

# Handheld hydraulic test systems

*Flow - Pressure - Temperature -  
Speed - Analog 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."

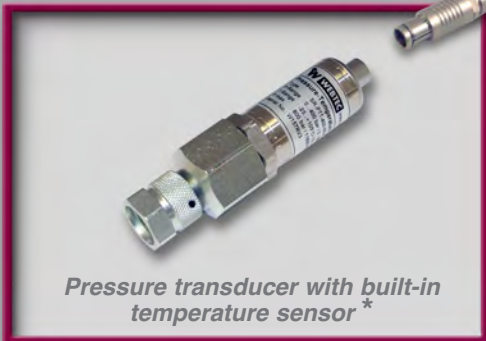
"The two-input HPM420 now has a two-line display making it a very flexible readout, ideal for measuring any two parameters simultaneously as well as differential and peak pressure. Users can easily switch between flow, pressure, temperature or speed sensors with no calibration required."



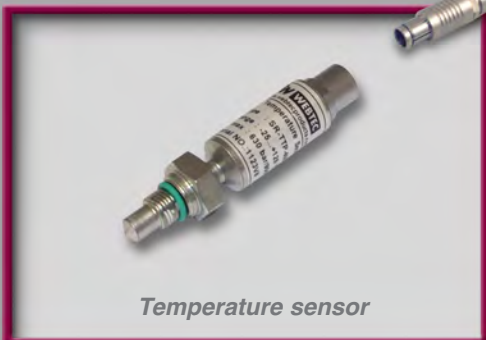
Turbine flow meter



Turbine flow meter with built-in loading valve



Pressure transducer with built-in temperature sensor\*



Temperature sensor



Screen shot showing two inputs. Pressure 1 and 2.



Screen shot showing differential pressure



Screen shot showing peak pressure 1 and 2

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

# Datalog...

# Analyse...

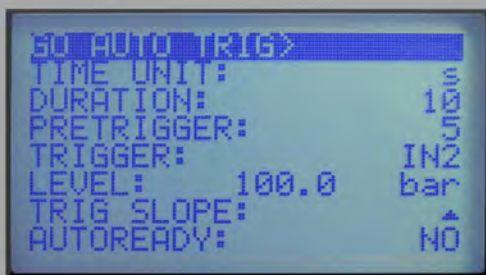
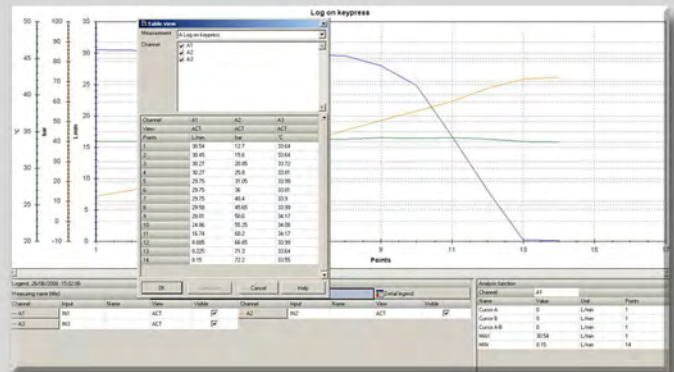
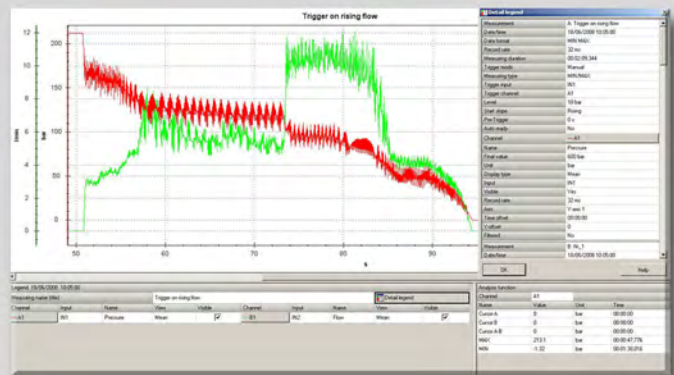
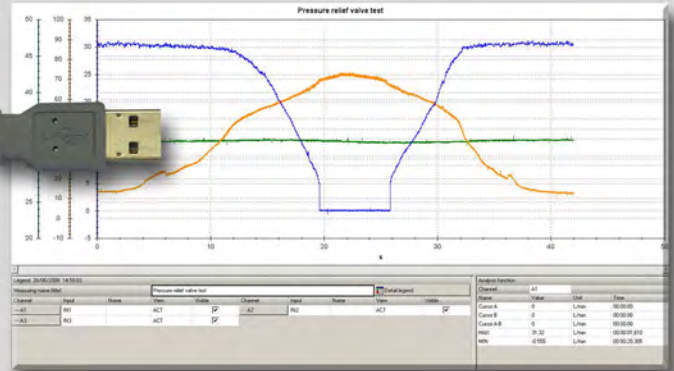
"For in-depth hydraulic faultfinding the HPM540 and HPM460 enable you to datalog to onboard memory up to 1000 times a second on all channels and save the results for immediate viewing or analysis at a later date."

"Test results can easily be transferred to a laptop or PC for further analysis, sharing with colleagues or print 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."

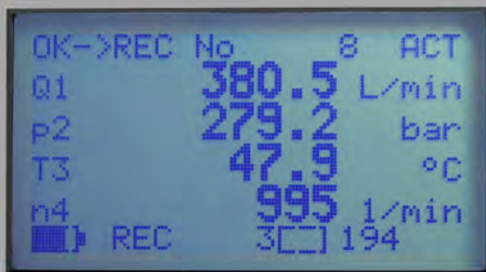
**USB**  
**UNIVERSAL SERIAL BUS**



HPM540 Data logger with USB data transfer direct to laptop



Screen shot showing the Auto Trigger menu



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

# 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.



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 or minimum pressure, battery level, engineering units as well as a bar graph indicator. 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

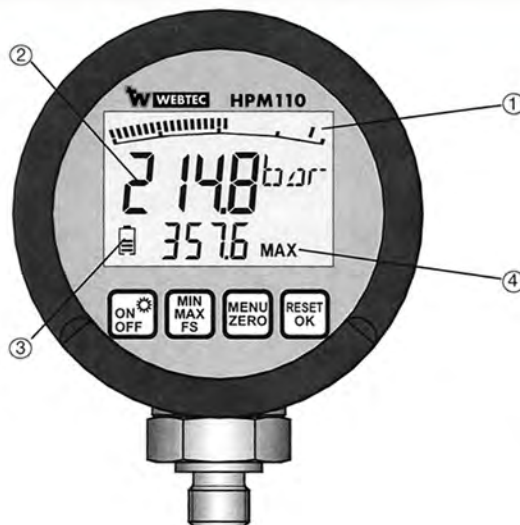
## Technical Data

### Input

Sensor element ceramics (relative)  
Strain gauge pressure measurement cell (absolute)  
Pressure ports stainless steel 7/16"-20 UNF-2B #4 SAE O-Ring Male.

10 msec. scanning rate  
Accuracy  $\pm 0.5\%$  FS (typ.)  
A/D converter 12 bit 4096 steps resolution

	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



- 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 switch  
Back-lit display
-  Minimum/maximum value  
FullScale
-  Menu: auto shut-off  
Choice of units  
Zero: Zero point equalisation
-  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 analyze 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 recognize 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 displayed simultaneously 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, peak and differential 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 0.35" (9 mm). The two inputs are scaled automatically when the required sensors are connected. Readings are displayed with default engineering units for pressure (psi), flow (gpm) and temperature (°F) these can be changed to bar, lpm, °C 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 5.7" x 2.75" x 1.57" (145 x 70 x 40 mm)
<b>Weight:</b>	approx. 0.75 lbs (340 g).

\*Charger included

## HPM420-A Kit Contents:

- Carrying case
- HPM420-A Readout (Rechargeable) battery
- Power supply unit with three AC plug adaptors
- Universal connecting cable 3m long
- Pressure Sensor 0 - 8700 psi
- Specify additional sensors as required

# HPM540 data logger

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

HPM540  
Datalogger,  
4 inputs &  
USB data  
output



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 other unique sensors as well as DC Current or Voltage can be connected with the optional 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 / temperature transducer)
- Automatic set-up with any Sensor Recognition (SR) sensor
- Data log continuously, auto-trigger or log by point
- Connect, view & store readings on PC in real time 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

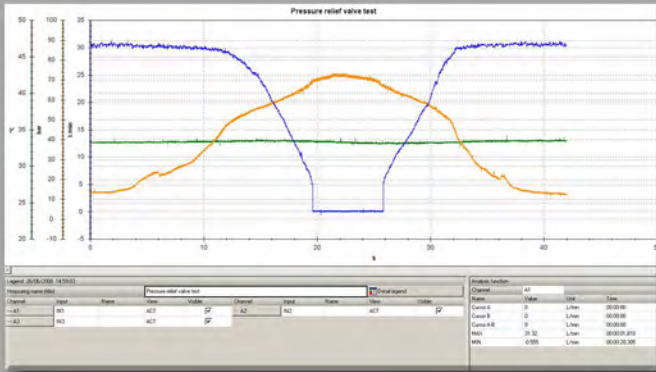
**Trigger - Manual trigger**, press a key when you want the test to begin

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

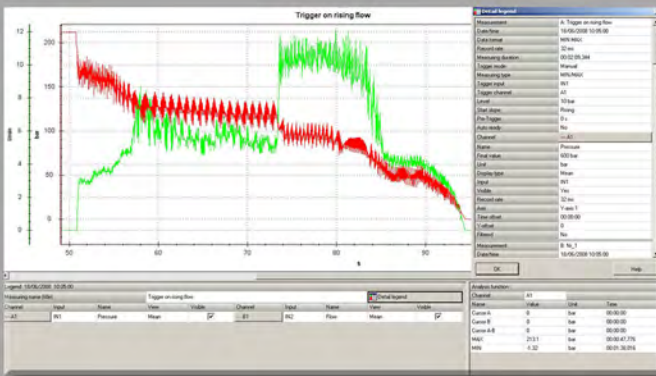
# HPM540 data logger

## Diagnostic fault-finding

Using continuous logging from the PC. . .

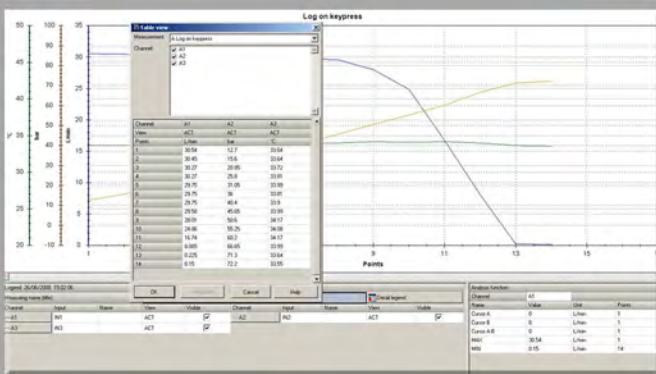


Using auto-trigger. . .



## Calibration and testing at pre-defined points

Using log by point...



## Detailed specification

**Technical data**  
**Input:** Sensor recognition (p/T/Q/n)  
 Connecting auxiliary sensors  
 Plug-in connection, 5-pin push-pull

**Resolution:** 12 bit + sign = 4,096 steps

**Sampling Rate:** 1 ms (Inputs 2-4 active)  
 0.25 ms FAST MODE (Input 1 active)

**Display:** LCD 128 x 64 pixels, size 72 x 40 mm  
 Illumination, Height of characters 6 mm

**Input:** Membrane keypad

**Interface:** USB 2.0  
 Online speed 20 ms  
 ACT-MIN-MAX (min-max over sample period)

**Display functions:** Difference; addition; power; volumes  
 ACT; MIN; MAX; FS; TEMP

**Measured value memory:** Measured value memory: 1,000,000 data 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)

**Environmental Conditions:** 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

**CE** DIN/EN 61000-6-2  
 DIN/EN 61000-6-3

**Power supply (external)** 11 ... 30 VDC  
 Power supply unit 110/240 VAC - 15 VDC  
 Car adapter 12/24 VDC

**Battery** NiMH  
 Charging time 180 minutes  
 Operating time 8 hours

**Housing** Polyamide  
 235 x 106 x 53 mm  
 Weight 530 g

**PC software SensoWin** Read out/depict measurement data and analyse on PC  
 Device settings read out/process  
 Load sensor settings into HPM540 from library on PC

# 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 unique sensors and DC amperage or voltage can be made with the optional external signal modules.

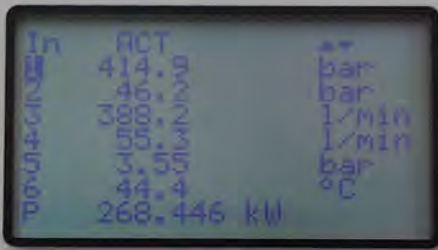
## Features

- **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.

## Detailed specification

**Sensor inputs:** 6 inputs  
 With sensor recognition (p/T/Q/n)  
 Adaptor for external sensors (volts, amps)  
 Plug-in connection: 5-pin, push-pull  
 Sample rate:  $\geq 1$  ms = 1,000 measurement values/sec.  
 Resolution: 12 bit + sign = 4,096 steps  
 Frequency input via input #3 for flow turbine or tachometer  
 Frequency range: 0.5 Hz ... 30 kHz  
 Signal input: depends on frequency 5 VPP (max)

**Display:** Graphic LCD  
 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 software

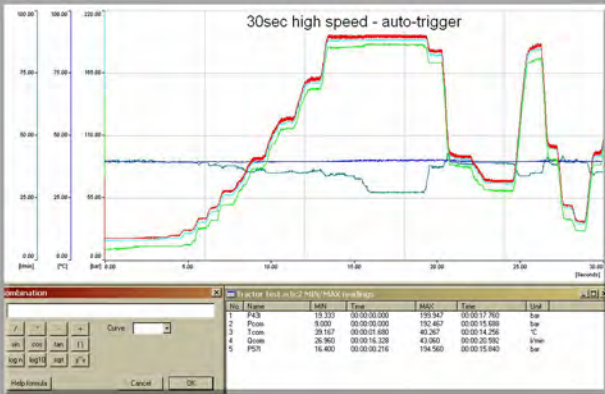
**Functions:** I1-I2 indication of differential values  
 Indication of MIN/MAX/ACTUAL values  
 Indication of TEMP values PTT transducers  
 Auto power off/battery level control  
 Hydraulic power/outflow volume

**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 adjustable 1-100%  
 External trigger with optional modular SCMA-TR

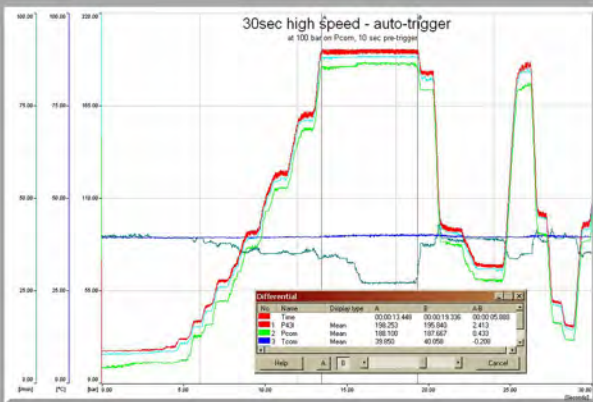
**Ambient conditions:** Temperature range: 0 ... +50 °C  
 Storage temperature: -25 ... +60 °C  
 Temperature error:  $< 0.02\%$  / °C  
 Rel. humidity:  $< 80\%$   
 Protection according to DIN 40050: IP 54 (water spray/ oil)

**Power supply:** Internal: NiCd-battery 7.2 V/700 mAh  
 Battery charging circuit  
 Battery service capacity: 5 h approx.  
 External: with SCSN-450 (220/100 VDC)  
 Automotive power adaptor (12/24 VDC)

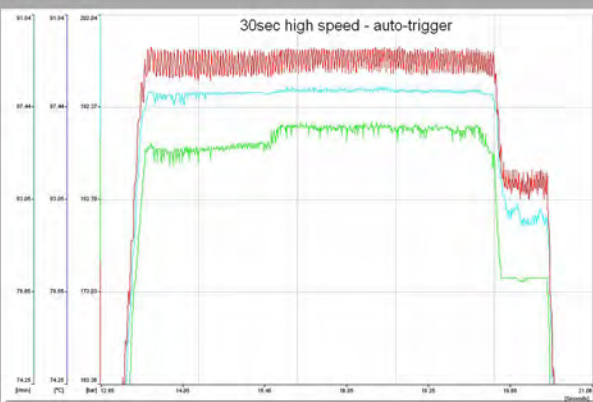
**Housing:** Material: glass ball-reinforced polyamide  
 Dimensions: 235 x 106 x 53 mm (L/W/H)  
 Weight: approx. 530 g



Plot a graph and analyse the results



Using two cursors to measure exact values



Zooming in on the high pressure area of the graph

# 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 6000 / 7000 psi.

**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 #4 SAE

### 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 (gpm)	Calibrated range (gpm)	Accuracy	Max. cont. pressure (psi)	Inlet/outlet ports
CT15-SR-S-S	0 - 4	0.25 - 4	1% FS	6000	3/4" UNF #8 SAE O-Ring
CT60-SR-S-S	0 - 16	0.8 - 16	1% IR *	6000	1-1/16" UN #12 SAE O-Ring
CT150-SR-S-S	0 - 40	1.3 - 40	1% IR *	6000	1-1/16" UN #12 SAE O-Ring
CT300-SR-S-S	0 - 80	2.0 - 80	1% IR *	6000	1-5/16" UN #16 SAE O-Ring
CT600-SR-S-S	0 - 160	4.0 - 160	1% IR *	7000	1-7/8" UN #24 SAE O-Ring
CT750-SR-S-S	0 - 200	5.0 - 200	1% IR *	7000	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 #4 SAE

### Cable:

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

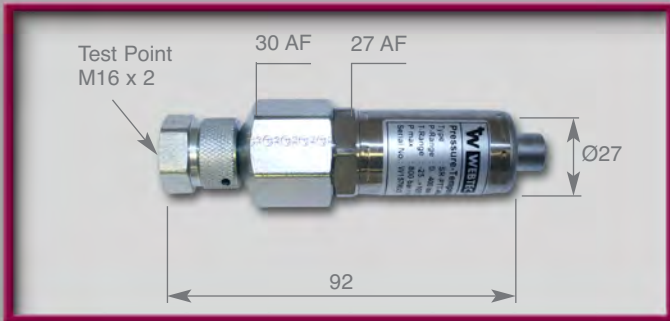
Model number	Scaled range (gpm)	Calibrated range (gpm)	Accuracy	Max. cont. pressure (psi)	Inlet/outlet ports
CT300R-SR-S-S	0 - 80	2.0 - 80	1% IR (> 5.3 Gpm)	6000	1-5/16" UN #16 SAE O-Ring
CT600R-SR-S-S	0 - 160	5.0 - 160	1% IR (> 6.6 gpm)	7000	1-7/8" UN #24 SAE O-Ring
CT750R-SR-S-S	0 - 200	5.0 - 200	1% IR (> 6.6 gpm)	7000	1-7/8" UN #24 SAE O-Ring

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

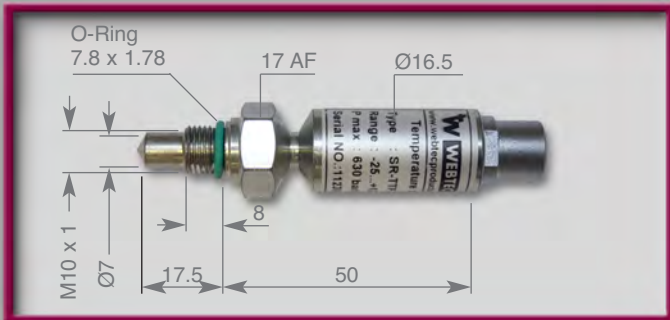
Note: A 5m long, 5 pin to 5 pin extension cable SR-CBL-005-55-FM is available for use with all sensors.

# Additional sensors

All dimensions in millimetres



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



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



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



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

## Pressure Transducer

Model number	Pressure range	Overload pressure	D.p. pressure
SR-PTT-015-05-0C**	-14.5 to 210 psi†	435 psi	2
SR-PTT-060-05-0C**	0 to 870 psi	1740 psi	2
SR-PTT-150-05-0C	0 to 2175 psi	4350 psi	1
SR-PTT-400-05-0C	0 to 5800 psi	11600 psi	1
SR-PTT-600-05-0C**	0 to 8700 psi	17400 psi	1
SR-PTT-1K0-05-0C	0 to 14500 psi	17400 psi	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  
 † Range: 0 - 210 psi when used with HPM420

## 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:** 9100 psi  
**Material:** Steel zinc plated

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

## 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.

## 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

4

6

**Digital pressure gauge**

**2 input readout**

**4 input data logger**

**6 input data logger**

**HPM110**



**HPM420**



**HPM540**



**HPM460**



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