



# ULS-100/10

## Ultrasonic Liquid Level Switches

### Instruction Bulletin No. 146077

#### General Description

The **ULS-100/10 Series Liquid Level Detection System** is an ideal, low cost, ultrasonic liquid level detection system for many applications. It operates in a broad spectrum of viscous to light liquids.

#### Principle of Operation

The **ULS-100/10 Series** operates using ultrasonic sound wave propagation. Ultrasonic sound waves are greatly attenuated when transmitted through air. Conversely, when liquid is present, transmission of the sound waves is greatly enhanced. The electronic control unit generates electrical signals that are converted to bursts of ultrasonic energy at the sensor. The ultrasonic bursts are transmitted across the liquid sensing gap. Upon receipt of a valid signal, the solid-state electronics generate a **data enable** condition, indicating liquid is present. This signal energizes a relay to provide a contact closure or a 4 mA/20 mA, 2-wire current output.

#### Model Description

<u>GEMS Model No.</u>	<u>Mounting Type</u>	<u>Input Power</u>	<u>Output</u>	<u>Function</u>
ULS-100	Integral Remote	115 VAC/230 VAC 24 VDC/12 VDC	10 Amp DPDT " "	Standard Point Level
ULS-10	Integral Remote	115 VAC/230 VAC 24 VDC	10 Amp DPDT 2-wire 4/20mA	Standard Point Level

#### Notes:

1. Standard sensor for contact type point level: 316 stainless steel.
2. Different sensor materials include Monel, Hastalloy, Titanium, Teflon, Kynar, CPVC, PVC or any special metal, alloy. Consult Factory.
3. 3/4" NPT is standard, different NPT and flanges are optional.
4. Standard length of sensor is 1". Extension up to 120" is available.

# Installation

## General

The unit is easy to install. The sensor, with its integral electronics control unit, can be mounted in any position or orientation desired. Remote-mounted electronics are also possible.

Make sure that all wiring, conduit and electrical fittings conform to local Electrical Codes for the location selected.

## Visual Inspection

Unpack the control unit and sensor assemblies. Visually inspect them for any damage. **Advise Factory immediately if either assembly is damaged.**

## Preliminary Operational Check

Before installing the unit, a simple operational check-out should be performed:

1. Fill a container with liquid.

**WARNING: In a hazardous environment, never open housing cover or connect power leads without first disconnecting electrical power at the source.**

2. Open the control unit housing cover and connect power to the control unit. **(See Wiring Diagram - Page 5.)**
3. Apply power from the source.
4. Place the sensor in the liquid. Relay should energize. If current source, current will change from 4 mA (dry) to 20 mA (wet).
5. Remove sensor from the liquid. Relay will deenergize. System is functioning properly.
6. Disconnect power to the control unit.
7. Proceed to final installation.

***If the system does not function, notify the Factory immediately.***

# Final Installation

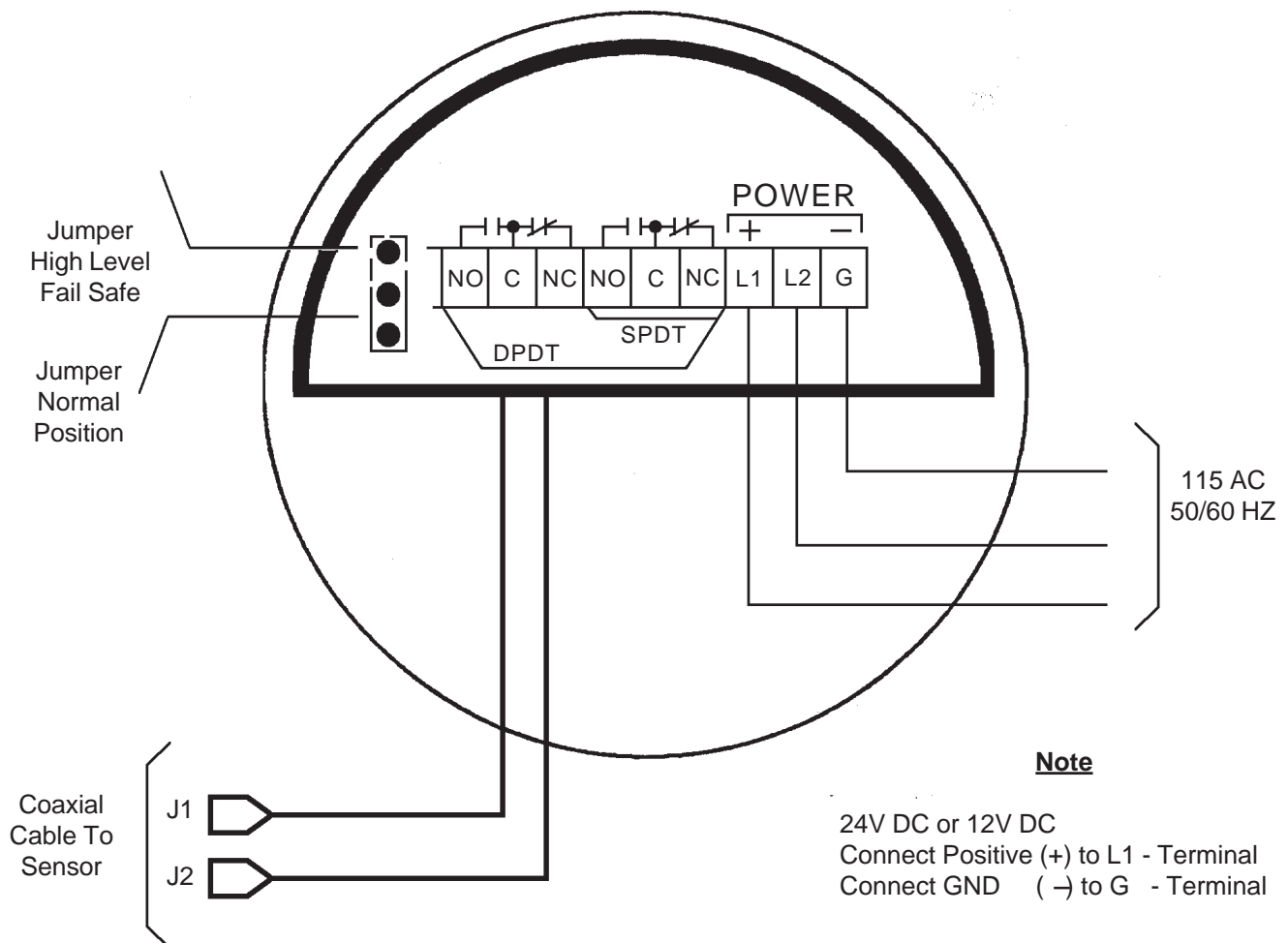
## Invasive Contact Type

Follow the instructions below:

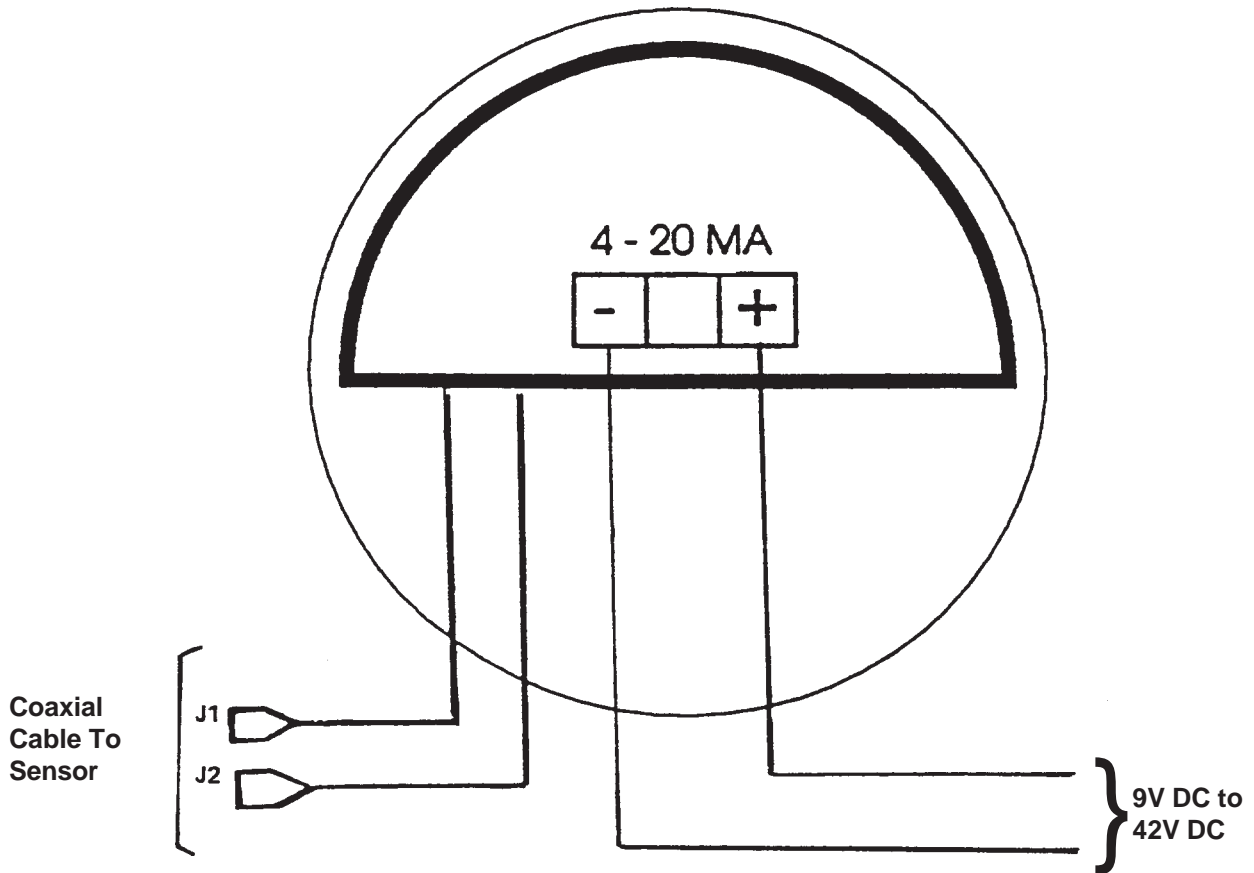
1. Drill a suitable hole in the vessel or pipe wall and tap for 3/4" NPT. In thin walled vessel or material not suitable for threading, weld or braze a bushing to accept the sensor.
2. Screw the sensor in the threaded section and make sure that there is a good seal. Use a pipe compound or sealing tape to avoid excessive tightening. Do not overtighten.
3. Run the power and control wiring cables to the electronics control unit.

**Observe all applicable electrical codes and proper wiring procedures.**

## Wiring Diagram Model ULS-100



# Wiring Diagram Model ULS-10



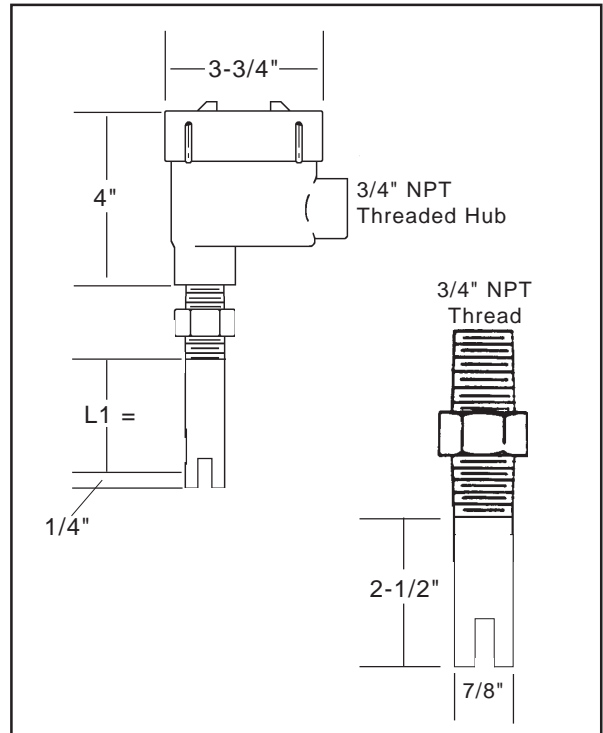
- Note**
- Two-Wire Unit
  - 4-20mA Output

# Specifications and Dimensions

(ULS-10 and ULS-100 Models)

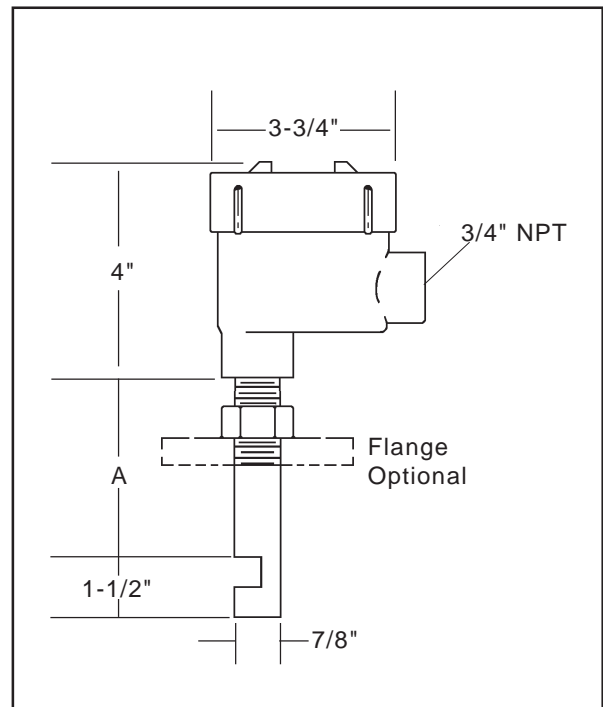
## Model ULS-10

- Repeatability** - 2mm Typical  
**Delay (On)** - 0.5 Seconds (Standard)  
**Input Power** - 115 VAC, 230 VAC, 50/60 Hz AC (Standard)  
12 VDC & 24 VDC optional  
**Outputs** - 10A DPDT Relay (Standard)  
Two-Wire (4mA - Dry, 20mA - Wet)  
**Housing** - Cast aluminum  
**Nema Ratings** - 4 and 7; Watertight and Explosionproof;  
Class I, Group C & D; Class II, Group E, F & G; and  
Class III, Division 1 & 2  
**Sensor Materials** - 316 Stainless Steel (Standard)  
**Sensor Mounting** - 3/4" NPT (Standard)  
(Flanges mounting available)  
**Temperature Ratings**  
Sensor: -40°F to 300°F  
Electronics: -20°F to 170°F  
**Pressure Rating** - Up to 1000 psig  
**Weight** - 1 Lb. Approx.



## Model ULS-100

- Repeatability** - 1mm Typical  
**Accuracy** - 0.5 Seconds, Other options available  
**Input Power** - 115 VAC, 230 VAC, 50/60 Hz  
12 VDC & 24 VDC optional  
**Output** - 10A DPDT  
**Integral Housing** - Cast aluminum; remote housing  
optional  
**Nema Ratings** - 4 and 7; Watertight and Explosionproof;  
Class I, Group C & D; Class II, Group E, F & G; and  
Class III, Division 1 & 2  
**Sensor Materials** - 316 Stainless Steel; Other metals,  
Teflon and Kynar are optional  
**Sensor Mounting** - 3/4" (19mm) Std;  
(Flanges and other sizes optional)  
**Temperature Ratings**  
Sensor: -40°F to 300°F (-40°C to 149°C)  
Electronics: -20°F to 170°F (-29°C to 77°C)  
**Pressure Rating** - Up to 1000 psig (68 bar)  
Plastics: Up to 100 psig (6.8 bar)  
**Weight** - 1 Lb (0.45kg) Approx.



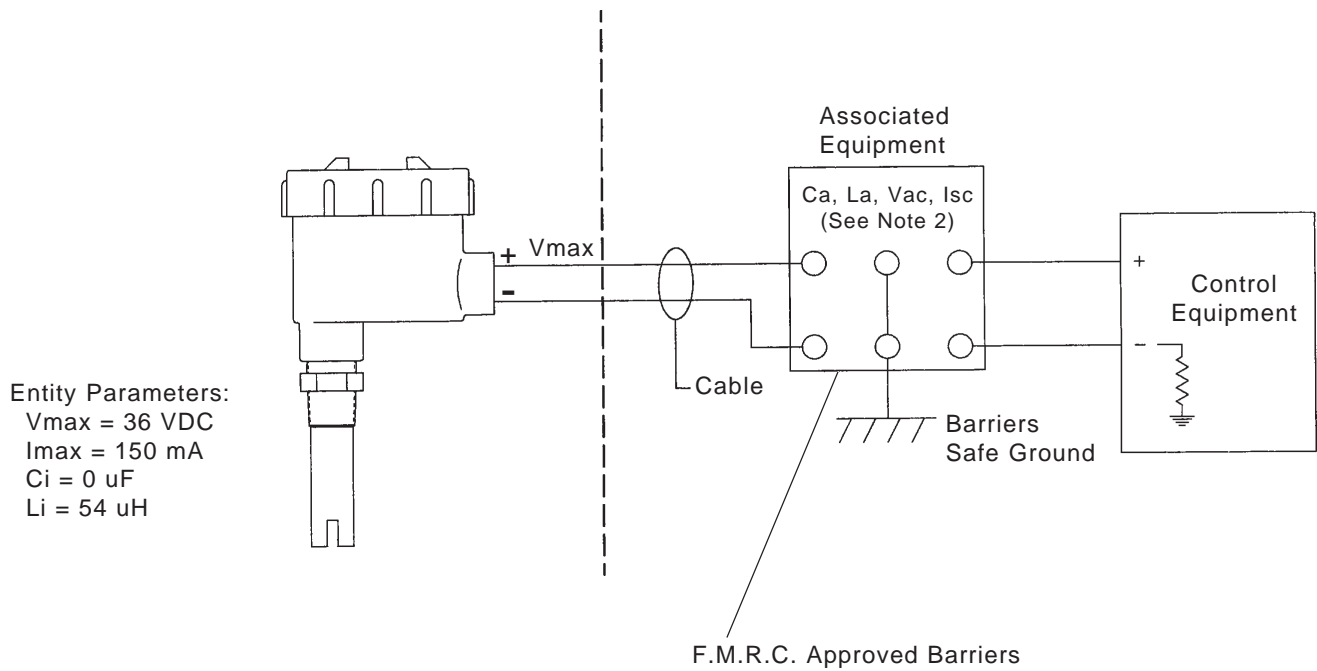
# Intrinsically Safe Installation

(Model ULS-10)

## Hazardous Location

Class I, II, III, Division 1  
Groups A, B, C, D, E, G

## Non-Hazardous Location



### Notes

1. Control equipment must not use or generate more than 250V.
2.  $V_{max} \geq V_{ac}, I_{max} \geq I_{sc}$   
 $C_a \geq C_{cable} + C_i$   
 $L_a \geq L_{cable} + L_i$

## **Maintenance**

Electronics are constructed with solid-state components and epoxy-potted. Periodically, check and clean the sensor when used with liquids which cause a coating build-up on the sensor. No other maintenance is required.

### **Cleaning**

If the pipe or vessel to which the unit is mounted is to be steam-cleaned or cleaned with abrasive detergents, remove the entire unit before cleaning by:

- (1) Disconnecting the power at source;
- (2) Opening the housing cover;
- (3) Removing power and control wiring cables;
- (4) Unthreading the sensor.

To reinstall, follow installation procedures.

### **System Malfunction**

**Should the system malfunction, notify the Factory immediately.**

## Warranty

All components of GEMS systems are warranted to be free from defects in material and workmanship for a period of one year from the date of shipment to the original purchaser. This warranty applies to general purchaser and to components installed, serviced and operated according to GEMS' instruction manual.

GEMS will repair or replace, at its option, FOB at its plant or any other location designated, any part which proves to be defective in manufacture or workmanship.

All claims must be made within the Warranty period. No claims outside of the Warranty period will be honored.

Warranties are not applied to any components which have been damaged by improper installation, use exposure to unusual atmospheric conditions or components which have been misused, abused, damaged by neglect or accident. This warranty shall not apply to any components which have been altered or repaired without the prior written consent of GEMS.

GEMS assumes no responsibility or liability for any labor or material or back charges, without written authorization. Any products returned must be with prior written authorization.

THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTIES OF MERCHANTABILITY AND/OR FOR FITNESS FOR PARTICULAR PURPOSE AND GEMS ASSUMES NO OTHER LIABILITIES EXPRESS OR IMPLIED. GEMS SHALL NOT BE LIABLE FOR NORMAL WEAR AND TEAR, NOR FOR DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES. IN NO EVENT SHALL GEMS LIABILITY EXCEED THE PRICE OF ITS PRODUCT AT THE TIME OF PURCHASE.

### **Important Points!**

Product must be maintained and installed in strict accordance with the National Electrical Code and GEMS product catalog and instruction bulletin. Failure to observe this warning could result in serious injuries or damages.

An appropriate explosion-proof enclosure or intrinsically safe interface device must be used for hazardous area applications involving such things as (*but not limited to*) ignitable mixtures, combustible dust and flammable materials.

Pressure and temperature limitations shown on individual catalog pages and drawings for the specified level switches must not be exceeded. These pressures and temperatures take into consideration possible system surge pressures/temperatures and their frequencies.

Selection of materials for compatibility with the media is critical to the life and operation of GEMS level switches. Take care in the proper selection of materials of construction; particularly wetted materials.

Life expectancy of switch contacts varies with applications. Contact GEMS if life cycle testing is required.

Ambient temperature changes do affect switch set points, since the specific gravity of a liquid can vary with temperature.

Level switches have been designed to resist shock and vibration; however, shock and vibration should be minimized.

Liquid media containing particulate and/or debris should be filtered to ensure proper operation of GEMS products.

Electrical entries and mounting points may require liquid/vapor sealing if located in an enclosed tank.

Level switches must not be field repaired.

Physical damaged sustained by the product may render it unserviceable.



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