



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.

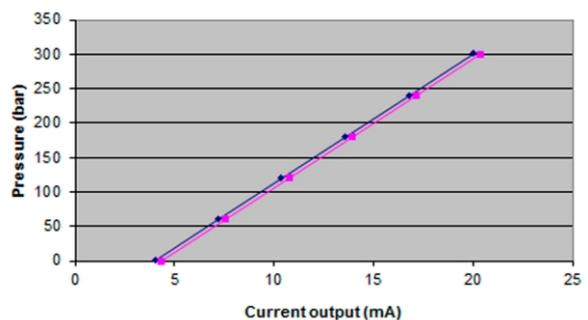
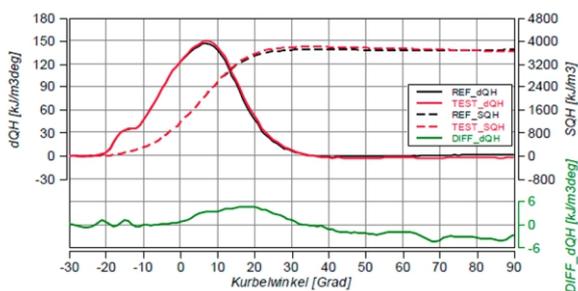
Engine manufacturers are required to fulfil numerous international safety standards and even the engines in the field have to be optimally adjusted as they have to fulfil numerous environmental regulations.

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.

The advanced data acquisition and visualisation systems allow marine, generating plant and gas compressor stations to operate cleaner, more efficiently and more reliable by reducing fuel consumption, CO₂ emissions and carbon particles.



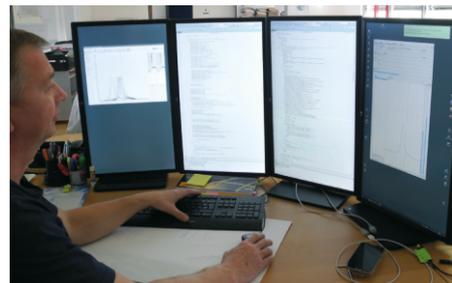
Thermodynamic comparison of IMES sensor CPS-01 to watercooled piezo electric sensor

Long-term stability of IMES sensor HTT-04. Evaluation after more than 10,000 operating hours.

The particular aspect of IMES cylinder pressure sensors

Long-time experience

For more than 20 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.



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 GL, ABS, Lloyd's Register, Class NK or China Classification Society.



Prompt, flexible, reliable

Due to our own special setup and connection method and our own special platform strategy we are able 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.

Overview - IMES Cylinder pressure sensors

All our sensors offer

Output signal range	Frequency range	Accuracy	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

Specification and technical data	HTT-04®	HTT-04CA®	HTT-05®	CPS-01	CPS-01CA®	CPS-02
	On-line combustion control on diesel- and gas engines for increasing engine performance and optimised engine control.		Sensor with integral SCU for on-line combustion control to increase engine performance and optimise engine control.	On-line combustion control on diesel- and gas engines for increasing engine performance and optimised engine control.		Sensor with integral SCU for on-line combustion control to increase engine performance and optimise engine control.
Application	Closed loop control on diesel-, gas- and dual-fuel engines		Closed loop control on internal combustion engines	Closed loop control on diesel-, gas- and dual-fuel engines		Closed loop control on internal combustion engines.
Measuring range	0...300 bar	0...300 bar	0...300 bar	0...300 bar (others on request)	0...300 bar (others on request)	0...300 bar
Over pressure static	1200 bar (option 1500 bar)	1200 bar (option 1500 bar)	1200 bar (option 1500 bar)	1200 bar (option 1500 bar)	1200 bar (option 1500 bar)	1200 bar (option 1500 bar)
Electrical connector	Plug DIN M12	MIL-C-26482	Plug DIN M12	Plug DIN M12	MIL-C-26482	Plug DIN M12
Thread	M14 x 1,25	M14 x 1,25	M14 x 1,25	M10 x 1	M10 x 1	M10 x 1

Specification and technical data	TCS-01CA	FPS-01	FPS-01CA	FPS-02	SPS-01	SPS-01CA
	Two-stroke combustion sensor for continuous measurement of combustion pressure. Perfectly suitable for cylinder balancing and performance evaluation	Front membrane pressure sensor for continuous measurement of combustion pressure. Perfectly suitable for cylinder balancing and performance evaluation.			Small pressure sensor for continuous measurement of combustion pressure on diesel- and gas engines.	
Application	Permanent installation on two-stroke diesel engines.	Permanent installation on four-stroke diesel engines or dual fuel engines.			Permanent installation at close proximity, where access is a problem and in very thin pipes.	
Measuring range	0...250 bar	0...300 bar	0...300 bar	0...300 bar	0...300 bar (others on request)	
Over pressure static	400 bar	400 bar	400 bar	400 bar	1200 bar	
Electrical connector	MIL-C-26482	Plug DIN M12	MIL-C-26482	Plug DIN M12 / MIL-C-26482	Plug DIN M12	MIL-C-26482
Thread	M10 x 1	M10 x 1	M10 x 1	M14 x 1,25	M8 x 0,75	

All data sheets with more specific information may be found on our web site www.imes.de/support.html

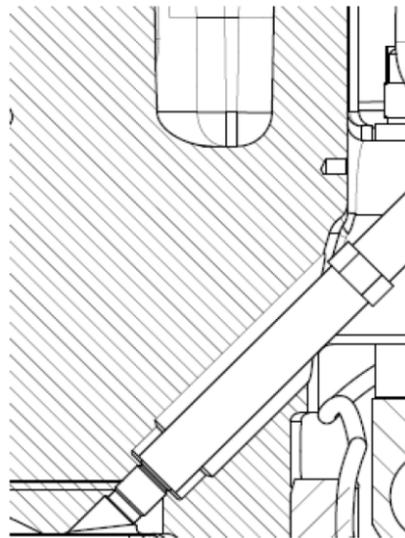
and mounting option

Mounting

The sensor 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

HTT-04CA[®] for compressors



Compression pressure sensor for real time pressure inputs from the compressor cylinders, e.g. indicated HP, rod load, volumetric efficiencies. Received CSA approval.

High pressure measurements on compression pump

0...1500, 3000, 5000 psi

3000, 4000, 10000 psi

Plug DIN M12

M14 x 1,25

Protection cover

For all our cylinder pressure sensors we offer protection covers for the signal condition electronic (SCU). They are temperature and oil resistant.

The protection cover reduces vibration level of SCU on engines and it enables an easy mounting on the engines.



Periodic combustion monitoring on Diesel Engines

The user friendly electronic indicator EPM-XP is designed for periodic monitoring of cylinder pressure on large 2- and 4-stroke diesel engines. It is equipped with our powerful cylinder pressure sensor HTT-04® and can record cylinder pressure values on up to 20 cylinders on 2-stroke diesel engines operating at speeds between 40 and 300 rpm and on 4-stroke medium and highspeed diesels with rated speeds between 200 and 1500 rpm.

More than 2,300 units have been sold so far world wide and it is famous for its high accuracy, reliability and ease of use.



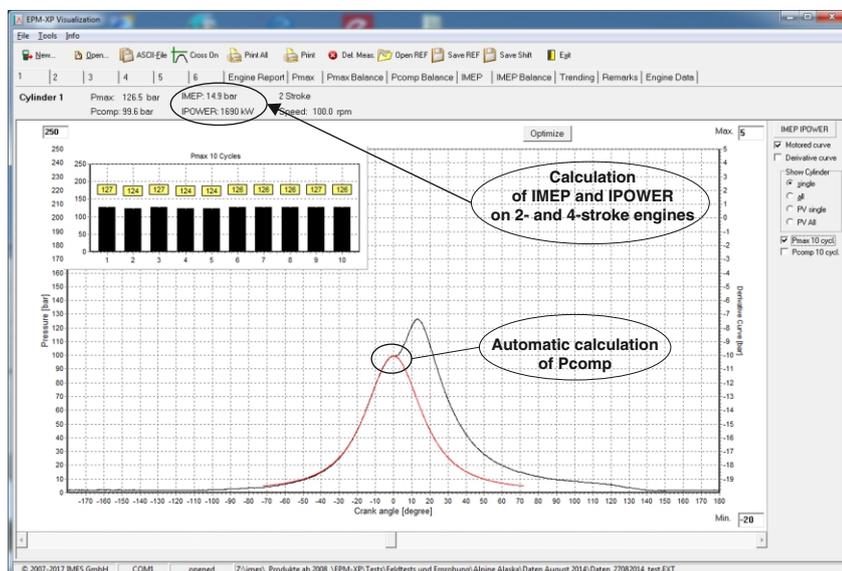
Measuring range	0...300 bar
Accuracy	+/- 0,5% full scale
Storing capacity	20 measurements / engine
Interface	USB
Battery	E-Block re-chargeable NiMH 270 mA

Electronic pressure indicator EMP-XP with HTT-04® sensor including adaptor

Advanced visualisation and data processing software

The EPM-XP visualisation software provides important measurement data for engine diagnostic and condition monitoring directly at the point of use. The acquired data can be downloaded to a computer where the IMES visualisation and evaluation software is used to calculate specific combustion parameters, for example IMEP and IPOWER,

Furthermore trending functions can be used to compare measurement data at the same engine output to find deviations in the combustion process for preventive maintenance on engine.



On 2- and 4-stroke application the software automatically calculates the curve to optimise TDC position for Pcomp value of each cylinder.

Periodic combustion monitoring on Gas Engines

The EPM-XG gas engine balancer is designed as a compact, lightweight and affordable hand-held electronic device, specially tailored to periodic cylinder pressure monitoring and output balancing on gas engines. It delivers valuable information on engine condition. It is popular in pipeline compressor application because of its high accuracy and ease-of-use characteristics combined with its sophisticated analysis software.

EPM-XG employs the same basic technology as the EPM-XP device for diesel engines and also its capabilities and functionalities are essentially similar to EPM-XP.



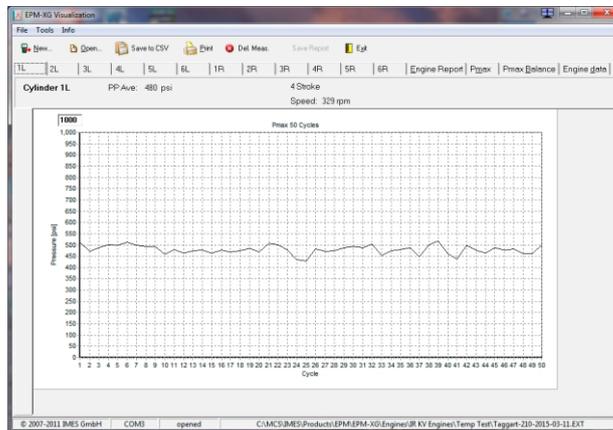
Measuring range	0...2000 psi
Accuracy	+/- 0,5% full scale
Storing capacity	20 measurements / engine
Interface	USB
Battery	E-Block re-chargeable NiMH 270 mA

EPM-XG in operation on a gas compressor

Advanced visualisation and data processing software

EPM-XG comes with powerful PC analysis software that includes the following features:

- Balancing bar chart
- Peak pressure bar chart
- 50 cycle peak pressure history for each cylinder
- Excel-based analysis report that includes peak pressure, standard deviation, Pmax and Pmin for each cylinder



The cylinder tabs display a graph of the peak pressure measured on 50 consecutive engine cycles. The cylinder number, the average peak pressure and RPM measured over the 50 cycles, and the 2/4 stroke mode are displayed above the graph.

The user can adjust the peak pressure scale.



We deliver worldwide!

Professional support worldwide due to our global sales organisation.

www.imes.de/sales-team.html