Measuring Pressure in Fluid Process Applications in Hazardous Areas

Application Note

Intrinsically Safe wireless pressure sensing provides a more efficient and safer method for measuring absolute or gauge pressure in fluid process applications in hazardous areas.

Problem Statement

Petrochemical plants, oil and gas refineries, and wastewater treatment facilities are some of the locations where hazardous areas are present due to concentrations of flammable gases and vapors in the surrounding atmosphere. In these hazardous areas, non-intrinsically safe electrical devices may risk igniting these flammable gases and vapors, creating fires or even explosions.

Intrinsically Safe (IS) design provides safe operation of electrical or electronic equipment in hazardous areas by using internal circuitry that is not capable of releasing electrical or thermal energy to ignite an explosive atmosphere.

Solution

Honeywell's Intrinsically Safe Wireless Pressure Sensor (IS-WPS) not only features intrinsically safe design for flammable gases and vapors, it also uses Honeywell's proven wireless communication protocols and technology. Combined, these features allow the IS-WPS to provide pressure monitoring capabilities in hazardous area applications where it is not feasible or safe to run live wires, or where wiring and connections are too costly. By eliminating wires, wireless technology of the IS-WPS not only reduces overall system installation cost but also enhances the performance and efficiency of the system. Furthermore, the remote monitoring capability of the IS-WPS reduces the need to have working personnel physically near a gauge to take a pressure reading.

Pressure is a critical data point in nearly every industrial fluid process. Monitoring pressure in an oil and natural gas wellhead is one of those hazardous area applications where pressure data is required to monitor and control various chemical processes during the lifetime of a well. The IS-WPS can be installed in the wellhead process instrumentations or in process pipes to measure gas volumes and liquid levels in wellhead casing and tubing. The pressure data can then be used to control a process by initiating shutdown of valves or pumps during wellhead operations.

Furthermore, the data can be used to monitor and control multiple plunger lifts. Wellhead sites are often located in remote areas. The wireless technology of the IS-WPS will enable the sensor to transmit the pressure data to the Honeywell Limitless™WMPR wireless receiver, that can be located up to 305 m [1000 ft] from the wellhead site.

Similarly in hazardous fluid storage facilities, such as oil refineries and petrochemical plants, a plant manager can determine the level of fluid in a tank by measuring the pressure at a specified point in the tank. By installing an IS-WPS in a dedicated port in the tank, a user can measure the level of fluid in the tank. The pressure reading from the sensor will be linearly proportional to the fluid level. For example, when the tank is full, the sensor reading will be full scale and when the tank is empty, the sensor reading will be zero. The fluid level data can then be transmitted to a Honeywell Limitless™WMPR wireless receiver, that may be located at the plant manager's office. This way, plant management can optimize labor resources and tank re-filling times.

The IS-WPS series pressure sensors utilize durable materials such as powder coated aluminum for the housing and Hastalloy® C-276 for the sensing diaphragm. Optional port NPT threading allows the IS-WPS to be more easily integrated into spots that previously utilized a gauge or into entirely new locations.

Table 1. IS-WPS Pressure Sensor Approvals and Certifications

cULus LISTING	ATEX CERTIFICATION	IEC Ex CERTIFICATION
Class I, Div I, Groups A, B, C, D T4	Zone 1 Ex ia IIC T4 Ga	Zone 1 Ex ia IIC T4 Ga
	Zone 0 Ex ia IIC T4 Ga	Zone 0 Ex ia IIC T4 Ga
Class I, Zone 1 AEx ia IIC T4 Ga		
Class I, Zone 1 Ex ia IIC T4 Ga		
Class I, Zone 0 AEx ia IIC T4 Ga		
Class I, Zone 0 Ex ia IIC T4 Ga		
$T_{ambient}$ -40° C to +70 C°		

refer to installation drawing for more info on certifications

Features and Benefits

- Measures absolute or gauge pressures from 0 psi to 500 psi through 0 psi to 15,000 psi
- Wireless design: Radio (license-free and global) P2P (Point-to-Point) or ISA100 Wireless™ compliant provide increased reliability, flexibility, and security in wireless transmission
  - P2P: WPAN 802.15.4, 2.4 GHz; up to 305 m [1000 ft] line-of-sight communication range when used with Honeywell's Wireless Multi-Protocol Receiver Module (WMPR Series), sold separately.
  - ISA100: 2.4 GHz; up to 305 m [1000 ft] line-of-sight communication range when used with a compliant ISA100 Wireless™ system
- Sealing: IP65, IP67 (self-certified by Honeywell)
- Powered by two 3.6 Vdc "D" size, Lithium Thionyl batteries
- Battery life up to eight years depending on update rate and configuration
- Total Error Band ±2 %FSS max
- Barrier diaphragm constructed with 316L, Hastelloy® C-276
- Process head manufactured from 316SSL
- Field programmable update rates: 1, 5, 10, 30, 60 seconds
- Field programmable units: psi, kPa, bar, and Pa
- Off-the-shelf batteries simplify replacement
- Temperature range -40 °C to 70 °C [-40 °F to 158 °F]
- Pressure port connections – 1/2 in NPT male, 3/4 in NPT male, 9/16-UNF for autoclave connection

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While Honeywell may provide application assistance personally, through our literature and the Honeywell web site, it is customer's sole responsibility to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, Honeywell assumes no responsibility for its use.

⚠**WARNING**
IMPROPER INSTALLATION
- Consult with local safety agencies and their requirements when designing a machine control link, interface and all control elements that affect safety.
- Strictly adhere to all installation instructions.

Failure to comply with these instructions could result in death or serious injury.

For more information

To learn more about Honeywell's
sensing and switching products,
call 1.800.537.6945 , visit sensing.honeywell.com,
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