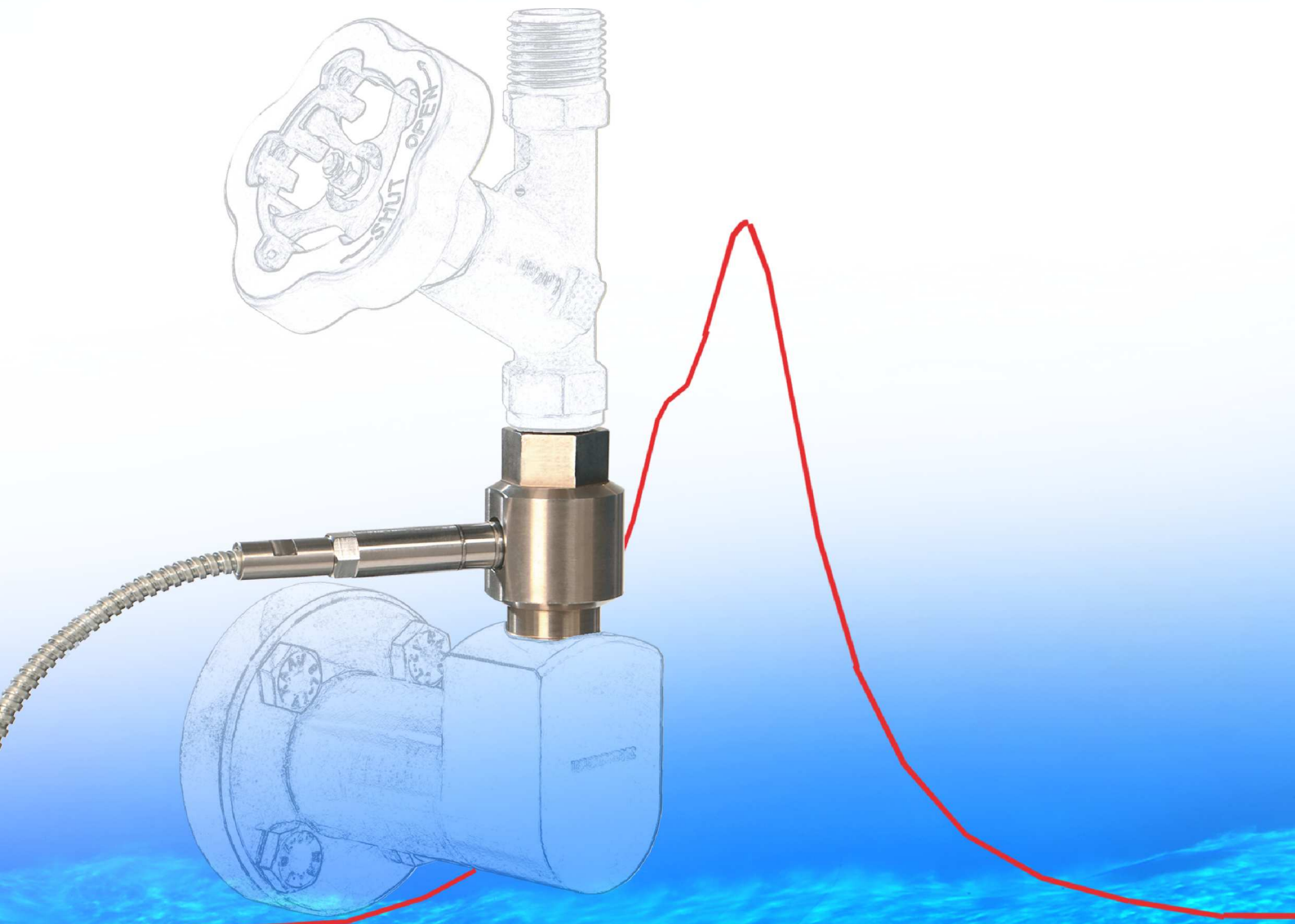




the cylinder pressure people

## CCM Marine

Optimise your engine performance



[www.imes.de](http://www.imes.de)

# CCM Marine - Combustion Monitoring Systems

CCM is an easy to use plug and play system, which enables in real time data acquisition of cylinder pressure on engines. Data can be recorded from up to 20 cylinders for closed loop control applications and to diagnose malfunctions or to assist in the setting and optimising of engine parameters e.g. balancing cylinders.

CCM Marine is a modern system for advanced engine balancing on 2- and 4-stroke marine diesel engines. At the centre of the efforts is cylinder balancing – the equalisation of output across all cylinders. Well balanced engines minimise fuel consumption between 2% and 3%. The smoother engine running will decrease wear and tear in the engine.

As an additional benefit, emissions of the greenhouse gas carbon dioxide can be reduced by some 2% which is of high importance in times where environmental regulations are becoming increasingly stringent (e.g. IMO TIER III limitations in Emission Control Areas).

We offer fixed and portable CCM systems for diesel and gas engines.



## Combustion control Module CCM

The main component of our CCM systems is the combustion control module. It is a smart combustion signal processing device for marine engines and stationary gas engines. Its function is to acquire and process in real time data from cylinder pressure sensors. Every combustion cycle will be evaluated on every cylinder for to calculate key parameters engine builders need to implement cylinder pressure based control on engines.

CCM is designed as a plug and play module, that means CCM communicates via CAN bus with the engine control system and it can be integrated to the engine management system. A further important function is that all data can be transmitted via internet to the server of the engine operator. This enables to control the engine from land.



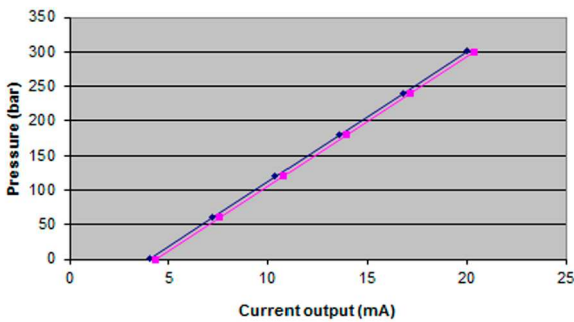
CCM combustion control module- the heart of our CCM systems

# for continuous and periodic operation

## High precision cylinder pressure sensors

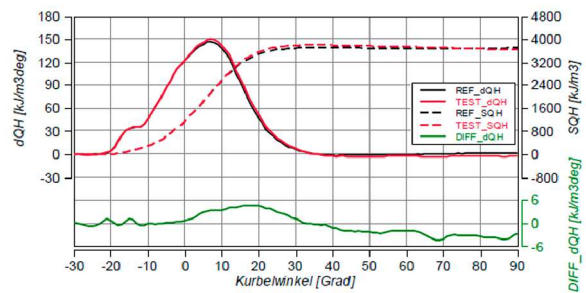
Our various types of cylinder pressure sensors are suitable for installation on 2- and 4-stroke engines and mesh with our CCM systems. Depending on engine type we offer sensors with various thread (M8 x 0,75, M10 x 1, M14 x 1,25), various sleeve and cable length and different measuring cells.

They all 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.



— IMES HTT-04 sensor 2008 — IMES HTT-04 sensor 2012

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



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

## Marine Type Approvals

Large engine manufacturers are required to fulfil numerous international safety standards. Marine Type Approval is therefore a mandatory requirement for voyage and safety critical devices installed on any ship.

Our sensor types 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.

For our combustion control module CCM, Marine Type Approval from Bureau Veritas and Class Nk are in preparation. Other approvals will follow shortly.



