Digital Pressure Indicator DPI-2

Cylinder Pressure Monitoring

The Digital Pressure Indicator DPI-2 measures dynamic pressures. It is especially designed to analyze large two and four stroke Diesel and gas engines.

Friedrich Leutert GmbH & Co. KG, Schillerstrasse 14, 21365 Adendorf / Germany, tel +49-4131-959-0, www.leutert.com, info@leutert.com

Description

The Digital Pressure Indicator DPI-2 measures dynamic pressures. It is especially designed to analyze large two and four stroke Diesel and gas engines. The main application area is the marine market and mobile and stationary power stations.

The DPI-2 is a powerful and easy-to-use high quality electronic engine indicator which can be characterized by its long life components. It provides the following essential engine values for analysis:

- Indicated power
- Mean indicated pressure (mip)
- Peak pressure (Pmax)
- Minimum peak pressure (Pmin)
- Average peak pressure (Pav)
- Standard deviation of peak pressure (Sdev)
- PV-plot
- Compression pressure (P-comp)
- Maximum gradient of pressure curve (dp/da)
- Speed (rpm)

The measuring method of the DPI-2 is fast and simple: The pressure sensor is temporarily connected to the indicator valve (connection W27 x 1/10"). While the measuring series is being recorded, the data can be read off the LC display. After that, the data sets are saved to memory and can be transferred to the PC. The data may be evaluated and administered with the DPI software.

The DPI system works independently of the mains voltage. It uses its own integrated power supply.

An optional TDC sensor (4-stroke engine) relates the pressure curve to the crankshaft position. By using the crank angle encoder or incremental encoder on a 2-stroke engine the pressure values are measured in relation to the actual crankshaft angle.

All systems can be supplied as permanent installation for vessels or as plug-in version for service engineers. The DPI-2 is delivered in a tough waterproof carrying case.

Every single device is being tested and calibrated according to our ISO 9001 quality standards and will be supplied with a calibration certificate proving the accuracy of the device.

Features

- Menu controlled operation
- Sufficient memory to analyze up to 32 cylinders
- Measurement and display of cylinder pressure in individual cycles or in up to 16 cycles on average
- Storage of motor and measurement parameters
- Selection of various filters
- High sensitivity through 12-bit A/D converter
- Real time clock
- Integrated rechargeable batteries
- Interface for PC (RS 232, adapter for USB)

Hand-held Data Acquisition Unit

The electronic components of the portable DPI hand-held are incorporated in a tough aluminium water resistant body. The figure below shows the hand-held data acquisition unit.

Hand-held data acquisition unit

Pressure Sensor

The DPI system includes the pressure sensor which serves to determine the cylinder pressure in the engine. It is characterized by a high level of precision and rugged design. This type of quartz sensor has passed a trial of non-stop 16,000 hours and is accepted worldwide by all engine manufacturers.

Pressure sensor

TDC Sensor

The TDC sensor is used on 4-stroke engines to determine the exact position of top dead centre on the cylinders. This is necessary for an accurate power and MIP calculation.

TDC sensor

CAE Sensor

The CAE sensor is used in combination with a TDC sensor on 2-stroke engines to measure the angular position of the crankshaft and the cylinders for accurate power and MIP calculation.

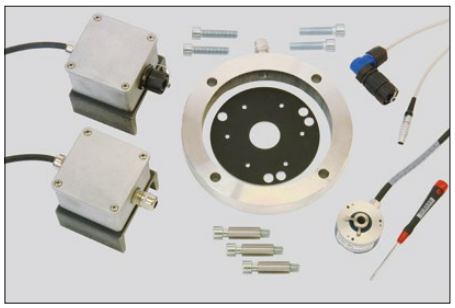
CAE sensor

Incremental Encoder

The incremental encoder delivers up to 2,048 pulses to the electronics system, thereby enabling a very precise recording of the engine data, such as the position of the top dead centre, or of the crankshaft angle. Therefore, no additional TDC sensor and CAE sensor is required here.

For Wärstilä RT-flex Engines

The incremental encoder is delivered to you with a complete assembly kit for mounting on Wärtsila RT-flex engines.



Incremental encoder for RT-flex engines

For MAN Alpha Lubricator Systems

The use of the Leutert alpha lubricator connection kit is optional and suitable exclusively for engines equipped with an MAN alpha lubricator system. It enables the use of the incremental encoder already standard installed with the MAN alpha lubricator without impairing its function.

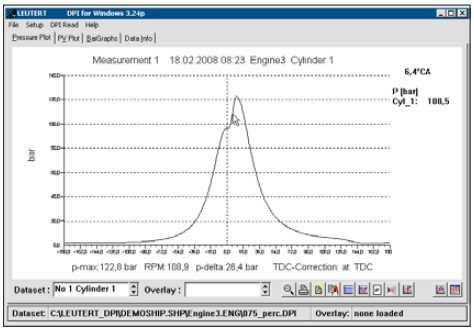
Leutert alpha lubricator connection kit

Analyzing software

After measuring the pressure with the hand-held data acquisition unit and the pressure sensor, the measured data may be downloaded to any PC and analyzed with our analyzing software supplied with the DPI system.

Pressure relevant to crankshaft angle, peak pressure and the PV diagram may be displayed as well as the derivative plot. Additionally, the power of each cylinder and the total power of the engine may be calculated, see figures below.

Other functions including overlaying of measurements for comparisons and e-mail sending function assist in using the DPI system for condition based maintenance.



Screenshots of the DPI software

Technical specifications

Pressure range	:	0 – 250 bar
Standard connection	:	W27 x 1/10"
Speed range	:	35 – 800 rpm for 2-stroke engines 120 – 1400 rpm for 4-stroke engines
Pressure resolution	:	0.07 bar for pressure range 0 – 250 bar
Accuracy	:	< 0.5%
Memory capacity	:	9 engines (32 data sets)
Battery capacity	:	6 hrs
Battery charger		
Input	:	100 – 240 V AC, 50 – 60 Hz
Operating temperature range		
Hand-held unit	:	0 – 55 °C
Pressure sensor	:	0 – 350 °C
Dimensions		
Hand-held unit	:	220 mm x 130 mm x 45 mm
Pressure sensor	:	Ø = 60 mm , L = 210 mm
Carrying case	:	470 mm x 365 mm x 146 mm
Weight		
Hand-held unit	:	790 g
Pressure sensor	:	830 g
Carrying case	:	6500 g incl. contents

Carrying case