

WIF-1250 Water in Fuel Sensor

- ▶ Designed for OHV and Generator Set applications
- ▶ Compact size, easy to install
- ▶ Operates in plastic or metal tanks
- ▶ Reliable and affordable OEM solution
- ▶ Solid-State – no moving parts

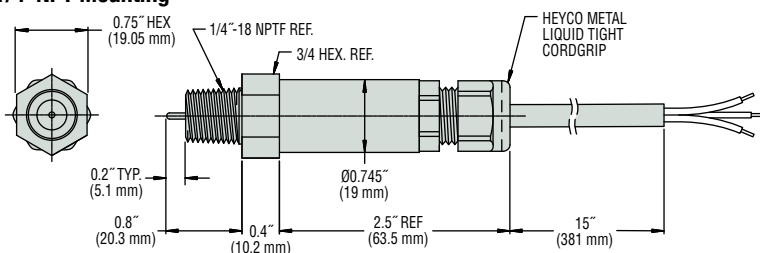
The WIF-1250 sensor is an innovative, no-moving-parts solution specifically designed to detect the presence of water in fuel. The sensor is an ideal solution for OEM's of off-highway vehicles, locomotive and generator sets. It is also ideal for use with fuel filters. Based on reliable conductivity technology, WIF-1250 sensors are built from robust nickel plated steel for compatibility with temperatures up to 257°F (125°C), and are suited for the most challenging environments or applications. A 5-second delay circuit prevents "slosh" actuation. The sensor is easily mounted in any position.

Specifications

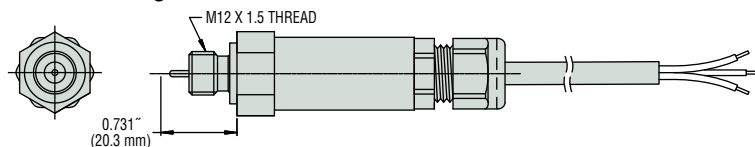
Housing Materials	Nickel plated steel, electrolytic nickel plated & fused glass conductivity pin insulator
Sensing Element Length	0.2" (5.1 mm)
Operating Pressure	750 PSI (51.7 bar) @ 70°F (21°C)
Operating Temperature	-40°F to 257°F (-40°C to 125°C)
Sensitivity	10,000 Ohms (fluid resistance)
Slosh Dampening	5 seconds
Supply Voltage	8 to 32 V DC
Current Consumption	<20 mA
Output	Open collector, sinking output
Output Load Capability	250 mA max.
Electrical Connection	20 AWG 3-Conductor Cable, 15" (381 mm)
Approvals	CE

Dimensions

1/4" NPT Mounting



M12x1.5 Mounting



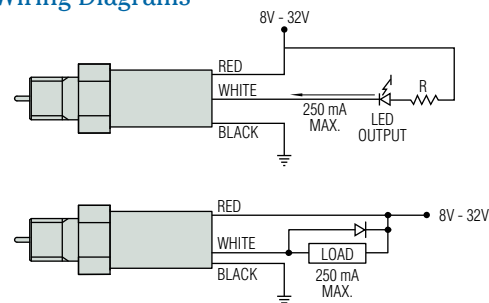
CE

Typical Applications

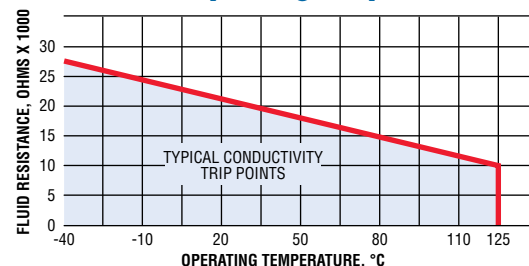
To detect water in:

- Fuel filters
- Diesel fuel storage tanks

Wiring Diagrams

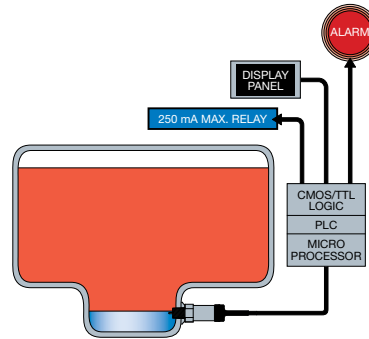


Resistance vs. Operating Temperature

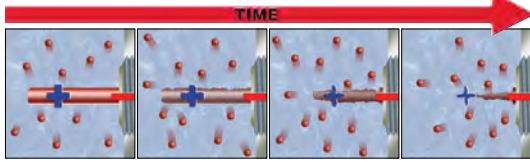


Operating Principle

WIF-1250 liquid level sensors are solid-state devices designed to detect the presence or absence of water in fuel. Each sensor contains integral, high-temperature-rated electronics that generate an alternating voltage to a probe tip. The presence of water completes the circuit which, in turn, changes the condition of the transistor output. Output options vary and can be used to actuate relays, indicator lights or LEDs, as well as to interface with CMOS/TTL logic, PLCs or microprocessors.

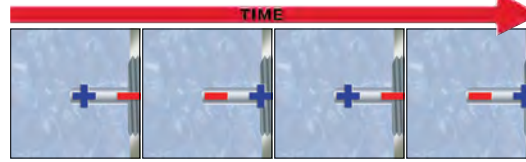


Conventional Conductivity Probe



When a single potential (DC Voltage) is applied to a probe submerged in conductive liquid, metal from that probe will be lost over time via electrolysis.

Gems WIF-1250 Probe



Gems applies extra circuitry to produce an alternating potential (alternating +/- DC square wave). Metal lost in one state is retrieved in the alternating state, resulting in virtually zero probe material loss.

How to Order

Select Part Number based on Mounting Thread and Switch Logic.

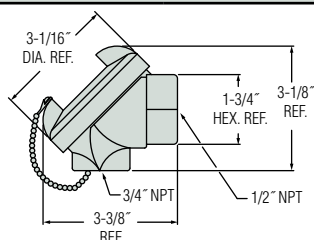
Probe Condition at Current Sink	Part Numbers	
	1/4" NPT	M12x1.5
Wet	238737	238856
Dry	238773	238855

Junction Boxes

GEMS offers optional CSA Listed and FM Approved, explosion-proof junction boxes for many level switch models. Compatible level switches are indicated throughout this catalog by the small icon—.

NOTE: Explosion-proof ratings are available only when J-boxes are part of factory assembled sensor unit. J-boxes below, when ordered separately, do not carry explosion-proof ratings.

Explosion-Proof J-Boxes



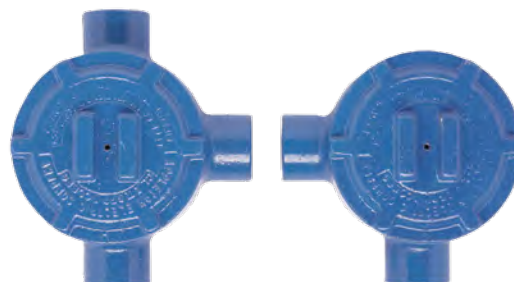
Materials	Aluminum	Iron
	Die Cast Aluminum	Cast Iron
	Stainless Steel Chain and Pin	
	EPDM Rubber Gasket (300°F/149°C Max. Service Temp.)	
Finish	Polished	Electroless Nickel Plate
Weight (approx.)	.62 lbs.	.62 lbs.
NEMA Rating	4, 13	4
Part Number	192147	198848



Non-Explosion Proof J-Boxes

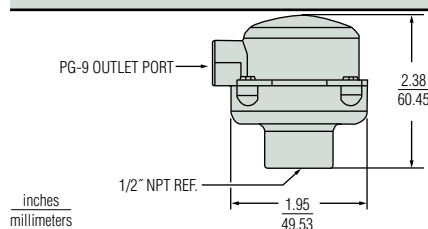
Alloy			Plastic		
1/2" TRADE SIZE (2 PORTS)		1/2" TRADE SIZE (2 PORTS)	1/2" NPT 2 PORTS		
Type	3-pin	7-pin	DPDT Relay	3-pin	7-pin
Part Number	113873 ⚡	113877	75980	113850	118828

⚡ – Stock Items.



Junction boxes are CSA and FM approved for explosion proofing in Class I, Division 1, Groups B, C, D, E, F, G

Conduit/Cable Gland Connections



Standard		5-Amp Relay
Specifications	Empty enclosure for lead wire splice connections.	120 VAC 50/60 HZ Contacts: 5A – 240 VAC Res 1/3 HP – 120 VAC 5A – 28 VDC Res.
Part Number	181410	180417



CAP-100 Series – Non-Contact, Capacitive Level Sensor

- ▶ For non-metallic containers
- ▶ Easy external mounting
- ▶ Compact – 30x45 mm (1.18" x 1.77")
- ▶ Potentiometer for sensitivity adjustment
- ▶ Power on and signal LED indicators

The CAP-100 series offers a unique level sensing solution for a wide variety of bottle types including plastic, glass and fiberglass. The non-contact sensor is ideally suited for medical applications such as waste, reagent or diluent liquids as well as dark, sticky or viscous fluids. The easy-to-calibrate sensor is available in both aqueous and non-aqueous versions and can be delivered with factory preset sensitivity for quick installation for OEM orders. The CAP-100 may also be used as a proximity sensor to detect the presence of solids such as paper or pulp.

Specifications

Performance	
Nominal Sensing Distance, Sn	0.39" (10mm)
Sensing Range	0-0.39" (0-10mm)
Repeat Accuracy - (% of Sn)	<10%
Hysteresis - (% of Sn)	<20%
Mechanical	
Enclosure Ratings	IP67, NEMA 1,3,4,6,13
Operating Temperature Range	-13°F to +158°F (-25°C to +70°C)
LED Signal Indicator	Yellow
Power On LED Indicator	Green
Potentiometer	Yes
Sensor Type	
Unshielded	L-Type, Non-Embeddable
Shielded	D-Type, Embeddable
Sensor Material	Glass Filled Nylon
Cable	78.74" (2 meter), 3 Wire PVC
Shock	30g, 11ms
Vibration	55Hz, 1mm amplitude in all planes
Electrical	
Supply Voltage	5-48 VDC
Continuous Switching Current	300 mA
Voltage Drop	<2 VDC
Current Consumption	<10 mA
Switching Frequency	100 Hz
Transient Protection	2kV, 1ms, 1 kOhm
Overload Protection	Yes
Short Circuit	Yes
Reverse Polarity Protection	Yes
Approvals	CE (Except at Frequency 803-805 MHz), RoHS

How To Order

Select a Part Number based on Fluid Properties and Sink State.

Fluid Properties	Max. Container Wall Thickness	Wet/Dry Sink	Part Number
Water Based, Conductive (unshielded sensor)	5/8"	Wet	230079
		Dry	230081
Non-Water Based, Not Conductive (shielded sensor)	3/8"	Wet	228830
		Dry	229855

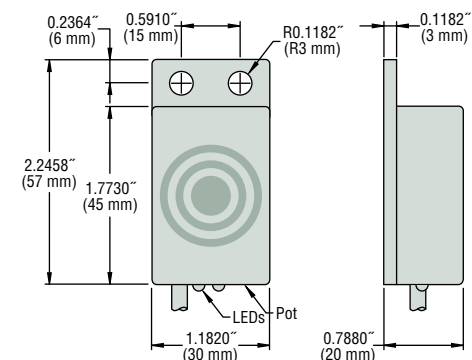


Typical Applications

Fluid Monitoring:

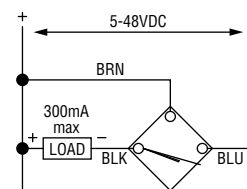
- Waste
- Reagents
- Diluent
- Detergent/Wash
- Coolant
- Printing Ink

Dimensions

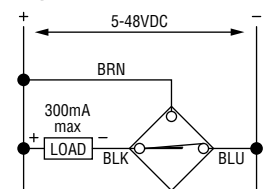


Wiring Diagram

Wet Sink



Dry Sink



CAP-150 Series – Capacitive Level Sensor

- ▶ For non-metallic containers
- ▶ Non-intrusive level sensing
- ▶ Optional Sight Glass Bracket
- ▶ Potentiometer for sensitivity adjustment

The CAP-150 series offers a unique level sensing solution for a wide variety of bottle types including plastic, glass and fiberglass. The non-contact sensor is ideally suited for medical applications such as waste, reagent or diluent liquids as well as dark, sticky or viscous fluids. The easy-to-calibrate sensor is available in both aqueous and non-aqueous versions and can be delivered with factory preset sensitivity for quick installation for OEM orders. The CAP-150 may also be used as a proximity sensor to detect the presence of solids such as pulp & paper.

Specifications

Performance	
Nominal Sensing Distance, Sn	0.2" (5mm)
Repeat Accuracy - (% of Sn)	<2%
Hysteresis - (% of Sn)	<20%
Mechanical	
Enclosure Ratings	IP67, NEMA 1,3,4,6,13
Operating Temperature Range	-13°F to +158°F (-25°C to +70°C)
LED Signal Indicator	Yellow
Power On LED Indicator	Green
Potentiometer	Yes
Termination	78.74" (2 meter), 3 Wire PVC
Shock	30g, 11ms
Electrical	
Supply Voltage	5-48 VDC
Continuous Switching Current	300 mA
Voltage Drop	<2 VDC
Current Consumption	<10 mA
Switching Frequency	100 Hz, maximum
Overload Protection	No
Short Circuit	Yes
Reverse Polarity Protection	Yes
Approvals	CE

How To Order

Select a Part Number based on Fluid Properties and Sink State.

Fluid Properties	Sensor Material	Flush Mountable	Sensing Range	Shielded	Sink/Source	Logic	Part Number
Aqueous, Conductive (Unshielded Sensor)	Delrin® Body with Valox® Sensor Face	No	2-8mm	No	Sink	Wet	239890
						Dry	239891
					Source	Wet	241366
						Dry	241367
Non-Aqueous, Non-Conductive (Shielded Sensor)	Ni-Plated Brass Body with Valox® Sensor Face	Yes	1-5mm	Yes	Sink	Wet	240607
						Dry	240612
					Source	Wet	241368
						Dry	241369

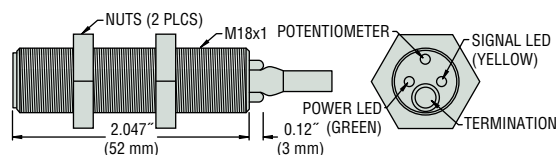


Typical Applications

Fluid Monitoring:

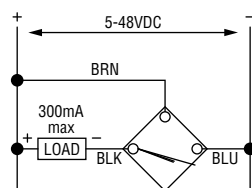
- Waste
- Reagents
- Diluent
- Detergent/Wash
- Coolant
- Printing Ink

Dimensions

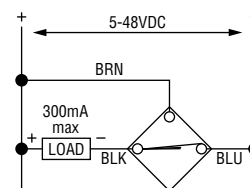


Wiring Diagram

Wet Sink



Dry Sink

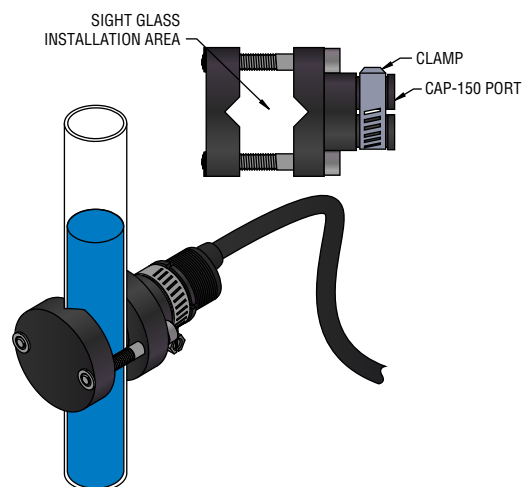


Convert Simple Sight Glass into Switch Actuation Device

- For glass tubing 1/4" to 1" Dia.

Use this easy-to-install clamp with the CAP-150 to provide liquid level sensing and switch actuation along the length of sight glasses 1/4" to 1" in diameter.

Part Number: 240836



CAP-200 Series – Compact, 1/2" NPT Mount

- ▶ For metallic and non-metallic containers
- ▶ Food grade plastic housing
- ▶ No sensor well required
- ▶ Potentiometer for sensitivity adjustment

The CAP-200 Series is easily threaded directly into 1/2" NPT fittings for an easy level sensing solution within a wide variety of metal and non-metal tanks. The highly accurate sensor is built from durable Delrin® material, and is available in both aqueous and non-aqueous versions. The easy to calibrate sensor can be delivered with factory preset sensitivity for quick installation by OEM. The CAP-200 may also be used as a proximity sensor to detect the presence of solids such as paper or pulp.

Specifications

Performance	
Nominal Sensing Distance, Sn	0.118" (3mm)
Sensing Range	0-0.118" (0-3mm)
Repeat Accuracy - (% of Sn)	<10%
Hysteresis - (% of Sn)	<20%
Mechanical	
Enclosure Ratings	IP67, NEMA 1,3,4,6,13
Operating Temperature Range	-13°F to +158°F (-25°C to +70°C)
LED Signal Indicator	Yellow
Power On LED Indicator	Green
Potentiometer	Yes
Sensor Type	
Unshielded	L-Type, Non-Embeddable
Shielded	D-Type, Embeddable
Barrel Material	Delrin®
Termination	78.74" (2 meter), 3 Wire PVC
Shock	30g, 11ms
Vibration	55Hz, 1mm amplitude in all planes
Max. Pressure	150 psi (10.3 bar)
Electrical	
Supply Voltage	5-48 VDC
Continuous Switching Current	300 mA
Voltage Drop	<2 VDC
Current Consumption	<10 mA
Switching Frequency	100 Hz
Transient Protection	2kV, 1ms, 1 kOhm
Overload Protection	Yes
Short Circuit	Yes
Reverse Polarity Protection	Yes
Approvals	CE (Except at Frequency 803-805 MHz), RoHS

How To Order

Select a Part Number based on Fluid Properties and Sink State.

Fluid Properties	Container Material	Wet/Dry Sink	Part Number
Water Based, Conductive (unshielded sensor)	Non-Metallic	Wet	230077
		Dry	230078
Non-Water Based, Not Conductive (shielded sensor)	Non-Metallic or Metallic	Wet	230082
		Dry	230083

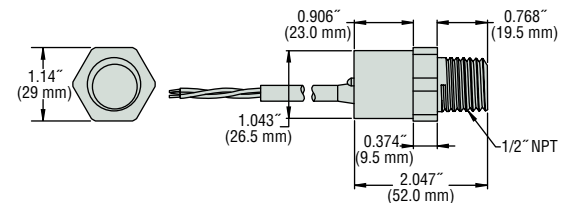


Typical Applications

Fluid Monitoring:

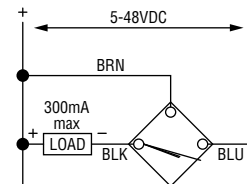
- Waste
- Reagents
- Diluent
- Detergent/Wash
- Coolant
- Printing Ink

Dimensions

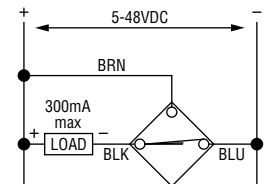


Wiring Diagram

Wet Sink



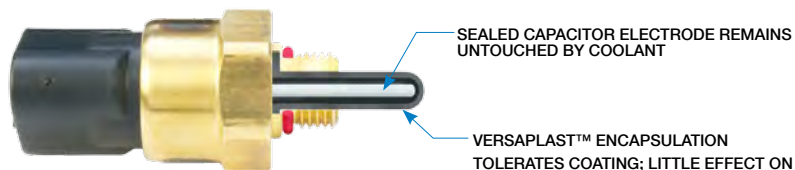
Dry Sink



CAP-300 Series – Capacitive Level Sensor

- ▶ Durable sealed design – IP67
- ▶ Developed for the most rugged aqueous applications
- ▶ Tolerates coolant coating
- ▶ Small size – 2" (51 mm) long
- ▶ Available in Stainless Steel for Food & Beverage Applications

The CAP-300 capacitive level sensor is one of our most durable and reliable point level sensors. The versatile CAP-300 is the ideal OEM solution for power generation equipment, off-highway vehicles, generators, Food & Beverage, Medical, Rail and HVAC applications, and excels in coolant monitoring. With nearly zero maintenance, the sensor mounts in any position, is compact, tolerates coating, remains reliable even in standby mode, and is compatible with temperatures up to 257°F (125°C). For use where sloshing occurs, or the reservoir's attitude changes frequently, Gems offers a variety of actuation delays.



Specifications

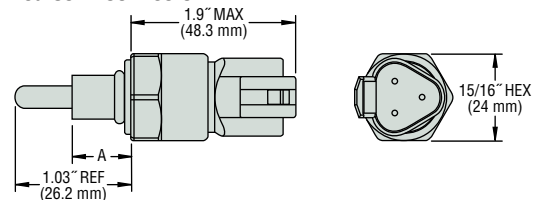
Mountings	1/4" NPT, 1/2"-20 per SAE J1926-3, M12x1.0-8g, M12x1.5 ISO 6149-3, 1/2" NPT
Materials	
Housing	Brass or 316L Stainless Steel*
O-Ring	EPDM
Probe Tip	Versaplast™
Operating Pressure	Up to 100 PSIG
Operating Temperature	
Common	-40°F to +257°F (-40°C to +125°C)
Cable Versions	-4°F to +158°F (-20°C to +70°C)
Supply Voltage	9 to 32 VDC
Current Consumption	15mA max. (no load)
Output	Open collector, sinking or sourcing output, 9-32 VDC, 30mA max.
Electrical Termination	3-pin Deutsch, 18 AWG Type SXL flying leads or 18 AWG PVC Cable
Sensing Element Length	1.03" (26.2mm) Max. (including thread length)
Approvals	CE, IP67, RoHS

* NSF Approved material of construction

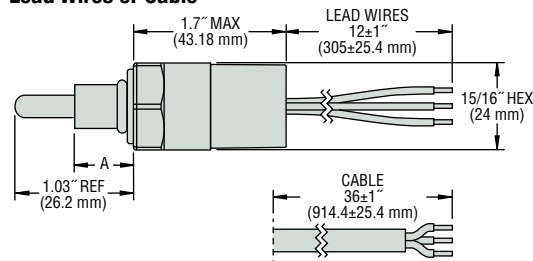


Dimensions

Deutsch® Connector



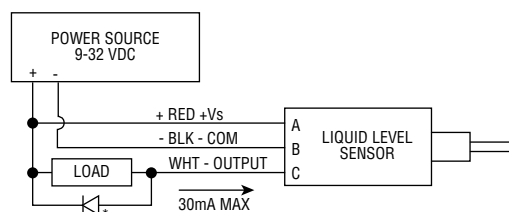
Lead Wires or Cable



		A DIM. REF.	EPDM O-Ring
Thread Sizes	1/2"-20	0.43" (10.9 mm)	3-905
	M12x1-8g	0.54" (13.5 mm)	2-110
	M12x1.5	0.53" (15.2 mm)	9.3 x 2.2 mm
	1/4"-18NPT	0.62" (15.7 mm)	None
	1/2"-14NPT	0.62" (15.7 mm)	None

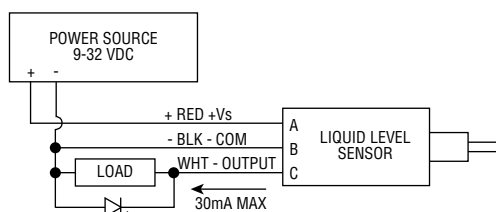
Wiring Diagram

Sinking



* For inductive loads, use diode suppression.

Sourcing



How To Order

Select a Part Number based on mounting type, connection and actuation condition.

Actuation Condition	Electrical Connection	Thread Sizes						
		Brass					316L Stainless Steel	
		1/4"-18 NPT (male)	1/2"-20 per SAE J1926-3	M12x1.5 Stud End Per ISO6149-3	M12x1.0-8g	1/2"-14 NPT (male)	1/4"-18 NPT (male)	1/2"-14 NPT (male)
Wet Sink	Integral 3-pin Deutsch® DT04-3P Connector	240640	240700	240800	240900	242970	244510	244540
	12" 18 AWG SXL Flying Leads	240660	240720	240820	240920	242975	244515	244545
	36" PVC Cable	240680	240740	240840	240940	242980	244520	244550
Dry Sink	Integral 3-pin Deutsch® DT04-3P Connector	240650	240710	240810	240910	242985	244525	244555
	12" 18 AWG SXL Flying Leads	240670	240730	240830	240930	242990	244530	244560
	36" PVC Cable	240690	240750	240850	240950	242995	244535	244565
Wet Source	Integral 3-pin Deutsch® DT04-3P Connector	240645	240705	240805	240905	242971	244511	244541
	12" 18 AWG SXL Flying Leads	240665	240725	240825	240925	242976	244516	244546
	36" PVC Cable	240685	240745	240845	240945	242981	244521	244551
Dry Source	Integral 3-pin Deutsch® DT04-3P Connector	240655	240715	240815	240915	242986	244526	244556
	12" 18 AWG SXL Flying Leads	240675	240735	240835	240935	242991	244531	244561
	36" PVC Cable	240695	240755	240855	240955	242996	244536	244566

Optional Delay

Delays are useful when the liquid being sensed is subject to frequent sloshing or the reservoir's attitude changes significantly. For low quantities, Gems offers a 5- and 10-second delay ($\pm 1/2$ second). Gems will customize the delay up to 99 seconds for large volume OEM applications. Please call Gems for more information.

XLS-1 — Ultrasonic Level Sensor

- ▶ No Moving Parts
- ▶ Zero Maintenance
- ▶ Ignores Condensation on Sensor
- ▶ Will Not Sense Foam as Liquid
- ▶ Microcontroller-Based Electronics

XLS-1 ultrasonic level sensors are compatible with water-based and hydrocarbon-based liquids, and are perfect for applications where condensation may affect other sensing technologies. The XLS-1 is an ideal solution for sensing liquid level in generators, water tanks, radiators, printers, and other industrial applications. XLS-1 ultrasonic level switches expand the Gems catalog of solid-state level sensors.

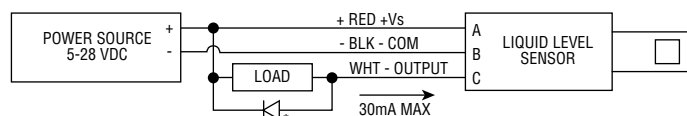
Specifications

Probe Length	1.25" (including threads)
Fluid Compatibility	Water, Water-based medias, Hydrocarbon-based chemicals, not compatible with high-viscosity liquids
Materials	
Housing	316L Stainless Steel
O-Ring Seal*	EPDM; NBR, Silicon, Kalrez® or Chemraz® available (Consult Factory)
Connector Housing	30% Glass-filled Polyester
Performance	
Accuracy	±1 mm from centerline
Repeatability	±1 mm
Temperatures	
Fluid	-40°F to +257°F (-40°C to +125°C)
Ambient	-40°F to +185°F (-40°C to +85°C)
Pressures	
Operating	0 to 250 psig
Burst	1000 psig
Environmental	
Ingress	IP67 Per IEC60529 IP6K9K Per DIN40050-9 (sensor only)
Vibration	Per IEC 60068-2-6; 20 m/s², 10-55 Hz; MIL-STD-202G, Method 204D, 10G, 57-2000 Hz
Shock	Per IEC 60068-2-27; 15G, 11ms
Audio Frequency Immunity	Per MIL 461D, CS101
EMC Immunity	IEC 61326-1; EN61000-4-(2 thru 6)
Input Power	5-28 VDC regulated power, max supply current 20 mA
Outputs	Open collector, sinking or sourcing output Open collector specs 30 VDC, 30mA max
Electrical Interface	3 Pin Deutsch DT Series Connector, 18 AWG wire or cable
Mechanical Interface	1/4" NPT, 1/2" NPT, M12x1.0, M12x1.5, 1/2"-20, G1/4", others available upon request
Mounting Orientation	Mounted Horizontally ±60 degrees
Approvals	CE (EMC 2004/108/EC) and RoHS, UL/cUL Recognized
Calibration	None required

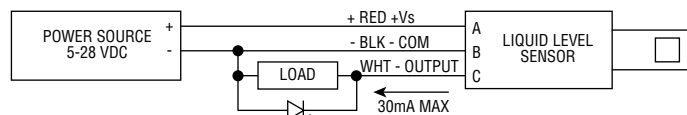
* Where applicable.

Wiring Diagram

Sinking



Sourcing

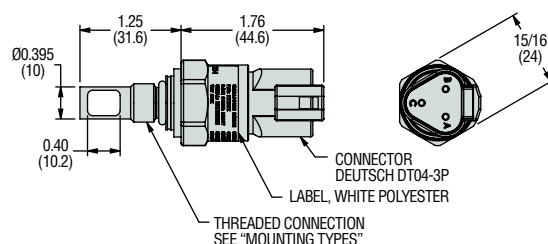


* For inductive loads, use diode suppression.

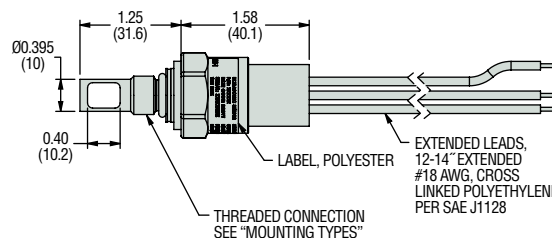


Dimensions

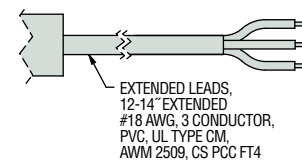
3-PIN Deutsch Connector



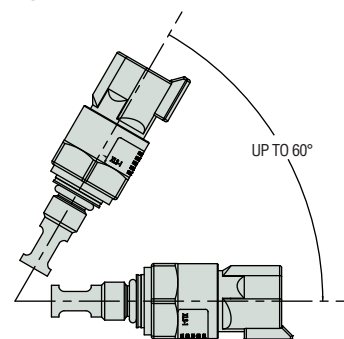
3-Wire Output



PVC Cable



Mounting Attitude



Mounting Types

SAE

1/2"-14 NPT	1/4"-18 NPT	1/2"-20 per SAE J1926-3

BSP & Metric

M12 x 1.0	M12 x 1.5 per ISO6149-3	G1/4"-19 BSPP
See Note 1	See Note 1	See Note 2

 inch
(mm)

How To Order

Select a Part Number based on mounting type, connection and actuation condition.

Actuation Condition	Electrical Connection	Mounting Type					
		M12 x 1.0 (TYPE 10) ¹	1/2"-14 NPT (TYPE 12)	1/4"-18 NPT (TYPE 14)	M12 x 1.5 per ISO6149-3 (TYPE 15) ¹	1/2"-20 per SAE J1926-3 (TYPE 20) ¹	G1/4"-19 BSPP (TYPE 24) ²
Wet Sink	Integral 3-pin Deutsch® Connector	247670	247690	247700	247680	247660	250010
	18 AWG, 12"-14" Extended Flying Leads	247740	247780	247800	247760	247720	250020
	12"-14" PVC Cable	247750	247790	247810	247770	247730	250030
Dry Sink	Integral 3-pin Deutsch® Connector	247675	247695	247715	247685	247665	250005
	18 AWG, 12"-14" Extended Flying Leads	247745	247785	247805	247765	247725	250015
	12"-14" PVC Cable	247755	247795	247815	247775	247735	250025
Wet Source	Integral 3-pin Deutsch® Connector	250830	250820	250840	250850	250870	250890
	18 AWG, 12"-14" Extended Flying Leads	250930	250920	250940	250950	250970	250990
	12"-14" PVC Cable	251030	251020	251040	251050	251070	251090
Dry Source	Integral 3-pin Deutsch® Connector	250835	250825	250845	250815	250875	250895
	18 AWG, 12"-14" Extended Flying Leads	250935	250925	250945	250855	250975	250995
	12"-14" PVC Cable	251035	251025	251045	250915	251005	250955

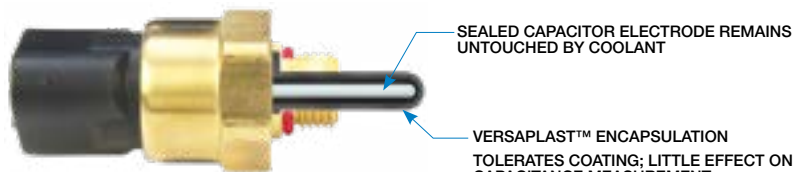
Notes:

1. Supplied with EPDM O-ring. Consult factory for alternate O-ring materials.
2. Designed for use with Dowty Bonded Seal. Not supplied.

CAP-300 Series – Capacitive Level Sensor

- ▶ Durable sealed design – IP67
- ▶ Developed for the most rugged aqueous applications
- ▶ Tolerates coolant coating
- ▶ Small size – 2" (51 mm) long
- ▶ Available in Stainless Steel for Food & Beverage Applications

The CAP-300 capacitive level sensor is one of our most durable and reliable point level sensors. The versatile CAP-300 is the ideal OEM solution for power generation equipment, off-highway vehicles, generators, Food & Beverage, Medical, Rail and HVAC applications, and excels in coolant monitoring. With nearly zero maintenance, the sensor mounts in any position, is compact, tolerates coating, remains reliable even in standby mode, and is compatible with temperatures up to 257°F (125°C). For use where sloshing occurs, or the reservoir's attitude changes frequently, Gems offers a variety of actuation delays.



Specifications

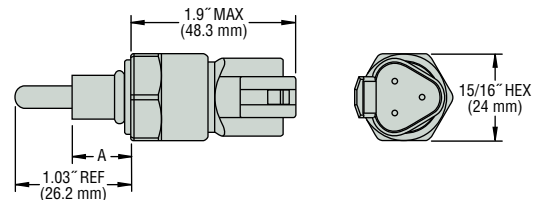
Mountings	1/4" NPT, 1/2"-20 per SAE J1926-3, M12x1.0-8g, M12x1.5 ISO 6149-3, 1/2" NPT
Materials	
Housing	Brass or 316L Stainless Steel
O-Ring	EPDM
Probe Tip	Versaplast™
Operating Pressure	Up to 100 PSIG
Operating Temperature	
Common	-40°F to +257°F (-40°C to +125°C)
Cable Versions	-4°F to +158°F (-20°C to +70°C)
Supply Voltage	9 to 32 VDC
Current Consumption	15mA max. (no load)
Output	Open collector, sinking or sourcing output, 9-32 VDC, 30mA max.
Electrical Termination	3-pin Deutsch, 18 AWG Type SXL flying leads or 18 AWG PVC Cable
Sensing Element Length	1.03" (26.2mm) Max. (including thread length)
Approvals	CE, IP67, RoHS

For NSF certified product options, contact Gems.

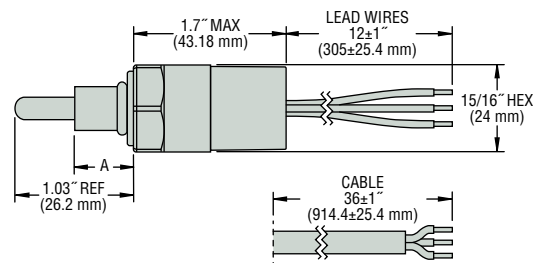


Dimensions

Deutsch® Connector



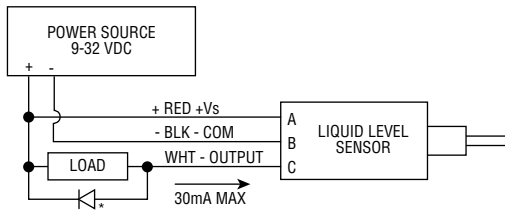
Lead Wires or Cable



		A DIM. REF.	EPDM O-Ring
Thread Sizes	1/2"-20	0.43" (10.9 mm)	3-905
	M12x1-8g	0.54" (13.5 mm)	2-110
	M12x1.5	0.53" (15.2 mm)	9.3 x 2.2 mm
	1/4"-18NPT	0.62" (15.7 mm)	None
	1/2"-14NPT	0.62" (15.7 mm)	None

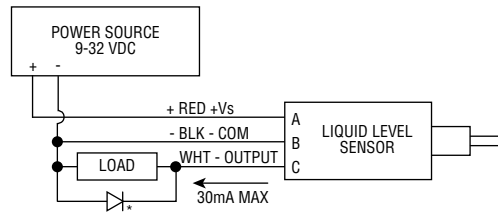
Wiring Diagram

Sinking



* For inductive loads, use diode suppression.

Sourcing



How To Order

Select a Part Number based on mounting type, connection and actuation condition.

Actuation Condition	Electrical Connection	Thread Sizes						
		Brass					316L Stainless Steel	
		1/4"-18 NPT (male)	1/2"-20 per SAE J1926-3	M12x1.5 Stud End Per ISO6149-3	M12x1.0-8g	1/2"-14 NPT (male)	1/4"-18 NPT (male)	1/2"-14 NPT (male)
Wet Sink	Integral 3-pin Deutsch® DT04-3P Connector	240640	240700	240800	240900	242970	244510	244540
	12" 18 AWG SXL Flying Leads	240660	240720	240820	240920	242975	244515	244545
	36" PVC Cable	240680	240740	240840	240940	242980	244520	244550
Dry Sink	Integral 3-pin Deutsch® DT04-3P Connector	240650	240710	240810	240910	242985	244525	244555
	12" 18 AWG SXL Flying Leads	240670	240730	240830	240930	242990	244530	244560
	36" PVC Cable	240690	240750	240850	240950	242995	244535	244565
Wet Source	Integral 3-pin Deutsch® DT04-3P Connector	240645	240705	240805	240905	242971	244511	244541
	12" 18 AWG SXL Flying Leads	240665	240725	240825	240925	242976	244516	244546
	36" PVC Cable	240685	240745	240845	240945	242981	244521	244551
Dry Source	Integral 3-pin Deutsch® DT04-3P Connector	240655	240715	240815	240915	242986	244526	244556
	12" 18 AWG SXL Flying Leads	240675	240735	240835	240935	242991	244531	244561
	36" PVC Cable	240695	240755	240855	240955	242996	244536	244566

Optional Delay

Delays are useful when the liquid being sensed is subject to frequent sloshing or the reservoir's attitude changes significantly. For low quantities, Gems offers a 5- and 10-second delay ($\pm 1/2$ second). Gems will customize the delay up to 99 seconds for large volume OEM applications. Please call Gems for more information.



ULS-200

Solid-State Point-Level Sensor

Data Sheet No. 263795 Rev. E



Order from: **C A Briggs Company**
622 Mary Street; Suite 101; Warminster, PA 18974
Phone: 267-673-8117 - Fax: 267-673-8118
Sales@cabriggs.com - www.cabriggs.com

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1. About This Document

1.1 Function

This instruction provides the information required for mounting, connection, setup, maintenance, and resolving faults. Please read this information before installing the sensor and putting the instrument into operation and keep this manual accessible. All performance characteristics within this document are at a set of standard conditions, and user experience may differ depending on varying application conditions.

1.2 Document Online Location

<https://www.gemssensors.com/uls-200-datasheet>



1.3 Symbols Used



INFORMATION, NOTE, TIP:

This symbol indicates helpful additional information and tips for successful work.



NOTE:

This symbol indicates notes to prevent failures, malfunctions, damage to devices or plants.



CAUTION:

Non-observance of the information marked with this symbol may result in personal injury.



WARNING:

Non-observance of the information marked with this symbol may result in serious or fatal personal injury.



DANGER:

Non-observance of the information marked with this symbol results in serious or fatal personal injury.



EX APPLICATIONS:

This symbol indicates special instructions for Ex applications.



BATTERY DISPOSAL:

This symbol indicates special information about the disposal of batteries and accumulators.

2. Safety

2.1 Personal Protective Equipment (PPE)

Personal protective equipment should always be worn when working with the sensor.

2.2 Appropriate Use

Note the following:



WARNING: GEMS PRODUCTS MAY ONLY BE USED FOR THE APPLICATIONS DESCRIBED IN THIS DOCUMENT. IF PRODUCTS AND COMPONENTS FROM OTHER MANUFACTURERS ARE USED, THESE MUST BE RECOMMENDED OR APPROVED BY GEMS. PROPER TRANSPORT, STORAGE, INSTALLATION, ASSEMBLY, COMMISSIONING, OPERATION AND MAINTENANCE ARE REQUIRED TO ENSURE THAT THE PRODUCTS OPERATE SAFELY AND WITHOUT ANY PROBLEMS. THE PERMISSIBLE AMBIENT CONDITIONS MUST BE COMPLIED WITH. THE INFORMATION IN THE RELEVANT DOCUMENTATION MUST BE OBSERVED.

2.3 Incorrect Use

Incorrect or inappropriate use of this sensor can increase the likelihood of application hazards not limited to vessel overfill, damage to property, environmental contamination, and damage to the sensor itself.

3. Product Description

The Gems' ULS-200 Solid-State Point-Level Sensor works with a wide variety of media. It eliminates failure caused by moving parts and works well in high-viscous, high-pressure, humid, and reflective applications. It does not rely on specific gravity or conductivity.

- Compact design
- Accurate and repeatable electronic point level switching
- Durable all 316L stainless steel or brass housing with IP6k9k rating
- Wide media range

Applications

- Construction
- Water & Wastewater
- Emergency Vehicles
- Power Generation
- Renewable Energy
- Buses & Recreational
- HVAC
- Semiconductor
- Agriculture
- Oil & Water TCUs
- Medical & Laboratory
- General Industrial

3.1 Specifications

MEDIA		Aqueous, Oil & Hydrocarbon-Based Liquids, Dielectric > 2.2
MOUNTING		1/4"-18 NPT, 1/2"-14 NPT, G1/4"-19 B, M12x1.5-6g
WETTED MATERIALS	HOUSING	Brass, 316L Stainless Steel
	O-RING	Buna-N
	PROBE TIP	PVDF (Aqueous) or PBT (Hydrocarbon)
OPERATING PRESSURE		Up to 300 PSIG (20.7 bar)
OPERATING TEMPERATURE		-40° F to +257° F (-40° C to +125° C)
SUPPLY VOLTAGE		9-32 VDC
CURRENT CONSUMPTION		6mA Max. (No Load)
OUTPUT		Solid-State, Sinking or Sourcing Output, 9-32 VDC, 300mA Max.
ELECTRICAL TERMINATION		3-pin Deutsch DT04-3P
TIME DELAY		No Delay, 3 Sec, 5 Sec, 10 Sec
INGRESS PROTECTION		IPX7 & IP6K9K
APPROVALS		CE, RoHS

Reference Operating Conditions: Ambient Temperature: 20°C (68°F) ±5°C; Media Temperature: 20°C (68°F) ±5°C; Process Pressure: 1 Bar (14.5 PSI); Media Type: Water; Humidity: <60% RH Non-condensing

3.2 Part Number Nomenclature

ULS200	X	X	X	X	X	XX	XX
SERIES	HOUSING MATERIAL	ACTUATION CONDITION	THREAD SIZE	INTEGRAL CONNECTOR	MEDIA BASED SENSING TYPE	TIME DELAY (INCREASING LEVEL)	TIME DELAY (DECREASING LEVEL)
	S - 316 S.S.	A - Wet Sink [†]	1 - 1/4" NPT [†]	Y - Deutsch DT04-3P [†]	W - Water ^{†*}	00 - No Delay [†]	00 - No Delay [†]
	B - Brass [†]	B - Dry Sink	2 - 1/2" NPT		H - Hydrocarbon	03 - 3 sec.	03 - 3 sec.
		C - Wet Source	3 - M12x1.5			05 - 5 sec.	05 - 5 sec.
		D - Dry Source	4 - G1/4-19			10 - 10 sec.	10 - 10 sec.

[†]Standard Configuration

^{*}Please consult the factory for application review assistance for media with dielectric constants < 40.

3.3 Sensor Labels



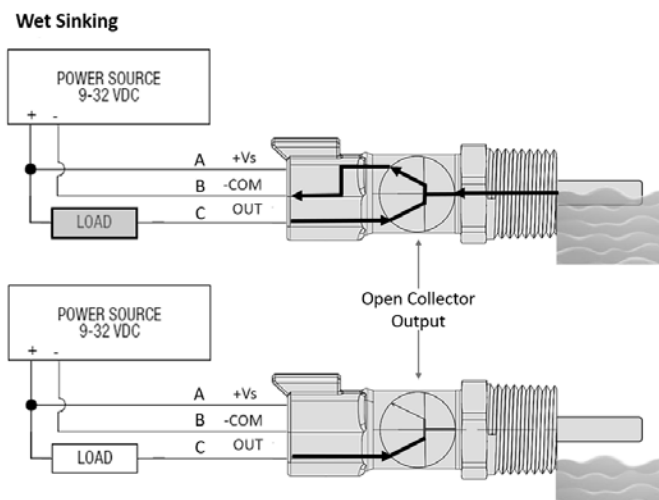
Product Label



Package Label

3.4 Operating Principle

The ULS-200 uses a solid-state switching output. It can be configured from our factory to switch to a positive “true” signal in either wet or dry condition. It can also be configured with a built in delay on rising, falling, or both. Diagram example is shown below (signal “true” when wet).

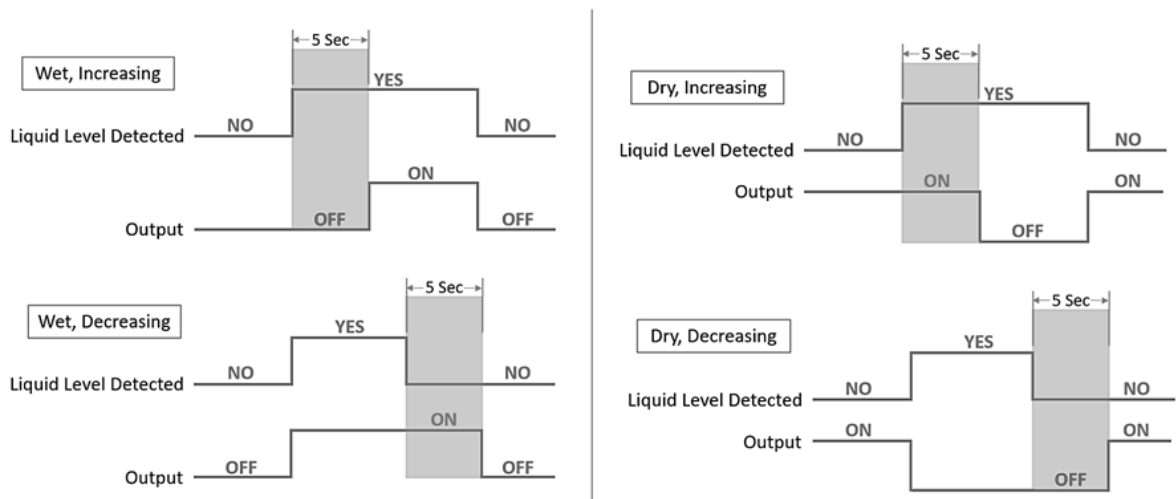


3.5 Sensor Technology

The ULS-200 uses capacitive sensing technology to detect the presence or absence of high (water-based) or low (oil-based) dielectric liquid media.

More on Capacitive sensing can be found here: <https://www.gemssensors.com/resource-center/operating-principles-installation-and-maintenance/level/capacitive-level-switch-operating-principle>

3.6 Time Delays

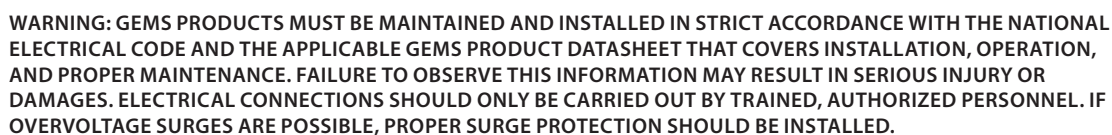


1/4" NPT	1 to 2 Turns Right Hand-Tight
1/2" NPT	1 to 2 Turns Right Hand-Tight
M12x1.5	14.5 - 16.5 ft/lb
G1/2-19	25 - 27.5 ft/lb

Sensor may be mounted in any position. Optimal performance is with sensor in horizontal position. The sensing probe should be kept at least 0.50" (12.7 mm) away from any surface.

5. Electrical Connection

All electrical connections should be carried out by qualified personnel.



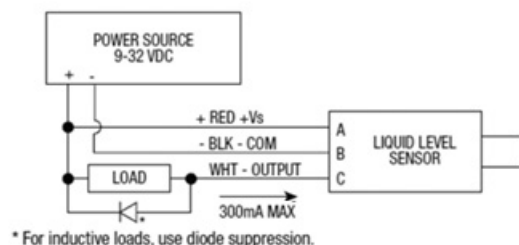
WARNING: ALTHOUGH THE ULS-200 COMES WITH IP6K9K RATING, THAT DOES NOT INCLUDE THE ELECTRICAL MATING CONNECTION. TO INSURE BETTER PROTECTION FROM MOISTURE INGRESS, PLEASE CONSIDER THE FOLLOWING MEASURES:

- FIRMLY INSERT THE MATING CABLE UNTIL FULLY SEATED
- PATH THE CONNECTION CABLE OR WIRES DOWNWARDS

SUPPLY VOLTAGE	9-32 VDC
CURRENT CONSUMPTION	6mA Max. (No Load)

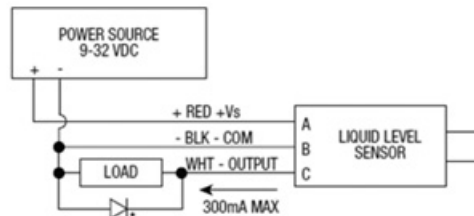
OUTPUT	Solid-State, Sinking or Sourcing Output, 9-32 VDC, 300mA Max.
---------------	---

Sinking



* For inductive loads, use diode suppression.

Sourcing



Deutsch DT04-3P

(inch)
(mm)



Diagram of the Deutsch DT04-3P connector showing pins A, B, and C.

Pin ID	Voltage Mode
A	+Vs
B	-COM
C	OUT

More information on sinking vs sourcing found here:

- <https://article.gemssensors.com/knowledge/sinking-or-sourcing-general-overview>
- <https://article.gemssensors.com/knowledge/how-to-choose-between-wet-sink-or-dry-sink>
- <https://article.gemssensors.com/knowledge/how-to-choose-between-wet-source-or-dry-source>

6. Maintenance

6.1 Basic Maintenance

Only use cleaning agents that are compatible with the sensor's materials. Use proper care when cleaning, and only use methods that do not exceed the housing protection rating.

- Electrical entries and mounting points in an enclosed tank may require liquid/vapor sealing.
- Our sensors must not be field-repaired.
- Physical damage sustained by product may render it unserviceable.

6.2 Basic Troubleshooting

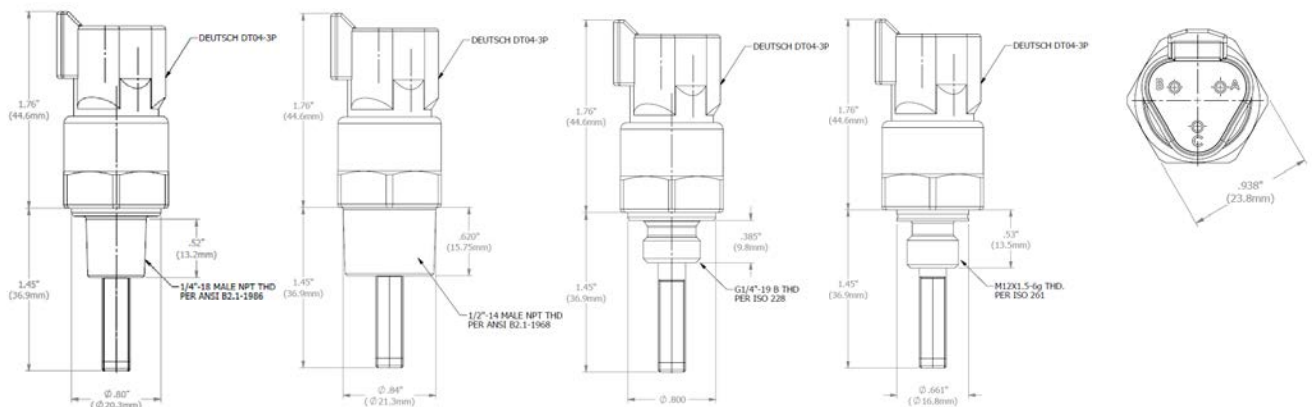
Is the power supply correct?	• Standard sensors require a 9 to 32 VDC input. Use a known good power supply as well as a known good voltmeter and see if the sensor responds to media.
Is the wiring correct?	• Wiring schematics can be found in section 5.4 of this document.
Did you inspect the sensing element?	• Make sure the sensing probe is clean without dried-on debris that could cause a false reading, and the probe should be kept at least 0.50" (12.7 mm) away from any surface.
Have you tested the sensor?	• Remove the sensor completely from your mechanical and electrical system. This will isolate any variable in the circuitry. Test with room temp tap water or engine oil. This way, it is a good known target fluid
Have you reviewed the mounting and switch point location?	• The sensor should not be mounted in a port or tube where media can get trapped. It should not be mounted at the top vertically or at a severe angle. Best mounting practice is horizontal direct into tank wall.
Is the dielectric constant outside of the sensor's range?	• Please confirm the dielectric constant of the media. For dielectric constants < 40, please consult the factory for application review assistance.

Also see our guide on electrical noise here: <https://article.gemssensors.com/knowledge/electrical-noise-various-causes-and-how-to-avoid-effects>

6.3 Returns

Standard terms & conditions of sale apply. Refer to the document located online at <https://www.gemssensors.com/docs/default-source/resource-files/terms-conditions/gems-customer-terms>. All RA activity must go through the Gems quality services team. To initiate an RA please go to <https://ecatalog.gemssensors.com/support/ra>

7. Mechanical Construction



8. Certificates & Approvals

8.1 Certificates, Approvals & Ratings

IPX7 & IP6K9K per ISO 20653

Application of EU Directive(s):

- 2014/30/EU Electromagnetic Compatibility
- 2011/65/EU Restriction of Hazardous Substances in Electrical and Electronic Equipment and subsequent amendment 2015/863/EU

Harmonized Standard(s) to which Conformity is declared:

- EN IEC 61326-1:2021
- EN IEC 61326-2-3:2021
- EN IEC 63000:2018

9. Contact Information

Toll Free: 1-855-877-9666

Outside the US: 860-747-3000

Contact Email: is@gemssensors.com

Order from: **C A Briggs Company**

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2024-05-21

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