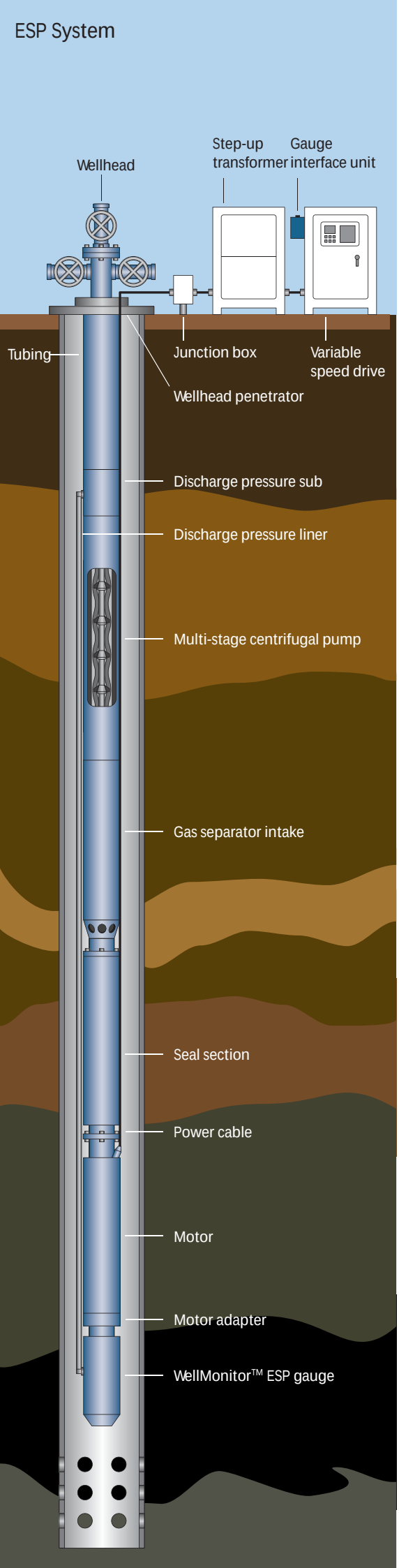

Oxford Monitoring SOLUTIONS

ESP MONITORING
WELLMONITOR™ ESP GAUGE SYSTEMS

Ver. 2.2017

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Oxford Monitoring SOLUTIONS

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WELLMONITOR™ ESP GAUGE SYSTEMS

WellMonitor™ ESP Gauge Systems.

WellMonitor™ ESP gauge systems enable ESP operators to protect their ESP system from well pump off, premature failure, optimise their well production and improve their gauge utilisation. Simplicity, reliability and sophistication are combined into one package providing the benchmark in ESP monitoring.

Simplicity.

The gauge systems are compatible with any brand, size and voltage of ESP motor, including permanent magnet motors.
Motor adapters and WYE points are available to connect to any size and type of motor base.
The gauge systems are available in 175C, 150 C, 125 C and 100 C temperature ratings, offering excellent value across their range of downhole applications.
The gauge interface card can be set up in seconds to match an existing SCADA Modbus map.

Reliability.

The gauge systems are designed and supported by experts with more than 100 years of ESP gauge design and power line telemetry experience.
Modern electronic components are carefully screened and incorporated into a gauge that is designed for long term reliability and reduced lifetime ownership costs.
The gauges provide critical diagnostic information, enabling real time condition monitoring of the tool.
Comprehensive technical support is available 24/7.

Sophistication.

The gauge systems provide the following parameters:
Standard parameters available on all gauge types include **Pi** (pump intake pressure), **Ti** (pump intake temperature), **Tm** (motor oil or motor winding temperature) **Vx** and **Vy** (dual axis vibration) and **Cl** (current leakage).
Optional parameters include **Vsp** (motor star point voltage) and **Pd** (pump discharge pressure).
The optional real time inclinometry module provides deviation data in real time, allowing accurate placement of the ESP installation in complex or uncertain geometry wells.

System overview.

The WellMonitor™ ESP system consists of three main items – the gauge, the surface interface package and the 3 phase surface choke assembly. The gauge is connected directly to the downhole ESP motor star point, the surface interface package is located either inside or on the outside of the switchboard or variable frequency drive enclosure and the 3 phase surface choke assembly is normally co-located with the ESP step-up transformer.
The gauge is powered by the surface interface package through the ESP power cable and it sends its data to the surface interface package via the ESP power cable. The surface interface package is isolated and protected from the high voltage ESP power cable by the 3 phase choke assembly, which is normally connected in to the high voltage secondary windings of the ESP step-up transformer via three high voltage fuses.

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The surface interface package is available in a number of different options that are designed to meet the operator's individual requirements. The base option is a Gauge Decode Board / Module (GIB/GIM) which is normally installed inside the switchboard or VSD enclosure. This acts as a gauge decode interface with a Modbus RS485 / RS232 output. The Gauge Decode Module (GDM) provides an isolated 4 to 20 mA analogue output, an isolated RS 485 Modbus output and one relay control. The Display Logger Module (DLM) provides an OLED data display and a 2 Gb removable Micro-SD card on which the data is recorded in csv format. The GDM and DLM can be packaged into an integrated outdoor enclosure and this assembly is referred to as the Integrated Surface Panel. The most advanced surface panel is the Operator Surface Panel (OSP) that utilizes a TFT screen for displaying and trending of multiple monitored parameters.

Model to Parameter Cross Reference

Gauge model	Parameters											
	Pi.	Ti.	Vx.	Vy.	Vz.	Cl.	Vsp.	Tm_1.	Tm_2.	Tm_3.	Pd.	Incl.
A-6	√	√	√	√		√		√				
A-7	√	√	√	√		√		√			√	
A-8	√	√	√	√		√	√	√			√	
B-6	√	√	√	√		√		√				
B-7	√	√	√	√		√		√			√	
B-8	√	√	√	√	√	√	√	√				
B-9	√	√	√	√	√	√	√	√			√	
B-10	√	√	√	√	√	√	√	√			√	√
B-11	√	√	√	√	√	√	√	√	√		√	√
B-12	√	√	√	√	√	√	√	√	√	√	√	√
C-9	√	√	√	√	√	√	√	√			√	
C-10	√	√	√	√	√	√	√	√	√		√	
C-11	√	√	√	√	√	√	√	√	√		√	√
C-12	√	√	√	√	√	√	√	√	√	√	√	√

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WellMonitor™ ESP A175 Gauge System.

The WellMonitor™ ESP A175 gauge system provides all of the parameters that are needed for real time protection and optimization of ESP installations in high temperature oil wells.

Standard parameters available are **Pi** (pump intake pressure), **Ti** (pump intake temperature), **Tm** (motor oil or motor winding temperature), **Vx** and **Vy** (dual axis vibration) and **Cl** (current leakage).

Optional parameters include **Vsp** (motor star point voltage) and **Pd** (pump discharge pressure).

The gauge system has features that allow ESP service companies to optimise the management of their gauge inventory, improve gauge troubleshooting and integrate the gauge into existing customer operations:

Electronics temperature, data transmission link quality, maximum star point voltage, maximum electronics temperature and the status of downhole thermal indicators are optionally available parameters that enhance operational troubleshooting and provide definitive proof of over-temperature events.

Gauge lifetime temperature history is an optional feature that tracks the temperature history of each WellMonitor™ ESP A175 gauge from the date that it was manufactured. WellMonitor™ ESP gauges are often re-installed after a failed ESP system is pulled. Our Isis software forecasts the run life of each gauge at a new wellbore temperature allowing operators to decide in which well they should re-install the gauge.

The gauge interface card can be set up in minutes to match an existing SCADA Modbus map, providing easy integration into an existing ESP operation

Gauge model	Parameters							
	Pi.	Ti.	Vx.	Vy.	Cl.	Tm.	Pd.	Vsp.
A175-6	√	√	√	√	√	√		
A175-7	√	√	√	√	√	√	√	
A175-8	√	√	√	√	√	√	√	√

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WellMonitor™ ESP A175 Gauge Systems.

Diameter	3.7" (9.4 cms)
Length	40.0" (101.6 cms)
Weight	73.1 lbs (33.25 kgs)
Material	13 Cr Stainless Steel
Bottom connection	2 3/8"EUE 8 RND box
Top connection	4.5" or 3.75" 6 hole flange
Maximum hanging weight	25,000 lbs (11,340 kgs)
Maximum continuous operating temperature	175 C (350 F)
Calibrated range	5800 psi and 175 C (350 F)
Maximum AC operating voltage	3000 V phase to ground, 5190 V phase to phase
Insulation test rating	Reverse polarity to 5000 V DC for 10 seconds

Parameters	Rating	Accuracy	Resolution	Data rate
Intake temperature	0-175 C	+/- 1 C	0.01%	6 s variable
Motor temperature	0-300 C	+/- 1 C	0.01%	6 s variable
Intake/discharge pressure	0-5800 psi	+/- 0.1% FS	0.1 psi	6 s / 20 s
Vibration	+/-16 g	+/- 1% FS	0.001 g	20 s
Current leakage	0-25 mA	+/- 0.2% FS	0.01 mA	1 s
Star point voltage	0-1000 V	+/- 2% FS	1 V	60 s

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WellMonitor™ ESP B150 Gauge System.

The WellMonitor™ ESP B150 gauge system provides all of the parameters that are needed for real time protection and optimization of ESP installations in high temperature oil wells.

Standard parameters are **Pi** (pump intake pressure), **Ti** (pump intake temperature), **Tm** (motor oil or motor winding temperature), **Vx** and **Vy** (dual axis vibration) and **Cl** (current leakage).

Pd (pump discharge pressure) is the optional parameter.

Gauge model	Parameters						
	Pi.	Ti.	Vx.	Vy.	Cl.	Tm.	Pd.
B150-6	√	√	√	√	√	√	
B150-7	√	√	√	√	√	√	√

Gauge Specifications	
Diameter	3.7" (9.4 cms)
Length	40.0" (101.6 cms)
Weight	73.1 lbs (33.25 kgs)
Material	13 Cr stainless steel
Bottom connection	2 3/8" EUE 8 RND box
Top connection	4.5" or 3.75" 6 hole flange
Maximum hanging weight	25,000 lbs (11,340 kgs)
Calibrated range	5800 psi and 150 C (302 F)
Maximum AC operating voltage	3000 V phase to ground, 5190 V phase to phase
Insulation test rating	Reverse polarity to 5000 V DC for 10 seconds

Parameters	Rating	Accuracy	Resolution	Data rate
Intake temperature	0-150 C	+/- 1 C	0.01 C	6 s variable
Motor temperature	0-300 C	+/- 1 C	0.01 C	6 s variable
Intake/discharge pressure	0-5800 psi	+/- 0.1% FS	0.1 psi	6 s / 20 s
Vibration	+/-16 g	+/- 1% FS	0.001 g	20 s
Current leakage	0-25 mA	+/- 0.2% FS	0.01 mA	1 s

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WellMonitor™ ESP B150 10K Gauge System.

The WellMonitor™ ESP B150 10K gauge system provides all of the parameters that are needed for real time protection and optimization of ESP installations in high temperature and high pressure oil wells.

Standard parameters are **Pi** (pump intake pressure), **Ti** (pump intake temperature), **Tm** (motor oil or motor winding temperature), **Pd** (pump discharge pressure @ 10K psi), **Vx** and **Vy** (dual axis vibration) and **Cl** (current leakage).

Gauge model	Parameters						
	Pi.	Ti.	Vx.	Vy.	Cl.	Tm.	Pd.
B-7 DX	√	√	√	√	√	√	√

Gauge Specifications	
Diameter	3.7" (9.4 cms)
Length	40.0" (101.6 cms)
Weight	73.1 lbs (33.25 kgs)
Material	13 Cr stainless steel
Bottom connection	2 3/8" EUE 8 RND box
Top connection	4.5" or 3.75" 6 hole flange
Maximum hanging weight	25,000 lbs (11,340 kgs)
Calibrated range	5800 / 10000 psi and 150 C (302 F)
Maximum AC operating voltage	3000 V phase to ground, 5190 V phase to phase
Insulation test rating	Reverse polarity to 5000 V DC for 10 seconds

Parameters	Rating	Accuracy	Resolution	Data rate
Intake temperature	0-150 C	+/- 1 C	0.01 C	6 s variable
Motor temperature	0-300 C	+/- 1 C	0.01 C	6 s variable
Intake pressure	0-5800 psi	+/- 0.1% FS	0.1 psi	6 s / 20 s
Discharge pressure	0-10,000 psi	+/- 0.1% FS	0.1 psi	20 s
Vibration	+/-16 g	+/- 1% FS	0.001 g	20 s
Current leakage	0-25 mA	+/- 0.2% FS	0.01 mA	1 s

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WellMonitor™ ESP B150+ Gauge System.

The WellMonitor™ ESP B150+ gauge system provides all of the parameters that are needed for real time protection and optimization of ESP installations in moderate to high temperature oil wells.
Standard parameters are **Pi** (pump intake pressure), **Ti /Td** (pump intake & discharge temperatures), **Tm** (motor oil or motor winding temperature),**Vx**, **Vy** & **Vz** (Tri axis vibration), **Vsp** (star point voltage) and **Cl** (current leakage). Gauge life profiling is an added feature that is available on this gauge system.
Tm2/3 (multiple motor winding temperatures), **Pd** (pump discharge pressure) and Inclination measurement are the optional parameters

Gauge model	Parameters											
	Pi.	Ti.	Vx.	Vy.	Vz.	Cl.	Vsp.	Tm_1.	Tm_2.	Tm_3.	Pd.	Incl.
B-8	√	√	√	√	√	√	√	√				
B-9	√	√	√	√	√	√	√	√			√	
B-10	√	√	√	√	√	√	√	√			√	√
B-11	√	√	√	√	√	√	√	√	√		√	√
B-12	√	√	√	√	√	√	√	√	√	√	√	√

Parameters	Rating	Accuracy	Resolution	Data rate
Intake temperature	0-150 C	+/- 1 C	0.01 C	6 s variable
Motor temperature	0-300 C	+/- 1 C	0.01 C	6 s variable
Intake/discharge pressure	0-5800 psi	+/- 0.1% FS	0.1 psi	6 s / 20 s
Vibration	+/-16 g	+/- 1% FS	0.001 g	20 s
Current leakage	0-25 mA	+/- 0.2% FS	0.01 mA	1 s
Star point voltage	0-1000 V	+/- 2% FS	1 V	60 s

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WellMonitor™ ESP B125 Gauge System.

The WellMonitor™ ESP B125 gauge system provides all of the parameters that are needed for real time protection and optimization of ESP installations in moderate temperature oil wells.

Standard parameters are **Pi** (pump intake pressure), **Ti** (pump intake temperature), **Vx** and **Vy** (dual axis vibration) and **Cl** (current leakage).

Tm (motor oil or motor winding temperature) and **Pd** (Pump discharge pressure) are the optional parameters.

Gauge model	Parameters						
	Pi.	Ti.	Vx.	Vy.	Cl.	Tm.	Pd.
B125-6	√	√	√	√	√	√	
B125-7	√	√	√	√	√	√	√

Gauge Specifications	
Diameter	3.7" (9.4 cms)
Length	40.0" (101.6 cms)
Weight	73.1 lbs (33.25 kgs)
Material	13 Cr stainless steel
Bottom connection	2 3/8" EUE 8 RND box
Top connection	4.5" or 3.75" 6 hole flange
Maximum hanging weight	25,000 lbs (11,340 kgs)
Calibrated range	5800 psi and 125 C (257 F)
Maximum AC operating voltage	3000 V phase to ground, 5190 V phase to phase
Insulation test rating	Reverse polarity to 5000 V DC for 10 seconds

Parameters	Rating	Accuracy	Resolution	Data rate
Intake temperature	0-125 C	+/- 1 C	0.1 C	6 s variable
Motor temperature	0-300 C	+/- 1 C	0.1 C	6 s variable
Intake/discharge pressure	0-5800 psi	+/- 0.1% FS	0.1 psi	6 s / 20 s
Vibration	+/-16 g	+/- 1% FS	0.001 g	20 s
Current leakage	0-25 mA	+/- 0.2% FS	0.01 mA	1 s

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WellMonitor™ ESP B100 Gauge System.

The WellMonitor™ ESP B100 gauge system provides all of the parameters that are needed for real time protection and optimization of ESP installations in low temperature oil wells and Coal Bed Methane (CBM/CSG) dewatering applications

Standard parameters are **Pi** (pump intake pressure), **Ti** (pump intake temperature), **Vx** and **Vy** (dual axis vibration) and **Cl** (current leakage).

Tm (motor oil or motor winding temperature) is an optional parameter.

Gauge model	Parameters					
	Pi.	Ti.	Vx.	Vy.	Cl.	Tm.
B100-5	√	√	√	√	√	
B100-6	√	√	√	√	√	√

Specifications	
Diameter	3.7" (9.4 cms)
Length	40.0" (101.6 cms)
Weight	73.1 lbs (33.25 kgs)
Material	Carbon steel or 13 Cr stainless steel
Bottom connection	2 3/8" EUE 8 RND box
Top connection	4.5" or 3.75" 6 hole flange
Maximum hanging weight	25,000 lbs (11,340 kgs)
Maximum continuous operating temperature	100 C (212 F)
Calibrated range	5,800 psi and 100 C (212 F)
Maximum AC operating voltage	3000 V phase to ground, 5190 V phase to phase
Insulation test rating	Reverse polarity to 5000 V DC for 10 seconds

Parameters	Rating	Accuracy	Resolution	Data rate
Intake temperature	0-100 C	+/- 1 C	0.1 C	6 s variable
Motor temperature	0-300 C	+/- 1 C	0.1 C	6 s variable
Intake pressure	0-5800 psi	+/- 0.1% FS	0.1 psi	6 s / 20 s
Vibration	+/-16 g	+/- 1% FS	0.001 g	20 s
Current leakage	0-25 mA	+/- 0.2% FS	0.01 mA	1 s

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WellMonitor™ ESP C150 Gauge System.

The WellMonitor™ ESP C150 gauge system provides all of the parameters that are needed for real time protection and optimization of ESP installations in high temperature oil wells. It additionally provides high speed downhole pressure and temperature data when the ESP motor is shut down. This feature allows ESP operators to acquire reservoir pressure and temperature build up data for well test interpretation purposes.

Standard parameters are **Pi** (pump intake pressure), **Ti** (pump intake temperature), **Tm** (motor oil or motor winding temperature), **Vx**, **Vy and Vz** (tri axis vibration),
Cl (current leakage), **Tm** (multiple motor winding temperatures), **Pd** (discharge pressure) and **Vsp** (motor star point voltage).
Tm2/3 (multiple motor winding temperatures) and **Inclination measurement** are optional parameters.

Gauge model	Parameters											
	Pi.	Ti.	Vx.	Vy.	Vz.	Cl.	Vsp.	Tm_1.	Tm_2.	Tm_3.	Pd.	Incl.
C-09	√	√	√	√	√	√	√	√			√	
C-10	√	√	√	√	√	√	√	√	√		√	
C-11	√	√	√	√	√	√	√	√	√		√	√
C-12	√	√	√	√	√	√	√	√	√	√	√	√

Gauge Specifications	
Diameter	3.7" (9.4 cms)
Length	40.0" (101.6 cms)
Weight	73.1 lbs (33.25 kgs)
Material	13 Cr stainless steel
Bottom connection	2 3/8" EUE 8 RND box
Top connection	4.5" or 3.75" 6 hole flange
Maximum hanging weight	25,000 lbs (11,340 kgs)
Maximum continuous operating temperature	150 C (302 F)
Calibrated range	5,800 psi and 150 C (302 F)
Maximum AC operating voltage	3000 V phase to ground, 5190 V phase to phase
Insulation test rating	Reverse polarity to 5000 V DC for 10 seconds

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WellMonitor™ ESP C150 Gauge Systems.

Parameters	Rating	Accuracy	Resolution	Data rate
Intake temperature	0-150 C	+/- 1 C	0.01 C	6 s variable
Motor temperature	0-300 C	+/- 1 C	0.01 C	6 s variable
Intake/discharge pressure	0-5800 psi	+/- 0.1% FS	0.1 psi	6 s / 20 s
Vibration	+/-16 g	+/- 1% FS	0.01 g	20 s
Current leakage	0-25 mA	+/- 0.2% FS	0.01 mA	1 s
Star point voltage	0-1000 V	+/- 2% FS	10 V	60 s

Parameters On ESP Shutdown	Rating	Accuracy	Resolution	Data rate
Intake temperature	0-150 C	+/- 1 C	0.01 C	1 Second
Intake pressure	0-5800 psi	+/- 0.1% FS	0.1 psi	1 Second

The WellMonitor™ **ESP Type C** gauge system continues to monitor the **Pi** (pump intake pressure) and **Ti** (pump intake temperature) after the shut down of the ESP motor and the data rate from the gauge for these two parameters changes to once every second. The Display Logger Module displays the data and records the data on the MicroSD card. An isolated and un-interrupted power source is required for the gauge system to continue operation after the shutdown of the ESP system.

The gauge system has features that allow ESP service companies to optimise the management of their gauge inventory, improve gauge troubleshooting and integrate the gauge into existing customer operations:

Electronics temperature, data transmission link quality, maximum star point voltage, maximum electronics temperatureand the status of downhole thermal indicators are optionally available parameters that enhance operational troubleshooting and provide definitive proof of over-temperature events.

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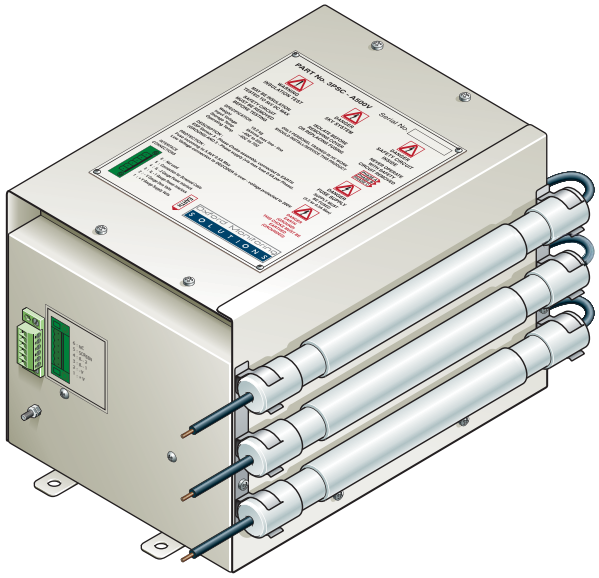

WellMonitor™ 3 Phase Surface Choke.

The WellMonitor ESP™ 3 Phase Surface Choke incorporates a precision balanced "C" core choke assembly and 3 high voltage isolation fuses. It is used to isolate the gauge surface interface package from the high voltage ESP power cable. It is usually installed inside the step-up transformer terminal cabinet and is connected to the high voltage terminals of the transformer via the high voltage fuses, using a high voltage cable.

A shielded multi core cable is connected from the choke signal terminals into the Gauge Decode Module. The cable carries the gauge signal and also a safety link circuit that powers down the output from the Gauge Decode Module when the plug of the shielded multi core cable is removed from the choke terminal. This is an important safety feature because many ESP technicians are unaware that the output power from the Gauge Decode Module may be fatal.

The enclosure of the 3 Phase Surface Choke is not suitable for location in an outdoor environment; an optional outdoor enclosure is available on request.

The 3 Phase Surface Choke has been developed to provide the highest degree of performance of any ESP surface choke that is currently available. Its 3 phase precision balanced resistance and inductance values contribute significantly to the robust telemetry performance of the WellMonitor™ ESP gauge systems.

The WellMonitor™ 3 Phase Surface Choke is available in three voltage ratings. The standard rating available for oil well applications is the 5000 V rated choke. However, a 3000 V rated choke is also available for lower voltage ESP installations.

Specifications	
Enclosure	Powder coated, IP 30 rated metal enclosure
Installation	Horizontal or vertical using 4 mounting lugs
Voltage rating	5000 V, 3000 V or 2000 V phase to phase
Connections	3 x Crimp connections for HV wire; 6 way terminal for GDM
Operating temperature	-30 to +80 C
Dimensions and weight	27 x 23 x 22 cms; 19.5 Kg.

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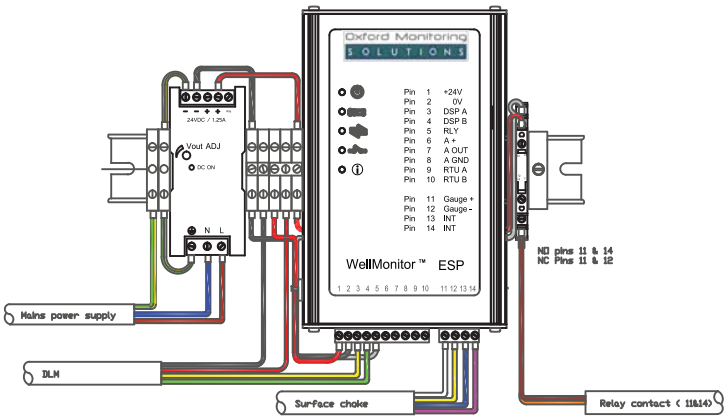

WellMonitor™ Gauge Decode Module (GDM).

The WellMonitor™ ESP gauge surface interface equipment is compact, modular and easy to configure for varying customer requirements.

The simplest surface equipment configuration requires one compact IP 30 DIN rail mounted Gauge Decode Module (GDM) to be installed inside the customer's variable frequency drive or switchboard enclosure. This module sends power to the gauge and also decodes the signal coming from the gauge. It makes all of the gauge data available to a variable frequency drive controller, motor controller or remote terminal unit (RTU) via an isolated RS 485 Modbus RTU slave port. In addition it incorporates one 16 bit isolated analogue output port, one RS 485 Modbus RTU engineer's port, and one relay driver port for alarm and trip signals. The relay port can be programmed to be activated on 4 different monitoring parameters simultaneously.

In the event that more functionality is required, there are a range of compatible expansion modules available:

The SIC 3 DIN rail mounted data logger and relay controller provides 2 Gb Micro SD data logging and adds two more relay ports.

The IOX DIN rail mounted analogue output and relay controller provides one extra 16 bit isolated analogue out and two more relay control ports.

The SDAC multi-port I/O data controller provides multiple analogue and digital I/O and multiple comms ports, including RS 485 and RS 232 Modbus RTU ports.

The DLM Display Logger Module provides an OLED display and 2 Gb Micro SD data logging in an outdoor IP 66/ NEMA 4 enclosure.

Specifications	
Enclosure	IP 30 metal enclosure
Power supply	24 VDC (+/- 10%)
Power consumption	140 mA typical, 700 mA on relay activation
Connections	2 - part push fit connectors
Connection Orientation	Bottom entry
Communications	Isolated RS 485 Modbus RTU, isolated 4-20 mA
Relay drivers	One
Operating temperature	-30 to +80 C
Dimensions and weight	15.5 x 16.5 x 6.0 cms; 0.8 Kg.

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WellMonitor™ Display and Logger Module. (DLM).

The WellMonitor™ ESP gauge surface equipment is compact, modular and easy to configure for varying customer requirements.

The Display and Data Logging Module (DLM) combines a high resolution OLED display with a removable 2 Gb Micro SD card logger in an external IP 66 rated enclosure. The module is normally positioned on the outside of the customer's variable frequency drive or switchboard enclosure and is connected to the Gauge Decode Module which is installed inside the enclosure.

The OLED display provides better visibility in bright sunlight than a LCD display. It can be programmed to power down at a timed interval in order to extend the life of the display in harsh environments, reduce the display's energy consumption or hide the displayed data from public view. The display is reactivated using a magnet.

The Micro SD card records any of the gauge parameters that are set up to be displayed. It can store over one year of high frequency gauge data which can be read from the memory card by Microsoft Excel or other compatible spreadsheet software. The MicroSD card is located in an external IP66 enclosure. This allows access to the data card without having to open the DLM enclosure door.

The DLM has a programmable RS 485 Modbus RTU master port, one engineer's port and an optional Bluetooth wireless data connection. As an option, the DLM may be programmed to poll any Modbus RTU slave device, display the data on the OLED display and log the data on the MicroSD card.

The unit is programmed via PC software and all settings are stored in a PC setup file which allows the operator to clone the settings in order to set up multiple DLM modules. As an option, the Modbus RTU master port can communicate with 2 different slave addresses such as the Gauge Decode Module (GDM) and a variable frequency drive port. Both devices can therefore be monitored and their data displayed on the OLED display and also logged into one handy file on the Micro SD card. All data captured by the display logger is also made available on its slave port for SCADA or local use.

Specifications	
Enclosure	IP66 / NEMA 4 Polycarbonate enclosure
Power supply	24 VDC (+/- 10%),
Power consumption	60 mA typical
Connections	Screw terminals for cable connections
Communications	Programmable Modbus RTU master and slave
Display type	OLED
Data storage	2 GB, FAT 16 disk format, CSV file
Operating temperature	-30 to +80 C
Dimensions and weight	13.5 x 12.0 x 6.0 cms; 0.5 Kg.

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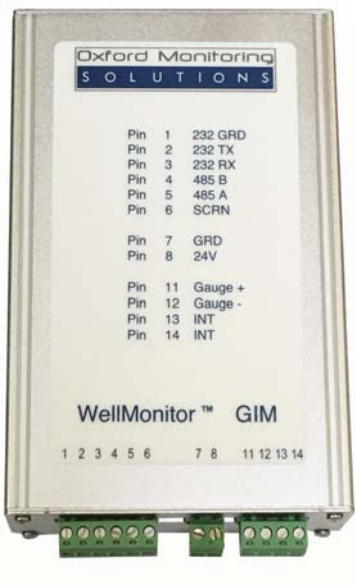

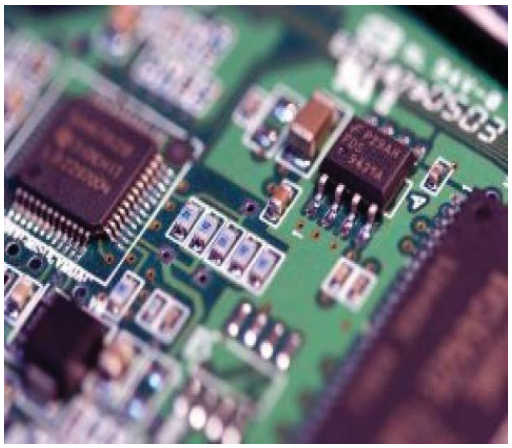

WellMonitor™ Gauge Interface Board (GIB) / Gauge Interface Module (GIM).

The WellMonitor™ ESP Gauge Interface Board (GIB) and WellMonitor™ ESP Gauge Interface Module (GIM) are compact, modular and easy to configure surface decoder options that facilitate the exchange of gauge parameters and data over an industry standard Modbus (RS232 / RS485) port for varying customer requirements.

The simplest surface equipment configuration requires one compact Gauge Interface Board (GIB) to be installed within the customer's surface equipment, or an IP 30 DIN rail mounted Gauge Interface Module (GIM) to be installed inside the customer's variable frequency drive or switchboard enclosure. The main function of this module is to provide power to the gauge and decode the signals coming from the gauge.

The GIB and GIM serve as the simplest options to provide gauge parameter and data from the WellMonitor™ ESP Gauge to customer's existing display unit, SCADA, variable frequency drive controller, motor controller or remote terminal unit (RTU) via an isolated RS485 or RS232 Modbus RTU slave port.

Specifications	
Enclosure, If required	IP 30 metal enclosure
Power supply	24 VDC (+/- 10%)
Power consumption	140 mA typical, 700 mA on relay activation
Connections	2 - part push fit connectors
Connection Orientation	Bottom entry
Communications	Isolated RS 485 & RS 232 Modbus RTU
Operating temperature	-30 to +80 C
Dimensions and weight with enclosure	10.5 x 16.5 x 6.0 cms; 0.6 Kg.

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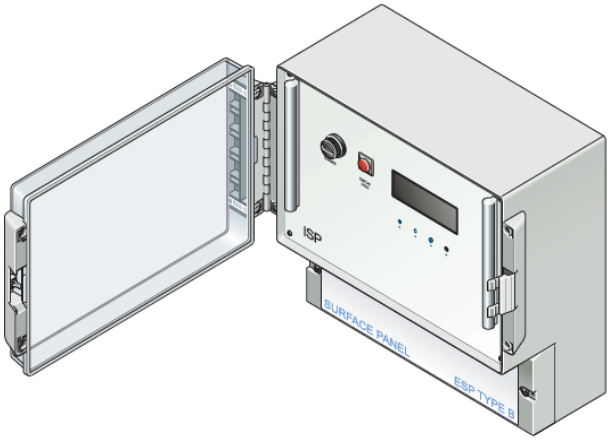

WellMonitor™ Integrated Surface Panel (ISP).

The WellMonitor™ Integrated Surface Panel (ISP) is a modular package that combines the Gauge Decode Module (GDM) and OLED screen display with all the interconnections between the components to make field connections simple and straight forward. The changing of settings and configurations is done using a computer with the OXMOS Configuration Manager software.

The Gauge Decode Card sends power to the gauge and also decodes the signal coming from the gauge. It makes all of the gauge data available to a variable frequency drive controller, motor controller or remote terminal unit (RTU) via an isolated RS 485 Modbus RTU slave port. In addition it incorporates one 16 bit isolated analogue output port, one RS 485 Modbus RTU engineer's port, and one relay driver port for alarm and trip signals. The relay port can be programmed to be activated on 4 different monitoring parameters simultaneously.

The high resolution OLED display provides better visibility in bright sunlight than a LCD display. The removable 2 Gb Micro-SD card is located on the front panel of the ISP in an IP66 enclosure. It can store over one year of high frequency gauge data in .csv format which can be read from the memory card by Microsoft Excel or other compatible spreadsheet software.

Specifications	
Enclosure	Poly Carbonate, UV resistant, IP65
Power supply	110 to 230 V AC, <20 Watts ; 20 to 26V DC
Connections	Connector rail, color coded
Connection Orientation	Bottom entry
Communications	Isolated RS 485 Modbus RTU, isolated 4-20 mA
Relay drivers	One, configured to four parameters
Operating temperature	-30 to +70 C
Dimensions and weight with enclosure	30 x 28 x 18 cms; 3.0Kg.
Data storage	2 GB, FAT 16 disk format, CSV file
Display type	OLED

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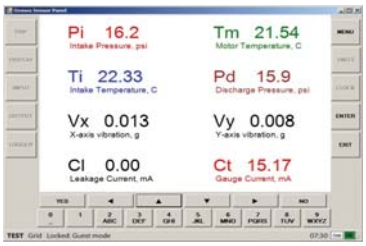

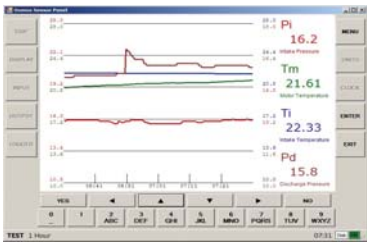

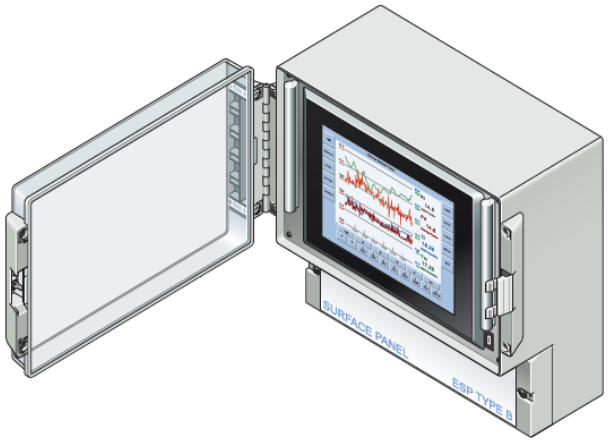

WellMonitor™ Operator Surface Panel (OSP).

The WellMonitor™ Operator Surface Panel (OSP) is a modular package that combines the Gauge Decode Module (GDM) and a high resolution large screen display that can be setup easily at the well site using the embedded keypad for changing settings and configurations.

The OSP consists of the Gauge Decode Card, an onboard computer, power supply module and a high resolution TFT display. The Gauge Decode Card sends power to the gauge and also decodes the signal coming from the gauge. It makes all of the gauge data available to a variable frequency drive controller, motor controller or remote terminal unit (RTU) via an isolated RS 485 Modbus RTU slave port. In addition it incorporates one 16 bit isolated analogue output port, one RS 485 Modbus RTU engineer's port, and one relay driver port for alarm and trip signals. The relay port can be programmed to be activated on 4 different monitoring parameters simultaneously.

The OSP has an onboard SSD memory module that can store a large amount of data including more than two years of monitored downhole and surface data. Data retrieval from the panel is through a USB drive that can be connected to the external USB port and the data for any required time period can then be transferred into the USB drive.

The display is a color TFT screen with an embedded keypad in a 4:3 screen format. The large display provides simultaneous viewing capability of all monitored parameters on one screen for easy monitoring and recording of data. The display also facilitates the trending of the historical monitored data for quick and easy analysis of the performance of the well.

Specifications	
Enclosure	Poly Carbonate, UV resistant, IP65
Power supply	110 to 230 V AC, <30 Watts ; 20 to 26VDC
Connections	Connector rail, color coded
Connection Orientation	Bottom entry
Communications	Isolated RS 485 Modbus RTU, isolated 4-20 mA
Relay drivers	One, configured to four parameters
Operating temperature	-30 to +60 C
Dimensions and weight with enclosure	30 x 28 x 18 cms; 4.0 Kg.
Data storage	Onboard SSD, Retrivable through USB port
Display type	20 Cms, Colour TFT touch

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WellMonitor™ Installation and Commissioning Panel (ICP).

The WellMonitor™ Installation and Commissioning Panel (ICP) is a modular self-powered package that combines the gauge interface card and a high resolution, OLED display that is used at the well site to monitor and record real time installation data. The ICP is also a very important tool used during the troubleshooting of installed gauge systems.

The ICP consists of the gauge interface card, a high resolution display, data logger and a long lasting, quick charge Lithium Nano Phosphate battery pack. There is an option to access the data from the ICP through a Bluetooth connection. The gauge data is stored in a Micro SD card and the file format used is CSV that can be easily accessed using a spreadsheet software like Microsoft Excel. The ICP is supplied with the necessary cables for connecting to the gauge and a power supply for recharging the batteries.

Specifications	
Enclosure	Poly Carbonate Pelican Case, UV resistant, IP65
Power supply	110 to 230 V AC, for recharging
Connections	Plug & Play socket connections
Connection Orientation	Top & Back
Charge cycles	>1400
Operating temperature	-30 to +70 C
Dimensions and weight with enclosure	22 x 12 x 19 cms; 2.5 Kg.

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