



Cylinder Pressure Sensors

Specification and Application



IMES - Cylinder pressure sensors made in Germany



Nowadays sensors and measuring systems to analyse cylinder pressure and injection pressure are of great importance in the field of combustion engines.

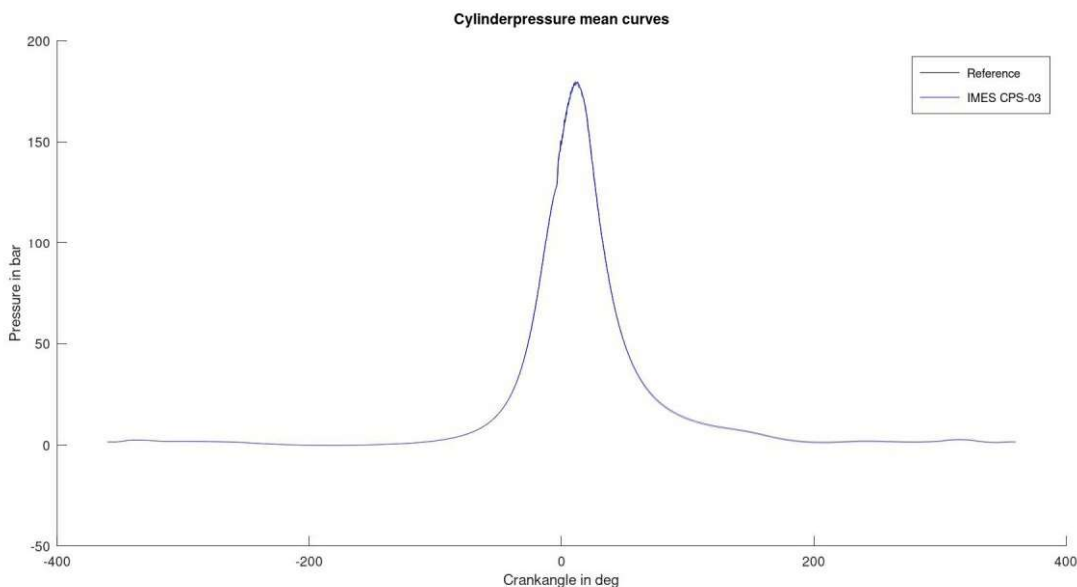
Engine manufacturers are required to fulfil numerous international safety standards and even the engines in the field have to be optimally adjusted as they have to fulfil numerous environmental regulations. Robust cylinder pressure sensors are becoming increasingly challenging.

Optimal adjusted engines do not only comply with different regulations, they also offer great potential savings e.g. less fuel and oil consumption, less wear and tear, more durable engines.

IMES sensors are employed on a wide range of diesel-, gas- and dual fuel engines, on ships and locomotives, in power and cogeneration plants and pipeline compressor stations all around the world.



Thermodynamic comparison of IMES' sensor CPS-03 to watercooled piezoelectric sensor

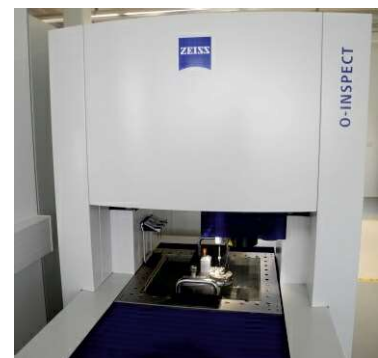
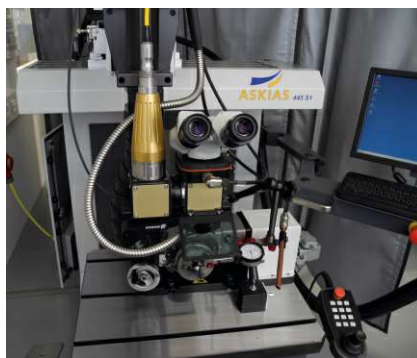


The particular aspect of IMES cylinder pressure sensors

State-of-the-art facilities

For more than 25 years IMES is specialised in cylinder pressure sensors for every kind of engine like diesel-, gas- or dual-fuel engines, two- and four stroke engines from 100 kw to 60,000 kw output.

Due to our state-of-the-art ISO certificated production facilities equipped with the latest manufacturing technology and a highly qualified development department all our products provide an outstanding quality and know-how.



Our own special setup and connection method and our own special platform strategy enable us to manufacture all sensors according to our customers' requirements with short delivery times.

Depending on customers wishes we provide our sensor types with various sleeve length, cable length, measuring cell and different electronic with various measuring range and output signal range.

Permanent high quality

Our sensors convince with their long term accuracy with minimal signal drift over long periods. Designed for a minimum of 16,000 operating hours they enable the acquisition of highly accurate, processable data during periodic checks and during continuous monitoring of combustion pressure.

International standards

Marine Type Approval is a mandatory requirement for voyage and safety critical devices installed on a ship. Of course, our sensors have received Marine Type Approval from all significant international classification societies such as Bureau Veritas, DNV, ABS, Lloyd's Register, Class NK and RINA.

We also offer sensors that are also suitable for hazardous areas and that received certificate of compliance from SGS.

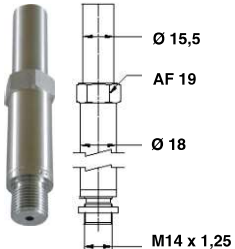
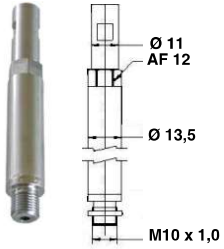
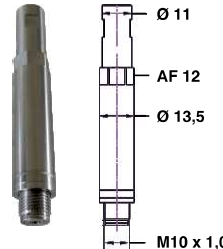


IMES Cylinder pressure sensors

All our sensors offer

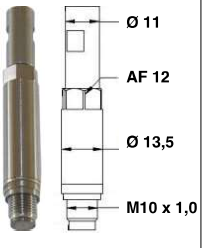
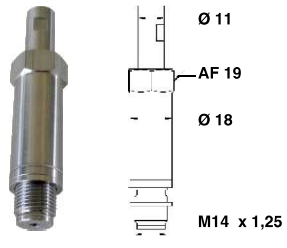
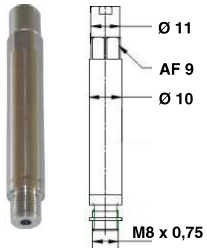
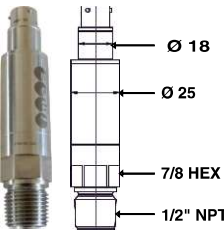
Output signal range	Frequency range	Accuracy error	max. temperature measuring cell	Thermal shock 1500 RPM pmi=10 bar
4...20 mA option 0,5...4,5 V	2 or 10 kHz (others on request)	≤ 1% Full scale	300°C (short time 1 min. 350°C)	< +/- 0,5 bar

NEW sensor type

Specification and technical data	HTT-04®	HTT-04CA®	CPS-01	CPS-01CA®	CPS-03	CPS-03CA	
				<p>On-line combustion control on diesel- and gas engines for increasing engine performance and optimised engine control.</p>	<p>On-line combustion control on diesel- and gas engines for increasing engine performance and optimised engine control. Extreme robust against high dp/dt and against vibration. Protection class IP69.</p>	<p>Closed loop control on diesel-, gas- and dual-fuel engines</p>	<p>Closed loop control on diesel-, gas- and dual-fuel engines</p>
Application	0...300 bar	0...300 bar	0...300 bar (others on request)	0...300 bar (others on request)	0...300 bar	0...300 bar	
Measuring range	1200 bar (option 1500 bar)	1200 bar (option 1500 bar)	1200 bar (option 1500 bar)	1200 bar (option 1500 bar)	1200 bar (option 800 bar)	1200 bar (option 800 bar)	
Over pressure static	Plug DIN M12	MIL-C-26482	Plug DIN M12	MIL-C-26482	Plug DIN M12	MIL-C-26482	
Electrical connector	M14 x 1,25	M14 x 1,25	M10 x 1	M10 x 1	M10 x 1	M10 x 1	
Thread							

NEW sensor type

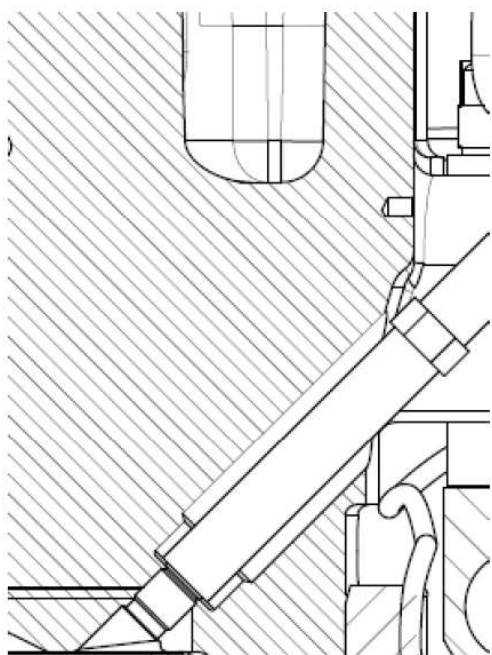
NEW sensor type

Specification and technical data	TCS-01CA	HTT-06	HTT-06CA	SPS-01	HTT-05CA for compressors		
					<p>Two-stroke combustion sensor for continuous measurement of combustion pressure. Perfectly suitable for cylinder balancing and performance evaluation.</p>	<p>On-line combustion control on diesel- and gas engines for increasing engine performance and optimised engine control. Extreme robust against high dp/dt and against vibration. Protection class IP69.</p>	<p>Small pressure sensor for continuous measurement of combustion pressure on diesel- and gas engines.</p>
Application	0...250 bar	0...300 bar	0...300 bar	0...300 bar (others on request)	0...300, 600, 1000, 1500, 3000, 5000 psi		
Measuring range	400 bar	1200 bar (option 800 bar)	1200 bar (option 800 bar)	1200 bar	3000, 4000, 10000 psi		
Over pressure static	MIL-C-26482	Plug DIN M12	MIL-C-26482	Plug DIN M12 / MIL-C-26482	MIL-C-26482		
Electrical connector	M10 x 1	M14 x 1,25	M14 x 1,25	M8 x 0,75	1/2" NPT		
Thread							

Mounting options

Our sensors convince with their long-term accuracy with minimal signal drift over long periods. Designed for a minimum of 16,000 operating hours they enable the acquisition of highly accurate, processable data during periodic checks and during continuous monitoring of combustion pressure.

Mounting



The combustion pressure sensors should be installed close to the combustion chamber, the length of the pressure bore between sensor and combustion chamber depends on engine speed.

Generally, there are two possibilities for the installation position of cylinder pressure sensors:

Head mounted or set-back mounted. We recommend the head mounted installation.

Head mounted installation near to the combustion chamber

Protection cover

For all our cylinder pressure sensors we offer protection covers for the signal conditioning unit (SCU). They are temperature and oil resistant. The protection cover reduces the vibration level of SCU on engines and it enables an easy mounting on the engines.



The new cylinder pressure sensor generation

CPS-03 and HTT-06 for online combustion control on diesel- and gas engines



Characteristics

- Extreme robust against high dp/dt
- Designed life expectancy of 16,000 h
- Digital electronic with event storing
- Very good thermodynamic performance
- Protection class IP69

Marine qualification

- DNV
- Bureau Veritas
- Class NK
- Korean Register
- American Bureau Of Shipping
- Lloyd's Register
- RINA

The new cylinder pressure sensor types HTT-06 and CPS-03 fulfil the requirements of engine manufacturers regarding efficiency, longevity and accuracy for application on high efficiency diesel- and gas engines.

The heart of these sensors is a high temperature strain gauge thin film measuring element based on TION (Titanium oxynitride) which is located in the front of the sensor thread (M10x1 and M14x1,25). Due to a new connection method the sensors withstand temperatures up to 350°C for short time as well as high shock levels.

HTT-05CA - compression pressure sensor



The temperature compensated compression pressure sensor HTT-05CA with integrated electronic has a very good zero offset stability and is suitable for temperatures from -55°C up to +200°C. Pressure ranges are available from 300 to 10,000 psi.

The application in areas with special gases like H₂ and H₂S is in preparation.

Characteristics

- For measurement on compressors
- Application in hazardous areas
- Temperature compensated pressure signal
- SGS certified Div1, Class1, Group A-D
- Very good zero offset stability
- Medium temperature -55°C - +200°C

Accuracy check for all IMES sensor types

Sensor-Test-Kit for sensor offset and -span evaluation

The main components of the easy to mount test-kit are the hydraulic pressure pump including manometer, the sensor check-box and the visualisation software.



Sensor Check Report



Company, ship name or power plant: IMES, Cogeneration plant
 Engine: MAN
 Engine number: 123456789
 Operator: Stefan Vaumann
 Date: 08.11.2018
 Sensor type: OHS-01CA
 Serial Number: 9552-17-1273-0

Evaluation (Temperature: 23°C)	
Offset	Current: 4,508mA
	Pressure: 2,8bar
	Deviation: 3,77% (referenced to 1,000mA)
	Result: within specification
Span	Current (measured): 8,091mA
	Pressure (measured): 50,0bar
	Current (norm. to 300,0bar): 6,0182mA
	Pressure (normalized): 300,3bar
	Deviation: 0,11% (referenced to 16,000mA)
	Result: within specification
Tidal status:	approved

Read out Sensor Operation Data

Operation time (powered): 0h
 Operation time (engine running): 0h
 Maximum pressure: 283,4bar
 Maximum temperature: 82,6°C

Pressure Pump

Model: Sika Ref E2
 Serial number: 1795168
 Calibration date: 16.10.2018

Signature:

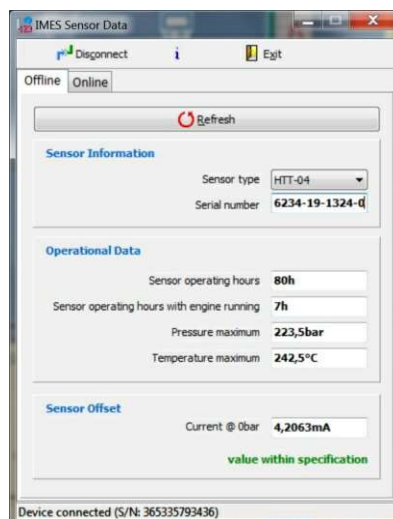
All data will be displayed in a sensor evaluation report and the measured data of sensor offset and -span will be compared with sensor specification.

In conjunction with the hydraulic pressure pump the check-box is suitable for **sensor offset and -span evaluation**.

The software is reading out stored **maximum pressure, maximum temperature and engine operating hours**.

Check-box for sensor data evaluation

Control of sensor accuracy by reading out sensor operation data. The sensor SCU is connected to the check-box by serial interface and via USB to a PC.



Read out from sensor electronic

- sensor operating hours
- maximum pressure
- maximum temperature
- sensor offset @ 0 bar
- actual Pmax and Tmax reading during engine operation



We deliver worldwide!

Professional support worldwide due to our global sales organisation.

www.imes.de/sales-team.html