

Pressure calibration

Application Note

Pressure instrumentation is found in virtually every process plant. Periodic calibration of these pressure, level, and flow instruments is required to keep plants operating efficiently and safely. Fluke provides a broad range of pressure calibration tools to help you quickly and reliably calibrate your pressure instrumentation.

These pressure calibrators accurately measure pressure by using:

- Internal sensors, or
- External Pressure Modules

A pressure source may be provided by:

- A self-contained internal pressure pump, or
- An external source such as an accessory pump or a pressure bottle/regulator

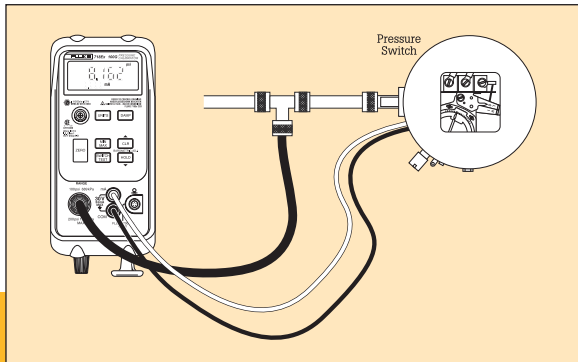
A summary of the pressure calibration capabilities of Fluke Process Tools is shown below.



Pressure calibration with Fluke calibrators

Function	700G and 700RG Pressure Gauges	717 Pressure Calibrator	718 Pressure Calibrator	719Pro Electric Pressure Calibrator	721 Precision Pressure Calibrator	725 and 726 Multifunction Process Calibrators	753 Documenting Process Calibrator	754 Documenting Process Calibrator	5522A Multi-Product Calibrator	3130 Portable Pressure Calibrator
Measure Pressure to 10,000 psi/ 700 bar with internal sensor	•	•								
Measure Pressure to 300 psi/20 bar with internal sensor			•	•						•
Measure Pressure to 10,000 psi/700 bar with Fluke 750Pxx Pressure Modules		•	•	•	•	•	•	•	•	
Measure two pressures simultaneously from 15 psi/1 bar to 5,000 psi/345 bar					•					
Pressure switch test		•	•	•	•	•	•	•	•	•
Source pressure with accessory pumps		•	•	•	•	•	•	•	•	•
Source pressure with built-in pump			•	•						•
Measure mA		•	•	•	•	•	•	•	•	•
Source mA				•			•	•	•	
Loop power supply		•	•	•	•	•	•	•		•
Multifunction source and measure						•	•	•	•	
Electronic data capture	•						•	•		
Communication to PC	•					•	•	•	•	•
Integrated HART communication								•		

How to use the 718 to calibrate a pressure switch



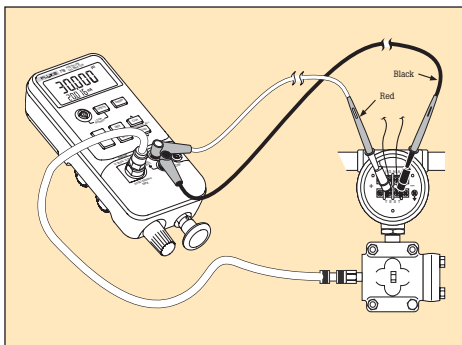
Pressure switch calibration

Verify the setpoint and deadband of pressure switches using the 718 Pressure Calibrators.

1. Depressurize and isolate the pressure switch from the process.
2. Plumb the 718 and make connections as per the illustration.
3. Turn on the 718 and open the vent valve. Press the Zero button to clear the zero offset. Close the vent.
4. Press the Switch Test button to enter the switch test mode.
5. Apply pressure slowly with the hand pump until you approach the setpoint. Using the fine adjust vernier adjust the pressure until the switch opens and OPEN is displayed on the 718.
6. Release the pressure slowly using the fine adjust vernier until RCL is displayed.
7. Press the Switch Test button once to read the pressure values for switch opening and again to see the pressure at switch closing.
8. Press and hold the Switch Test button for 3 seconds to clear the test results and start over.
9. Adjust the pressure switch setpoint until the switch contacts open and close at the desired pressure.

Typical pressure applications

How to calibrate a P/I transmitter



With a built-in hand pump, precision measurement of both pressure and current, and a 24 volt loop supply, the Fluke 718 Pressure Calibrator is a complete, self-contained tool for the calibration of P/I transmitters. To calibrate a 3-15 psi / 4-20 mA transmitter using a Fluke 718 30G Pressure Calibrator:

1. Depressurize the transmitter, and then plumb the transmitter to the 1/8 inch NPT pressure port of the 718. Connect the test leads per the figure above.
2. Turn the calibrator on. (If you need to power the transmitter, hold down the UNITS key while turning on the calibrator.)
3. Press the UNITS key until PSI shows in the display.
4. With the 718's bleed valve open to atmosphere, press the ZERO key.

Close the bleed valve. Set the pressure / vacuum valve to +, for positive pressure.

5. Use the hand pump to apply roughly 3 psi to the transmitter. Partial pump strokes will apply small increments of pressure. Use the fine-adjust knob to get reasonably close to 3.00 psi.
6. Press the HOLD key, and record the psi and mA readings. Press the HOLD key to resume reading.
7. Calculate and record the error, using: $\text{Error} = \left[\frac{(i-4)}{16} \right] - \left[\frac{(P-3)}{12} \right] * 100$ where Error is in % of span, i is your measured current in mA and P is your measured pressure in psi.
8. Repeat steps 5 through 7 at mid-range, around 9 psi, to check linearity at mid-span.
9. Repeat steps 5 through 7, now at 15 psi, for a check at 100 % of span.

If your calculated errors are within tolerance, the transmitter has passed your As-found test, and you are done. If necessary, perform your zero and span adjustments, then repeat steps 5 through 9 for an As-left test. Depressurize the line, and disconnect the 718.

Innovative new pump design

- Pumps can be easily contaminated with process fluids
 - Often requires repair
- New design reduces repairs and cost of ownership

Has two clean out ports!

- Remove fluids, clean with a cotton swab
- Easy access, can be serviced in the field



Intrinsic safe version available

Measuring less than nine inches in length and weighing just over two pounds, the rugged 718 is easy to carry into the field. The 718 is offered in 1 psi, 30 psi, 100 psi and 300 psi models. Media compatibility is dry air and non-corrosive gasses. A built-in pump generates pressure or vacuum. Min, Max, Hold and error % calculator functions

are available. The 718 can also measure pressure using any of the 48 Fluke 750Pxx Pressure Modules, to cover applications up to 10,000 psi. The 718 comes complete with protective holster, test leads, test clips, Users Manual, and two 9-volt batteries (installed).

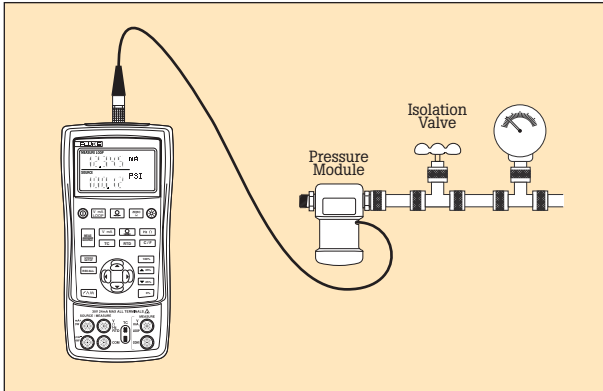
Functional Pressure Specifications				
Model	Range	Resolution	Over Pressure	Functions
717 1G	-1 PSI to 1 PSI, (-68.9 mbar to 68.9 mbar, -6.89 to 6.89 kPa)	0.001 psi, 0.001 mbar	Over Pressure 5xFS	Zero, Min, Max, Hold, Damp
717 15G	-12 PSI to 15 PSI, (-850 mbar to 1.03 bar, -85 to 103 kPa)	0.001 psi, 0.1 mbar	Over Pressure 2xFS	Zero, Min, Max, Hold, Damp
717 30G	-12 PSI to 30 PSI, (-850 mbar to 2 bar, -85 to 206.84 kPa)	0.001 psi, 0.1 mbar	Over Pressure 2xFS	Zero, Min, Max, Hold, Damp
717 100G	-12 PSI to 100 PSI, (-850 mbar to 6.895 bar, -85 to 689.48 kPa)	0.01 psi, 1 mbar	Over Pressure 2xFS	Zero, Min, Max, Hold, Damp
717 300G	-12 PSI to 300 PSI, (-850 mbar to 20.68 bar, -85 to 2068.4 kPa)	0.01 psi, 1 mbar	Over Pressure 375 PSI, 25 bar	Zero, Min, Max, Hold, Damp
717 500G	0 PSI to 500 PSI, (0 mbar to 34.47 bar, 0 to 3447.4 kPa)	0.01 psi, 1 mbar	Over Pressure 2xFS	Zero, Min, Max, Hold, Damp
717 1000G	0 PSI to 1000 PSI, (0 mbar to 68.95 bar, 0 to 6894.8 kPa)	0.1 psi, 1 mbar	Over Pressure 2xFS	Zero, Min, Max, Hold, Damp
717 1500G	0 PSI to 1500 PSI, (0 mbar to 103.42 bar, 0 to 10342 kPa)	0.1 psi, 0.01 bar	Over Pressure 2xFS	Zero, Min, Max, Hold, Damp
717 3000G	0 PSI to 3000 PSI, (0 mbar to 206.84 bar, 0 to 20684 kPa)	0.1 psi, 0.01 bar	Over Pressure 2xFS	Zero, Min, Max, Hold, Damp
717 5000G	0 PSI to 5000 PSI, (0 mbar to 344.74 bar, 0 to 34474 kPa)	0.1 psi, 0.01 bar	Over Pressure 2xFS	Zero, Min, Max, Hold, Damp
717 10000G	0 PSI to 10,000 PSI, (0 mbar to 700 bar, 0 to 70,000 kPa)	0.1 psi, 0.01 bar	Over Pressure 2xFS	Zero, Min, Max, Hold, Damp

718, 719 Models	Pressure				mA		
	Range	Resolution	Accuracy	Max non-destructive pressure	Range	Resolution	Accuracy
718-1G	-1 psi to 1 psi (-68.9 mbar to 68.8 mbar)	.001 psi (0.001 mbar)	0.05 % FS	5X full scale	0-24 mA Measure	0.001 mA	0.015 % + 2 counts
718-30G	-12 psi to 30 psi (-850 mbar to 2 bar)	0.001 psi (0.01 mbar)	0.035 % FS	2X full scale	0-24 mA Measure	0.001 mA	0.015 % + 2 counts
718-100G	-12 psi to 100 psi (-850 mbar to 7 bar)	0.01 psi (0.01 mbar)	0.035 % FS	2X full scale	0-24 mA Measure	0.001 mA	0.015 % + 2 counts
718-300G	-12 to 300 psi (-850 mbar to 20 bar)	0.01 psi (1 mbar)	0.05 % FS	375 psi or 25 bar	0-24 mA Measure	0.001 mA	0.015 % + 2 counts
719-30G	-12 psi to 30 psi (-850 mbar to 2 bar)	0.001 psi (0.01 mbar)	0.035 % FS	2X full scale	0-24 mA Measure Source	0.001 mA	0.015 % + 2 counts
719-100G	-12 psi to 100 psi (-850 mbar to 7 bar)	0.01 psi (0.01 mbar)	0.035 % FS	2X full scale	0-24 mA Measure Source	0.001 mA	0.015 % + 2 counts

Specifications are based on a one year calibration cycle and apply for ambient temperature from +18 °C to +28 °C. "Counts" are the number of increments or decrements of the least significant digit. 719 accuracy specification is for 6 months.

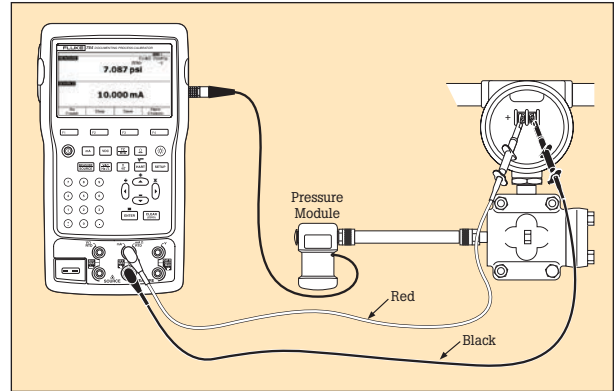
		Low pressure sensor			High pressure sensor		
721 Models	Description	Range sensor 1	Resolution sensor 1	Accuracy sensor 1	Range sensor 2	Resolution sensor 2	Accuracy sensor 2
Fluke-721-1601	Dual Sensor Pressure Calibrator, 16 PSIG, 100 PSIG	-14 psi to +16 psi -0.97 bar to 1.1 bar	0.001 psi, 0.0001 bar	0.025 % of full scale	-12 psi to +100 psi -0.83 bar to 6.9 bar	0.01 psi 0.0001 bar	0.025 % of full scale
Fluke-721-1603	Dual Sensor Pressure Calibrator, 16 PSIG, 300 PSIG				-12 psi to +300 psi -0.83 bar to 20 bar	0.01 psi 0.001 bar	
Fluke-721-1605	Dual Sensor Pressure Calibrator, 16 PSIG, 500 PSIG				-12 psi to +500 psi -0.83 bar to 34.5 bar	0.01 psi 0.001 bar	
Fluke-721-1610	Dual Sensor Pressure Calibrator, 16 PSIG, 1000 PSIG				0 psi to +1000 psi 0.00 bar to 69 bar	0.1 psi 0.001 bar	
Fluke-721-1615	Dual Sensor Pressure Calibrator, 16 PSIG, 1500 PSIG				0 psi to +1500 psi 0.00 bar to 103.4 bar	0.1 psi 0.001 bar	
Fluke-721-1630	Dual Sensor Pressure Calibrator, 16 PSIG, 3000 PSIG				0 psi to +3000 psi 0.00 bar to 200 bar	0.1 psi 0.01 bar	
Fluke-721-1650	Dual Sensor Pressure Calibrator, 16 PSIG, 5000 PSIG				0 psi to +5000 psi 0.00 bar to 345 bar	0.1 psi 0.01 bar	0.035 % of full scale
Fluke-721-3601	Dual Sensor Pressure Calibrator, 36 PSIG, 100 PSIG	-14 psi to +36 psi -0.97 bar to 2.48 bar	0.001 psi, 0.0001 bar	0.025 % of full scale	-12 to +100 psi -0.83 bar to 6.9 bar	.01 psi 0.0001 bar	0.025 % of full scale
Fluke-721-3603	Dual Sensor Pressure Calibrator, 36 PSIG, 300 PSIG				-12 psi to +300 psi -0.83 bar to 20 bar	0.01 psi 0.001 bar	
Fluke-721-3605	Dual Sensor Pressure Calibrator, 36 PSIG, 500 PSIG				-12 psi to +500 psi -0.83 bar to 34.5 bar	0.01 psi 0.001 bar	
Fluke-721-3610	Dual Sensor Pressure Calibrator, 36 PSIG, 1000 PSIG				0 psi to +1000 psi 0.00 bar to 69 bar	0.1 psi 0.001 bar	
Fluke-721-3615	Dual Sensor Pressure Calibrator, 36 PSIG, 1500 PSIG				0 psi to +1500 psi 0.00 bar to 103.4 bar	0.1 psi 0.01 bar	
Fluke-721-3630	Dual Sensor Pressure Calibrator, 36 PSIG, 3000 PSIG				0 psi to +3000 psi 0.00 bar to 200 bar	0.1 psi 0.01 bar	
Fluke-721-3650	Dual Sensor Pressure Calibrator, 36 PSIG, 5000 PSIG				0 psi to +5000 psi 0.00 bar to 345 bar	0.1 psi 0.01 bar	0.035 % of full scale

719Pro Models	Pressure measurement			Comment
	Range	Resolution	Accuracy	
Fluke-719Pro-30G	-12 to 30 PSI /-0.8 to 2 bar	0.001 PSI, 0.0001 bar	± 0.025 % of full scale, 6 months ± 0.035 % of full scale, 1 year	Dry Air and non-corrosive gas only
Fluke-719Pro-150G	-12 to 150 PSI /-0.8 to 10 bar	0.01 PSI, 0.001 bar		
Fluke-719Pro-300G	-12 to 300 PSI / -0.8 to 20 bar	0.01 PSI, 0.001 bar		
Temperature effect (all ranges)			Add ± 0.002 % F.S./°C for temps outside of 15 °C to 35 °C	No effect on accuracy on all functions from 15 °C to 35 °C
719Pro and 721 Models				
Function	Range	Resolution	Accuracy (1 year)	Comment
mA dc source, simulation (719Pro only) and measurement	0-24 mA dc	0.001 mA	± 0.015 % of reading ± 2 counts	1000 ohm maximum load in mA source, 26 V dc maximum voltage in mA simulate
Volts dc (measurement only)	30 V dc	0.001 V	± 0.015 % of reading ± 2 counts	No AC voltage measurement, do not exceed 30 V dc
Temperature (measurement only, Pt100 RTD)	-50 to 150 °C	0.01 °C 0.01 °F	Temperature ± 0.1 °C	± 0.25 °C combined uncertainty when using 720 RTD probe (optional accessory)
Loop power supply	24 V dc	N/A	24 mA at 24 V	
Temperature effect (all functions)			Add ± 0.002 % F.S./°C for temps outside of 15 °C to 35 °C	No effect on accuracy on all functions from 15 °C to 35 °C



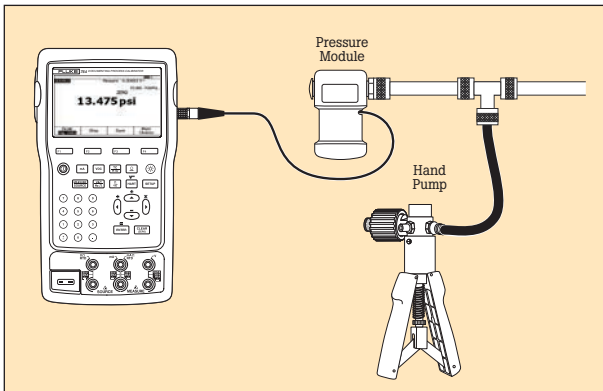
Measuring pressure

To measure pressure, the appropriate pressure module for the pressure to be tested is attached to the calibrator. The measured pressure can be displayed in a variety of engineering units. A Fluke 725 or 726 multifunction process calibrator could be used here.



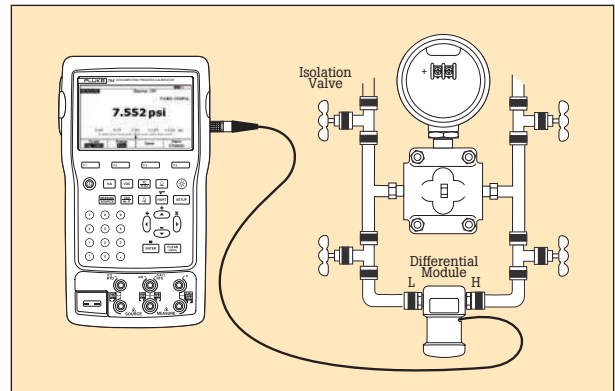
I to P device calibration

The I to P device is used to convert 4 mA to 20 mA electrical analog loop control to pneumatic analog loop control, generally 3 psi to 15 psi. Here, a typical configuration for using a pressure module with a 750 Series DPC is demonstrated.



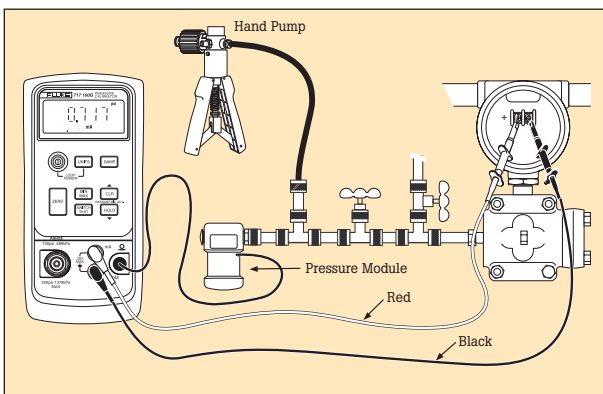
Sourcing pressure

To calibrate an instrument with pressure input, pressure from an external source (such as a hand-held pump) is applied. Prompts on the 750 Series Calibrator display indicate when to increase or decrease the input pressure, and when the specified test points are achieved. Here, a Fluke 754 Documenting Process Calibrator is shown.



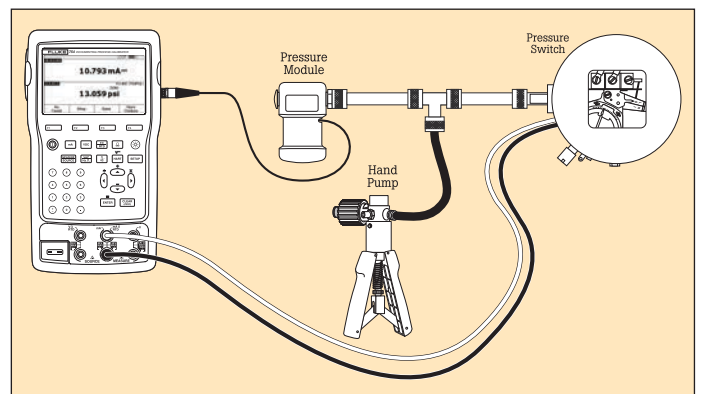
Differential measurements

Differential pressure modules are useful in a wide variety of applications, e.g., measuring the fluid level in a tank or calibrating a differential pressure transmitter. A Fluke 754 Documenting Process Calibrator is shown.



P to I device calibration

The P to I device is used to convert pneumatic analog loop control signals of 3 psi to 15 psi to electrical loop control signals of 4 mA to 20 mA. Here, a Fluke 717 Pressure Calibrator is used.



Pressure switch calibration

Verify and document the setpoint and deadband of pressure switches using the 750 Series Documenting Process Calibrators.

Pressure modules

A complete family of pressure modules

A family of 48 pressure modules covers the most common pressure calibrations from 0-1" H₂O (0-.25 kPa) to 0-10,000 psi (0-70,000 kPa).

Gage pressure modules have one pressure fitting and measure the process pressure with respect to atmospheric pressure. Differential pressure modules have two pressure fittings and measure the difference between the applied pressure on the high fitting versus the low fitting. Each module is clearly labeled for range, over-pressure specification, and media compatibility.

Quick and easy measurements

Fluke 750P Series Pressure Modules are easy to operate. To measure pressure, the technician plumbs the pressure module to a pressure source, and connects the pressure module cable to the calibrator. Pressure is applied, measured by the pressure module, and displayed digitally on the calibrator. At the touch of a button, the pressure may be displayed in up to 11 different engineering units. When used with the 750 Series Documenting Process Calibrators, pressure readings can be date/time stamped and stored electronically for later retrieval. This saves time, eliminates errors, and supports compliance with quality standards and regulations.

Pressure module performance

Fluke 750P Series Pressure Modules are highly accurate, with total specifications that apply from 0% to 100% of full span and from 0 °C to 50 °C (32 °F to 122 °F)—a feature that sets them apart from other pressure calibrators. Many ranges have total uncertainties of 0.03% of full scale and reference uncertainties of 0.0175% of scale. The reference

class ranges have total uncertainty of 0.015% of full scale and reference uncertainty of 0.01% of full scale. (see Table, page 5)

This performance is possible through the innovative application of mathematics and micro-processor power. Fluke pressure modules have silicon piezo-resistor sensors which consist of a resistive bridge fabricated in a silicon diaphragm. Pressure applied to the diaphragm causes a change in the balance of the bridge which is proportional to the applied pressure. The bridge balance change is not linear and is very sensitive to temperature. However, since these effects are quite stable with time and through repetitive changes of condition, the sensors can be very accurate in measuring pressure provided they are carefully characterized.

During manufacture, Fluke pressure modules are characterized by reading temperature and pressure at more than 100 points. A least-squares regression is used to calculate the coefficients of a polynomial expression for pressure. The coefficients, unique to that pressure module, are stored in the module's memory.

Each module has its own microprocessor, allowing it to run the measurement circuitry and to communicate digitally with a calibrator. When connected to the calibrator, the modules coefficients are uploaded from the pressure module to the calibrator. Then, as pressure measurements are made, raw sensor values for pressure and temperature are digitally loaded to the calibrator, where the raw sensor values and coefficients are manipulated to derive and display the pressure reading.

This innovative technique provides several benefits:

1. Digital communication eliminates errors due to poor connections and electrical interference.
2. The modules are inherently temperature-compensated from 0 °C to 50 °C (32 °F to 122 °F).



3. The modules are fully interchangeable because all measurements are completed in the pressure module itself and then communicated to the calibrator in digitized form. Modules are calibrated independently of the calibrator, and can be used with any 700 Series calibrator. Each module has its own serial number to facilitate traceability.

Sensor protection in isolated modules

Many of these modules (see Table) incorporate a stainless steel diaphragm to isolate the sensor. With these modules, any medium that is compatible with stainless steel can be used on the high side of the module.

Rugged construction

A urethane overmolding protects against shock if a module is accidentally dropped and also seals against dirt, dust, and moisture. Pressure connections are 1/8" NPT female connection. 1/8" NPT Male, 1/4" BSP/ISO and M20 male adapters are also provided with each pressure module.

Convenient setup

A one-meter cable between the pressure module and calibrator reduces the length of connecting tubing to the pressure source. The remote pressure head also provides an extra margin of safety and convenience by removing the calibrator and operator from the pressure source.

Pressure performance

Summary calibrator specifications: (one year, 18 °C to 28 °C)

717	718/719	719Pro	721	725/726	753	754	5522A	3130	Function	Range	Resolution	Accuracy	Notes
•									Measure Pressure ¹ (internal sensor)	1 psi to 10000 psi see table	0.0001 psi to 0.01 psi see table	0.05 % full scale	Gasses/liquids ³ (non-corrosive) Zero, Min, Max, Hold, Damp
•	•								Measure Pressure ¹ (internal sensor)	1 psi to 300 psi see table 100 psi (719)	0.0001 psi to 0.01 psi see table	0.05 % full scale (718) 0.025 % full scale (719 and 719Pro)	Gasses (non-corrosive) Zero, Min, Max, Hold, Damp
								•	Measure Pressure (internal sensor)	-80 kPa to 2 MPa (-12 to 300 psi -0.8 to 20 bar)	0.01 psi	0.025 % of reading ± 0.01 % FS	
			•						Measure two pressures simultaneously with internal sensors: low side up to 32 psi, high side up to 5000 psi. For specific range, resolution, and accuracy, see table on page 4.			16 psig and 36 psig range: Non-corrosive dry gases or liquids compatible with silicon, pyrex, RTV, gold, ceramic, nickel, and aluminum. 100 to 5000 psig range: Non-corrosive dry gases or liquids compatible with 316 SS.	
•	•	•	•	•	•	•	•		Measure Pressure ¹ (with Pressure Modules) Over pressure per pressure module specs ²	48 Pressure Modules, 1 in. H ₂ O/ 0.25 kPa to 10,000 psi/69 MPa	To 0.0001 psi, per Pressure Module specs ²	To 0.015 % of full span, per Pressure Module specs ²	Media compatibility per Pressure Module specs ² Zero, Min, Max, Hold, Damp
•	•							•	Source pressure built-in pump	-12 psig to full scale	N/A	N/A	Pressure or vacuum, overpressure protected
•	•								Measure mA	0 to 24 mA	0.001 mA	0.05 % reading + 1 count	719 Source mA
			•						Measure mA	0 to 24 mA	0.001 mA	0.020 % reading + 2 count	
					•	•			Measure mA	0 to 24 mA	0.001 mA	0.010 % reading + 0.015 % of full scale	
	•	•							Measure mA	0 to 24 mA	0.001 mA	0.015 % reading + 2 count	719PRO source mA
								•	Measure mA	0 to 24 mA	0.001 mA	0.015 % of reading ± 0.002 mA	
								•	Measure mA	0 to 32.999 mA	0.1 µA	100 ppm + 0.25 µA	
•	•	•	•	•	•	•	•	•	Loop power supply	24 V dc	N/A	± 10 %	

¹ Supported Pressure Units on 753 and 754 include: psi, kPa, bar, inches Hg, mm Hg, inches H₂O (@ 4 °C), and feet H₂O (@4 °C) kg/cm², inches H₂O (@ 60 °F), mm H₂O (@ 4 °C). Supported Pressure Units on 717, 718, and 725 include psi, kPa, bar, mbar, kg/cm², inches Hg, mm Hg, inches H₂O (@ 4 °C), inches H₂O (@ 20 °C), cm H₂O (@ 4 °C), and cm H₂O (@ 20 °C).

² For Pressure Module specifications, see table below. Supported Pressure Units on 719PRO and 721 include psi, kPa, bar, mbar, kg/cm², inches Hg, mm Hg, inches H₂O (@ 4 °C), inches H₂O (@ 20 °C), inches H₂O (@ 60 °C) cm H₂O (@ 4 °C), and cm H₂O (@ 20 °C), mH₂O (@20 °C), ftH₂O (@ 4 °C), ftH₂O (@ 20 °C), ftH₂O (@ 60 °C).

³ Gasses only for 718, 719 and 719PRO internal sensors.

Pressure module specifications (all specifications in % of full span. Specifications reflect a confidence interval of 95 %.)

Model	Parameter/Range	Burst Rating ⁶	Hi Side Media ²	Lo Side Media ²	Reference Uncertainty ⁴	Total Uncertainty 1-year (15-35 °C)	Total Uncertainty 1-year ¹	Total Uncertainty 6-month (15-35 °C)	Total Uncertainty 6-month ¹
Differential									
750P00	0 to 1 in H ₂ O (0 to 2.5 mBar)	30X	Dry Air	Dry Air	± 0.15 %	± 0.3 %	± 0.35 %	± 0.25 %	± 0.30 %
750P01	0 to 10 in H ₂ O (0 to 25 mBar)	3X	Dry Air	Dry Air	± 0.1 %	± 0.2 %	± 0.3 %	± 0.15 %	± 0.25 %
750P02	0 to 1 psi (0 to 70 mBar)	3X	Dry Air	Dry Air	± 0.050 %	± 0.1 %	± 0.15 %	± 0.075 %	± 0.125 %
750P22	0 to 1 psi (0 to 70 mBar)	3X	316 SS	Dry Air	± 0.050 %	± 0.1 %	± 0.15 %	± 0.075 %	± 0.125 %
750P03	0 to 5 psi (0 to 350 mBar)	3X	Dry Air	Dry Air	± 0.02 %	± 0.04 %	± 0.05 %	± 0.035 %	± 0.04 %
750P23	0 to 5 psi (0 to 350 mBar)	4X	316 SS	Dry Air	± 0.02 %	± 0.04 %	± 0.05 %	± 0.035 %	± 0.04 %
750P04	0 to 15 psi (0 to 1 bar)	3X	Dry Air	Dry Air	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750P24	0 to 15 psi (0 to 1 bar)	4X	316 SS	Dry Air	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
Gage									
750P05	0 to 30 psi (0 to 2 bar)	4X	316 SS	N/A	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750P06	0 to 100 psi (0 to 7 bar)	4X	316 SS	N/A	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750P27	0 to 300 psi (0 to 20 bar)	4X	316 SS	N/A	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750P07	0 to 500 psi (0 to 35 bar)	4X	316 SS	N/A	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750P08	0 to 1000 psi (0 to 70 bar)	3X	316 SS	N/A	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750P09	0 to 1500 psi (0 to 100 bar)	3X	316 SS	N/A	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750P2000	0 to 2000 psi (0 to 140 bar)	3X	316 SS	N/A	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
High									
750P29	0 to 3000 psi (0 to 200 bar)	3X	316 SS	N/A	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750P30	0 to 5000 psi (0 to 340 bar)	3X	316 SS	N/A	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750P31	0 to 10000 psi (0 to 700 bar)	2X	316 SS	N/A	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %

Pressure module specifications (continued)

Model	Parameter/Range	Burst Rating ⁶	Hi Side Media ²	Lo Side Media ²	Reference Uncertainty ⁴	Total Uncertainty 1-year (15 °C to 35 °C)	Total Uncertainty 1-year ¹	Total Uncertainty 6-month (15 °C to 35 °C)	Total Uncertainty 6-month ¹
Absolute									
750PA3	0 to 5 psia (0 to 350 mBar)	4X	316 SS	N/A	± 0.03 %	± 0.06 %	± 0.07 %	± 0.05 %	± 0.06 %
750PA4	0 to 15 psia (0 to 1 bar)	4X	316 SS	N/A	± 0.03 %	± 0.06 %	± 0.07 %	± 0.05 %	± 0.06 %
750PA5	0 to 30 psia (0 to 2 bar)	4X	316 SS	N/A	± 0.03 %	± 0.06 %	± 0.07 %	± 0.05 %	± 0.06 %
750PA6	0 to 100 psia (0 to 7 bar)	4X	316 SS	N/A	± 0.03 %	± 0.06 %	± 0.07 %	± 0.05 %	± 0.06 %
750PA27	0 to 300 psia (0 to 20 bar)	4X	316 SS	N/A	± 0.03 %	± 0.06 %	± 0.07 %	± 0.05 %	± 0.06 %
750PA7	0 to 500 psia (0 to 35 bar)	4X	316 SS	N/A	± 0.03 %	± 0.06 %	± 0.07 %	± 0.05 %	± 0.06 %
750PA8	0 to 1000 psia (0 to 70 bar)	3X	316 SS	N/A	± 0.03 %	± 0.06 %	± 0.07 %	± 0.05 %	± 0.06 %
750PA9	0 to 1500 psia (0 to 100 bar)	3X	316 SS	N/A	± 0.03 %	± 0.06 %	± 0.07 %	± 0.05 %	± 0.06 %
Vacuum									
750PV3	-5 psi (-350 mBar)	4X	316 SS	Dry Air	± 0.03 %	± 0.06 %	± 0.07 %	± 0.05 %	± 0.06 %
750PV4	-15 psi (-1 bar)	4X	316 SS	Dry Air	± 0.03 %	± 0.06 %	± 0.07 %	± 0.05 %	± 0.06 %
Dual									
750PD2	-1 to 1 psi (-70 to 70 mBar)	4X	316 SS	Dry Air	± 0.05 %	± 0.1 %	± 0.15 %	± 0.075 %	± 0.125 %
750PD3	-5 to 5 psi (-350 to 350 mBar)	4X	316 SS	Dry Air	± 0.03 %	± 0.06 %	± 0.07 %	± 0.05 %	± 0.06 %
750PD10	-10 to 10 psi (-700 to 700 mBar)	4X	316 SS	Dry Air	± 0.025 %	± 0.05 %	± 0.07 %	± 0.04 %	± 0.06 %
750PD4	-15 to 15 psi (-1 to 1 bar)	4X	316 SS	Dry Air	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750PD5	-15 to 30 psi (-1 to 2 bar)	4X	316 SS	—	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750PD50	-15 to 50 psi (-1 to 3.5 bar)	4X	316 SS	—	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750PD6	-15 to 100 psi (-1 to 7 bar)	4X	316 SS	—	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750PD7	-15 to 200 psi (-1 to 14 bar)	4X	316 SS	—	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
750PD27	-15 to 300 psi (-1 to 20 bar)	4X	316 SS	—	± 0.0175 %	± 0.035 %	± 0.045 %	± 0.03 %	± 0.04 %
Reference									
750R04 ⁵	0 to 15 psi (0 to 1 bar)	3X	Dry Air	Dry Air	± 0.01 % of FS	± 0.02 % of FS	± 0.04 % of FS	± 0.015 % of FS	± 0.035 % of FS
750R06 ⁵	0 to 100 psi (0 to 7 bar)	4X	316 SS	—	± 0.01 % of FS	± 0.02 % of FS	± 0.04 % of FS	± 0.015 % of FS	± 0.035 % of FS
750R27	0 to 300 psi (0 to 20 bar)	4X	316 SS	—	± 0.01 % of FS	± 0.02 % of FS	± 0.04 % of FS	± 0.015 % of FS	± 0.035 % of FS
750R07	0 to 500 psi (0 to 35 bar)	4X	316 SS	—	± 0.01 % of FS	± 0.02 % of FS	± 0.04 % of FS	± 0.015 % of FS	± 0.035 % of FS
750R08 ⁵	0 to 1000 psi (0 to 70 bar)	3X	316 SS	—	± 0.01 % of FS	± 0.02 % of FS	± 0.04 % of FS	± 0.015 % of FS	± 0.035 % of FS
750R29	0 to 3000 psi (0 to 200 bar)	3X	316 SS	—	± 0.01 % of FS	± 0.02 % of FS	± 0.04 % of FS	± 0.015 % of FS	± 0.035 % of FS
750R30	0 to 5000 psi (0 to 340 bar)	3X	316 SS	—	± 0.01 % of FS	± 0.02 % of FS	± 0.04 % of FS	± 0.015 % of FS	± 0.035 % of FS
750R31 ⁵	0 to 10000 psi (0 to 700 bar)	2X	316 SS	—	± 0.01 % of FS	± 0.02 % of FS	± 0.04 % of FS	± 0.015 % of FS	± 0.035 % of FS
750RD5	-15 to 30 psi (-1 to 2 bar)	4X	Dry Air	—	± 0.01 % of FS	± 0.02 % of FS	± 0.04 % of FS	± 0.015 % of FS	± 0.035 % of FS
750RD6 ⁵	-12 to 100 psi (-1 to 7 bar)	4X	316 SS	—	± 0.01 % of FS	± 0.02 % of FS	± 0.04 % of FS	± 0.015 % of FS	± 0.035 % of FS
750RD27	-12 to 300 psi (-0.8 to 20 bar)	4X	316 SS	—	± 0.01 % of FS	± 0.02 % of FS	± 0.04 % of FS	± 0.015 % of FS	± 0.035 % of FS

1. Total uncertainty, % of full span for temperature range 0 °C to +50 °C, one year interval. Total uncertainty, 1.0% of full span for temperature range -10 °C to 0 °C, one year interval. No 6 month specification available for range -10 °C to 0 °C.
2. "NONCORROSIVE GASSES" indicates dry air or non-corrosive gas as compatible media. "Stainless Steel 316-SS" indicates media compatible with Type 316 Stainless Steel.
3. Specifications % of Full Span unless otherwise noted.
4. * Reference Uncertainty is the specification for as left data for 24 hours.
5. When reference class modules are used with fixed resolution products (717, 718, 719 series, 725 and 726) calibrators add ± 1 count to the overall accuracy specification.
6. Burst rating specification refers to the multiplier times full scale of the module for the rated burst pressure.

Model	Parameter	Range	Total uncertainty 1-year	Comment
3130	Pressure	-80 kPa to 2 MPa (-12 to 300 psi, -0.8 to 20 bar)	0.025 % of reading ± 0.01 % FS	Compatible with 750P modules
	mA	0 to 20 mA	0.015 % of reading ± 0.002 mA	4-20 mA and loop power
	Volts	0 to 30.000 V dc	0.015 % of reading ± 0.002 V	Switch testing



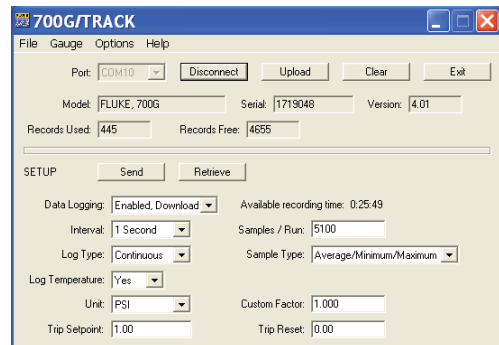
3130 Portable Pressure Calibrator

Fluke 700G Series Precision Pressure Test Gauges



Features

- Precision pressure measurement from ± 10 inH₂O/20 mbar to 10,000 psi/690 bar
- Absolute pressure measurement ranges 15, 30, 100, 300 psia
- Accuracy to 0.05 % of full scale
- Reference class gauge accuracies to 0.04 % of reading
- Easy to use, rugged construction for reliable performance
- CSA; Class 1, Div 2, Groups A-D rating
- ATEX rating: II 3 G Ex nA IIB T6
- Combine with the 700PTPK or 700HTPK pump kits for a complete pressure testing solution for up to 600 psi (40 bar) with the PTP-1 pneumatic pump and up to 10,000 psi (690 bar) with the HTP-2 hydraulic pump
- Log up to 8,493 pressure measurements to memory (requires 700G/TRACK software)
- Three-year warranty



Fluke-700PTPK Pneumatic Test Kit

- Combine with any Fluke-700G Series Gauge, 1,000 psi (69 bar) or less, to make a complete pressure testing kit
- Generate pressure up to 600 psi, 40 bar with the 700PTP-1 test pump
- Connect the 700G Series gauge directly to the included PTP-1 hand pump
- Includes hoses and adapters for connecting to the pressure device to be tested
- Hard case protects pump and gauge and allows gauge to remain connected to the pump

Fluke-700HTPK Hydraulic Test Kit

- Combine with any Fluke-700G Series Gauge, 1,000 psi (69 bar) range or greater, to make a complete pressure testing kit
- Generate pressure up to 10,000 psi, 690 bar with the included 700HTP-2 test pump
- Connect the 700G Series gauge directly to the HTP-2 hand pump
- Includes 700HTH-1 hose kit and adapters for connecting to the pressure device to be tested
- Hard case protects pump and gauge and allows gauge to remain connected to the pump

700G/TRACK Logging Software

- Use with 700G Series gauges to perform real time data logging to a PC
- Download logging configurations to the 700G Series gauges for a remote logging event
- Configure logging event reading rate, duration and measurement units
- Upload measurements logged remotely and display or export measurements
- Includes communication cable for connection to a PC

700G Series specifications

Model	Range	Resolution	Accuracy	Burst pressure
Fluke-700G01	-10 to +10 inH ₂ O -20 mbar to 20 mbar	0.0001 inH ₂ O 0.001 mbar	Positive pressure ± 0.1 % of range Vacuum ± 0.1 % of range	3 psi 210 mbar
Fluke-700G02	-1 to +1 psi -70 mbar to 70 mbar	0.0001 psi 0.001 mbar		5 psi 350 mbar
Fluke-700G04	-14 psi to 15 psi -.97 bar to 1 bar	0.001 psi 0.0001 bar	Positive pressure ± 0.05 % FS Vacuum ± 0.1 % FS	60 psi 4 bar
Fluke-700G05	-14 psi to 30 psi -.97 bar to 2 bar	0.001 psi 0.0001 bar		120 psi 8 bar
Fluke-700G06	-12 psi to 100 psi -.83 bar to 6.9 bar	0.01 psi 0.0001 bar		400 psi 26 bar
Fluke-700G27	-12 psi to 300 psi -.83 bar to 20 bar	0.01 psi 0.001 bar		1200 psi 80 bar
Fluke-700G07	-12 psi to 500 psi -.83 bar to 34 bar	0.01 psi 0.001 bar		2000 psi 138 bar
Fluke-700G08	-14 psi to 1000 psi -.97 bar to 69 bar	0.1 psi 0.001 bar		4000 psi 266 bar
Fluke-700G10	-14 to 2000 psi -.97 bar to 140 bar	0.1 psi 0.01 bar		8000 psi 550 bar
Fluke-700G29	-14 psi to 3000 psi -.97 bar to 200 bar	0.1 psi 0.01 bar		10000 psi 690 bar
Fluke-700G30	-14 psi to 5000 psi -.97 bar to 340 bar	0.1 psi 0.01 bar		10000 psi 690 bar
Fluke-700G31	-14 psi to 10000 psi -.97 bar to 690 bar	1 psi 0.01 bar		20000 psi 1035 bar
Fluke-700GA4	0 to 15 psia 0 to 1 bar absolute	0.001 psi 0.0001 bar	± 0.05 % of range	60 psi 4 bar
Fluke-700GA5	0 to 30 psia 0 to 2 bar absolute	0.001 psi 0.0001 bar		120 psi 8 bar
Fluke-700GA6	0 to 100 psia 0 to 6.9 bar absolute	0.01 psi 0.0001 bar		400 psi 27 bar
Fluke-700GA27	0 to 300 psia 0 to 20 bar absolute	0.01 psi 0.001 bar		1200 psi 80 bar
Fluke-700RG05	-14 to +30 psi -.97 to +2 bar	0.001 psi 0.0001 bar	Positive pressure ± 0.04 % of reading +.01 % of range Vacuum ± 0.05 % of range	90 psi 6 bar
Fluke-700RG06	-12 to 100 psi -.83 to 6.9 bar	0.001 psi 0.0001 bar	Positive pressure ± 0.04 % of reading +.01 % of range Vacuum ± 0.1 % of range	400 psi 27 bar
Fluke-700RG07	-12 to 500 psi -.83 to 34	0.01 psi 0.001 bar		2000 psi 138 bar
Fluke-700RG08	-14 to 1000 psi -.97 to 69 bar	0.01 psi 0.001 bar		4000 psi 275 bar
Fluke-700RG29	-14 to 3000 psi -.97 to 200 bar	0.1 psi 0.01 bar		10000 psi 690 bar
Fluke-700RG30	-14 to 5000 psi -.97 to 340 bar	0.1 psi 0.01 bar		15000 psi 1035 bar
Fluke-700RG31	-14 to 10000 psi -.97 to 690 bar	1 psi 0.01 bar		20000 psi 1380 bar
700R Ranges: Temperature Compensation 0 e°C to 50 °C (32 °F to 122 °F) to rated accuracy. For temperatures from -10 °C to 0 °C and 50 °C to 55 °C, add .005 % FS/°C				
Media compatibility				
<ul style="list-style-type: none"> • 10 inH₂O, 1, 15, 30 psi: any clean dry non-corrosive gas • 100 psi and above: any liquids or gases compatible with 316 stainless steel. 				

Pressure accessories

Fluke 700PTP-1 Pneumatic Test Pump



For use with: Fluke 750 Series Pressure Modules and the Fluke 710 Series Pressure Calibrators.

Description: The Fluke 700PTP-1 is a handheld pressure pump designed to generate either vacuum to -13 psi/-0.9 bar or pressure to 600 psi/40 bar.

The Fluke 700PTP-1 has two pressure ports:

- 3/8-BSP (ISO228) female parallel thread fitting for the reference gauge or pressure module
- 1/8-BSP (ISO228) female parallel thread fitting for the unit under test

Application: The Fluke 700PTP-1 features an integral pressure adjustment vernier which varies the pressurized volume by 2.0 cc over approximately eleven turns of the vernier knob. The pressure variation achievable with the vernier will depend on the nominal pressure and total pressurized volume, but with a minimum volume and maximum pressure, the vernier provided 600 ± 20 psi adjustment range. With a minimum volume and no pressure applied, the vernier can also be used to provide a 0 to 70" H₂O range. Larger volumes will provide a smaller range of adjustment, but greater resolution. The length of the stroke can be adjusted to limit the maximum output pressure. Maximum output pressure is adjustable from 2.5 psi to 600 psi.

Fluke 700HTP-2 Hydraulic Test Pump



For use with: Fluke 750 Series Pressure Modules and the Fluke 710 Series Pressure Calibrators.

Description: The Fluke 700HTP-2 is designed to generate pressures up to 10,000 psi/700 bar. The Fluke 700HTP-2 has two pressure ports:

- 3/8-BSP (ISO228) female parallel thread fitting for the reference gauge or pressure module
- 1/8-BSP (ISO228) female parallel thread fitting for the unit under test

Note: The user must provide a hose with appropriate end fittings from this port to the unit under test.

Application: This pump can provide up to 10,000 psi using distilled water or mineral-based hydraulic oil. The pump is operated by pumping several strokes to prime the system, then switching to high pressure mode when the resistance increases. An integral pressure adjustment vernier knob varies the pressurized volume by 0.6 cc. The pressure variation achievable with the vernier will depend on the nominal pressure and total pressurized volume, but with a minimum volume, the vernier provided 150-3,000 psi (at 150 psi nominal) and 3,000-10,000 psi (at 3,000 psi nominal) adjustment ranges. With a minimum volume and no pressure applied, the vernier can also be used to provide a 0 to 1.7 psi range. Larger volumes will provide a smaller range of adjustment, but greater resolution.

Fluke 700LTP-1 Low-Pressure Test Pump



Description: The Fluke 700LTP-1 is a hand operated pressure pump designed to generate either vacuum to -12 psi/-0.85 bar or pressures to 100 psi/6.9 bar. The Fluke 700LTP-1 has two pressure ports with push fit connectors. These push fit connectors, one for the reference port for connection to a Fluke 700 series pressure module and one to connect to a unit under test, connect to the supplied test hoses. These test hoses are terminated with 1/4-BSP (ISO228) female parallel thread fittings that can be adapted using the fittings included.

Application: The Fluke 700LTP-1 is primarily intended for low pressure applications. It features a fine adjust vernier with .00145 / PSI resolution at low pressures. The pressure variation achievable with the vernier will depend on the nominal pressure and total pressurized volume, but with minimum volume and maximum pressure the vernier provides $30 \text{ psi} \pm 6 \text{ psi}$. The adjustable pressure relief valve features a slow-bleed capability that allows the user to slowly release pressure at a controlled rate to achieve a desired pressure.

Fluke 700HTH-1 Hydraulic Test Hose



Description: The Fluke 700HTH-1 hydraulic test hose is a 10,000 psi, 700 bar working pressure test hose. The hose uses self-sealing fittings with easy finger tight connections.

Application: The Fluke 700HTH-1 allows connections to a unit under test from a Fluke 700HTP-1 hydraulic test pump in use with the Fluke 700 series pressure modules. The 700HTH-1 is compatible with water and non-corrosive oil.

Fluke 700PRV-1 Pressure Relief Valve Kit

For use with: Fluke 700HTP-1 Hydraulic Test Pump.

Description: The Fluke 700PRV-1 consists of two relief valves (1360 and 5450 psi) to be used with the 700HTP-1 Hydraulic Test Pump. These relief valves will protect the Fluke pressure modules from damage due to over-pressurization. 1/4 BSP male parallel thread to fit Fluke 700HTP-1.

Application: Repeatability ± 10 % of nominal setting. Multi-turn adjustment screw to set preload on internal disc springs.

Fluke 71X Hose Kit

For use with: Fluke 717, 718, 719, 719Pro and 721 Pressure Calibrators. Maximum pressure 300 psi, 20 bar.

Description: The Fluke 71X hose kit includes (2) quick disconnect fittings, three 1 meter translucent hoses and one BSP adapter.

Fluke 700ILF In-line Filter



For use with: Fluke 717, 718, 719, 719Pro and 721 Pressure Calibrators to help isolate the calibrator from liquid contamination.

Description: Use to isolate calibrator from contact with liquids. Input is 1/8" NPT female. Output is 1/8" NPT male.

Application: The Fluke 700ILF can be used to isolate the calibrator from incidental contact with fluids present in the gas medium being measured. Particularly useful with the 718/719/719Pro/721 calibrator to help keep moisture or oils from contaminating the on-board pump. The 1/8" NPT male threaded output threads directly into the 717, 718, 719, 719Pro and 721 calibrators. Maximum pressure is 100 psi. Burst pressure is 375 psi. Maximum flow is 10 SCFM and filtration to 1 micron.

Fluke 700PMP Pressure Pump



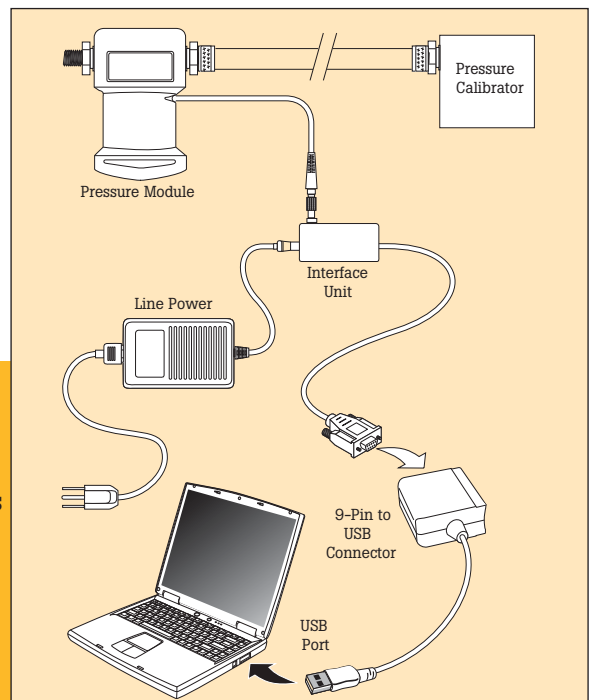
For use with: Fluke 750 Series Pressure Modules and the Fluke 710 Series Pressure Calibrators.

Description: The Fluke 700PMP is a hand-operated pressure pump to provide pressures up to 150 psi/1000 kPa. Output fitting is 1/8 FNPT.

Application: Linear stroke of 1.6" (4 cm). Multi-turn vernier for fine adjustment of pressure. Includes controlled pressure bleed valve.

Fluke 700 PCK Calibration Kit

The Fluke 700PCK Pressure Calibration Kit makes it possible to calibrate your pressure modules at your facility using your own precision pressure standards. The kit consists of a power supply, an interface adapter, appropriate cables, and Fluke 700PC Pressure Module Calibration software. When installed on your PC, the Windows®-based software easily steps you through an as-found verification, a calibration adjustment, and an as-left verification. Calibration data is captured for import to your database. A precision pressure standard with an uncertainty of less than 1/4 that of the pressure module being verified.



Note: With a Fluke 700PCK and any Fluke Pressure Module, a Fluke 5522A Calibrator becomes a precision pressure standard.

Pressure Terminology

Absolute pressure — absolute pressure measurements are referenced to zero pressure, (a perfect vacuum.)

Absolute pressure transducer — a transducer that has an internal reference chamber sealed at or close to zero pressure (full vacuum) when exposed to atmosphere a reading of approximately 14.7 psi results.

Boyle's Law — the volume of a gas is inversely proportional to the pressure of the gas at constant temperature: $V=1/P$.

Charles' Law — essentially states for a fixed volume of gas, if the temperature is raised, the pressure will increase.
 $P = \text{Constant} \times T$.

Common mode pressure — the underlying common pressure (or static pressure) within a system from which a differential measurement is being made.

D/P: Differential pressure, (pronounced DP) — other names used to mean the same thing are d/p cell, d/p transmitter and ΔP transmitter (where Δ is delta or differential). This is the most common type of transmitter used in most process industries. It can be used to measure level, flow, pressure, differential pressure, and density or specific gravity. With some modifications, it can measure such things as temperature and oxygen purity. The d/p transmitter can be pneumatic, electromechanical, or solid state. It can also be a smart transmitter. A typical large process plant can have hundreds or thousands of d/p transmitters in service.

Gage pressure — the pressure relative to atmospheric pressure. Gage pressure = absolute pressure minus one atmosphere.

Gage pressure transducer — a transducer that measures pressure relative to atmospheric pressure.

Ideal Gas Law — combining Boyle's Law and Charles' Law, results in the Ideal Gas Law: $PV=nRT$, where nR is constant for a particular gas analogous to the number of molecules and the relative size of the molecule.

I/P (I to P) — a current to pressure transmitter. A common instrument in modern industrial plants. A typical large paper mill or refinery could have 5,000 I/Ps in use.

Line pressure — the maximum pressure in the pressure vessel or pipe for differential pressure measurement.

Orifice plate — a very low cost and common primary sensing element (PSE) for measuring flow. It must be used in conjunction with a d/p cell. It creates a venturi and a resulting P is developed across the plate whose square root is proportional to flow.

P/I (P to I) — a pressure to current transducer.

Pneumatic relay — refers to a pneumatic instrument that performs a function to its input and provides the result on its output (Example: square root extractor, adder, etc.).

PSI — pounds per square inch (same as psig).

PSIA — pounds per square inch absolute.

PSID — pounds per square inch differential.

PSIG — pounds per square inch gage (same as psi).

Square root extractor — an instrument or software program that takes the square root of input and puts the result on its output. Square root extraction is needed to linearize many flow signals. Example: orifice plates, venturis, target flow meters, and pitot tubes all require the transmitter's output signal to be linearized. Mag flow meters, turbine flow meters, Doppler flow meters, and vortex shedding flow meters don't require square root extraction.

Static pressure — the zero-velocity pressure at any arbitrary point within a system.

Wet/dry differential — a differential pressure transducer or transmitter that uses a metal diaphragm at the wet port where fluids can be applied, and no diaphragm at the dry port. The dry port exposes the sensor material to the medium, so only clean dry gas can be applied to this port.

Wetted parts — the diaphragm and pressure port material that comes in direct contact with the medium (gas, liquid).



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