Description

General Description

The **ULS-11/20 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-11/20 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.

Model Description

<table>
<thead>
<tr>
<th>GEMS Model No.</th>
<th>Mounting Type</th>
<th>Input Power</th>
<th>Output (Relay)</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>ULS-11</td>
<td>Integral</td>
<td>9 - 42 VDC</td>
<td>1 Amp N.O. or N.C.</td>
<td>Level</td>
</tr>
<tr>
<td>ULS-20</td>
<td>Integral</td>
<td>120/240 VAC</td>
<td>10 Amp N.O. or N.C.</td>
<td>Level</td>
</tr>
</tbody>
</table>

**Notes:**

1. Standard sensor for contact type point level: 316 stainless steel.
2. 3/4" NPT is standard, different NPT and flanges are optional.
3. Standard length of sensor is 2.5". Extension up to 99" 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.

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. See wiring diagram for making the proper wiring connections. (9 to 42 VDC)

3. Apply power from the source.

4. Place the sensor in the liquid. Relay should energize.

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-11

<table>
<thead>
<tr>
<th>Wiring Color Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Power</td>
</tr>
<tr>
<td>Red (+)</td>
</tr>
<tr>
<td>Black (-)</td>
</tr>
</tbody>
</table>

| 2. Relay  |
| COM = White  |
| N.O. = Blue  |
| N.C. = Brown |

| 3. Ground  |
| Green  |
| Shield  |

Wiring Color Code

Red (+) 9 to 36 VDC
Black (-)
Green (Shielded) (Ground)

3/4" NPT
Red (+)
White, Blue or Brown (1 Amp Relay)
Black (-)
Green (Shielded) (Ground)

Observe all applicable electrical codes and proper wiring procedures.
System Wiring Diagram
ULS-11 Series Ultrasonic Level Sensor
(P/N 140197)

115 VAC, 50 Hz

3-Conductor Cable:
Black - Hot
White - Neutral
Green - Ground

Normally Open
10 Amp Contact
White - Common
Blue - N.O.
Brown - N.C.

Note
A (Standard) = 2-1/4"

Material: 316 SS. Call Factory for special size, material, extension length.
**ORDERING INFORMATION:**

**POWER INPUT:**
1 - 115 VAC  
2 - 230 VAC  
3 - 24 VDC  
0 - SPECIAL

**OUTPUT:**
1 - TEN AMP RELAY (N.O.)  
2 - TEN AMP RELAY (N.C.)

**SENSOR:**
5 - 316 SS  
0 - SPECIAL (SPECIFY)

**EXTENSION LENGTH:**
00: STD. (1")  
TO 99: 99"

**NOTE:**
FOR ORDERING INFO. NOTE SEE SK-3802.

**SPECIFICATIONS:**

**REPEATABILITY:** 2 mm OR BETTER
**DELAY:** 0.5 SECONDS
**INPUT POWER:** 115 V / 230 V AC 50/60 Hz
**SENSOR WITH ENCLOSURE:** 316 SS STANDARD
**CONSULT FACTORY FOR OTHER MATERIALS**
**TEMPERATURE:** -20° F TO +160° F
**PRESSURE:** UP TO 1000 PSI
**MOUNTING:** 3/4" NPT
**CONSULT FACTORY FOR OTHER SIZES**
**CABLE LENGTH:** 12"  
**CONSULT FACTORY FOR OTHER LENGTHS**

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**ULTRASONIC LEVEL SWITCH**  
**ULS-11/20**

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**IMI**  
**Imo Industries Inc.**  
**Gene Sensors Division**  
**Plainville, CT 06062-1198**

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**DRAWING LEVEL**

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**CONTRACT NO.**

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**UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.**
**TOLERANCES EXCEPT AS NOTED:**
DECIMAL: ±0.005  
FRACTIONAL: ±1/64"  
ANGULAR ±1°  
MACHINE FILLETS AND  
SÄRF MACHINED EDGES ±0.005 ±0.015
## Specifications and Dimensions

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeatability</td>
<td>2 mm or better</td>
</tr>
<tr>
<td>Delay (On)</td>
<td>0.5 seconds</td>
</tr>
<tr>
<td>Input Power</td>
<td>9 VDC to 42 VDC (optional A.C. power available)</td>
</tr>
<tr>
<td>Leakage Current</td>
<td>Less than 50 mA</td>
</tr>
<tr>
<td>Output</td>
<td>One Amp, Relay output (dry contact, N.O. or N.C.)</td>
</tr>
<tr>
<td>Protection</td>
<td>Transient, Reverse Polarity</td>
</tr>
<tr>
<td>Sensor</td>
<td>316 SS standard. Consult Factory for other materials</td>
</tr>
<tr>
<td>Temperature</td>
<td>-20°F to +160°F</td>
</tr>
<tr>
<td>Pressure</td>
<td>Up to 1000 psig</td>
</tr>
<tr>
<td>Mounting</td>
<td>3/4” NPT STD. (For special mounting, consult Factory.)</td>
</tr>
<tr>
<td>Cable Length</td>
<td>12 Inches (For longer lengths, consult Factory.)</td>
</tr>
</tbody>
</table>
| Power Consumption @ 24 VDC | 35 mA, Max. (On)  
                          | 17 mA, Max. (Off)                                                      |

**Material:** 316 SS  
(Other materials available)  
Call Factory for special size, material, extension length.
**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 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.