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1, 2 & 3 Series
Portable Hydraulic Testers User Manual

www.webtecproducts.com

Introduction

Webtec Portable Hydraulic Testers have been designed for easy connection to a hydraulic circuit so that flow, pressure and temperature can be readily checked. Testers can take full back pressure up to 210/420/480 bar (3000/6000/7000 psi) depending on the model, and the built-in loading valve enables many of the operating conditions to be simulated. The tester can be connected anywhere in the hydraulic system to test pumps, motors, valves and cylinders in both flow directions.

Bi-Directional Flow Testing
The loading valve gives smooth control of pressure in both flow directions and is protected in both flow directions by two replaceable safety discs which are designed to rupture at approximately 7 bar (100 psi) over the maximum working pressure. When these discs rupture, the oil by-passes the loading valve at low pressure and continues to flow freely through the hydraulic system. A range of pressure safety discs are available to protect both the tester and other components in the hydraulic system.

Although the Bi-Directional tester can be used in both flow directions, the preferred direction is indicated by the larger arrow on the panel. When the tester is used for reverse flow tests, slightly lower accuracies may be obtained depending on the oil viscosity, density and compressibility.

The tester should be connected to the hydraulic circuit by means of flexible hoses 1 - 2 metres long. The use of quick-disconnect couplings can save time. Make sure the hoses are long enough so that the tester can be used conveniently on the machine. The hoses and fittings at the inlet to the tester must be of adequate size for the flow being tested. Elbows, rotary couplings etc., at the inlet and outlet ports of the tester should be avoided to ensure accurate readings.

The use of the flexible hoses will help to isolate the test unit from vibration which often exists.

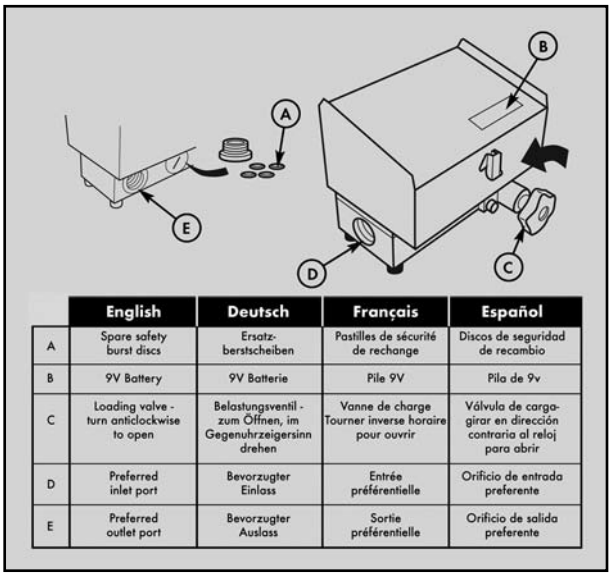
After installing the Tester it is important to ensure that all connections are tightened and the oil can flow freely throughout the hydraulic system BEFORE running the machine at full speed. Check that the circuit is correctly connected and any shut-off valves are opened. Also quick disconnect couplers MUST be open.
IMPORTANT: Start the pump momentarily to ensure there is no obstruction which could cause pressure build up.

Testers have an automatic electronic system which shuts the power off after approximately 20 minutes should you forget. To reactivate the tester, turn the selector switch to the “OFF / RESET” position then back to 'ON'.

Do not use with water

The standard Webtec Hydraulic Testers are designed for use with mineral oil having reasonable lubrication properties. They are not suitable for use with water or fluids with a high water content. If a tester is used with water it should be flushed immediately after use with white or methylated spirit or similar and then flushed with mineral oil to minimise any internal corrosion. This may avoid an expensive repair. Damage to a tester from the use of a non-approved fluid invalidates our normal warranty.

Warning: Open the loading valve prior to testing



	English	Deutsch	Français	Español
A	Spare safety burst discs	Ersatz-berstscheiben	Pastilles de sécurité de rechange	Discos de seguridad de recambio
B	9V Battery	9V Batterie	Pile 9V	Pila de 9v
C	Loading valve - turn anticlockwise to open	Belastungsventil - zum Öffnen, im Gegenuhrzeigersinn drehen	Vanne de charge Tourner inverse horaire pour ouvrir	Válvula de carga-girar en dirección contraria al reloj para abrir
D	Preferred inlet port	Bevorzugter Einlass	Entrée préférentielle	Orificio de entrada preferente
E	Preferred outlet port	Bevorzugter Auslass	Sortie préférentielle	Orificio de salida preferente

Principles of Operation

Flow meter
The flow meter comprises an axial turbine mounted in the aluminium base block. The oil flow rotates the turbine and its speed is proportional to the oil velocity. The revolutions of the turbine are measured by means of a magnetic sensing head which feeds a pulse every time a turbine blade goes by to an electronic circuit. The electronic circuit has a built-in micro processor; the signal is amplified and linearised to maximise accuracy. The readout is calibrated in lpm or gpm, units are selectable on some models.

Pressure gauge
The pressure gauge has a spiral Bourdon tube and the gauge case is filled with glycerine to ensure good dampening on pulsating pressures. The gauge is connected to the turbine block by a fine bore capillary tube. The Bi-Directional tester gauge has a shuttle valve which automatically reads the highest pressure in both directions of flow. A gauge port is provided on the block for the addition of a low pressure gauge.

Temperature
The Thermistor temperature transducer is in contact with the oil flow and readout is on the meter scale calibrated 32 - 248°F or 0 - 120°C.

Bi-Directional Loading Valve
The reverse flow valve gives positive shut-off and pressure control in both directions of flow. The loading valve has two easily replaceable safety discs located in the valve assembly which internally protect the tester and machine in both flow directions.

Spare Safety Discs
Four spare safety discs are supplied in a threaded storage holder on the rear of the flowmeter body (see illustration above). Safety discs need to be fitted in pairs.

Installing the test unit

1 Connect the Tester to the circuit (see inside back cover for port sizes). The preferred flow direction is indicated by the larger arrow on the panel. Use hoses and fittings of sufficient diameter for the flow being tested. Avoid restrictions at inlet and outlet ports of the Tester. Also avoid sharp bends because high pressure hoses will deflect and straighten under pressure.

2 Ensure that the pressure loading valve is fully opened by turning the knob counter clockwise.

3 Switch the unit on. On digital models if the display flashes, or on analogue models if the needle points to the  symbol, then the battery needs replacing.

4 Select the desired test using the front panel controls (not applicable on 1 series)

5 When low pressure testing is required, connect the optional low pressure gauge with automatic cut-out valve to the tester block.

Note: the test point can be connected by hand at full pressure.

Accessories

For 2 series testers only INFRARED PHOTO TACHOMETER comprises infrared photo tach head, six metre connecting cable and reflective tape. The BA20 magnetic base with flexible arm is also available, this is used to secure the tacho head on the machine.

Note: The Photo-Tachometer should not be plugged in when the unit is already switched on. First switch off the tester, plug in the Tacho and then switch the tester back on. Only Webtec supplied Photo-Tachometers labelled FT9251 ISSUE B should be used with this tester. Using other brands or earlier unlabeled versions, however similar they may appear, could cause permanent damage to the Tester and or Photo-tachometer.

For all models of tester LOW PRESSURE GAUGE KIT comprises 63 mm Glycerine filled 40 bar (600 psi) gauge with automatic cut-out valve, pressure test point and 300 mm (12”) long micro bore hose. The test point is fitted permanently into the tester block and the low pressure gauge can be connected by hand without the need to stop the machine.

ADAPTORS. Fitting kits are available for all testers. Consult Sales Office.

Instructions for using the portable hydraulic test unit

The tester is designed to measure pressure, flow, temperature and rpm* (* 2 series only). It can take full system pressure between 210 and 480 bar (3000 and 7000 psi) depending on the model. It is capable of measuring flow in both directions for motor and cylinder testing.

Make all tests at operating temperatures because as the oil temperature increases it becomes thinner and any internal leakage becomes greater.

Testing will be easier and faster if quick disconnect couplers are used to connect the Test Unit.

There are two basic 'set-ups' when using the Tester.

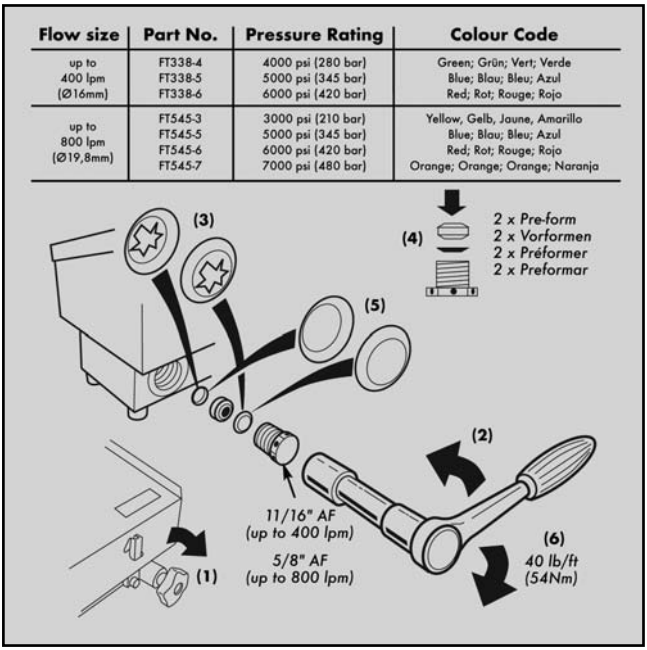
a) The In Line test to check out pumps, entire systems and also monitoring operating conditions.

b) The Tee Test to check out pumps, directional control valves and the overall system condition.

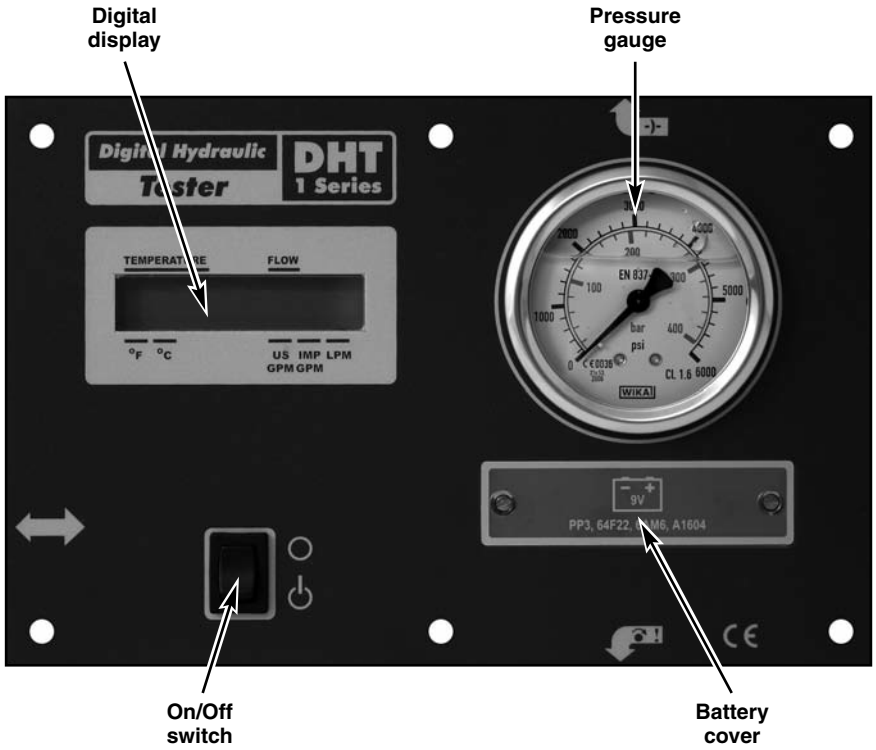
A preliminary check of the hydraulic system's oil supply, pump rotation, filters, oil lines, cylinder rods as well as looking for external leaks should be made prior to installing the Hydraulic Tester.

Safety burst disc information

Flow size	Part No.	Pressure Rating	Colour Code
up to 400 lpm (Ø16mm)	FT338-4 FT338-5 FT338-6	4000 psi (280 bar) 5000 psi (345 bar) 6000 psi (420 bar)	Green; Grün; Vert; Verde Blue; Blau; Bleu; Azul Red; Rot; Rouge; Rojo
up to 800 lpm (Ø19,8mm)	FT545-3 FT545-5 FT545-6 FT545-7	3000 psi (210 bar) 5000 psi (345 bar) 6000 psi (420 bar) 7000 psi (480 bar)	Yellow, Gelb, Jaune, Amarillo Blue; Blau; Bleu; Azul Red; Rot; Rouge; Rojo Orange; Orange; Orange; Naranja



DHT 1 Series Digital Hydraulic Tester



- **Digital display** - Digital display for flow and temperature. Automatically turns off if the unit is unused for more than 20 minutes.
- **Pressure gauge** - Analog pressure gauge, filled with glycerine to ensure good dampening when reading pulsating pressures.
- **On/Off** switch
- **Battery cover** - Remove this to replace the battery.

Bi-Directional Loading Valve

The reverse flow valve gives positive shut-off and pressure control in both directions of flow. The loading valve has two easily replaceable safety discs located in the valve assembly which internally protect the tester and machine in both flow directions.

Specification

EU Specification

Model Number	Flow Range (lpm)	Pressure Range (bar)	Temperature Range (°C)	Inlet/Outlet Ports
DHT401-B-6	10 - 400	0 - 420	0 - 120	1” BSPF
DHT801-S-7	20 - 800	0 - 480	0 - 120	1 7/8” - 12 UN

Dimensions (Millimetres)

DHT401: 240 Wide, 200 Deep, 200 High
Weight: Unpacked 6.5 kg, Shipped 7 kg (Approx.)

DHT801: 245 Wide, 225 Deep, 225 High
Weight: Unpacked 10 kg, Shipped 11 kg (Approx.)

US Specification

Model Number	Flow Range (gpm)	Pressure Range (psi)	Temperature Range (°F)	Inlet/Outlet Ports
DHT401-S-6	4 - 100	6000	32 - 250	1-5/16" - 12 UN #16 O-ring
DHT801-S-7	7 - 210	7000	32 - 250	1-7/8” - 12 UN #24 O-ring
DHT801-F-3	7 - 210	3000*	32 - 250	1.5" C61 4-Bolt Flange

* per J508 SAE C61 standard

Dimensions (Inch)

DHT401: 9.45" W, 7.87" D, 7.87" H
Weight: Unpacked 14.33 lb
Shipped approximately 15.4 lb

DHT801: 9.65" W, 8.86" D, 8.86" H
Weight: Unpacked 22 lb
Shipped approximately 24.2 lb

Connections
Flow block connection by flexible hoses 1 - 2 metres (3 - 6ft) long.

Adaptors
Adaptor Fitting kits and flanges are available to suit the range of flow blocks. Consult the sales office.

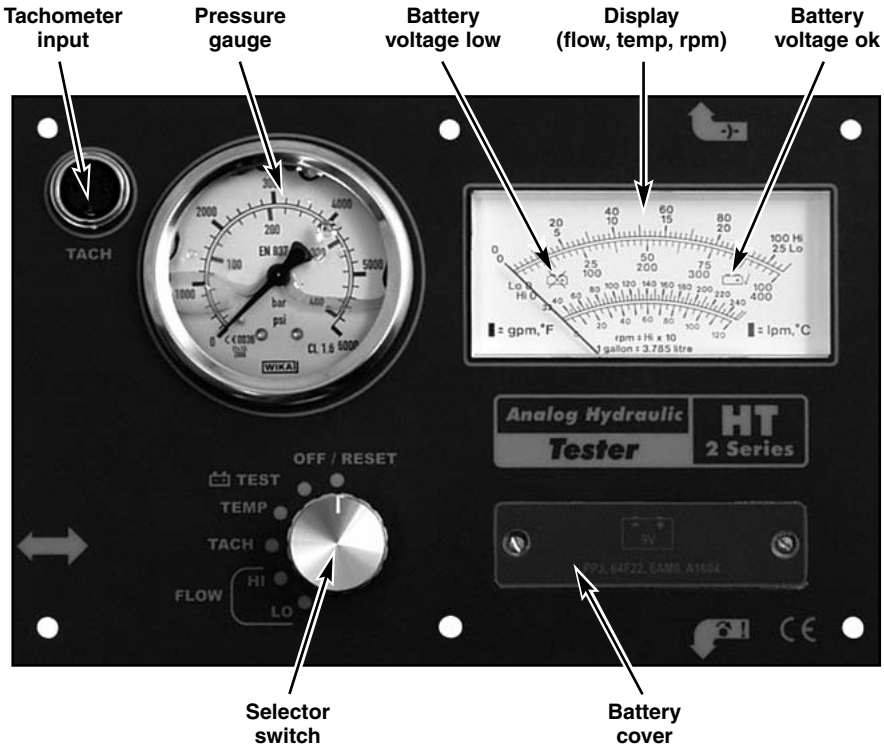
Flow
Measured by the electronic count of an axial turbine designed to minimise the effects of variation in temperature and viscosity. The EU version displays flow in lpm, the US version displays flow in gpm.
Accuracy: ± 1% of full scale.

Pressure
Glycerine filled dual scale pressure gauge bar / psi connected by capillary tube to a shuttle valve built into the flow block thereby always indicating the high pressure side of the valve regardless of flow direction.
Accuracy: ± 1.6 % of full scale.

Temperature
Sensed by a thermistor pick-up in the oil flow for fast response. Temperature is permanently displayed in °C/°F.
Accuracy: ± 1°C, 2°F.

Seals
Viton seals compatible with oil, water/oil emulsion are fitted as standard. EP seals for phosphate-ester are available to special order.

HT 2 Series Analog Hydraulic Tester



- **Display** - Large analog display. Automatically turns off if the unit is unused for more than 20 minutes.
- **Pressure gauge** - Analog pressure gauge, filled with glycerine to ensure good dampening when reading pulsating pressures.
- **Tachometer input** - Connection socket for the optional infra-red phototachometer.
- **Selector switch** - Turn the switch to select the required function.
  - **OFF/RESET** - Switches the tester off and resets the unit after automatic power shut off.
  - **'B' TEST** - Checks the condition of the battery.
  - **TEMP** - Temperature is indicated on the display.
  - **TACH** - RPM is indicated on the display.
  - **FLOW 'HI'** - Flow is indicated on the 'Hi' scale of the display.
  - **FLOW 'LO'** - Flow is indicated on the 'LO' scale of the display.
- **Battery cover** - Remove this to replace the battery.

Bi-Directional Loading Valve

The reverse flow valve gives positive shut-off and pressure control in both directions of flow. The loading valve has two easily replaceable safety discs located in the valve assembly which internally protect the tester and machine in both flow directions.

Specification

EU Specification

Model Number	Flow Range (lpm)	Flow Scales (lpm) Low	Flow Scales (lpm) High	Pressure Range (bar)	Temperature Range (°C)	Speed (rpm)	Inlet/Outlet Ports
HT302-B-6	8 - 300	0 - 75	0 - 300	0 - 420	10 - 120	300 - 3000	1” BSPF
HT402-B-6	10 - 400	0 - 100	0 - 400	0 - 420	10 - 120	300 - 4000	1” BSPF
HT602-S-7	20 - 600	0 - 150	0 - 600	0 - 480	10 - 120	300 - 6000	1-7/8” -12 UN
HT802-S-7	20 - 800	0 - 200	0 - 800	0 - 480	10 - 120	300 - 5000	1-7/8” -12 UN

Dimensions (Millimetres)
HT302/402: 240 Wide, 200 Deep, 200 High
Weight: Unpacked 6.5 kg, Shipped 7 kg (Approx.)

HT602/802: 245 Wide, 225 Deep, 225 High
Weight: Unpacked 10 kg, Shipped 11 kg (Approx.)

US Specification

Model Number	Flow Range (gpm)	Flow Scales (gpm) Low	Flow Scales (gpm) High	Pressure Range (psi)	Temperature Range (°F)	Speed (rpm)	Inlet/Outlet Ports
HT302-S-6	4 - 80	0 - 20	0 - 80	6000	32 - 250	300 - 3000	1-5/16"-12 UN #16 ORB
HT402-S-6	4 - 100	0 - 25	0 - 100	6000	32 - 250	300 - 4000	1-5/16"-12 UN #16 ORB
HT602-F-3	6 - 160	0 - 40	0 - 160	3000*	32 - 250	300 - 6000	1.5" C61 4-Bolt Flange
HT602-S-7	6 - 160	0 - 40	0 - 160	7000	32 - 250	300 - 6000	1-7/8"-12 UN #24 ORB
HT802-F-3	7 - 200	0 - 50	0 - 200	3000*	32 - 250	300 - 5000	1.5" C61 4-Bolt Flange
HT802-S-7	7 - 200	0 - 50	0 - 200	7000	32 - 250	300 - 5000	1-7/8"-12 UN #24 ORB

* per J508 SAE C61 standard

Dimensions (Inch)
HT302/402: 9.45" W, 7.87" D, 7.87" H
Weight: Unpacked 14.33 lb
Shipped approximately 15.4 lb

HT602/802: 9.65" W, 8.86" D, 8.86" H
Weight: Unpacked 22 lb
Shipped approximately 24.2 lb

Connections
By flexible hoses 1 - 2 meter minimum length (3 - 6 foot). Care should be taken to avoid constrictions at the inlet or outlet port.

Adaptors
Adaptor Fitting and flanges are available to suit the range of flow blocks. Consult the sales office.

Flow
Measured by the electronic count of an axial turbine designed to minimise the effects of variation in temperature and viscosity. The large analogue readout meter has high / low scales selected by a switch.
Accuracy: ± 1% of full scale.

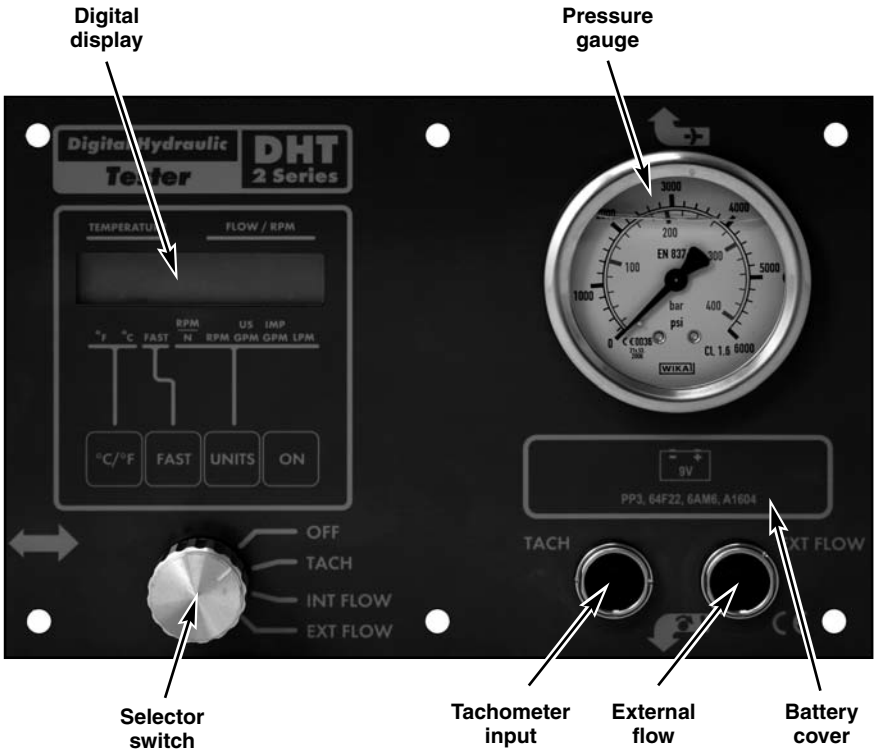
Pressure
Glycerine filled dual scale pressure gauge 420 bar / 6000 psi (7000 psi / 480 bar for HT602/802) connected by capillary tube to a shuttle valve built into the flow block thereby always indicating the high pressure side of the valve regardless of flow direction.
Accuracy: ± 1.6% of full scale.

Temperature
Sensed by a thermistor pick-up in the oil flow for fast response. Temperature is displayed in °C/°F.
Accuracy: ± 2°C, 4°F.

Speed
Rotational speed of motors, shafts etc., can be measured by optional infra-red phototachometer using one or more retro-reflective marks. Range: See Table.
Accuracy: ± 2% of full scale.

Seals
Viton seals compatible with oil, water/oil emulsion are fitted as standard. EP seals for phosphate-ester are available to special order.

DHT 2 Series Digital Hydraulic Tester



- **Digital display** - Digital display for flow and temperature. Automatically turns off if the unit is unused for more than 20 minutes.
- **Change settings indicated by the ^ on the display** - using the °C/F and UNITS buttons. The FAST button changes the screen refresh from 1 to 3 times per second. The ON button will switch the unit back on after the power has automatically shut-off if the unit is un-used.
- **Pressure gauge** - Analog pressure gauge, filled with glycerine to ensure good dampening when reading pulsating pressures.
- **Tachometer input** - Connection socket for the optional infra-red phototachometer.
- **External flow** - Connection socket for optional second 'LT' series flow meter, to measure a second flow and temperature.
- **Selector switch** - Turn the switch to select the required function.
  - **OFF** - Switches the tester off and disconnects the battery.
  - **TACH** - RPM is indicated on the display.
  - **INT FLOW** - Display flow and temperature measured by the internal flow meter.
  - **EXT FLOW** - Display flow and temperature measured by the optional external flow meter.
- **Battery cover** - Remove this to replace the battery.

Bi-Directional Loading Valve

The reverse flow valve gives positive shut-off and pressure control in both directions of flow. The loading valve has two easily replaceable safety discs located in the valve assembly which internally protect the tester and machine in both flow directions.

Specification

EU Specification

Model Number	Flow Range (lpm)	Pressure Range (bar)	Temperature Range (°C)	Speed (rpm)	Inlet/Outlet Ports
DHT302-B-6	8 - 300	0 - 420	10 - 120	300 - 6000	1” BSPF
DHT402-B-6	10 - 400	0 - 420	10 - 120	300 - 6000	1” BSPF
DHT602-F-3	20 - 600	0 - 210	10 - 120	300 - 6000	Code 61 - 1 1/2" 4-bolt Flange
DHT602-S-7	20 - 600	0 - 480	10 - 120	300 - 6000	1 7/8" - 12 UN
DHT802-F-3	20 - 800	0 - 210	10 - 120	300 - 6000	Code 61 - 1 1/2" 4-bolt Flange
DHT802-S-7	20 - 800	0 - 480	10 - 120	300 - 6000	1 7/8" - 12 UN

Dimensions (Millimetres)
DHT302/402: 240 Wide, 200 Deep, 200 High
Weight: Unpacked 6.5 kg, Shipped 7 kg (Approx.)

DHT602/802: 245 Wide, 225 Deep, 225 High
Weight: Unpacked 10 kg, Shipped 11 kg (Approx.)

US Specification

Model Number	Flow Range (gpm)	Pressure Range (psi)	Temperature Range (°F)	Speed (rpm)	Inlet/Outlet Ports
DHT302-S-6	4 - 80	6000	32 - 250	300 - 6000	1-5/16"-12UN #16 O-ring
DHT402-S-6	4 - 100	6000	32 - 250	300 - 6000	1-5/16"-12UN #16 O-ring
DHT602-F-3	6 - 160	3000*	32 - 250	300 - 6000	1-1/2” C61 4-Bolt Flange
DHT602-S-7	6 - 160	7000	32 - 250	300 - 6000	1 7/8”-12UN #24 O-ring
DHT802-F-3	7 - 210	3000*	32 - 250	300 - 6000	1-1/2” C61 4-Bolt Flange
DHT802-S-7	7 - 210	7000	32 - 250	300 - 6000	1 7/8"-12UN #24 O-ring

* per J508 SAE C61 standard

Dimensions (Inch)
DHT302/402: 9.45" W, 7.87" D, 7.87" H
Weight: Unpacked 14.33 lb
Shipped approximately 15.4 lb

DHT602/802: 9.65" W, 8.86" D, 8.86" H
Weight: Unpacked 22 lb
Shipped approximately 24.2 lb

Connections
Flow block connection by flexible hoses 1 - 2 metres (3 - 6ft) long.

Adaptors
Adaptor Fitting kits and flanges are available to suit the range of flow blocks. Consult the sales office.

Flow
Measured by the electronic count of an axial turbine. The large digital display reads in lpm, UK gpm or US gpm, selected by push button and indicated by a cursor arrow on the display.
Accuracy: ± 1% of indicated reading (over 15 - 100% of range).

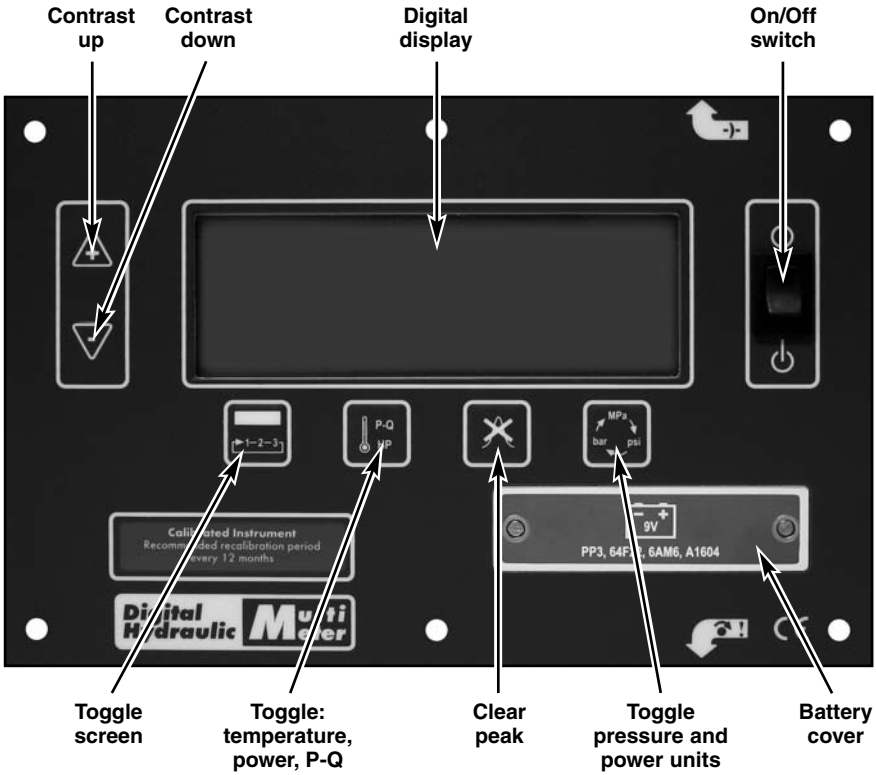
Pressure
Glycerine filled dual scale pressure gauge bar / psi connected by capillary tube to a shuttle valve built into the flow block thereby always indicating the high pressure side of the valve regardless of flow direction.
Accuracy: ±1.6% of full scale.

Temperature
Sensed by a thermistor pick-up in the oil flow for fast response. Temperature is displayed in °C or °F for either the internal or external flow block.
Accuracy: ± 1°C, 2°F.

Speed
Rotational speed of motor shafts etc., can be measured by optional infra-red phototachometer using one or more reflective marks. Range 300 - 6000 rpm.
Accuracy: ± 1/4% of full scale with one count per revolution.

Seals
Viton seals compatible with oil, water/oil emulsion are fitted as standard. EP seals for phosphate-ester are available to special order.

DHM 3 Series Digital Hydraulic Multimeter



- **Digital display** - Large digital display. Automatically turns off if the unit is unused for more than 20 minutes.
- **Contrast up** - Press & hold to make the screen text darker and easier to read in different light conditions.
- **Contrast down** - Press & hold to make the screen text lighter.
- **On/Off switch** - Turn power to the unit ON or OFF with this switch.
- **Toggle screen** - This button toggles through the three display screens.
- **Toggle: temperature, power, P-Q** - Pressing this button will change the bottom line of the display from temperature to power. This button is also used when setting-up for efficiency on screen 3.
- **Clear peak** - Press to clear the peak pressure value
- **Toggle pressure and power units** - Toggles through a selection of engineering units for pressure and the corresponding power units.
- **Battery cover** - Remove this to replace the battery.

Bi-Directional Loading Valve

The reverse flow valve gives positive shut-off and pressure control in both directions of flow. The loading valve has two easily replaceable safety discs located in the valve assembly which internally protect the tester and machine in both flow directions.

Specification

EU Specification

Model Number	Flow Range (lpm)	Pressure Range (bar)	Temperature Range (°C)	Inlet/Outlet Ports
DHM403-B-6	10 - 400	0 - 420 (0 - 600 peak)	0 - 120	1" BSPF
DHM803-S-7	20 - 800	0 - 480 (0 - 600 peak)	0 - 120	1 7/8" - 12 UN

Dimensions (Millimetres)
DHM403: 240 Wide, 200 Deep, 200 High
Weight: Unpacked 6.5 kg, Shipped 7 kg (Approx.)

DHM803: 245 Wide, 225 Deep, 225 High
Weight: Unpacked 10 kg, Shipped 11 kg (Approx.)

US Specification

Model Number	Flow Range (gpm)	Pressure Range (psi)	Temperature Range (°F)	Inlet/Outlet Ports
DHM403-S-6	4 - 100	0 - 6000 (0 - 8700 peak)	32 - 250	1-5/16 UN -12 #16 ORB
DHM803-S-7	7 - 210	0 - 7000 (0 - 8700 peak)	32 - 250	1-7/8" UN-12 #24 ORB

Dimensions (Inch)
DHM403: 9.45" W, 7.87" D, 7.87" H
Weight: Unpacked 14.33 lb
Shipped approximately 15.4 lb

DHM803: 9.65" W, 8.86" D, 8.86" H
Weight: Unpacked 22 lb
Shipped approximately 24.2 lb

Connections
Flow block connection by flexible hoses 1 - 2 metres (3 - 6ft) long.

Adaptors
Adaptor Fitting kits and flanges are available to suit the range of flow blocks. Consult the sales office.

Flow
Measured by the electronic count of an axial turbine designed to minimise pressure drop and the effects of viscosity. The EU version displays flow in lpm, the US version displays flow in gpm.
Accuracy: ± 1% of indicated reading (over 15 - 100% of range).

Pressure and peak pressure
Measured using a built-in pressure transducer rated to 600 bar / 8700 psi. The transducer has a typical response time of <1 ms to enable the accurate capture of peak pressures. The engineering units for pressure can be changed using the 'pressure units' button on the front panel. Standard units are 'BAR, PSI, MPA, KSC'.
Accuracy: Pressure 0.5% FSD, Peak 1% FSD.

Temperature
Sensed by a thermistor built into the flow transducer to maximise contact with the oil flow and ensure fast response. The EU version displays temperature in °C, the US version displays temperature in °F.
Accuracy: ± 1°C, 2°F.

Power
Calculated from the flow and pressure, the hydraulic power is displayed in either HP or KW. The engineering units for power are linked to the pressure units and can be changed using the 'pressure units' button on the front panel.
Accuracy: ± 3 kW / 4 HP (≤ 100 kW / 134 HP), ± 5 kW / 6.7 HP (> 100 kW / 134 HP).

Volumetric efficiency
Calculated as a ratio of the flow at high pressure to the flow under reference conditions. Volumetric Efficiency is expressed as a percentage, at constant rpm.
Accuracy: ± 1% point.

Seals
Viton seals compatible with oil, water/oil emulsion are fitted as standard. EP seals for phosphate-ester are available to special order.

Screen 1 (Digital)

This screen displays the measurement type, value and engineering units in digital format.

Screen 2 (Analogue)

This screen displays the measurements in the same order as in SCREEN 1, but this time displays the value, engineering units and a bar graph which corresponds to the value indicated. The bar graph is scaled from zero to the maximum calibrated value for the tester (see below).

Bar graph scaling:

		EU			US	
		DHM403	**DHM803**		**DHM403**	**DHM803**
Flow	**LPM**	0 - 400	0 - 800	**GPM**	0 - 100	0 - 210
Pressure	**BAR**	0 - 600	0 - 600	**PSI**	0 - 8700	0 - 8700
Peak	**BAR**	0 - 600	0 - 600	**PSI**	0 - 8700	0 - 8700
Temperature	**°C**	0 - 120	0 - 120	**° F**	32 - 250	32 - 250
Power	**kW**	0 - 400	0 - 800	**HP**	0 - 536	0 - 1072

Screen 3 (P - Q)

This screen is used for testing pump efficiency. The screen initially displays flow and pressure on the top two lines as in SCREEN 2 and power on the bottom two lines.
Once the efficiency reference point has been entered, then the third line displays the current efficiency and the bottom line shows the reference point, the top two lines will continue to display the current flow and pressure.

DHM Operation

Turn the tester on by flipping the rocker switch to the 'ON' position.
The display will return to the last screen viewed, indicating the current conditions. The engineering units will be as selected when the tester was last used.
If the screen starts flashing, then the battery should be replaced as soon as possible.

Now that the tester is turned on, you may use the contrast adjustment buttons to set the contrast of the screen to suit the ambient lighting conditions.
Once adjusted, the setting will be remembered for next time the tester is switched on.

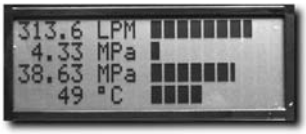
Pressing  on screen1 will change the bottom line of the display from temperature to power.

If the pressure in the system is now increased and then decreased, the second line on the display will show the current pressure and the third line will show the peak pressure reached so far.

Pressing  again now, will change the bottom line of the display back to temperature.

Pressing  now will allow you to change the engineering units for pressure. Keep pressing this button until the desired units are displayed. If power is being displayed, then its engineering units will change to suit the selected pressure units.

Press  if you wish to see the readings displayed as values, engineering units and a bar graph, this is screen2.



Pressing  will once again allow you to change the engineering units for pressure.

Pressing  will toggle the bottom line of the display between temperature and power.

Pressing  at any time when on screen1 or 2 will clear the peak pressure.

Pressing  now will open screen3 used to test pump efficiency. When first accessing this screen, power will be displayed on the bottom line, until you have set your efficiency reference point.

To set the reference point for efficiency testing on screen3, you must first reduce the system pressure as much as you can and set your pump to the speed you wish to test at.

Press 

and the current conditions will be stored as the reference (with the assumption that 100% efficiency is achieved at this point). The flow and pressure values for the reference point will be indicated on the bottom line of the display and the third line of the display will now show the calculated efficiency. The reference point will be lost if you press the toggle screen button.

As you now load the system by increasing the pressure, any reduction in flow rate will reduce the efficiency value displayed on line 3 and will automatically update.