

LEVEL-TEK Model 310

General Description

The Robertshaw Model 310 LEVEL-TEK is an all new RF capacitance sensing, on-off Control and Display Instrument. Used primarily for detecting and controlling product level changes in vessels or containers, it provides contact closure for external control action by means of a DPDT plug-in type, dust tight relay. The weather-tight unit has alarm lights. This instrument is available with a choice of three supply voltage variations, has adjustable differential (deadband) and adjustable time delay (response time). All adjustments are multi-turn by means of sealed potentiometers.

Suitable for use on liquids and granular materials, the system will detect interface levels, flow-no-flow conditions, and operate under relatively high temperature and pressure conditions. It provides high accuracy, outstanding stability and excellent repeatability despite wide variations in ambient temperature or supply voltage.

The system utilizes a special triaxial cable (eliminates the effect of cable capacitance) as a means of electrically connecting a remotely mounted sensing probe to the control unit. The cable assembly consists of a conduit outlet box and special triaxial cable assembly designed for connection between the probe mounted into the vessel and the remotely mounted display/control unit containing the electronic circuitry.

This design allows easy access to all calibration adjustments when the system is used on elevated tanks or other inconvenient service areas. The conduit outlet box, mounted on the probe assembly, takes up only a small space on the tank.

The Control Unit assembly is available in a weather-tight enclosure with indicating lights for general purpose outdoor applications, or in an explosion-proof enclosure without lights for hazardous area applications.

PRINCIPLE OF OPERATION

State-of-the-art integrated circuits are put to use in the Model 310 Level-Tek which eliminates the need for oscillator circuits. The Robertshaw Model 310 Level-Tek operates on a unique capacitance measurement concept. This instrument has the capability of being mounted remote from the Probe Assembly. The Level-Tek senses the change in product or material level as a function of the capacitance change between the probe element and the wall of the container. The Probe Assembly and the Model 310 are connected by a special Triaxial (3 conductor) cable. The sensing probe is "charged" by the Model 310 through a sealed potentiometer (zero adjust) and its charging rate is compared with that of a reference capacitor within the instrument. These charging rates are simultaneously fed as time sequenced inputs to an integrated circuit differential amplifier and to an amplifying circuit which drives the inner-shield of the triax cable at a potential equal to and in phase with the incoming of capacitance signal. This results in the cancellation of



Probe, Cable and Conduit Outlet Box
shown for illustration only. Not included.



CERTIFIED
MODEL 310
LEVEL-TEK

Features & Benefits

- **Field Selectable Fail-Safe Modes**

Relocation of shorting bar links on the chassis assembly provides high or low level fail-safe operation upon loss of electrical power.

- **Special Triax Connecting Cable**

Any length of cable can be used up to 150 ft. max. without padding or other compensation. Eliminates the effect of cable capacitance with no decrease in sensitivity.

- **Ease of Installation & Maintenance**

All electronics housed in a remotely mounted control unit provides greater wiring convenience and accessibility to terminal boards & plug-in, dust-tight relay.

- **Simplified Calibration**

Solid-state indicating light on the chassis aids in initial calibration by eliminating the need for special test equipment.

- **Adjustable Time Delay & Differential**

Continuous adjustments by means of multi-turn potentiometers provides adjusting the unit to eliminate transient level surges due to splashing, turbulence, etc.



Certified (See Specifications)

(Continued from Column 1)

the capacitance of the probe connecting cable. This permits the Probe Assembly to be mounted as far as 150 feet away from the Model 310 Level-Tek.

The inputs to the integrated circuit differential amplifier provide an output only if the charging rate of the reference capacitor exceeds that of the probe capacitance. This signal then establishes an input to a second integrated circuit differential amplifier, having reversing capabilities, to provide for the desired fail-safe operational mode, either "high" or "low" level fail-safe.

The Model 310 design provides an adjustable differential, for applications requiring high and low level control points to prevent undue cycling of pumps and/or control valves. This action is accomplished by means of positive feedback within the circuit, and the "on to off" action of the control relay is easily adjustable by means of a sealed potentiometer. Also incorporated is a potentiometer adjustable time delay which acts upon the input of the second differential amplifier. Output of this amplifier drives the control relay.

SPECIFICATIONS:

ENVIRONMENTAL CONDITIONS

- Operating Temperature Limits** -40°F to +160°F
- Storage Temperature** -55°F to +225°F
- Vibration Limits** 2 g's to 100 Hz
- Enclosure Classification** Weathertight NEMA 4 locations & CSA enclosure 5, or Explosion-proof, Class I, Div. 1, Groups C & D, and Class II, Div. 1, Groups E, F, & G.
- Operating Humidity Range** 0% to 95% RH

ELECTRICAL CONDITIONS

- Supply** 26.5 VDC ± 10%, 120 VAC ± 10% 50/60 Hz, or 240 VAC ± 10% 50/60 Hz
- Supply Power** 10 watts max with lights 5 watts max without lights
- Output Relay (Electromechanical Type):**
 - Form* DPDT, Plug-in
 - Contact* 5A, 28 VDC, 120 VAC, Non-inductive
- Intrinsic Safety:** ...Probe circuit for Models 310-(B,C) (2,4) for Class I, Div. 1, Group C,D; Class II, Div. 1, Group E, F, G hazardous locations.

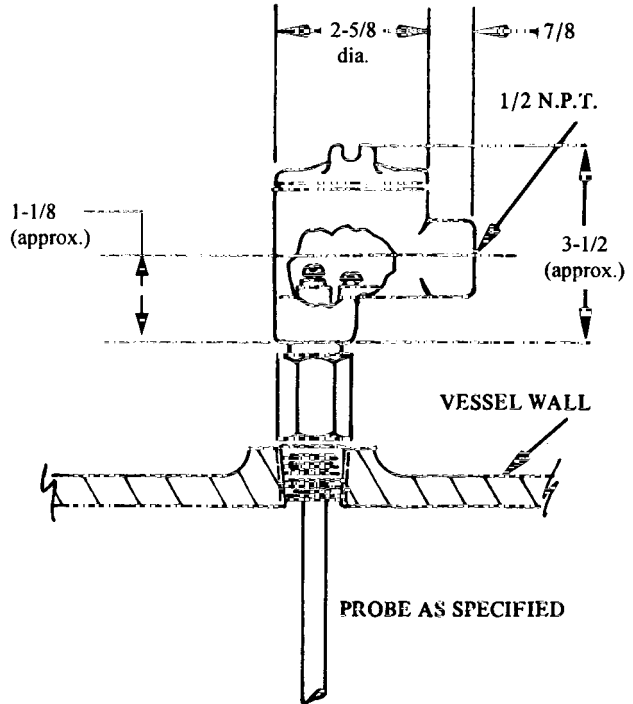
- Zero Adjustment (Control Point) Range** 20 to 225 pf
- Differential (Deadband)** 0.2 pf to 200 pf
- Response Time (Time Delay)** 0.5 to 20.0 seconds
- Connecting Cable Length** Any length up to 150 ft. max.
- Sensitivity** 0.1 pf
- Repeatability** within 0.1 pf

AGENCY CERTIFICATIONS

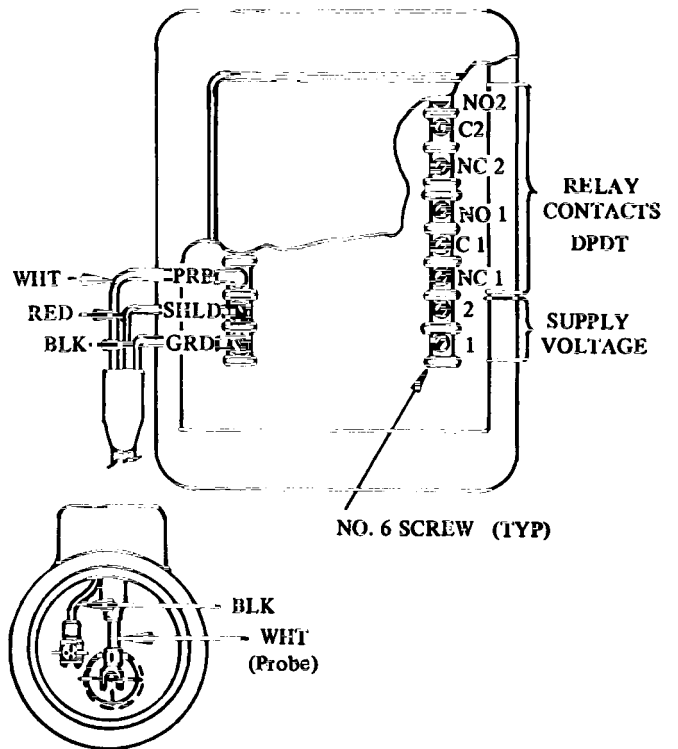
CSA Models 310-(B, C) (2, 4) when used with 702, 728, 729, 736, 738, 739, 740 or 741 probe.

NOTE: Connecting triax cable should be protected with flexible or rigid conduit.

Probe Mounting Conduit Outlet Box Dimensions

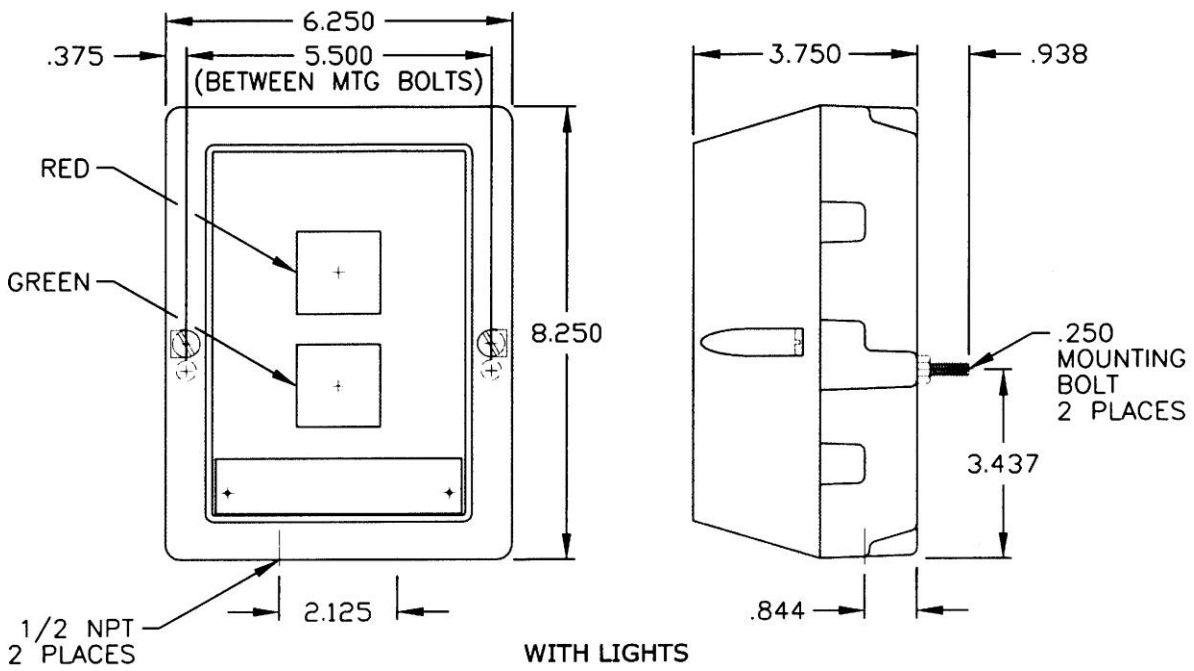


Electrical Connections

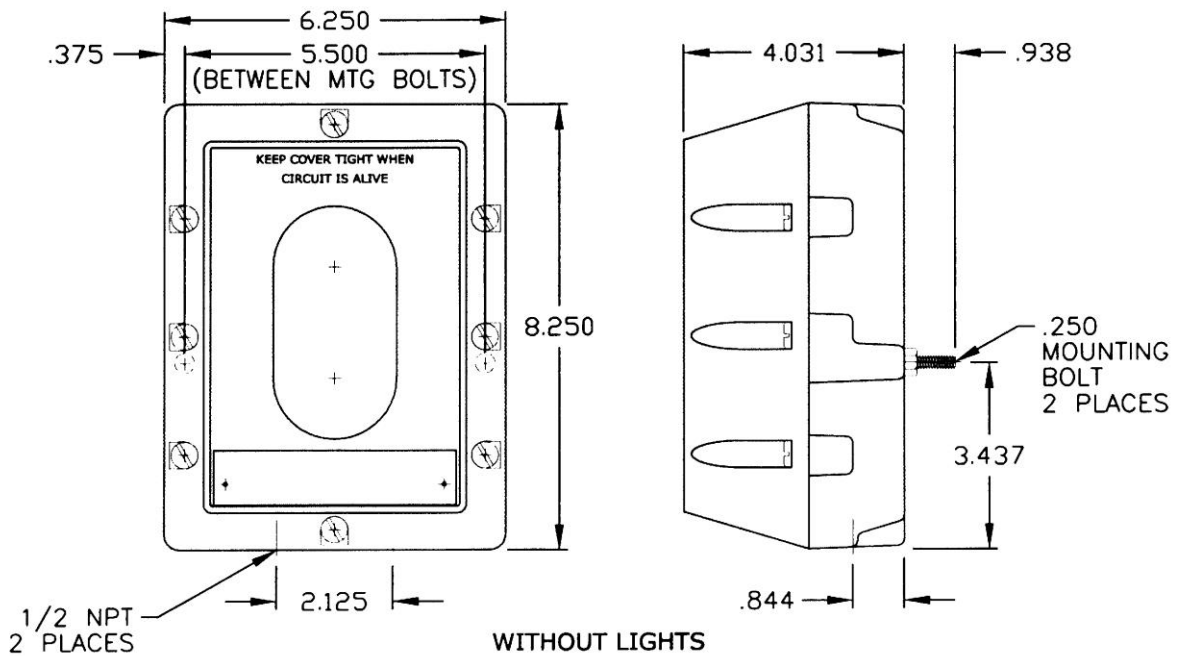


(REF) CONDUIT OUTLET BOX

Mounting Dimensions for Model 310 Level-Tek with Weather-Resistant Display Unit

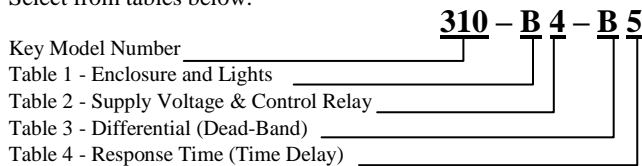


Mounting Dimensions for Model 310 Level-Tek with Explosion Proof Display Unit



ORDERING INFORMATION

***STANDARD MODEL**
OPTIONAL MODELS
 Select from tables below.



KEY MODEL NUMBER

Model No.	Description
* 310	Capacitance actuated Level-Tek for remotely mounted probe assembly. Unit has on-off electric control contacts. See Accessory items for probe conduit outlet box and connecting cable.

TABLE 1 - ENCLOSURE AND LIGHTS

Designation	Description
*B	Weatherproof Case, Aluminum Enclosure with lights, meets NEMA 4 locations & CSA Enclosure 5, has red and green signal lights in cover.
C	Explosion-proof enclosure without lights, suitable for Class I, Division 1, Group C & D; Class II, Division 1, Group E, F & G hazardous areas.

TABLE 2 - SUPPLY VOLTAGE

Designation	Description
2	26.5 VDC ±10%
*4	120 VAC ±10%, 50/60 Hz
6	240 VAC ±10%, 50/60 Hz

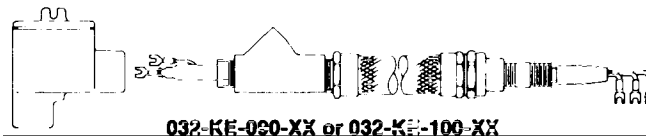
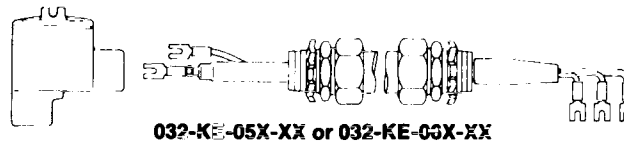
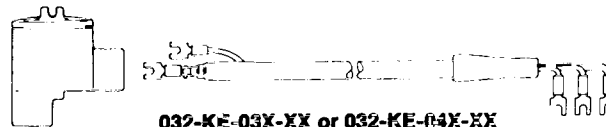
TABLE 3 - DIFFERENTIAL (DEAD-BAND)

Designation	Description
*B	Adjustable dead-band. Differential adjustable from 0.2 to 200 pf

TABLE 4 - RESPONSE TIME (TIME-DELAY)

Designation	Description
*5	Adjustable time delay from 0.5 to 20 seconds.

MODEL 310 TRIAXIAL CABLE ACCESSORY ITEMS



Part Number	Description
032KE03X-XX	GENERAL PURPOSE Triax Cable with terminations and probe connection conduit outlet box. (Recommended for use with customer supplied rigid or flexible conduit). Maximum temperature 185°F. Specify length in feet for XXX in part number.
032KE05X-XX	Same as above but with flexible conduit (protective armor). Specify length in feet for XXX in part number.
032KE04X-XX	HIGH TEMP Triax (Teflon insulated) Cable with terminations and probe connection conduit outlet box. (Recommended for use with customer supplied rigid or flexible conduit). Max. temperature 350°F. Specify length in feet for XXX in part number.
032KE06X-XX	Same as above but with flexible conduit (protective armor). Specify length in feet for XXX in part number.
032KE090-XX	GENERAL PURPOSE Triax Cable with terminations in Explosion Proof Flexible conduit with seal fitting & probe connection conduit outlet box. Max. temperature 185°F. Specify either -05 or -10 for XX in part number.
032KE100-XX	Same as above except with High Temp (Teflon insulated) Triax Max. temperature 350°F. Specify either -05 or -10 for XX in part number



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