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MODEL KUSO ULTRASONIC SWITCH INSTALLATION / OPERATION INSTRUCTIONS

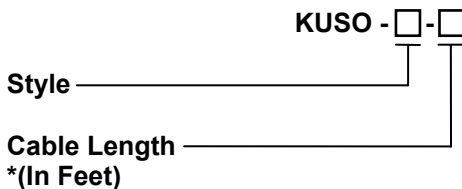
GENERAL DESCRIPTION

The KUSO Series Ultrasonic Level Switches are ideal, low cost solutions for many liquid level control applications. They operate in a wide variety of services.

PRINCIPLE OF OPERATION

Ultrasonic switches use piezoelectric crystals to transform electrical energy into mechanical motion (sound). The Transmit Crystal sends a pulse of sound through the space between the crystals, to the Receive Crystal. If the space is filled with air, gas, or vacuum, the Receive Crystal does not detect the sound pulse. However, if the space is filled with liquid, **any liquid**, the pulse is detected by the Receive Crystal, and the switch output changes.

MODEL DESCRIPTION



Style

| Description | Code |
|----------------|------|
| 1A SPDT 316LSS | 0 |

*Standard is 1FT.

INSTALLATION

Unpack the switch carefully. Inspect all units for damage. Report any damage to carrier immediately. Check the contents against the packing slip and purchase order.

Kenco's Ultrasonic Switches are manufactured to the highest quality standards. These switches use electronic components that can be damaged by static electricity. Make sure that you are properly grounded before starting installation. Insure that all electrical connections are properly made, and that there are no "floating" connections.

Operational Check

Before installing the switch a simple operational check should be performed, as follows:

1. Fill a container with water
2. Connect the wiring (see the section on "**Wiring**")
3. Apply power
4. Place the sensor gap into the water.
 - a. Relay Version -- The relay will energize (the contacts between (NC) and (C) should open).
 - b. 2-wire Version -- The current in the Red wire will be 16.0mA \pm 1.0mA.
5. Remove the sensor from the liquid.
 - a. Relay Version -- The relay will de-energize (the contacts between (NC) and (C) should close)
 - b. 2-wire Version -- The current in the Red wire will be 4.0mA \pm 1.0mA.
6. Disconnect the wiring

Mounting

For threaded process connections, screw sensor into the opening using a wrench on the sensor mounting nut flats. Use thread tape or suitable pipe compound on the threads. If flanged, bolt the sensor to the mating flange with the proper gasket.

The sensor gap must protrude into the vessel / pipe being measured. The sensor will not function properly if the detection tip is in a nozzle.

Wiring

It is recommended that conduit be installed onto the 3/4" NPT connection on the back of the sensor. A seal drain fitting should be used to prevent moisture from entering the switch. All wiring, conduit, and electrical fittings must conform to local electrical codes for the location selected. The wiring color code is shown in the following table:

| Color | Function |
|---------------|-----------------------------------------|
| Blue | Normally Open Contact (Relay version) |
| White | Common Contact (Relay version) |
| Brown | Normally Closed Contact (Relay version) |
| Black | Power (-) |
| Red | Power (+) |
| Green | Ground |
| Silver (Bare) | Shield |

Connect the Black and Red wires to the power source (6 – 24Vdc). If this is the 2-wire loop version, measure the current in the red wire to determine the output condition (4.0mA ± 1.0mA = Dry; 16.0mA ± 1.0mA = Wet). For the Relay version, you must also connect the Blue (NO), White (C), and Brown (NC) wires. The Green and Silver (Bare) wires are chassis ground, and should be connected to earth ground.

The following table shows the relay condition for each switch state:

| Switch State | Relay Condition | Relay Terminals | |
|--------------|-----------------|-----------------|---------|
| | | NC to C | NO to C |
| Dry | De-energized | Closed | Open |
| Wet | Energized | Open | Closed |

Specifications

| Description | Specification | |
|-------------------------------------|---------------------|-----------------------------------------|
| Input Power | DC | 6 – 24Vdc, 5Vdc (Optional) |
| Output | Relay | 1A SPDT |
| | Two-wire (Isolated) | 4mA = Dry; 16mA = Wet |
| Temperature Range | | -20°F to 160°F; up to 212°F (Special) |
| Pressure Range | 316SS | Vacuum to 1000psig |
| | Tefzel [®] | Vacuum to 100psig |
| Cable Length | | 12"; For longer lengths consult factory |
| Mounting | | 3/4" NPT; For flanges consult factory |
| Sensitivity (Signal-to-noise Ratio) | | 500:1 |
| Repeatability | | ±2mm |
| Response Time | | 0.5 sec. non-adjustable |

TROUBLESHOOTING

| Problem | Solution |
|------------------------------------|----------------------------------------------------------------------------------------------------------------|
| No output change with level change | Check wiring; verify that the correct input voltage is applied |
| | Verify that liquid is filling the sensor gap |
| | Check for dense foam or dried product in the gap. Switch may not function properly if either condition exists. |
| The output is "chattering" | Check wiring; verify that the correct input voltage is applied |
| | Check for turbulence. Relocate switch or isolate from turbulence |
| | Check for excessive aeration in process fluid. This is particularly important in viscous fluids. |