



PFM6, PFM6BD and PFM8 Portable Hydraulic Testers

Installation & Operating Instructions

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Introduction

Flo-tech Portable Hydraulic Testers are designed to provide fast diagnostic troubleshooting of hydraulic systems and components. These compact, self-contained testers feature laboratory accuracy and provide flow, temperature, pressure and optional power measurements simultaneously from one point.

Flo-tech offers three models, all available in a choice of up to 5 flow ranges and 3 port sizes:

PFM6 Digital Hydraulic Tester



Features:

- Accuracy of $\pm 1\%$ of full flow range
- 3-1/2 digit LCD display for flow and temperature
- Helical tube pressure gauge
- One toggle switch to control power and select flow and temperature
- Loading valve with fingertip control of pressure up to 6000 PSI (414 Bar)
- Platinum resistive temperature sensor
- Internal over pressure burst disc protection

PFM6BD Bi-directional Hydraulic Tester



Features:

- Bi-directional testing
- Low pressure drop
- Accuracy of $\pm 1\%$ of full flow range
- 3-1/2 digit LCD display for flow and temperature
- Helical tube pressure gauge
- One toggle switch to control power and select flow and temperature
- Loading valve with fingertip control of pressure up to 6000 PSI (414 Bar)
- Platinum resistive temperature sensor
- Internal over pressure burst disc protection

PFM8 Digital Hydraulic Tester & Dynamometer



Features:

- Accuracy of $\pm 1\%$ of full flow range
- 3-1/2 digit LCD displays
- Digital pressure readings
- Membrane switch to select flow, temperature, pressure or power
- Front panel switch to select U.S. or metric readings
- Loading valve with fingertip control of pressure up to 6000 PSI (414 Bar)
- Platinum resistive temperature sensor
- Internal over pressure burst disc protection

Specifications

Material

| | |
|--------------------|--|
| Housing: | 6013-T351 Anodized aluminum |
| Turbine Rotor: | T416 Stainless steel |
| Rotor Supports: | 6061-T6 Aluminum |
| Seals: | Buna N standard Viton® and EPR optional |
| Ball Bearings: | 440 C Stainless steel |
| Hub Cones: | 6061-T6 Aluminum alloy |
| Temperature Probe: | 12L14 Steel, electroless nickel plate |

PFM6/8 Series Testers

| | |
|------------------------|---|
| Valve | |
| for 15/30 Models: | Cold rolled steel body with 303 SS stem |
| for 60/85/200 Models: | 12L14 steel body with 303 SS stem |
| Sleeve for 200 Model: | D.O.M. steel tube |
| Poppet: | 12L14 Steel, hardened |
| Straightening Sections | |
| for 15/30 Models: | CA360 Brass |
| for 60/85/200 Models: | 6061-T6 Aluminum |
| Cones: | 2024-T4 Aluminum |

PFM6BD Series Testers

| | |
|-------------------------|-----------------------------------|
| Valve: | 12L14 steel body with 303 SS stem |
| Spool/Sleeve: | 4340 Alloy steel, hardened |
| Straightening Sections: | 6061-T6 Aluminum |
| Cones: | 2024-T4 Aluminum |

| | |
|--------|---|
| Ports: | SAE Straight thread O-ring boss, female, J1926/1; BSPP ISO1179 |
|--------|---|

Magnetic Pick-up

| | |
|-------|---------------------------------------|
| Body: | 12L14 steel, electroless nickel plate |
| Nut: | 12L14 steel, electroless nickel plate |

| | |
|--------------------------|---|
| Electronic Case & Cover: | Cold rolled steel, zinc plate with clear seal, epoxy black paint |
|--------------------------|---|

Performance

| | |
|----------------------|---|
| Flow Accuracy: | ±1% of full scale |
| Repeatability: | ±0.2% |
| Pressure Rating: | 6000 PSI (414 Bar) maximum with a 3:1 safety factor |
| Turbine Response: | ≤200 ms |
| Fluid Temperature: | -4 to +300 °F (-20 to +150 °C) |
| Ambient Temperature: | -4 to +131 °F (-20 to +55 °C) |
| Flow Readout: | Linearity and zero shift = ±1 digit |
| Operating Pressure: | up to 6000 PSI (414 Bar, 41.4 MPa, 420 kg/cm ²) |
| Pressure Drop: | See Δ P charts on page 18 |
| Fluid Temperature: | up to 300 °F (150 °C) |
| Readout Accuracy: | ±1 digit |
| Battery Type: | AA size alkaline, ~50 hrs of service |

Calibration

Testers are calibrated with a 32 cSt (150 SUS) hydraulic oil. Standard calibration is done using 5 points and is traceable to NIST, ISO 9001. An optional 10 point calibration can be performed for increased accuracy.

Series/Model Number Designations

| SERIES | MODEL NUMBER * | NOMINAL PORT SIZE | FLOW RATE | POWER HP (kW) |
|------------|------------------|-------------------|------------------------------|---------------|
| PFM6-15 | F5080 (CE) - XXX | SAE 12 | 1 - 15 GPM | |
| PFM6-30 | F5079 (CE) - XXX | SAE 12 | 2 - 30 GPM | |
| PFM6-60 | F5078 (CE) - XXX | SAE 16 | 3 - 60 GPM | |
| PFM6-85 | F5077 (CE) - XXX | SAE 16 | 4 - 85 GPM | |
| PFM6-200 | F5076 (CE) - XXX | SAE 24 | 7 - 199.9 GPM | |
| PFM6-15 | F5110 (CE) - XXX | G 3/4 | 4 - 56 LPM | |
| PFM6-30 | F5111 (CE) - XXX | G 3/4 | 7.5 - 113.6 LPM | |
| PFM6-60 | F5112 (CE) - XXX | G 1 | 12 - 227 LPM | |
| PFM6-85 | F5113 (CE) - XXX | G 1 | 15 - 321 LPM | |
| PFM6-200 | F5114 (CE) - XXX | G 1-1/2 | 26 - 757 LPM | |
| PFM6BD-60 | F5082 (CE) - XXX | SAE 16 | 3 - 60 GPM / 12 - 227 LPM | |
| PFM6BD-85 | F5083 (CE) - XXX | SAE 16 | 4 - 85 GPM / 15 - 321 LPM | |
| PFM6BD-200 | F5084 (CE) - XXX | SAE 24 | 7 - 199.9 GPM / 26 - 757 LPM | |
| PFM8-15 | F5061 | SAE 12 | 1 - 15 GPM / 4 - 56 LPM | 52.5 (39) |
| PFM8-30 | F5058 | SAE 12 | 2 - 30 GPM / 7.5 - 113.6 LPM | 105 (78) |
| PFM8-60 | F5052 | SAE 16 | 3 - 60 GPM / 12 - 227 LPM | 210 (157) |
| PFM8-85 | F5053 | SAE 16 | 4 - 85 GPM / 15 - 321 LPM | 298 (222) |
| PFM8-200 | F5054 | SAE 24 | 7 - 199.9 GPM / 26 - 757 LPM | 700 (522) |

* Replace XXX with PSI, BAR, KG/CM2 or MPA to specify complete model number.

Dimensions

| SERIES | DIMENSIONS Length (A) × Depth (B) × Height (C) | | WEIGHT LBS (KG) |
|------------|--|-----------------|--------------------|
| | INCHES | mm | |
| PFM6-15 | 11.3 × 3.5 × 9.8 | 287 × 89 × 249 | 13.85 (6.3) |
| PFM6-30 | 11.3 × 3.5 × 9.8 | 287 × 89 × 249 | 13.85 (6.3) |
| PFM6-60 | 11.5 × 3.5 × 9.8 | 292 × 89 × 249 | 16.50 (7.5) |
| PFM6-85 | 11.5 × 3.5 × 9.8 | 292 × 89 × 249 | 16.50 (7.5) |
| PFM6-200 | 12.3 × 4.0 × 10.3 | 311 × 101 × 262 | 20.00 (9.1) |
| PFM6BD-60 | 11.3 × 3.5 × 10.1 | 287 × 89 × 256 | 16.50 (7.5) |
| PFM6BD-85 | 11.3 × 3.5 × 10.1 | 287 × 89 × 256 | 16.50 (7.5) |
| PFM6BD-200 | 11.8 × 4.0 × 10.6 | 300 × 101 × 268 | 20.00 (9.1) |
| PFM8-15 | 11.3 × 3.5 × 9.8 | 287 × 89 × 249 | 13.85 (6.3) |
| PFM8-30 | 11.3 × 3.5 × 9.8 | 287 × 89 × 249 | 13.85 (6.3) |
| PFM8-60 | 11.5 × 3.5 × 9.8 | 292 × 89 × 249 | 16.50 (7.5) |
| PFM8-85 | 11.5 × 3.5 × 9.8 | 292 × 89 × 249 | 16.50 (7.5) |
| PFM8-200 | 12.3 × 4.0 × 10.3 | 311 × 101 × 262 | 20.00 (9.1) |

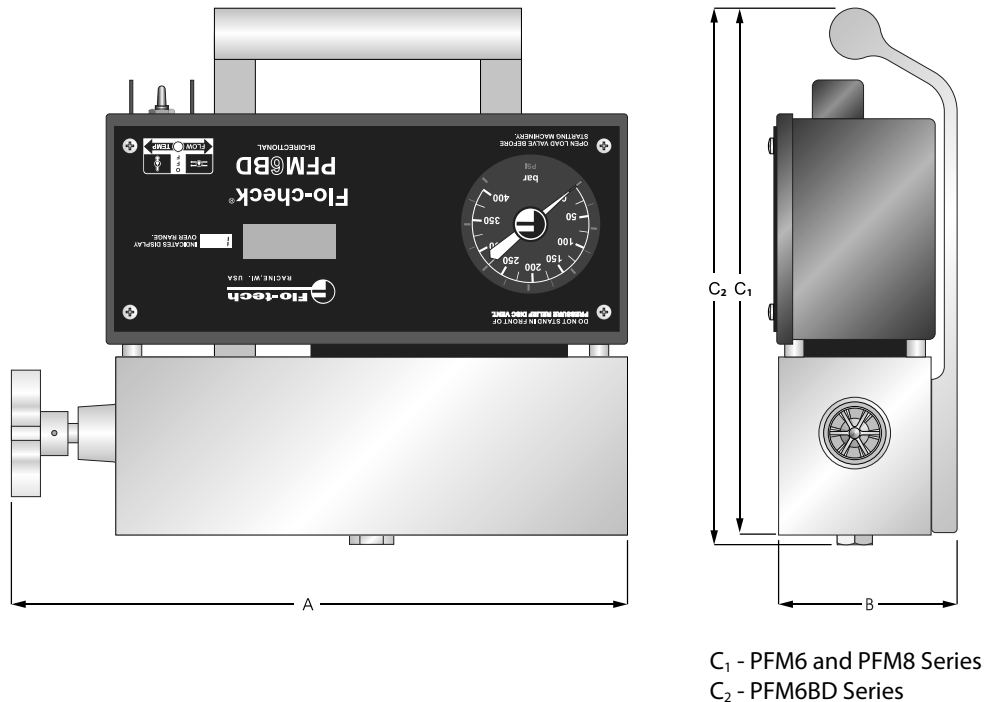


FIGURE 1 - Hydraulic Tester Dimension Illustration



CAUTION

Read instructions thoroughly before installing the tester. If you have any questions regarding product installation or maintenance, call your local supplier or the factory for more information.

INSTALLATION



CAUTION

The information in this manual is for general application only. Any guidelines furnished by the manufacturer of the machine's hydraulic components should be followed. Specific systems may require specific test procedures.

Install the PFM6, PFM6BD or PFM8 tester at any location in the hydraulic circuit with the flow from "IN" to "OUT" as marked near the ports of the flow meter. The "IN" and "OUT" ports on the PFM6BD indicate the primary flow direction. It is advisable to keep any elbows, tees, valves, etc. at least 12 inches (31 cm) away from the inlet and outlet ports to preserve the accuracy of the flow measurement. Use quick disconnect couplings for easy connections and to keep tester sealed and clean when not in use.

Diagrams illustrating Typical Test Placements for the testers are located in the Test Procedures section beginning on page 10.

OPERATION



WARNING

All testers are shipped with the loading valve in the closed position. The loading valve must be opened fully before initiating flow and testing of the hydraulic circuit. Turn the loading valve handle counterclockwise to the fully open position. Failure to open the loading valve fully can result in injury to personnel and/or damage to the equipment.

The PFM6 and PFM6BD testers utilize a 3 position, single toggle switch to turn on the power and to select to display either flow or temperature readings. These models are factory calibrated for either U.S. or metric readings.

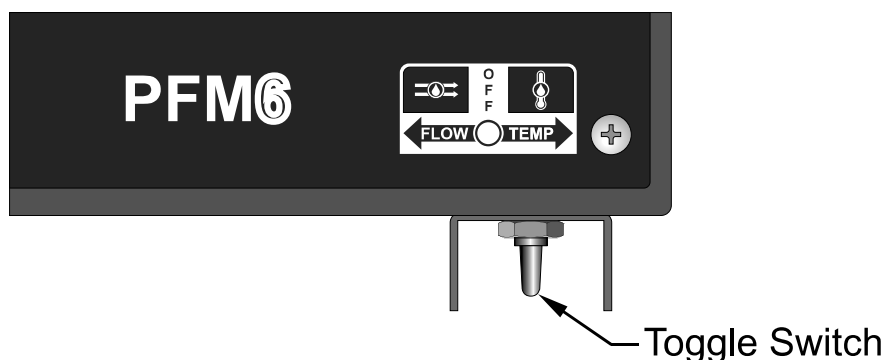


FIGURE 2 - PFM6 and PFM6BD Toggle Switch

The PFM8 testers can be changed in the field between U.S. and metric readings via a slide switch located in the center of the front panel. Use a small pointed object to slide this switch to the desired position. See **Figure 3** on page 9.

After the selecting U.S. or metric, power and display options are made via the membrane switches. When the "ON" switch is pressed, pressure will show in the left display and flow in the right display. To view temperature in the right LCD, simply press the "TEMP." switch. To view Power in the left LCD, press the "PWR." switch.

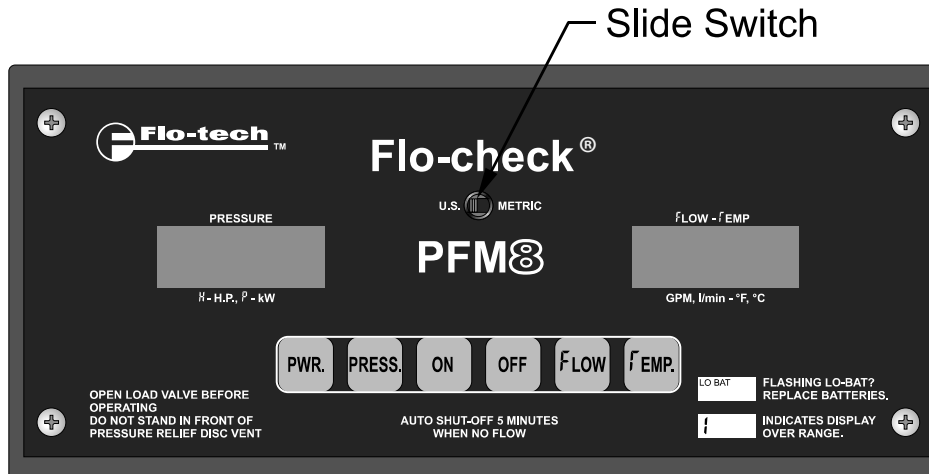


FIGURE 3 - PFM8 Slide and Membrane Switches

Flow is identified by the F symbol and the Γ symbol indicates temperature. Horsepower readings will be followed by the H symbol and kilowatt by a P symbol.

NOTE: If no flow has been present for five minutes, the power saver circuit will automatically shut the PFM8 off. Pressing the “ON” switch will restore power.

To prolong battery life on all testers, select the “OFF” option by returning the toggle switch to the “OFF” position on the PFM6 and PFM6BD models or pressing “OFF” on the membrane switch of the PFM8 model when the tester is not being used.

Once the tester has been installed, the pressure can be regulated by operation of the loading valve.

ALWAYS START WITH THE LOADING VALVE OPEN



WARNING

Turn the loading valve handle counterclockwise to open before starting machinery. Injury to personnel and/or damage to the equipment can result if the loading valve is fully closed.



CAUTION

The PFM6BD is **not** designed for high pressure "deadhead" (loading valve fully closed) applications, in the reverse direction. Usage under this condition could lead to loading valve failure. Under such conditions, maximum operating pressure is limited to 2000 PSI (138 Bar).

The PFM6 and PFM8 testers are equipped with a poppet style loading valve. The PFM6BD testers utilize a spool design loading valve to accommodate bi-directional flow. The spool design requires more turns to go from total open to total close.

Pressure is displayed as follows:

- PFM6 - the gauge indicates pressure at the inlet port
- PFM6BD - the gauge indicates pressure at the inlet port dependent on the direction of flow
- PFM8 - pressure is displayed on the LCD. A minimum of 200 PSI (14 kg/cm²) is required to activate the display. PSI will increment in 10s (i.e. 200, 210, 220, etc.); kg/cm², bars or MPa will increment in single units (i.e. 141, 142, 143, etc.)

On all models, the battery voltage is affected by cold temperatures. Allow time for the circulating oil to warm the tester before critical measurements are taken. On the PFM6 and PFM6BD, a LO BAT signal on the display indicates a low battery condition. On the PFM8, a flashing colon (:) on the display indicates a low battery condition. Replace the batteries with 4 "AA" alkaline batteries. See Battery Replacement on page 17.

Test Procedures



WARNING

All testers are shipped with the loading valve in the closed position. The loading valve must be opened fully before initiating flow and testing of the hydraulic circuit. Turn the loading valve handle counterclockwise to the fully open position. Failure to open the loading valve fully can result in injury to personnel and/or damage to the equipment.



CAUTION

The information in this manual is for general application only. Any information furnished by the manufacturer of the machine's hydraulic components should be followed. Specific systems may require specific test procedures.

General Information

The PFM6 and PFM6BD testers are designed to measure flow, pressure and temperature. The PFM8 testers are also designed to measure power.

The power measurements are derived from the product of flow and pressure. When using a PFM6 or PFM6BD, power can be calculated using the formulas on page 19.

Standard Test Conditions

1. Install the PFM tester as described in one of the following test procedures:
 - a. Pump Test
 - b. "Tee" Test
 - c. Control Valve, Cylinder and Hydraulic Motor Test
 - d. Relief Valves in Separate Housings
 - e. Relief Valves
2. Open the loading valve fully by turning the handle counterclockwise.
3. Start the pump and adjust it to rated speed.
4. To raise the system temperature, close the tester loading valve to develop a pressure somewhat below the relief valve pressure. Maintain until the desired temperature is reached.
5. Open the tester's loading valve fully and proceed with the required test procedure.
6. The tester will display flow, pressure, temperature and power readings.

Pump Test

A tee must be installed between the pump discharge port and the return line to the tank. Be sure the fluid path is only through the pump, the hydraulic test unit, and back to the tank.

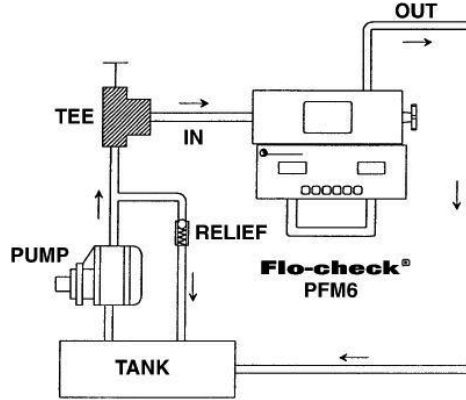


FIGURE 4 - Pump Test

1. Plug the line to the control valve.
2. Open the tester loading valve fully to read maximum pump flow at zero pressure.
3. Close the loading valve to increase pressure from zero pressure to rated or maximum pump pressure to determine pump condition.
4. The pump flow at rated pressure can now be checked against the pump manufacturer's specifications. A decrease in flow from zero pressure to maximum pressure indicates the pump condition. A pump that delivers a constant low flow at zero pressure and at maximum pressure suggests suction problems.

“Tee” Test

A tee must be installed between the pump and control valve and connected to the “IN” port of the PFM tester. The “OUT” port of the tester is connected to the tank. Pumps and relief valves can be isolated from the system and checked with the “Tee” Test.

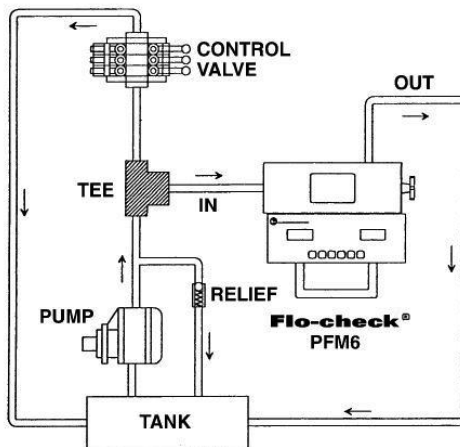


FIGURE 5 - “Tee” Test



WARNING

Increase pressure slowly. The relief valve may now be isolated from the hydraulic circuit, and system pressures higher than the relief valve setting can result in injury to personnel and/or damage to the equipment.

1. Pump Test
 - a. Plug the line to the control valve.
 - b. Open the tester loading valve fully to read maximum pump flow at zero pressure.
 - c. Close the loading valve to increase pressure from zero pressure to rated or maximum pump pressure to determine pump condition.
 - d. The pump flow at rated pressure can now be checked against the pump manufacturer's specifications. A decrease in flow from zero pressure to maximum pressure indicates the pump condition. A pump that delivers a constant low flow at zero pressure and at maximum pressure suggests suction problems.
2. Relief Valve Test (For relief valve in separate housing, see page 13)
 - a. Put a control valve into a power output mode with the output flow blocked, such as a cylinder at the end of its stroke.
 - b. Close the tester loading valve while viewing the pressure. Pressure will increase until the relief valve opens. Record the pressure at this point. Repeat to check the relief valve adjustment.

Control Valve, Cylinder and Hydraulic Motor Test

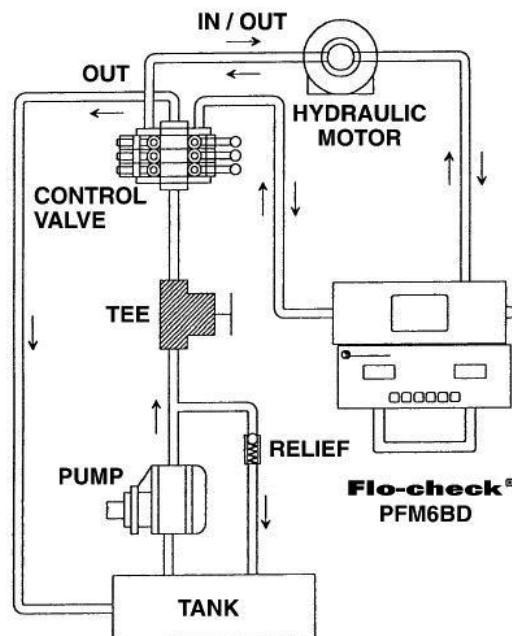


FIGURE 6 - Control Valve, Cylinder and Hydraulic Motor Test (PFM6BD)

1. Put one control valve in an operating position. (Only one control valve should be in an operating position at any one time.)
2. Slowly close the tester loading valve to achieve the pressure obtained in Step 3 under Pump Test or Step 1.c. under "Tee" Test and record the flow. Repeat for all operating positions of all control valves.
 - a. If all components are in good operating condition, pressure and flow measurements should be the same as in Step 3 of the Pump Test.
 - b. If a decrease in flow in any control valve position is noted, leakage is indicated. See Step 3 below for the test routine to determine which control valve is at fault.
 - c. If the decrease in flow is the same with the control valve(s) in all positions, it indicates that the relief valve is at fault. (**Note:** This can also indicate some other leak is present in the control valve such as a defective casting, damaged seals, or worn valve position detents - but always check the relief valve FIRST.)
3. To locate the fault in the control valve, cylinder or motor, disconnect cylinder and plug connection.
 - a. Place the control valve handle in the position where greatest decrease of flow was noted.
 - b. Close the tester loading valve to achieve the test pressure and record the flow.
 - c. If the same decrease in flow is noted as in test performed in Step 2.b. above, then the control valve is at fault. HOWEVER, if the flow readings are now higher and comparable to the other control valves, then a faulty cylinder or motor is indicated.

Relief Valve in Separate Housing

1. Install the tester in a "Tee" Test configuration to the line connecting the pump and relief valve. Plug any extra outlets.
2. Close the tester loading valve and watch the pressure and flow.
 - a. Reconnect the control valve to the tee. Put a control valve into a power output mode with the output flow blocked, such as a cylinder at the end of its stroke.
 - b. Close the tester loading valve while watching the pressure. Pressure will increase until the relief valve opens. Record the pressure at this point. Repeat to check the relief valve adjustment.

Relief Valves

Often relief valves will start to open before they reach their full pressure flow settings. This can be noted by comparing the pressure and flow rate readings made in Step 3 under "Tee" Test. Any great decrease in flow rate from tests made in Step 3 under "Tee" Test indicates a faulty relief valve.

MAINTENANCE / TROUBLESHOOTING

The PFM testers are designed to give years of trouble-free service. However, if trouble is suspected, a few simple checks can be made.

Load Valve

If the valve fails to load the system, remove the valve body and check for foreign material, worn parts or seals.

Flow

The absence of any flow reading may indicate a blockage of the turbine. Remove the retaining ring from the inlet port and carefully remove the turbine assembly. Remove any material that may be preventing easy rotation of the rotor.

Reassemble and attempt a flow reading again. If the tester still fails to indicate flow, it is recommended to return the tester to the factory. For return procedures, see the Return Goods Authorization section of the manual on page 20.

Burst Discs and Burst Disc Bodies

The burst discs are designed to rupture at a specified pressure. The PFM6 and PFM8 testers have a single burst disc that by-passes flow around the loading valve when ruptured. The PFM6BD testers provide protection from excessive pressure in either direction with two internal burst discs that when ruptured by-pass flow around the loading valve. If rupture occurs, the burst discs must be replaced.



WARNING

If you do not have the proper tools to accomplish this task, it is highly recommended that you return the tester(s) to the factory for replacement of the burst disc housing and the burst discs. Injury to personnel and/or damage to equipment may result if the burst discs are installed improperly.

The following tools and parts will be needed:

- 5/8" open end box wrench
- 0-80 (or greater) pound-inch torque wrench
- Burst discs
 - PFM6 - P.N. F1614-7500 (1 each)
 - PFM6BD - P.N. F1614-7500 (2 each)
 - PFM8 - P.N. F1614-7500 (1 each)
- Optional
 - O-Ring - P.N. F3137-015 (1 each)
 - Backup Ring - P.N. F1015-015 (1 each)

A. Burst Disc Procedure for PFM6 and PFM8 Testers

1. Position the tester block to expose the internal burst disc body as shown in **Figure 7**.

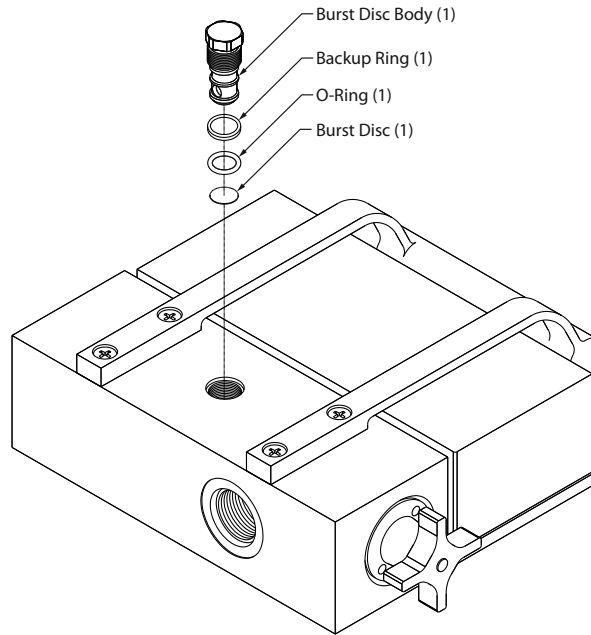


FIGURE 7 - PFM6 and PFM8 Burst Disc

2. Loosen the burst disc body from the flow meter block.
3. Remove the burst disc body from the flow meter block.
4. Remove the ruptured burst disc from the flow meter block and discard.
5. Clean out the burst disc port. Remove any debris from the sealing surfaces.
6. Rotate the tester to face the burst disc port upwards and drop in a new burst disc. Make sure it lies flat on the sealing surface entrance. Lubricate the O-ring on the burst disc housing and insert it back into the block. Tighten the burst disc housing down to form the disc against the sealing surface.
7. Using a torque wrench, tighten the burst disc body in the block to 35 foot-pounds (50.8 Nm).



CAUTION

Do not over torque the burst disc housing. Applying too much torque will damage the burst disc and cause the disc to rupture prematurely.

B. Burst Disc Procedure for PFM6BD

1. Position the PFM6BD to expose the internal burst disc body as shown in **Figure 8**.

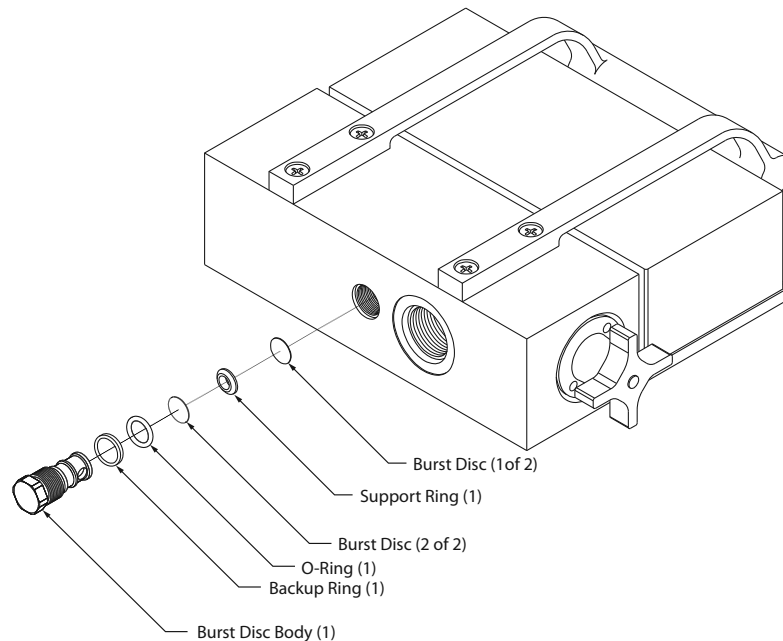


FIGURE 8 - PFM6BD Burst Discs

2. Loosen the burst disc body from the flow meter block.
3. Remove the burst disc body from the flow meter block.
4. Remove the ruptured burst discs from the flow meter block and discard. Retain the support ring.
5. Clean out the burst disc port and the support ring. Remove any debris from the sealing surfaces.
6. Rotate the tester to face the burst disc port upwards and drop in a new burst disc. Make sure it lies flat on the sealing surface entrance. Drop in the support ring and follow it with the second burst disc. Lubricate the O-ring on the burst disc housing and insert it back into the block. Tighten the burst disc housing down to form the disc against the sealing surfaces.
7. Using a torque wrench, tighten the burst disc body in the block to 60 foot-pounds (81.4 Nm).

**CAUTION**

Do not over torque the burst disc housing. Applying too much torque will damage the burst disc and cause the disc to rupture prematurely.

Battery Replacement

All PFM testers utilize four AA size alkaline batteries. These batteries will normally provide approximately 50 hours of service before a low battery condition is indicated. On the PFM6 and PFM6BD, a LO BAT signal on the display indicates a low battery condition. On the PFM8, a flashing colon (:) on the display indicates a low battery condition. When a low battery condition has been displayed, immediately remove discharged batteries from the tester to prevent battery holder corrosion.

To change the batteries, remove the 4 screws on the cover assembly. Pull the cover slowly upward to clear the internal components. The batteries are located on the bottom of the case. See **Figure 9**. When installing the new batteries, ensure that they are centered in the holder and making contact at both ends. Replace the cover and secure the 4 screws.

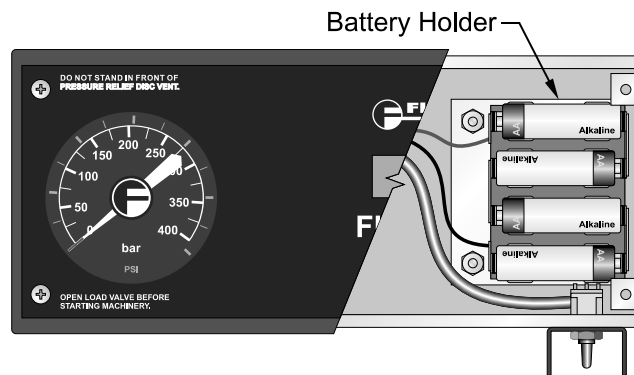
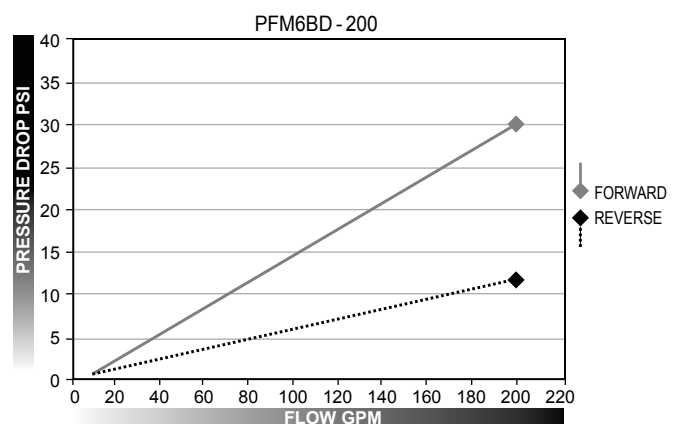
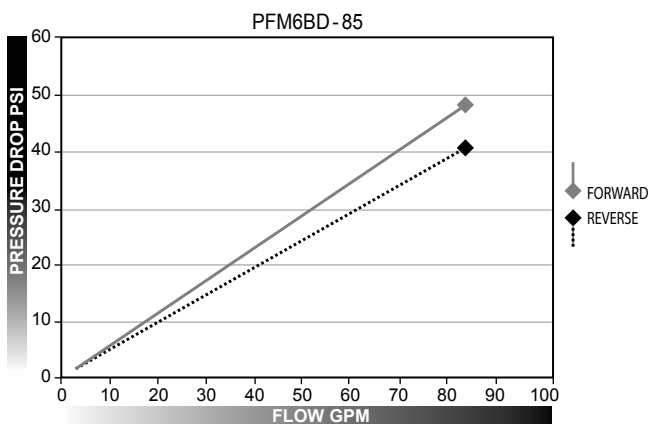
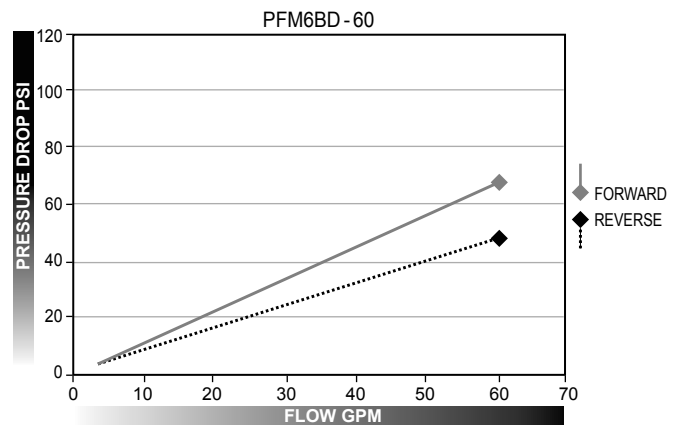
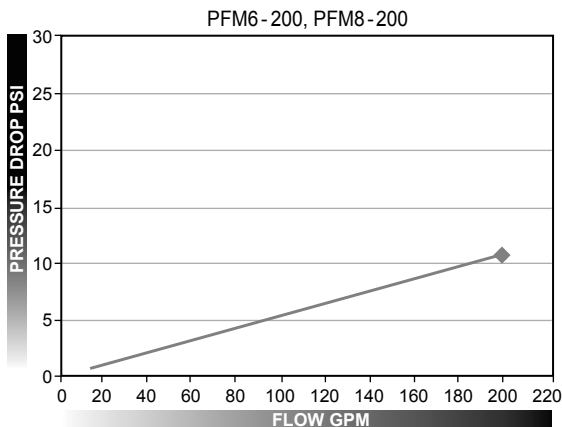
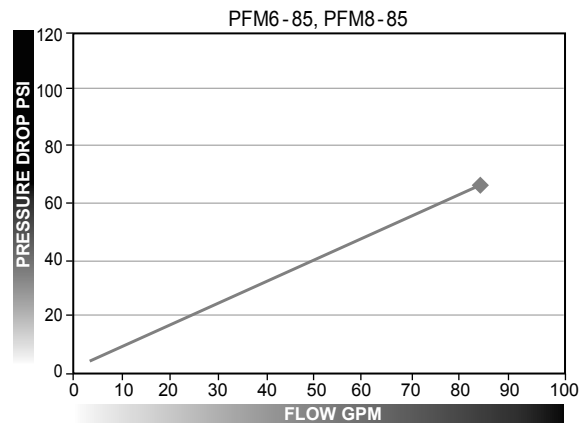
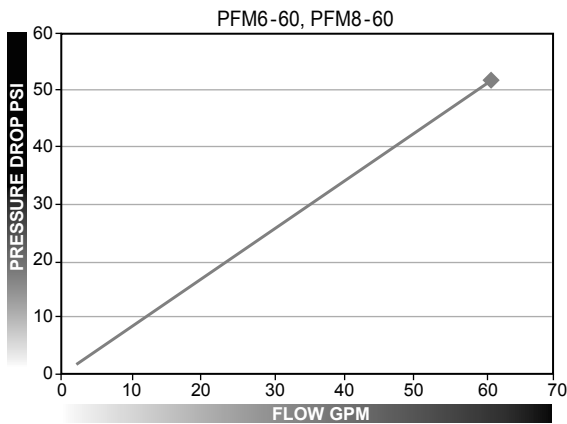
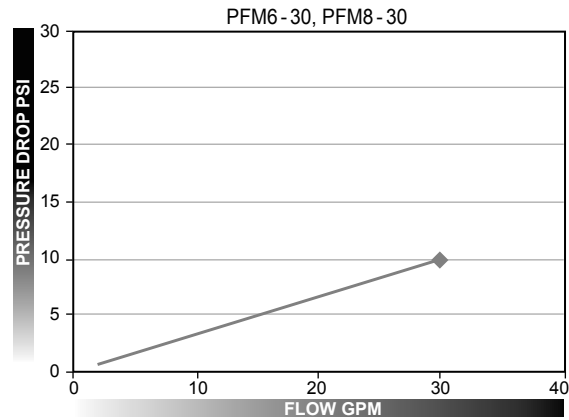
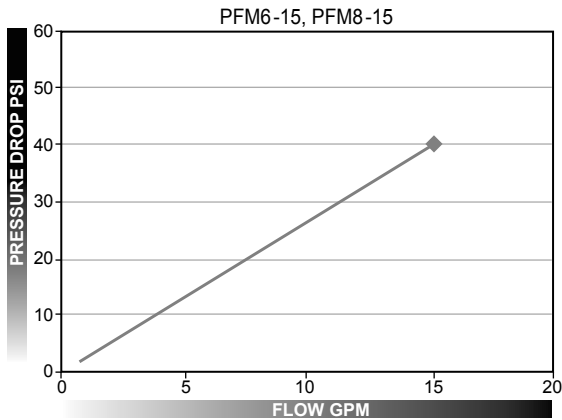


FIGURE 9 - Battery Replacement

Flow vs Pressure Drop Charts – ΔP Captured Using Loading Valves


Hydraulic Formulas and Viscosity Information

Flow Rate Formulas

$$\text{Frequency (Hz)} = \frac{K \times \text{GPM}}{60} \qquad \text{GPM} = \frac{\text{Hz} \times 60}{K}$$

$$\text{K factor (K)} = \frac{\text{Hz} \times 60}{\text{GPM}} \qquad \text{Time Base (TB)} = \frac{\text{GPM}}{\text{Hz}}$$

Flow Rate Related Formulas

$$\text{Valve } C_v \text{ Factor} = \frac{\text{Flow Rate (GPM)} \times \sqrt{\text{Fluid Specific Gravity}}}{\sqrt{\Delta P \text{ across valve (PSI)}}$$

$$\text{Cylinder Velocity} = \frac{0.3208 \times \text{Flow Rate (GPM)}}{\text{Net Cylinder Area (in}^2\text{)}}$$

$$\text{Fluid Motor Torque} = \frac{\text{Flow Rate (GPM)} \times \text{Pressure (PSIG)} \times 36.77}{\text{Rotational Speed}}$$

Power Calculations

$$\text{H.P.} = \frac{\text{GPM} \times \text{PSI}}{1714} \qquad \text{H.P.} = \frac{\text{liters/min} \times \text{Bar}}{447.4} \qquad \text{kW} = \frac{\text{liters/min} \times \text{Bar}}{600}$$

Fluid Viscosity Conversion Table

| Saybolt Universal Seconds (SUS) | ISO-VG | CentiStoke | CentiPoise ¹ | Typical Brands/Liquids at 100 °F |
|---------------------------------|--------|------------|-------------------------|--|
| 31 | 2 | 1.0 | 0.876 | Water |
| 35 | 3 | 2.5 | 2.19 | - |
| 40 | 5 | 4.2 | 3.68 | - |
| 45 | 5/7 | 5.9 | 5.17 | - |
| 50 | 7 | 7.5 | 6.57 | Kerosene |
| 55 | 7/10 | 8.8 | 7.71 | Atlantic Richfield/Duro 55 Hydraulic Oil |
| 60 | 10 | 10.5 | 9.20 | Monsanto/Skydrol - 500 A |
| 70 | 10/15 | 13.2 | 11.56 | Mobil/Aero HFA Hydraulic Oil |
| 80 | 15 | 15.7 | 13.75 | No. 4 Fuel Oil |
| 90 | 22 | 18.2 | 15.94 | Stauffer Chemical/Fyrquel 90 |
| 100 | 22 | 20.6 | 18.05 | Conoco/Syncon Synthetic AW Hydraulic Oil |
| 150 | 32 | 32.0 | 28.03 | Mobil/DTE 24 Hydraulic Oil |
| 200 | 46 | 43.2 | 37.84 | Citco/Glycol FR-40XD (Oil in Water) |
| 300 | 68 | 65.0 | 56.94 | SAE 20 Crankcase Oil |
| 400 | 68/100 | 86.0 | 75.34 | Sunoco/Sunvis 41 Hydraulic Oil |
| 500 | 100 | 108 | 94.61 | SAE 30 Crankcase Oil |
| 750 | 150 | 162 | 141.91 | SAE 40 Crankcase Oil |
| 1000 | 220 | 216 | 189.22 | Mobil/Paper Machine Oil - Type K |
| 1500 | 320 | 323 | 282.95 | SAE 50 Crankcase Oil |
| 2000 | 460 | 431 | 377.56 | Amoco/American Industrial Oil - No. 460 |
| 3000 | 680 | 648 | 567.65 | SAE 140 Gear Oil |
| 4000 | 1000 | 862 | 755.11 | SAE 250 Gear Oil |

±1% Viscosity Range for Flo-tech Testers and Sensors is 25 to 500 SUS

Fluid viscosity used to calibrate Testers and Sensors.

¹ CentiPoise are given for oil of 0.876 specific gravity. Relationship: CentiStokes × Specific Gravity = CentiPoise

Return Goods Authorization

When returning equipment for service, a Returned Goods Authorization (RGA) number must be obtained from our Service Department. Please contact them by phone at 800-433-5263 or 262-639-6770 or by e-mail to flo-techtechhelp@racinefed.com.

All returns go to the following address and must include the RGA number on the outside of the box:

Flo-tech
Division of Racine Federated Inc.
8635 Washington Avenue
Racine, WI 53406-3738 USA
Attn: RGA # xxx-xxxx

Waste and Electronic Equipment (WEEE) Directive



In the European Union, this label indicates that this product should not be disposed of with household waste. It should be deposited at an appropriate facility to enable recovery and recycling.

For information on how to recycle this product responsibly in your country, please visit:
www.racinefed.com/recycle/



Flo-tech

Division of Racine Federated Inc.

Limited Warranty and Disclaimer

Flo-tech, Division of Racine Federated Inc. warrants to the end purchaser, for a period of one year from the date of shipment from the factory, that all flow meters manufactured by it are free from defects in materials and workmanship. This warranty does not cover products that have been damaged due to misapplication, abuse, lack of maintenance, or improper installation. Flo-tech's obligation under this warranty is limited to the repair or replacement of a defective product, at no charge to the end purchaser, if the product is inspected by Flo-tech and found to be defective. Repair or replacement is at Flo-tech's discretion. A returned goods authorization (RGA) number must be obtained from Flo-tech before any product may be returned for warranty repair or replacement. The product must be thoroughly cleaned and any process chemicals removed before it will be accepted for return.

The purchaser must determine the applicability of the product for its desired use and assumes all risks in connection therewith. Flo-tech assumes no responsibility or liability for any omissions or errors in connection with the use of its products. Flo-tech will under no circumstances be liable for any incidental, consequential, contingent or special damages or loss to any person or property arising out of the failure of any product, component or accessory.

All expressed or implied warranties, including **the implied warranty of merchantability and the implied warranty of fitness for a particular purpose or application are expressly disclaimed** and shall not apply to any products sold or services rendered by Flo-tech.

The above warranty supersedes and is in lieu of all other warranties, either expressed or implied and all other obligations or liabilities. No agent or representative has any authority to alter the terms of this warranty in any way.



NOTES



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Materials and specifications subject to change without notice.

RFI Racine Flow Meter Group *Blancett* **DYNASONICS Flo-tech HEDLAND PRESO racine**

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