



GFI™ Ground Fault Immune ESP Monitoring

Continuous surveillance despite ground fault conditions

GFI™ ESP Gauge: Ground Fault Immune Monitoring

Delivering reliable well data as long as the ESP cable is operational
ensuring maintained optimised production levels despite fault conditions

Operators have been using DC current based ESP well monitoring technology for over forty years and have consistently had a percentage of these sensors fail due to earth leakage in the ESP cable.

When a fault occurs on the ESP cable this cuts off the power supply to the gauge. So while the pump is still running, its performance is left as a guessing game.

The pioneering Ground Fault Immune™ (GFI) ESP gauge offers a robust monitoring solution which cannot be disturbed by cable ground faults for the first time.

The patented GFI ESP gauge remains fully operational with any single phase shorted to ground and any combination of three phases with partial faults to ground. Effectively the operator will continue to receive reliable downhole data as long as the ESP cable is operational.

Reliable data delivery

Around 15% of downhole ESP monitoring systems will fail due to ground fault, cutting off all data transmitted about the operation of the pump. While the ESP will still be running, the interference in data transmission means that pressure, fluid levels and temperature readings are unobtainable. Operators are faced with running motors at lower pumping rates to keep motor temperatures in safe operating areas, and also with a larger head of fluid to ensure the pump does not pump off.

Loss of data due to ground fault can result in up to 25% reduction in fluid output compared to a pump optimised with a live downhole gauge, resulting in a significant loss of production.

The GFI gauge spells the end of monitoring system failure when a ground fault occurs on the ESP cable, giving operators the ability to maintain continuous well surveillance essential for production optimisation and pump protection

Patented technology solving industry problems

As a world leader in artificial lift monitoring, Zenith® Oilfield Technology has the knowledge and experience to continually develop technologies that meet the challenges faced by the industry.

The industry-first GFI gauge runs a unique new power and communication system so that insulation breakdown caused by ground faults will not short the system.

Increased knowledge for better decision making

With the ability to measure the location and severity of the cable fault, the GFI gauge enables informed decisions to be made regarding problematic pumping systems. In addition, the technology ensures that reservoir build ups are caught when the pump shuts down, and at higher logging rates than previously possible.

Delivering significant savings

In one case, Zenith worked on a field where 40% of gauges in the ESP wells failed due to ground faults.

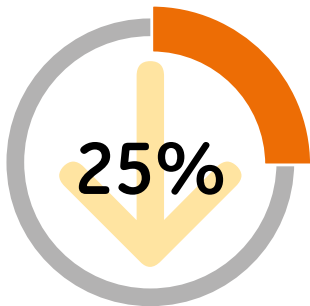
Until the introduction of the Zenith GFI gauge, the only solution was to remove perfectly functional gauges from the well, which could then be replaced alongside the pump when required.

When pumps can last a number of years, and 10-15% of ground fault failures occur in the first six months, this represents a significant loss in production over the remaining lifetime for ESPs.

GFI gauge parameter options

pump intake pressure	current leakage
pump discharge pressure	tool head voltage
intake temperature	3-phase voltage and imbalance
motor oil or motor winding temperatures	cable fault severity with phases affected
vibration (x and y axes)	cable fault location in feet from surface

What can happen without a GFI ESP Gauge



\$7,154,000 annual loss of revenue from a single well

Compared to production from an ESP optimised with an operational gauge, a 25% reduction in fluid output from a well producing 800 BOPD at \$98 per barrel would equate to \$7.154M per year lost revenue from a single well.



\$14,308,000 loss of revenue from a single well across the lifetime of the pump

A 20% loss from a monitoring system failure caused by a ground fault on the ESP cable six months after installation, with 30 months of operation before replacement of the ESP, multiplies a \$5.7M annual loss figure to over \$14.3M.



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AL14-0011-EN-REV00