

# MODEL 513 CONDUCTANCE PROBE LEVEL SWITCH

## INTEGRAL OR REMOTE MOUNTING

TS513

### FEATURES

- Reliably detects conductive solids or liquids
- Circuit is plastic coated for protection against moisture and corrosion
- DPDT relay is sealed for high reliability
- Unaffected by conductive probe buildup
- Actuation setpoint resistance is adjustable to prevent false switching
- 2 second time delay is basic, 1-60 seconds adjustable is optional
- 4X hoseproof housing is basic
- Low level sensor voltage for safety
- AC signal protects sensing probe life
- Intrinsically safe probe is optional

### APPLICATION

The Model 513 produces a switching action as a conductive material touches the tip of its sensing probe. An individual probe is required for each switch action point. Each basic 513 switch station may be wired for alarm action or for differential pump control action. See the electrical wiring diagram for details. Models are also available with up to 4 independent switching points in a single unit; see Models 512 and 514 for details.

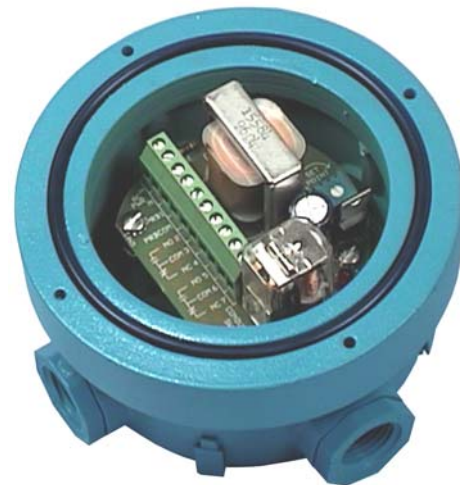
### OPERATING PRINCIPLE

The Model 513 actuates its relay when a small electrical current flows from its sensing probe to the vessel wall or to another probe used for ground return. A low voltage AC signal is applied between the sensing probe and ground. The very small current is conducted between the two when the process liquid touches the sensing probe. This current flow is sensed by an electronics network which actuates the output relay.

On/off differential control is accomplished by using two sensing probes, one of which is longer than the other. The relay is actuated when the liquid level touches the upper probe. The relay actuation disconnects the upper probe and connects the lower probe to the measuring circuit input. The unit is then "latched in" through the lower probe/liquid/ground connection and remains actuated until the liquid level drops below the lower probe. The relay then deactuates, and the upper probe is reconnected to the measuring circuit input.



513R Mounted In A Remoted Fiberglass Housing



513A Mounted In An Integral PVC Housing

### FLUIDS AND SOLIDS SENSED

This unit will sense the presence of water or almost any water based compound or mixture. A solution having 10% or more free water is usually adequate for operation. Typical examples are: acid, tap water, beer, sodium hydroxide, brine, and mine water.

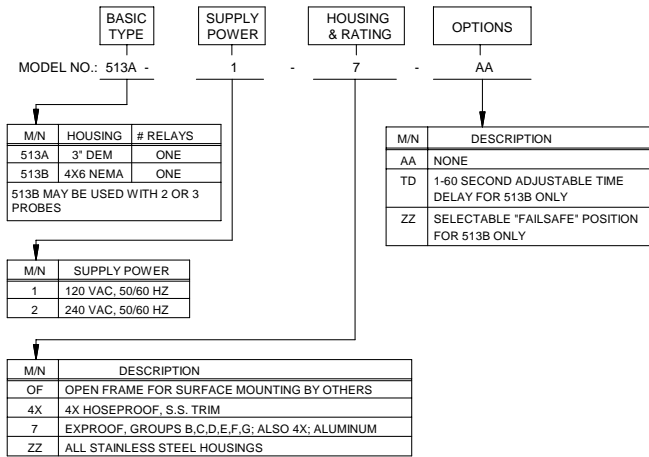
Most carbons and carboneous solids are conductive and can be detected by the Model 513. These solids may be in the form of powders, granules, or lumps. Typical examples are: coal, coke, graphite, and carbon black.



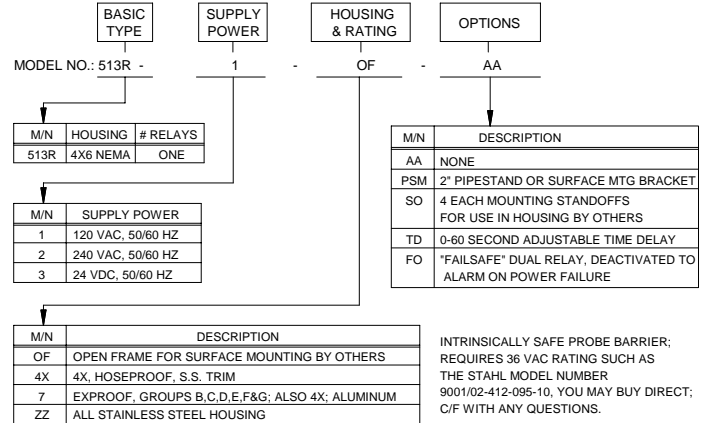
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# MODEL NUMBERING SYSTEM AND SPECIFICATIONS

## INTEGRAL ELECTRONICS



## REMOTED ELECTRONICS



## SPECIFICATIONS

**Relay:** DPDT 5 amps @ 120 or 240 VAC, 50/60 Hz, 4 amps @ 28 VDC; (SPDT when wired for differential).

**Supply Power:** 120 or 240 VAC, 5 VA.

**Operating Temperature:** -20°F to +180°F, (PVC housing limit is 140°F).

**Response:** 2 seconds fixed time delay (0-60 seconds adjustable optional).

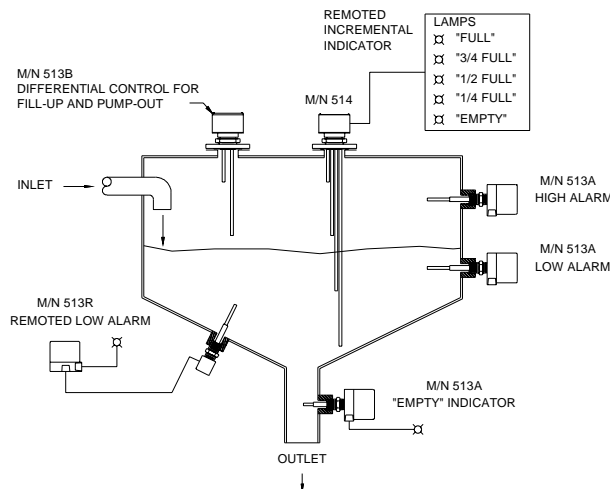
**Input:** Adjustable 100 to 35,000 ohms maximum pull-in.

**Solution Conductivity:** Potable water to strong acids; carbon solids.

## CONDUCTIVE BUILD-UP APPLICATIONS

The Model 513 does a better job on fluids that leave conductive deposits than do most other types of level switches. Many process fluids carry entrained solids, which accumulate on any surface that they contact. These deposits usually remain conductive after the fluid has dropped off of the probe and commonly continue to collect until the physical size of the buildup mass is quite large. The Model 513 will continue to operate through a conductive buildup because when the fluid rises and contacts the buildup mass, the sensing current can flow through the conductive buildup, through the fluid, and on to ground return. The sensing probe should enter the vessel vertically from the top. This prevents the collected buildup from bridging across the rod insulation to the tank wall ground, which could cause the Model 513 to be continuously activated.

## TYPICAL APPLICATIONS OF THE MODEL 513



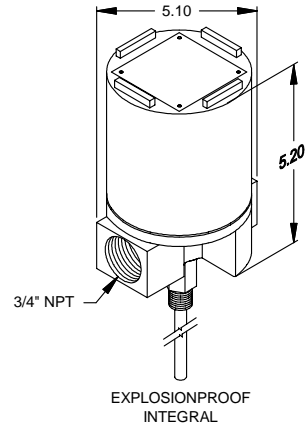
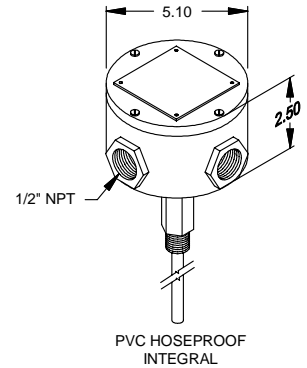
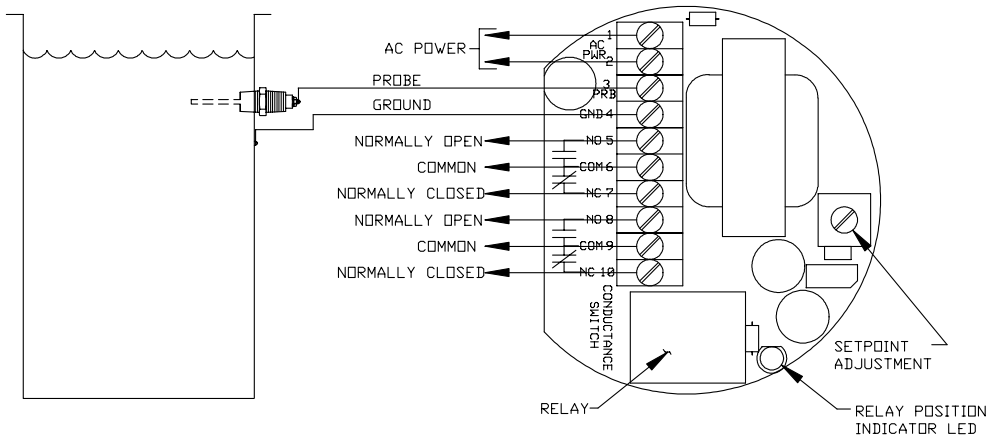
## CALIBRATION AND SAFETY

The Model 513 relay switches when the conductive material makes an electrical connection between the sensing probe and ground return. The sensing rod(s) length is selected so that the rod tip is at an elevation where switching is required.

The Model 513 only has a low AC voltage on its sensing probe even under conditions of an open probe circuit.

# INTERCONNECTION AND SENSOR WIRING DIAGRAMS

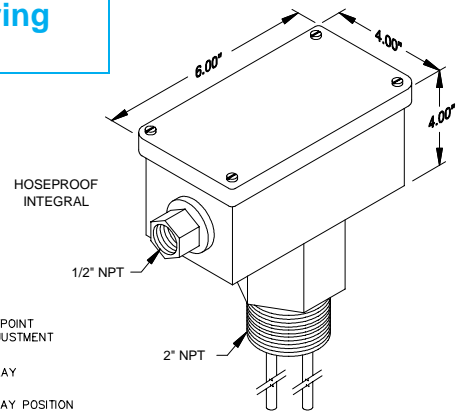
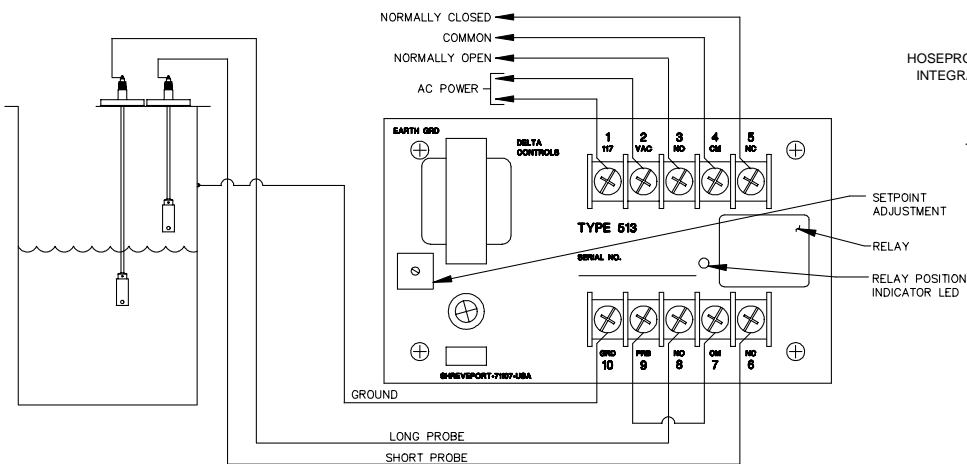
## Model 513A Conductance Level Switch Wiring Diagram



Model 513A (for integral mounting) shown wired for use as a Level Alarm

- Note:
1. Can only be remote mounted if for differential control.
  2. The 3" DEM Module fits the Delta small housing.
  3. Available with fixed time delay only.

## Model 513B and 513R Conductance Level Switch Wiring Diagram



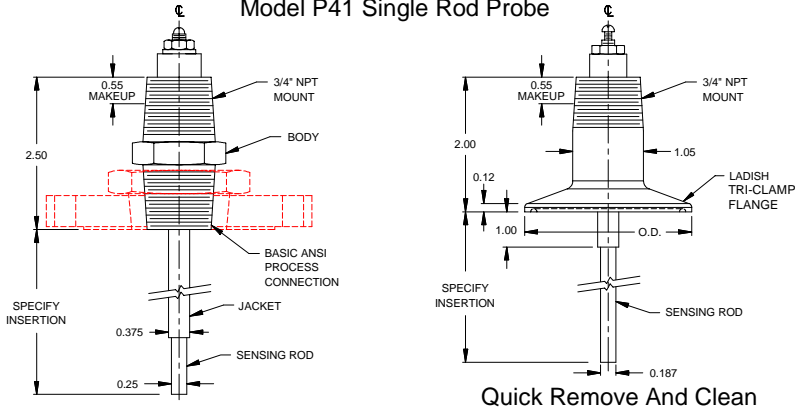
Model 513B (for on-off differential control) (513R for remote mounting), both shown wired for use as a Differential Level Controller.

- Note:
1. The Model 513B and 513R modules are rectangular and fit in NEMA size housings.

# BASIC SENSING PROBE DESIGN

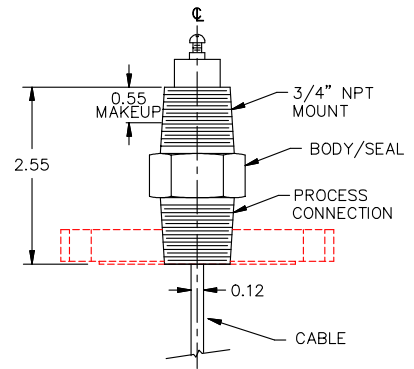
(actual design will be determined by the application)

Model P41 Single Rod Probe

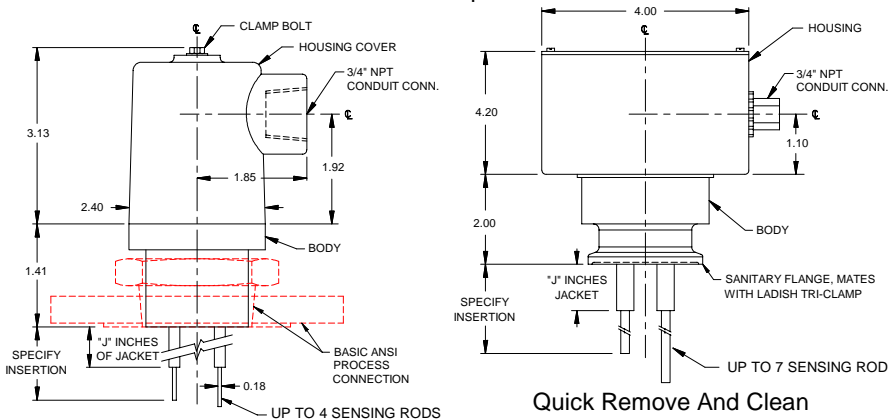


Quick Remove And Clean

Model P42 Single Cable Probe

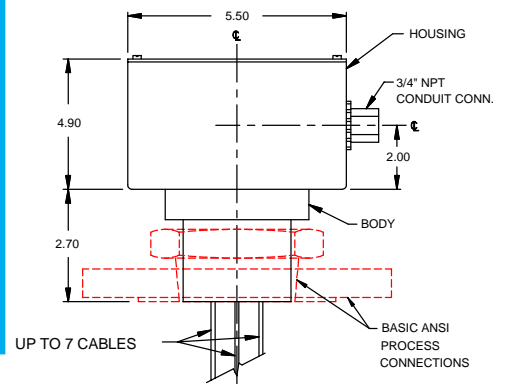


Model P44 Multiple Rod Probe

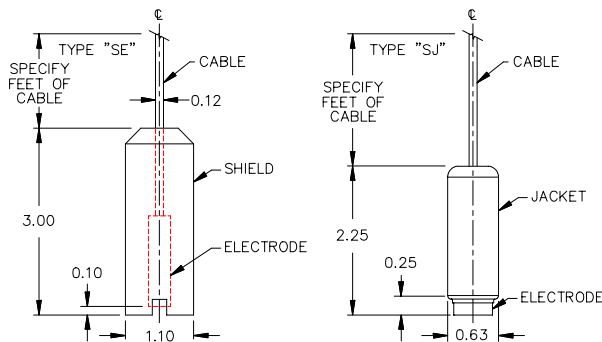


Quick Remove And Clean

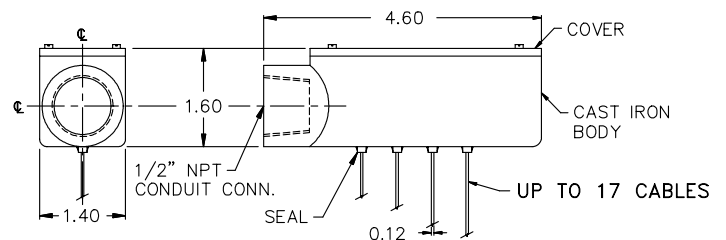
Model P43 Multiple Cable Probe



Model "SE" and "SJ" Lower Cable/Electrodes



Model P46 Conduit Supported Probe



NOTE: CABLE/ELECTRODE ASSEMBLY IS A SEPARATE UNIT

## PROBE SPECIFICATIONS

**Working Pressure:** -15 to 1500 PSIG (-1 to 100 Bar)

**Insertion Lengths:** Rods: 1 inch to 20 feet ( M)

Cables: 6 inch to 200 feet ( M)

**Process Temperature:** -450 to +1000°F (-273 to 550°C)

**Process Connection:** ANSI Flange, Sanitary Flange, NPT, BPT, DIN, or any other.

## Basic Wetted Materials (others available as required):

**Sensing rods and electrodes:** 316 S.S., Hastelloy "C"

**Jackets and cable insulation:** PVC, PTFE

**Housings:** PVC, Fiberglass, Aluminum, S.S.

**Seals:** Viton® "O" rings, PTFE packing

**Body:** Steel, S.S., PVC, Kynar®, PTFE, Hastelloy "C"



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