

Electro-Optic Level Switches

Single Point

- ▶ Small size
- ▶ Economically priced
- ▶ Built-in, solid-state electronics
- ▶ No moving parts
- ▶ Simple, one-unit installation

ELS Series Level Switches are low cost, compact, optical level sensors with built-in switching electronics. With no moving parts, these small units are ideal for a variety of point level sensing applications — especially where dependability and economy are a must.

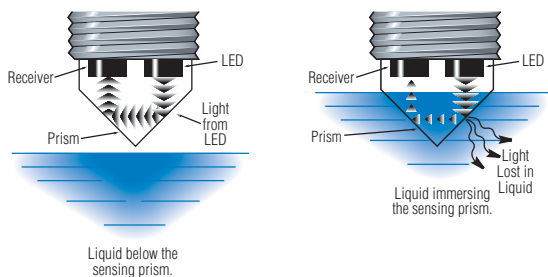
Level switches are suitable for high, low or intermediate level detection in practically any tank, large or small. Installation is simple and quick through the tank top, bottom or side. Solid state-switching ensures dependability over long service life.

The sensor offers $\pm 1\text{mm}$ repeatability and broad liquid compatibility. They are not recommended for use in any liquid that crystallizes or leaves a solid residue.

General Operating Principle

The electro-optic sensor contains an infrared LED and a light receiver. Light from the LED is directed into a prism which forms the tip of the sensor.

With no liquid present, light from the LED is reflected within the prism to the receiver. When rising liquid immerses the prism, the light is refracted out into the liquid, leaving little or no light to reach the receiver. Sensing this change, the receiver actuates electronic switching within the unit to operate an external alarm or control circuit.

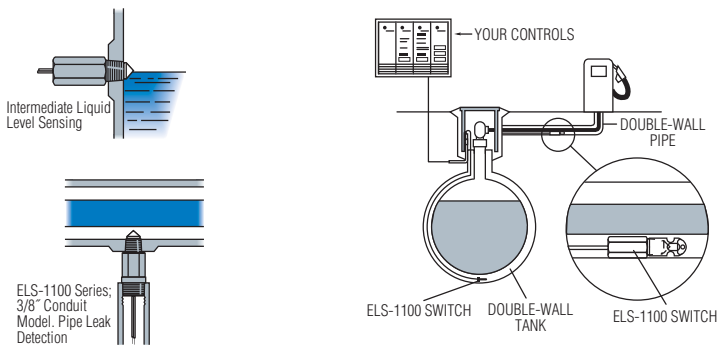


Reflective Surface

Any optical sensor may be affected by reflective surfaces. Consult Gems if prism is to be less than 2 inches from any reflective surface.

Typical Applications

- Medical laboratory
- Food and beverage systems
- Pharmaceuticals
- Petrochemicals
- Leak detection
- Hydraulic reservoirs
- Machine tools



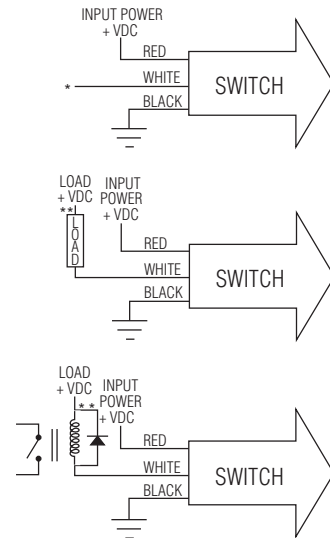
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Opto-Pak	A-33

Industry's Largest Selection!



LEVEL SWITCHES - SINGLE POINT

Typical Wiring Diagrams - For all electro-optic units not otherwise specified.



* TTL/CMOS Output-For levels greater than 5 volts, a 10K pull-up resistor is required at the output.
 ** Maximum load=40mA @ 30VDC.

ELS-950 Series Rugged Electro-Optic Level Sensors

The ELS-950 Series represents Gems' smallest electro-optic level sensors developed to monitor a broad range of media including OHV type fluids.

Our UL-approved design features a TPE over-molded electronics insert, TPE insulated wires, and fluorocarbon o-ring seals that create a watertight, environmentally resistant assembly, ideally suited for use in harsh environments offering excellent temperature and pressure capabilities.

The ELS-950 is excellent for industrial OEMs requiring a solid-state sensor for small space and high temperature environments.

Specifications

Materials	
Housing	Polysulfone (Contact Gems for alternative material types)
Prism	Polysulfone
O-Ring	Fluorocarbon (1/4" MNPT - None)
Electronics	Over-molded TPE
Operating Pressure	0 to 250 PSI (0 to 17 bar) maximum
Operating Temperature*	-40°F to +230°F (-40°C to 110°C)
Current Consumptions (No Load)	
5 VDC	4 mA No Load
12 VDC	10mA No Load
Output	Sink 40 mA max., up to 30 VDC
Repeatability	±1 mm
Lead Wires	3x TPE Insulated; 22 AWG
Approvals	
CE, UL file No. E108913	
IP66/67 Rating	
ROHS Compliant	

* These switches are not for use in freezing liquids or steam/high condensation environments. Contact Gems for alternative solutions.

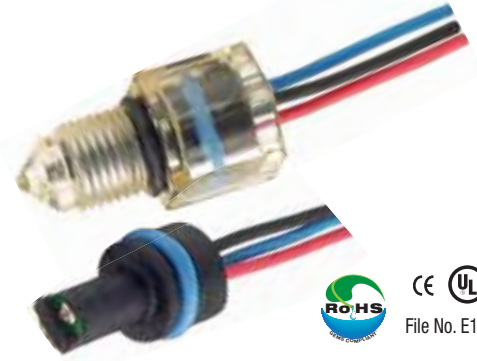
How To Order

Specify Part Number based on Input and Output Condition required.

Input Power	Actuation Condition	Lead Wire Length	Mounting Type		
			1/4" MNPT	1/2" - 20UNF-2B*	M12x1-8*
5 VDC ±10%	Wet	6 inches	224504 ⚡	224501 ⚡	224508 ⚡
		2 meters	226545	226541	226549
	Dry	6 inches	224505	224502 ⚡	224509
		2 meters	226546	226542	226550
12 VDC ±10%	Wet	6 inches	224506 ⚡	224503 ⚡	224510
		2 meters	226547	226543	226551
	Dry	6 inches	224507 ⚡	223625 ⚡	224511 ⚡
		2 meters	226548	226544	226552

* Supplied with standard fluorocarbon o-ring.

⚡ - Stock items.

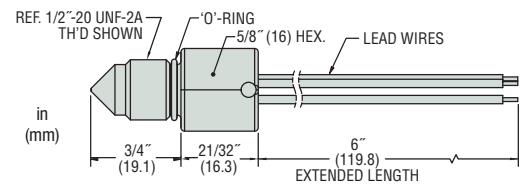


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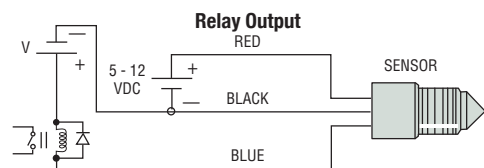
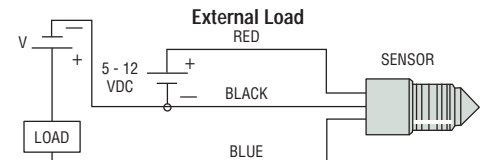
Typical Applications

- Coolant reservoir monitoring and warning
- Medical diagnostic, sterilizer, washers and dialysis equipment
- Low lubricant warning on machine tools, generator sets, on- or off-highway vehicles
- Low level warning in hydraulic reservoirs
- Plastic over flow bottles, plastic radiators
- Leak detection for drip pans

Dimensions



Wiring Diagrams



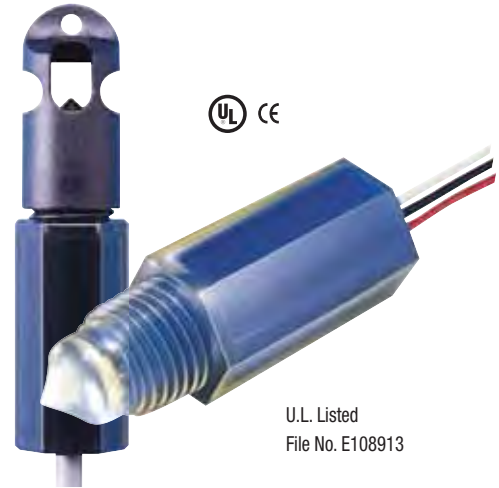
General Purpose ELS -1100 Series Satisfies Most Applications

These polysulfone units are both compact and economical. They feature a variety of mountings, power requirements and electrical terminations to make it easy to find a perfect match for your application.

Specifications

Materials	
Housing and Prism	Polysulfone or Nylon
Operating Pressure	0 to 150 PSI, Maximum
Operating Temperature*	0°F to 176°F (-17.8°C +80°C)
Current Consumption	18 mA, Approximately
Output†	TTL/CMOS Compatible. Open Collector Output May Sink 40 mA UP TO 30 VDC.
Repeatability	±1 mm
EMI Susceptibility	Meets (MIL-STD-461B Part 2 Modified) Specification of 10 V/M for Frequency Range 30 to 1000 MHz (Except 609 MHz = 9 V/M and 679 MHz = 7.5 V/M).

* These switches are not for use in freezing liquid or steam/high condensation environments. Contact Gems for alternative solutions.



U.L. Listed
File No. E108913

Dimensions

	1/4" NPT Mounting	1/4" NPT Mounting with 3/8" Conduit	1/2" Straight Thread Mounting with O-Ring	M12x1-8g Straight Thread with O-Ring	"Fish" Pull Ring
Electrical Termination	Lead Wires, 22 AWG, PVC Jacketed, 12" to 14" Extended				25' Cable, 22 AWG, PVC Jacketed

How To Order

Specify Part Number based on Mounting Type, Input Power and Output Condition required.

Input Power	Probe Condition at Current Sink	Mounting Type					
		1/4" NPT	1/4" NPT & 3/8" Conduit		1/2" Straight Thread	M12x1-8g Straight Thread	"Fish" Pull Ring
		Polysulfone	Polysulfone	Nylon	Polysulfone	Polysulfone	Polysulfone
5 VDC	Wet	138167 ⚡	144225	175631	144235	166541	—
10-28 VDC	Wet	142700 ⚡	143585 ⚡	157750	143580	169555	143577
	Dry	143570 ⚡	143590	175632	143575	169556	148973

⚡ - Stock Items.

Intrinsically-Safe Versions

GEMS ELS-1100 Switches may be rendered intrinsically-safe for Class I, Division 1, Group C & D when used with appropriate GEMS Zener Barriers. Call Gems Sensors for special ELS-1100-IS (intrinsically-safe) part numbers and Installation Bulletins 148745 and 148744, File No. E44570.

Extended Power and Switching Capabilities of 12 VDC Models with Gems.

Converts TTL output signal to 5 Amp relay output. Available as open circuit board or mounted in a NEMA 4X enclosure (pictured). See Page A-33.



ELS -1100HT

Handles Temperatures to 212°F

Slightly larger than the ELS-1100, the "HT" or High Temperature version is made from high performance Isoplast® plastic. While maintaining broad chemical compatibility, these units also handle fluid temperatures to 212°F. They feature 3/8" NPT mountings and the shortest of any of our plastic electro-optic switch bodies – HTS versions are a mere 1/2" long!

Typical Applications

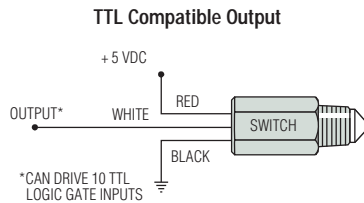
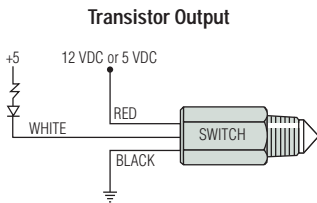
- Coolant reservoir monitoring
- Medical diagnostic and sterilizer equipment
- Low lubricant warning on machine tools
- Low level warning in hydraulic reservoirs

Specifications

Materials	
Housing and Prism	Isoplast®
Operating Pressure	0 to 150 PSI, Maximum
Operating Temperature*	-40°F to +212°F (-40°C +100°C)
Current Consumption	45 mA, Approximately
Output	TTL/CMOS Compatible. Transistor Output with 10K Pull Up Resistor May Sink 18 mA. 12 VDC input power units switch a maximum 5 VDC on output
Repeatability	±1 mm

* These switches are not for use in freezing liquids or steam/high condensation environments. Contact Gems for alternative solutions.

Wiring Diagrams



How To Order

HT Series

Specify Part Number based on Input and Output Condition required.

Input Power	Probe Condition at Current Sink	
	Wet	Dry
5 VDC	153061	153062
12 VDC*	153063	153064

*12 VDC input power units switch a maximum 5 VDC on output.
Note: Extend the power and switching capabilities of 10-28 VDC models with Gems Opto-Pak Controllers.

HTS Series - 5 VDC Input Only

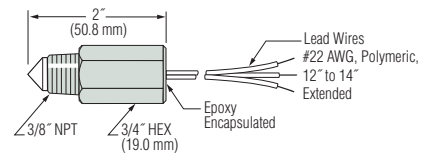
Specify Part Number based on Wet or Dry switch actuation and mounting type.

Mounting Type	Probe Condition at Current Sink	
	Wet	Dry
3/8" NPT	181674	181675
M16x2	191341	191342



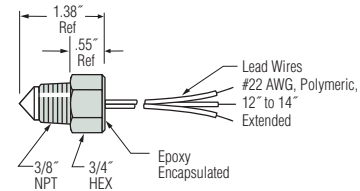
Dimensions

HT Series

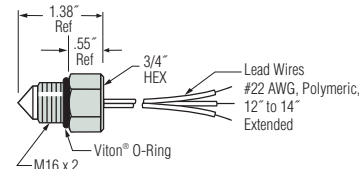


HTS Series

3/8" NPT Mounting



M16 x 2 Straight Thread Mounting with O-Ring



Extended Power and Switching Capabilities of 12 VDC Models with Gems.

Converts TTL output signal to 5 Amp relay output. Available as open circuit board or mounted in a NEMA 4X enclosure (pictured). See Page A-33.



ELS-1100TFE Teflon® For Ultra-Pure or Aggressive Fluids

When high purity or resistance to chemical attack is vital, ELS-1100TFE sensors are the ultimate solution. They feature a pure Teflon® body and prism construction. Even the Hypalon® vapor barrier and Teflon® coated lead wires give evidence to the care we've taken to make this the perfect liquid level sensor for pharmaceuticals, semiconductor manufacturing, food and beverage, chemical processing, or anywhere purity or chemical resistance is the major criteria.

Specifications

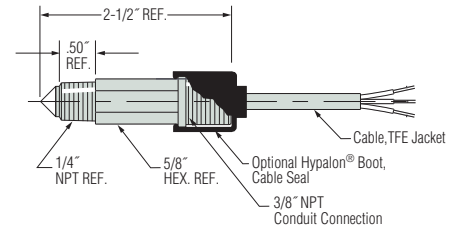
Materials	
Housing and Prism	Teflon®
Operating Pressure	0 to 150 PSI, Maximum
Operating Temperature*	0°F to 176°F (-17.8°C +80°C)
Input Voltage	10 - 28 VDC
Current Consumption	18 mA, Approximately
Output†	TTL/CMOS Compatible. Open Collector Output May Sink 40 mA Up to 30 VDC.
Repeatability	±1 mm
EMI Susceptability	Meets (MIL-STD-461B Part 2 Modified) Specification of 10 V/M for Frequency Range 30 to 1000 MHz (Except 609 MHz = 9 V/M and 679 MHz = 7.5 V/M).

* These switches are not for use in freezing liquid or steam/high condensation environments.
Contact Gems for alternative solutions.

† See Page A-25 for Wiring Diagrams



Dimensions



How To Order

Specify Part Number based on Output Condition and Boot Option.

Probe Condition at Current Sink	Part Number	
	With Cable Boot	No Cable Boot
Wet	187595	173800 ⚡
Dry	185600	173700

ELS-1100FLG Flange Mounting for Installations Without Threaded Holes

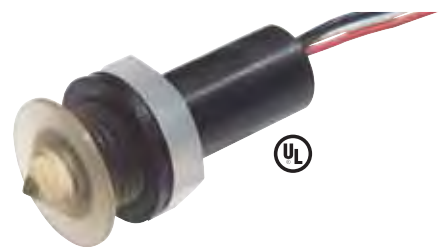
The easy solution for thin wall tanks ($\leq 1/4$ " thick): ELS-1100FLG Series. No threads needed with these flanged units. Slip through a .75" hole and tighten the jam nut; Viton® gasket forms a tight seal. Ideal for sheet metal, molded plastic tanks and medical applications where elimination of exposed threads removes potential bacterial breeding grounds.

Specifications

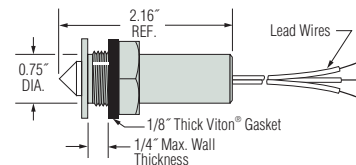
Materials	
Housing and Prism	Polysulfone
Operating Pressure	0 to 150 PSI, Maximum
Operating Temperature*	0°F to 176°F (-17.8°C +80°C)
Input Voltage	10 - 28 VDC
Current Consumption	18 mA, Approximately
Output†	TTL/CMOS Compatible. Open Collector Output May Sink 40 mA Up to 30 VDC.
Repeatability	±1 mm
EMI Susceptability	Meets (MIL-STD-461B Part 2 Modified) Specification of 10 V/M for Frequency Range 30 to 1000 MHz (Except 609 MHz = 9 V/M and 679 MHz = 7.5 V/M).

* These switches are not for use in freezing liquid or steam/high condensation environments.
Contact Gems for alternative solutions.

† See Page A-25 for Wiring Diagrams



Dimensions



How To Order

Specify Part Number based on Input Power and Output Condition Required.

Input Power	Probe Condition at Current Sink	
	Wet	Dry
5 VDC	187575	187590
10-28 VDC	187585	187580

Extended Power and Switching Capabilities of 12 VDC Models with Gems.

Converts TTL output signal to 5 Amp relay output. Available as open circuit board or mounted in a NEMA 4X enclosure (pictured). See Page A-33.



ELS-950M Series Rugged Electro-Optic Level Sensors

The ELS-950M Series represents Gems' most compact alloy-housed electro-optic level sensors. They monitor a broad range of media including OHV type fluids.

Our UL-approved design features a brass housing, fused glass prism, and TPE insulated wires. They provide a durable, watertight, and environmentally resistant assembly, ideally suited for use in harsh environments including outdoors and engine bays. They offer excellent temperature and pressure capabilities. The ELS-950M is excellent for industrial OEMs requiring a solid-state sensor for small space and high temperature environments.

Specifications

Materials	
Housing	Brass
Prism	Fused Glass
O-Ring	Fluorocarbon (1/4" MNPT - None)
Electronics	Over-molded TPE
Operating Pressure	0 to 250 PSI (0 to 17 bar) maximum
Operating Temperature*	-40°F to +230°F (-40°C to 110°C)
Current Consumptions (No Load)	
5 VDC	4 mA No Load
12 VDC	10mA No Load
Output	Sink 40 mA max., up to 30 VDC
Repeatability	±1 mm
Lead Wires	3x TPE Insulated; 22 AWG
Approvals	
	CE, UL file No. E108913
	IP66/67 Rating
	ROHS Compliant

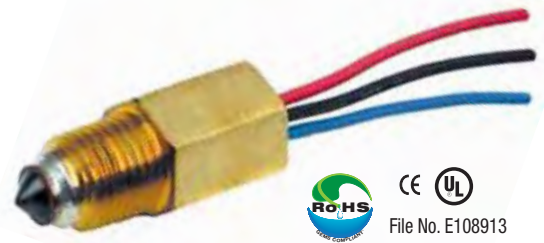
* These switches are not for use in freezing liquids or steam/high condensation environments. Contact Gems for alternative solutions.

How To Order

Specify Part Number based on Input and Output Condition required.

Input Power	Actuation Condition	Lead Wire Length	Mounting Type		
			1/4" MNPT	1/2" - 20UNF-2B*	M12x1-8*
5 VDC ±10%	Wet	6 inches	232175	232171	232179
	Dry	6 inches	232176	232172	232180
12 VDC ±10%	Wet	6 inches	232177	232173	232181
	Dry	6 inches	232178	232174	232182

* Supplied with standard fluorocarbon o-ring.

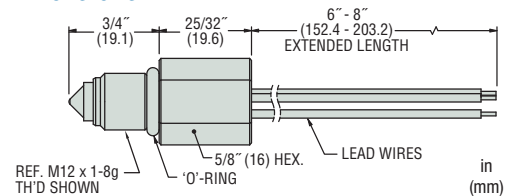


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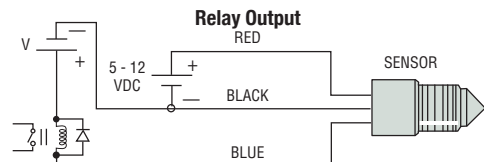
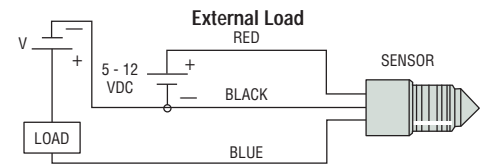
Typical Applications

- Coolant reservoir monitoring and warning
- Low lubricant warning on machine tools, generator sets, on- or off-highway vehicles
- Low level warning in hydraulic reservoirs
- Leak detection for drip pans

Dimensions



Wiring Diagrams



ELS-1150

Compact Electro Optic Level Switch available in Nickel-Plated Steel or Stainless Steel

The enhanced ELS-1150 series is the highest performing electro optic level switch from Gems Sensors. At just 1.38" long, the ELS-1150 has been upgraded with a micro processor board design to provide a wide range of capabilities including sinking and sourcing and time delay outputs. The strong fused glass prism eliminates leak potential and is capable of handling extreme temperature and pressure applications up to 2500 psi. The ELS-1150 explosion-proof series is available in versions with wide voltage ranges (see ELS-1150XP). Built with solid state reliability, the sensor is available at an affordable price in Nickel-Plated Carbon Steel or Stainless Steel. The compact size of the sensor makes them ideal candidates for monitoring the small, pressurized vessels found in HVAC, refrigeration and hydraulic applications in Oil and Gas. The sensors are most commonly used for low, high and intermediate level detection in a variety of media.

The stainless steel version (ELS-1150SS) is excellent for application requiring corrosion resistance and is ideal for acids, solvents and dielectric water applications. An explosion proof version, ELS-1150XP, is excellent for applications in Oil & Gas that require small, accurate level sensing of constant media (ie. hydraulic fluid or coolant).

* Higher temperature versions available up to 125°C.
Contact our factory experts for additional ordering information.

Applications

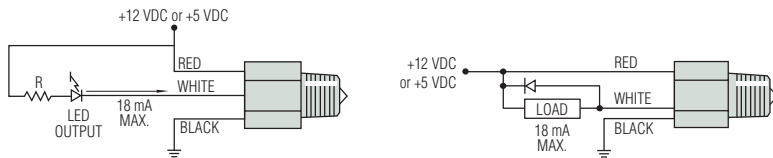
- Hydraulic and lubricating oil reservoirs
- Corrosive liquids such as: acids, solvents, and dielectric water applications
- Critical fluid level monitoring on machine tools, compressors, chillers and other industrial OEM equipment
- Medical Equipment; Anesthesia, Histology

Specifications

Mounting	1/2" NPT, 3/4"-16 Straight Thread
Materials	
Housing	Nickel-Plated Carbon Steel or Stainless Steel
Prism	Fused Glass
Operating Pressure	0 to 2500 PSI, Maximum
Operating Temperature*	-40°F to +212°F (-40°C to +100°C)
Current Consumption	~45 mA
Output	Open Collector Output, 18 mA Sink, Max.
Electrical Termination	22 AWG, Polymeric, 12" to 14" Extended Lead Wires
Repeatability	±1 mm
Approvals**	CE, UL File No. E108913, CUL

* These switches are not for use in freezing liquid or steam/high condensation environments. For higher temperature versions up to 257°F (125°C), and for other alternate requirements, contact Gems factory.
** Carbon Steel model only.

Wiring Diagrams - Typical



Note: Inductive loads must be diode suppressed.

How To Order

Specify Part Number based on Input Power/ Output Condition and material required.

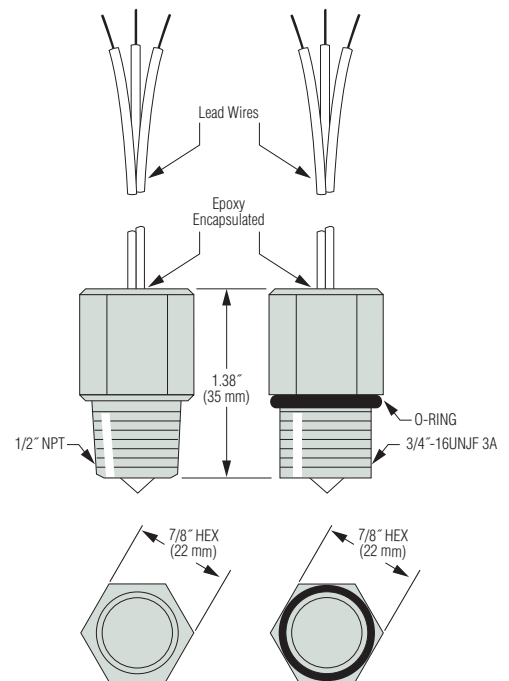
Input Power	Probe Condition at Current Sink	Nickel-Plated Steel Housing		Stainless Steel Housing
		1/2" NPT Mounting	3/4" - 16 Straight Thread	1/2" NPT Mounting
5 VDC	Wet	194469	195201	205486
	Dry	194470	195202	205487
12 VDC	Wet	194471	195203	205490
	Dry	194472	195204	205495



Dimensions

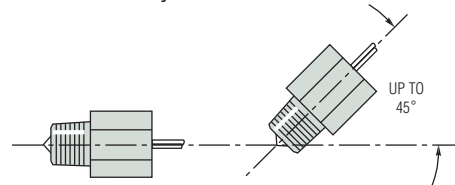
1/2" NPT Mounting

3/4" - 16 Straight Thread Mounting



Mounting Attitude

These units must be mounted horizontally or up to 45° from horizontal only.



Extended Power and Switching Capabilities of 12 VDC Models with Gems.

Converts TTL output signal to 5 Amp relay output. Available as open circuit board or mounted in a NEMA 4X enclosure (pictured). See Page A-33.



ELS-1150XP

FM-Approved Explosion-Proof

The explosion-proof ELS-1150XP series is designed for use in areas containing flammable bases or vapors in quantities sufficient to produce explosive or ignitable mixtures. It is FM-Approved for use with virtually all hydrocarbon based liquids, as well as with combustible atmospheres containing dusts of coal, coke, flour, starch of other grain.

These solid-state level sensors are available in nickel-plated carbon steel or stainless steel. The strong fused glass prism eliminates leak potential and is capable of handling high temperature and pressure applications up to 5000 psi. The compact size of the sensor makes them ideal candidates for monitoring the small, pressurized vessels found in oil, gas and petrochem environments.

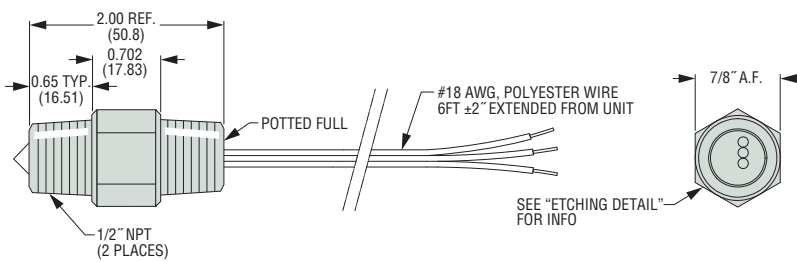
Applications

- Storage Tank Level Monitoring
- Remote Level Monitoring
- Chemical Injection
- Well Head Automation

Specifications

Mounting	1/2" NPT
Materials	
Housing	Nickel-Plated Carbon Steel or Stainless Steel
Prism	Fused Glass
Operating Pressure	0 to 5000 PSI, Maximum (10000 PSI Proof)
Operating Temperature	-40°F to +257°F (-40°C to +125°C)
Input Voltage	5-28 VDC ±5%
Current Consumption	~1 mA
Output	Open Collector Output, 100 mA Sink @ 30VDC, Max.; 100 mA Source, Max.
Electrical Termination	18 AWG, Polyester, 6ft ±2" Extended Lead Wires
Approvals	FM Approved Class I, Div. I Groups A, B, C, D Class II/III, Groups E, F, G

Dimensions



How To Order

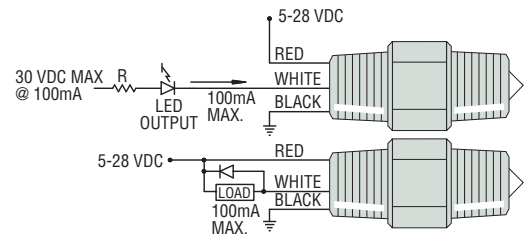
Specify Part Number based on Output Logic State and material required.

Output Logic State	Nickel-Plated Steel Housing	Stainless Steel Housing
Wet - Sink	227201	227257
Dry - Sink	227202	227256
Wet - Sourcing	227203	227255
Dry - Sourcing	227204	227254

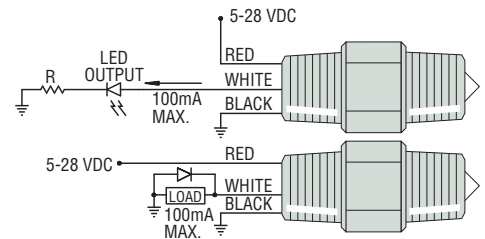


Wiring Diagrams - Typical

Sinking



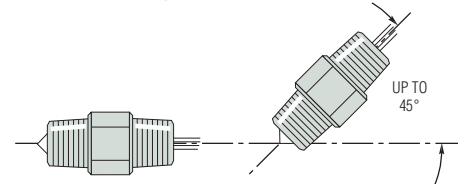
Sourcing



Note: Inductive loads must be diode suppressed.

Mounting Attitude

These units must be mounted horizontally or up to 45° from horizontal only.



Extended Power and Switching Capabilities of 12 VDC Models with Gems.

Converts TTL output signal to 5 Amp relay output. Available as open circuit board or mounted in a NEMA 4X enclosure (pictured). See Page A-33.



Opto-Pak® Controllers for GEMS Electro-Optic Switches

Extend power and switching capabilities
of 12 VDC Electro-Optic switches

- ▶ Converts TTL output signal to an SPDT 5 Amp relay output.
- ▶ Operates with 12 VDC ELS-1100, ELS-1100HT*, ELS-1150, ELS-1200* and ELS-300 Series Electro-Optic Switches.
- ▶ Available as open board or mounted in NEMA 4X junction box.

GEMS Opto-Pak Controllers convert standard 110 VAC line current to the 12 input power required for ELS-1100 and ELS-300 operation, and provide an SPDT, 5 Amp relay output for direct control of moderate loads. Two models are available: an open circuit board Opto-Pak Controller for incorporation into custom enclosures, and the self-contained, NEMA 4X model pictured here.

*12 VDC versions only.

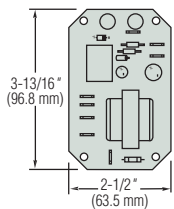
Specifications

Voltage Input	115 VAC ±10%, 50/60 Hz
Maximum Current Draw	70 mA @ 120 VAC
Relay Output	SPDT; 5 Amps @ 115 VAC, 5 Amps @ 30 VDC
Operating Temperatures	-13°F to + 158°F (-25°C to + 70°C)
Electrical Connections	1/4" Male Spade Terminals*

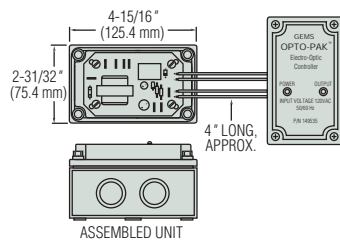
*Ten (10) 1/4" female spade connectors (not shown) shipped loose with each unit.

Dimensions

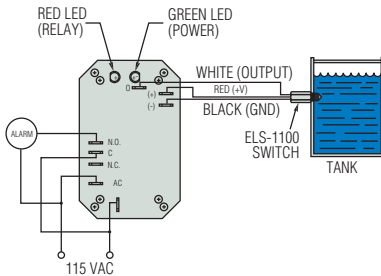
Open Circuit Board Type



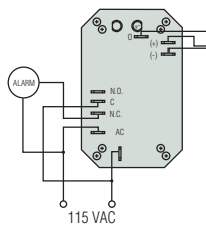
NEMA 4X Type



Typical Wiring
Normally Open



Normally Closed



How To Order

Specify Opto-Pak™ Controllers by Part Number.

Description	Part Number
Open Board	149536
NEMA 4X Enclosure	149535



Green and Red LEDs indicate power and output status.

Typical Applications

Works with 12V units:

- ELS-1100
- ELS-1100HT
- ELS-1200
- ELS-1100FLG
- ELS-1150
- ELS-950