



measurement
SPECIALTIES™

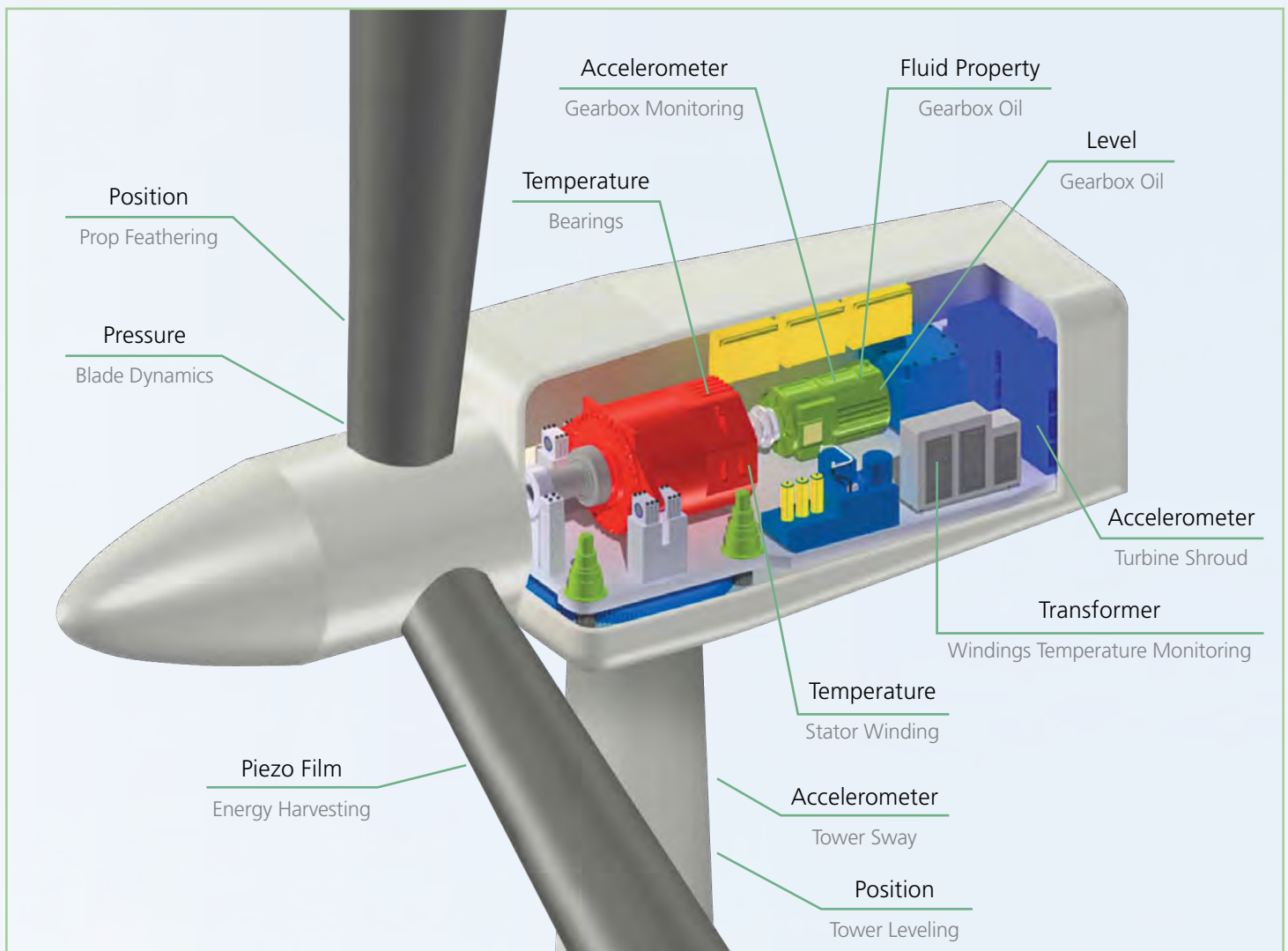
Sensors for Wind Turbines

sensing your world™

Superior Performance & Reliability....

As a global designer and manufacturer of sensors and sensor-based systems Measurement Specialties provides support to wind engineers in both the development and operation of wind turbines. Our operations in the US, Europe and China provide resources close to our customers. This global footprint allows us to offer the lowest cost of ownership to OEMs.

We offer a broad range of sensing technologies to manufacturers, system integrators, wind farm operators, R&D labs and universities. Among others, they include vibration sensors for gear box monitoring, oil level sensors, tilt sensors for tower installation and accelerometers for tower sway and blade monitoring. There is significant interest in our piezo film sensors for energy harvesting, miniature pressure sensors for blade monitoring and our LVDTs for facilitating emergency prop feathering and shutdown. Our temperature sensors are found in hundreds of wind turbines throughout the world. All sensors are shipped with industry-standard warranties and extended warranties when required.



Position Sensors



DPL/DPN-Series

Package	PCB board
Type	Inclination board module
Range	$\pm 2^\circ$ to $\pm 30^\circ$
Output	Voltage / RS 232 / SPI
Unique Features	<ul style="list-style-type: none"> - High resolution - Minimal temperature drift - User configurable
Accuracy	$\pm 0.05^\circ$ to $\pm 0.8^\circ$
Operating Temp	-40°C to 85°C
Dimensions (mm)	45 x 45 x 14
Typical Apps	Tower leveling



D-Series

Package	AL housing IP 67
Type	Inclinometer
Range	$\pm 5^\circ$ to $\pm 30^\circ$
Output	RS232 / Voltage / Current / Switch / PWM / CAN open
Unique Features	<ul style="list-style-type: none"> - High accuracy - Rugged housing - Programmable - CE approved
Accuracy	$\pm 0.04^\circ$ to $\pm 0.8^\circ$
Operating Temp	-40°C to 85°C
Dimensions (mm)	84 x 70 x 46
Typical Apps	Tower leveling



DC-SE

Package	AISI-400 series stainless steel
Type	LVDT
Range	0 - 0.1 to 0 - 6 inches
Output	0 - 5 VDC (4 wire) 1 - 6 VDC (3 wire)
Unique Features	<ul style="list-style-type: none"> - CE mark - Low current consumption (6 mA typical) - Synchronous demodulation - Shielded cable
Accuracy	$\pm 0.25\%$ of range
Operating Temp	-25°C to 85°C
Dimensions (mm)	19
Typical Apps	Monitor vibration to facilitate emergency prop feathering and shutdown

Piezo Film Sensors



DT1 & SDT1

Package	Unshielded element with twisted pair or shielded element with shielded cable
Type	Flexible film, adhesive mount
Range	15 mV/ μ up to 1% strain
Unique Features	<ul style="list-style-type: none"> - Thin, flexible, robust - Withstands up to 1% strain - Ultra-low power (self generating)
Accuracy	$\pm 20\%$ (typical)
Operating Temp	-40°C to 70°C (up to 125°C available)
Dimensions (mm)	Application dependent
Typical Apps	Energy harvesting to power sensors



ACH01

Package	Ceramic base, plastic cover, shielded cable
Type	Adhesive mount
Range	± 250 g (typical)
Unique Features	<ul style="list-style-type: none"> - Extremely high bandwidth - Low cost - Ultra-low power
Accuracy	$\pm 20\%$ (typical)
Operating Temp	-40°C to 85°C
Dimensions (mm)	18.80 x 13.21 x 6.10
Typical Apps	Gearbox condition monitoring

Vibration Sensors



201

Ingress Protection	IP65
Static/Dynamic Response	Static and Dynamic
Full Scale Range	± 2 g, 5g, 10g, 20g, 30g, 50g, 100g
Full Scale Output	± 2 V
Unique Features	<ul style="list-style-type: none"> - High resolution - Low current consumption - 2-pole filter - Ruggedized cable
Power Excitation	5 - 30 Vdc
Operating Temp.	-40°C to 125°C
Dimensions (mm)	25.4 x 21.59 x 9.65
Typical Apps	Tower sway



4332

Ingress Protection	IP68
Static/Dynamic Response	Static and Dynamic
Full Scale Range	± 2 g, 5g
Full Scale Output	± 2 V
Unique Features	<ul style="list-style-type: none"> - Triaxial (3-axis) - Low noise - Temperature compensated - Ruggedized cable
Power Excitation	5 - 30 Vdc
Operating Temp.	-40°C to 125°C
Dimensions (mm)	34.5 x 34.5 x 31.2
Typical Apps	Seismic motion



8011/8021-01

Ingress Protection	Hermetically Sealed
Static/Dynamic Response	Dynamic
Full Scale Range	± 10 g, 80g, 500g
Full Scale Output	± 5 V, 8V, 5V
Unique Features	<ul style="list-style-type: none"> - Voltage output - Stainless steel housing - MIL-5015C connector - Thru-hole option: 8021
Power Excitation	18 - 30 Vdc
Operating Temp.	-55°C to 125°C
Dimensions (mm)	48.3 x 22.23
Typical Apps	Gearbox monitoring



8011/8021-AR/AP

Ingress Protection	Hermetically Sealed
Static/Dynamic Response	Dynamic
Full Scale Range	± 5 g, 10g, 20g, 50g
Full Scale Output	4 to 20mA RMS or Peak
Unique Features	<ul style="list-style-type: none"> - Current output - Stainless steel housing - MIL-5015C connector - Thru-hole option: 8021
Power Excitation	12 - 30 Vdc
Operating Temp.	-40°C to 85°C
Dimensions (mm)	48.3 x 22.23
Typical Apps	Gearbox monitoring



8011/8021-VR/VP

Ingress Protection	Hermetically Sealed
Static/Dynamic Response	Dynamic
Full Scale Range	0.5, 1.0, 3.0, 5.0 in/sec
Full Scale Output	4 to 20mA RMS or Peak
Unique Features	<ul style="list-style-type: none"> - Velocity transmitter - Stainless steel housing - MIL-5015C connector - Thru-hole option: 8021
Power Excitation	12 - 30 Vdc
Operating Temp.	-40°C to 85°C
Dimensions (mm)	48.3 x 22.23
Typical Apps	Gearbox monitoring

Temperature Sensors



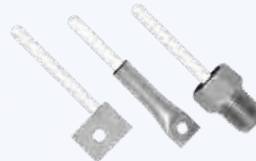
Surface Mount Probe

Package	- Silicone rubber or kapton laminated element
Type	- Flat, flexible, rectangular sensor - Variety of designs available
Sensor Range	RTD: Pt, Ni, Cu Thermocouple: J, K, T, E
Unique Features	- Surface sensing for round or uneven surfaces - Noninvasive, simple installation - Adhesive backing option
Accuracy	RTD: $\pm 0.06\%$, $\pm 0.12\%$ and $\pm 0.5\%$ at 0°C
Operating Temp.	Varies by design Standard: - -50°C to 200°C (-58°F to 392°F) Available up to 220°C
Dimensions (mm)	Custom dimensions available
Typical Apps	Monitor end windings of stator coils



Embedment Probe

Package	- Stainless steel or tin plated copper case - Four case styles
Type	- Miniature design
Sensor Range	RTD: Pt, Ni Thermocouple: J, K, T, E
Unique Features	- For use where space is limited - Simple installation - Custom designs - Feedthrough options
Accuracy	RTD: $\pm 0.12\%$, $\pm 0.36\%$ and $\pm 0.5\%$ at 0°C
Operating Temp.	-50°C to 250°C (-58°F to 482°F)
Dimensions (mm)	Case specific dimensions
Typical Apps	Bearing monitoring



Bolt-On Probe

Package	- Threaded bolt, tube style, flat rectangular style
Type	- Quick response time
Sensor Range	RTD: Pt, Ni
Unique Features	- For use where space is limited - Retro fitting - Simple installation - Custom designs
Accuracy	DIN Class B (IEC 75) and $\pm 0.5\%$ at 0°C
Operating Temp.	-50°C to 250°C (-58°F to 482°F)
Dimensions (mm)	Case specific dimensions
Typical Apps	Generator



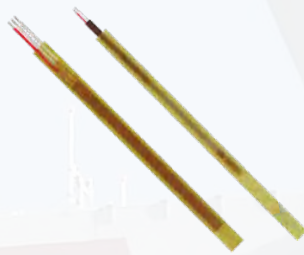
Transformer Probe

Package	- Pt element embedded into Ceramic tube and cover with PTFE shrinkable sleeve
Type	- Push-in probe
Sensor Range	RTD: Pt100
Unique Features	- Dielectric strength 3KV - 4 wires measurement - Various length of cable
Accuracy	Cl.B according to IEC 751
Operating Temp.	-40°C to 250°C (-40°F to 482°F)
Dimensions (mm)	$\varnothing 5\text{mm}$ Lg 50mm (Custom cable lengths available)
Typical Apps	Temperature monitoring in low voltage Transformer's windings



Bearing Probe

Package	- Copper alloy tip - Stainless steel, isolated stainless steel or epoxy glass case
Type	- Rigid sheath - Tip sensitive - Cable / leadwire options
Sensor Range	RTD: Pt, Ni, Cu Thermocouple: J, K, T, E
Unique Features	- Cut-to-length - Copper tip for fast time response - Assemblies with fluid seal and sprint loading - Explosion-proof assemblies available - Single or dual elements
Accuracy	RTD: DIN Class B (IEC 75) and $\pm 0.5\%$ at 0°C
Operating Temp.	Sheath specific, up to 250°C
Dimensions (mm)	Custom lengths Standard sheath diameters: 0.188", 0.215", 0.250"
Typical Apps	Bearing monitoring



Stator Winding Probe

Package	- Epoxy glass laminated, Class F and Class H
Type	- Rigid / flat slot sensor - Cable / leadwire options
Sensor Range	RTD: Pt, Ni, Cu Thermocouple: J, K, T, E
Unique Features	- Extended sensitive length - FM and ATEX ratings - Single or dual elements - Elastomer filled cable - Smackproof design - Calibration available
Accuracy	RTD: $\pm 0.2\%$ and $\pm 0.5\%$ at 0°C
Operating Temp.	Max. temp: Class F, 155°C and Class H, 180°C Available up to 200°C
Dimensions (mm)	Custom dimensions available
Typical Apps	Monitor between stator coils



Stator Winding Probe

Package	- TPE / CPME
Type	- Rigid flat / slot sensor with cable prolongation
Sensor Range	Pt100 sensor
Unique Features	- Dielectric strength 3 KV(TPE), 5 KV (CPME) - ATEX EExi according to type - Class B, A according to IEC60751
Accuracy	$\pm 0.12\%$
Operating Temp.	-20°C to 180°C
Dimensions (mm)	- 150 x 8 x 2 (TPE) - 60 x 10 x 2, 80 x 10 x 2.3, 80 x 7.5 x 2 (CPME) - Typical cable lengths = 5, 10, 15, 25 m
Typical Apps	Stator monitoring

Fluid Property Sensors



HTM2500B3C4 OIL

Package	Fully integrated, stand-alone module combines sensor and processing electronics for in-situ monitoring
Type	Water content in oil and temperature sensor
Operating Range	0 to 1 aw (aw, activity = water content / water content in saturated oil)
Operating Temp	-40°C to 85°C
Unique Features	<ul style="list-style-type: none"> - Full interchangeability - High reliability and demonstrated long term stability in oil - Ratiometric to voltage supply - Sensitive elements with unique mechanical and chemical robustness
Calibration	Factory calibrated and tested
Dimensions (mm)	76.2 x 30 x 30
Typical Apps	Gearbox oil



FPS2802

Package	Fully integrated, stand-alone module combines sensor and processing electronics for in-situ monitoring
Type	Gear oil quality sensor in high viscosity conditions
Operating Range	Viscosity up to 10,000 mPa-S
Operating Temp	-40°C to 150°C
Unique Features	<ul style="list-style-type: none"> - Rugged construction for high pressure and high flow environments - Proprietary corrosion and contaminant resistant coating for wetted parts - On-board microprocessor for real-time data analysis with 12-24 volts supply - High reliability and long term stability
Calibration	Factory calibrated and tested
Dimensions (mm)	81 x 30 x 30
Typical Apps	Gearbox oil

Level Sensor



EVS312-51N

Housing Material	Nylon 6.6
Float Material	Glass filled Nylon 6.6
Contact Material	Ruthenium
Float SG	0.74
Operating Temp	-30°C to 110°C
Medium	Fuel / Oil
Housing Color	Blue
Float Color	Blue
Shock	50 g for 11mS duration
Vibration	35 g up to 500 Hz
Maximum Pressure	4.7 Bar
Float Diameter	22 mm
IP	IP65
Typical Apps	Gearbox oil level

Pressure Sensors



M5100, U5100

Package	Industrial stainless steel housing with a large selection of threaded fittings, electrical connectors, cable options and customized housings for mid to low volume applications
Type	Gage (M5100) Gage, sealed gage, absolute (U5100)
Pressure Range	0 - 50 psi thru 0 - 30K psi (M5100) 0 - 1 psi thru 0 - 5K psi (U5100)
Output / Span	0.5 - 4.5 Vdc, 1 - 5 Vdc, 0 - 5 Vdc, 0 - 10 Vdc, 4 - 20 mA
Unique Features	<ul style="list-style-type: none"> - Microfused™ technology (M5100) - UltraStable™ technology (U5100) - High performance at a low cost - Solid state reliability - 1% total error band (-20°C to 85°C all possible errors combined) (M5100) - 0.75% total error band (-20°C to 85°C all possible errors combined) (U5100)
Accuracy	0.25% FSO (M5100), 0.1% FSO (U5100)
Operating Temp	-40°C to 125°C
Dimensions (mm)	M5100: 22.23 x 22.23 x 80.77 U5100: 22.23 x 22.23 x 98.04
Typical Apps	Hydraulic and oil pressure measurement
Agency Approvals	CE, UL 508



M7100, U7100

Package	Automotive grade, stainless steel hermetic pressure ports and integral electrical connector for high volume, OEM applications
Type	Gage, absolute
Pressure Range	0 - 15 psi thru 0 - 43K psi
Output / Span	0.5 - 4.5 Vdc
Unique Features	<ul style="list-style-type: none"> - 1% total error band (-20°C to 85°C) - 2% total error band (-20°C to 125°C) - Solid state reliability - Survives high vibration and immersion - Microfused™ technology (M7100) - UltraStable™ technology (U7100)
Accuracy	0.25% FSO (M7100), 0.5% FSO (U7100)
Operating Temp	-40°C to 125°C
Dimensions (mm)	26.7 x 26.7 x 50.0
Typical Apps	Hydraulic and oil pressure measurement
Agency Approvals	CE



EPIH

Package	Various housings: cylindrical body from diam. 1.27 to 2.36 mm, low profile housing or threads M4x0.7, M5x0.8, 6-32UNC, 10-32UNF
Type	Gage, sealed gage, absolute
Pressure Range	0 - 5, 10, 15, 25, 50, 75, 100, 200, 300 psi
Output / Span	12 mV to 75 mV
Unique Features	<ul style="list-style-type: none"> - Diffused silicon diaphragm with a large variety of sizes and shapes available as small as 0.05" outside diameter - High frequency response (to 1.7 MHz)
Accuracy	±1.0% FSO
Operating Temp	-40°C to 120°C
Typical Apps	Application dependent
Agency Approvals	Dynamic pressure measurement on turbine blade



Quality Statements:

- ◆ AS/EN 9100
- ◆ ATEX
- ◆ ATEX 949EC
- ◆ CE-MDD
- ◆ CMDR – Health Canada
- ◆ EN 13980
- ◆ ESA 266
- ◆ ESCC266E
- ◆ ESCC 400C
- ◆ FDA
- ◆ ISO 13485
- ◆ ISO 14001
- ◆ ISO 9001
- ◆ MID
- ◆ Measuring Instruments Directive 2004/22/EC annex D
- ◆ NASA Qualified
- ◆ NSF-61 Water Quality
- ◆ PART21G
- ◆ TS 16949

Our sensors often play mission critical roles within the end device in which they are embedded. Accordingly, our customers rely on MEAS sensors to operate accurately, every time. At MEAS, we place the highest emphasis on quality in terms of design standards, process control and customer feedback/integration and back up our products with an industry leading warranty.

MEAS maintains the highest quality certifications, including:

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