

## Measurement While Drilling (MWD) for Oil Rigs

### An Application Note

#### Background

Well stimulation (fracturing and acidizing), mud pumping, and well development (casing and cementing) are vital oil and gas processes that utilize pressure sensors for measurement and monitoring functions. They need to be built tough to survive some of the world's most demanding environmental conditions for both on land and offshore drilling well platforms while providing accurate and reliable performance.

On well heads, a wing union pressure transducer's output is used along with feedback instrumentation that utilizes positive mud pulsing technology to provide inclination and azimuth measurements for bottom hole drilling assembly location in the vertical downhole drilling. This is often referred to as Measurement While Drilling (MWD). By sending a pulse into the hole with fluid, the sensor output helps determine response characteristics such as pressure based on the feedback from pulses such as depth, material composition (bedrock soil, sand, etc.), and thus optimize how the drill speed or drill bit should be modified based on the measurements and material.

If not monitored accurately, it could lead to a catastrophic failure, explosion, and/or broken equipment. This measurement is key to preventative maintenance and optimization.

#### Solution

Oil mud pumping applications 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 help 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).

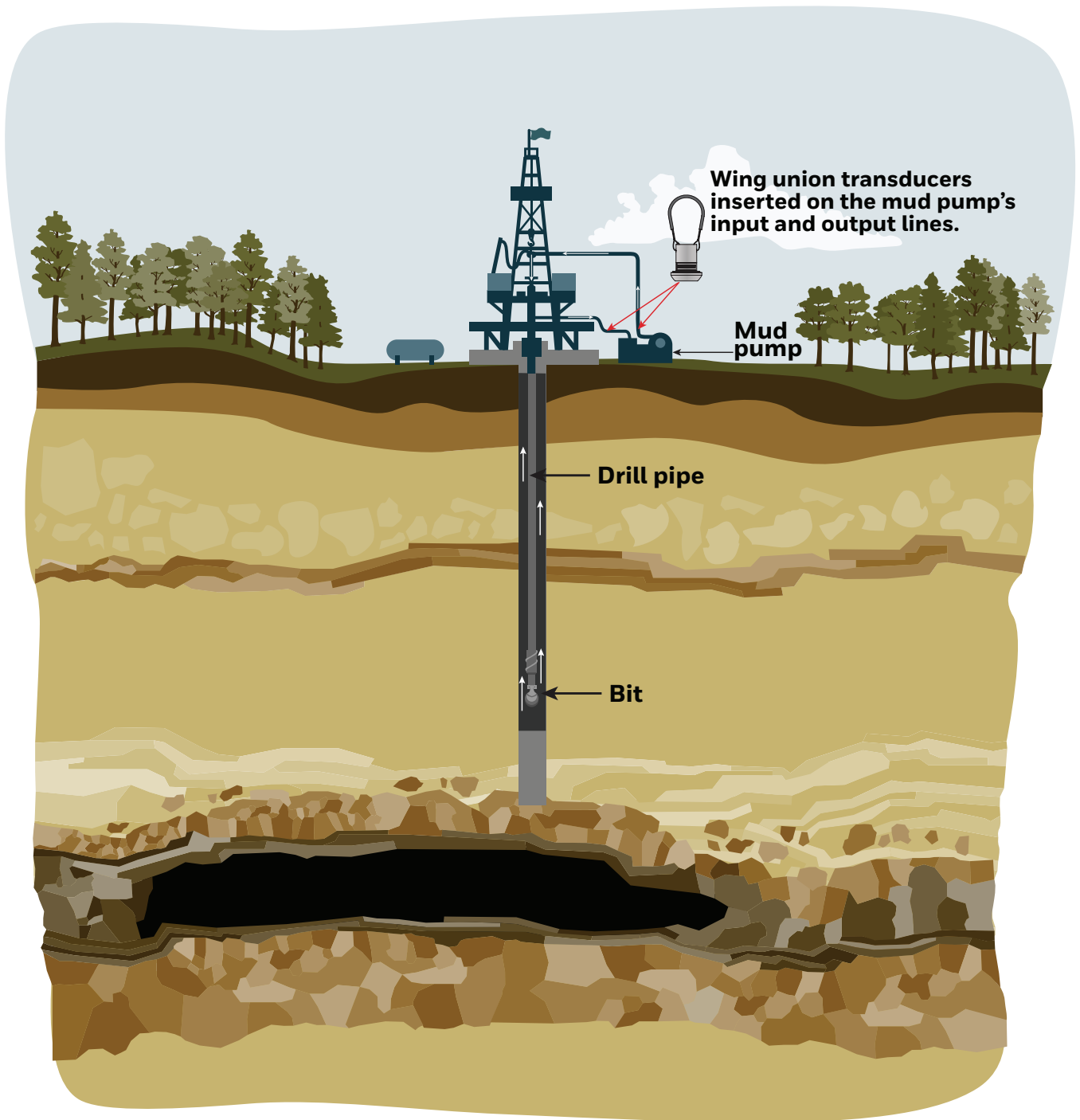
Honeywell's Wing Union/Hammer Union pressure sensors help detect pressure level changes in the media circulation system, which can indicate changing conditions being encountered downhole by the drill



bit, thus allowing the operator to quickly make adjustments to the drilling mixture pressure or drilling process as needed.

Models 434/435/437 Wing Union/Hammer Union Pressure Sensors are designed for demanding oil and gas applications such as well stimulation and circulation systems. They are constructed as an all-welded, stainless steel assembly with the sensor diaphragm and wing union fitting machined as one part, which provides hermetic integrity and minimizes media leakage versus multi-piece parts. The isolated pressure sensing diaphragm minimizes zero-shift during hammer up and eliminates long-term signal drift in the field, resulting in more accurate, longer-lasting performance. The Weco® 1502, 2002, and 2202 Wing Union-compatible fittings are machined of Inconel® X-750, or optional NACE-compliant Inconel® 718, allowing for use with abrasive and corrosive media. The Honeywell proprietary stainless steel electrical connection provides enhanced secondary pressure containment. Special assembly processes provide enhanced shock and vibration for reliable performance in the field.

Figure 1. Measurement While Drilling (MWD) • Placement of Wing Union Pressure Sensors



## Features and Benefits

- Reduced downtime
- Longer lasting and more reliable than many competitors' products
- Pressure range 0 to 5000 psi; 0 to 6000 psi; 0 to 10000 psi; 0 to 15000 psi; 0 to 20000 psi; 0 to 350 bar; 0 to 400 bar; 0 to 700 bar; 0 to 1000 bar; 0 to 1350 bar
- High accuracy  $\pm 0.1$  %FSS BFSL (Model 435); standard accuracy  $\pm 0.2$  %FSS BFSL (Models 434/435/437)
- Standard aperture (Models 434/435) and wide aperture (Model 437) pressure ports support media blends with high viscosities
- Inconel® X-750 or optional NACE-compliant Inconel® 718 wetted parts
- Multiple electrical connectors supported
- Pressure connections: WECO® 1502, 2002, 2202
- High accuracy 1-wire or 2-wire shunt calibration option allows ability to validate the offset signal in the field, ensuring the sensor is actively plugged into the system
- Protective cage option
- RFI/EMI protected
- Intrinsically safe: CFMUS/ATEX/IEC Ex certification
- CE approved

### For more information

To learn more about Honeywell's sensing and switching products, call 1.800.537.6945, visit [sensing.honeywell.com](http://sensing.honeywell.com), or e-mail inquiries to [info.sc@honeywell.com](mailto:info.sc@honeywell.com)

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## **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.**

### 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 acknowledgment 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 writing. However, Honeywell assumes no responsibility for its use.

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\* Weco is registered trademark of Fmc Corporation

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