

PRESSURE SENSOR FOR COMBUSTION ANALYSIS

Data Sheet



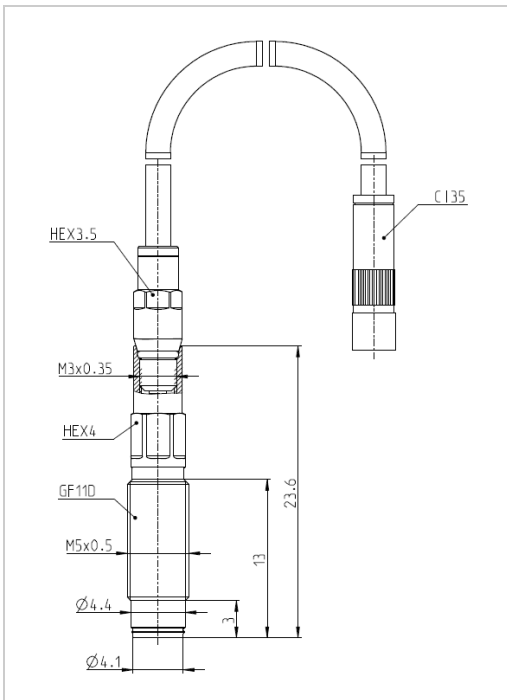
GF11D

TIGG2736A.01 incl. SID⁽¹⁾
TIGG2765A.01 excl. SID⁽¹⁾

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The GF11D is a slim front sealing M5 sensor combining knock resistance and the accuracy for thermodynamic application simultaneously. This is realized by thermally optimized piezoelectric crystal stacking and the special Double Shell™ design. The new sensor design reduces the cyclic temperature drift and the sensor-to-sensor variation to a minimum, improves the signal to noise ratio and allows temperatures up to 500°C at the sensor front. Using a thermo protection like PH21 decreases the small cyclic drift of ≤ 0.4 bar even further. The sensor can be equipped with built in SID for SDM.

Specifications

Measuring range	0 ... 300 bar		
Overload	350 bar		
Sensitivity	15 pC/bar	nominal	
Linearity	$\leq \pm$	0.2 %	FSO
Calibrated ranges (RT, 250 °C)	0 ... 80 bar 0 ... 150 bar 0 ... 300 bar		
Natural frequency	\sim	175 kHz	Sensor complete
Acceleration sensitivity	0.0003 bar/g	axial	
	0.0002 bar/g	radial	
Shock resistance	\geq	2000 g	
Insulation resistance	\geq	$1 * 10^{13} \Omega$	100 V, RT
Capacitance	7 pF		
Operating temperature range ⁽²⁾	- 40 ... 500 °C		
Thermal sensitivity change	$\leq \pm$	1.5 %	20 ... 500 °C and 0 ... 300 bar typ.
	$\leq \pm$	0.2 %	200 \pm 50 °C and 0 ... 300 bar
Maximum operating temperature at sensor front	500 °C		
Load change drift		1.5 mbar/ms	max. gradient typ.
Cyclic temperature drift ⁽³⁾	$\leq \pm$	0.4 bar	
Thermo shock error Δp ⁽⁴⁾	$\leq \pm$	0.2 bar	typ.
Thread diameter	M5x0.5	front sealed	
Cable connection	M3x0.35	negative	
Weight	1.9 grams	without cable	
Mounting torque	1.5 Nm	using SF01	

Scope of Supply

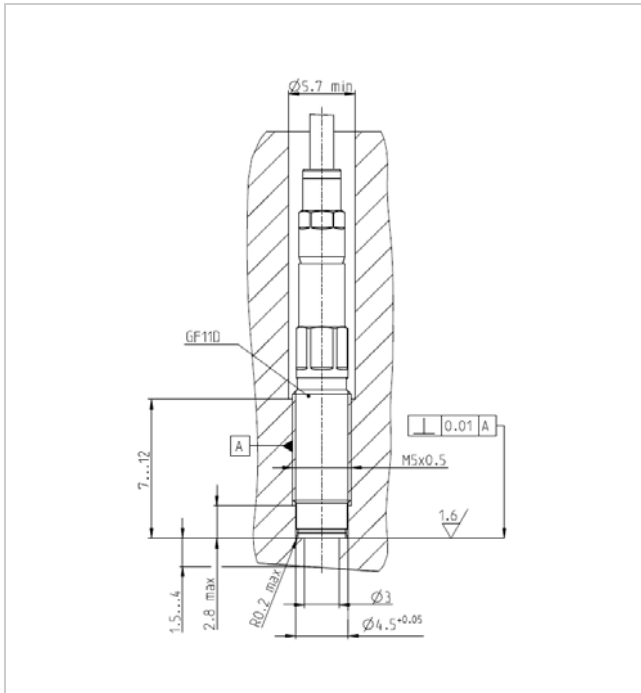
- Sensor GF11D
- Piezo-input cable C135-1
- Fitted coupling CC31
- Accessory kit (protection cap + 2 spare O-rings)
- Calibration sheet
- Documentation

¹⁾ SID (Sensor Identification) is used for SDM (Sensor Data Management)

²⁾ surface temperature around the HEX < 200 °C

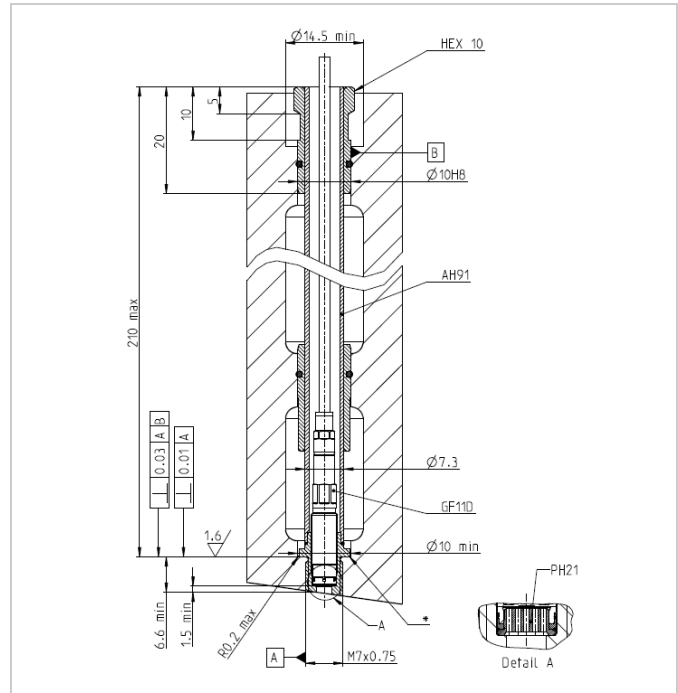
³⁾ at 7 bar IMEP and 1300 rpm, diesel

⁴⁾ at 9 bar IMEP and 1500 rpm, gasoline



Front sealed direct installation.

*) 1.5 mm for steel, 4 mm for cast iron and aluminium R01 alloys.



Installation with an AH91 adaptor and the PH21.

*) Rigid adhesive, e.g. LOCTITE 648 or Henkel omniFIT.

Accessories

Cables & couplings	CI31, CI32, CI35, CI3V, CC31, E124, CH31	
Cable-mounting tool	TC02	TIWG0613A.01
Dummy	DG24	TIWG0334A.01
Dummy removal tool	TD13	TIWG0224A.01
Adaptor sleeves	AH01, AH01A, AH91, MA01, MA02, MA03, MA07	
Mounting tool	Toolset TS21 (TT21A, TT02) Mounting socket TT21A Torque wrench TT02 PH21 dismounting tool TT51	TIWG0213A.01 TIWG0663A.01 TIWG0117A.01 TIWG0532A.01
Machining tool	Toolset MS15 (MD12, MT12) Step drill MD12 Tap drill MT12 Seat dressing tool MR01-85 Seat dressing tool MR01-160	TIWG0337A.01 TIWG0335A.01 TIWG0346A.01 TIWG0616A.01 TIWG0632A.01
Mounting paste	SF01	TIHK0094A.01
Thermo protection	PH21	TIBQ0283A.01

Icons of strength / Measurement Task

	<p>Toughness / knock applications Purpose: Specially designed to withstand under extreme and harsh conditions</p>	<p>Examples: Analysis of knocking combustion, operation under high engine loads, supercharged engines.</p>		<p>Gallium Orthophosphate GaPO₄ Patented unique crystal material.</p>	<p>Today, GaPO₄ is by far the best suited piezoelectric material to be used in sensor applications. It has a combination of several unique properties that make it the first choice.</p>
	<p>Precision / thermodynamic analysis Purpose: Very highly accurate measurements for critical thermodynamic analysis.</p>	<p>Examples: Measurements for heat release and friction loss calculations</p>		<p>Double Shell™ Mechanically decouples the crystals from the housing for premium signal quality.</p>	<p>Due to their high sensitivity, these elements are also susceptible to any other kind of applied pressure which would else cause a misreading of the combustion pressure</p>
	<p>Durability / endurance testing Purpose: Specially designed to withstand under extreme and harsh conditions</p>	<p>Examples: Onboard monitoring of large marine or stationary engines</p>		<p>SDM Sensor Data Management Increasing efficiency due to organized workflow.</p>	<p>SDM guarantees end-to-end automated data transfer and thus ensures errorfree measurements. This solution covers the complete measurement chain running from the sensor to the software.</p>

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