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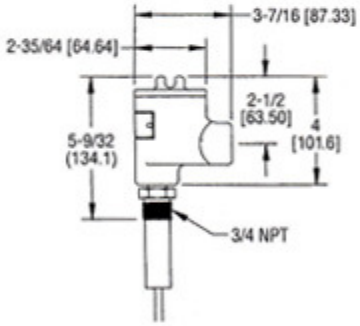
Radio Frequency Level Control

Specifications – Installation and Operating Instructions



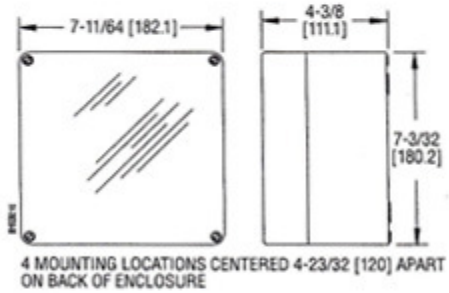


FIGURE A

PHYSICAL DATA

GENERAL

Operating Temperature Limits: –40 to 140°F (–40 to 60°C)
Probe Antenna Temperature Limits: –40 to 250°F (–40 to 121°C)
Maximum Pressure: 100 psig (6.89 bar). Optional 1000 psig (68.9 bar)
Wetted Parts: 316 stainless steel, Teflon®
Probe Enclosure: NEMA 4 & 7. Explosion-proof; Class I, Divs. 1 & 2, Groups B, C & D. Class II, Divs. 1 & 2, Groups E, F & G
Control Box Enclosure: NEMA 4X, PVC with polycarbonate cover

ELECTRICAL

Power Supply: 110/120 VAC, 50/60 Hz std., field selectable for 220 VAC or 24 VDC
Power Consumption: Approximately 5 VA
Switch Contacts, Rating: DPDT form C contacts, 2.0 A @ 115 VAC
Time Delay: On or off delay, four ranges adjustable from 0 to 30 seconds, 1 sec. to 2 min., 2 sec. to 16 min. or 15 sec. to 2 hours
Connecting Cable, Probe to Control Box: 16 AWG, 3-wire shielded or in metal conduit, to 1000 feet

MECHANICAL

Process Connection: 3/4" NPT. Install in 3/4" NPT half coupling.
Weight, Probe Assembly: 3.4 lbs., (1.54 kg)
Weight, Control Box: 1.8 lbs. (0.82 kg)

GENERAL

Series RF Radio Frequency level controls consist of two basic components; a probe assembly and a control box. The probe assembly includes an antenna which continuously sends and receives an FM signal within the vessel and senses changes in the signal as it is affected by the presence or absence of material. When a change exceeds limits set during a simple calibration procedure, the probe assembly signals a remotely located control box, actuating a DPDT relay which is typically wired to terminate or initiate a fill cycle and/or sound an alarm, etc.

PROBES

Standard 1/4" dia. 316 SS probe is used for materials with higher dielectric constants over 20 such as water, acids, liquid sugars, etc. It can be trimmed or extended if necessary to accommodate changing requirements. Use only with vertical mounting.

Teflon® covered 3/8" dia. probe is designed for horizontal or vertical mounting. This coating helps prevent material bridging which adversely affects sensitivity while it improves chemical resistance.

Special 7/8" dia. probe is for materials with lower dielectric constants (below 20) such as oils, powders, petroleum, etc. The larger size increases sensitivity. Use only with vertical mounting.

CONTROL BOXES

Single control box is for use with a single probe and includes selectable power input for 110 VAC, 220 VAC or 24 VDC, a DPDT relay output, adjustable time delay up to 2 hours and selectable low or high failsafe.

Dual control box is for use with two probes. All features above are included for each probe, plus a selectable differential latch between probes to allow for pump up or pump down between low and high limit probes.

MECHANICAL INSTALLATION

Standard 1/4" and special 7/8" dia. probes must be installed at the top of the tank with the antenna in a vertical plane. Horizontal mounting will adversely affect operation and place mechanical stress on the probe. Note: probe antenna must be at least 6" from sides of metal tanks. Units with a 3/8" dia. Teflon® probe can be mounted horizontally or vertically. All probes should be mounted in a 3/4" NPT half coupling. Optional A-630, 4" × 3/4" cast iron flange can also be used where flange opening exists.

Mount the control box at an accessible location for possible changes in wiring, time delay and for observation of the LED status indicator. Indicator will be lit when output relay is energized.

ELECTRICAL CONNECTIONS

Use 16 AWG or heavier 3 conductor shielded cable between each probe and its control box terminals. Probe head terminal block is removable. Separate wires can be used inside conduit but it must be grounded on one end only. **Do Not** run control wires near to, parallel to, or in the same conduit as AC power.

Connect wiring between probe and control box, matching terminal numbers as shown in Fig.C. Connect wiring carefully. Incorrect connections will damage probe electronics. Connect probe 1 to control box terminals marked probe 1 and if dual system, connect probe 2 to terminals marked probe 2.

Units are factory wired for 110 VAC operation. Make line connections to power supply terminals 1 and 2 as shown in Fig. D. Connections for 220 VAC or 24 VDC are also shown. Note jumper between terminals 2 and 3 with 220 VAC operation.

PROBE CALIBRATION

1. Since the Series RF Level Control can work in many different substances, it is necessary to calibrate the probe for the specific application. With wiring complete and power applied, set timer switch A on, switch B off and timer adjust fully counter-

clockwise. This will produce minimum delay for calibration purposes. Be sure probe is in free air with no material contacting it and at least 2 inches from any metal.

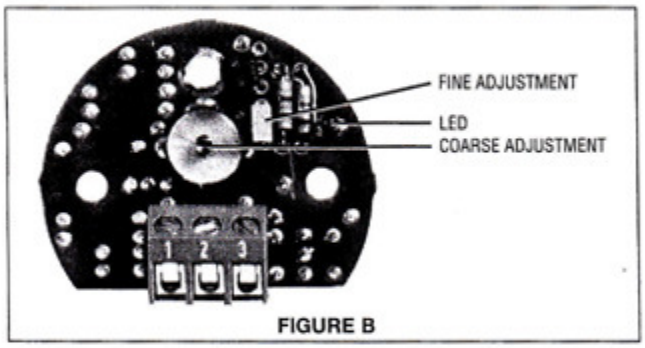


FIGURE B

2. Unscrew cover from probe head. Note the fine and coarse sensitivity adjustment screws and the LED indicator. Clockwise rotation of the adjustment screws increases sensitivity and counter-clockwise rotation decreases sensitivity. Use a small plastic screwdriver to turn the coarse adjustment screw fully counter-clockwise to minimum sensitivity. Adjust the fine trim-pot fully clockwise to maximum sensitivity. The LED will be lit. Slowly turn the coarse adjustment screw clockwise in 1/16" increments until the LED stops glowing. Turn the fine adjustment screw counter-clockwise until the LED lights again. Rotate the fine adjustment screw another 1/16" counter-clockwise and stop. Seal screw heads with a drop of varnish. If LED is difficult to see because of high ambient lighting, use a DC voltmeter spanned to 0-30 VDC. Connect positive lead to terminal 3 and negative lead to terminal 2. Meter will read 24-30 VDC when LED is on and below 1 VDC when it is off.

SWITCH SELECTION CHART – TIMER RANGE/OPERATING MODE

SWITCH A	SWITCH B	TIMER RANGE	SWITCH C	SWITCH D	OPERATING MODE
On	Off	0–30 Sec	Off	Off	Delay On, Fail Low
Off	On	1 Sec–2 Min	On	Off	Delay On, Fail High
Off	Off	2 Sec–16 Min	Off	On	Delay Off, Fail High
On	On	15 Sec–2 Hrs	On	On	Delay Off, Fail Low

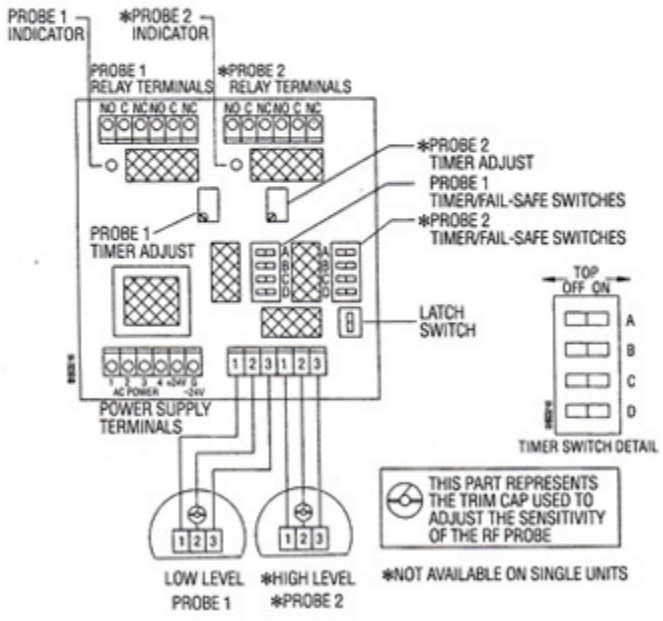


FIGURE C

TIME DELAY SETTINGS

Time delay on helps prevent false signals which can occur as a result of splashing liquids or agitation. In reverse, time delay off, it can allow relay to remain actuated for an extended period after probe no longer senses material, avoiding the need for dual probes in many applications. See switch selection chart at lower left for how to set switches C and D for the required operating mode. If no time delay is required, use the shortest time delay and turn the time adjustment completely counter-clockwise.

Two settings are required for selection of time delay interval. See chart at lower left for coarse settings made by selecting appropriate on-off positions for switches A and B. Make fine adjustments to the potentiometer located above and to the right of the coarse span switches. Clockwise rotation will increase time delay within each time range. The fine adjust screw will click when it reaches the limits of its range. If this occurs, select a higher or lower coarse span, as required.

FAILSAFE OPERATION

Failsafe defines the default state of the unit if a power failure or other problem occurs. See Switch Selection Chart for how to set switches C and D for the required operating mode. Failsafe low keeps the relay in the normally closed position until the probe detects material, assuming no time delays. Failsafe high keeps the relay in the normally open position until material is detected. Note that if failsafe high is chosen, the relay is on unless the probe detects material or a power failure occurs. Therefore the N.O./C/N.C. markings are reversed while power is on. When the relay is on, its LED will be lit.

DIFFERENTIAL MODE

On dual probe control units a differential latch is provided. See Fig. C for location. When the latch switch is off (moved down) the two probes operate independently. When the switch is on (moved up) a differential latch will occur with probe 1 as low level and probe 2 as high level. In differential mode, when probe 1 (low) senses material its relay switches. When probe 2 (high) senses material its relay also switches. Both relays will remain switched even if level falls below the probe 2 (high) level. They will return to their failsafe state only when level falls below both probes. This operation is used for automatic pump up or pump down of a system.

With latching operation, the failsafe mode of both switches must be set the same. If they are not, probe 2 will not operate.

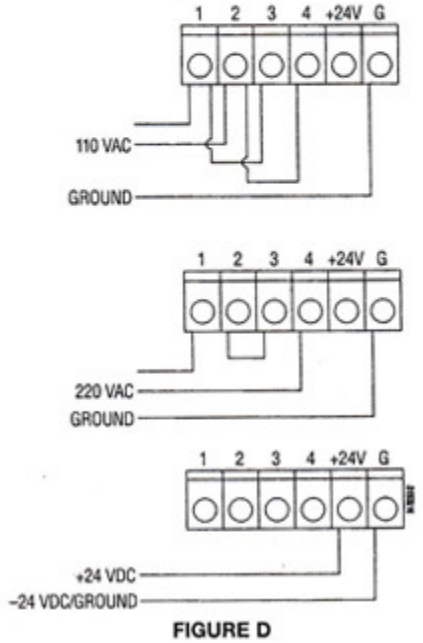


FIGURE D