
1891 PRESSURE TRANSDUCER INSTALLATION EXAMPLES

INTRODUCTION

The Model 1891 Level/Depth Transducer is widely used in hydroelectric power generating stations to measure head and tail water levels. It is also widely used to measure the level of fuel or other liquids in a tank. One of the many features, which make these systems popular for these applications, is the sensor's easy installation. The 1891 can be used with the INCON model 1810 or 1511 Panel Instrument.

The 1891 is a submersible-type pressure sensor, specifically designed for liquid level measurement. It is simply lowered into the liquid to a depth below the lowest liquid level expected. The vent tube in the sensor's cable provides an atmospheric pressure reference so that changes in weather conditions do not affect the level indication. The Panel instrument computes the height of the liquid above the transducer from the hydrostatic head pressure. The Panel Instrument can be scaled to display any units of measure and offset for any desired value. A non-linear tank table can also be programmed for volume conversion.

STILLING WELLS

Submerged instrumentation installed at hydroelectric facilities is typically installed in stilling wells. Primarily, these are used to provide physical protection for the instrumentation and to "still" any wave turbulence where measurements need to be taken. Stilling wells consist of some sort of vertical pipe or tube, which fills to the same level as the body of water being measured, by hydrostatic forces. It may simply be a pipe, open at the bottom and vented at the top, which is suspended in the water. In other cases, piping may connect a stilling well to a body of water, which is some distance away. In either case, the sensor will report the correct level information.

A significant advantage for the 1891 sensor is that it can be installed in very small stilling wells. In cases where old wells have been destroyed or otherwise rendered useless, a simple replacement may be fashioned out of a small diameter (2 inch ID) PVC pipe. These are often attached to the structure by means of simple metal straps (see Figure 1) and are much simpler to install than the large wells required by some other equipment.

In most cases, the transducer may be suspended in the well by its cable, without anything attaching the transducer itself to the stilling well. However, the 1891 does include a threaded hole in its nose cone, which may be used to attach a weight or some sort of mounting bracket to hold the transducer in place. INCON offers 2 inch (model **TSP-KI2**) or 4 inch (model **TSP-KW4**) pipe plugs that have a cable clamp ideal for hanging an 1891 in a stilling well (see Figure 1). The 1891 can also be held in place by a strap clamp around the body of the transducer.

The 1891 has a capillary tube that vents the back side of the sensing diaphragm to atmospheric pressure. This tube **must be terminated** to either a desiccant pack or an aneroid bellows. A desiccant pack is supplied with each new 1891, and must be routinely checked and periodically changed. The aneroid bellows is available from INCON (model **1891-B**) as an accessory. If this capillary tube is not terminated as described, moisture will enter the transducer and seriously shorten its functional lifespan.

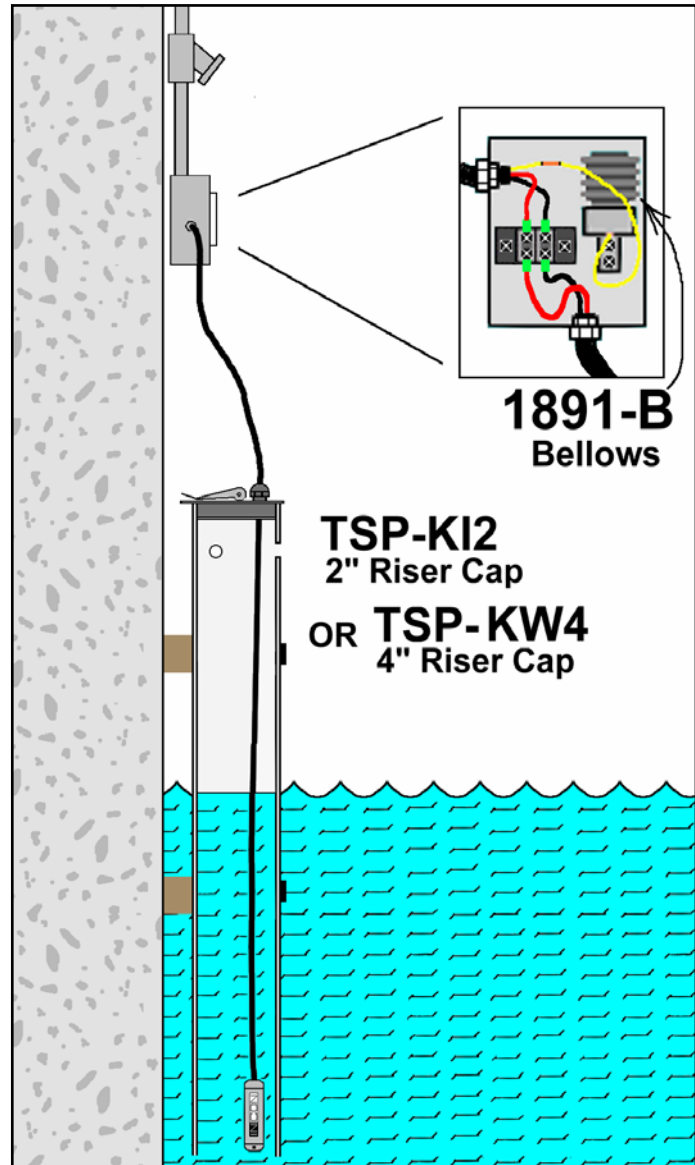


Figure 1

Materials Required:

- 1) Riser Cap: INCON model **TSP-KI2** for 2" ID riser pipes; model **TSP-KW4** for 4" ID pipes
- 2) Aneroid Bellows: INCON model **1891-B**
- 3) Pressure Transducer: INCON model **1891** or **1891S** (Lightening Surge Protected)
- 4) Junction Box : NEMA 3 or higher such as McMaster-Carr #8261K25
- 5) Terminal Block: Generic 2 pole such as McMaster-Carr #7527K62
- 6) Panel Instrument: INCON model **1511** or **1810**
- 7) 2 or 4 Inch ID PVC Pipe with suitable mounting

TANKS

The 1891 can reliably and accurately transmit the level of fluid in a tank to a remote panel instrument. Typically a tank will have a spare threaded bung where a riser pipe can be installed. The 1891 can be installed in a tank through a 2"ID or 4"ID riser pipe. The installation could not be simpler. INCON offers 2 inch (model **TSP-KI2**) or 4 inch (model **TSP-KW4**) pipe plugs that have a cable clamp ideal for hanging an 1891 in a riser pipe (see Figure 2).

Materials Required:

- 1) Riser Cap:
INCON model **TSP-KI2** for 2" ID riser pipes
INCON model **TSP-KW4** for 4" ID pipes
- 2) Intrinsically Safe Barrier:
INCON model **1950**
- 3) Aneroid Bellows
INCON model **1891-B**
- 4) Pressure Transducer:
INCON model **1891**
- 5) Junction Box – NEMA 3 or higher such as
McMaster-Carr #8261K25
- 6) Terminal Block – Generic 2 pole such as
McMaster-Carr #7527K62
- 7) Panel Instrument:
INCON model **1511** or **1810**

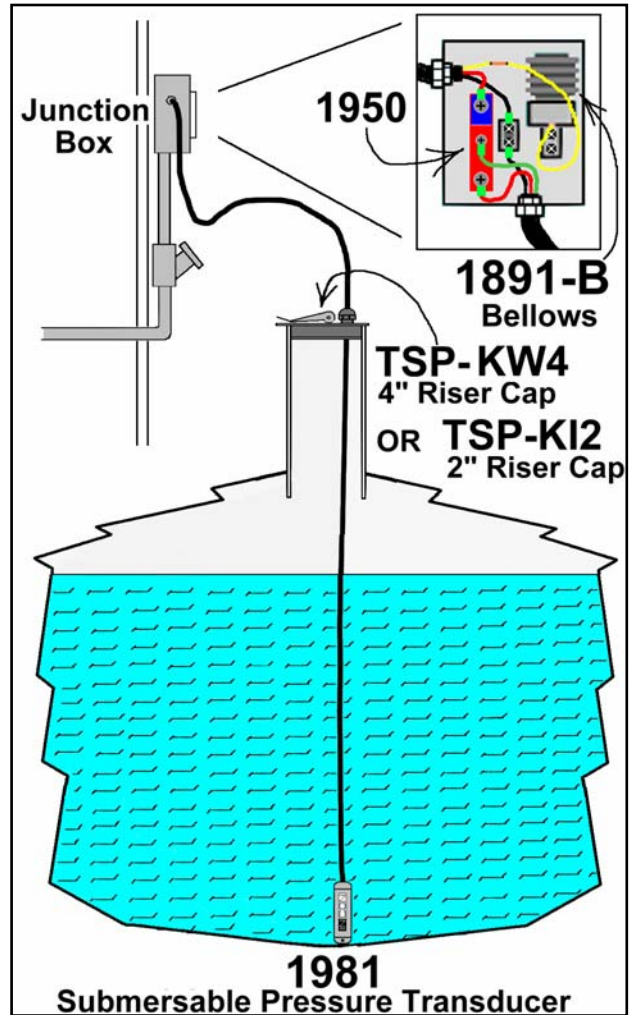


Figure 2

NOTES

- An Intrinsic Safety Barrier (model 1950) must be used with all flammable liquids.
- All underground fuel tanks are required by law to have a certified method of leak detection. The INCON Panel Instruments and 1891 Transducer are not certified for leak detection.
- The junction box must be vented to atmospheric pressure. If a sealed junction box is used, you must drill a small hole through the box to allow atmospheric pressure to equalize.

INSTALLATION and WIRING:

1. Remove the rubber grommet in the cable clamp on the Riser Cap. The 1891 cable is too large to fit through the clamp with the grommet in place.
2. Feed the cable through the Riser cap and through the cable clamp. Adjust the length of cable from the cap to the Transducer to the approximate desired depth.
3. Drop the Transducer into the stilling well or tank and press the Riser Cap into the end of the pipe. Flip the locking handle down to lock the Cap into the pipe.
4. Adjust the height of the Transducer by raising or lowering the cable through the cable clamp. The ideal position of the Transducer in a tank is 1 to 2 inches above the bottom. You can feel the transducer touch the bottom of the tank because the cable will go slack. From this point, pull up 1 or 2 inches of cable and tighten the cable clamp.
5. Mount the Aneroid Bellows, the Terminal Block, and the Intrinsic Safety Barrier (if used) in the Junction Box. If the Box is not vented, drill a small hole in the bottom of the Box to allow atmospheric pressure to equalize.
6. Feed the Transducer's cable into the Junction Box. Cut off any excess cable length or coil it outside the Box. Strip 10 to 12 inches of sheathing from the cable inside the Junction Box.
7. Join the Transducer's capillary tube to the Bellows' capillary tube.
8. Wire the positive (red) wire from the Transducer to the Barrier's "Safe" (blue) side. Wire the negative (black) wire to a terminal block. Wire the Barrier's center terminal to a Safety Ground.
9. Wire the Barrier's "Hazardous" (red) side to the Panel Instrument's input terminal "F". Wire the opposing terminal on the terminal block to the Panel Instrument's input terminal "A". All wiring to the Panel Instrument should be run in proper conduit. (See Figure 2)
10. Program the Panel Instrument for the application according to the User's Guide and perform the system calibration procedure to calibrate the Transducer's output to the desired units of measure.

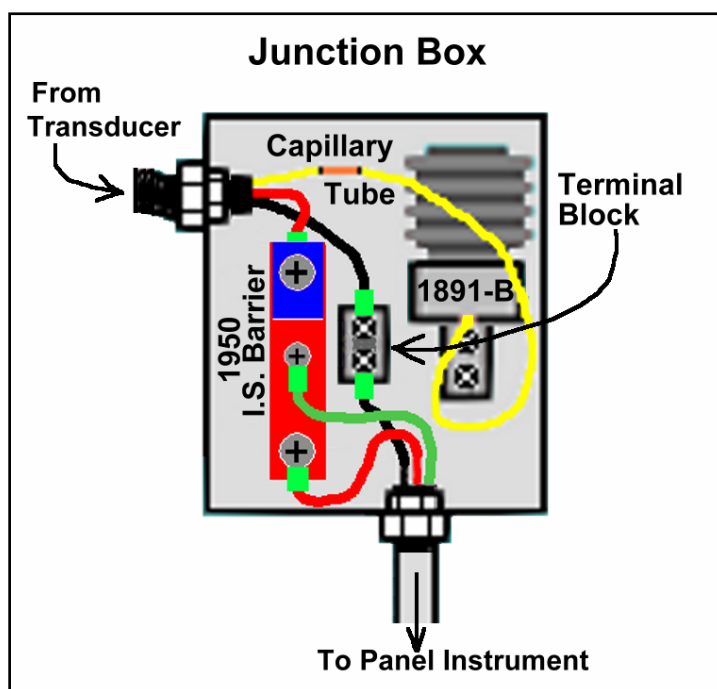


Figure 3