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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



FLUKE®

718 Series

Pressure Calibrator

Users Manual

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Pressure Calibrator

Introduction

The Fluke 718 Series Pressure Calibrators do the following:

- Calibrate P/I (pressure to current) transmitters
- Measure pressure via a 1/8-inch NPT pressure fitting and an internal pressure sensor or via a Fluke 700 Series Pressure Module
- Source pressure
- Measure current up to 24 mA
- Simultaneously display pressure and current measurements.
- Supply loop voltage
- Calculate mA percentage in Percent Mode
- Calculate mA error % in Percent Error Mode

The 718 Pressure Calibrators (hereafter, “the Calibrator”) include:

- 718 1G
- 718 30G
- 718 100G
- 718 300G

The Calibrator makes 5-digit pressure readings in the following units: psi, inH₂O at 4 °C, inH₂O at 20 °C, kPa, cmH₂O at 4 °C, cmH₂O at 20 °C, bar, mbar, kg/cm², inHg, and mmHg.

Pressure sensor specifications are as listed under “Pressure Sensor Input”.

The Calibrator measures pressure sensor inputs in the units shown in Table 1.

For pressure modules, full scale readings for all pressure ranges can be made in psi, kPa, and inHg units. To avoid display overflow, full scale readings are limited to 1000 psi in cmH₂O, mbar, and mmHg units, and 3000 psi in inH₂O units. Pressures of at least 15 psi must be measured for meaningful readings in bar and kg/cm² units.

Your Calibrator is supplied with a holster, two installed 9 V alkaline batteries, one set of TL75 test leads, one set of AC70A alligator clips, one 700-ILF In-Line Filter (to protect the pump), a Product Overview Manual, and a CD-Rom.

If the Calibrator is damaged or something is missing, contact the place of purchase immediately. Contact your Fluke distributor for information about accessories. See

“How to Contact Fluke.” To order replacement parts or spares, see “Parts and Accessories.”

Table 1. Input Units

Displayed Pressure Units
psi
inH ₂ O at 4°C
inH ₂ O at 20°C
cmH ₂ O at 4°C
cmH ₂ O at 20°C
bar
mbar
kPa
inHg
mmHg
kg/cm ²

Safety Information

Use the Calibrator only as specified in this Users Manual, otherwise the protection provided by the Calibrator may be impaired.

A **Warning** identifies conditions and actions that pose hazard(s) to the user; a **Caution** identifies conditions and actions that may damage the Calibrator or the equipment under test.

Table 2. Safety Information

⚠ ⚠ Warning

To avoid possible electric shock or personal injury:

- Never apply more than 30 V between the mA terminals, or between either of the mA terminals and earth ground.
- Do not use the Calibrator to make measurements in a CAT II, CAT III, or a CAT IV environment.
CAT I equipment is designed to protect against transient from high-voltage, low-energy sources, such as electronic circuits or a copy machine
- Remove the test leads from the Calibrator before you open the battery door.
- Make sure the battery door is closed and latched before you operate the Calibrator.
- Do not operate the Calibrator if it is damaged.
- Do not operate the Calibrator around explosive gas, vapor, or dust.
- When using probes, keep fingers behind the finger guards on the probes.
- Use only two 9 V batteries, properly installed in the Calibrator case, to power the Calibrator.
- Follow all equipment safety procedures.
- Turn off circuit power before connecting the Calibrator mA and COM terminals in the circuit. Place Calibrator in series with the circuit.
- When servicing the Calibrator, use only specified replacement parts.
- Do not allow water inside the case.

Table 2. Safety Information (cont.)

⚠ ⚠ Warning

- To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator  appears.
- To avoid a violent release of pressure in a pressurized system, shut off the valve and slowly bleed off the pressure before you attach or detach the internal pressure sensor or pressure module fitting to the pressure line.
- To avoid over pressure damages, do not apply pressure that exceeds the limits listed in the Pressure Specifications table in the “Specifications” section.
- To avoid mechanically damaging the Calibrator, do not apply torque between the pressure fitting and the Calibrator case. See Figure 1 for the proper use of tools.
- To avoid misleading readings, disconnect the pressure module connector at the Calibrator.
- To avoid damage to the pressure module, refer to the related *Instruction Sheet*.
- To avoid damage to the pump, use with dry air and non-corrosive gases only. Check test leads for continuity before using. Inspect Calibrator for cracks or damage, do not use the probes if they are damaged or show high resistance.

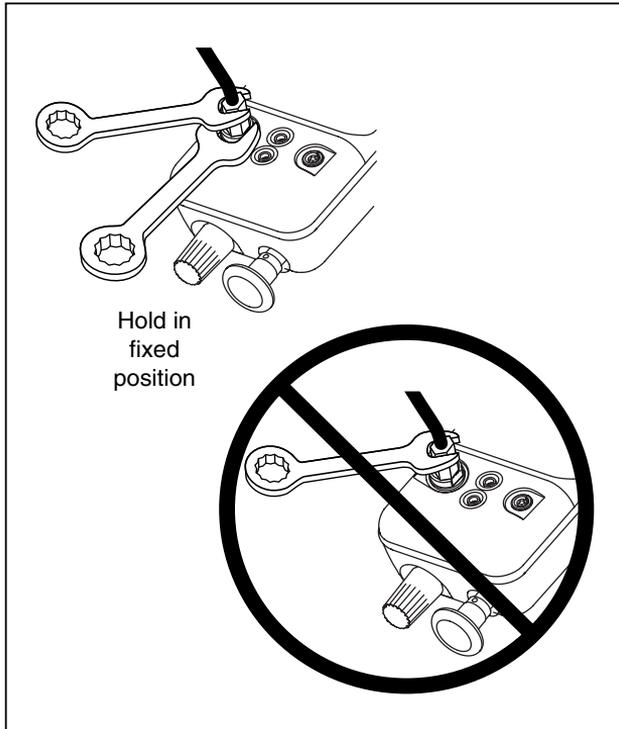


Figure 1. Connection Technique

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Table 3. International Electrical Symbols

Symbol	Meaning
	Earth ground
	Fuse
	Battery
	Refer to this instruction sheet for information about this feature.
	Hazardous voltage. Risk of electric shock.
	Double insulated
	Conforms to relevant Canadian Standards Association directives.
	Conforms to relevant European Union directives
	Pressure

Getting Acquainted with the Calibrator

Press **Ⓢ** to turn the Calibrator on and off. The Calibrator displays pressure and current measurements simultaneously. See Figure 2.

The upper part of the display shows the applied pressure or vacuum. (Vacuum is shown as a negative value.) Press **UNITS** to select a different unit. When you cycle the power off and on, the Calibrator retains the unit you last used.

The lower part of the display shows the current (up to 24 mA) applied to the current (mA) inputs.

To source loop voltage, press **UNITS** while pressing **Ⓢ** on.

Pushbutton operation is described in Table 4. Pump features are shown in Figure 3 and described in Table 5.

Power Saver

The Calibrator automatically turns off after 30 minutes of inactivity. To reduce this time or disable this feature:

1. With the Calibrator OFF, press **Ⓢ**.
2. **P.S. xx** is displayed, where **xx** is the turn-off time in minutes. **OFF** means the power saver is disabled.
3. Press **HOLD** (**▼**) to decrease or **mA MODE** (**▲**) to increase the turn-off time.
4. To disable, press **HOLD** until the display shows **OFF**.

The Calibrator resumes normal operation after 2 seconds.

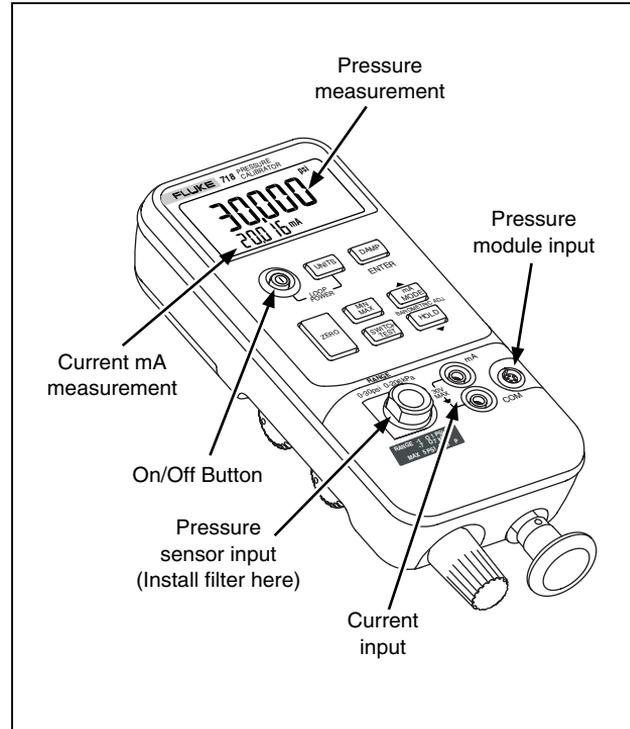


Figure 2. Front Panel Features

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Table 4. Pushbutton Functions

Pushbutton	Description
	Press to select a different pressure unit. All units are available when the pressure sensor input is used. For higher pressure module inputs, inappropriate (out-of-range) units are not available. Press  on while pressing  to source loop voltage.
 	Turns pressure reading damping on and off. With damping on, the Calibrator averages several measurements before displaying a reading. Press to confirm selection of 0% and 100% output parameters.
	Press to zero the pressure display. Vent pressure to atmosphere before you press this pushbutton. With an Absolute Pressure Module, see special instructions below.
	Press to read the minimum pressure and current readings since power was turned on or the registers were cleared. Press again to read the maximum pressure and current readings since power was turned on. Press and hold for 3 seconds to clear the MIN/MAX registers.
	Press to perform switch test.
	Press to toggle the mA display mode between mA, mA Percent, and mA Percent Error.
	Press  to freeze the display. The HOLD symbol appears on the display. Press  again to resume normal operation.

Switch Test

To perform a switch test, do the following:

Note

This example uses a normally closed switch. The procedure is the same for an open switch but the display reads OPEN instead of CLOSE.

1. Connect the Calibrator mA and COM terminals to the switch using the pressure switch terminals and connect an external pump between the Calibrator and the pressure switch. The polarity of the terminals does not matter.

Note

If using an external pump, connect the pump to the Calibrator and to the input of the switch using a tee fitting.

2. Make sure the vent on the pump is open and zero the Calibrator if necessary. Close the vent after zeroing the Calibrator.

3. Press  to enter pressure switch test mode. The Calibrator will display CLOSE instead of a mA measurement.
4. Apply pressure with the pump slowly until the switch opens.

Note

In the switch test mode, the display update rate is increased to help capture changing pressure inputs. Even with the enhanced sample rate, pressuring the device under test should be done slowly to ensure accurate readings.

5. OPEN is displayed once the switch is open. Bleed the pump slowly until the pressure switch closes. RCL appears on the display.
 6. Press  to read the pressure values for when the switch opened, for when it closed, and for the deadband
- Hold  for 3 seconds to reset Switch Test mode; hold any other key for 3 seconds to exit.

Zeroing with Absolute Pressure Modules

For zeroing, adjust the Calibrator to read a known pressure. This can be barometric pressure, if it is accurately known, for all but the 700PA3 module. An accurate pressure standard can also apply a pressure within range for any Absolute Pressure Module. Adjust the Calibrator reading as follows:

- 1. Press and hold **ZERO** .
- 2. Press **MA MODE** (▲) to increase or **HOLD** (▼) to decrease the Calibrator reading to equal the applied pressure.
- 3. Release **ZERO** to exit the zeroing procedure.

Press the **UNITS** button to convert to any convenient measurement display unit.

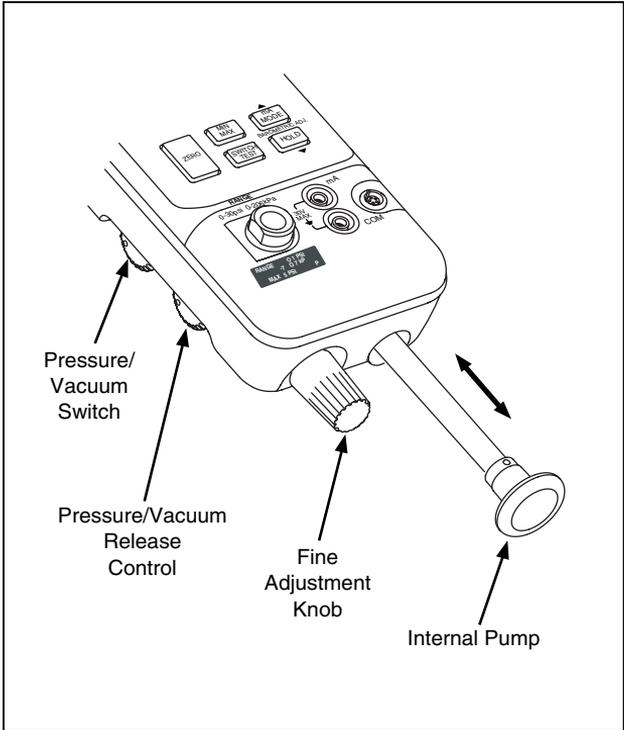


Figure 3. Pump Features

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Table 5. Pump Features

Item	Description
Pressure Vacuum Switch	Rotate forward (clockwise) for pressure, backward (counter-clockwise) for vacuum.
Pressure Vacuum Release Valve	Rotate fully backward (counter-clockwise) to release all pressure or vacuum. (Rotate slightly for partial release.) Rotate fully forward (clockwise) to close valve.
Fine Adjustment Knob	Rotate either direction for precise adjustment of applied pressure or vacuum. Full rotation is about 30 turns.
Internal Pump	Increase pressure on the inward stroke. In vacuum mode, decrease pressure on the outward stroke.

Calibrating a P/I Transmitter

To calibrate a P/I (pressure to current) transmitter, apply a pressure to the transmitter and measure the transmitter's current loop output. You can apply pressure with the Calibrator's internal pump or with an external pump.

⚠ ⚠ Warning

To avoid a violent release of pressure or vacuum, always depressurize the system slowly using the pressure/vacuum release control before detaching any pressure line.

Using the Internal Pump

The internal pump can provide the rated pressure for all Model 718 Calibrators.

The preferred use for the internal pump is shown in Figure 4, where the Calibrator displays pressure measured with the internal sensor and provided by the internal pump.

The internal pump can also be used with certain Fluke 700 Series Pressure Modules. In this case, pressure measured by the Pressure Module is displayed by the Calibrator. Appropriate pressure modules for each Calibrator model are identified in Table 6 . Figure 5 shows the internal pump being used with a pressure module.

⚠⚠ Warning

If both a pressure module and the internal sensor are connected, the Calibrator displays ONLY the pressure module measurement.

To use the Calibrator's internal pump, refer to Figure 3 and perform the following steps:

1. Depressurize and drain the line before connecting the Calibrator.
2. Connect the pressure transmitter to the Calibrator internal sensor as shown in Figure 4 (for internal pressure sensor measurements) or Figure 5 (for pressure module measurements.)

Note

To avoid leaks, use Teflon tape or similar sealant on all pressure connections.
3. Make sure the pressure/vacuum switch is in the desired position. Forward (clockwise) is for pressure; backward (counter-clockwise) is for vacuum.
4. Turn the pressure/vacuum release control backward (counter-clockwise) to vent pressure/vacuum from the pump.
5. Press ZERO to zero the pressure display.

6. Turn the fine adjustment knob to mid-range.
7. Turn the pressure/vacuum release control forward (clockwise) to close the release valve.
8. Work the pump handle in and out to apply incrementally larger pressure/vacuum changes. Shorten the stroke to apply smaller increments of pressure/vacuum change.
9. To make very small pressure/vacuum changes, use the fine adjustment knob.

Note

This knob adjusts a small internal reservoir to vary the total volume. With larger external pressure/vacuum volumes, this control will adjust pressure or vacuum within a smaller range.
10. Depressurize the system before disconnecting the pressure line.

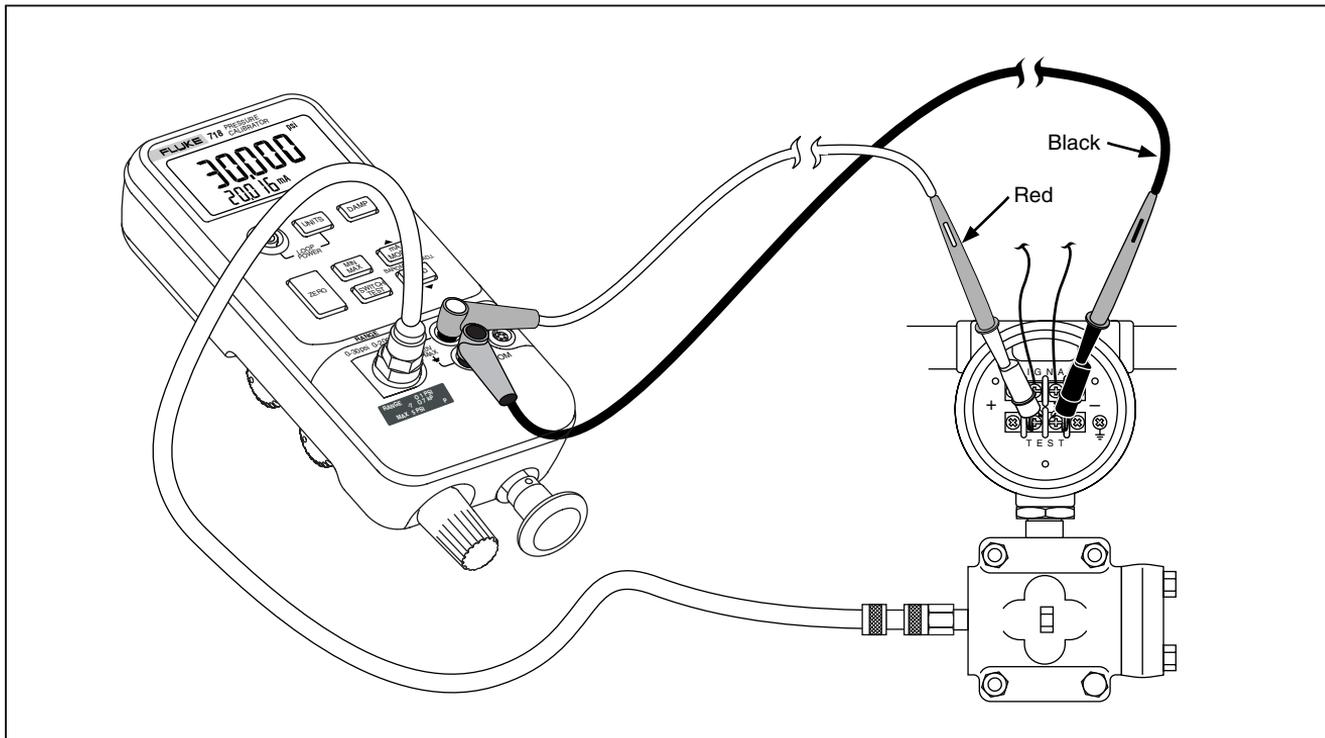


Figure 4. Internal Pressure Sensor with Internal Pump

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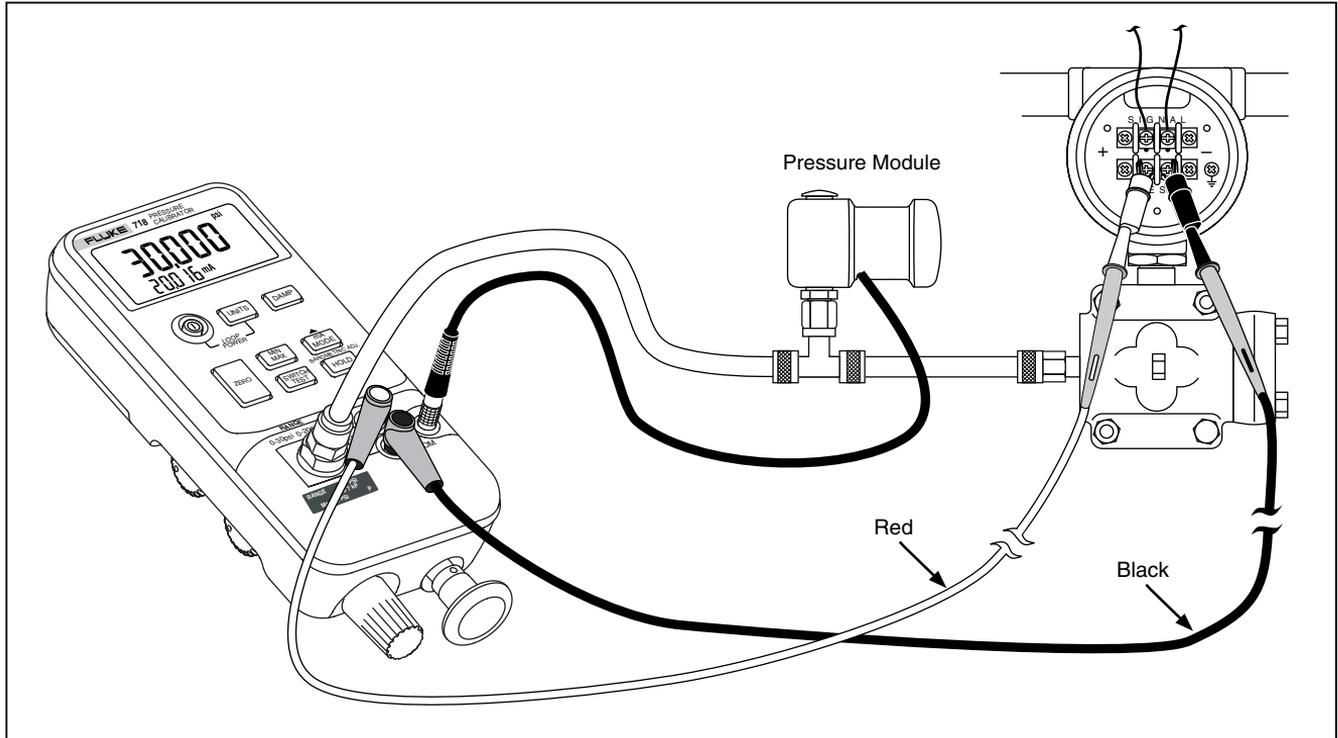


Figure 5. Pressure Module with Internal Pump

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Table 6. Recommended Pressure Modules

Pressure Module	External Pump	Internal Pump			
	718 all models	718 1G	718 30G	718 100G	718 300G
700 P00	X	X			
700 P01	X	X			
700 P02	X	X	X	X	X
700 P22	X	X	X	X	X
700 P03	X		X	X	X
700 P23	X		X	X	X
700 P04	X		X	X	X
700 P24	X		X	X	X
700 P05	X		X	X	X
700 P06	X			X	X
700 P27	X				X
700 P07	X				
700 P08	X				
700 P09	X				

Pressure Module	External pump	Internal Pump			
	All 718 models	718 1G	718 30G	718 100G	718 300G
700 PA3	X		X	X	X
700 PA4	X		X	X	X
700 PA5	X		X	X	X
700 PA6	X			X	X
700 PV3	X		X	X	X
700 PV4	X		X	X	X
700 PD2	X	X	X	X	X
700 PD3	X		X	X	X
700 PD4	X		X	X	X
700 PD5	X		X	X	X
700 PD6	X			X	X
700 PD7	X				X
700 D29	X				
700 P30	X				
700 P31	X				

Pump Valve Assembly Cleaning Instructions

1. Using a small screwdriver, remove the two valve retention caps located in the oval shaped opening on the underside of the Calibrator.
2. After the caps have been removed, gently remove the spring and o-ring assembly.
3. Set aside the valve assemblies in a safe area and clean out the valve body using a cotton swab soaked in IPA (isopropyl alcohol).
4. Repeat this process several times using a new cotton swab each time until there is no remaining sign of residue.
5. Pump the unit several times and check again for residue.
6. Clean the o-ring assembly and o-ring on the retention caps with IPA and inspect the o-rings closely for any cuts, nicks, or wear. Replace if needed.
7. Inspect the springs for wear or loss of tension. They should be approximately 8.6 mm long in the relaxed state. If they are shorter than this, they may not allow the o-ring to seat properly. Replace if needed.
8. Once all parts have been cleaned and inspected, reinstall the o-ring and spring assemblies into the valve body.
9. Reinstall the retention caps and gently tighten the cap.
10. Seal the output of the Calibrator and pump up the unit to at least 50 % its rated pressure.
11. Release the pressure and repeat several times to ensure that the o-rings seat properly.

The Calibrator is now ready for use.

Using an External Pump

Warning

To avoid damage to the Calibrator and possible release of pressure, do not connect the internal sensor to an external pressure source that exceeds the maximum rated pressure.

To develop higher pressure or vacuum, use an external pump (such as the Fluke Model 700PTP). Use a Fluke Pressure Module connected to the pressure module input on the Calibrator. Pressure modules are listed in Table . Make overall connections as shown in Figure 6.

Refer to setup and operating instructions included with the pressure module and pump.

