

# TeleSensor™

## Liquid Level Sensor for Tank Gauging

- Pneumatic or electronic (4-20 mA) output
- Extended version for tank top mounting
- Adjustment free operation

### Rugged and Reliable Measurement

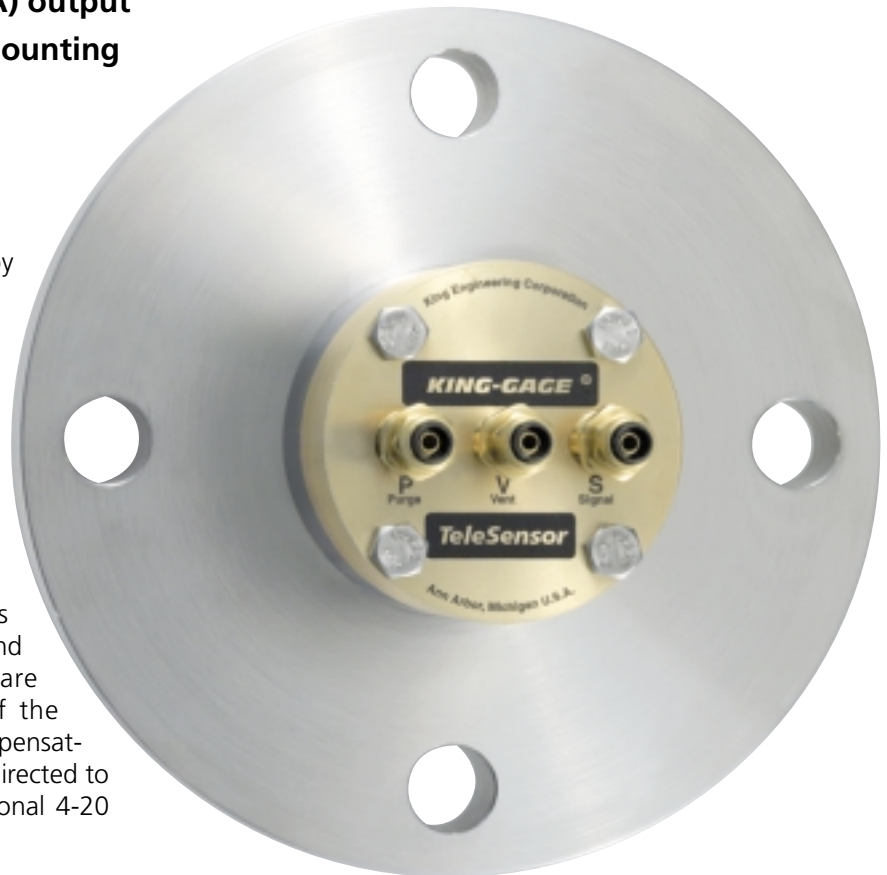
These unique pneumatic sensors detect level by sensing hydrostatic pressure created by liquid depth. Acting on the force balance principle, a sensitive diaphragm is exposed to the liquid contents of the tank. Compressed air within the sensor creates a pneumatic pressure that balances the force of the liquid acting against the diaphragm. This compensating pneumatic pressure is directly proportional to the depth of liquid in the tank.

The pneumatic force balance technique is virtually free from long term drift, hysteresis and temperature sensitivity. Effects of stress are insignificant since mechanical deflection of the diaphragm is not directly measured. The compensating pneumatic balance pressure can either be directed to a suitable gauge or converted into a proportional 4-20 mA output.

### External TeleSensor

The basic configuration is designed for mounting to any typical outlet near the bottom of the tank. It features a pipe flange connection (2", 3" or 4" class 150 ANSI). Since the TeleSensor sensing diaphragm responds to the pressure due to the head of liquid in the tank, the mounting location determines the starting level measurement point. In actuality, the sensor is measuring the mass (weight) of fluid matter that can be correlated to units of standardized volume.

Owing to the direct contact, all wetted materials should be selected based on compatibility with tank contents. Standard diaphragms include titanium, buna-N and silicone rubber. Flange connectors are available in various materials as well.



### Internal TeleSensor

An optional configuration extends the diaphragm assembly into the interior of the tank. This permits sensor installation where only the top of the tank is accessible or when no suitable openings in the tank bottom are practical. The diaphragm extension also lends itself to applications where certain liquids tend to thicken or solidify in the confined space of a tank outlet or nozzle.

Internal TeleSensors are offered with a 3" or 4" mounting flange (class 150 ANSI). The internal sensing diaphragms include Kel-F, 316 stainless and titanium. Standard extension pipe is 304 stainless steel and is fabricated to the exact length required.

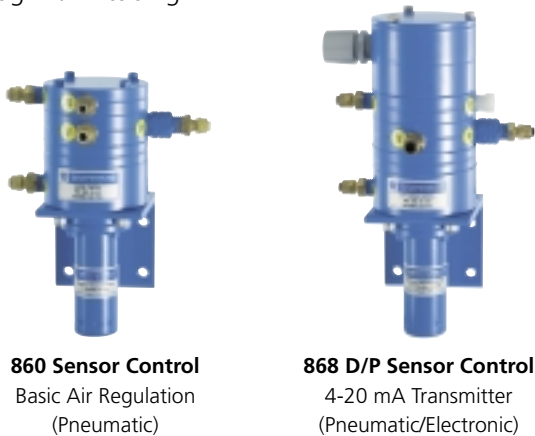
## Pneumatic Operation

TeleSensor diaphragm units require the use of an air regulating Sensor Control. This specialized regulator provides continuous 1 CFH (cubic foot per hour) air flow to the underside of the diaphragm to create a pneumatic balance pressure. It also incorporates a back-pressure regulator assembly that maintains linear 1:1 response throughout the entire operating pressure range. This ensures the pneumatic output signal is directly equivalent to the hydrostatic head of liquid in the tank.

Pneumatic operation of the TeleSensor is fully compatible with continuous explosion hazard applications (Zone One or Division One). This means that it is possible to assemble a complete tank gauging system without the requirement of zener barriers or other intrinsic safety devices. Pneumatic sensors such as TeleSensor use no electrical energy for operation when using the 860 Sensor Control. The pneumatic pressure output of the sensing system can be transmitted 1000 feet or more to a compatible indicator or converted to a 4-20 mA signal.

## Output Signal Options

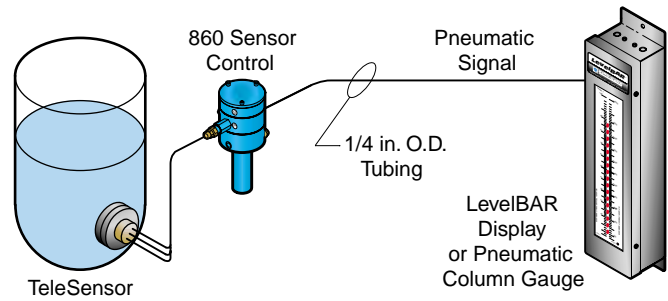
860 Sensor Control regulates both airflow and venting of the TeleSensor diaphragm unit. The basic control is an entirely pneumatic component. An output connection of the control provides the pneumatic pressure signal to the receiver (or external transmitter). As shown in the diagrams at right, the pressure signal is typically conveyed through 1/4" tubing.



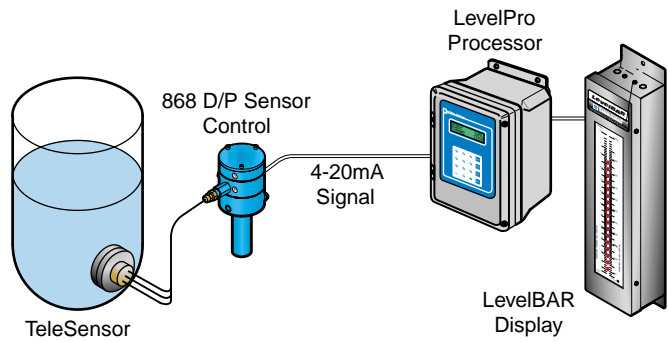
**860 Sensor Control**  
Basic Air Regulation  
(Pneumatic)

**868 D/P Sensor Control**  
4-20 mA Transmitter  
(Pneumatic/Electronic)

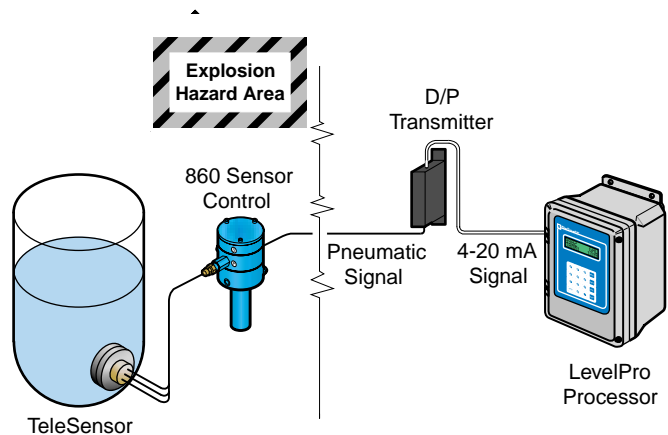
The available 868 D/P Sensor Control incorporates a precision differential pressure transmitter to convert pneumatic output. This enhanced version includes the basic air control as described above integrated with a loop powered two wire electronic transmitter. It provides a proportional 4-20 mA analog signal suitable for process control or remote level indication.



**Pneumatic Output** - TeleSensor system with pneumatic pressure signal transmitted to compatible indicator.



**4-20 mA Output** - TeleSensor system with D/P Sensor Control providing 4-20mA signal loop.



**Explosion Hazard Use (Zone One or Division One)** - Pneumatic sensors such as TeleSensor use no electrical energy for operation when using the 860 Sensor Control. The pneumatic pressure signal output of the sensing system can be transmitted 1000 feet or more to a safe area for electronic readout or 4-20 mA conversion.

**Specifications**

**Sensitivity**

Better than .001 psi (.02" water)

**Repeatability**

Better than ± .002 psi (± .05" water)

**Primary Accuracy**

± .007 psi (± 0.2" water)

**Secondary Accuracy – D/P Transmitter**

± 0.2% FS; includes non-linearity, hysteresis and repeatability errors. (Repeatability is ± 0.02% of calibrated span )

**Temperature Range**

External TeleSensor: 30° F to 300° F (0° C to 149° C)  
 Internal TeleSensor: 0° F to 250° F (-18° C to 121° C)  
 If titanium diaphragm is used, upper limit is 110° F (43° C)

**Pressure Range**

Sensor is a 1:1 pneumatic force balance diaphragm capable of repeating hydrostatic pressure as an equivalent pneumatic output. Functional pressure limit is 130 psi (or 3598 inches @ 1.00 specific gravity). Maximum measurement pressure is determined by compressed air supply pressure (35-150 psi) less 20 psi.

**Air Consumption**

Total air consumption of sensor package (including sensor control) is less than 10 CFH or 0.16 scfm.

**868 D/P Sensor Control Range**

Integral differential pressure transmitter ranges are 0-5, -10, -15, -30, -50 psid. ±40% span adjustment with zero suppression/elevation.

**Compressed Air Supply**

Operation of the internal or external TeleSensor requires a compressed air/gas source providing supply pressure of 35-150 psig (2.5-10.5 kg/cm2). Pneumatic components require instrument-grade compressed air that is clean, dry and oil-free to ensure trouble free performance.

**External TeleSensor**

Mounting flange and diaphragm are wetted surfaces requiring compatibility with process media. Sensor flanges available in 2", 3" or 4" size, flat faced, class 150 rating per ANSI B16.5-1973. Consult factory for full range of material selections available.

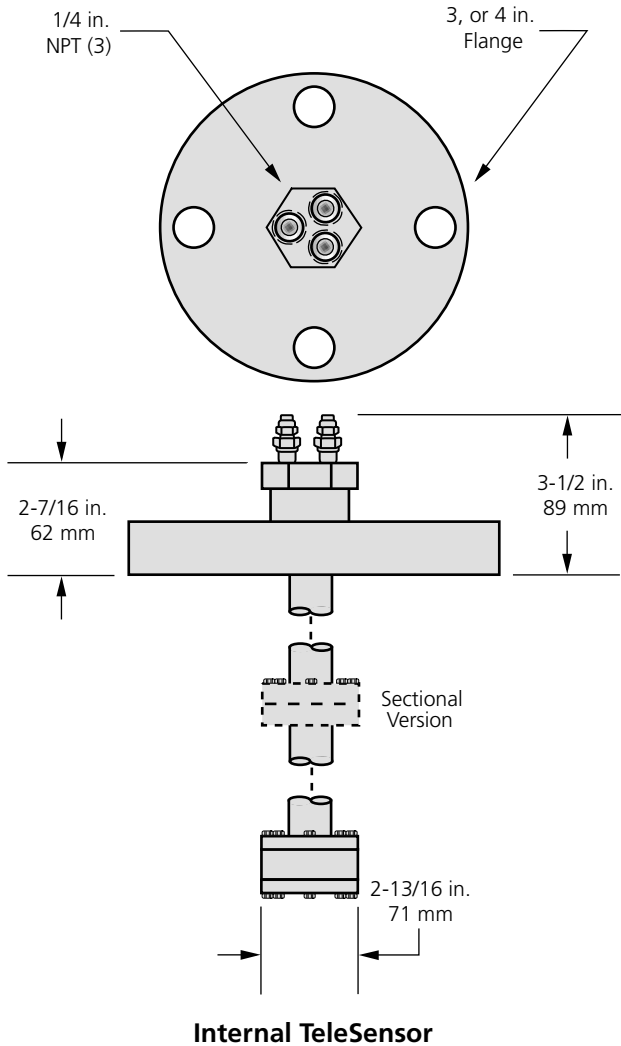
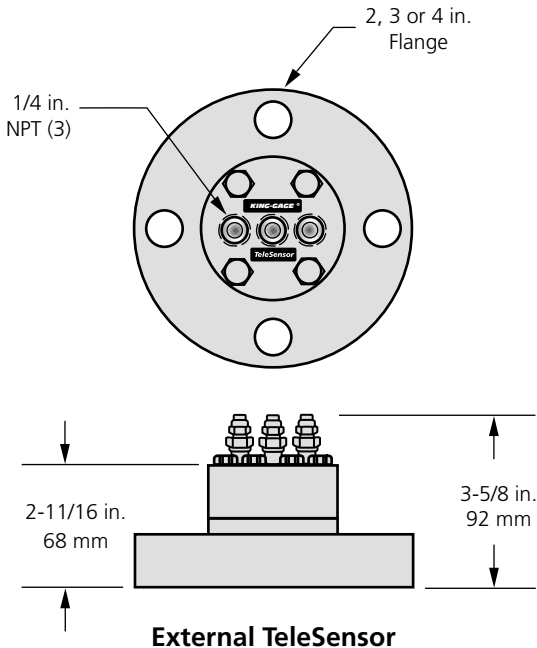
**Diaphragm Material** - titanium, teflon-coated titanium, silicone rubber, buna-N

**Internal TeleSensor**

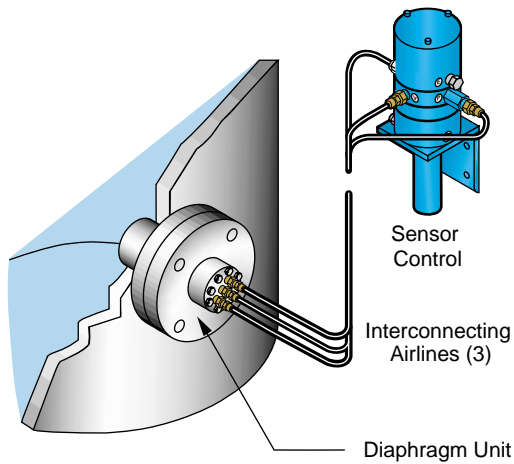
Mounting flange, extension pipe and diaphragm should be considered wetted surfaces. Sensor flanges available in 3" or 4" size, flat faced, class 150 rating per ANSI B16.5-1973. Standard material is 304 stainless steel.

Consult factory for optional materials of construction. Length of diaphragm assembly extension must be specified. Minimum extension dimension is 3.5" (89 mm). Sectional extension assemblies are available for applications where tank entry clearance is limited.

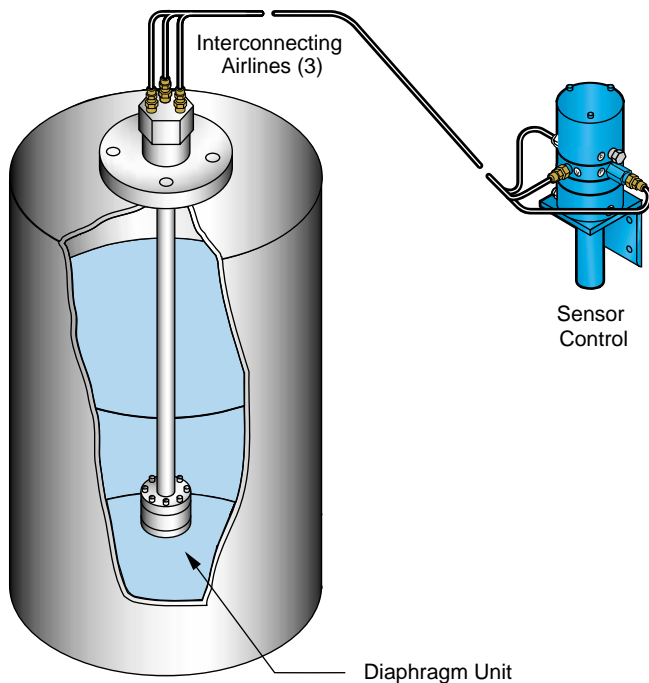
**Diaphragm Material** - Titanium, 316 stainless steel, Kel-f



# TeleSensor™



## External TeleSensor Mounting



## Top Mount Internal TeleSensor

## Sensor Installation

On side mounted installations, check pitch of the outlet pipe to ensure that it drains back into the tank. Otherwise, liquid may become trapped against the sensor diaphragm resulting in a false pressure reading.

Location of the Sensor Control air flow regulator should generally be no greater than 50 feet from the TeleSensor unit. Three 1/4" O.D. tube air lines are used to interconnect the air control and diaphragm unit. Distances greater than 50 feet between these components may increase response time of sensor to changes in liquid level.

## Internal TeleSensor Mounting

In a typical top mount configuration, the sensor mounts to a pipe flange connection with the diaphragm assembly extending down into the tank interior. Minimum opening size is 2.9" I.D. to accommodate insertion of the diaphragm probe (e.g. maximum Schedule 80 for 3" piping).

The diaphragm should be situated as close as practical to the tank bottom to ensure greatest depth measurement range.

When overhead clearance is limited, a multi-sectional extension can be fabricated. The shorter extension sections are assembled as unit is inserted into the tank. Minimum length of extension section is 3-1/2" (89 mm), maximum length is 20 feet (6 m).

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Box 1228, Ann Arbor, Michigan 48106-1228 U.S.A.  
Phone: (734) 662-5691 ■ FAX: (734) 662-6652