TECHNICAL INFORMATION

PREDICTIVE MAINTENANCE SYSTEMS

SENSONICS LTD

Air Gap Transducer System

CS07 Capacitive Sensor – 7.0 mm measurement range

- 7.0 mm measurement range of static or dynamic surfaces
- Edge mounted arrangement for cable exit on smaller machines
- Suitable for generator and motor applications
- 0.8mm sensor thickness with integral dual micro coaxial cable
- Driver unit with multiple output options
- Dynamic, Pole Profile and Minimum Gap outputs
- Probe operating temperature range -20 °C to +125 °C

Air Gap monitoring of hydro / turbo generators and electrical motors is a critical measurement requirement driven by the need to understand the dynamic relationship between the rotor and stator in power generation applications. The rotor to stator air gap can be used to monitor both the eccentricity of the rotor relative to the stator and individual pole to stator air gaps.

Centrifugal and magnetic forces, in addition to changes in temperature, have a direct impact on the eccentricity and hence the efficiency of the machine. Individual pole gap analysis also provides important rotor condition monitoring data which can be utilised to schedule maintenance and extend the life of older plant minimising downtime for inspection and refurbishment. The early detection of rotor / stator rubs allows the machine to be shutdown prior to the onset of permanent damage.

The CS07 air gap sensor from Sensonics is an edge mounted sensor offering a non-contact dynamic positional measurement from the sensor face to a metal target. The advantage of the capacitive technique in generator and motor applications is the high immunity to magnetic fields; the CS07 also provides high resolution and relative insensitivity to different (metal) target materials.

The CS07 sensor is designed in a robust strip line mechanical arrangement for mounting on the stator, the integral coaxial cable is extended outside of the machine for easy of routing to the driver which provides the transmission signal for the strip line and receiver detection. A linearised opto-isolated output is provided in both voltage and current format which can be configured to represent various rotor pole measurements with respect to the stator. The CS07 is suitable for smaller machines and exhibits a lower profile than the 15mm, 25mm, 50mm and 75mm measurement range sensor options.

DS1271

Air Gap Transducer System

System Performance

Measurement Range:	1.0 mm to 7.0 mm
Linearity: (% of FS)	± 1% (at nominal +25 °C) ± 3% (over temperature range) measured at 5.0 mm gap
Sensitivity:	1.50 V / mm ± 1 % (V) 1.0 V = 1.0 mm, 10.0 V = 7.0 mm 2.667 mA / mm ± 1 % (I) 4.0 mA = 1.0 mm 20.0 mA = 7.0 mm
Resolution:	<0.05 mm
Absolute Accuracy:	< ± 2% of Full Scale Range
Interchangability:	The sensor and driver are provided as matched pairs. Maximum inter-changeability error replacing either probe or driver in calibrated system is ± 3 % at 4.0 mm gap.
Available system lengths:	5 m and 10 m
Cable length tolerance Cable Extension (5 m): Cable Extension (10 m):	 5.0 m to 5.2 m 10.0 m to 10.2 m
Frequency Response:	DC to 1 kHz
System Outputs:	Dynamic (Isolated I or V) Minimum Gap (Isolated I or V)
System Warm up time:	20 minutes typically

Probe

Probe dimensions: (L x W x D)	75 mm x 10 mm x 0.8 mm
Probe material:	High Temperature FR4
Cable type:	RG179 75 Ohm Miniature Coaxial FEP Insulation Separate cables for Tx and Rx Polyester monofilament braided outer jacket (+150 °C)
Connector type:	SMC Female Plug
Temperature Drift:	<400 ppm / °C
Operating Temp Range:	-20 °C to +125 °C
Storage Temp Range:	-30 °C to +125 °C
Immunity to Magnetic Field:	1.5 Tesla Max.
Weight with 10m cable:	450 grams
Weight with 5m cable:	250 grams

Driver

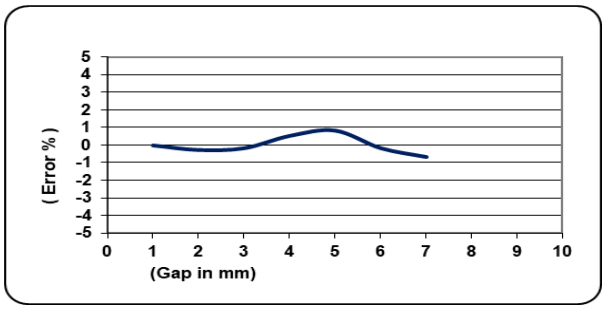
Dynamic Output:	This represents the measured continuous air gap.
Min Gap:	This represents the minimum r gap with a droop of 5.0 s / V.

Voltage Outputs

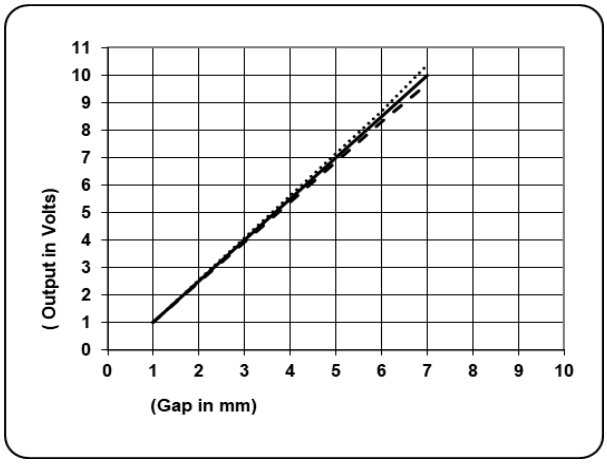
Range:	0.0 to 10.0 Vdc
Output Impedance:	100 Ohms
Minimum Load:	5.0 KOhm
Isolation:	1500 Vrms

Current Outputs

Range:	4.0 to 20.0 mA
Maximum Load:	500 Ohms
Isolation:	1500 Vrms
Power supply range:	20 Vdc to 28.0 Vdc
Power supply sensitivity:	< 0.3 mVout / Vsupply
Power consumption:	250 mA max +24 Vdc
Mass:	600 grams
Operating Temp Range:	0 °C to +50 °C
Storage Temp Range:	-30 °C to +80 °C



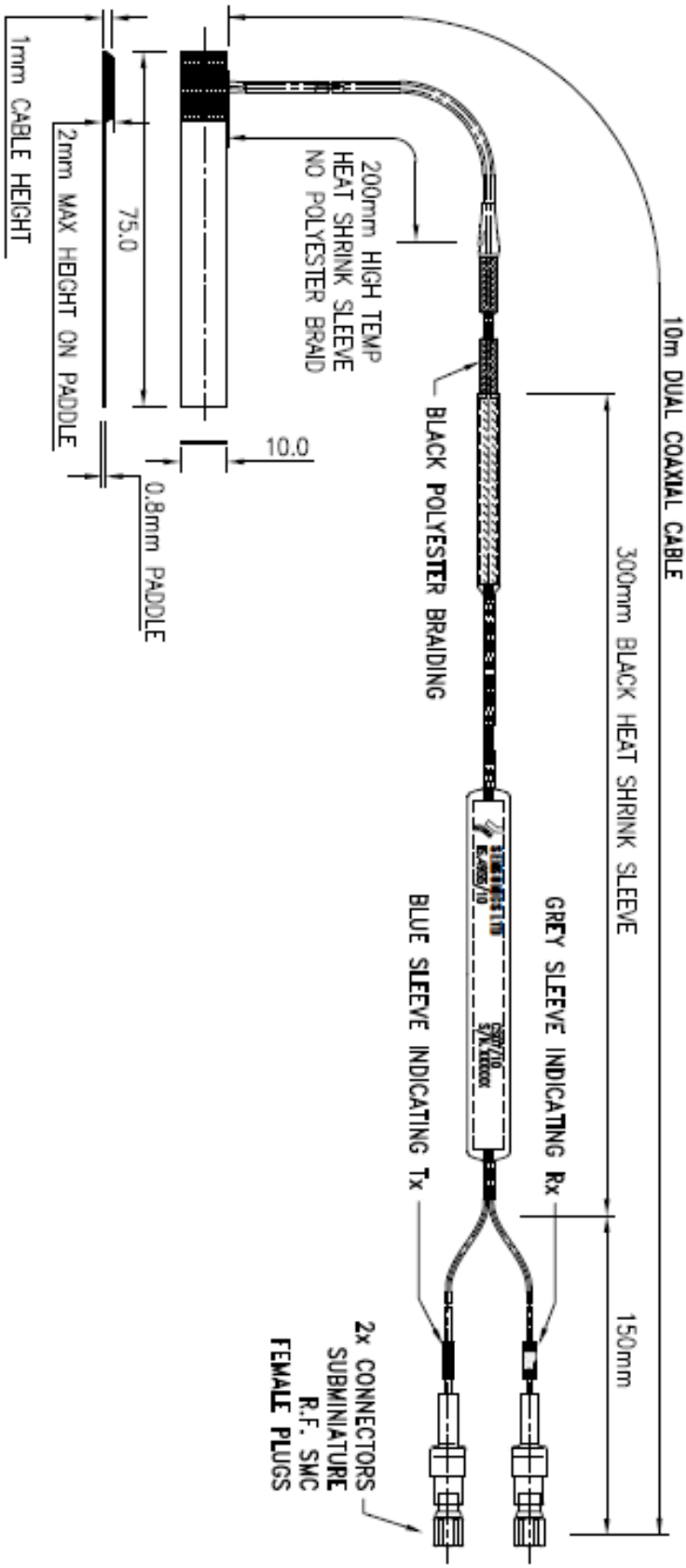
Typical 10m system performance at 25 °C



Typical probe Performance

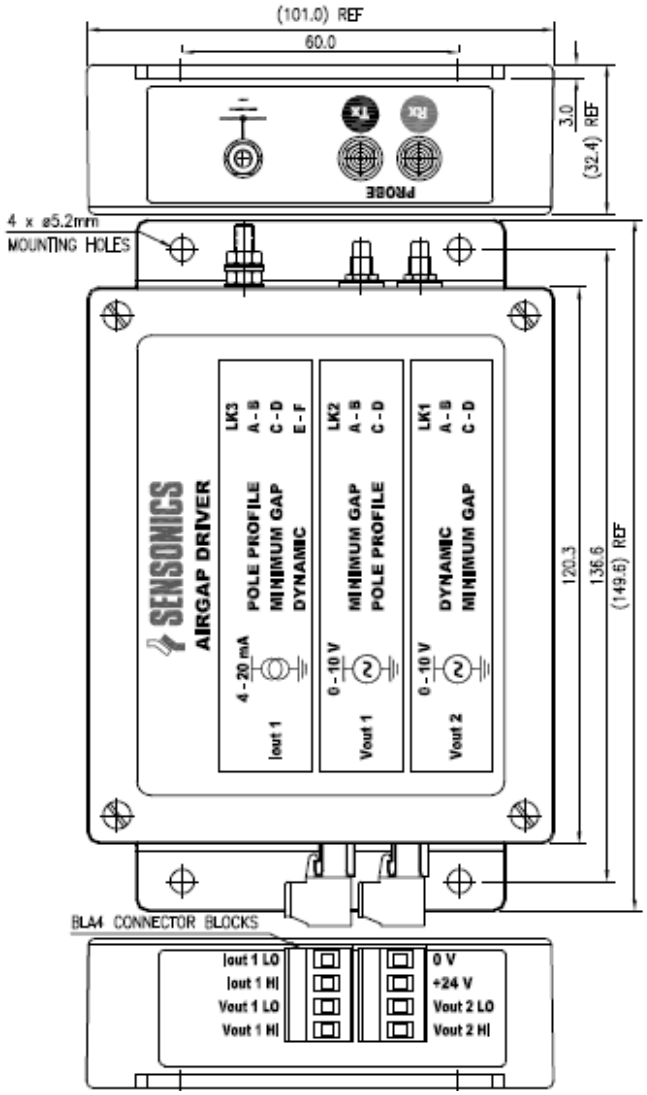
- - - - *0 °C*
——— *25 °C*
..... *125 °C*

Probe Mechanical Configuration



Note:- Performance of the sensor will be significantly affected through contact with liquid.

Driver Mechanical Configuration



Housing is Painted Aluminium. Internally potted and sealed with Silicon compound.

Ordering Information

Sensor CS07/5, Driver CSD07/5 – Air Gap System with 5m interconnecting cable
Sensor CS07/10, Driver CSD07/10 – Air Gap System with 10m interconnecting cable

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