



Engine Performance Monitoring

Getting from A to B on time can be a challenge in wind and weather. A well-coordinated team on a reliable ship is the be-all and end-all in seafaring.

Just like the sensory impulses our body sends us, our measured values from the analysis tools serve you.

How fit am I, how high is my load, ...?

The engine is the heart of the ship and requires special care.

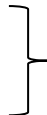
If the individual component groups are well coordinated and monitored, you can not only improve performance, but also increase longevity and efficiency and get the last out of your machines.

Reporting and internal reports can be generated at the push of a button. Maintenance can be planned (at an early stage and considered in the scheduling in good time.

Let's get the best out of your engine together.

The recording and processing of the following engine measured variables help us to do this:

- Shaft Torque
- Shaft Speed
- Shaft Power

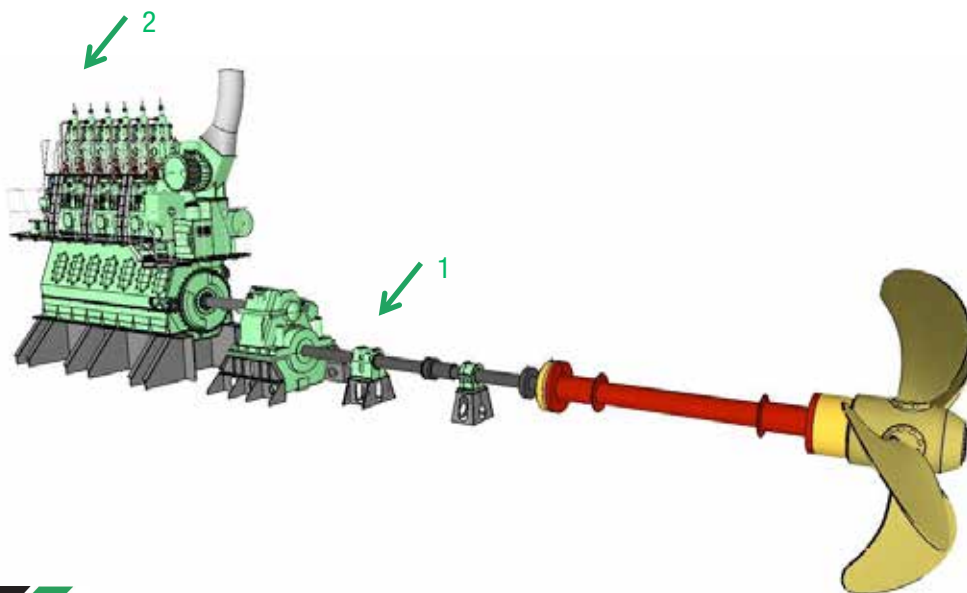


→ our solution for you the **TORXmeter® mkII shaft power meter (1)**

- Cylinder pressure
- Combustion characteristics



→ our solution for you are electronic and mechanical indicators **PMImkII, Type 50 and MSI-3 (2)**





TORXmeter® digi

Shaft power meter and ShaPoLi solution

Application:

The shaft power measurement system measures the power transmitted through a shaft, enabling the measurement of actual engine power delivered to the propeller.

Shaft power is an essential input (KPI) for ship performance monitoring systems and ship efficiency. Actual shaft power measurements levels provide an accurate reference point to assist with the assessment of:

- Engine performance monitoring
- Hull and Propeller condition
- Specific fuel oil consumption
- Operational efficiency planning
- Ship condition changes

Features:

- Easy to install via ship's crew (training video available)
- Easy operation
- PC software for displaying measuring data
- No electronic parts on the rotating shaft
- Full contactless
- Maintenance free
- Can be Installed in 1 day
- All Components can be replaced individually
- Easy error diagnosis via email due to fault indicators on the components and NMEA protocol
- Zeroing (new calibration) can be done by ship's crew

Measurement principle:

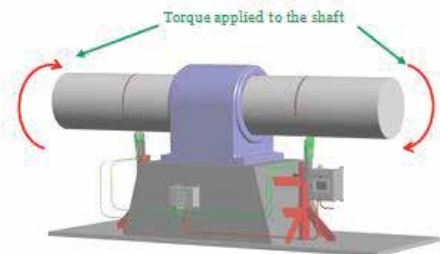
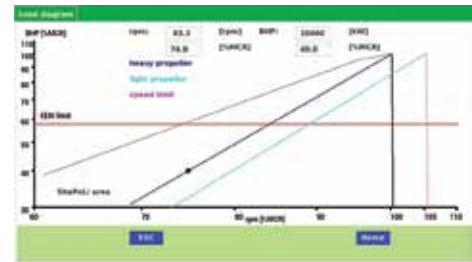
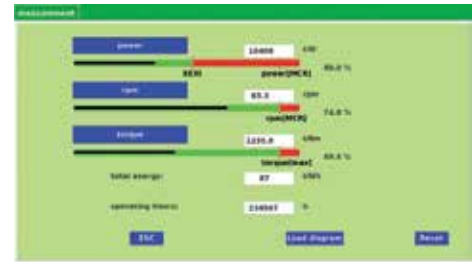
For the measurement of torque (twist angle) the system has two EXFR sensors (each with two sensor heads) and two EXFR sensor belts installed on the shaft. The two sensors detect the twisting of the shaft during operation of the engine through extremely fast response (EXFR) magnetic scanning of the magnetic pattern of the 2 installed belts. The sensors use the magnetic pole changing and the zero crossing (change of the magnetic fields) between the two EXFR sensor belts for angle measurement.



More Functionality – More Flexibility
ShaPoLi compliant – Class certificate in progress

TORXmeter® digi

www.txmarine.com

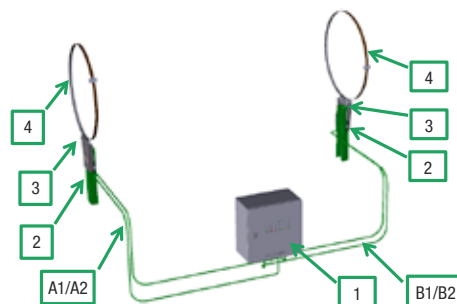




TORXmeter® digi

Scope of supply

- No. 1 Control unit with small display inside
- No. A1/A2 Pre-wired cable between Control Unit and EXFR sensors mkll (appr. 7,5 m)
- No. B1/B2 Pre-wired cable between Control Unit and EXFR sensors mkll (appr. 7,5 m)
- No. 2 2x Welding brackets (bracket must be welded to ships structure –No.4)
- No. 3 2x Sensor holder with pre-mounted 2 x 2 EXFR sensors mkll (A1/A2) (B1/B2)
- No. 4 2x EXFR sensor belts mkll
- No. 5 PC Software for setup parameter, display of measurement data and calibration (no picture)
- No. 6 “Torsional vibration” viewer of raw data and twist (no picture)



Technical Specification:	
Sensor Accuracy:	<0,1 % (Shaft Torque, Shaft RPM, Shaft Power) <0,1 %+Ke (Shaft Torque) (Ke means total error in shaft modulus constant and shaft diameter)
System Accuracy:	<0,1 % (Shaft Power, Shaft RPM)
Shaft diameter:	150 mm up to 3000 mm
Speed Range:	Up to 1200 rpm
Data & Performance Output:	Output via RS485 (NMEA183) protocol 1/s; Baud rate 4800 up to 38400 Output for °twist/°crankshaft; resolution <2°; binary 14 bytes Alarm output (Overload and system failure) 4-20mA output and MODBUS on request
Data storage:	Mini SD card on control board
Communication:	Setup via Laptop of all parameters via software and USB connection Small coloured display for setup and displaying measurement data
Update:	via USB connection
Option:	Repeater Display, ShaPoLi Display, Fuel Display

Optional available:

Display WH with Shaft Power Limitation (ShaPoLi) solution as optional equipment for the TORXmeter® shaft power meter. The system is a high-accurate and cost-effective measurement system in comparison with other power limitation solution, e.g. engine power limitation (EPL). The system is developed according with the latest EEXI Implementation Guidelines, published by the International Association of Classification Societies (IACS) in Rec. No. 172 with refers to the MEPC.335 (76). Our system is the reduced solution with alarm on the bridge and afterwards manual power limitation by the nautical personnel.





PMImkII

Electronic engine indicator

Application:

Precise digital pressure measurement for two and four stroke Diesel engines.

Features:

- No need to install a TDC Sensor
- Easy handling and Plug 'n' play installation of the Soft-and hardware results in less user related problems
- Long life components
- Usage of a high-quality sensor
- Integrated rechargeable batteries
- Software for analysis of measurement data, storage and send via email
- Start-up service and assistance for the first measurement via mail

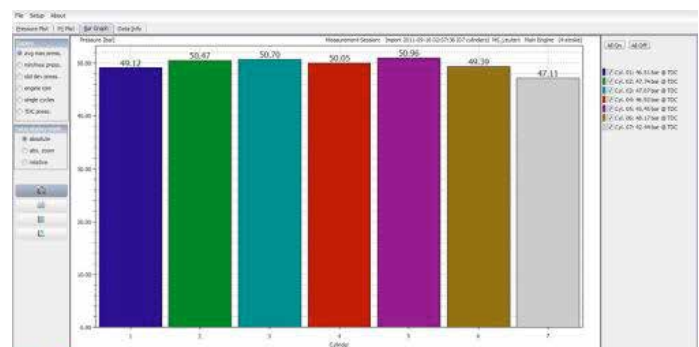
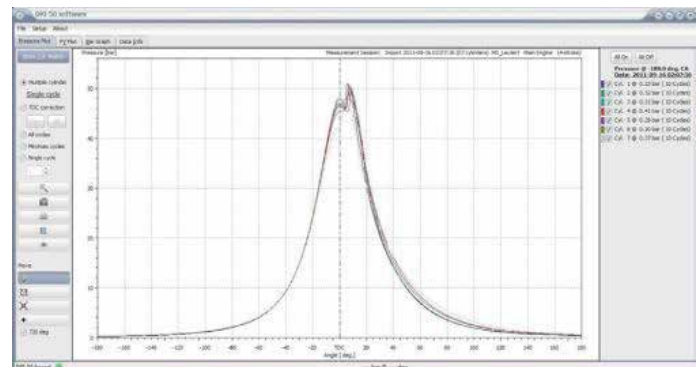
Measuring principle:

The pressure sensor is temporarily connected to the indicator valve. While the measuring series is being recorded, the data can be read off the LC display of the PMImkII handheld. After that, the data sets are saved to memory and can be transferred to the PC via the USB interface. The data may be evaluated and administered with the DPI software. In order to connect the pressure sensor, the engine to be analysed must be equipped with standard indication valves (Thompson connection).

Analysing Software:

A larger amount of information as shown on the screen of the device can be displayed on a PC or laptop using the PC software.

After measuring the pressure with the PMImkII handheld the measured data can be downloaded to any PC and analysed with our analysing software supplied with the PMImkII on the handheld.



	Cyl.1	Cyl.2	Cyl.3	Cyl.4	Cyl.5	Cyl.6	Cyl.7	Mean	Total
Date	2011-09-28	2011-09-28	2011-09-28	2011-09-28	2011-09-28	2011-09-28	2011-09-28		
Time	12:59:52	12:59:58	12:59:58	12:59:46	12:59:28	12:59:28	12:59:16		
Rotation (RPM)	1500	1500	1500	1500	1500	1500	1500	1500	1500
#-Hous (Bar)	46.12	36.91	36.76	36.36	36.36	36.36	45.53	36.69	
#-Hous (Bar)	46.21	51.21	51.27	36.76	31.36	36.83	47.66	36.46	
#-Line (Bar)	46.88	50.28	50.27	46.81	36.64	36.71	46.48	36.27	
IMEP (Bar)	0.27	0.27	0.46	0.27	0.39	0.39	0.57	0.37	
IMEP (Bar)	41.21	47.74	47.27	41.21	41.41	41.27	42.69	41.23	
IMEP (Bar)	710.14	746.76	746.62	746.83	746.17	746.36	746.51	746.75	
Ind. Power (kW)	29.03	18.97	16.81	18.66	43.20	36.46	46.31	18.33	246.24
Ind. Power (kW)	34.63	55.61	55.61	34.61	34.61	34.61	55.61		
Ind. Power (kW)	0	0	0	0	0	0	0		
Fuel rack setting	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
IGT setting	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Additional information									



Technical Specification:	
Pressure range:	0 to 300 bar
Engine range:	50 to 5.000 rpm
Accuracy:	< 0.5 %
A/D sampling precision:	16 bits (0.0092 bar / sample)
Memory capacity:	50 engines
Battery type:	Standard AA, rechargeable
Battery capacity:	> 6 hrs (charging via USB)
Display:	20 x 4 alphanumeric characters, backlight, high Contrast
Standard connection:	W 27 x 1/10"
Operating temperature:	0 to 55 °C (Handheld unit); 0 to 350 °C (Pressure sensor)
Dimensions:	211 x 100 x 45 mm (Handheld unit) Ø = 60 mm, L = 210 mm (Pressure sensor)
Weight:	380 g (Handheld unit); 830 g (Pressure sensor)

TXM PMI Online System

Our TXM PMI Online system is an advanced system designed for real-time cylinder pressure data acquisition. 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 cylinder.

Benefits and Key Features:

- Real-Time Monitoring:** Our system provides instantaneous data acquisition of cylinder pressure, enabling you to monitor engine performance in real-time.
- Minimise fuel consumption:** 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 %.
- Reduce emissions:** Emissions of the greenhouse gas carbon dioxide can be reduced by some 2 %. The smoother engine running will decrease wear and tear in the engine.
- Accuracy and Precision:** Utilizing state-of-the-art sensors, our system ensures accurate and precise measurement of cylinder pressure, offering a comprehensive understanding of engine dynamics.
- Data Logging and Analysis:** The acquired data is logged and can be analyzed comprehensively. This feature allows for in-depth insights into engine behavior, facilitating proactive maintenance and optimization.
- Compatibility:** Our system is designed for seamless integration with a variety of engines, ensuring versatility and adaptability to different setups.
- User-Friendly Interface:** The user interface is intuitive, making it easy for operators to navigate and interpret the data effectively.





Type 50

Mechanical Indicator (System Maihak)

Application:

Precise pressure measurement for two and four stroke Diesel engines.

Measuring principle:

A metal stylus draws a clear pressure-diagram which records the pressure curve within the engine cylinders as influenced by the piston stroke. The recording drum can be moved by means of a string, which is pulled manually or by the engine. If the drum is driven by the engine, the diagram may be planimetered.



Technical Specification:			
Measuring range:	140 bar, 160 bar, 200 bar, 250 bar, 300 bar		
Engine range:	up to $n = 300$ rpm or max. $dp/dt = 9 \times 10^3$ bar/sec		
Max. diagram:	50 mm / 80 mm (height / length)		
Drum diameter:	50 mm	Weight:	1,5 kg (without wooden box); 4,4 kg (with wooden box)
Paper size:	180 mm x 65 mm		
Dimensions:	165 mm x 130 mm x 90 mm	Standard connection:	W 27 x 1/10"

MSI-3

Peak Pressure Indicator

Application:

Designed for displaying the maximum value of firing pressure of two- or four-stroke engines.

Features:

- Easy handling
- High accuracy in all speed ranges
- Insensitive to vibration
- Light weight
- Measuring range up to 300 bar
- Extremely robust, low maintenance
- Pressure gauge in safety construction



Technical Specification:			
Measuring range:	0 to 160 bar, 0 to 250 bar and 0 to 300 bar		
Engine range:	Up to 2.500 rpm		
Permissible Temperature:	Ambient -20 to 60 °C		
Error margin:	± 1.6 %	Weight:	3.0 kg with wooden box
Dimension:	210 mm x 155 mm x 60 mm		
Standard connection:	W 27 x 1/10"		