

sensors, controls and fluidic systems



OUR EXPERIENCE

YOUR SOLUTION



product overview

Our Experience | Your Solution



Gems Sensors & Controls is a leading manufacturer of a broad portfolio of liquid level, flow, and pressure sensors, miniature solenoid valves, solid-state electronics and fluidic systems. Decades of application engineering experience has given Gems the knowledge required to deliver tailored products 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 & Controls are used in almost every industry from medical to waste water treatment, semiconductor fabrication to off-highway vehicles and HVACR to food and beverage.

Your Solution Partner

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 50 years of experience, 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 direct sales force of experts in fluid level, flow and pressure sensors, controls, solenoid valves and associated fluidic systems
- The resources of Danaher Corporation, a Fortune 500 company; committed 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

General Purpose

Providing 2- and 3-way functions and available in miniature and sub-miniature sizes, Gems general purpose solenoid valves deliver Flow Coefficients (C_v) 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).

Gems General Purpose Solenoid Valve Series:



All Gems 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.

Isolation for High Purity or Aggressive Fluids

Available in miniature and sub-miniature sizes, these units feature a diaphragm design to isolate the media from the internal components. Diaphragm materials include Viton®, EPR, nitrile (NSF/FDA), perfluoroelastomer and EPDM. Numerous port configurations, voltage options, and coil constructions enable Gems Isolation valves to easily integrate into any complex or demanding system.



Gems Isolation Solenoid Valve Series:

Cryogenic Valves to -320° F (-196° C)

These miniature 2-way valves can be configured for liquid nitrogen, liquid carbon dioxide and other extreme temperature media. Teflon® coated plungers, 316 stainless steel guide tubes and plunger springs, encapsulated coils, and Teflon® or Rulon™ seat seals produce a truly robust cryogenic valve for applications requiring high cycle life in extreme environments.

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



Pinch Valves

By the nature of their design Gems Pinch Valves keep fluid separate from the valve operating mechanism and provide excellent temperature buffering as well. Gems pinch valves operate on as little as 2.8 Watts, with fluid pressure ranging 15 to 30 psig (1.03 to 2.07 bar), and are available with 2-way Normally Open (NO) and Normally Closed (NC), or 3-way Directional Control operation. They support tubing up to 1/4" (6.35mm) O.D..

Gems Pinch Solenoid Valve Series:



■ Switches

Electro-Optic

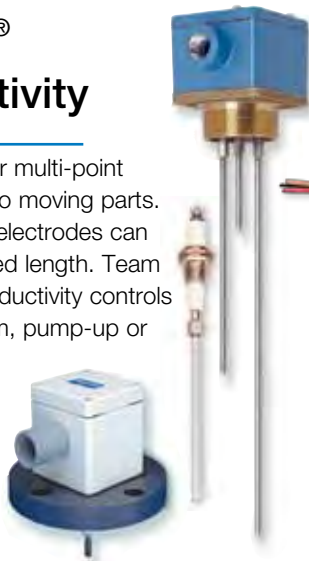
Industry's largest selection of electro-optic liquid level sensors is right here at Gems. Compact design for a small footprint anywhere space is at a premium. Solid-state switching and no moving parts ensures dependability over long service life.



■ Switches

Warrick® Conductivity

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



■ Switches

Capacitance Level Sensors

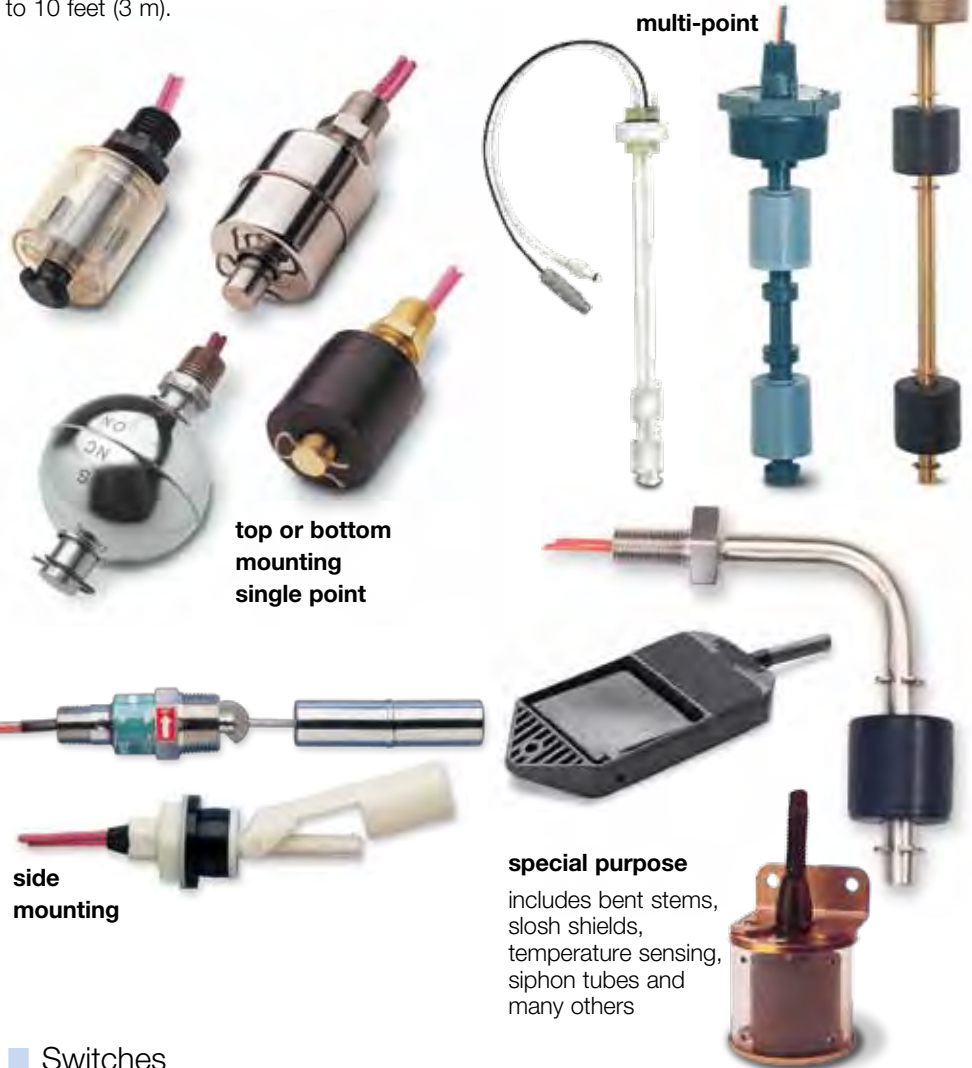
An excellent choice for turbulent or coating liquids, Gems offers multiple solid-state capacitance point level switches, including non-contact versions that sense liquid level from the outside of non-metallic vessels. Heavy duty CAP-300 is designed for off-highway vehicles and power generator coolant monitoring.



■ Switches

Float

Available in a vast range of sizes, mountings and materials, Gems 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. They are available in both single point and multi-point configurations. Multi-point switches monitor up to six levels with a single unit; lengths from a few inches (centimeters) to 10 feet (3 m).



multi-point

top or bottom mounting
single point

side mounting

special purpose
includes bent stems, slosh shields, temperature sensing, siphon tubes and many others

■ Switches

High Purity

Gems high purity sensors are designed for ultra-pure fluid applications. PTFE and PVDF resist build-up of foreign material and sticky media. These high-purity level sensors come in single, multi-point, float and electro-optic types.



■ Switches/Transmitters

Ultrasonic

Gems ultrasonic switches and transmitters are ideal for applications requiring solid-state level measurement such as those with ultrapure, dirty, coating, scaling or corrosive-type liquids. Available in contact and non-contact single point, or multi-point versions. Up to four actuation levels or continuous measurement to 26 feet (8 m). Also available for small tanks less than 4 ft. (1.2 m). Made of polypropylene, PVDF, PFA.



■ Switches

WIF-1250

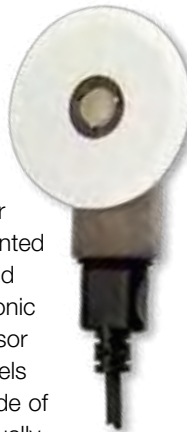
This solid-state sensor is an innovative, no-moving-parts solution specifically designed to detect the presence of water in fuel. The sensor is an ideal solution for OEM's of off-highway vehicles, locomotive and generator sets. It is also ideal for use with fuel filters, and in compressor crank cases to determine if water is present in lubricating oil.



■ Switches

Non-Intrusive

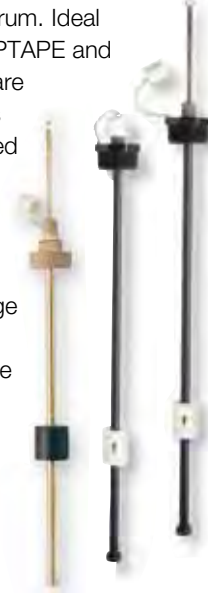
The ExOsense™ sensor is a break-through in liquid sensor technology. The unique, patented piezo-resonant transducer and microprocessor based electronic control module allow the sensor to accurately detect liquid levels non-intrusively from the outside of plastic bottles. ExOsense virtually eliminates all concerns over sensor compatibility, calibration and liquid media contamination.



■ Indicators

DIPTAPE™ and DRUMTAPE™

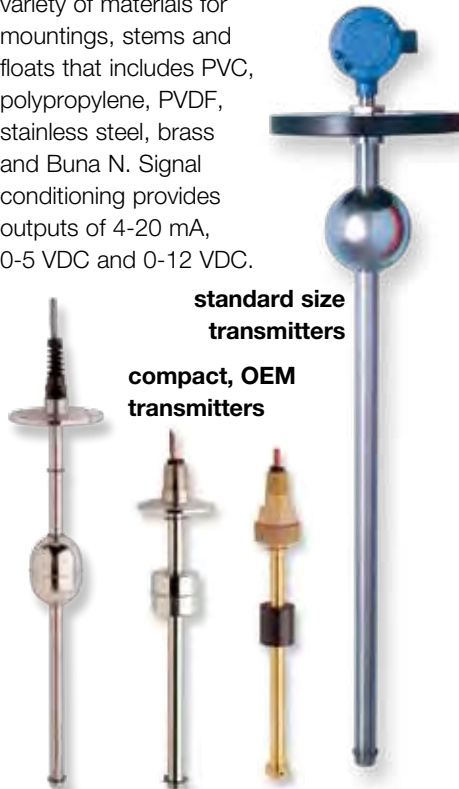
Pop the cap, pull the tab—and up comes the tape to tell you exactly how much liquid remains in the tank or drum. Ideal for hazardous areas, DIPTAPE and DRUMTAPE indicators are non-electric, plus liquids and vapors remain sealed from the atmosphere. DIPTAPE indicators are designed for tanks; DRUMTAPE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



■ Transmitters

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.



■ Transmitters

Magnorestrictive

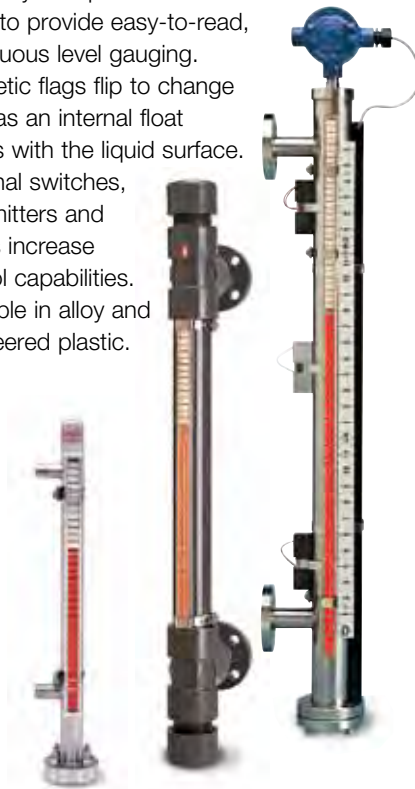
These robust transmitters are particularly ideal where extremely accurate level measurement is required; providing accuracy to within ±0.2mm, and a resolution better than 0.1mm. The temperature-compensated signal output is 4 to 20 mA. These units are available in lengths ranging from 8" to 157" (200 to 6,000 mm). The HART protocol version allows dual float tracking, and the explosion-proof version enables operation in Category 1 (Zone 0) or Category 1/2 environments.



■ Visual Level Indicators

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.



■ Switches

Piston/Diaphragm



Gems 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.

■ Transducers

Capacitive



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.

■ Switches

Solid-State



Utilizing our proven pressure sensor and ASIC design, Gems solid state pressure switches offer greater accuracy and repeatability in high shock and vibration environments. They also provide an advantage over electromechanical switches when actuations exceed 50 cycles/minute and a broad frequency response is needed. Available with a large selection of pressure port and electrical connection options.

■ Transducers

Submersible

9500 Series pressure transducers are designed specifically to meet the rigorous conditions for ground water monitoring while providing ultimate performance. They feature a true level reading through built in specific gravity compensation over a 23° F to 113° F (-5° C to 45° C) temperature range.

2400 Series



9500 Series

The 2400 Series features silicon-based Micro-Electro-Mechanical Systems (MEMS). Its complete 'system-on-chip' enables an ultra-slim design for bore hole applications.

Both series are impervious to the effects of water, even in the highest humidity and long-term submersion.

■ Transducers

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.



3100/3200 Series

- **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.

■ Transducers

Chemical Vapor Deposition

Gems Chemical Vapor Deposition (CVD) pressure transducers and transmitters are based on a solid, proven technology. Our CVD instruments 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.



2600 Series

2200 Series

3300 Series

Thicker Diaphragm

Handles pulsating pressures—all stainless steel wetted parts.

CVD Sensor

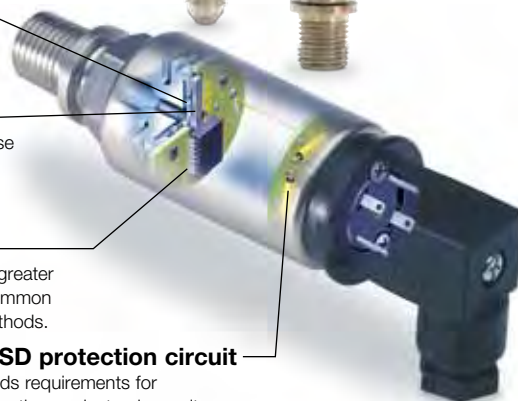
Stability and high sensitivity allow use of our thicker diaphragm. 17-4 PH SS sensor beam is laser welded for distortion-free construction.

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.

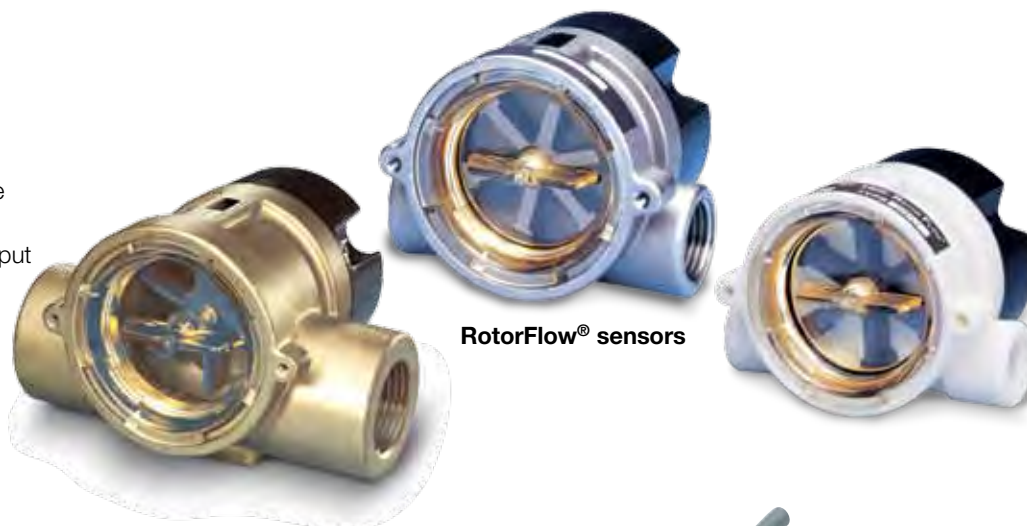


- **1200/1600 Series** — 4X full-scale proof pressure. Typical 0.5% full-scale accuracy.
- **2200/2600 Series** — 2X full-scale proof pressure. Typical 0.25% full-scale accuracy.
- **3300 Series** — Compact versions for pressures to 600 PSI (41 bar).
- **6000 Series** — 5 to 1 turndown. Typical 0.15% full-scale accuracy.

Sensors/Indicators

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).



RotorFlow® sensors

Switches

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.



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 $\pm 3\%$ 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

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 capability versions offer viscosity compensation, and high pressure handling to 1,500 PSIG (103 bar). Brass, plastic or stainless steel bodies.



Switches

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.



Switches

Shuttle

For monitoring water and oil—in line sizes 3/4" to 3" (2.5 to 7.6 cm). 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).



■ Solid-State

Intrinsically Safe Relays and Controls

Render any non-voltage-producing sensor, switch or conductivity electrode intrinsically safe with these relays and barriers from Gems. They amplify sensor load-handling capabilities in a wide range of AC and DC control switching applications. They are designed for easy installation 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.

In addition to safety, they offer great economy by reducing your need for costly explosion-proof sensors, switches, controls and housings. Solid-state reliability assures consistent performance, and with a completely encapsulated construction they are impervious to dust, moisture or foreign material. Select from a broad choice of Safe-Pak® and Warrick models.



Warrick® Series 17/27 conductivity level control

Warrick® Series 47 4-channel relay alarm panel control



SAFE-PAK® relays & Zener barriers



■ Electrical

Standard and Custom Warrick® Panels

Gems 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.



DMS-470/570 Series



RA-431 alarm panel

■ Solid-State

Standard Relays and Conductivity Level Controls

These relays boost your sensor's load handling ability in non-hazardous locations with the reliability and advantages inherent in solid-state controls. Available with plug-in bases, open board or threaded terminals.

Warrick® Series 16/26M



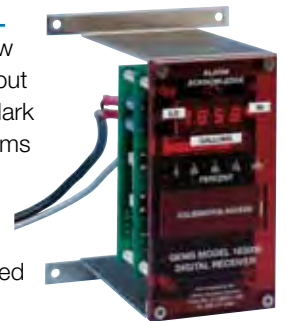
Warrick® Dual Function Series DF



■ Transmitters

Receivers

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



compact level cubes and panel mounted receivers



9 | Custom Modification & Sub-Assemblies

This brochure provides a broad overview of the range of Gems products. We offer thousands of variations of the fluid sensors and controls seen within, and for 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, what is a "Standard" product may not be exactly what you need.

Always keep in mind that since day one, Gems has been ready to modify a component to deliver the specific needs of performance and installation improvement to meet customer needs.

Our Sales, Engineering and Manufacturing groups, along with Application Specialists work daily with customers to customize our current products **and** to develop new components, sub-assemblies and complete fluid systems. We'll do the same for you.

Customization includes:

- Wetted and Non-Wetted Materials: Alloys and Engineered Plastics
- Electrical Terminations of All Types
- Port Sizes, Fittings and Other Installation Methods
- Sub-assembly Design and Manufacturing
- Integrated Sensor and Control Modules

When you don't see exactly what you need, or your manufacturing process would benefit from a supplied sub-assembly incorporating Gems components, simply let us know. We turn your "wish lists" into reality.



Solutions Engineering



Gems is dedicated to lean manufacturing and understands the critical need for a robust quality system that includes the right documentation, supplier qualification and ISO certification to meet the demanding requirements of the most specialized industries. With manufacturing facilities in the US, Europe and Asia, our global presence reduces lead-times and allows Gems to cost effectively ship ready-to-use systems throughout the world, exactly when customers request delivery.

With more than 50 years of engineering and application experience, a broad portfolio of key products, lean manufacturing tools and quality systems, Gems has one goal: To enable our customers to get to market fast with the best possible solution

Gems experience and passion for providing solutions to OEMs produces further benefits to our customers, including:

- Collaborative Engineering
- Reduced Development Costs
- Quicker Time to Market
- Reduced Supplier Base
- Managed Inventory



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