



IAWEA

Fall Operators

Conference

September 9th – 10th, 2015



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PRESENTS

Level Sensing Instruments



Basic Level Sensing Instruments

1. Float Switches
2. Submersible Transducers (Hydrostatic Pressure)
3. Ultra-Sonic Level Transducers/Controllers
4. Radar or Guided Wave Radar Type Level Transducers
5. Bubbler Type Level Systems

Side Topic: Installation of instruments in wet wells and compliance with NEC on hazardous areas.

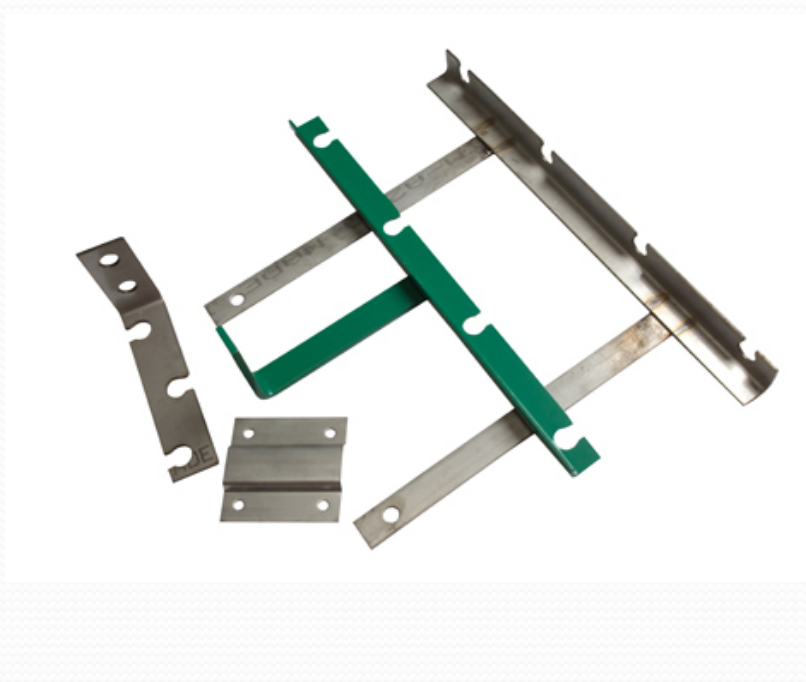
Float Switches: With Cable Weight or Internal Weight.

- Mercury Switch or Reed Switch
- Suspended Directly from Cable
- Inexpensive and reliable
- May required intrinsically safe barrier
- Can be purchased with higher/motor rated amperage



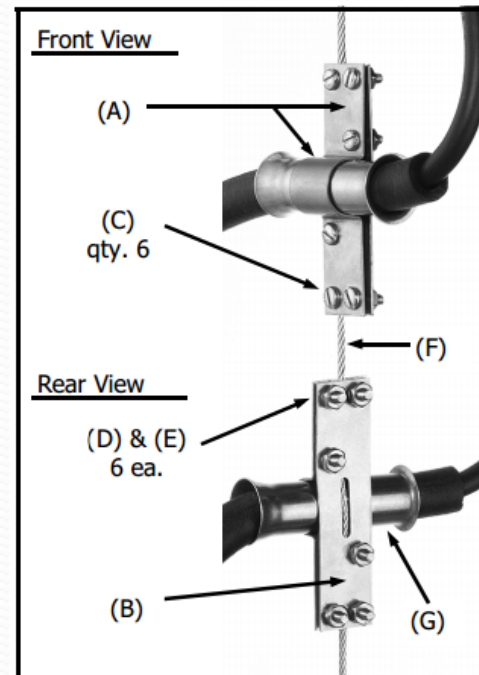
Weighted Float Switch Suspension.

- Typically suspended from bracket and secured with plastic grommets.



Non-Weighted Float Switches.

- Mercury Switch or Reed Switch
- Pipe Mounted, Cable Suspension with Anchor
- Teflon Coated Stainless Steel.
- More Expensive than plastic floats
- May required intrinsically safe barrier



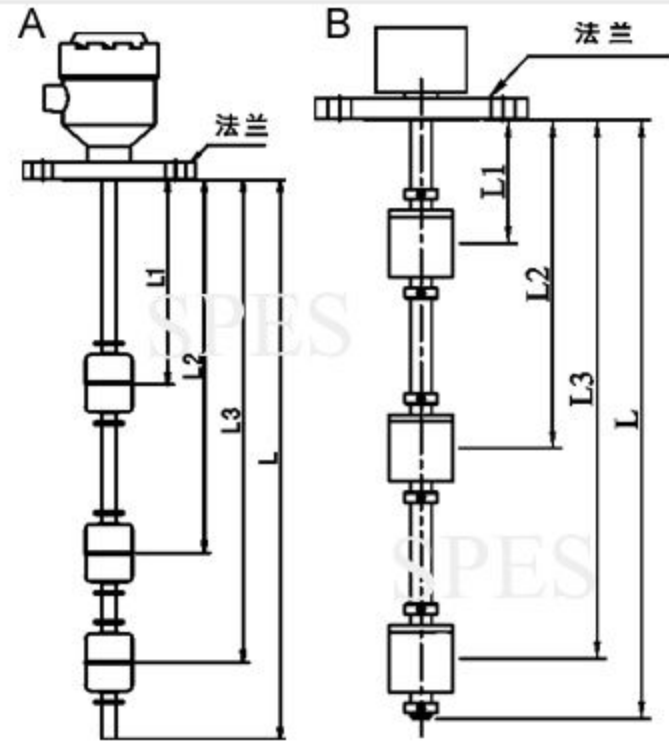
Float Switch for Flood Alarms.

- Typically low amperage reed switch.
- Wall or Conduit Mounted
- Plastic or Stainless Steel.
- Inexpensive way to alarm on flood condition in dry pit areas or basements
- May required intrinsically safe barrier



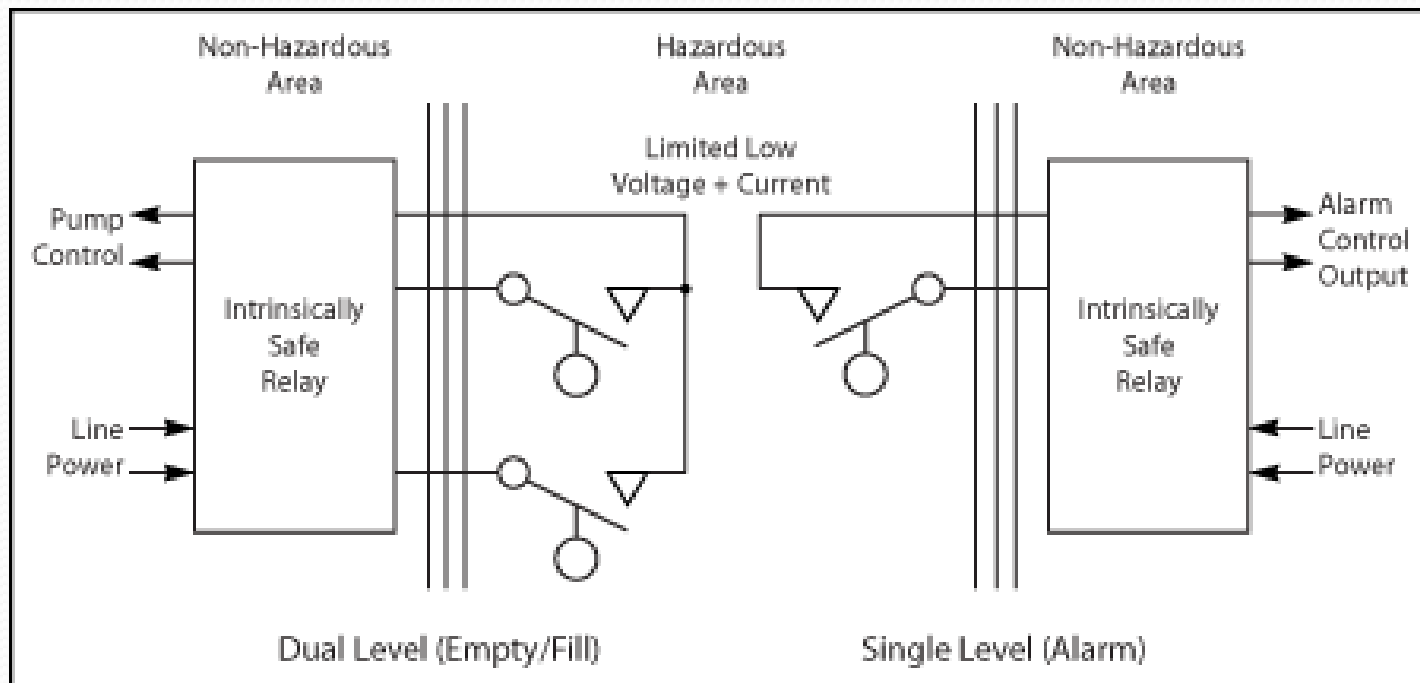
Multi-point Level Switches.

- Typically low amperage reed switch.
- Multiple Switch Points mounted on rod.
- Mounting Flange
- Plastic or Stainless Steel.
- Small Tank Applications
- May required intrinsically safe barrier



Intrinsically Safe Barriers/Relays for Floats.

- Hazardous areas typically are Class 1, Div. II or Class 1, Div. 1
- Limits Voltage and Current in Hazardous Areas.
- Barrier/Relay mounted in control panel.
- NEC wiring practices must be followed for proper protection.



Submersible Level Transmitters.

- Typically Suspended into Wet Well or Tank.
- Pressure Range based upon tank depth and desired measurement range. 5, 10, 15, 20..psi
- 4-20mA or 1-5vdc Analog Signal
- Large or Small Diameter
- Turbulent conditions may required a stilling well.
- Intrinsically Safe Barrier/Relay may be required



Ultra-Sonic Level Sensors.

- Operate by sending a sound wave generated from a piezoelectric transducer to the surface of the water.
- Wave reflected from the process material must move in a straight line back to the transducer
- Factors such as dust, heavy vapors, tank obstructions, surface turbulence, foam, and even surface angles can affect the operation.
- Utilized to measure levels in flumes or over weirs for flow measurement.
- Can be paired with a controller to provide complete pump controls.



Radar or Guided Wave Radar Level Sensors

Non Contacting Radar uses a carrier frequency, e.g. 6 GHz or 26 GHz, to carry the microwave which are radiated into the tank with an antenna.

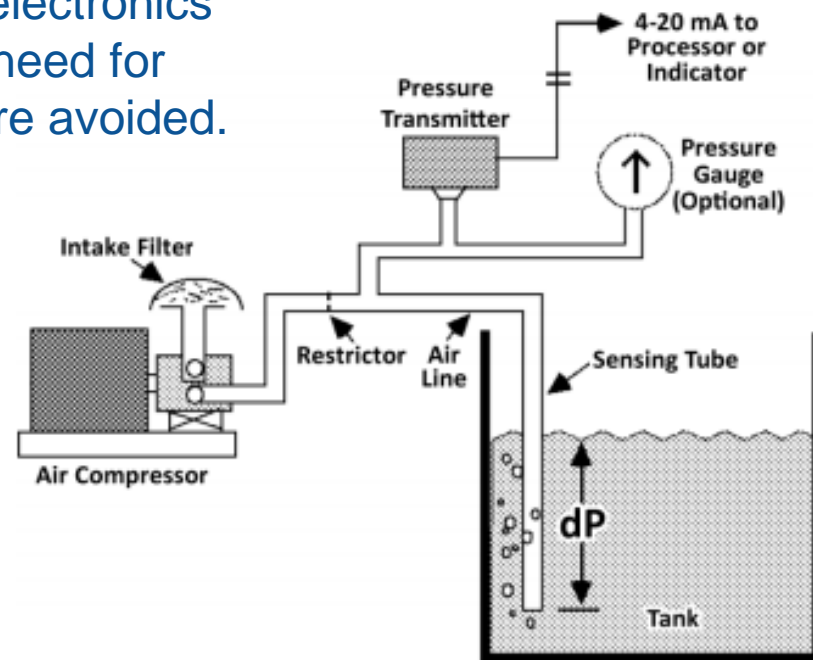


Guided Wave Radar the pulsed microwave are guided down the tank by the probe, making it less sensitive to disturbances than free propagating microwaves.



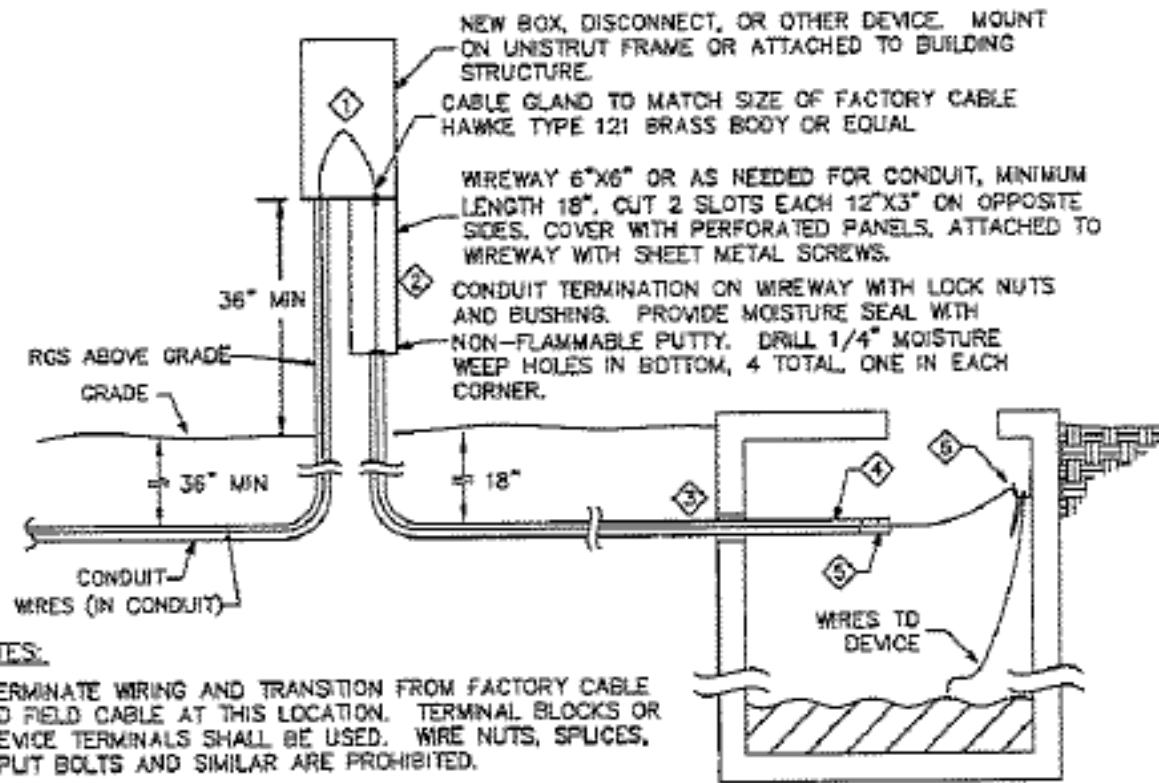
Bubbler Level Sensing System

- Older but Proven Technology
- A complete bubbler level measurement system consists of a source of compressed air, an air flow restrictor, sensing tube, and pressure transmitter.
- Since there are no electrical or electronics components in the wet well the need for intrinsically safe barrier/relays are avoided.



Installation of Instruments in Hazardous Areas (Wet Wells)

- Hazardous areas typically are Class 1, Div. II or Class 1, Div. 1
- If Conduit Seal Fittings are required factory cables on pumps, transducers, floats, etc SHOULD NOT be installed and sealed in these fittings.
- Per NEC if 18" air gap is provided conduit seal fittings are not required.

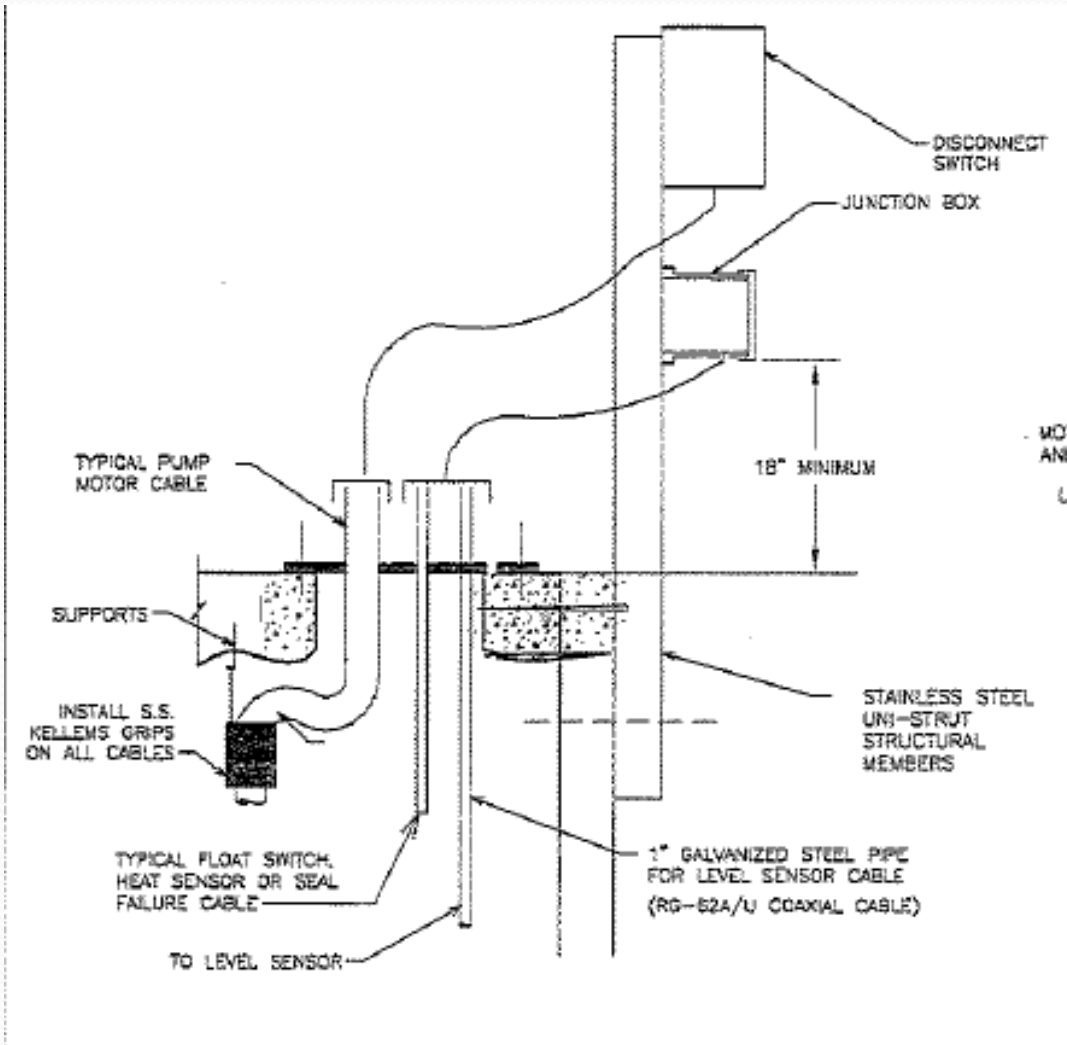


NOTES:

- ① TERMINATE WIRING AND TRANSITION FROM FACTORY CABLE TO FIELD CABLE AT THIS LOCATION. TERMINAL BLOCKS OR DEVICE TERMINALS SHALL BE USED. WIRE NUTS, SPLICES, SPLIT BOLTS AND SIMILAR ARE PROHIBITED.
- ② WIREWAY PAINTED STEEL, HAMMOND 1486 SERIES OR EQUAL PERFORATED PANELS, 1/8" HOLES ON 1/4" CENTERS, ALUMINUM, 14GAUGE.
- ③ CORE DRILL OR SLEEVE IN SIDE OF WET WELL. INSTALL NON-SHRINK GROUT TO COVER GAP OF CONDUIT.
- ④ EXTEND CONDUIT TO EDGE OF ACCESS MANHOLE, SO END OF CONDUIT AND WIRING CAN BE REACHED FROM GRADE LEVEL, WITHOUT ENTERING WET WELL. ROUTE IN MANNER THAT DOES NOT INTERFERE WITH ACCESS TO PUMPS, RAILS, VALVES, OPERATION OF HOISTS, OR ANY OTHER WET WELL EQUIPMENT. PROVIDE SUPPORTS FROM CEILING OF MANHOLE AS NEEDED.
- ⑤ PROVIDE DUX-SEAL WATER PROOFING TO SEAL CONDUIT AND WIRING FROM WET WELL.
- ⑥ PROVIDE STAINLESS STEEL J-HOOK. COIL 36" MINIMUM SPARE WIRE ON HOOK. SUPPORT NEATLY.

5 | WET WELL INSTALLATION DETAIL

E.06 | NO SCALE





Preventative Maintenance

- Keeping field instruments such as transducers and floats clear of debris, grease, rust or scaling build up.
- Periodic checks and tightening of wiring connections.
- Purposely cause a high level alarm in your wet wells but tipping float or letting level come up to test alarm system and alarm notification.