

## Ground Fault Tolerant ESP Monitoring System



### Safeguard optimal ESP performance

The SPECTRUM ADVANCE Ground Fault Tolerant (GFT) ESP monitoring systems is a downhole gauge (Patent Pending) that continues to provide fast, reliable data on reservoir and pump performance when standard sensors fail due to cable ground faults.

While an ESP can continue to run with a ground fault in the electrical system, the power to the gauge is cut off and the pump is essentially running blind and unprotected. To limit motor temperature and avoid pumping off the well, operators are forced to run the ESP without any protection and to limit the speed of the pump which significantly reduces production.

### Maintain data continuity and accuracy

The SPECTRUM ADVANCE GFT gauge is able to operate with a severe short on one phase or a resistive short on 1, 2 or 3 phases—continuing to send critical data at industry-leading update times.

The gauge holds its calibration details within the downhole tool and does not require a matched surface panel removing the risk of data inaccuracy.

### Robust and easy to connect design

The SPECTRUM ADVANCE GFT sensor interface connects directly to the Modbus communication module in the SPECTRUM motor controller. Data is sent via RS232 or RS485 to the Remote Terminal Unit (RTU) enabling quick and simple connection to the SCADA system.

Installed at the base of the ESP, directly or via a motor adapter, all sensors are housed in a 13 chrome stainless steel body, tested to 329°F (165°C), rated to 302°F (150°C) and 5,800 PSI.

### APPLICATIONS

- High work over cost ESP installations
- Offshore/remote ESP installations
- ESP installations requiring reservoir information
- ESP installations requiring optimization/troubleshooting
- High temperature installations

### BENEFITS

- High speed data updates - 2.5 second times for all parameters
- Long term trending of equipment and reservoir performance
- Optimize ESP & reservoir recovery
- Prevent dead heading (against closed chokes/valves)
- Prevent ESP motor overheating
- Monitoring of electrical system insulation degradation

### FEATURES

- No return valve on discharge line to prevent recirculation
- Rigorously tested at 150°C, 5,800 PSI
- Alarms can be set for each measured parameter and are configurable based on application
- 13 chrome metallurgy
- Compatible with existing SCADA Modbus Maps
- Configurable data update rate
- Integrated with SPECTRUM VSD Skid
- 5KV high voltage interface
- Flexible surface package options
- 4GB data logger
- 2 serial ports for SCADA - MC connection
- Aflas elastomers as standard
- All sensor transducers held within protection of gauge body
- Calibration details held within downhole, not matched to surface panel
- Discharge pressure lines connects to SPECTRUM discharge pressure sub at head of pump

SERIES  
400

## APPLICATIONS

Measured parameter	Monitoring uses	ESP protection
Intake pressure	<ul style="list-style-type: none"> <li>Free Gas breakout Well Productivity</li> </ul>	<ul style="list-style-type: none"> <li>Closed loop response from VSD to maintain higher fluid level over pump</li> <li>Trip/alarm to protect against Pump Off condition</li> </ul>
Intake temperature	<ul style="list-style-type: none"> <li>Changing fluid properties</li> <li>Indication of stress on insulation</li> <li>Diagnose recirculation</li> </ul>	<ul style="list-style-type: none"> <li>Protect from increasing gauge temperatures</li> </ul>
Motor oil/winding temperature	<ul style="list-style-type: none"> <li>Calculate operating temperature rise</li> <li>Indication of fluid property changes</li> <li>Indication of system electrical imbalance</li> <li>Diagnose low flow, overloading, mechanical wear, high friction losses in ESP system</li> </ul>	<ul style="list-style-type: none"> <li>Protect from motor overheating</li> </ul>
Discharge pressure	<ul style="list-style-type: none"> <li>Evidence of pump operating point</li> <li>Protect from dead heading, incorrect rotation</li> </ul>	<ul style="list-style-type: none"> <li>Protect against pump operating out of range</li> <li>Protect from producing against closed valve</li> </ul>
Vibration (Vx, Vy, Vz)	<ul style="list-style-type: none"> <li>Indication of pump bend, mechanical wear, abrasives, gas slugging</li> <li>Evidence of resonant frequency, pump set in dog leg</li> </ul>	<ul style="list-style-type: none"> <li>Set frequency avoidance bands</li> </ul>
Current leakage	<ul style="list-style-type: none"> <li>Indication of insulation degradation across ESP system</li> </ul>	<ul style="list-style-type: none"> <li>Trend over time, increasing value indicative of impending ground fault</li> </ul>

## APPLICATION SPECIFICATIONS

Measurement	Range	Resolution	Accuracy	Rate
Intake pressure, psi (kPa)	0 - 5,800 (0 - 39,989)	0.1	0.1%	2.5 second
Discharge pressure, psi (kPa)	0 - 5,800 (0 - 39,989)	0.1	0.1%	2.5 second
Intake temperature, °F (°C)	32 - 302 (0 -150)	0.1 (0.1)	1%	2.5 second
Motor oil or winding temperature, °F (°C)	32 - 482 (0 -250)	0.1 (0.1)	1%	2.5 second
Vibration, (Vx, Vy, Vz) g	0 - 25	0.01	0.1%	2.5 second
Current leakage, mA	0 - 100	0.1	0.1%	2.5 second

## SPECTRUM EXCEED GFT DOWNHOLE SENSOR SPECIFICATIONS

Series	400
Length, in (cm)	37.8 (96.00)
OD, in (cm)	3.78 (9.60)
Weight lbs, (kg)	75.84 (34.4)
Max. environmental pressure, psi (kPa)	5,800 (39,000)
Tested insulation rating, V DC	Reverse polarity to 4,000V DC for 10 seconds
Seals	Metal to metal with back up
Rated temperature, °F (°C)	302 (150)
Material	13 chrome stainless steel
Bottom connection, in (cm)	2-3/8 (6.033) 8RND EUE box