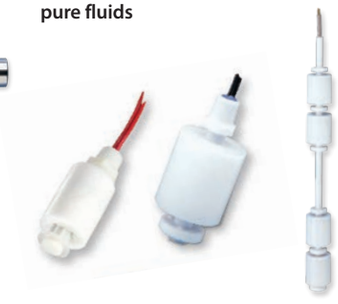
top or bottom mounting

multi-point single point

side mounting single point



high purity – PTFE and PVDF resist build-up of foreign material for ultra-pure fluids

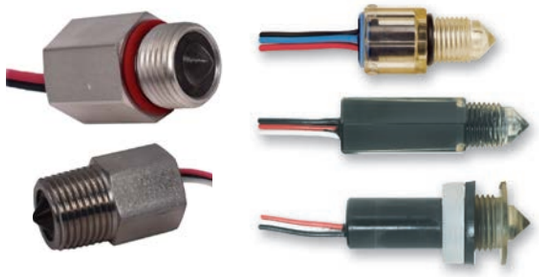


SPECIAL PURPOSE

Includes bent stems, slosh shields, temperature sensing, siphon tubes and many others.

ELECTRO-OPTIC

These compact electro-optic liquid level sensors feature a small footprint for anywhere space is at a premium. Solid-state switching delivers dependability over a long service life.



CONDUCTIVITY

These single- or multi-point sensors have no moving parts. Stainless steel electrodes can be cut to desired length. Team with Gems Sensors conductivity controls to provide alarm, pump-up or pump-down control in electrically conductive liquids.

Water-in-Fuel

This solid-state sensor is an innovative, no-moving-parts solution specifically designed to detect the presence of water in fuel tanks and filters. An ideal solution for off-highway vehicles, locomotive and generator sets.

WIF-1250

Hazardous Environment

Warrick CP Control Panels are ideal for hazardous atmospheres and have NEMA-1, NEMA-4 and NEMA-4X ratings. The control panels interface with a variety of sensors including level and flow switches and Warrick® conductance probes.

Level Sensors

CAPACITANCE

An excellent choice for turbulent or coating liquids, Gems Sensors offers multiple solid-state capacitance point level switches, including non-contact versions.

ULTRASONIC XLS-1

XLS-1 level switches are compatible with water-and hydrocarbon-based liquids. Perfect for applications where condensation may affect other sensing technologies.

- Zero maintenance
- Ignores condensation on sensor
- Will not sense foam as liquid

GUIDED WAVE RADAR

Gems Sensors RLI-G Guided Wave Radar Level Sensor is a no-moving parts continuous level sensor with advanced radar level sensing technology.

- Installation flexibility: Self configures to media dielectric constant
- LCD display module: Comes with a plug-in module to assist in programming & displaying values
- Time Domain Reflectometry (TDR): Pulses are sent down the probe at the speed of light
- Multiple sensing & probe options: For a wide range of applications

FLOAT

Standard lengths offer measurement from a few inches (centimeters) to 18 feet (5.5 m). Choose from a variety of materials for mountings, stems and floats that includes PVC, polypropylene, PVDF, stainless steel, brass and Buna N. Signal conditioning provides outputs of 4-20 mA, 0-5 VDC and 0-12 VDC.

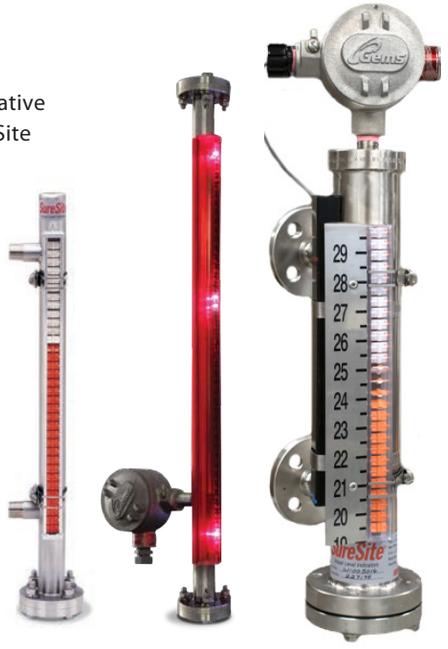
VISUAL INDICATORS

DipTape™ and DrumTape™

Pop the cap, pull the tab — and up comes the tape to tell you exactly how much liquid remains in the tank or drum. Ideal for hazardous areas, indicators are non-electric, plus liquids and vapors remain sealed from the atmosphere. DIPTAPE indicators: designed for tanks; DRUMTAPE indicators: fit 30 or 55 gallon storage drums. Available in alloy, all PVC and engineered plastic versions.

SureSite®

A more durable and safer alternative to breakable sight glasses. SureSite visual level indicators feature stainless steel, alloy or engineered plastic housings that mount externally to top or sides of tanks to provide easy-to-read, continuous level gauging. Magnetic flags flip to change color as an internal float moves with the liquid surface. Optional switches, transmitters and scales increase control capabilities. Available in alloy and engineered plastic. LED version available for low-light environments.



Pressure Sensors

PISTON/DIAPHRAGM & SEALED PISTON

SWITCHES

Gems Sensors offers a choice of pressure switches, from compact cylindrical models for OEM use, to larger enclosed units for rugged process applications. A piston/diaphragm design, incorporating the high proof pressure of piston technology allows these switches to operate with the sensitivity and accuracy of a diaphragm design. Repeatability ranges from 0.2 to 2% of the highest set point. Enclosures include aluminum, stainless steel, baked-on enamel coating, reinforced plastic and zinc-plated steel. All are NEMA4 or NEMA4X certified.

CAPACITIVE

TRANSDUCERS

Capacitive transducers are simple, durable and fundamentally stable. Variable capacitor technology, a rugged physical configuration, stainless steel wetted parts and a careful marriage of the mechanical assembly to the electronic circuitry combine to create highly repeatable transducers with low hysteresis and only .5% long-term-drift full scale per year, for low pressure applications. This large family of sensors includes models for positive pressures to 10,000 psi (700 bar), absolute vacuums, differential pressures, barometric pressure, low pressures (0-15 psi/ 0-1 bar), and clean-in-place 3A sanitary applications.

SOLID-STATE

SWITCHES

3600 Series

Communications Interface for field programming

Offering exceptional accuracy and stability, these solid-state switches employ sophisticated sputtered thin film sensors. They provide excellent repeatability in high shock and vibration environments, and are superior to mechanical switches in high frequency cycling applications. An optional Communications Interface enables Set Point, Reset Point, and Time Delay programming in the field.

SUBMERSIBLE

TRANSDUCERS

2600 Series

3700 Series

9600 Series

9600 Series pressure transducers meet the rigorous conditions for ground water monitoring with Hastelloy® and 318 SS wetted parts. The 3700 Series is optimized for low power consumption for battery-powered remote monitoring. They feature hermetic headers and a fully potted cable assembly to ensure long service life when immersed. Suitable for both clean and salt water applications. The 2600 series feature an all welded stainless steel back end for demanding submersible applications.

Pressure Sensors

SPUTTERED THIN FILM

Sputtered thin film technology provides years of worry-free measurements under demanding real-world conditions. Sputtered metallic strain gauge sensors have terrific thermal properties and superior stability specifications. Ideal for harsh applications demanding long-term service where precise laboratory-type measurements are required.

4000 Series — The King of Stability: just 0.06% drift per year (non-cumulative). A broad range of models include submersible, high temperature, and weather proof versions.

- **3100 Series** — Delivers an output signal for both temperature and pressure, providing full scale accuracy of 0.25% and long term drift to just 0.1% over the full scale per year. Unbeatable price to performance ratio in a compact package.
- **3200 Series** — Features thicker diaphragm and pressure snubber to withstand pressure spikes and cavitation.
- **31IS/32IS Series** — Intrinsically safe variants. ExII 1G; Ex ia IIBt4 Ga; ATEX Certified.
- **31CS/32CS Series** — CSA Certified intrinsically safe variants.
- **31EP/EA and 32EP/EA Series** — CSA and ATEX approved explosion-proof variants.

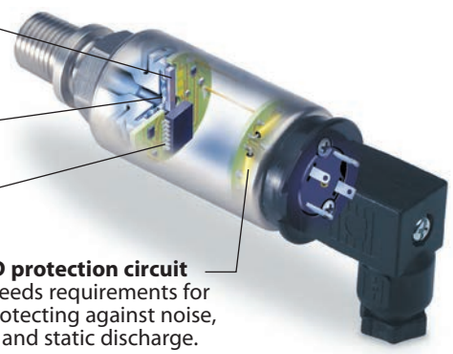
CHEMICAL VAPOR DEPOSITION

Gems Sensors Chemical Vapor Deposition (CVD) pressure transducers provide an effective method of overcoming the often severe limitations of other low-cost pressure measuring products. A state-of-the-art ASIC chip in each transducer provides greater linearity correction than traditional thermal compensation methods.

CVD Sensor
Stability and high sensitivity allow use of our thicker diaphragm. 17-4 PH SS sensor beam is laser welded for distortion-free construction.

Thicker Diaphragm
Handles pulsating pressures—all stainless steel wetted parts.

ASIC Chip
Programmability provides greater linearity correction than common thermal compensation methods.



RFI/EMI & ESD protection circuit
Meets and exceeds requirements for CE marking. Protecting against noise, voltage spikes and static discharge.

2600 Series

2200 Series

- **1200/1600 Series** — 4X full-scale proof pressure. Typical 0.5% full-scale accuracy.
- **2200/2600 Series** — 2X full-scale proof pressure. Typical 0.25% full-scale accuracy.
- **6000 Series** — 5 to 1 turndown. Typical 0.15% full-scale accuracy.

LOW PRESSURE - MEMS

- 5 to 600 psi (0.35 to 40 bar)

3500 Series transducers are compact with all-stainless steel wetted parts at an unbeatable price performance ratio. Available in a wide choice of electrical outputs, and electrical/pressure connections.

3500 Series

Solenoid Valves

GENERAL PURPOSE

Providing 2- and 3-way functions and available in miniature and sub-miniature sizes, Gems Sensors general purpose solenoid valves deliver Flow Coefficients (Cv) of .018 to .880. Select from NPT port, manifold or barbed connection types. Body materials include brass, stainless steel, acetal, aluminum, and polypropylene. Versions within this group will control operating pressure differentials up to 1000 psi (70 bar).

All valves are available with a wide range of options. Our modular designs can be easily configured to your specific application. For products with specifications not shown here please contact Gems Sensors.

Gems Sensors General Purpose Solenoid Valve Series:

SPECIALTY

Latching

These 2-way and 3-way valves allow the user to control in remote applications where power is limited. Epoxy-filled powder-coated housings and customer-specified elastomers, for superior media compatibility makes these valves suited for non-traditional and extreme applications. The BL Series can change states in temperatures below -40 degrees Celsius, making it well suited for multiple unique markets and applications.

Cryogenic

These miniature 2-way valves are configured for use with liquid nitrogen (LN2), liquid carbon dioxide (LCO2) and other extreme temperature media. Gems Sensors Cryogenic Valves have a specialized silicone epoxy-encapsulated coil for moisture ingress protection from -320 degrees Fahrenheit to 356 degrees Fahrenheit. PTFE coated plungers and 316 Stainless Steel guide tubes make these valves suitable for applications requiring high cycle life.

Gems Sensors Cryogenic Solenoid Valve Series: B-Cryo and D-Cryo

Humidifier

Available in two orifice sizes (3/64" and 3/32"), the humidifier solenoid valve has a brass body, integrated fittings, ready to connect direcrly to your plumbing. The valve was originally designed and manufactured for original equipment manufacturers (OEMs) and is now available as a replacement solenoid valve for in-home and commercial humidifiers.

Isolation

Available in miniature and sub-miniature sizes for high purity or aggressive liquids and gases, these valves feature a diaphragm to isolate the media from internal components. Numerous diaphragm materials, port configurations and voltage options allow the valve to be easily integrated into any complex or demanding system or application containing harsh fluids.

Flow Sensors

CONTINUOUS FLOW SENSORS (Electronic)

RotorFlow®

These highly visible, paddle wheel designs offer accurate visual indication, flow rate sensing and switching. The visual indication is combined with a choice of either pulsed DC output 0-10V DC analog or adjustable 1 Amp switched output. Available with brass, stainless steel or hydrolytically-stable polypropylene housings. Line sizes: 1/4″ to 1″ (.64 to 2.5 cm). Adjustable settings: 0.1 to 60 GPM (.38 to 227 l/m).

TurboFlow®

Ultra-compact TurboFlow® low flow rate sensors provide continual measurement ranging from 0.1 to 8 GPM (0.5 to 30 lpm). Their Hall-effect sensor delivers accuracy to ±3 % of reading and 0.5 % repeatability. Lightweight, they mount in any position. Incorporate flow sensing into custom assemblies with the tiny TurboFlow® Insert.

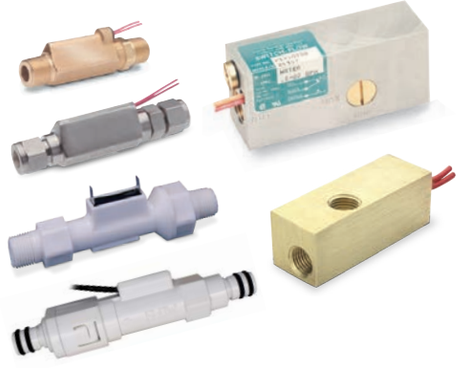
TurboFlow® sensors

Tiny TurboFlow® insert

POINT FLOW SWITCHES

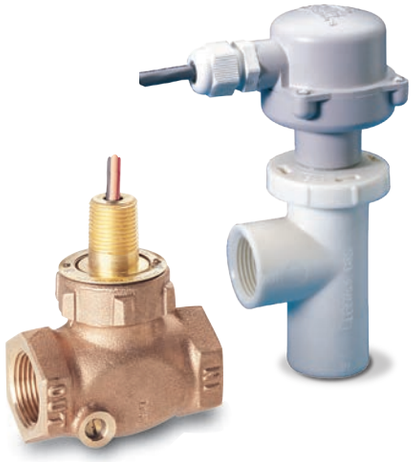
Piston

Proven piston switch technology delivers high repeatability and precise calibration for liquids or gases. Fixed setpoints range from a low 50 cc/min to 1.5 GPM (5.7 l/m); adjustable version features setting of 0.5 to 20 GPM (2 to 76 l/m). Special capabilities include viscosity compensation, and high pressure handling to 1,500 PSIG (103 bar). Brass, plastic or stainless steel bodies.



Shuttle

For monitoring water and oil—in line sizes 3/4″ to 3″. They are accurate with 1% repeatability and low-pressure drop. Plastic, bronze, stainless steel and marine grade housings. Fixed settings from 0.5 to 100 GPM (1.9 to 378.5 l/m); adjustable settings from 0.75 to 15 GPM (2.8 to 56.8 l/m).



Paddle

Flow/No-Flow detection for pipes with 1-1/4″ (3 cm) diameter and up. Paddles are cut to length for desired actuation setting (from 1-1/4″ to 5-1/2″ (3 to 14 cm). Unique, patented cam design assures low pressure drop and does not require bellows, seals or mechanical linkages.

NO MOVING PARTS

FS-600 Series features solid-state thermal dispersion technology to provide reliable flow switch operation even without filtration. They are compatible with both conductive and non-conductive fluids. A straight-through design makes the FS-600 ideally suited for fluids with particulates or slurries, or alternating media viscosity.

Controls

STANDARD RELAYS & CONDUCTIVITY LEVEL CONTROLS

Relays boost your sensor's load handling ability in non-hazardous locations with the reliability and advantages inherent in solid-state controls.

General Purpose

Warrick® Series 16/16D

Warrick® Series 16M/16VM

Boiler Controls

Warrick® Dual Function Series DF

Warrick® Series 26

Warrick® Series 26M/26NM

INTRINSICALLY SAFE RELAYS AND CONTROLS

Render any non-voltage producing sensor, switch or conductivity electrode intrinsically safe with these relays and barriers. They amplify sensor load-handling capabilities in a wide range of AC and DC control switching applications and are easy to install in standard circuit boxes in non-hazardous areas. The amount of energy they send to sensors and switches within hazardous areas is insufficient to cause ignition of a specific hazardous atmospheric mixture in its most ignitable concentration. Select from a broad choice of Safe-Pak® and Warrick® models.

Warrick® Series 27 conductivity level control

Warrick® Series 47 4-channel relay alarm panel control

Warrick® Series 67 multi-function level control

SAFE-PAK® relays & Zener barriers

ALARM AND VISUAL INDICATING

Panels

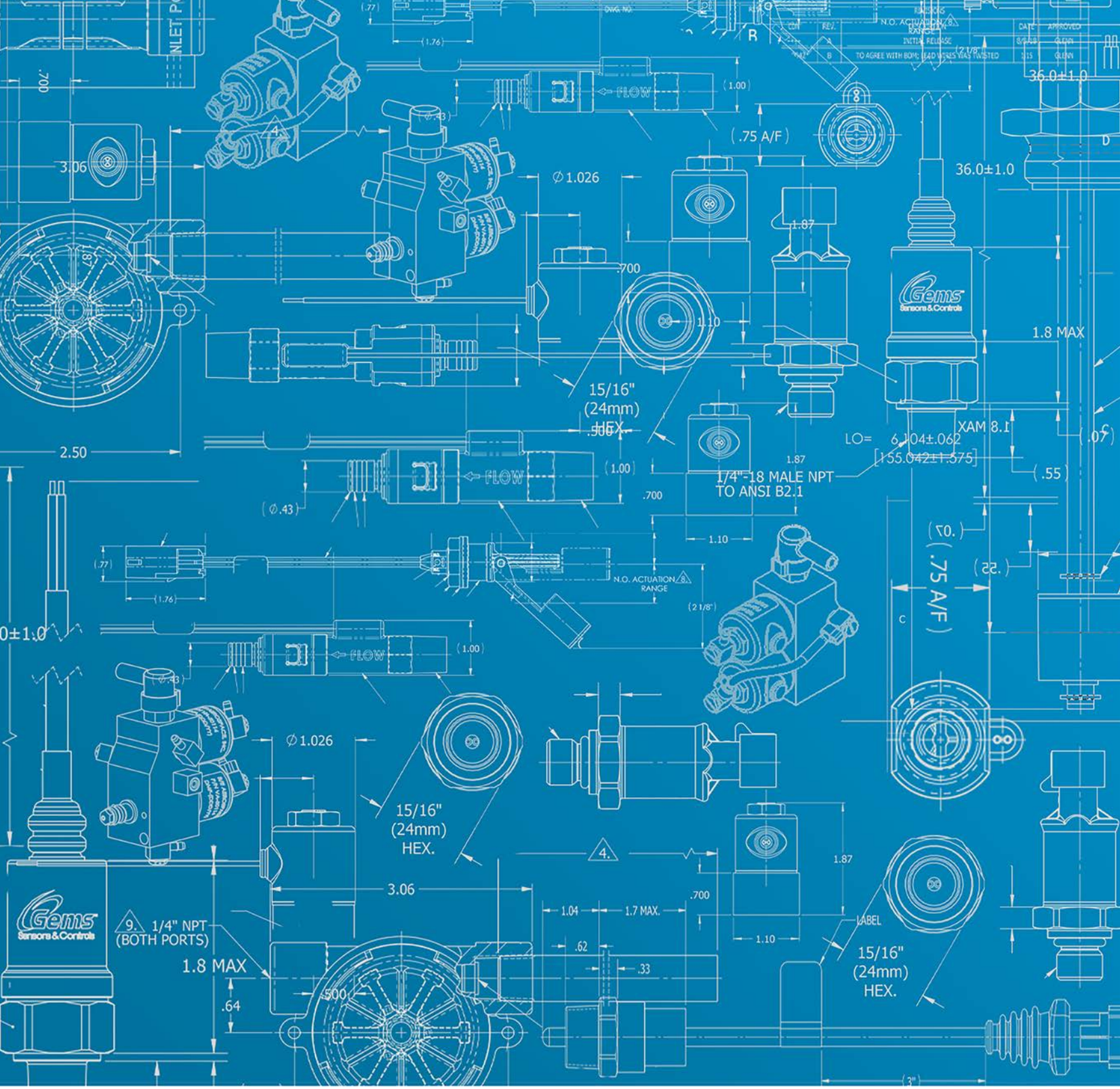
Gems Sensors manufactures both custom and standard control panels, bearing the safety mark of UL or CSA, for use in hazardous (UL 913) and non-hazardous (UL 508A) locations. We offer a complete selection of controls including solid-state relays, timers, alternators, transformers, alarms, indicator lights and more.

RA-431 alarm panel

Receivers

Your sensors know what's going on, but you're still in the dark without one of Gems Sensors receivers. Each receiver features all the calibration adjustments needed to complete a continuous level indication system. Some available with relay output switching.

compact panel mounted receivers



Gems™
Sensors & Controls

LEVEL | FLOW | PRESSURE | TEMPERATURE | SOLENOID VALVES | FLUIDIC SYSTEMS

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