



the cylinder pressure people

EPM-XP

Electronic Indicator
for Diesel Engines



www.imes.de

Instrument for Combustion Monitoring



EPM-XP instrument case incl. all components

.Designed for periodic monitoring of cylinder pressure on diesel engines, the Electronic Indicator EPM-XP can record cylinder pressure values on a maximum of 20 cylinders (option: 160 cylinders) on two-stroke diesel engines operating at speeds of 40 to 300 rpm and on four stroke medium and high speed diesels with rated speeds from 200 to 1500 rpm.

The EPM-XP, more than 1,300 units sold, has proven considerably simpler to operate and far more accurate. After acquisition, recorded data can be downloaded immediately to a PC or notebook via a USB connection. Recorded data can be simply processed by IMES' visualisation software.

Transmitting the data by Internet makes them available for expert analysis and condition monitoring at a remote location. An optional software upgrade allows power calculation to assist cylinder balancing.



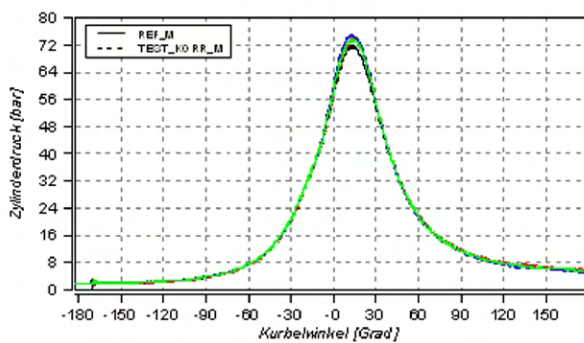
Application on MAN B&W two stroke engine built under license by Kawasaki Heavy Industries

Designed for robustness, high accuracy and long life



HTT cylinder pressure sensor including adaptor

The EPM-XP cylinder pressure indicator is characterised by its high accuracy, reliability and ease of use. Central to the performance of EPM-XP is the proven accuracy, reliability, longevity and cost effectiveness of IMES' advanced type HTT pressure sensor employing TION thin film technology. More than 40,000 type HTT sensors have been delivered for a range of closed loop control applications.



Comparison to water cooled piezoelectric reference sensor

They are affordable and their robustness and performance has been proven in many applications. As a result, standard effective life is more than 16,000 operating hours on both diesel and gas engines. On this basis we are sure that our sensors offer the best combination of robustness, longevity, reliability, price and above all accuracy available on the market.



EPM-XP connected to a hand-operated pneumatic testing pump and manometer set

With our hand-operated pump and manometer device, IMES provides customers with a quick and straightforward way of investigating apparently anomalous readings as well as achieving compliance with the ISO 9001 requirement for end-user testing of measuring equipment. Due to this no workshop calibration is needed.

IMES Visualisation and data processing software

IMES' visualisation and data processing software is used to process acquired values and to display the derived information. The resulting files can be transmitted by Internet to the engine builder and shipowner for separate, independent evaluation

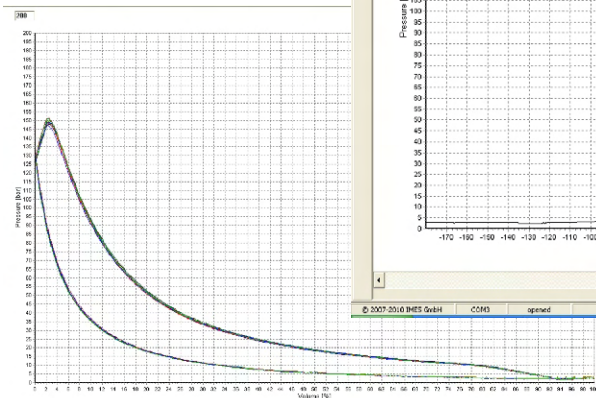
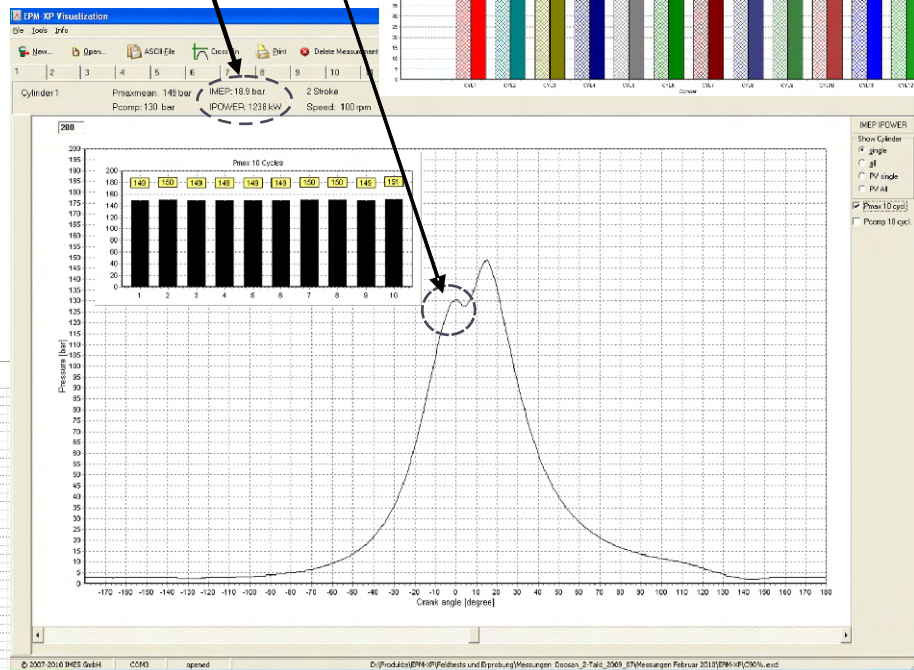
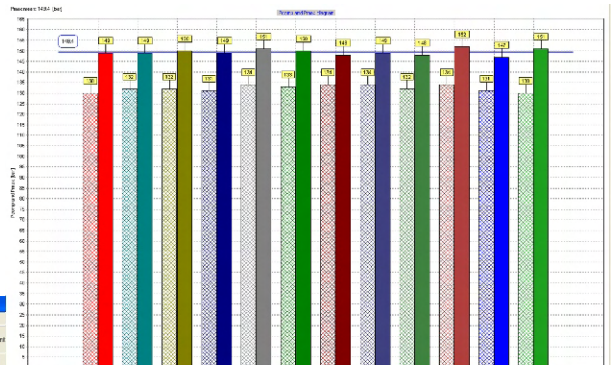
The standard software allows to calculate compression pressure on 2-stroke engines automatically.

With the EPM-XP hardware dongle further evaluations can be activated. This enables to calculate IPOWER and IMEP by using a mathematical algorithm.



EPM-XP connected via USB cable to notebook for quick data download and for charging 9 V block battery

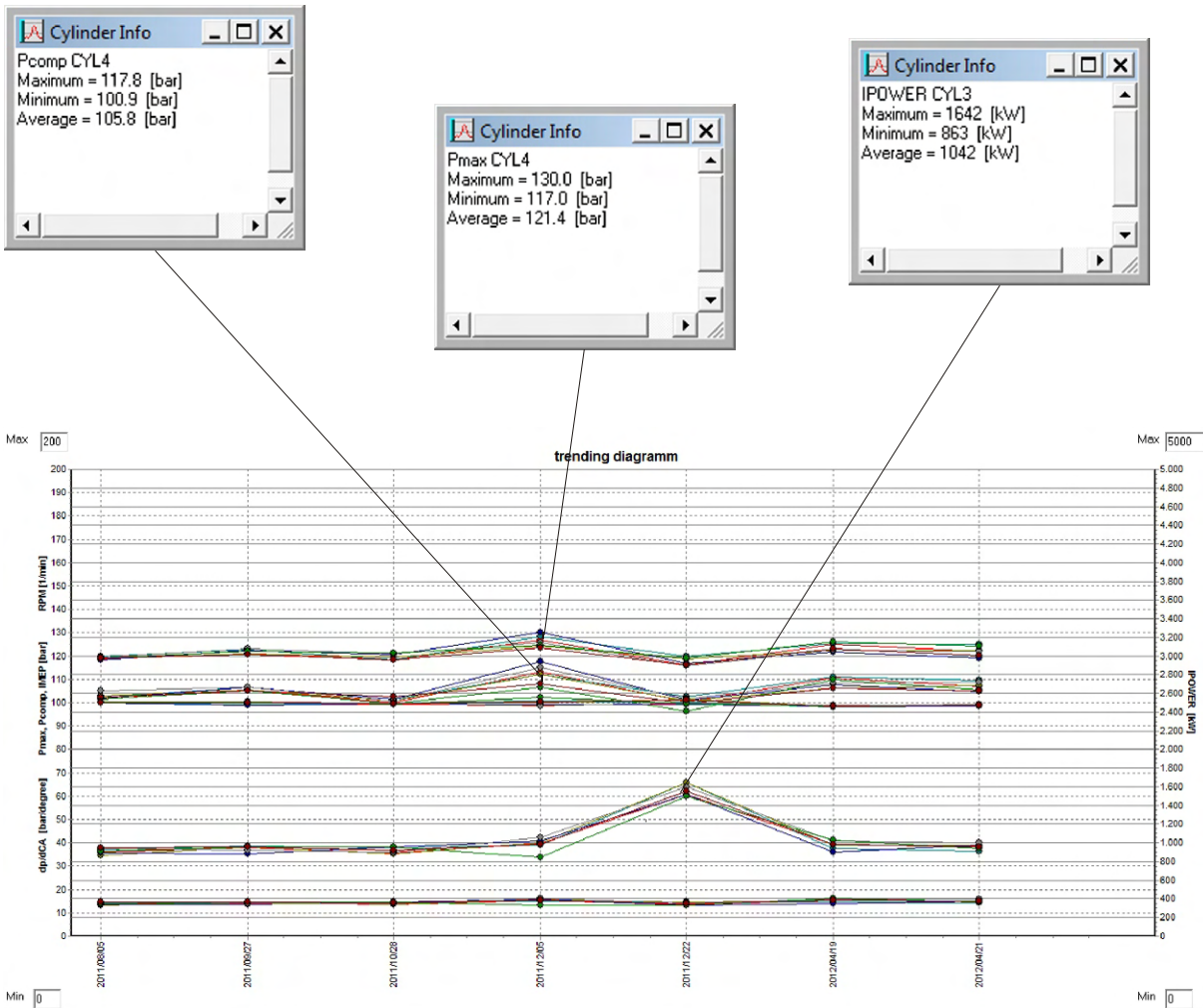
Calculation of Pcomp and IPOWER on two strokes



with trending function

The advanced trending function is a useful tool to compare measurement data at the same engine output to find deviations in combustion process for preventive maintenance on engine. The analysis can be made

by comparing the results to other measurements, mean values and configured limit lines (optimal range). Measurements made in long term indicate clearly the trends of the engine parameters, which will help to predict emerging failures.

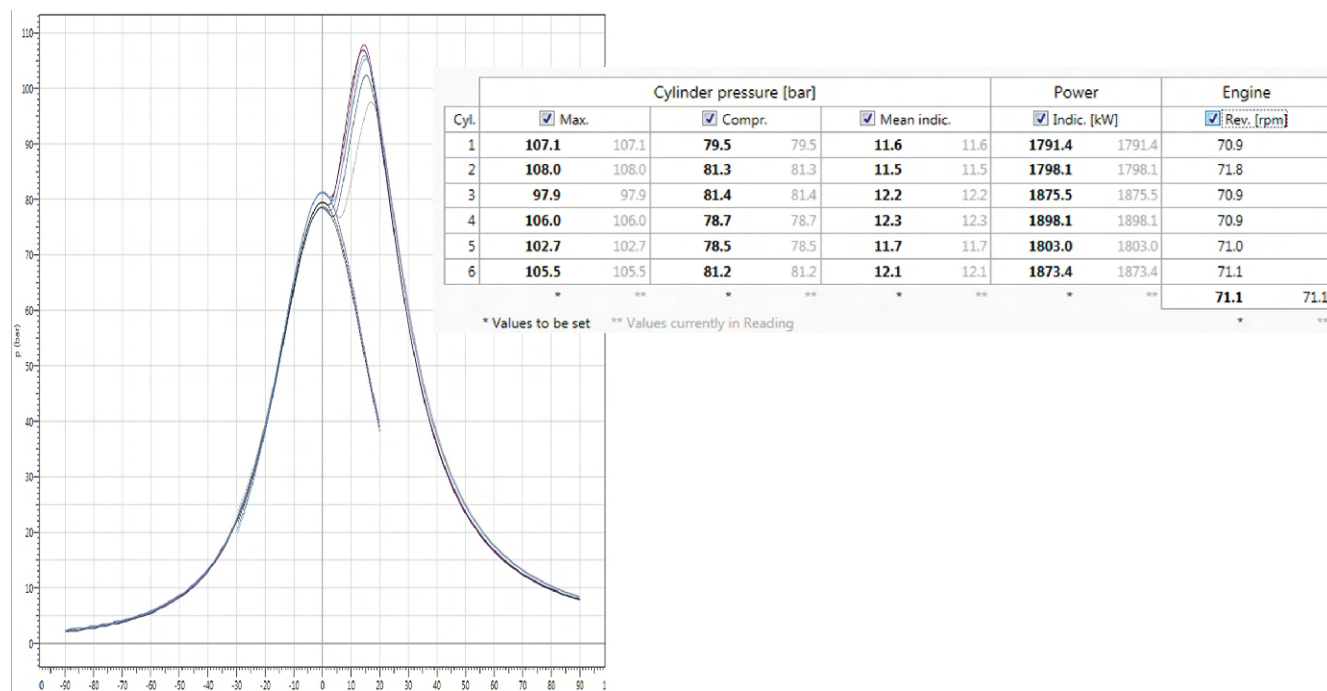




IMES TPE—Performance Evaluation Software

The new IMES TPE software loads cylinder pressure data from EPM-XP directly. It is designed to facilitate the collection, evaluation, management and comparison of engine performance data for marine diesel engines. You only need to fill in the required information so the program can do ISO corrections and compare against

new-engine performance benchmarks. Performance graphs and reports give a quick status of an engine and suggest actions take for optimising engine condition. This enables extensive savings by reducing fuel and oil consumption as well as engine repairs caused by inadequately adjusted engines.



	ISO CORRECTED		MEASURED							
	REF.	CALC.	AVG.	CYL 1	CYL 2	CYL 3	CYL 4	CYL 5	CYL 6	
Firing pressure	barG	116,0	108,0	104,5	107,1	108,0	97,9	106,0	102,7	105,5
pmax deviation	bar			2,6	3,5	-6,6	1,5	-1,8	1,0	
Compression pressure	barG	80,7	81,6	80,1	79,5	81,3	81,4	78,7	78,5	81,2
pcomp deviation	bar			-0,6	1,2	1,3	-1,4	-1,5	1,1	
Mean indicated pressure	barG	12,11		11,92	11,64	11,53	12,18	12,33	11,69	12,13
MIP deviation	bar				-0,28	-0,39	0,26	0,41	-0,23	0,21
Mean effective press. (MEP)	bar	11,47		11,27						
Power indicated	kW		SUM:	11039	1791	1798	1876	1898	1803	1873
pmax-pcomp pcomp / pscav	-	35,3 34,8		24,5 35,5						

Extensive savings due to professional evaluation

IMES TPE offers an automatic evaluation of current engine performance. Performance graphs and reports show deviation and suggest actions to take for optimising engine adjustment.

Other indications		
Exh. gas temp. TC in 1	High	
Firing press. (pmax) CYL 1	Very low	See Firing pressure AVG
Firing press. (pmax) CYL 2	Low	See Firing pressure AVG
Firing press. (pmax) CYL 3	Very low	See Firing pressure AVG
Firing press. (pmax) CYL 4	Very low	See Firing pressure AVG
Firing press. (pmax) CYL 5	Very low	See Firing pressure AVG
Firing press. (pmax) CYL 6	Very low	See Firing pressure AVG
p_max deviation CYL 2	High	
p_max deviation CYL 3	Very low	Injection- or fuel pump valves worn. / Injection pumps and cams adjustment wrong.

Furthermore the report gives an overview about potential savings. Fuel and lube oil can be reduced up to 2 %. This means savings about 20.000,00 USD in two month.

Optimization potential

Influenced by	Potential saving / reduction		Cylinder lub oil
	Fuel	Thermal load	
Injection timing	2,4 g/kWh	3 °C	
Suction pressure			
Pressure drop accross SAC			
Water temp. SAC in (for setpoint 29°C)			
Scav. air temp. SAC out			
Press. drop accross ENGINE			
Exh. gas press. TC out			
Turbocharger efficiency	1,0 g/kWh	10 °C	
Light running (sea margin)			
Fuel oil viscosity ENGINE in			
TOTAL	3,4 g/kWh		0,14 g/kWh
TOTAL (% of current)	1,8 %		
TOTAL (absolute / 1000 run. hrs.)	36 t		1,452 t

Consumption

Indication	Measured / calculated values		
	Fuel oil		Cylinder lub oil
Specific consumption reference	167,4 g/kWh		1,73 g/kWh
Specific consumption ISO / current	179,4 g/kWh		1,87 g/kWh
Measured values (uncorrected):			
Consumption per hour day	2025 kg/h	48,6 t/d	19,9 kg/h
Consumption nautical			



We deliver worldwide!

Professional support worldwide due to our global sales organisation.

www.imes.de/sales-team.html