

# Handheld hydraulic test systems

*Flow - Pressure - Temperature -  
Speed - Analogue Inputs*



**HPM Series - Sensor Recognition**

# Collect...

# Display...

*"It has never been easier to analyse a hydraulic circuit. The Sensor Recognition (SR) family includes flow, pressure, temperature and speed transducers. The SR sensors and universal connecting cables can be used with the HPM420, 540 and 460 readouts."*

*"The two-input HPM420 now has a two-line display making it a very flexible readout, ideal for measuring any two parameters simultaneously as well as differential and peak pressure. Users can easily switch between flow, pressure, temperature or speed sensors with no calibration required."*



*Turbine flow meter*



*Turbine flow meter with built-in loading valve*



*Pressure transducer with built-in temperature sensor\**



*Temperature sensor*

\* Temperature can be displayed when used with the HPM460, however this information can only be recorded with the HPM540.



*Screen shot showing two inputs. Pressure 1 and 2.*



*Screen shot showing differential pressure*



*Screen shot showing peak pressure 1 and 2*

# Datalog...

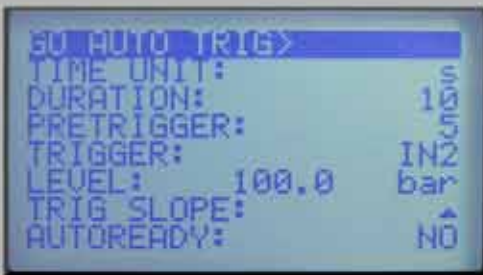
# Analyse...

"For in-depth hydraulic faultfinding the HPM540 and HPM460 enable you to datalog to onboard memory up to 1000 times a second on all channels and save the results for immediate viewing or analysis at a later date."

**USB**  
**UNIVERSAL SERIAL BUS**



HPM540 Data logger

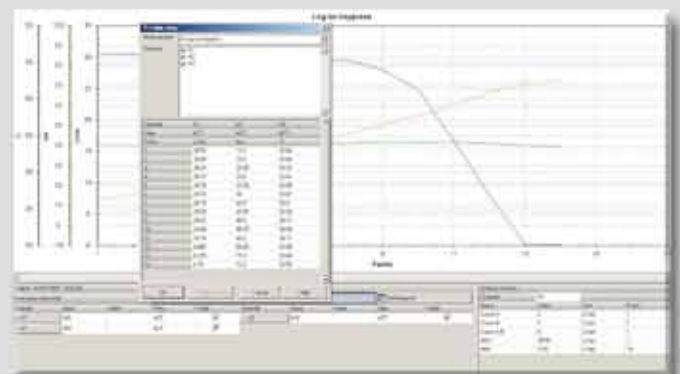
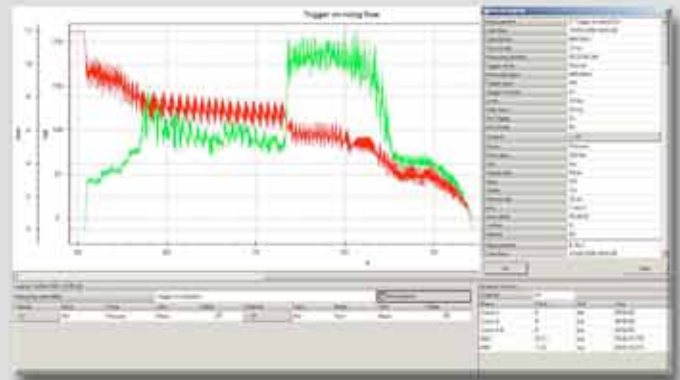
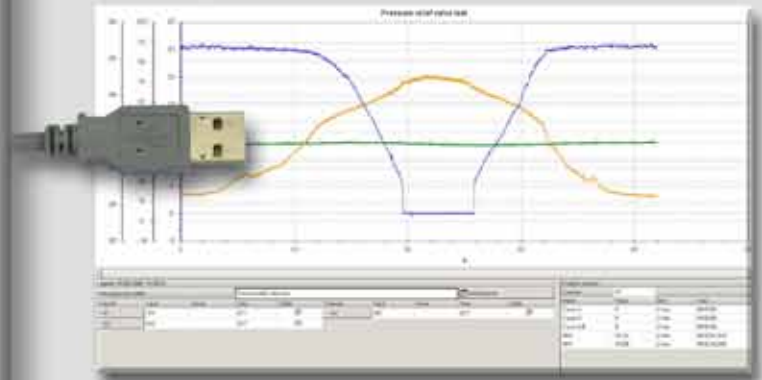


Screen shot showing the Auto Trigger menu



Screen shot showing 4 values on the screen while logging on by point

"Test results can easily be transferred to a laptop or PC for further analysis, sharing with colleagues or printing out. Graphs can be overlaid upon each other for easy comparison. On-screen tools, such as zoom or dual cursors make measuring time-periods very easy."



# HPM110 pressure gauge

## Applications

The HPM110 digital pressure gauge is designed for continuous monitoring of oil, gas, water, hydraulic and other pressure media in mobile equipment, industrial hydraulics, compressors and process control equipment.



	EU versions (bar)		US versions (psi)	
<b>Range</b>	0 - 100	0 - 600	0 - 1500	0 - 8700
<b>Overload Pressure Pmax</b>	200	1200	3000	17,400
<b>Burst Pressure</b>	800	2200	6000	31,900

The HPM110 offers an economical solution to monitoring pressure and peak pressure with a simple visual display. The hand-held unit can be installed when required using a standard test point, or left permanently connected in a system. Since the HPM110 is battery powered it requires no external wiring.

The HPM110 simultaneously displays actual pressure, peak pressure, battery level and the engineering units selected. The back light can be switched on at the press of a button. Using the buttons on the front panel the user can clear the peak value, display min, max and actual pressure, reset the zero point and change the engineering units. The unit is available in four models.

## Features

- Accuracy ( $\pm 0.5\%$  Full Scale)
- Economically priced
- Rugged design
- Digital display with bar graph
- Stainless Steel wetted parts
- Peak pressure - 10 ms scan rate
- Back lit display

## Technical Data

### Input

Sensor element ceramics (relative)  
 Strain gauge pressure measurement cell (absolute)  
 Pressure ports stainless steel 1.4404, G1/4 (BSPP), ISO 1179-2  
 10 msec. scanning rate  
 Accuracy  $\pm 0,5\%$  FS (typ.)  
 A/D converter 12 bit 4096 steps resolution



- ① Display with bar-graph due to peak & hold function
- ② Actual value back-lit display (15 mm)
- ③ Battery level display
- ④ Display of MIN/MAX or Full Scale Range display (FS)

### Menu functions

- ON/OFF** On/off switch  
Back-lit display
- MIN/MAX FS** Minimum/maximum value  
Full Scale
- MENU/ZERO** Menu: auto shut-off  
Choice of units  
Zero: Zero point equalisation
- RESET/OK** Delete MIN/MAX value  
Confirm menu function

# HPM420 readout



HPM420 Readout,  
2 inputs



Standard HPM420 Kit  
(Custom Kits Available)



Testing pump flow and pressure with the HPM420

“It has never been easier to analyse a hydraulic circuit. The Sensor Recognition (SR) family includes flow, pressure, temperature and speed transducers. The SR sensors and universal connecting cables can be used with the HPM420, 540 and 460 readouts.”

The HPM420 Series readouts and associated pressure, temperature and flow sensors provide an accurate, economical and user friendly solution for servicing and commissioning hydraulic systems and components. The HPM420 readouts have two inputs which recognise which pressure, temperature or flow sensors are connected and automatically sets the correct calibration to each input for the type of sensor being used.

## Features

- Readout with 2 inputs to measure Flow, Pressure, Peak, Differential Pressure, Temperature, Speed
- Carry Case available
- Automatic set-up with any Sensor Recognition (SR) sensor
- Battery Powered rechargeable battery as standard
- Switch between minimum and peak values
- Large Clear two-line LCD
- Online Logging model available, version 'C'
- Differential Pressure calculated at the touch of a button
- Sample Rate 2ms

## HPM420 A / HPM420 C

The HPM420 has a large easy to read two-line LCD display with a character height of 9 mm. The two inputs are scaled automatically when the required sensors are connected. Readings are displayed with default engineering units for pressure (bar), flow (lpm) and temperature (°C) these can be changed to psi, gpm, °F by the operator. Peak pressure and differential pressure can be user selected by push button. The ABS housing is protected to IP54 and has a rubber cover with built-in stand. To conserve battery life the readout has auto 'power off' after 15 minutes of being inactive. The HPM420-C has RS232 output for online logging via the serial or USB\*port on a PC or Laptop. (\*adaptor required)

## Power Supply:

HPM420-A Rechargeable battery and charger\*

HPM420-C Rechargeable battery and charger\*

<b>Accuracy:</b>	< 0.3% ± 2 Digit
<b>Temperature range:</b>	0...+ 50°C Ambient
<b>Storage temperature:</b>	-20...+60°C
<b>Rel. Humidity:</b>	< 85%
<b>Dimensions:</b>	l/w/h 145 x 70 x 40 mm
<b>Weight:</b>	approx. 340 g.

\* Charger included

## HPM420-A Kit Contents:

- Carrying case
- HPM420-A Readout (Rechargeable) battery
- Power supply unit with three plug adaptors
- Universal connecting cable 3m long
- Pressure Sensor 0 - 600 bar
- Specify additional sensors as required

# HPM540 data logger

**USB**  
UNIVERSAL SERIAL BUS



HPM540  
Datalogger,  
4 inputs



Example of a  
custom HPM540 kit



Faultfinding on a hydraulic test bench with the HPM540 connected to a PC via USB

The HPM540 is ideal for use as a portable display and data logger as well as for permanent installation on small hydraulic test benches.

Powered by a rechargeable NiMH battery, this easy to use diagnostic test system is a valuable tool for comparative testing as well as preventive maintenance, verifying component settings, pinpointing poor system performance, measuring differential pressure and capturing harmful pressure spikes. Accessories include a wide range of pressure transducers and flow meters as well as temperature and speed sensors. In addition many custom sensors as well as DC, Current or Voltage can be connected with the available external signal modules.

## Features

- Measure and record flow, pressure, temperature, speed plus peak and differential pressure
- Option to connect in other sensors and DC Amp or Volt signals
- Four multi-purpose inputs (8 channels if you measure temperature using PTT pressure transducer)
- Automatic set-up with any Sensor Recognition (SR) sensor
- Data log continuously, auto-trigger or log by point
- Connect to a PC quickly and easily via USB
- Via PC HPMcomm software define 'projects' to simplify repeat tests
- Directly control continuous logging from your PC and graph data in real time
- Analyse data quickly and easily using free Windows® compatible HPMcomm software
- Easy operation with menu driven functions
- Store up 1 million values
- Rugged ergonomic design
- Sample Rate 0.25 ms (Input 1) 1 ms (Inputs 2-4)

## Data logging modes

**Continuous\*** - Start / Stop / Esc log at a high speed against time

(\* HPM540 also can be run in continuous log mode directly from the HPMcomm software on the PC)

**Trigger - Auto trigger** at high speed to start data logging when an event occurs, eg: when a pressure goes over a certain level or a trigger is received

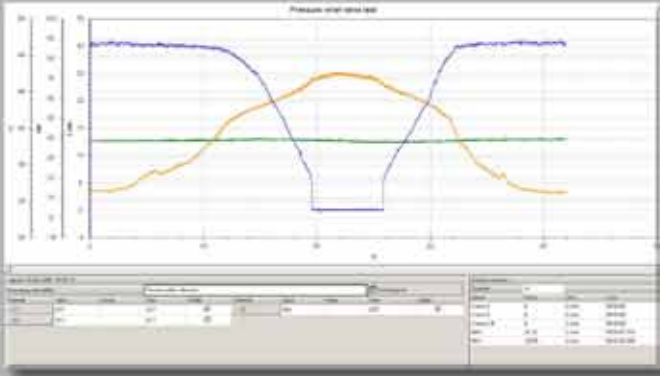
**Trigger - Manual trigger**, press a key when you want the test to begin

**Log by point** – Log data every time you press a key, ideal for recording data from a test procedure

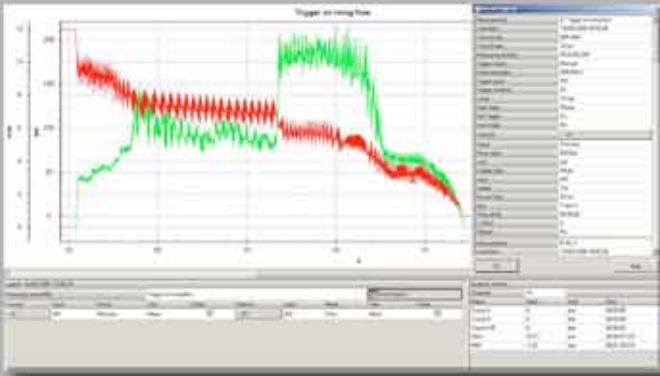
# HPM540 data logger

## Diagnostic fault-finding

Using continuous logging from the PC. . .

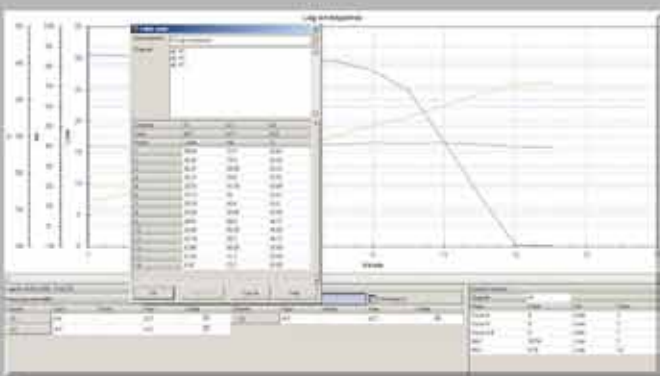


Using auto-trigger. . .



## Calibration and testing at pre-defined points

Using log by point...



## Detailed specification

<b>Technical data</b>	Sensor recognition (p/T/Q/n)
<b>Input:</b>	Connecting auxiliary sensors Plug-in connection, 5-pin push-pull
<b>Resolution:</b>	12 bit + sign = 4.096 steps
<b>Sampling:</b>	period 1 ms 0.25 ms FAST MODE (IN1)
<b>Display:</b>	LCD 128 x 64 pixels, size 72 x 40 mm Illumination, Height of characters 6 mm
<b>Input:</b>	Membrane keypad
<b>Interface:</b>	USB 2.0 Online speed 20 ms ACT-MIN-MAX
<b>Display functions:</b>	Difference; addition; power; volumes ACT; MIN; MAX; FS; TEMP
<b>Measured value memory:</b>	Measured value memory: 1 000 000 points Curve memory: 250 000 points Data format: ACT: MIN-MAX FAST (0.25 ms) Memory configuration: interval (e.g. 5 ms) points per channel (2,000)
<b>Environmental Conditions:</b>	Ambient temperature: 0 . . 50 °C Storage temperature: -25 °C . . 60 °C Temperature error: 0.02 %/°C Relative humidity: <80 % Degree of protection: EN 60529 IP 54 (water splash/oil) Drop test IEC 60068-2-32
<b>CE</b>	DIN/EN 61000-6-2 DIN/EN 61000-6-3
<b>Power supply (external)</b>	11 ... 30 VDC Power supply unit 110/240 VAC - 15 VDC Car adapter 12/24 VDC
<b>Battery</b>	NiMH Charging time 180 minutes Operating time 8 hours
<b>Housing</b>	Polyamide 235 x 106 x 53 mm Weight 530 g
<b>PC software HPMcomm</b>	Read out/depict measurement data and analyse on PC Device settings read out/process Load device settings into measuring instrument from library

*HPMcomm version 6.0 is compatible with Microsoft Windows XP - 32 bit version only*

*HPMcomm version 7.0 is compatible with Microsoft Windows XP \ Vista \ Win 7.0 - 32 bit versions only.*

*Neither version is compatible with 64 bit versions of Windows.*

# HPM460 data logger

HPM460 Datalogger,  
6 inputs



Example of a  
custom HPM460 kit



Faultfinding on a tractor with the HPM460

The HPM460 is ideal for use as an in-house or portable display and data logging instrument. Powered by a 9 Volt rechargeable battery, this easy to use diagnostic test system is a valuable tool for preventive maintenance, verifying component settings, pin-pointing poor system performance, measuring differential pressure and capturing harmful pressure spikes.

Accessories include a wide range of pressure transducers, flow meters, temperature sensors and diagnostic test points. Measurement of DC amperage or voltage can be made with the available external signal modules.

## Features

- **Measure** and record flow, pressure, temperature, speed plus peak and differential pressure
- **Option** to connect in other sensors and DC Amp or Volt signals
- **Six** multi-purpose inputs
- **Automatic** set-up with any Sensor Recognition (SR) sensor
- **Data** log continuously, auto-trigger or log by point
- **Connect** to a PC via RS232 – Serial cable
- **Analyse** data quickly and easily using free Windows© compatible HPMcomm software
- **Easy** operation with menu driven functions
- **Store** up 250,000 values
- **Rugged** ergonomic design
- **Measure** frequency directly from a speed sensor or flow meter (Channel 3)
- **Sample Rate** 1 ms

## Data logging modes

- **Continuous** - Start / Stop / Esc log at a high speed against time
- **Trigger** - Auto trigger at high speed to start data logging when an event occurs, eg: when a pressure goes over a certain level or an external trigger is received
- **Trigger** - Manual trigger, press a key when you want the test to begin
- **Trigger** – Start at a pre-defined time e.g.: 13:25

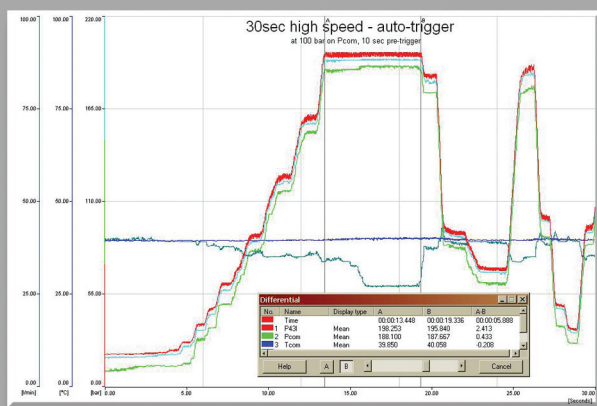
# HPM460 data logger



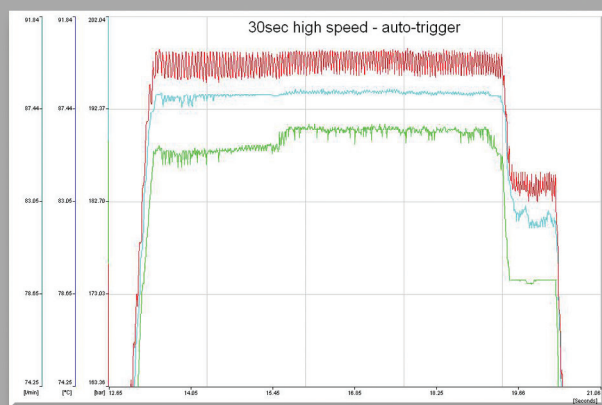
Screen shot of HPM460 showing 6 values on screen at once and calculated power.



Plot a graph and analyse the results



Using two cursors to measure exact values



Zooming in on the high pressure area of the graph

## Detailed specification

**Sensor inputs:** 6 inputs  
With sensor recognition (p/T/Q/n)  
Adaptor for external sensors  
Plug-in connection: 5-pin, push-pull  
Sample rate:  $\geq 1$  ms = 1,00 measurement values/sec.  
Resolution: 12 bit + sign = 4,096 steps  
Frequency input via input socket I3 for flow turbine or tachometer  
Frequency range: 0.5 Hz ... 30 kHz  
Signal input: depends on frequency 5 VPP (max)

**Display:** Graphic LC  
Resolution: 128 x 64 pixels  
Visible area: 72 x 40 mm  
Automatic adjustment of digit size  
Digit size: 4.2 mm (for 8 line display)  
Accuracy of display:  $< 0,25$  % of Full Scale Range  
Graphic curve representation

**Operation:** Via 11-key membrane keyboard  
With mechanical tactile touch and embossed edges

**Interface:** RS232C (4-pin, push-pull)  
optional with a standard RS232/USB PC adaptor  
Baud rate: 1,200 ... 38,400.8 data bits, 1 stop bit  
Online data transmission to the PC  
Transferring recorded data to PC with HPMcomm

**Functions:** I1-I2 indication of differential values  
Indication of MIN/MAX/ACTUAL values  
Indication of TEMP values PTT transducers  
Auto power off/battery level control  
Hydraulic power volume

**Measured value memory:** Memory capacity (250,000 MIN and MAX points)  
Variable storage interval (e.g. = 10 ms)  
Number of points per channel (e.g. 4,000 Min-Max)  
Variable recording time (2 s ... 100 h)  
Trigger: slope/manual/external/time  
Pre trigger  
External trigger with additional device EXT-TRG-05-1C

**Ambient conditions:** Temperature range: 0 ... +50 °C  
Storage temperature: -25 ... +60 °C  
Temperature error:  $< 0.02$  %/ °C  
Rel. humidity:  $< 80$  %  
Protection according to DIN 40050: IP 54 (water spray/ oil)

**Power supply:** Internal: NiCd-battery 7.2 V/700 mAh  
Battery charging circuit  
Battery service capacity: 5 h approx.  
External: with HPM-PSU-MC-1C (220/100 VDC)  
Automotive cable adaptor as equipment (12/24 VDC)

**Housing:** Material: glass ball-reinforced polyamide  
Dimensions: 235 x 106 x 53 mm (L/W/H)  
Weight: approx. 530 g

# Flow meters



Turbine flow meter

## Turbine flow meter

Webster flow meters are bi-directional for unrestricted connection and simplified testing and can operate at pressures up to 420 / 480 bar.

**Accuracy:** ±1% indicated reading (IR)\*  
**Calibration Viscosity:** 21cSt  
**Material:** High Tensile Aluminium  
**Pressure Test Point:** M16 x 2  
**Top Ports:** One M10 x 1 and one or two 1/4" BSP

**Cable:**  
 Use standard 3m universal male-male sensor cable  
 Model number: SR-CBL-003-55-MM

These easy to use turbine flow meters can help pinpoint hydraulic system faults, reduce downtime and help with preventative maintenance. Flow tests can be used to quickly locate defective pumps, valves, cylinders, motors; any of these components can cause poor performance and machine malfunction.

Model number	Scaled range (lpm)	Calibrated range (lpm)	Accuracy	Max. cont. pressure (bar)	Inlet/outlet ports
CT15-SR-B-B-6	0 - 15	1 - 15	1% FS	420	1/2" BSPP
CT60-SR-B-B-6	0 - 60	3 - 60	1% IR *	420	3/4" BSPP
CT150-SR-B-B-6	0 - 150	5 - 150	1% IR *	420	3/4" BSPP
CT300-SR-B-B-6	0 - 300	8 - 300	1% IR *	420	1" BSPP
CT600-SR-B-B-5	0 - 600	15 - 600	1% IR *	350	1 1/4" BSPP
CT750-SR-S-B-7	0 - 750	20 - 750	1% IR *	480	1-7/8" UN #24 SAE O-Ring

\* Accuracy 1% of the indicated reading over the top 85% of the flow range. FS = Full Scale



Turbine flow meter with built-in loading valve

## Flow meters with built-in loading valve

Webster bi-directional loading valves provide pressure loading in either flow direction. The valve incorporates the unique 'INTERPASS' burst disc safety method which protects the flow meter in the event of overpressure. The oil is contained within the hydraulic system, not vented externally, thus preventing expensive oil spillage and environmental damage.

**Accuracy:** ±1% indicated reading (IR)\*  
**Calibration Viscosity:** 21cSt  
**Material:** High Tensile Aluminium  
**Pressure Test Point:** M16 x 2  
**Top Ports:** One M10 x 1 and two 1/4" BSP

**Cable:**  
 Use standard 3m universal male-male sensor cable  
 Model number: SR-CBL-003-55-MM

Model number	Scaled range (lpm)	Calibrated range (lpm)	Accuracy	Max. cont. pressure (bar)	Inlet/outlet ports
CT300R-SR-B-B-6	0 - 300	8 - 300	1% IR *	420	1" BSPP
CT600R-SR-S-B-7	0 - 600	20 - 600	1% IR *	480	1-7/8" UN #24 SAE O-Ring
CT750R-SR-SB-7	0 - 750	20 - 750	1% IR *	480	1-7/8" UN #24 SAE O-Ring

\* Accuracy 1% of the indicated reading over the top 85% of the flow range.

Note: A 5m long, 5 pin to 5 pin extension cable SR-CBL-005-55-FM is available for use with all sensors.

# Additional sensors

All dimensions in millimetres



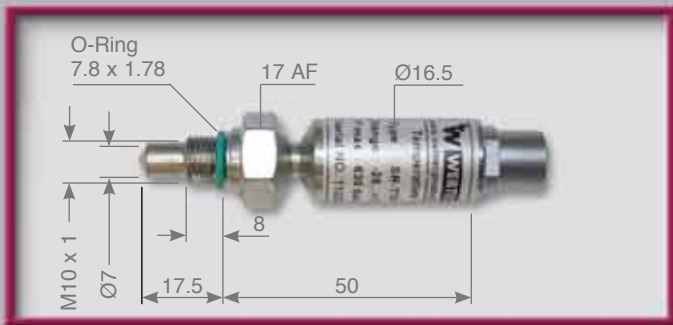
**Note:** M16 x 2 adaptor also available in two piece 316 SS version

## Pressure Transducer

Model number	Pressure range	Overload pressure	D.p.
SR-PTT-015-05-0C**	-1 to 15 bar <sup>†</sup>	30 bar	2
SR-PTT-060-05-0C**	0 to 60 bar	120 bar	2
SR-PTT-150-05-0C	0 to 150 bar	300 bar	1
SR-PTT-400-05-0C	0 to 400 bar	800 bar	1
SR-PTT-600-05-0C**	0 to 600 bar	1200 bar	1
SR-PTT-1K0-05-0C	0 to 1000 bar	1200 bar	0

**Accuracy:** ± 0.5% FS (max.), ± 0.25% FS (typical)  
**Response time:** 1 ms  
**Fluid temperature:** -25 to +105 °C  
**Material:** Stainless Steel (1.4301)

**Cable:** Use standard 3m universal male-male sensor cable  
 Model number: SR-CBL-003-55-MM  
<sup>†</sup> Range: 0 - 15 bar when used with HPM420



**Note:** For line mounting in a pipe, a Tee adaptor with an M10 x 1 port is available.

## Temperature Probe

The temperature probe houses a silicone chip which produces a voltage proportional to temperature. The probe can be connected directly into a high pressure line. Media Temperature Range -25°C to 125°C. Ambient temperature range 0 to 70°C.

**Model number:** SR-TTP-400-05-0C  
**Display:** -25 to 125°C  
**Accuracy:** ± 1.5% FS  
**Maximum pressure:** 630 bar  
**Material:** Steel zinc plated

**Cable:** Use standard 3m universal male-male sensor cable  
 Model number: SR-CBL-003-55-MM



**Note:** The photo-tachometer comes with a built-in 3m cable with a 5-pin connector

## Photo-tachometer

Two measurement methods are available Rotational speed photo-tachometer and optional cone point, or a wheel for linear speed.

**Model number:** SR-RPM-300-05-3C  
**Measuring distance:** 25...500 mm  
**Type of sensor:** Optical, red LED  
**Measuring range:** 20...10,000 rpm  
**Accuracy:** < 0.5% of FS  
**Resolution:** ± 5 RPM  
**Material:** ABS  
**Weight:** 300 g.



**Note:** External sensors may be connected using external modules for up to 4 Amp and 48 VDC.

## Custom sensor input box

Allows custom sensors to be connected into the HPM 540/460 series, complete with connecting lead (not shown).

**Model number:** SR-VADC-1C  
**Variable input ranges:** 48v, 10v, 3v, 20mA, 200mA, 4A

\*\* Sensors stocked as standard.  
 Unless stated otherwise, all seals in contact with the fluid are Viton®

# HPM Series Product selector

**Choosing the right hand-held device for you**

**Do you need to datalog**

No

Yes

**Display only**

**Display & Datalog**

**Multi-purpose use?**

**Number of inputs?**

No

Yes

**Digital pressure gauge**

**2 input readout**

**4 input data logger**

**6 input data logger**

**HPM110**

**HPM420**

**HPM540**

**HPM460**



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