



Air Gap Transducer - 3G technology

AGT-3G

FEATURES

- Embedded Digital Signal processing
- High-speed grade FPGA 6x300 MHz.
- Outstanding SNR performance
- Active Temperature compensation
- High accuracy and repeatability.
- Advanced algorithm for noise rejection
- Increased immunity to electrical disturbances
- IN/OUT Galvanic separation.
- Immunity to strong magnetic field



Monitoring solution



Air gap monitoring

Typical applications



Hydrogenerators



Windturbines



Gearless millsdrives

DESCRIPTION

The dynamic air gap monitoring of generators consists of the distance measurement between rotor poles and stator while it is in operation.

The MCm AGT range of air gap sensors are a non-contact dynamic position transducer utilising a capacitive technique to provide an accurate displacement measurement from the sensor face to a metal target. The advantage of the capacitive technique in generator applications is the high immunity to magnetic fields; the AGT series also provides high resolution and relative insensitivity to different (metal) target materials.

Typical contact-free capacitive Air Gap Transducer (AGT) is composed of 3 elements. It features separate Sensor (AGS), the Air Gap Oscillator (AGO) and the Demodulator (AGD).

Demodulator

The demodulator provides three signal outputs :

- MinGap¹ voltage (V)
- Pole Profile voltage (V)
- Pole Profile or MinGap¹ current (mA)

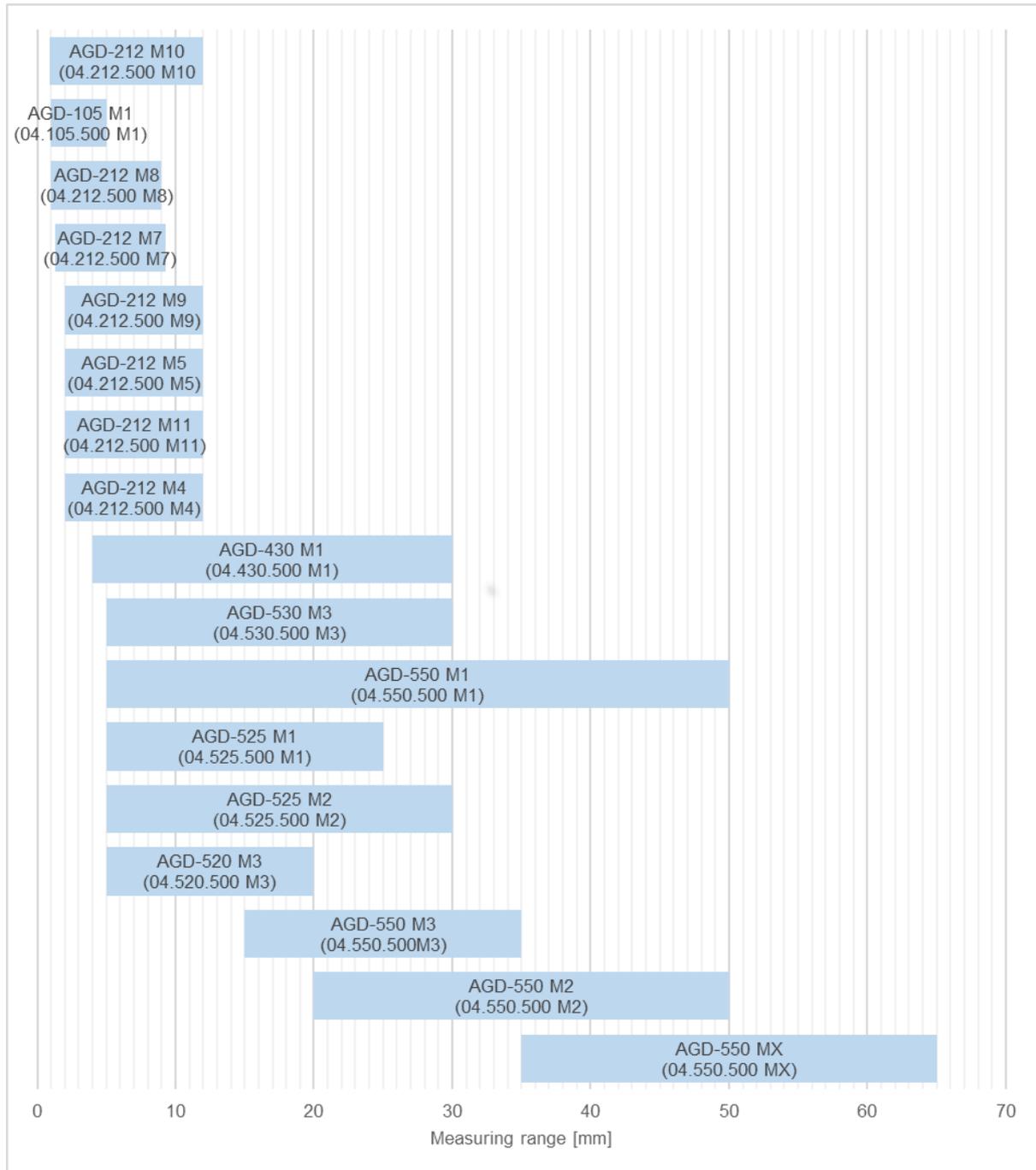
All outputs are galvanically isolated and the current output is factory set on Pole Profile. The digital technology combined with high performance noise rejection filters allow a linearization adjusted with great accuracy and resolution, with stable and repetitive behaviours. Industrial metal housing enables installation in harsh environments.

Sensor and Oscillator

Designed for long life cycles, harsh environments and strong magnetic fields. The sensor shape is suitable for its installation on the stator wall of generators and motors.

¹See user manual for detailed description

MEASURING RANGES OVERVIEW



AGT-212 3G SPECIFICATIONS

AGD-212 M4

Linear measuring range	2 to 12mm (0.079 to 0.47 in)
Voltage outputs sensitivity	0.8V/mm
Current outputs sensitivity	1.6mA/mm
Max. dev. from straight line	< 3.5% of reading
Average linearity error	< 0.5%

AGD-212 M5

Linear measuring range	2 to 12mm (0.079 to 0.47 in)
Voltage outputs sensitivity	0.8V/mm
Current outputs sensitivity	1.6mA/mm
Max. dev. from straight line	< 3.5% of reading
Average linearity error	< 0.5%

AGD-212 M7

Linear measuring range	1.3 to 9.3mm (0.051 to 0.366 in)
Voltage outputs sensitivity	1.0V/mm
Current outputs sensitivity	2.0mA/mm
Max. dev. from straight line	< 3.5% of reading
Average linearity error	< 0.5%

AGD-212 M8

Linear measuring range	1 to 9mm (0.039 to 0.35 in)
Voltage outputs sensitivity	1.0V/mm
Current outputs sensitivity	2.0mA/mm
Max. dev. from straight line	< 3.6% of reading
Average linearity error	< 1.0%

AGD-212 M11

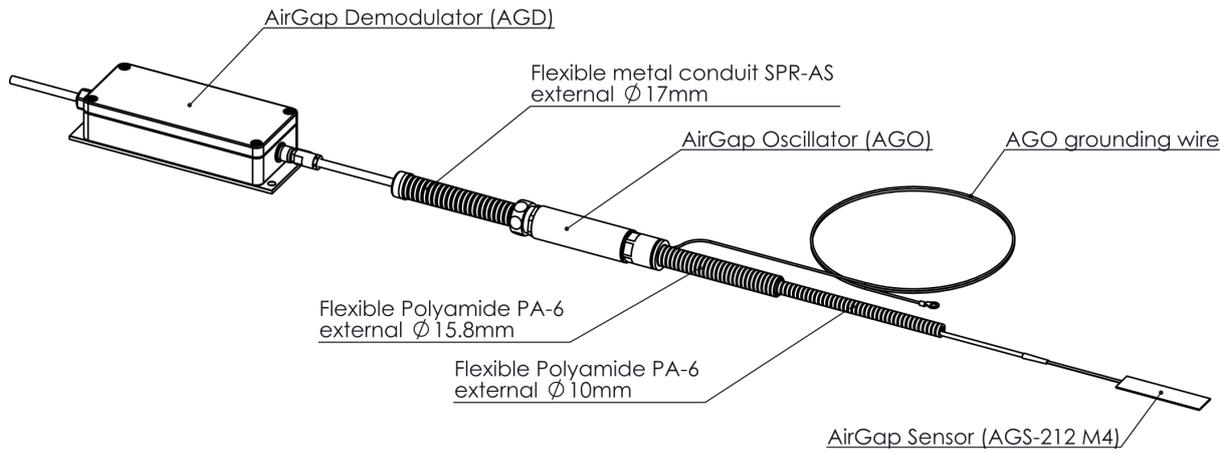
Linear measuring range	2 to 12mm (0.079 to 0.47 in)
Voltage outputs sensitivity	0.8V/mm
Current outputs sensitivity	1.6mA/mm
Max. dev. from straight line	< 3.1% of reading
Average linearity error	< 0.6%

PHYSICAL [mm]

Sensor surface	70 x 17.5 x 0.8 LxWxH with 80mm of flex part
Sensor interface	MCX coaxial plug (AGS-212 M4) MMCX coaxial plug (AGS-212 M5) LEMO coaxial plug (AGS-212 M7)
AGO module dimensions	120 L x ø25
Conditioner module dimensions	170 x 63 x 40 LxWxH

AGT-212 3G SPECIFICATIONS

TRANSDUCER OVERVIEW



AGT-520 3G SPECIFICATIONS

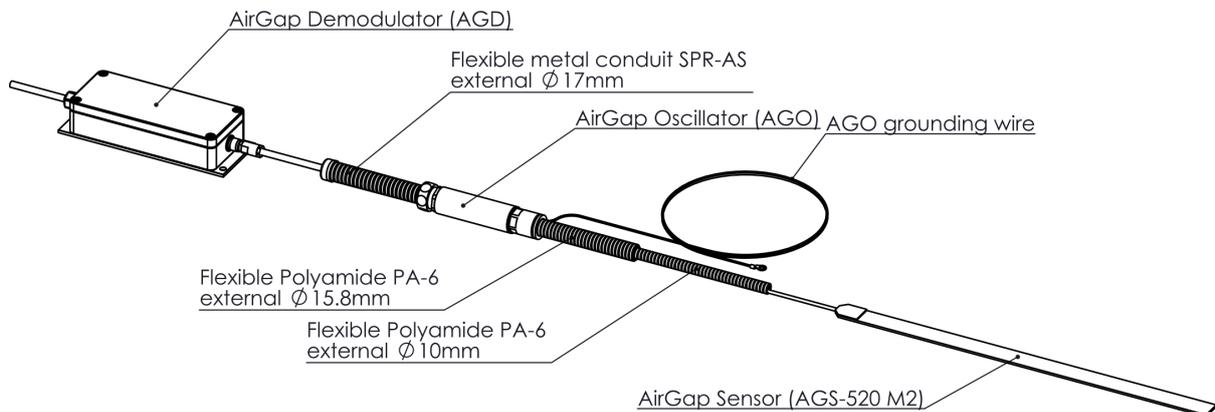
AGD-520 M3

Linear measuring range	5 to 20mm (0.2 to 0.79 in)
Voltage outputs sensitivity	0.53V/mm
Current outputs sensitivity	1.06mA/mm
Max. dev. from straight line	< 3.5% of reading
Average linearity error	< 0.6%

PHYSICAL [mm]

Sensor surface	385 x 20 x 3.5 LxWxH
Sensor interface	MCX coaxial plug
AGO module dimensions	120 L x ø25
Conditioner module dimensions	170 x 63 x 40 LxWxH

TRANSDUCER OVERVIEW



AGT-525 3G SPECIFICATIONS

AGD-525 M1

Linear measuring range	5 to 25mm (0.2 to 0.9 in)
Voltage outputs sensitivity	0.4V/mm
Current outputs sensitivity	0.8mA/mm
Max. dev. from straight line	< 4.5% of reading
Average linearity error	< 1.0%

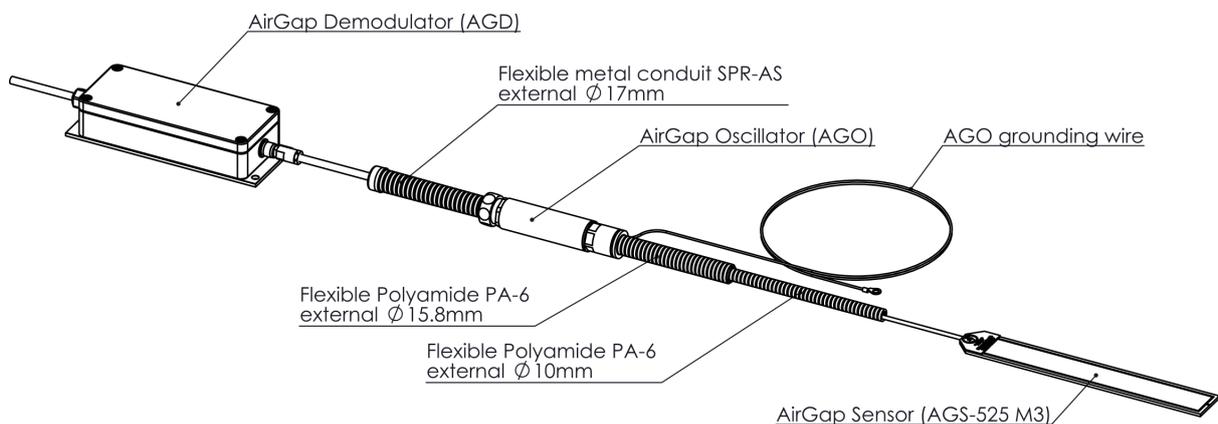
AGD-525 M2

Linear measuring range	5 to 30mm (0.2 to 1.18 in)
Voltage outputs sensitivity	0.32V/mm
Current outputs sensitivity	0.64mA/mm
Max. dev. from straight line	< 5.0% of reading
Average linearity error	< 0.5%

PHYSICAL [mm]

Sensor surface	221 x 32 x 3.5 LxWxH
Sensor interface	MCX coaxial plug
AGO module dimensions	120 L x ø25
Conditioner module dimensions	170 x 63 x 40 LxWxH

TRANSDUCER OVERVIEW



AGT-530 3G SPECIFICATIONS

AGD-530 M3

Linear measuring range	5 to 30mm (0.2 to 1.18 in)
Voltage outputs sensitivity	0.32V/mm
Current outputs sensitivity	0.64mA/mm
Max. dev. from straight line	< 3.5% of reading from 11mm to 29mm < 5.0% of reading from 5mm to 30mm
Average linearity error	< 0.8%

PHYSICAL [mm]

Sensor surface	221 x 32 x 3.5 LxWxH
Sensor interface	LEMO triaxial plug (AGS-525 M4)
AGO-2xx dimensions	Ø16 x 100
Conditioner module dimensions	170 x 63 x 40 LxWxH

AGT-430 3G SPECIFICATIONS

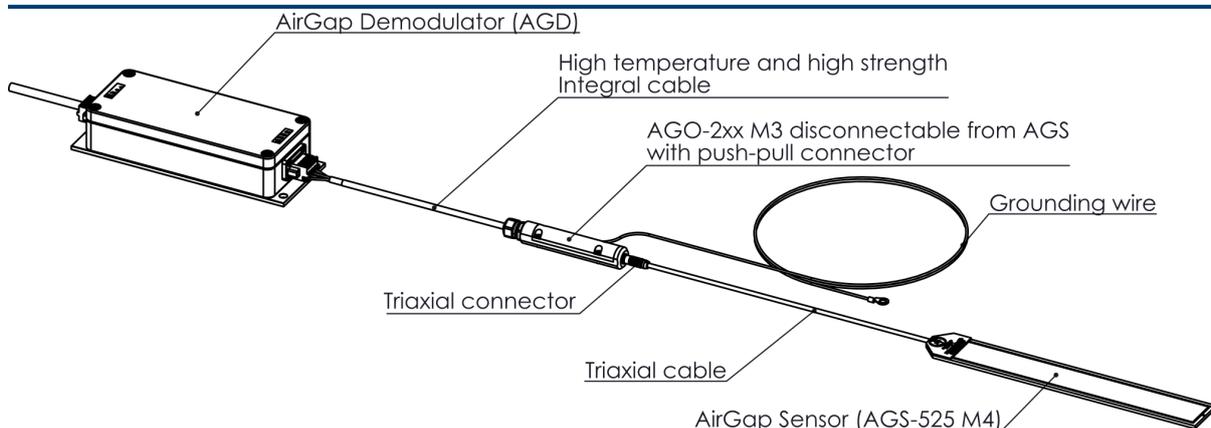
AGD-430 M1

Linear measuring range	4 to 30mm (0.157 to 1.18 in)
Voltage outputs sensitivity	0.308V/mm
Current outputs sensitivity	0.615mA/mm
Max. dev. from straight line	< 3.5% of reading from 10mm to 28mm < 5.5% of reading from 5mm to 30mm
Average linearity error	< 1.2%

PHYSICAL [mm]

Sensor surface	221 x 32 x 3.5 LxWxH
Sensor interface	LEMO triaxial plug (AGS-525 M4)
AGO-2xx dimensions	Ø16 x 100
Conditioner module dimensions	170 x 63 x 40 LxWxH

TRANSDUCER OVERVIEW



AGT-550 3G SPECIFICATIONS

AGD-550 M1

Linear measuring range	5 to 50mm (0.2 to 1.96 in)
Voltage outputs sensitivity	0.178V/mm
Current outputs sensitivity	0.355mA/mm
Max. dev. from straight line	< 4.2% of reading from 16mm to 46mm < 6.3% of reading from 5mm to 50mm
Average linearity error	< 0.5%

AGD-550 M2

Linear measuring range	20 to 50mm (0.79 to 1.96 in)
Voltage outputs sensitivity	0.267V/mm
Current outputs sensitivity	0.533mA/mm
Max. dev. from straight line	< 2.8% of reading
Average linearity error	< 0.6%

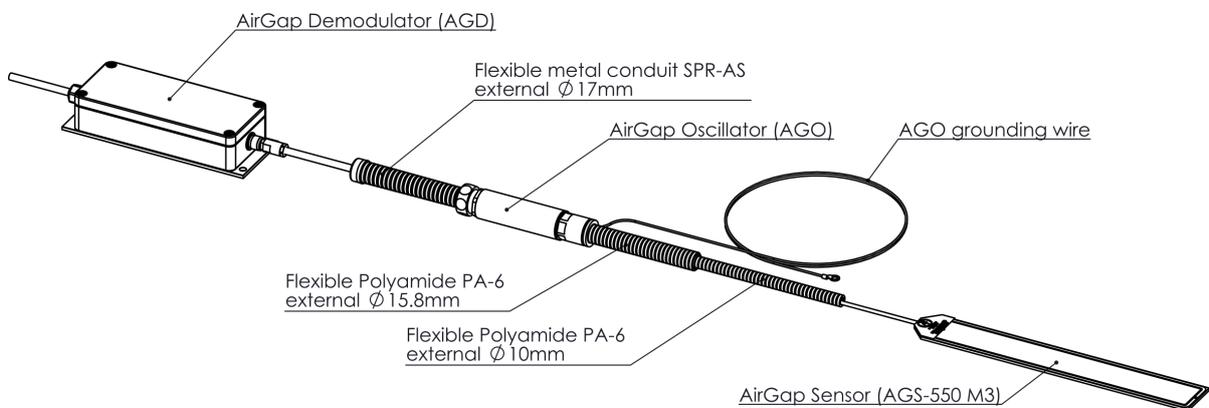
AGD-550 M3

Linear measuring range	15 to 35mm (0.59 to 1.38 in)
Voltage outputs sensitivity	0.4V/mm
Current outputs sensitivity	0.8mA/mm
Max. dev. from straight line	< 2.5% of reading
Average linearity error	< 0.3%

PHYSICAL [mm]

Sensor surface	263.5 x 38 x 3.5 LxWxH
Sensor interface	MCX coaxial plug
Adapter module dimensions	120 L x ø25
Conditioner module dimensions	170 x 63 x 40 LxWxH

TRANSDUCER OVERVIEW



AGT-550MX 3G SPECIFICATIONS

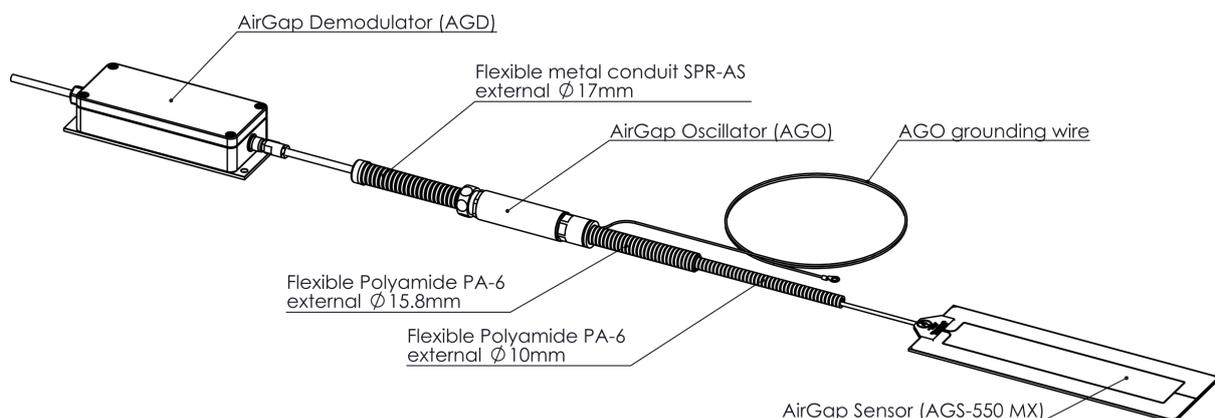
AGD-550 MX

Linear measuring range	35 to 65mm (1.38 to 2.56in)
Voltage outputs sensitivity	0.267V/mm
Current outputs sensitivity	0.533mA/mm
Max. dev. from straight line	< 2.1% of reading
Average linearity error	< 0.2%

PHYSICAL [mm]

Sensor surface	263 x 80 x 3.5 LxWxH
Sensor interface	MCX coaxial plug
Adapter module dimensions	120 L x ø25
Conditioner module dimensions	170 x 63 x 40 LxWxH

TRANSDUCER OVERVIEW



AGT 3G HT SPECIFICATIONS (High Temperature applications)

AGD-105 M1

Linear measuring range	1 to 5mm (0.039 to 0.19 in)
Voltage outputs sensitivity	2.0V/mm
Current outputs sensitivity	4.0mA/mm
Max. dev. from straight line	< 2.3% of reading
Average linearity error	< 0.2%

PHYSICAL [mm]

Sensor surface	38.5 x 18 x 0.7 LxWxH
Sensor interface	MMCX coaxial plug
Adapter module dimensions	120 L x ø25
Conditioner module dimensions	170 x 63 x 40 LxWxH

AGD-212 M9

Linear measuring range	2 to 12mm (0.079 to 0.47 in)
Voltage outputs sensitivity	0.8V/mm
Current outputs sensitivity	1.6mA/mm
Max. dev. from straight line	< 3.0% of reading
Average linearity error	< 0.6%

AGD-212 M10

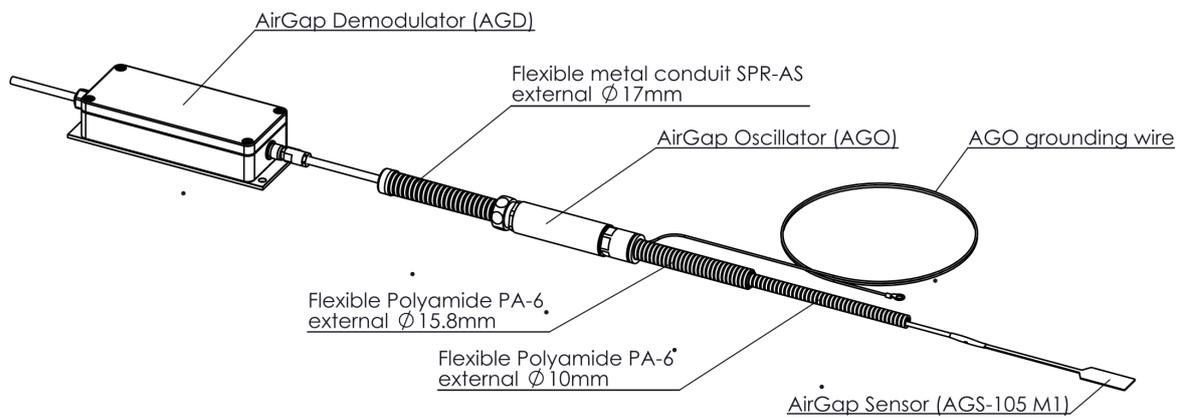
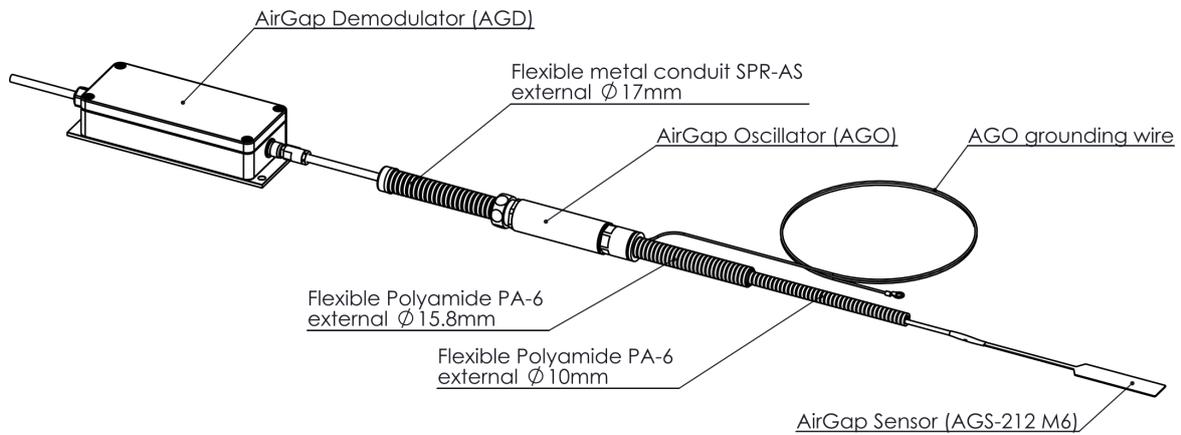
Linear measuring range	0.9 to 12mm (0.035 to 0.47 in)
Voltage outputs sensitivity	0.721V/mm
Current outputs sensitivity	1.442mA/mm
Max. dev. from straight line	< 3.8% of reading
Average linearity error	< 0.8%

PHYSICAL [mm]

Sensor surface	70 x 18 x 0.7 LxWxH
Sensor interface	MMCX coaxial plug
Adapter module dimensions	120 L x ø25
Conditioner module dimensions	170 x 63 x 40 LxWxH

AGT 3G HT SPECIFICATIONS (High Temperature applications)

TRANSDUCER OVERVIEW



COMMON SPECIFICATIONS

OPERATION

Output function	Voltage Pole Profile	Current - Pole profile or MinGap	Voltage MinGap
Output range	2 to 10V	4 to 20mA	2 to 10V
Loop resistance (current output)	n/a	Max. 500Ω	n/a
Output resistance (voltage outputs)	100Ω ±1%	n/a	100Ω ±1%
AGD-xxx Mx temperature coefficient	< 200ppm/°C		
AGO-xxx M3 temperature deviation max.	<2% of reading at mid-scale from 0°C to 85°C		
Typical frequency response (-3dB)	DC to 1kHz		
Output noise	< 50mVrms		
Interchangeability tolerance	< 5% of full scale for all types excepted below: <12% of full scale for types AGT-550		
Power			
Voltage	+24VDC nominal ±10% / Warm up time 10 minutes		
Current consumption	125mA typical		
Sensor (AGS) triaxial cable length			
AGS-212 M4, M5, M6:	1.30m min.		
AGS-520 M2:	1.80m min.		
AGS-525 M3, M4:	1.70m min.		
AGS-550 M3:	1.90m min.		
AGS-550 MX:	1.80m min.		

ENVIRONMENTAL

Temperature range :	Sensor (AGS)	Demodulator (AGD)	Oscillator (AGO)
Operation	-15° to +125°C	-15° to +85°C	-15° to +85°C
Temperature range (HT models) :	Sensor (AGS)	Demodulator (AGD)	Oscillator (AGO)
Operation	-15° to +180°C	-15° to +85°C	-15° to +85°C
Long term storage (all models) :	10 to 40°C / 10 to 50% RH non-condensing		
Ingress protection (acc. to EN60529)	-	IP66	-
Relative humidity (non-condensing)	0 to 95%		
Intended use	Indoor / outdoor		
Max. altitude of operation	No specific restriction		
Shock	IEC 68 2.27 standard, 15g peak, 11ms		
Vibration	IEC 68 2.27 standard 5g peak, 10Hz to 150Hz		
EMC	EN 61326-2-3 / Sensor withstands 1.5 Tesla in a 50 or 60Hz magnetic field		
Fluid compatibility	withstands contact with water, oil, solvents, acids without degradation of material		

DEFINITIONS

Max deviation from straight line:	Is the largest relative error calculated between the actual output level at any distance (voltage or current) and the theoretical output level for the same distance. This error does not include the interchangeability tolerance of the AGT parts.
Average linearity error:	Is the relative error between the theoretical output sensitivity and the actual average sensitivity

ORDERING INFORMATION

LIST OF PARTS NUMBERS:

Type (3G)	AGS (p/n)	AGO (p/n)	AGD (p/n)	Measuring range [mm]		Output range
				<i>min</i>	<i>max</i>	
AGT-212	AGS-212 M4 (04.212.100 M4)	AGO-xxx M3 (04.xxx.400 M3)	AGD-212 M4 (04.212.500 M4)	2	12	4-20mA / 2-10V
AGT-212	AGS-212 M4 (04.212.100 M4)		AGD-212 M7 (04.212.500 M7)	1.3	9.3	4-20mA / 2-10V
AGT-212	AGS-212 M4 (04.212.100 M4)		AGD-212 M8 (04.212.500 M8)	1	9	4-20mA / 2-10V
AGT-520	AGS-520 M2 (04.520.100 M2)		AGD-520 M3 (04.520.500 M3)	5	20	4-20mA / 2-10V
AGT-525	AGS-525 M3 (04.525.100 M3)		AGD-525 M2 (04.525.500 M2)	5	30	4-20mA / 2-10V
AGT-525	AGS-525 M3 (04.525.100 M3)		AGD-525 M1 (04.525.500 M1)	5	25	4-20mA / 2-10V
AGT-550	AGS-550 M3 (04.550.100 M3)		AGD-550 M1 (04.550.500 M1)	5	50	4-20mA / 2-10V
AGT-550	AGS-550 M3 (04.550.100 M3)		AGD-550 M2 (04.550.500 M2)	20	50	4-20mA / 2-10V
AGT-550	AGS-550 M3 (04.550.100 M3)		AGD-550 M3 (04.550.500M3)	15	35	4-20mA / 2-10V
AGT-550MX	AGS-550 MX (04.550.100 MX)		AGD-550 MX (04.550.500 MX)	35	65	4-20mA / 2-10V
AGT-430	AGS-525 M4 (04.525.100 M4)	AGO-2xx M3 (04.2xx.400 M3)	AGD-430 M1 (04.430.500 M1)	4	30	4-20mA[3]
AGT-525	AGS-525 M4 (04.525.100 M4)		AGD-530 M3 (04.530.500 M3)	5	30	4-20mA[3]
AGT-212	AGS-212 M7 (04.212.100 M7)		AGD-212 M11 (04.212.500 M11)	2	12	4-20mA[3]
AGT-105HT	AGS-105 M1 (04.105.100 M1)	AGO-3xx M3 (04.3xx.400 M3)	AGD-105 M1 (04.105.500 M1)	1	5	4-20mA / 2-10V
AGT-212	AGS-212 M5 (04.212.101 M5)		AGD-212 M5 (04.212.500 M5)	2	12	4-20mA / 2-10V
AGT-212HT	AGS-212 M6 (04.212.100 M6)		AGD-212 M9 (04.212.500 M9)	2	12	4-20mA / 2-10V
AGT-212HT	AGS-212 M6 (04.212.100 M6)		AGD-212 M10 (04.212.500 M10)	0.9	12	4-20mA / 2-10V

Notes:

AGO-xxx M3 standard lengths: 8m (AGO-080 M3), 10m (AGO-100 M3), 15m (AGO-150 M3), other length on request

AGO-2xx M3 standard lengths: 8m (AGO-208 M3), 22m (AGO-222 M3), 28m (AGO-228 M3), 35m (AGO-235 M3), Other length are obsolete.

AGO-3xx M3 standard length: 10m (AGO-310 M3), other lengths on request

ORDERING INFORMATION

STANDARDIZED COMPREHENSIVE SYSTEMS

Ordering code	Combination parts
AGT-105 series	
44.105.401	AGS.105 M1 + AGO-310 M3 + AGD-105 M1
AGT-212 series	
44.212.401	AGS-212 M4 + AGO-100 M3 + AGD-212 M4
44.212.402	AGS-212 M4 + AGO-100 M3 + AGD-212 M7
44.212.403	AGS-212 M4 + AGO-080 M3 + AGD-212 M4
44.212.406	AGS-212 M4 + AGO-080 M3 + AGD-212 M8
44.212.407	AGS-212 M6 + AGO-310 M3 + AGD-216 M9
AGT-430 series	
44.430.401	AGS-525 M4 + AGO-228 M3 + AGD-430 M1
AGT-520 series	
44.520.401	AGS-520 M2 + AGO-100 M3 + AGD-520 M3
AGT-525 series	
44.525.401	AGS-525 M3 + AGO-100 M3 + AGD-525 M1
44.525.402	AGS-525 M3 + AGO-150 M3 + AGD-525 M1
44.525.403	AGS-525 M3 + AGO-030 M3 + AGD-525 M1
AGT-530 series	
44.530.402	AGD-525 M2 + AGO-100 M3 + AGS-525 M3
44.530.403	AGD-530 M3 + AGO-228 M3 + AGS-525 M4
44.530.404	AGD-530 M3 + AGO-208 M3 + AGS-525 M4
AGT-550 series	
44.550.401	AGD-550 M1 + AGO-100 M3 + AGS-550 M3
44.550.402	AGD-550 M2 + AGO-100 M3 + AGS-550 M3
44.550.403	AGD-550 M3 + AGO-100 M3 + AGS-550 M3
AGT-550 MX series	
44.550.451	AGD-550 MX + AGO-100 M3 + AGS-550 MX

ACCESSORIES FOR AGT

Ordering code	Description
44.902.004	Flexible Metallic Conduit SPR-AS 10.2m
44.902.005	Flexible Metallic Conduit SPR-AS 8.2m
44.902.006	Flexible Metallic Conduit SPR-AS 15.2m
44.902.007	Flexible Metallic Conduit SPR-AS 3.2m
44.906.002	AGS installation kit - Starter
44.906.003	AGS installation kit - Refill

MC-monitoring Quality certifications

LOCAL REPRESENTATIVE

