Chart recorder

Pneumatech chart recorders indicate the measured data of the different sensors on a screen and give you the possibility to have all parameters at a glance. The measured curves are indicated graphically. With the according option the measured values are stored and can be analyzed with the PMH Basic software to find the most energy efficient solution for your application.

Check Box S6 - Intelligent chart recorder for compressed air and gases

Features & Benefits

▸ Clear layout: 7" color screen with touch panel-

▸ Versatile: Up to 12 optional sensors can be connected

▸ Suitable for industrial applications: Metal housing IP 65 or panel mounting

▸ Data available through world wide web: Network-compatible and remote transmission via webserver

▸ Intelligent: Daily/weekly/monthly reports-

▸ Mathematical function for internal calculations

▸ Totalizer function for analogue signals

▸ Saves time and costs during installation

Measurement - control - indication - alarm - recording - evaluation

Options

Flow sensors

Dew point sensors

Pressure sensors

Temperature sensors

Compressed air quality measurement

Current/effective power meters

From recording of the measured data, indication on a big color screen, alerting, storage up to remote read-out via webserver- this is all possible with Check Box S6. By means of the webserver software alarms can be sent via SMS or e-mail.

All measured values, measured curves and threshold exceeding are indicated. The curve progressions from the beginning of the measurement can be viewed by an easy slide of the finger.

Daily/weekly/monthly reports with costs in € and counter reading in m³ for each consumption sensor are completing the sophisticated system concept. The big difference to ordinary paperless chart recorders reveals in the easy initiation and in the evaluation of the measured data. All sensors are identified directly and powered by Check Box S6. Everything is matched and tuned.

Mathematical function for internal calculations, e.g. the typical figures of a compressed air plant:
- costs in € per generated m³ air
- kWh/m³ generated air
- consumption of single lines including summation

Totalizer function for analogue signals (e.g. 0/4-20 mA, 0-10 V). In case of third-party sensors which e.g. only give a 4-20 mA signal for the actual flow in m³/h a total counter reading in m³ can be generated by means of the totalizer function.

No time consuming studying of the instruction manual- this saves time. Internal voltage supply of all sensors, no wiring of external mains units - this saves additional costs.

At 12 freely assignable sensor inputs all our sensors can be connected as well as any optional third-party sensors and meters with the following signal outputs:

4-20 mA, 0-20 mA I 0-1 V / 0-10 V / 0-30 V I Pt 100 (2- or 3-wire), Pt 1000 (2- or 3-wire), KTY I pulse outputs (e.g. of gas meters) frequency output I Modbus protocol.

Flow sensors

- Installation and removal under pressure via standard 1/2" ball valve
- A safety ring avoids the uncontrolled ejection in case of installation/removal under pressure
- Usable for different gases: compressed air, nitrogen, argon, CO2, oxygen

Dew point sensors

- Extremely long-term stable
- Quick adaption time
- Large measuring range (-80° to +20°Ctd)
- For all driers: Desiccant driers, membrane driers, refrigeration driers
- Easy installation under pressure via the standard measuring chamber with quick coupling

Pressure sensors

- Large selection of pressure sensors with different measuring ranges for each measuring purpose
- Quick installation under ressure by quick coupling
- Pressure sensors 0-10/16/40/100/250/400/600 bar overpressure
- Pressure sensors -1 - +15 bar (under-/ overpressure)
- Differential pressure 0-1,6 bar
- Absolute pressure 0-1.6 bar (abs:)

Temperature sensors

- Large selection of temperature sensors e.g. for measurement of the ambient temperature or gas temperature
- Pt100 (2-wire or 3-wire)
- Pt1000 (2-wire or 3-wire)
- KTY sensors
- Temperature sensors with measuring transducer (4-20 mA output)

Compressed air quality measurement

- Monitoring the compressed air according to ISO 8773
- Residual oil, particle, residual moisture

Current/effective power meters

- PMH ENERIUM 30 current/effective power meters for panel mounting with external current transformer for big machines and plants
- External current transformers for encompassing the phases (max. 2000 A)
- Measures KW, kWh, cos phi, kVar, kVA
- Data transfer Check Box S6 via Modbus

By means of the intelligent chart recorder Check Box S6, all measuring data of a compressor station can be recorded, indicated and evaluated.

Measured values, statistics, curves with the 7" color screen touch panel

Real time measured values

▶ All measured values can be seen at a glance. Threshold exceeding are indicated in red color.

▶ A „measuring site name" can be allocated to each sensor.


Real time measured values

Graphic display

▶ This display replaces the former evaluation of ordinary paper chart recorders and offers lots of advantages. The time axis can be moved by a finger slide.

▶ The „zoom function by finger movement" which enables an analysis of peak values is unique.

Graphic display

Actual measurement values and graphic

▶ Additionally to the measurement curves the real time value is indicated as well.
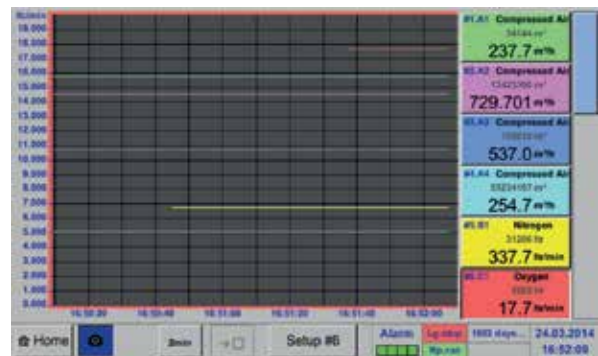
Actual measurement values and graphic

Statistic and reports

▶ Different to ordinary chart recorders the Check Box S6 offers not only the recording of the measured data but also the evaluation of all flow sensors optionally as daily/weekly/monthly report at the push of a button.

▶ It is no longer necessary to read-out the counter and transfer the values manually into a list. The reports can be imported to every PC into Excel® by means of a USB stick and after that they can be printed out without any additional software. This saves time and money and simplifies the evaluation enormously.

Statistic and reports

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Technical data of the Check Box S6

Technical data Check Box S6	
Dimensions of housing	280 x 170 x 90 mm, IP 65
Connections	18 x PG 12 for sensors and supply
Version panel mounting	Cutout panel 250 x 156 mm
Weight	7.3 Kg
Material	Die cast metal, front screen polyester
Sensor inputs	4/8/12 sensor inputs for analogue and digital sensors freely allocatable. See options Digital PMH sensors for dew point and consumption with SDI interface FA/VA series, digital third-party sensors RS 485 / Modbus RTU, other bus systems realizable on request. Analogue PMH Sensors for pressure, temperature, clamp-on ammeters pre-configured. Analogue third-party sensors 0/4-20 mA, 0-1/10/30V, pulse, Pt 100 / Pt 1000, KTY
Power supply for sensors	24 VDC, max. 130 mA per sensor, integrated mains unit max. 24 VDC, 25 W. In case of version 8/12 sensor inputs, 2 integrated mains units each max. 24 VDC, 25 W.
Interfaces	USB stick, Ethernet / RS 485 Modbus RTU / TCP, SDI other bus systems on request, WEB server optionally
Outputs	4 relays (changeover contact 230 VAC, 6 A), alarm management, relays freely programmable, collective alarm Analogue otuput, pulse in case of sensors with own signal output looped, like e.g. VA/FA series
Memory card	Memory size 4 GB SD memory card standard
Power supply	100-240 VAC / 50-60 Hz, special version 24 VDC
Color screen	7" touch panel TFT transmissive, graphics, curves, statistics
Accuracy	see sensor specifications
Operating temperature	0-50°C
Storage temperature	-20-70°C
Optionally	Webserver
Optionally	Option „energy and flow report" statistics, daily/weekly/monthly report

Description	Order no.
Check Box S6 - intelligent chart recorder in basic version (4 sensor inputs)	2255332462
Option: 4 additional sensor inputs for Check Box S6	2255332463
Option: 8 additional sensor inputs for Check Box S6	2255332464
Option: Integrated webserver	2255460218
Option: „energy and flow report" statistics, daily/weekly/monthly report	2255460220
Option: version for panel mounting	2255332465
Option: power supply 24 VDC (instead of 100-240 VAC)	2255332466
Option: „Mathematics calculation function" for 4 freely selectable „virtual" channels, (mathematical functions: addition, subtraction, division, multiplication)	2255460221
Option: „Totalizer function for analogue signals"	2255460222
External Gateway Profibus	2255332467
PMH Basic – data evaluation graphically and in tabular form - reading of the measured data via USB or Ethernet, license for 2 workstations	2255332468

Input signals	
Current signal Internal or external power supply Measuring range Resolution Accuracy Input resistance	(0-20mA/ 4-20mA) 0-20 mA 0.0001 mA ± 0.03 mA ± 0.05 % 50 Ω
Voltage signal Measuring range Resolution Accuracy Input resistance	(0-1 V) 0-1 V 0.05 mV ± 0.2 mV ± 0.05 % 100 kΩ
Voltage signal Measuring range Resolution Accuracy Input resistance	(0-10 V / 30 V) 0-10 V 0.5 mV ± 2 mV ± 0.05 % 1 MΩ
RTD Pt 100 Measuring range Resolution Accurancy	 -200-850°C 0.1°C ± 0.2°C (-100-400°C) ± 0.3°C (further range)
RTD Pt 1000 Measuring range Resolution Accuracy	 -200-850°C 0.1°C ± 0.2° (-100-400°C)
Pulse Measuring range	min. pulse length 500 µs frequency 0-1 kHz max. 30 VDC

Matching sensors can be found e.g. on pages 16 to 18

Check Box S1-S5 - Chart recorder

Standard equipment

▸ USB interface

▸ 3.5" graphic display with touch screen

▸ Integrated mains unit for supply of the sensors

▸ 4-20 mA output of all connected active sensors

▸ Pulse output (for total consumption) in case of flow sensors

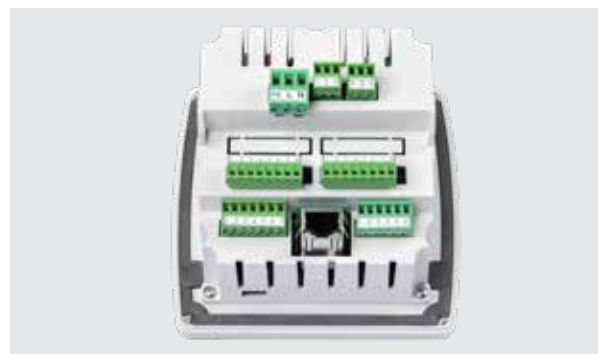▸ 2 alarm relays (pot.-free switch-over contacts, max. 230 V, 3 A)

Software options

▸ Integrated webserver

▸ Mathematics calculation function

▸ Totalizer function

Hardware options

▸ Integrated data logger

▸ Ethernet / RS 485 interface

▸ Additional sensor inputs (digital or analogue) selectable

Panel mounting

Back view

Description			Order no.
Check Box S1-S5 - Mobile chart recorder with graphic display and touch screen		Sensor input 1+2	Sensor input 3+4	
	S 1	Digital	--------	2255330407
	S 2	Digital	Digital	2255330408
	S 3	Digital	Analog	2255330409
	S 4	Analog	--------	2255330410
	S 5	Analog	Analog	2255330411
Options:			
Option: Integrated data logger for 100 million measured values			2255460217
Option: Integrated Ethernet and RS 485 interface			2255460216
Option: Integrated webserver			2255460218
Option: „Mathematics calculation function" for 4 freely selectable channels, (virtual channels): addition, subtraction, division, multiplication			2255332469
Option: „Totalizer function for analogue signals"			2255332470
External Gateway Profibus for RS 485 interface connection			2255332467
External Gateway Profinet for RS 485 interface connection			2255332676
Further accessories:			
PMH Basic – data evaluation graphically and in tabular form - reading of the measured data via USB or Ethernet, license for 2 workstations			2255332468

Technical Check Box S1-S5	
Dimensions	118 x 115 x 98 mm IP 54 (wall housing) 92 x 92 x 75 mm (panel mounting)
Inputs	2 digital inputs for FA 5xx resp. VA 5xx
Interface	USB
Power supply	100-240 VAC, 50-60 Hz
Accuracy	Please refer sensor specification
Alarm outputs	2 relays, (pot.-free)
Options	
Data logger	100 million measuring values start/stop time, measuring rate freely adjustable
2 additional sensor inputs	for connection of pressure sensors, temperature sensors, clamp-on ammeters, third-party sensors with 4-20 mA, 0 to 10 V, Pt 100, Pt 1000

The sensor inputs board 1 and 2 can be selected according to the required sensors (see table pages 16 to 18):

Input signals	
Current signal Internal or external power supply Measuring range Resolution Accuracy Input resistance	(0-20mA/4-20mA) 0-20 mA 0.0001 mA ± 0.03 mA ± 0.05 % 50 Ω
Voltage signal Measuring range Resolution Accuracy Input resistance	(0-1 V) 0-1 V 0.05 mV ± 0.2 mV ± 0.05 % 100 kΩ
Voltage signal Measuring range Resolution Accuracy Input resistance	(0-10 V / 30 V) 0-10 V 0.5 mV ± 2 mV ± 0.05 % 1 MΩ
RTD Pt 100 Measuring range Resolution Accurancy	-200-850°C 0.1°C ± 0.2°C (-100-400°C) ± 0.3°C (further range)
RTD Pt 1000 Measuring range Resolution Accuracy	-200-850°C 0.1°C ± 0.2° (-100-400°C)
Pulse Measuring range	minimum pulse length 500 µs frequency 0 - 1 kHz, max. 30 VDC

Digital	Digital	Digital	Digital
m³/h, m³	°Ctd	A, kW/h	

MOD-BUS

Flow sensor	Dew point sensor	Current meter	Thirt-party with RS 485

Analog	Analog	Analog	Analog
bar	A	°C	°C

4-20 mA
0-20 mA
0-10 V
Pulse
Pt 100
Pt 1000

Pressure sensor	Clamp-on ammeter	Temperature sensor	Third party sensor analog output

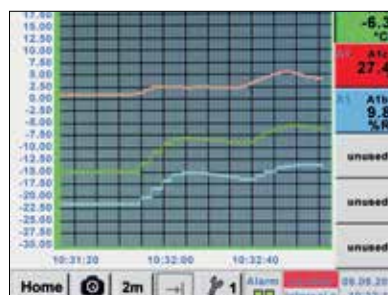# Check Box S1-S6 - Easy operation via touch screen

Configuration of flow sensor

▸ In the menu of the Check Box S1-S6, the flow sensor Flow Check can be set to the respective pipe inside diameter. Furthermore, the unit, the gas type and the reference condition can be set. The meter reading can be set to „zero" if necessary.


Configuration of flow sensor

Graphic view

▸ In the graphic view all measured values are indicated as curves.

▸ It is possible to browse back on the time axis by a slide of the finger (without data logger maximum 24 h, with data logger back to the start of the measurement).

Graphic view

Data logger

▸ With the option „integrated data logger" the measured values are stored in the Check Box S1-S6. The time interval can be determined freely. It is also possible to set the start time and end time of the data recording. Reading the measured data via USB interface or via the optional Ethernet interface.
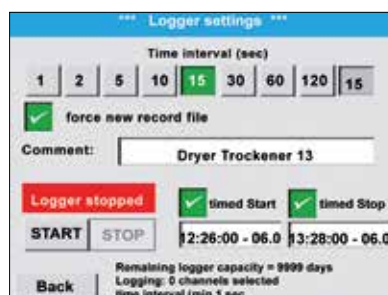
Data logger

Selection of the language

▸ Many languages are already stored in every Check Box

▸ S1-S6. The desired language can be selected via the selection button.

Selection of the language

All relevant parameters at a glance

▸ In addition to the flow rate in m³ / h, the Check Box S1-S6 also displays other parameters such as total consumption in m³ and speed in m/s.

All relevant parameters at a glance

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Webserver

The new webserver with extended features for the chart recorders Check Box S6 and Check Box S1-S5 is available with immediate effect. Users can get direct access to their measured values worldwide (current and historic ones) and display them on their smart phone, tablet or computer. For monitoring of threshold values users can receive an automated „alarm E-mail".

The new webserver can be ordered as an option with each stationary Check Box S1-S6, but also for their mobile devices. For using the features of the webservers, the Check Box S1.S6 must be set up with it's own IP address within the network..

The webserver provides a website, which displays the measuring values. This website can be accessed from any web browser on each smart phone, tablet or computer via it's unique IP address. This is all possible without the installation of any new or additional software.

Automated „alarm e-mail" for threshold value exceedance:

Access authorization
Different groups with different users/passwords can be assigned to different access levels.

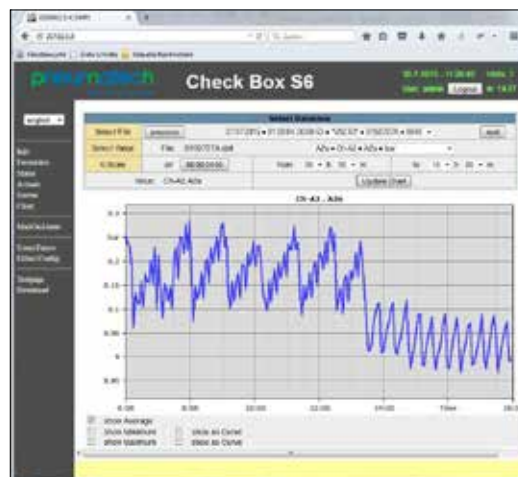**Starting the data logger**
In case of a stopped data logger the group operator or administrator can start the data logger remotely, via the web server.

PS: The new webserver can be retro fitted to any Check Box S1-S6 already in use.

View of the real time measured values (graphic table view)

View of the historic measured values as a single chart (time period freely selectable)

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# Check Box S1-S6 - Suitable sensors for Check Box S1-S6

Flow meters for installation and removal under pressure (insertion-type)

Flow meters insertion type	Order no.
Flow Check Universal 1 meter in basic version: Standard (92,7 m/s), probe length 220 mm, without display	2255332455

Flow Check Universal

| Flow meters in-line version	Order no.
Flow meter Flow Check 1 with integrated measuring section, (R 1/4" DN 8)	2255330393
Flow meter Flow Check 2 with integrated measuring section, (R 1/2" DN 15)	2255330394
Flow meter Flow Check 3 with integrated measuring section, (R 3/4" DN 20)	2255330395
Flow meter Flow Check 4 with integrated measuring section, (R 1" DN 25)	2255330396
Flow meter Flow Check 5 with integrated measuring section, (R 1 1/4" DN 32)	2255330397
Flow meter Flow Check 6 with integrated measuring section, (R 1 1/2" DN 40)	2255330398
Flow meter Flow Check 7 with integrated measuring section, (R 2" DN 50)	2255330399
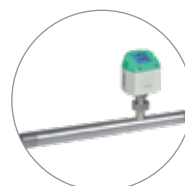
Flow Check

Dew point sensors	Order no.
PDP Sens 2 Dew point sensor, -80-+20 °Ctd incl. factory certificate	2255330413
PDP Sens 1 Dew point sensor, -20-+50 °Ctd incl. factory certificate	2255330412
Standard measuring chamber for compressed air up to 16 bar	2255460229

PDP Sens 1/2

Connection cable for flow meters/ dew point sensors flow check universal , flow check and pdp sens 1/2	Order no.
Connection cable for Flow/ PDP series, 5 m	2255460213
Connection cable for Flow/ PDP series, 10 m	2255460214
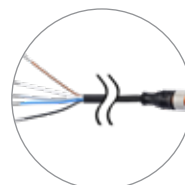
Connection cable

Pressure probes	± 1% Accuracy	± 0,5% Accuracy
Standard pressure probe PMH 16, 0-16 bar	2255330414	2255332478
Standard pressure probe PMH 40, 0…40 bar	2255330415	2255332479
Standard pressure probe PMH 1.6, 0-1.6 bar		2255332480
Standard pressure probe PMH 10, 0-10 bar	2255332477	2255332481
Standard pressure probe PMH 100, 0…100 bar		2255332482
Standard pressure probe PMH 250, 0…250 bar		2255332483
Standard pressure probe PMH 400, 0…400 bar		2255332484
Precision pressure probe PMH -1-+15 bar, ± 0.5% accuracy of f. s.		2255332485
Differential pressure probe 1.6 bar diff.	2255332486	
Calibration certificate pressure, 5 calibration points for the whole measuring range		2255332487

Pressure probes

Flow meters for installation and removal under pressure (insertion-type)
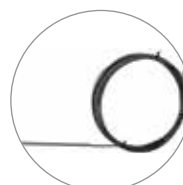
Inline flow meter

| Temperature sensors	Order no.
Screw-in temperature sensor PT 100 class A, length 300 mm, d = 6 mm, with transmitter 4-20 mA = -50 °C-+ 500 °C (2-wire)	2255332488
Outdoor temperature sensor PT 100 class B (2-wire) in panel mounting (82x55x33 mm) Application range: -50 °C-+80 °C	2255332489
Indoor temperature sensor PT 100 class B (2-wire) in panel mounting with ventilation slots (82x55x33 mm), application range: -50 °C-+80 °C	2255332490
Cable temperature sensor PT 100 class A (4-wire), length: 300 mm, d = 6 mm, -70 - + 260 ° C, 5 m connecting cable PFA with open ends	2255332491
Cable temperature sensor PT 100 class A (4-wire), length: 100 mm, d = 6 mm, -70 - + 260 ° C, 5 m connecting cable PFA with open ends	2255332492
Cable temperature sensor PT 100 class A (4-wire), length: 200 mm, d = 6 mm, -70 - + 260 ° C, 5 m connecting cable PFA with open ends	2255332493
Magnetic surface temperature sensor, magnet 39x26x25 mm, PT 100 class B (2-wire), -30-+ 180 °C, 5m connection cable PFA with open ends	2255332494
Compression fittings: 6mm; G 1/2" teflon clamping ring pressure-tight up to 10 bar. Material: stainless steel, application area: max. + 260 °C	2255332495
Compression fittings: 6mm; G 1/2» teflon clamping ring pressure-tight up to 16 bar. Material: stainless steel, application area: max. + 260 °C	2255332496
Calibration certificate temperature, 2 calibration points	2255332497

2255332488

2255332494

2255332491

2255332495

Connection cables for pressure probes/temp. sensors	Order no.
Connection cable for probes 5 m with open ends	2255332498
Connection cable for probes 10 m with open ends	2255332499

Clamp-on
ammeter

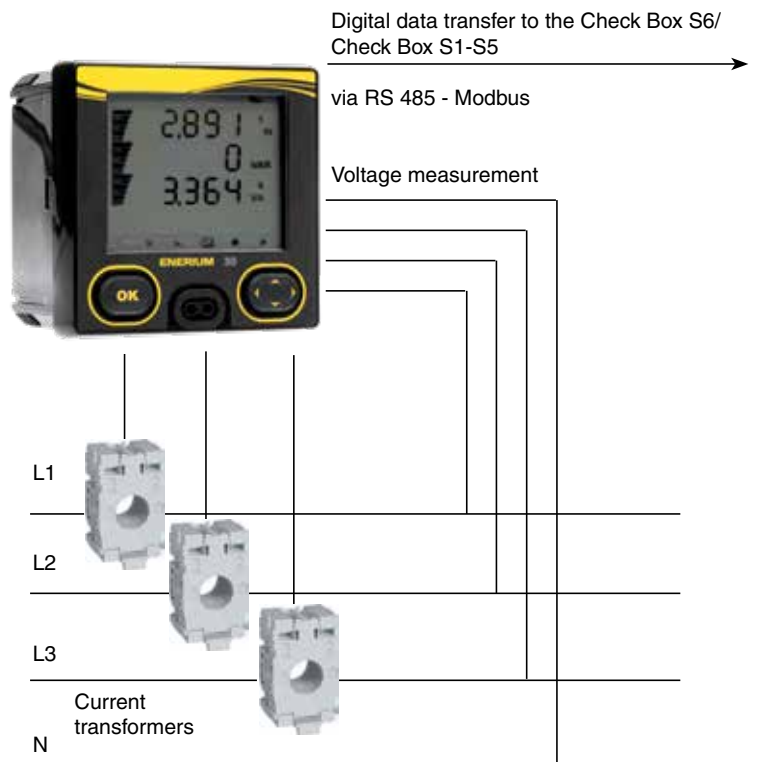| Clamp-on ammeters	Order no.
Clamp-on ammeters 0 - 1000 A TRMS incl. 3 m connection cable with open ends	2255332500
Clamp-on ammeters 0 - 400 A TRMS incl. 3 m connection cable with open ends	2255332501
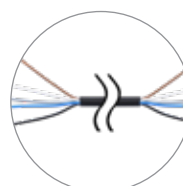
Connection
cable

PMH Enerium 30 - current/ effective power meter for panel mounting

Measures voltage, current and calculates:

Active power   [kW]
Apparent power [kVA]
Reactive power [kVar]
Active energy   [kWh]
cos phi

All measured data ar transmitted digitally (Modbus) to the Check Box S6 and can be recorded there.

Digital data transfer to the Check Box S6/ Check Box S1-S5

via RS 485 - Modbus

Voltage measurement

L1

L2

L3

Current transformers

N

Technical data Enerium 30	
Parameters	Voltage (Volt) Current (Ampere) Cos phi Active power (kW) Apparent power (kVA) Reactive power (kVar) Active energy (kWh) Power frequency (Hz) All parameters are transferred digitally to Check Box S1-S6
Accuracy current measurement	± 0,5% of 1 to 6 A
Accuracy voltage	± 0,5% of 50 V to 277 V
Accuracy active energy	IEC 62053-21 Class 1
Interfaces	RS 485 (Modbus protocol)
Measuring range	Voltage measurement max. 480 Volt
Dimensions	96 x 96 x 74 mm (B x H x T)
Operating temperature	-10-+55°C

Description	Order no.
PMH ENERIUM 30 current/effective power meter for panel mounting, with RS485 interface	2255332502
Install-construction for the Enerium 30, on top hat rail	2255332503
Current transformer 100/5 A connectable to current/effective power meter for panel mounting (for cables up to Ø 21 mm)	2255332504
Current transformer 200/5 A connectable to current/effective power meter for panel mounting (for cables up to Ø 21 mm)	2255332505
Current transformer 300/5 A connectable to current/effective power meter for panel mounting (for cables up to Ø 22 mm)	2255332506
Current transformer 500/5 A connectable to current/effective power meter for panel mounting (for cables up to Ø 22 mm)	2255332507
Current transformer 600/5 A connectable to current/effective power meter for panel mounting (for cables up to Ø 22 mm)	2255332508
Current transformer 1000/5 A connectable to current/effective power meter for panel mounting (for current bar up to 65 x 32 mm)	2255332509
Current transformer 2000/5 A connectable to current/effective power meter for panel mounting (for current bar up to 127 x 38 mm)	2255332510
Connection cable for probes 5 m, with open ends	2255332498
Connection cable for probes 10 m, with open ends	2255332499

Check Box M6 - Intelligent mobile chart recorder

The intelligent mobile chart recorder - energy analysis according to DIN EN ISO 50001

Energy analysis - flow measurement - leakage calculation at compressed air systems

Features & Benefits

▸ Easy operation via 7" color display with touch panel

Versatile

▸ Up to 12 sensors/meters connectable also third-party sensors/meters including power supply

Reliable

▸ Stores all measured values on a memory card, easy reading-out via USB stick possible

Intelligent energy analysis

▸ Daily / weekly / monthly evaluations mathematical functions for internal calculations e. g., the typical key figures of a compressed air system

- Costs in € per generated m³ air
- kWh/m³ generated air
- Flow of single lines including summation

Easy & intuitional
in its operation

Saves time
& costs
on installation

Technical data of the Check Box M6

Technical data Check Box M6

Case dimensions	360 x 270 x 150 mm
Weight	4,5 kg
Material	Diecast, front foil polyester, ABS
Sensor inputs	4/8/12 sensor inputs for analogue and digital sensors; freely allocatable. (See options). Digital PMH sensors for dew point and flow with SDI interface Flow/ PDP series, digital third-party sensors RS485 / Modbus RTU. Analogue PMH Sensors for pressure, temperature, clamp-on ammeters preconfigured. Analog third-party sensors 0/4-20 mA, 0-1/10/30V, pulse, Pt 100 / Pt 1000, KTY, counter
Voltage supply for sensor	24 VDC, max. 130 mA per sensor, integrated mains unit, max. 24 VDC, 25 W. In case of version 8/12 sensor inputs 2 integrated mains unit, each max. 24 VDC, 25 W.
Interfaces	USB stick, Ethernet / RS 485 Modbus RTU / TCP, SDI other bus systems on request, webserver optionally, GSM module
Memory card	Memory size 4 GB SD Memory card
Voltage supply	100-240 VAC / 50-60 Hz
Color display	7" touch panel TFT transmissive graphics, curves statistics
Accuracy	Please see sensor specifications
Operating temperature	0-50°C
Storage temperature	-20-70°C

Input signals

Current signal Internal or external power supply Measuring range Resolution Accuracy Input resistance	(0-20mA/4-20mA) 0-20 mA 0.0001 mA ± 0.03 mA ± 0.05 % 50 Ω
Voltage signal Measuring range Resolution Accuracy Input resistance	(0-1 V) 0-1 V 0.05 mV ± 0.2 mV ± 0.05 % 100 kΩ
Voltage signal Measuring range Resolution Accuracy Input resistance	(0-10 V / 30 V) 0-10 V 0.5 mV ± 2 mV ± 0.05 % 1 MΩ
RTD Pt 100 Measuring range Resolution Accuracy	-200-850°C 0.1°C ± 0.2°C (-100-400°C) ± 0.3°C (further range)
RTD Pt 1000 Measuring range Resolution Accuracy	-200-850°C 0.1°C ± 0.2° (-100-400°C)
Pulse Measuring range	Min. pulse length 100 µs frequency 0-1 kHz max. 30 VDC

Description	Order no.
Intelligent chart recorder Check Box M6-4, 4 sensor inputs	2255332457
Intelligent chart recorder Check Box M6-8, 8 sensor inputs	2255332458
Intelligent chart recorder Check Box M6-12, 12 sensor inputs	2255331721
Option: „integrated webserver"	2255460218
Option: „energy and flow report" statistics, daily/weekly/monthly report	2255460220
Option: „Mathematics calculation function" for 4 freely selectable „virtual" channels, (mathematical functions: addition, subtraction, division, multiplication)	2255460221
Option: „Totalizer function for analogue signals"	2255460222
PMH Basic – data evaluation graphically and in tabular form - reading of the measured data via USB or Ethernet, license for 2 workstations	2255332468
PMH Soft Energy Analyzer for energy and leakage analysis of compressed air stations	2255331729
Connecting cable for pressure, temperature and external sensors to mobile devices, ODU/open ends, 5 m	2255332514
Connecting cable for pressure, temperature and external sensors to mobile devices, ODU/open ends, 10 m	2255332515
Connection cable for Flow/ PDP sensors to mobile devices, ODU/M12, 5m	2255332516
Extension cable for mobile devices, ODU/ODU, 10 m	2255332517
Case for all sensors (dimensions: 500 x 360 x 120 x mm)	2255332518

Check Box M6 - Intelligent mobile chart recorder

12 sensor inputs - Including voltage supply for all sensors

Touch screen

USB stick

Ethernet connection

Options

Flow sensors

Dew point sensors

Pressure sensors

Temperature sensors

Clamp-on ammeters

Current/effective power meters

The intelligent chart recorder of the future - energy analysis according to DIN EN 50001

If we talk about operational costs of compressed air plants we are actually talking about the energy cost as they make up about 70 to 80 % of the total costs of a compressed air plant.

Depending on the size of the plant this means considerable operating costs. Even in smaller plants this may quickly add up to 10.000 to 20.000 € per year. This is an amount which can be considerably reduced - even in the case of well operated and maintained plants.

Does this also apply to your compressed air plant? Which actual costs per generated m³ air do you actually have? Which energy is grind due to the waste heat recovery? What is the total performance balance of your plant? How high are the differential pressures of single filters, how high is the humidity (pressure dew point), how much compressed air is used?

By means of the new intelligent chart recorder Check Box M6 and the suitable sensors and meters all these questions can be answered easily. For example by means of a long-term measurement over 7 days, data recording and evaluation at the PC.

Digital	Digital	Analog

Flow sensors
for compressed air and gases

- Installation and removal under pressure via standard 1/2" ball valve
- A safety ring avoids the uncontrolled ejection in case of installation/removal under pressure
- Usable for different gases: compressed air, nitrogen, argon, CO_2, oxygen

Dew point sensors

- Extremely long-term stable
- Quick adaption time
- Large measuring range (-80° to +20°Ctd)
- For all driers: Desiccant driers, membrane driers, refrigeration driers
- Easy installation under pressure via the standard measuring chamber with quick coupling

Pressure sensors

- Large selection of pressure sensors with different measuring ranges for each measuring purpose
- Quick installation under pressure by quick coupling
- Pressure sensors 0-10/16/40/100/250/400/600 bar overpressure
- Pressure sensors -1 - +15 bar (under-/overpressure)
- Differential pressure 0-1,6 bar
- Absolute pressure 0-1.6 bar (abs:)

Analog	Analog	Digital

Temperature sensors

- Large selection of temperature sensors e.g. for measurement of the ambient temperature or gas temperature
- Pt100 (2-wire or 3-wire)
- Pt1000 (2-wire or 3-wire)
- Temperature sensors with measuring transducer (4-20 mA output)

Clamp-on ammeters

- For the analysis of compressors (load and idle times, energy consumption, on/off cycles) the current consumption of up to 12 compressors is recorded by current clamp
- Measuring range of the current clamps: 0 - 400 A 0 - 1000 A

Current/effective power meters

- PMH PM 600 mobile current/active power meter with external current transformers for large machines and plants
- External current transformers for encompassing the phases (100 A or 600 A)
- External magnetic measuring tips for picking up the voltage measures KW, kWh, cos phi, kVar, kVA
- Data transmission Check Box M6 via Modbus

By means of the mobile chart recorder Check Box M6, all measuring data of a compressor station can be recorded, indicated and evaluated.

At 12 freely assignable sensor inputs all our sensors can be connected as well as any optional third-party sensors and meters with the following signal outputs:

4-20 mA, 0-20 mA I 0-1 V / 0-10 V / 0-30 V I Pt 100 (2- or 3-wire), Pt 1000 (2- or 3-wire), KTY I pulse outputs (e.g. of gas meters) frequency output I Modbus protocol.

Check Box M1-M5 - Affordable mobile chart recorder

Energy analysis - flow measurement - leakage calculation at compressed air systems

Features & Benefits

▸ Easy operation via 3.5″ color display with touch panel

▸ Internally rechargeable Li-Ion battery - about 8 hours continuous operation

Versatile:

▸ Up to 4 sensors / meters can be connected, including third-party sensors / counters incl. Power supply

Reliable:

▸ Stores all measured values on a memory card. Easy reading out via USB stick possible

Intelligent energy analysis:

▸ Daily / weekly / monthly evaluations mathematical functions for internal calculations e. g., the typical key figures of a compressed air system

- Costs in € per generated m³ air
- kWh/m³ generated air
- Flow of single lines including summation

Easy & intuitional in its operation

Saves time & costs on installation

Up to 4 sensors can be connected including power supply for all sensors

Options

Flow sensors

Dew point sensors

Pressure sensors

Temperature sensors

Clamp-on ammeters

Current/effective power meters

Sensors for Check Box M6 / Check Box M1-M5

Digital	Digital	Analog

Flow meters
for compressed air and gases

- Installation and removal under pressure via standard 1/2" ball valve
- A safety ring avoids the uncontrolled ejection in case of installation/removal under pressure
- Usable for different gases: compressed air, nitrogen, argon, CO2, oxygen

Dew point sensors

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- Quick adaption time
- Large measuring range (-80° to +20°Ctd)
- For all driers: Desiccant driers, membrane driers, refrigeration driers
- Easy installation under pressure via the standard measuring chamber with quick coupling

Pressure sensors

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- Quick installation under pressure by quick coupling
- Pressure sensors 0-10/16/40/100/250/400/600 bar overpressure
- Pressure sensors -1 - +15 bar (under-/overpressure)
- Differential pressure 0-1,6 bar
- Absolute pressure 0-1.6 bar (abs:)

Analog	Analog	Digital

Temperature sensors

- Large selection of temperature sensors e.g. for measurement of the ambient temperature or gas temperature
- Pt100 (2-wire or 3-wire)
- Pt1000 (2-wire or 3-wire)
- Temperature sensors with measuring transducer (4-20 mA output)

Clamp-on ammeters

- For the analysis of compressors (load and idle times, energy consumption, on/off cycles) the current consumption of up to 12 compressors is recorded by current clamp
- Measuring range of the current clamps: 0 - 400 A 0 - 1000 A

Current/effective power meters

- PMH PM 600 mobile current/active power meter with external current transformers for large machines and plants
- external current transformers for encompassing the phases (100 A or 600 A)
- external magnetic measuring tips for picking up the voltage
- measures KW, kWh, cos phi, kVar, kVA
- Data transmission Check Box M1-M5 mobile via Modbus

By means of the chart recorder Check Box M1-M5, all measured data of a compressor station can be recorded, indicated and evaluated. All digital sensors of our product range can be connected to the digital inputs.

Flow meter, dew point sensors, current/effective power meters and third-party sensors with Modbus RS 485 could be connected.

At analog sensor inputs third party sensors and meters with the following signal output could be connected: 4-20 mA, 0-20 mA | 0-1 V / 0-10 V / 0-30 V | Pt 100 (2- or 3-wire), Pt 1000 (2- or 3-wire), KTY | pulse outputs (e.g. of gas meters) | frequency output | Modbus protocol.
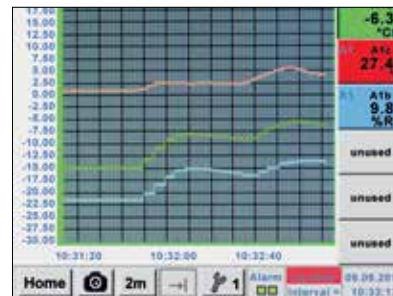
Configuration of flow sensor

▸ In the menu of the Check Box M6/ Check Box M1-M5, the flow sensor Flow Check Universal can be set to the respective pipe inside diameter. Furthermore, the unit, the gas type and the reference condition can be set. The meter reading can be set to „zero" if necessary.
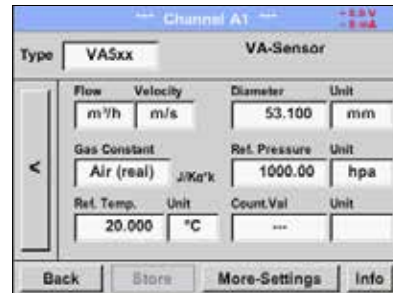
Configuration of flow sensor

Graphic view

▸ In the graphic view all measured values are indicated as curves.It is possible to browse back on the time axis by a slide of the finger (without data logger maximum 24 h, with data logger back to the start of the measurement).

Graphic view

Data logger

▸ With the option „integrated data logger" the measured values are stored in the Check Box M6/ Check Box M1-M5. The time interval can be free be determined. It is also possible to set the start time and end time of the data recording. Reading the measured data via USB interface or via the optional Ethernet interface.

Data logger

Selection of the language

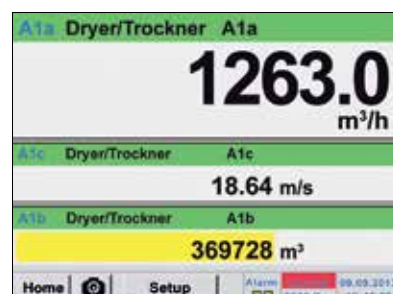▸ Many languages are already stored in every Check Box M6 mobile/ Check Box M1-M5. The desired language can be selected via the selection button.

Selection of the language

All relevant parameters at a glance

▸ In addition to the flow rate in m³/h, the Check Box M6/ Check Box M1-M5 also displays other parameters such as total consumption in m³ and speed in m/s.

All relevant parameters at a glance

Technical data of the Check Box M1 - M5

Technical data Check Box M1-M5	
Dimensions	270 x 225 x 156 mm (W x H x D)
Weight	2.2 kg
Inputs	2 x 2 sensor inputs for digital or analogue sensor signals
Interface	USB (standard), Ethernet (optional)
Power supply	Internal rechargeable Li-Ion batteries, approx 8 h continuos operation, 4 h charging time
Options	
Integrated data logger	100 million measuring values start/stop time, measuring rate freely adjustable
2 additional sensor inputs	for connection of pressure sensors, temperature sensors, clamp-on ammeters, third-party sensors with 4-20 mA 0 to 10 V, Pt100, Pt1000

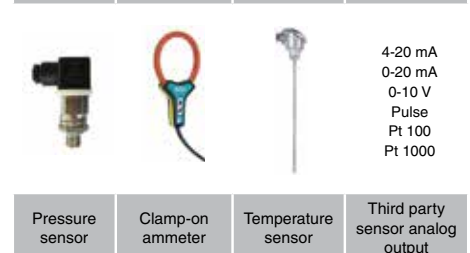| Description				Order no.
Check Box M1-M5 chart recorder with graphic display touch screen and integrated data logger		Sensor input 1 and 2	Sensor input 3 and 4	
	M1	Digital	--------	2255330402
	M2	Digital	Digital	2255330403
	M3	Digital	Analog	2255330404
	M4	Analog	--------	2255330405
	M5	Analog	Analog	2255330406
Option				
Option: Integrated Ethernet and RS 485 interface				2255460216
Option: Integrated webserver				2255460218
Option: „Mathematics calculation function" for 4 freely selectable channels, (virtual channels): addition, subtraction, division, multiplication				2255332469
Option: „Totalizer function for analogue signals"				2255332470
Further accessories				
PMH Basic – data evaluation graphically and in tabular form - reading of the measured data via USB or Ethernet, license for 2 workstations				2255332468
PMH Soft Energy Analyzer for energy and leakage analysis of compressed air stations				2255331729
Connecting cable for pressure, temperature and external sensors to mobile devices, ODU/open ends, 5 m				2255332514
Connecting cable for pressure, temperature and external sensors to mobile devices, ODU/open ends, 10 m				2255332515
Connection cable for Flow/ PDP sensors to mobile devices, ODU/M12, 5m				2255332516
Extension cable for mobile devices, ODU/ODU, 10 m				2255332517
Connecting cable for mobile current / active power meter to mobile devices, length 5 m				2255332519
Case for all sensors (dimensions: 500x360x120 mm)				2255332518

Input signals

Current signals Internal or external power supply Measuring range Resolution Accuracy Input resistance	(0-20mA/4-20mA) 0-20 mA 0.0001 mA ± 0.03 mA ± 0.05 % 50 Ω
Voltage signal Measuring range Resolution Accuracy Input resistance	(0-1 V) 0-1 V 0.05 mV ± 0.2 mV ± 0.05 % 100 kΩ
Voltage signal Measuring range Resolution Accuracy Input resistance	(0-10 V / 30 V) 0-10 V 0.5 mV ± 2 mV ± 0.05 % 1 MΩ
RTD Pt 100 Measuring range Resolution Accuracy	-200-850°C 0.1°C ± 0.2°C (-100-400°C) ± 0.3°C (further range)
RTD Pt 1000 Measuring range Resolution Accuracy	-200-850°C 0.1°C ± 0.2° (-100-400°C)
Impuls Measuring range	Min pulse length 500 µs frequency 0-1 kHz max. 30 VDC

Digital	Digital	Digital	Digital
m³/h, m³	°Ctd	A, kW/h	
Flow sensor	Dew point sensor	Current meter	Thirt-party with RS 485

MOD-BUS

Analog	Analog	Analog	Analog
bar	A	°C	°C
Pressure sensor	Clamp-on ammeter	Temperature sensor	Third party sensor analog output

4-20 mA
0-20 mA
0-10 V
Pulse
Pt 100
Pt 1000

Check Box 500 mobile - Hand-held instrument for industry

The new Check Box 500 mobile is an all-purpose hand-held measuring instrument for many applications in industry like e. g.:

▸ Flow measurement

▸ Pressure/vacuum measurement

▸ Temperature measurement

▸ Moisture/dew point measurement

The graphic indication of colored measurement curves is inimitably.
Up to 100 million measured values can be stored with date and name of measuring site. The measured values can be transferred to the computer by means of al USB stick. The data can be comfortably evaluated with the PMH Basic software.

Measured data and service reports can be issued easily and quickly. The following sensors can be connected to the freely configurable sensor input of Check Box 500 mobile:

▸ Pressure sensors (high and low pressure)

▸ Flow sensors, Flow Check/ Flow Check Universal

▸ Temperature sensors Pt 100, Pt 1000 / 4-20 mA

▸ Dew point sensors PDP Sens

▸ Effective power meters

▸ Optional third-party sensors with the following signals: 0-1/10 V, 0/4-20 mA, Pt 100, Pt 1000, pulse, Modbus

Special features:

▸ Universal sensor input for lots of common sensor signals

▸ Internal rechargeable Li-Ion batteries (approx. 12h continuous operation)

▸ 3.5" graphic display / easy operation via touch screen

▸ Integrated data logger for storage of the measured values

▸ USB interface for reading out via USB stick

▸ International: Up to 8 languages selectable

Measurement curves are indicated graphically and thus the user can see the behavior of the dryer at a glance since the start of the measurement.
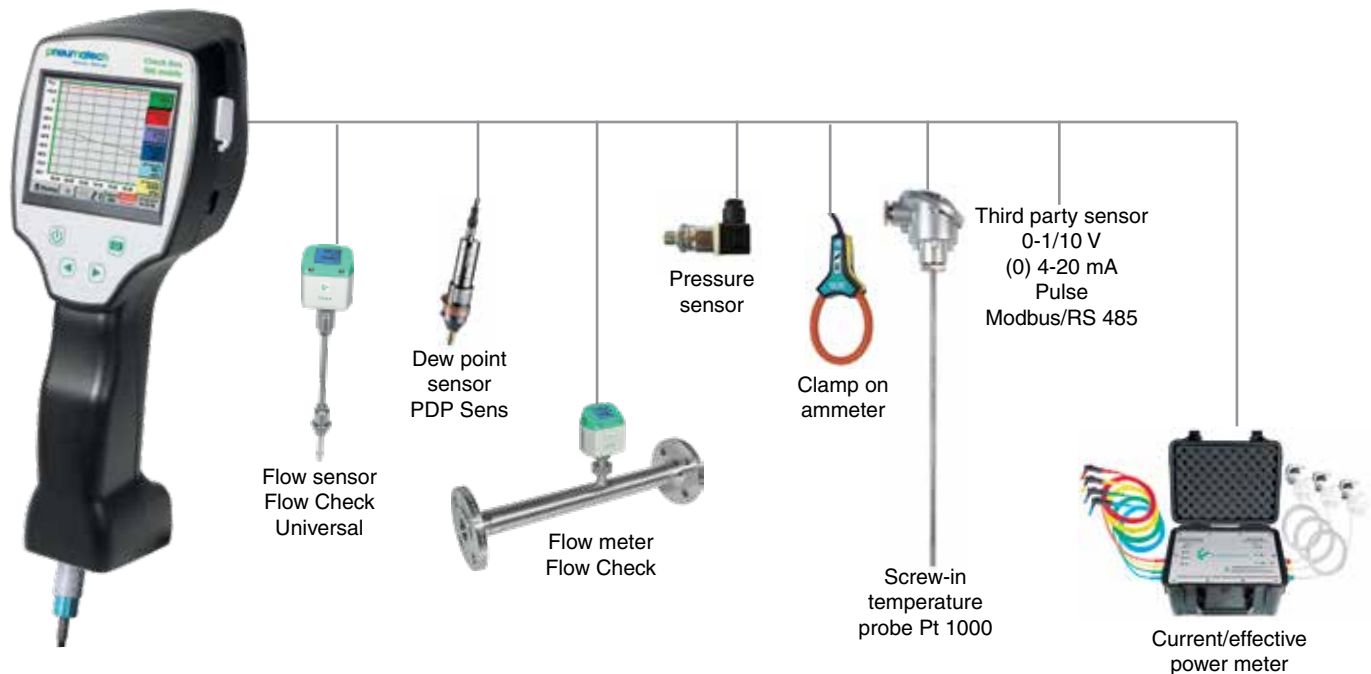
All physical parameters of moisture measurement are calculated automatically. The measured values of the external sensor will be displayed in addition.

It is possible to store up to 100 million measured values. Each measurement can be stored with a comment, e.g. measuring site name. The time interval can be freely determined.

Check Box 500 mobile - Hand-held instrument with large sensor selection

Flow sensor
Flow Check
Universal

Dew point
sensor
PDP Sens

Pressure
sensor

Flow meter
Flow Check

Clamp on
ammeter

Third party sensor
0-1/10 V
(0) 4-20 mA
Pulse
Modbus/RS 485

Screw-in
temperature
probe Pt 1000

Current/effective
power meter

Input signals	
Current signals Internal or external power supply	(0-20mA/4-20mA)
Measuring range	
Resolution	0-20 mA
Accuracy	0.0001 mA
Input resistance	± 0.03 mA ± 0.05 % 50 Ω
Voltage signal	(0-1 V)
Measuring range	0-1 V
Resolution	0.05 mV
Accuracy	± 0.2 mV ± 0.05 %
Input resistance	100 kΩ
Voltage signal	(0-10 V / 30 V)
Measuring range	0-10 V
Resolution	0.5 mV
Accuracy	± 2 mV ± 0.05 %
Input resistance	1 MΩ
RTD Pt 100	
Measuring range	-200-850°C
Resolution	0.1°C
Accuracy	± 0.2°C (-100-400°C) ± 0.3°C (further range)
RTD Pt 1000	
Measuring range	-200-850°C
Resolution	0.1°C
Accuracy	± 0.2° (-100-400°C)
Impulse Measuring range	Min pulse length 500 µs frequency 0-1 kHz max. 30 VDC

Description	Order no.
Check Box 500 mobile portable measuring instrument with integrated data logger, incl. power supply	2255332520
Option for Check Box 500 mobile: "mathematiPMH calculation function" for 4 freely selectable „virtual" channels	2255332521
Option „Totalizer function for analogue signals"	2255332522
PMH Basic – data evaluation graphically and in tabular form - reading of the measured data via USB or Ethernet, license for 2 workstations	2255332468
Transport case	2255332523

Further sensors can be found on pages 30 to 33

| Technical data check box 500 mobile	
Display	3.5˝ touchpanel TFT transmissive, graphics, curves, statistics
Interface	USB interface
Power supply for sensors	Output voltage: 24VDC ± 10% Output current: 120 mA in continuous operation
Power supply	Internal rechargeable Li-Ion batteries, charging time approx. 4 h, Check Box 500 mobile continuous operation> 4h depending on power consumption for ext. sensor
Power adapter	100 - 240 VAC / 50 - 60 Hz, 12 VDC - 1A, safety class 2 only for use in dry rooms
Dimensions	82 x 96 x 245 mm
Housing material	PC/ABS
Weight	450 g
Operating temperature	0-50°C Ambient temperature
Storage temperature	-20 bis +70°C
EMC	DIN EN 61326
Sensor input	For connection of pressure and temperature sensors, current clamps, external sensors with 4 - 20 mA, 0-10V, Pt 100, Pt 1000, Modbus
Memory Size	8 GB - Memory card standard

Consumption meters insertion-version	Order no.
Flow Check Universal flow meter, Max version (185 m/s), probe length 220 mm, incl. 5 m connection cable to mobile devices	2255332524
Flow Check Universal flow meter, High-Speed version (224 m/s), probe length 220 mm, incl. 5 m connection cable to mobile devices	2255332525

Flow Check
Universal

Flow meters inline version	Order no.
Flow Check 1 with integrated measuring section, (R 1/4˝ DN 8)	2255330393
Flow Check 2 with integrated measuring section, (R 1/2" DN 15)	2255330394
Flow Check 3 with integrated measuring section, (R 3/4" DN 20)	2255330395
Flow Check 4 with integrated measuring section, (R 1" DN 25)	2255330396
Flow Check 5 with integrated measuring section, (R 1 1/4" DN 32)	2255330397
Flow Check 6 with integrated measuring section, (R 1 1/2" DN 40)	2255330398
Flow Check 7 with integrated measuring section, (R 2" DN 50)	2255330399
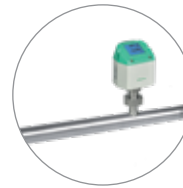
Flow Check

| Dew point sensors	Order no.
PDP Sens 2 set dew point sensor, -80 - + 20 ° Ctd incl. measuring chamber mobile and 5 m connection cable to mobile devices	2255332526
PDP Sens 1 set dew point sensor, -20 - + 50 ° Ctd incl. measuring chamber mobile and 5 m connection cable to mobile devices	2255332527

PDP Sens

Connection cable for flow check universal/ flow check and pdp sens 1/2 sensors	Order no.
Connection cable for Flow/ PDP sensors to mobile devices, ODU/M12, 5 m	2255332516
Extention cable for mobile für mobile equipment, 10 m	2255332517
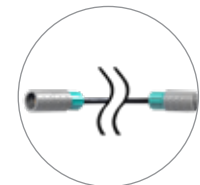
ODU/M12   Extention cable

Pressure probes	± 1% Accuracy	± 0,5% Accuracy
Standard pressure probe PMH 16, 0-16 bar	2255330414	2255332478
Standard pressure probe PMH 40, 0…40 bar	2255330415	2255332479
Standard pressure probe PMH 1.6, 0. 1.6 bar abs.	-	2255332480
Standard pressure probe PMH 10, 0-10 bar	2255332477	2255332481
Standard pressure probe PMH 100, 0…100 bar	-	2255332482
Standard pressure probe PMH 250, 0…250 bar	-	2255332483
Standard pressure probe PMH 400, 0…400 bar	-	2255332484
Precision pressure probe PMH -1-+15 bar, ± 0.5% accuracy of. f.s.	-	2255332485
Differential pressure probe 1.6 bar diff.	-	2255332486
Calibration certificate pressure, 5 calibration points for the whole measuring range	2255332487	-

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| Temperature sensors	Order no.
Bendable temperature probe PT 100 (2-wire) class A, length: 300 mm, d=3 mm, -70°C to +500°C, connect cable PFA, 2 m with ODU-plug (8 pole) to mobile instruments	2255332526
Screw-in temperature sensor PT 100 class A, length 300 mm, d = 6 mm, with transmitter 4-20 mA = -50 °C-+ 500 °C (2-wire)	2255332488
Cross-band surface temperature probe, thermocouple Type K, with integrated transducer 4…20 mA = 0°C…+180°C, 2 m connect calbe (PVC) with ODU-plug (8-pole) to mobile instruments	2255332527
Cable temperature sensor PT 100 class A (4-wire), length: 300 mm, d = 6 mm, -70 - + 260 ° C, 5 m connect cable PFA with open ends	2255332491
Cable temperature sensor PT 100 class A (4-wire), length: 100 mm, d = 6 mm, -70 - + 260 ° C, 5 m connection cable PFA with open ends	2255332492
Cable temperature sensor PT 100 class A (4-wire), length: 200 mm, d = 6 mm, -70 - + 260 ° C, 5 m connect cable PFA with open ends	2255332493
Magnetic surface temperature sensor, magnet 39x26x25 mm, PT 100 class B (2-wire), -30-+ 180 °C, 5m connection cable PFA with open ends	2255332494
Compression fittings: 6mm; G 1/2″ teflon clamping ring pressure-tight up to 10 bar. Material: stainless steel, application area: max. + 260 °C	2255332495
Compression fittings: 6mm; G 1/2″ teflon clamping ring pressure-tight up to 16 bar. Material: stainless steel, application area: max. + 260 °C	2255332496
Calibration certificate temperature, 2 calibration points	2255332497

2255332488   2255332527

2255332526   2255332491

Connection cables for pressure sensors / temperature sensors	Order no.
Connection cable for pressure, temperature and external sensors to mobile devices, ODU/open ends, 5 m	2255332514
Connection cable for pressure, temperature and external sensors to mobile devices, ODU/open ends, 10 m	2255332515
Extension cable for mobile instruments, ODU / ODU, 10 m	2255332517
ODU plug for connection to mobile devices	2255332528
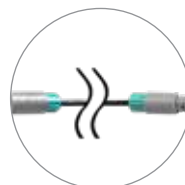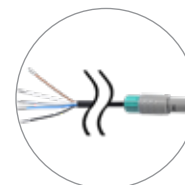
Extension cable   Connection cable/ODU   ODU connector

Clamp on ammeter	Order no.
Clamp-on ammeter 0 - 1000 A TRMS incl. 3 m connection cable	2255332529
Clamp-on ammeter 0 - 400 A TRMS incl. 3 m connection cable	2255332530

Clamp-on ammeter

PMH PM 600 - mobile current/ effective power meter

Mobile current/effective power meter suitable for:
Check Box M6/ Check Box M1-M5/ Check Box 500
mobile

Features & Benefits

▸ Magnetic voltage measuring tips for measuring
  the voltage during operation

▸ Hinged current transformers encompass the
  conductors of the phases L1, L2, L3. This can
  also be done during operation

▸ All measured data are transferred digitally
  (Modbus) to Check Box M6/ Check Box
  M1-M5 and can be recorded there.

▸ Current transformer can be opened

Third party sensor connectable

▸ Third-party sensor 0 - 1/10 V

▸ Third-party sensor RS 485 Modbus RTU

▸ Third-party sensor Pulse

▸ Thrid-party sensor 0/4-20 mA

Measures voltage,
current and calculates:

▸ Active power [kW]

▸ Apparent power [kVA]

▸ Reactive power [kVar]

▸ Active energy [kWh]

▸ Cos phi

Special features:

Magnetic voltage
measuring
tips electrically
isolated

Example:
Measurement at
a compressor

Current/effective power meter	Order no.
PMH PM 600 mobile current/effective power meter up to 100 A	2255332531
PMH PM 600 mobile current/effective power meter up to 600 A	2255332532

- Mobile current effective power meter with 3 external current transformers for big machines and plants
- External current transformers for clamping around the phases (100 A or 600 A)
- External magnetic measuring tip for measuring the voltage
- measures kW, kWh, cos, phi, kVar, kVA
- Data transfer to Check Box M6 / Check Box M1-M5 via Modbus
- Incl. connection cable for mobile current/effective power meter to mobile instruments, 5 m

Current transformer 100A/1A consisting of 3 transformers for mobile instruments	2255332533
Current transformer 600A/1A consisting of 3 transformers for mobile instruments	2255332534
Current transformer 1000A/1A consisting of 3 transformers for mobile instruments	2255332535

Any third-party sensor connectable

Additionally, any third-party sensors with the following signal outputs can be connected:
- 4-20 mA
- 0-20 mA
- 0-1 V / 0-10 V / 0-30 V
- Pt 100 (2- or 3-wire)
- Pt 1000 (2- or 3-wire)
- Pulse outputs (e. G. of gas gas meters)
- Frequency output
- Modbus protocol

Technical data PMH PM 600

Parameters	Voltage (Volt) Current (Ampere) Cos phi Active power (kW) Apparent power (kVA) Reactive power (kVar) Active energy (kWh) Supply frequency (Hz) All parameters are transferred digital to Check Box M6/ Check Box M1-M5
Accuracy current measurement	Threshold values for current deviation. Loss angle according to IEC 60044-1. Current deviation in % at rated current in 120 % 1 100 % 1 20 % 1,5 5 % 3
Accuracy active energy	IEC 62053-21 Class 1
Sensor connections	3 x current transformers (L1,L2,L3,N) 4 x voltage measurement (L1,L2,L3,N)
Interface	RS 485 (Modbus protocol)
Measure range	Voltage measurement max. 400 Volt Current measurement max. 100 A resp. 600 A
Size current transformers	100 A / 1 A (max.24 mm wire) 600 A / 1 A (max. 36 mm wire)
Dimensions case	270 x 225 x 156 mm (B x H x T)
Operating temperature	- 10-+40°C