

# IRIS POWER CAPACITIVE AIR GAP SENSORS

Continuous On-Line Air Gap Monitoring for Hydro Generators

Capacitive Air Gap Sensors measure the distance between the rotor and stator in hydroelectric generators to avoid reduced efficiency or damage caused by off-center or out-of-round conditions.

## WHY MONITOR AIR GAP?

In a typical scenario, stator deformation in an aging hydrogenerator can reduce the air gap between the rotor and the stator to critical proportions. The generator would have to be put into an unscheduled shut down, costing thousands of dollars.

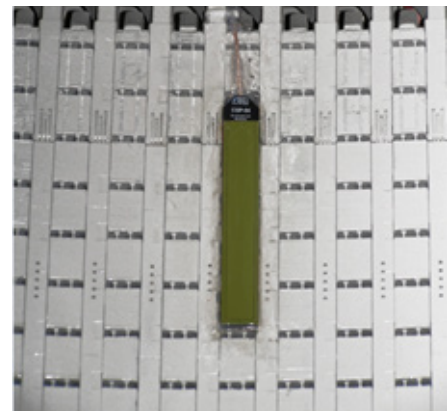
Online monitoring of the air gap with Iris Power Capacitive Gap Sensors (CGS) can provide important information about the generator condition as it changes, allowing air gap issues to be identified and corrected before an in-service failure.

## AIR GAP MEASUREMENTS

Air gap is the distance between the outside diameter of the rotor and the inside diameter of the stator. Monitoring of air gap in hydro generators is important as both the stator and the rotor can be quite flexible with the shape and location influenced by operating centrifugal forces, thermal effects, magnetic forces and mechanical system failure. Off-center or out-of-round conditions can reduce operating efficiency and lead to damage caused by magnetically induced heating or a rotor-to-stator rub.



Iris Power Capacitive Gap Sensor and Linearization Module



Iris Power Capacitive Gap Sensor Installed on a Hydrogenerator Stator Winding

## AIR GAP SENSOR FEATURES

- Capacitive Sensor Technology
- Output directly proportional to the air gap distance (pole profile)
- Easy to install and no special calibration needed
- Low Profile (3 types)
- High Temperature Stability
- Immune to magnetic fields, dust, oil, EMI, RFI
- The air gap sensor comes in a kit with a signal conditioner, junction box and mounting epoxy

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## CAPACITIVE AIR GAP SENSOR SPECIFICATIONS

TYPE	CGS- 02	CGS - 03	CGS - 04
Dimension	135 x 32 x 1.7mm	230 x 32 x 2.4mm	250 x 40 x 3.2mm
Maximum Sensor Distance From Top of Core	0.5m (1.6 ft)	1m (3.2ft)	1m (3.2ft)
Interface to Module Length	10m		
Operating Temperature	- 15 °C to 125 °C		
Measuring Range	3mm to 15mm	5mm to 25mm	10mm to 50mm
Full Range Accuracy	±3%	±3%	±5%
Recommend Range for Nominal Air Gap	5mm to 12mm	12mm to 22mm	22mm to 47mm
Temperature Drift	<300ppm/ °C		

## CAPACITIVE GAP LINEARIZATION MODULE

The Capacitive Gap Linearization Module converts the sensor output to a common industrial format for collection by a Continuous Monitoring Instrument. The user can select an output that is either 4-20mA or 2-10V proportional to the measured air gap distance



## CAPACITIVE GAP LINEARIZATION MODULE SPECIFICATIONS

TYPE	CGL MODULE
Frequency Response	0 TO 1000 Hz (-3dB)
Power Input	+24Vdc, ±10%, 220mA max
Operating Temperature	-15 °C to 70 °C
Relevative Humidity	95% non condensing
Mechanical Dimensions	175 x 80 x 60mm with endplate
Case Protection Class	IP66