

Application Note

Wing Union/Hammer Union Pressure Sensors Models 434, 435, and 437

Background

Pressure sensors are an essential element in today's oil and gas industry, used for many types of upstream applications such as exploration, well development, and production. They need to be built tough to survive some of the world's most demanding environmental conditions, both on land and offshore while providing accurate and reliable performance.

Well stimulation (fracturing and acidizing), mud logging, and well development (casing and cementing) are vital oil and gas processes that utilize pressure sensors for measurement and monitoring functions.

Potential Applications

Honeywell's Wing Union pressure sensors (also known as Hammer Union pressure sensors outside of the United States) are widely used by oil and gas companies to measure pressure level changes in media circulation systems.

Oil Mud Logging

For example, oil mud logging applications (see Figure 1) require a series of pressure sensors to be connected to the drilling apparatus and installed in specialized equipment to monitor or "log" the drill's activity. Logging While Drilling (LWD) and Measurement While Drilling (MWD) require pressure sensors designed to constantly measure drilling fluid pressure/flow along with the ability to adjust mixture or pressure levels to keep drills operating and prevent damage or equipment failures. This includes the circulation system's stand pipe (for pressure monitoring of mud from the pump into the well), mud pumps (for pressure monitoring of incoming and outgoing media to protect the mud pump and drill bit), and return line choke manifold (for pressure monitoring of the return line carrying the mud plus cuttings).

During the mud logging process, pumps send drilling media throughout the circulation system, down to the drilling bit, and then return the bit's cuttings to the surface for analysis



Figure 1. Oil mud logging pump line pressure measurement.



Model 434 with cage not pictured.

and disposal. Honeywell's wing union/hammer union pressure sensors help detect pressure level changes in the media circulation system, which can indicate changing conditions being encountered downhole by the drill bit, thus allowing the operator to quickly make adjustments to the drilling mixture pressure or drilling process as needed

Fracturing, Acidizing, and Cementing

Honeywell's Wing Union/Hammer Union pressure sensors are also used during fracturing, acidizing, and cementing applications for similar pressure monitoring and control purposes.

Solution

Honeywell Wing Union/Hammer Union Pressure Sensors are built rugged and oilfield tough to stand up to the rigorous demands of oil and gas drilling applications and environments. They have the sensitivity to ensure precise, reliable measurements every time, optimize drilling operation, reduce downtime, and maximize productivity.

Durable Construction

Models 434, 435, and 437 are constructed on Honeywell's time proven, all-welded, one-piece design, with the sensor diaphragm and Weco® 1502, 2002, 2202 Wing Union compatible fitting form factor machined as one part. This one-piece design provides a hermetically sealed unit, reducing the chance of media leakage into the sensitive electronic components, and increasing overall reliability. The isolated, pressure sensing diaphragm minimizes zero-shift during hammer up and also eliminates long term, signal drift in the field, making it easier to install and providing reliable pressure readings over time.

The sensor diaphragm is machined from either Inconel® X-750 or NACE-compliant Inconel® 718, which provides additional durability with highly abrasive and corrosive media, and is welded to the main stainless steel body. The stainless steel electrical connection provides enhanced secondary pressure containment, with multiple electrical connector options from which to choose.

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Optional 1-Wire or 2-Wire Shunt Calibration

Models 434, 435, and 437 provide an optional 1-wire or 2-wire shunt calibration. When a customer sends a signal to the wing union/hammer union from their instrumentation, another signal will be returned to validate the functionality of the unit. This provides confidence in the pressure readings during normal operation.

Optional Protective Cage

Models 434, 435, and 437 are also available with an optional protective cage which provides extra electrical connection protection and durability.

Various Accuracy Levels

- Model 434: standard accuracy of $\pm 0.2\%FSS$ BFSL
- Model 435: high accuracy $\pm 0.1\%FSS$ BFSL or standard accuracy $\pm 0.2\%FSS$ BFSL
- Model 437: standard accuracy $\pm 0.2\%FSS$ BFSL

Model 437 features a wider aperture design than the other models that is useful for customers utilizing more viscous media in certain applications, enabling uniform flow of different viscous media through the critical sensing area and helping to maintain consistent accuracy.

*Best Fit Straight Line

Benefits

- **Higher $\pm 0.1\%FSS$ BFSL Accuracy (Model 435):** Provides additional confidence in the actual measured pressure value, particularly for smaller changes in pressure, thus allowing the operator to make quicker adjustments to drilling operations for more precise control and increased efficiency during extraction
- **Wider Aperture Design (Model 437):** Wider than Models 434 and 435, helping to prevent media clogging when using more viscous media blends
- **Reliability / Durability:** All-welded, hermetically sealed, stainless steel construction with Inconel® X-750 or NACE-compliant Inconel® 718 wetted parts isolate corrosive or abrasive drilling media from sensitive internal electronics; materials retain strength in higher temperatures to provide rugged and reliable performance under demanding conditions; shock and vibration tested, intrinsically safe rating
- **Easy Installation / Serviceability:** Designed for quick field installation, including horizontal or vertical mounting; field-repairable connectors; zero and span adjustments can be accessed by removing the electrical connector, thus preventing ingress failures and deterring tampering; 1-wire or 2-wire shunt calibration allow the user to determine if the wing union/hammer union is still functional in the field, or if it has to be removed for service/calibration
- **Quick Shipment:** Many popular configurations are readily available through Honeywell's Quick Shipment program

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Selection Guide

Honeywell offers three versions from which to choose:

| | Model 434 | Model 435 | Model 437 |
|--|-----------|-----------|-----------|
|  | | | |
| Model 434 with cage not pictured. | | | |
| One-piece all-welded design featuring Inconel® X-750 or NACE-compliant Inconel® 718 wetted parts | ✓ | ✓ | ✓ |
| Compatible with Weco® 2002, 2202 fittings | ✓ | | |
| Compatible with Weco® 1502 fittings | | ✓ | ✓ |
| High accuracy: $\pm 0.1\% \text{FSS BFSL}$ | | ✓ | |
| Standard accuracy: $\pm 0.2\% \text{FSS BFSL}$ | ✓ | ✓ | ✓ |
| Protective cage option | ✓ | ✓ | ✓ |
| Free flow pressure port with wide aperture | | | ✓ |
| Optional 1-wire (with IS approval) or 2-wire (without IS approval) shunt calibration | ✓ | ✓ | ✓ |
| Multiple electrical connectors | ✓ | ✓ | ✓ |
| Overload burst pressure rating at 250 % rated pressure | ✓ | ✓ | ✓ |
| CE approval | ✓ | ✓ | ✓ |
| Intrinsically safe: cFMus/ATEX/IEC Ex certification | ✓ | ✓ | ✓ |
| RFI/EMI protected | ✓ | ✓ | ✓ |

For more information about Wing Union/Hammer Union pressure sensors, including nomenclature and dimensional drawings, see our Datasheet.

Find Out More

To learn more about Honeywell safety solutions, contact a Honeywell representative today at **1-800-537-6945**, e-mail info.tm@honeywell.com, or visit measurementsensors.honeywell.com

Warranty. 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 it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all 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 we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer 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, we assume no responsibility for its use.

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