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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®**

# **718Ex 30G/100G/300G**

Pressure Calibrator

Users Manual

May 2004 Rev. 2, 5/09

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Fluke Corporation  
P.O. Box 9090  
Everett, WA 98206-9090  
U.S.A.

Fluke Europe B.V.  
P.O. Box 1186  
5602 BD Eindhoven  
The Netherlands

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# 718Ex 30G/100G/300G Pressure Calibrator

## Introduction



**Read Safety Information before using the Calibrator.**

The Fluke Model 718Ex 30G, 718Ex 100G, and 718Ex 300G Pressure Calibrators (hereafter called Calibrator) can 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 Fluke 700PEX Series Pressure Modules.
- Measure current up to 24 mA.
- Simultaneously display pressure and current measurements.
- Perform switch testing.

The Calibrator is for use ONLY in Ex-hazardous areas.

The Calibrator makes 5-digit pressure readings in the following units: psi, inH<sub>2</sub>O at 4 °C, inH<sub>2</sub>O at 20 °C, kPa, cmH<sub>2</sub>O at 4 °C, cmH<sub>2</sub>O at 20 °C, bar, mbar, kg/cm<sup>2</sup>, inHg, and mmHg. Full-scale pressure sensor input is as follows:

- Model 718Ex 30G: 30 psi (206.85 kPa, 2.0685 bar).  
**OL** appears at 33 psi.
- Model 718Ex 100G: 100 psi (689.5 kPa, 6.895 bar).  
**OL** appears at 120 psi.
- Model 718EX 300G: 300 psi (2068 kPa, 20.68 bar).  
**OL** appears at 360 psi.

The Calibrator measures pressure sensor inputs in the units shown under Pressure Sensor Range and Resolution.

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 cmH<sub>2</sub>O, mbar, and mmHg units, and 3000 psi in inH<sub>2</sub>O units. Pressures of at least 15 psi must be measured for meaningful readings in bar and kg/cm<sup>2</sup> units.

The Calibrator is supplied with:

- a holster
- one installed 9 V alkaline battery
- one set of TL75 test leads
- one set of AC72A alligator clips
- a Control Drawing
- a CD-Rom

If the Calibrator is damaged or something is missing, contact the place of purchase immediately. Contact a Fluke distributor for information about accessories. See Contacting Fluke. To order replacement parts or spares, see Parts and Accessories.

## **How to Contact Fluke**

To contact Fluke, call one of the following telephone numbers:

Technical Support USA: 1-800-44-FLUKE  
(1-800-443-5853)

Calibration/Repair USA: 1-888-99-FLUKE  
(1-888-993-5853)

Canada: 1-800-36-FLUKE (1-800-363-5853)

Europe: +31 402-675-200

Japan: +81-3-3434-0181

Singapore: +65-738-5655

Anywhere in the world: +1-425-446-5500

Or, visit Fluke's website at [www.fluke.com](http://www.fluke.com).

To register your product, visit <http://register.fluke.com>.













To view, print, or download the latest manual supplement, visit <http://us.fluke.com/usen/support/manuals>.

## **Safety Information**

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.

Safety and electrical symbols used in this manual and on the Calibrator are displayed in Table 1.

**Table 1. International Electrical Symbols**

Symbol	Meaning
	Power ON/OFF
	Earth ground
	Conforms to ATEX requirements.
	Battery
	Hazardous Voltage
	Risk of Danger. Important information. Refer to manual.
	Double insulated
	Conforms to relevant Canadian and US Standards.
	Conforms to relevant European Union directives.
	Pressure
	Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.
	Conforms to relevant Australian standards.

## **⚠ ⚠ Warning**

To avoid electric shock, injury, or damage to the Calibrator:

- Use the Calibrator only as described in this User Manual and the Fluke 718Ex CCD (Concept Control Drawing) or the protection provided by the Calibrator may be impaired.
- Inspect the Calibrator before use. Do not use it if it appears damaged.
- Check the test leads for continuity, damaged insulation, or exposed metal. Replace damaged test leads.
- When using probes, keep fingers behind the finger guards on the probes
- Never apply more than 30.0 V between the input terminals, or between any terminal and earth ground.
- Applying more than 30.0 V to the input terminals invalidates the Calibrator's Ex Approval and may result in permanent damage to the unit so it can no longer be used.
- Use the proper terminals, mode, and range for the measuring or sourcing application.
- To prevent damage to the unit under test, be sure the Calibrator is in the correct mode before connecting the test leads.
- When making connections, connect the COM test probe before the live test probe. When disconnecting, disconnect the live probe before the COM probe.
- Never use the Calibrator with the red holster removed.
- Never open the Calibrator case. Opening the case invalidates the Calibrator's Ex Approval.
- Make sure the battery door is closed before using the Calibrator.
- Replace the battery as soon as the **+■** (low battery) symbol appears to avoid false readings that can lead to electric shock. Remove the Calibrator from the Ex-hazardous area before opening the battery door.

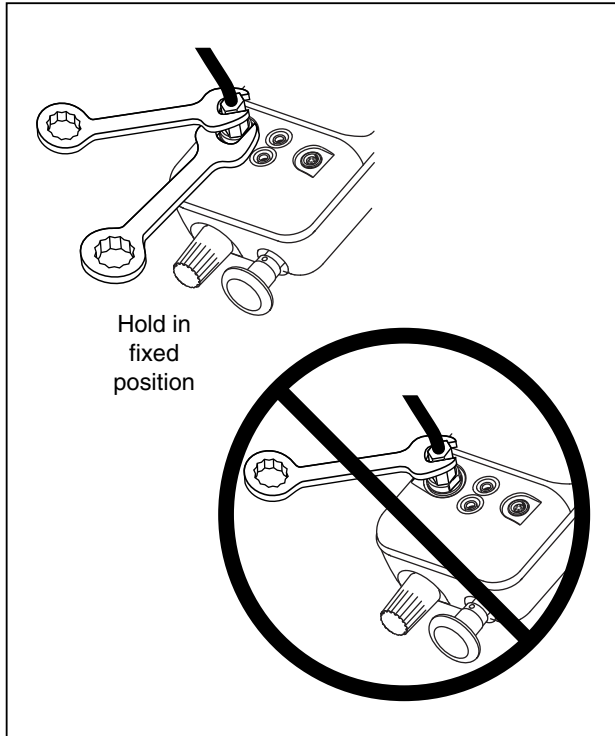
- Remove test leads from the Calibrator before opening the battery door.
- This equipment is specified for use in measurement category I (CAT I) pollution degree 2 environments and should not be used in CAT II, CAT III, or CAT IV environments. Voltage transients should not exceed 300 volts for the CAT I applications where this product is used. Measurement transients are defined in IEC1010-1 as 2  $\mu$ s rise time with a 50  $\mu$ s duration at 50 % of the maximum amplitude height.
- Measurement Category I (CAT I) is defined for measurements performed on circuits not directly connected to the mains.
- 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 open the Calibrator case. Opening the case invalidates the Calibrator's Ex Approval.
- Do not allow water inside the case.
- Do not use in a damp or wet environment.
- When using the Calibrator's internal pressure sensor, do not connect a pressure module at the Calibrator to avoid misleading readings. If both a pressure module and the internal pressure sensor are connected, the Calibrator displays ONLY the pressure module measurement. To avoid misleading readings, disconnect the pressure module connector at the Calibrator.
- To avoid a violent release of pressure in a pressurized system, shut off the valve and slowly bleed off the pressure before attaching or detaching the internal pressure sensor or pressure module fitting to the pressure line.
- To avoid overpressure damage, do not apply pressure to the internal pressure sensor input that exceeds the following:

- **Model 718Ex 30G: 30.000 psi, 206.85 kPa, or 2.0685 bar. OL appears at 33 psi.**
- **Model 718Ex 100G: 100.00 psi, 689.5 kPa, or 6.895 bar. OL appears at 120 psi.**
- **Model 718EX 300G: 300.00 psi, 2068 kPa, or 20.68 bar. OL appears at 360 psi.**
- **When measuring the pressure of potentially hazardous gases, care must be taken to minimize the possibility of leakage:**
  - **Confirm that all pressure connections are properly sealed.**
  - **Confirm that the Pressure/Vacuum Release Control is in the closed position (fully clockwise) and the Pressure/Vacuum switch is in the + position (fully clockwise).**
  - **If the Calibrator has been dropped or subjected to rough handling, remove the Calibrator to a safe area and check for leaks to confirm the integrity of the internal pneumatic components.**
- **Do not use a Model 718Ex (including 718Ex 300G) to measure potentially hazardous gases at pressure greater than 100 psi (6.9 bar).**

** Caution**

**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 damage to the pump, use with dry air and non-corrosive gases only.**



**Figure 1. Connection Technique**

### **Faults and Damage**

Applying a voltage greater than 30 V to the input of the Calibrator invalidates its Ex Approval and may impair its safe operation in an Ex-hazardous area.

If there is any reason to suspect that the safe operation of the Calibrator has been affected, it must be immediately withdrawn from use, and precautionary measures must be taken to prevent any further use of the Calibrator in an Ex-hazardous area.

Fully observe all instructions, warnings, and cautions contained in this manual. In case of doubt due to translation and/or printing errors, refer to the original English users manual.



The safety features and integrity of the unit may be compromised by any of the following:

- External damage to the housing
- Internal damage to the Calibrator
- Exposure to excessive loads
- Incorrect storage of the unit
- Damage sustained in transit
- Correct certification is illegible
- Using the product with the red holster removed
- Functioning errors occur
- Permitted limitations are exceeded
- Functioning errors or obvious measurement inaccuracies occur which prevent further measurement by the Calibrator
- Opening the case

### **Safety Regulations**

The use of the Calibrator meets the requirements of the regulations providing that the user observes and applies the requirements as stated in the regulations and that improper and incorrect use of the unit is avoided.

- Use must be restricted to the specified application parameters.
- Do not open the Calibrator.
- Do not remove or install the battery within the Ex-hazardous area.
- Do not carry additional batteries within the Ex-hazardous area.
- Use only type-tested batteries. The use of any other batteries will invalidate the Ex-certification and present a safety risk.
- Do not use the Calibrator in an Ex-hazardous area unless it is completely and securely fitted in its accompanying red holster.
- Only use the Calibrator in circuits with compatible entity parameters.

### Certification Information



II 1 G EEx ia IIC T4

Permitted for Zone 0 Equipment Group II, gas group IIC hazardous atmospheres, temperature class T4



Class I Div. 1 Groups A-D T4 Intrinsically Safe AEx ia IIC T4

Permitted for Division 1 hazardous atmospheres, Gas Groups A-D, temperature class T4

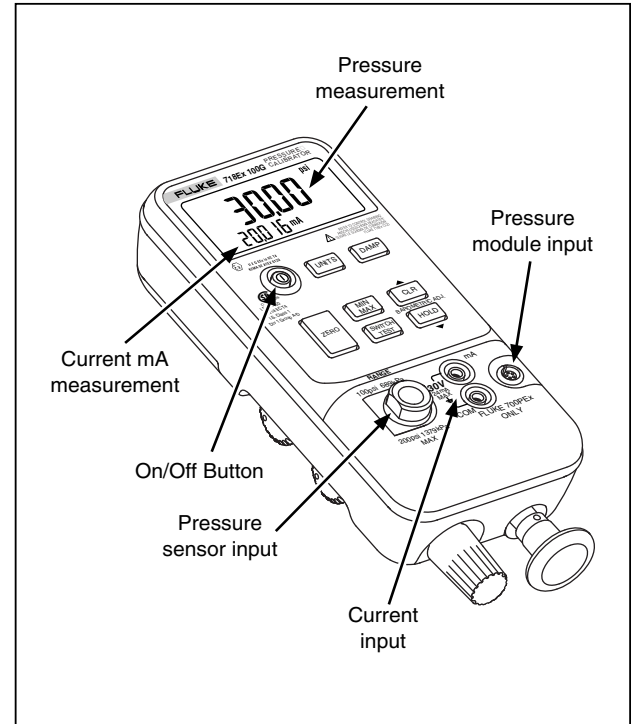
### Getting Acquainted with the Calibrator

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 cycling the power off and on, the Calibrator retains the unit last used.

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

Pushbutton operation is described in Table 2. Pump features are shown in Figure 3 and described in Table 3.



**Figure 2. Front Panel Features**

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Table 2. Pushbutton Functions

Pushbutton	Description
UNITS	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.
DAMP	Turns pressure reading damping on and off. With damping on, the Calibrator averages several measurements before displaying a reading.
ZERO	Press to zero the pressure display. Vent pressure to atmosphere before pressing this pushbutton. For an Absolute Pressure Module, see Zeroing with Absolute Pressure Modules.
MIN MAX	Press to read the minimum pressure and current readings since power was turned on or <b>CLR</b> was pressed. Press again to read the maximum pressure and current readings since power was turned on or <b>CLR</b> was pressed.
SWITCH TEST	Use for pressure switch test. See Switch Test.
CLR	Press to clear the MIN, MAX, and switch test memories
HOLD	Press <b>HOLD</b> to freeze the display. The <b>HOLD</b> symbol appears on the display. Press <b>HOLD</b> again to resume normal operation.

### **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 **Ⓞ**.

**P.S. xx** is displayed, where **xx** is the turn-off time in minutes. **OFF** means the power saver is disabled.

2. Press **[HOLD]** to decrease or **[CLR]** to increase the turn-off time.
3. To disable, press **[HOLD]** until the display shows **OFF**.

The Calibrator resumes normal operation after 2 seconds.

### **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. 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 **[HOLD]** 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.

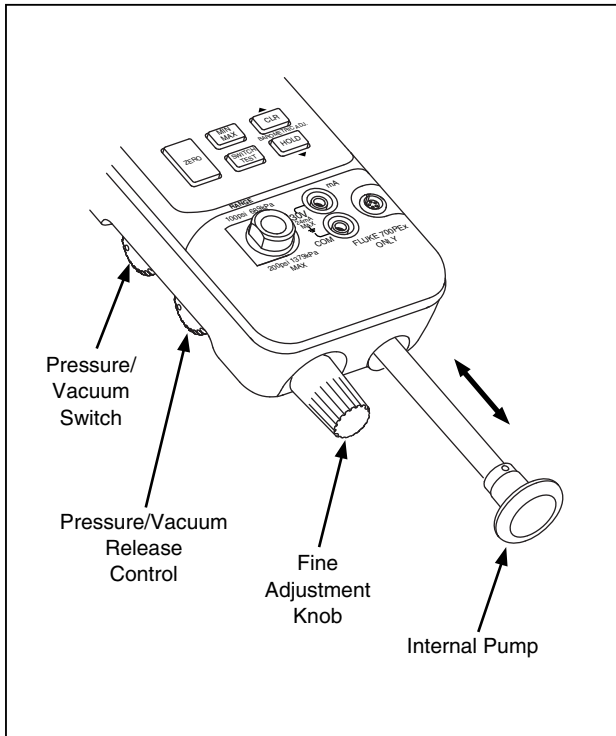


Figure 3. Pump Features

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Table 3. Pump Features

Item	Description
Pressure Vacuum Switch	Rotate forward (clockwise) for pressure, backward (counter-clockwise) for vacuum.
Pressure Vacuum Release Control	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. Pressure can be applied 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.**

**When measuring the pressure of potentially hazardous gases, care must be taken to minimize the possibility of leakage:**

- **Confirm that all pressure connections are properly sealed.**
- **Confirm that the Pressure/Vacuum Release Control is in the closed position (fully clockwise) and the Pressure/Vacuum switch is in the + position (fully clockwise).**

- **If the Calibrator has been dropped or subjected to rough handling, remove the Calibrator to a safe area and check for leaks to confirm the integrity of the internal pneumatic components.**

### **Using the Internal Pump**

The internal pump can provide 30 psi (2.0685 bar) for Model 718Ex 30G, 100 psi (6.895 bar) for Model 718Ex 100G, or 300 psi (20.68 bar) for Model 718Ex 300G.

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 700PEX 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 4. 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 the line before connecting the Calibrator.
2. Connect the pressure transmitter under test 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.*

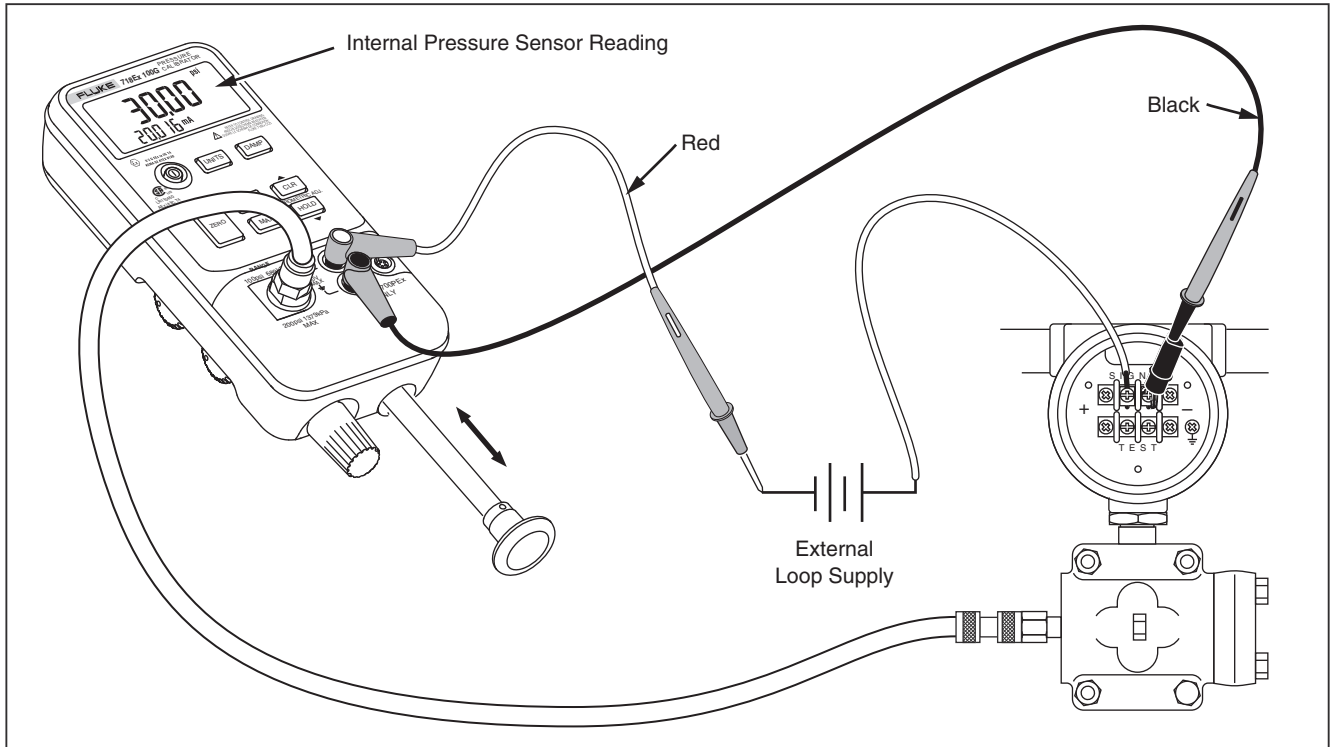
3. Make sure the pressure/vacuum switch on the Calibrator is in the desired position. Forward (clockwise) is for pressure; backward (counter-clockwise) is for vacuum.
4. Turn the pressure/vacuum release control backward (counter-clockwise) to vent pressure/vacuum from the pump.

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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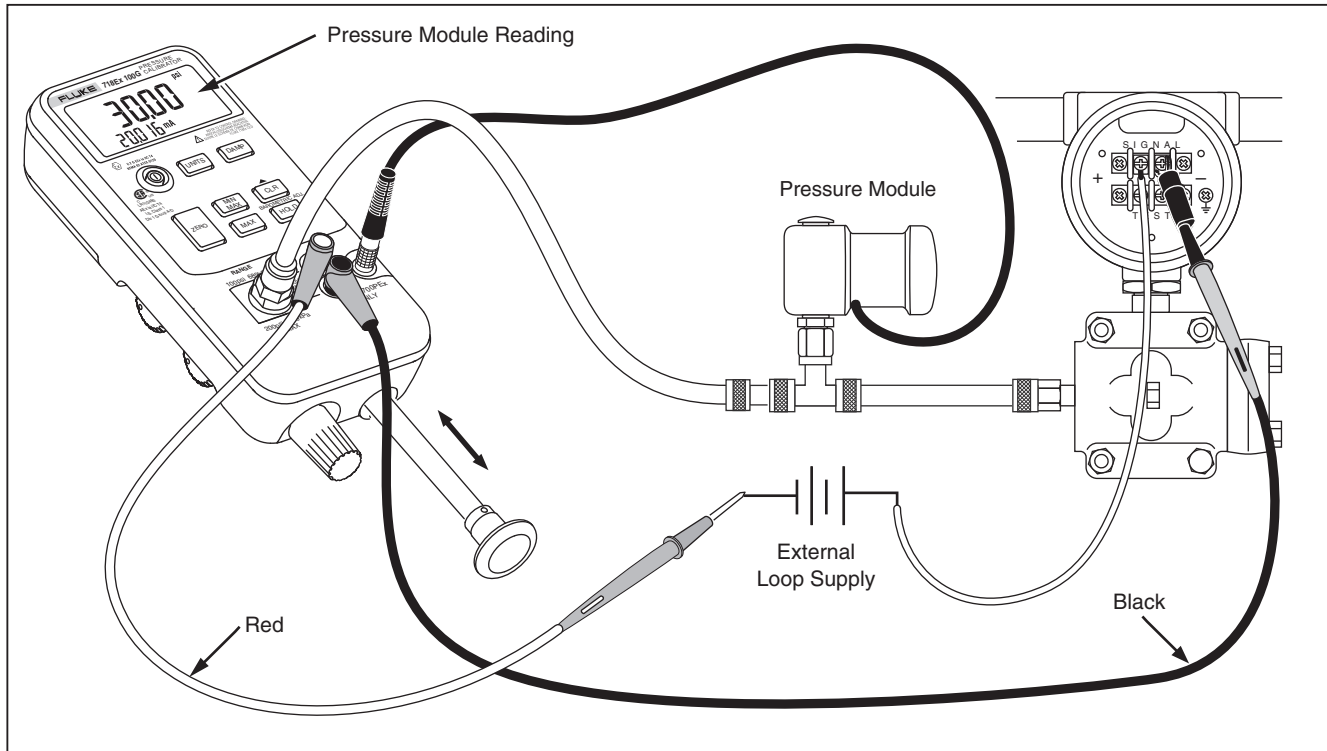


Figure 5. Pressure Module with Internal Pump

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**Table 4. Recommended Pressure Modules**

Pressure Module	External Pump	Internal Pump		
	718Ex 30G/100G/ 300G	718Ex 30G	718Ex 100G	718Ex 300G
700P01Ex	X	X	X	X
700P24Ex	X	X	X	X
700P05Ex	X	X	X	X
700P06Ex	X		X	X
700P27Ex	X			X
700P09Ex	X			
700PA4Ex	X	X	X	X
700P29Ex	X			

### 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 30 psi for Model 718Ex 30G, 100 psi for Model 718Ex 100G, or 300 psi for Model 718Ex 300G.

To develop higher pressure or vacuum, use an external pump. Use a Fluke 700PEX Pressure Module connected to the pressure module input on the Calibrator. Pressure modules are listed in Table 4. Make overall connections as shown in Figure 6.

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