FLUKE®
Calibration

6270A

Pressure Controller/Calibrator

Operators Manual

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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

11/99

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Introduction

The Fluke Calibration 6270A Pressure Controller/Calibrator (the Product) precisely measures and controls pneumatic pressures up to 20 MPa (3000 psi). Use the Product to calibrate, characterize, or test a wide variety of pressure measurement devices that include transmitters, gauges, and switches.

The Product uses interchangeable Pressure Measurement Modules (PMMs) and a Pressure Control Module (PCM) to regulate pressure output. The touchscreen display features a multi-language user interface (UI). See *Instrument Setup Menu* for more information.

Contact Fluke Calibration

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

- Technical Support USA: 1-877-355-3225
- Calibration/Repair USA: 1-877-355-3225
- Canada: 1-800-36-FLUKE (1-800-363-5853)
- Europe: +31-40-2675-200
- Japan: +81-3-6714-3114
- Singapore: +65-6799-5566
- China: +86-400-810-3435
- Brazil: +55-11-3759-7600
- Anywhere in the world: +1-425-446-6110

To see product information or download manuals and the latest manual supplements, visit Fluke Calibration's website at www.flukecal.com.

To register your product, visit http://flukecal.com/register-product.

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Safety Information

A **Warning** identifies conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test.

⚠⚠Warnings

To prevent possible electrical shock, fire, or personal injury:

- **Only assemble and operate high-pressure systems if you know the correct safety procedures. High-pressure liquids and gases are hazardous and the energy from them can be released without warning.**
- **Read all safety information before you use the Product.**
- **Carefully read all instructions.**
- **Do not use the Product around explosive gas, vapor, or in damp or wet environments.**
- **Do not operate the Product with covers removed or the case open. Hazardous voltage exposure is possible. Pressure modules may be exchanged through the front panel while the Product is turned on.**
- **Use this Product indoors only.**
- **Do not put the Product where access to the mains power cord is blocked.**
- **Use only the mains power cord and connector approved for the voltage and plug configuration in your country and rated for the Product.**
- **Make sure the ground conductor in the mains power cord is connected to a protective earth ground. Disruption of the protective earth could put voltage on the chassis that could cause death.**
- **Replace the mains power cord if the insulation is damaged or if the insulation shows signs of wear.**
- **Use the Product only as specified, or the protection supplied by the Product can be compromised.**
- **Before the Product is used to apply pressure, ensure the integrity of all components to be pressurized and make sure they are rated to adequate working pressure.**
- **Do not apply more than the rated voltage, between the terminals or between each terminal and earth ground.**
- **Do not touch voltages >30 V ac rms, 42 V ac peak, or 60 V dc.**

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- **Do not use the Product if it operates incorrectly.**
- **Disable the Product if it is damaged.**
- **Use only specified replacement parts.**
- **Have an approved technician repair the Product.**
- **Do not disable safety interlocks or pressure-relief devices.**
- **Use two handles to lift and carry the Product.**
- **Always wear safety glasses when working with pressurized equipment.**

Symbols

The symbols shown in Table 1 can be found in this manual or on the Product.

Note

The CE marking below does not apply to the 6270A-NPT-NA, PM600-A10M-NA, or PM600-A14M-NA.

Table 1. Symbols

Symbol	Description	Symbol	Description
⚠	Hazardous voltage. Risk of electric shock.		Certified by CSA Group to North American safety standards.
⚠	Risk of Danger. Important information. See Manual.	CE	Conforms to European Union directives.
▭	Fuse		Conforms to relevant Australian EMC standards.
⏚	Earth Terminal		Conforms to relevant South Korean EMC Standards.
	This product complies with the WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product. Do not dispose of this product as unsorted municipal waste.		

The Product Manual Set

The Product ships with:

- *6270A Safety Information*
- *6270A Operators Manual* (provided at the Fluke Calibration website)
- *6270A Remote Programmers Guide* (provided at the Fluke Calibration website)

To order, refer to the Fluke Calibration Catalog or contact a Fluke Calibration sales representative. See *Contact Fluke Calibration*.

This manual provides complete information to install and operate the Product from the front panel.

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Calibration and Repair Information

If calibration or repair is needed during the warranty period, contact an authorized Fluke Calibration Service Center to arrange for repair (see *Contact Fluke Calibration*). Please have the Product information ready such as the purchase date and serial number to schedule the repair.

Specifications

Safety specifications are located in the printed *6270A Safety Information.* Full specifications are located online in the *6270A Specifications.*

Unpack the Product

The Product is delivered in a corrugated container with suspension packaging. An optional molded shipping case with custom foam inserts is also available, see *User-Replaceable Parts and Accessories*.

Remove the Product and its accessories from the shipping container(s) and remove each element from its protective plastic bag. Check that all items listed in Table 2 are present and have no visible damage.

If it is necessary to reship the Product, use the original container. To order a new container, see *Contact Fluke Calibration*.

Table 2. Standard Equipment

Item	Model or Part Number
The Product	6270A
Mains Power Cord	See Table 3 and Figure 1
PMM (Pressure Measurement Module)	Assorted ranges and Barometer modules are also available. See Flukecal.com.
PCM (Pressure Control Module)	PCM-STD-20M
6270A Safety Information	4454642

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Product Placement

⚠⚠Warnings

To prevent possible electrical shock, fire, or personal injury, do not restrict access to the Product mains power cord. The mains power cord is the mains disconnecting device. If access to the power cord is inhibited by rack mounting, a properly-rated accessible mains disconnecting switch must be provided within reach as part of the installation.

To prevent possible personal injury:

- **Use good lifting practices when lifting or moving the Product. The Product is an unbalanced load and can weigh as much as 20 kg (44 lb).**
- **Use two handles to lift and carry the Product.**

Use the Product on a bench or in a standard 19 inch equipment rack. Purchase a rack mount kit to install the Product into an equipment rack. For bench-top use, install the Product on a flat, stable surface at a convenient height. The front feet can be extended to incline the Product for easier viewing.

Minimize the distance between the Product and the device or system under test to enhance control performance and reduce pressure settling times.

For installation, the Product requires:

- An electrical power source of 100 V ac to 240 V ac, 47 Hz to 63 Hz.
- A continuous, regulated pressure supply of clean, dry, non-corrosive gas at the Product's maximum control pressure +10 % or 70 kPa (10 psi), whichever is greater, to be connected to the Product SUPPLY port.
- A vacuum source of 7 kPa (1 psi) absolute and with a displacement of at least 90 L/m (3 cfm) if controlling pressures <20 kPa (3 psi) gauge.

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Connect to Mains Power

⚠⚠Warning

To prevent shock hazard, connect the factory-supplied three-conductor mains power cord to a properly-grounded power outlet. Do not use a two-conductor adapter or extension cord, as it will break the protective ground connection.

Mains Voltage

To power the Product, mains voltage ranging from 100 V ac to 240 V ac with frequencies from 47 Hz to 63 Hz is required.

The Product comes with the appropriate line power plug for the country of purchase. If a different type is necessary, refer to Table 3 and Figure 1. They list and show the mains line power plug types available from Fluke Calibration.

Table 3. Line Power Cord Types Available from Fluke Calibration

Type	Fluke Calibration Option Number
North America	LC-1
Universal Euro	LC-3
United Kingdom	LC-4
Switzerland	LC-5
Australia	LC-6
South Africa	LC-7
Brazil	LC-42

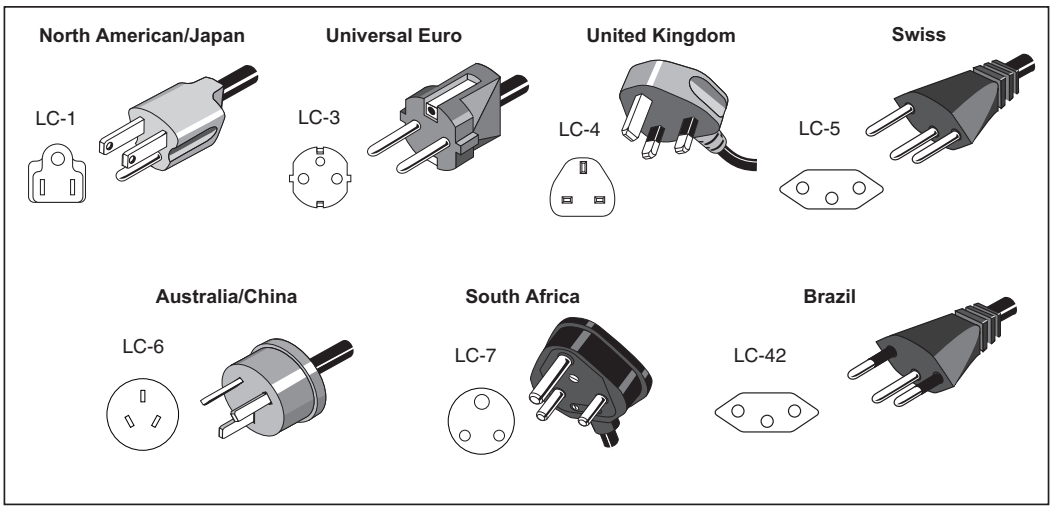


Figure 1. Available Mains Power Cord Types

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Access the Module Bay

After the Product is properly placed (in a standard 19 inch rack or on a bench top) install the modules in the Module Bay.

Note

The Product rear-panel power switch can be on or off during PMM exchange or installation.

Before removing the PCM, vent the supply pressure.

To access the Module Bay, see Figure 2:

1. Pull out the handle (①) located directly below the numeric keypad. This unlocks the front panel.
2. Pull the handle to slide out front panel and access the Module Bay (②).

Note

For safety, the Product automatically vents to atmosphere when the front panel is unlatched and opened. When the front panel is open, the system stays in the Vent mode until closed.

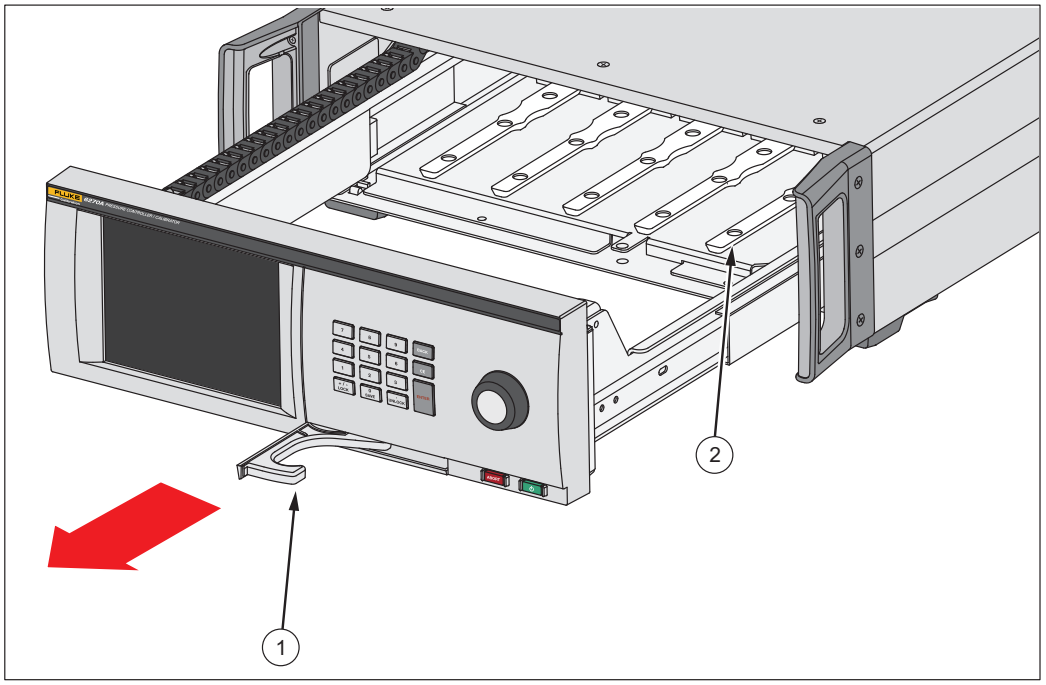
For service activity, see the Service Manual for detailed service processes.

For standard operations, the system pneumatic valves are a normally closed type. Depending on the chassis power/pressure down process, differing levels of trapped pressure are possible. During standard venting processes the maximum trapped pressure is minimal and may produce a small, safe pressure release when removing the PCM.

If power is lost to the product, while at high pressure, remove pressure supply to allow system to mostly depressurize. If possible, power on system to perform a vent.

Before you open the front panel, remove sensitive, low pressure devices from the test port. Use the optional Isolation Valve to improve protection for sensitive pressure devices.

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Figure 2. Module Bay

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PMM Installation

The PMMs are delivered in a separate box. Install the PMMs with the Product turned on or off. The PMMs can be installed in any order without the need to plug any of the unused slots. When the front panel is opened, information such as the pressure range of each module is shown after it is connected. The Product detects the PMM information when installed and shows the information in the Modules menu (see *Modules*).

To install the PMMs:

⚠Caution

To prevent damage to the sensors inside the modules, do not drop the modules.

1. Remove the PMM from its shipping box.
2. Remove the protective plastic cover from the PMM test and reference port.
3. Confirm that the test port and reference port O-rings are properly installed on the module and are not torn or damaged. Additional O-rings are located in the box in case they become lost or damaged.
4. Open the Module Bay as described in the *Access the PMMs and PCMs* section.
5. The PMM has a slot on the bottom of it that fits into the track that lies on the bottom of the inner Product case, see Figure 2 (②). Line the track up with the slot and slide the PMM into the bottom case until it stops. See Figure 3.
6. Turn the knob on the PMM clockwise until it clicks one time to tighten it.

Note

The PMM knob is a torque-limiting knob that slips once the proper amount of torque is applied. This prevents accidental over-tightening that can damage the manifold.

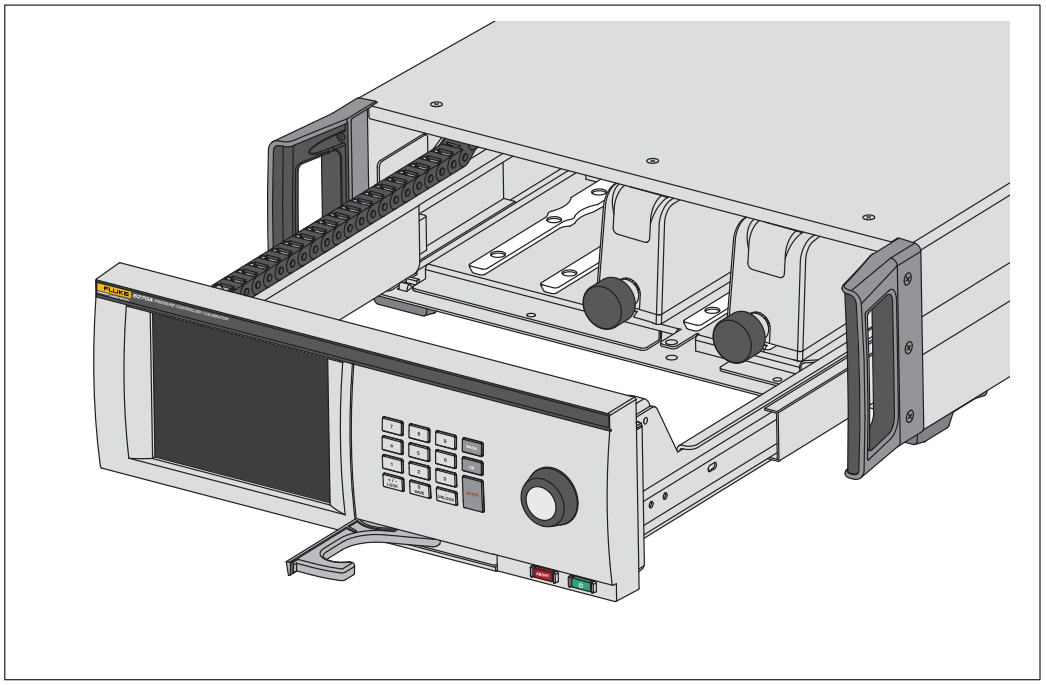
7. After tightening the PMM to the manifold, the module should automatically appear on the display. Check the main display to see if the PMM is properly installed.

Note

When the Module Bay is opened, the front-panel display shows the slots and visually displays the PMMs installed. This provides a method to quickly ensure the newly installed PMM is connected and communicating.

8. Repeat this procedure for any other PMMs and BRMs.
9. Close and latch the front panel.

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Figure 3. PMM Installation

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PCM Installation

Depending upon how the Product is ordered, the PCM may come installed in the unit or be delivered in a separate box.

To install the PCM:

⚠Caution

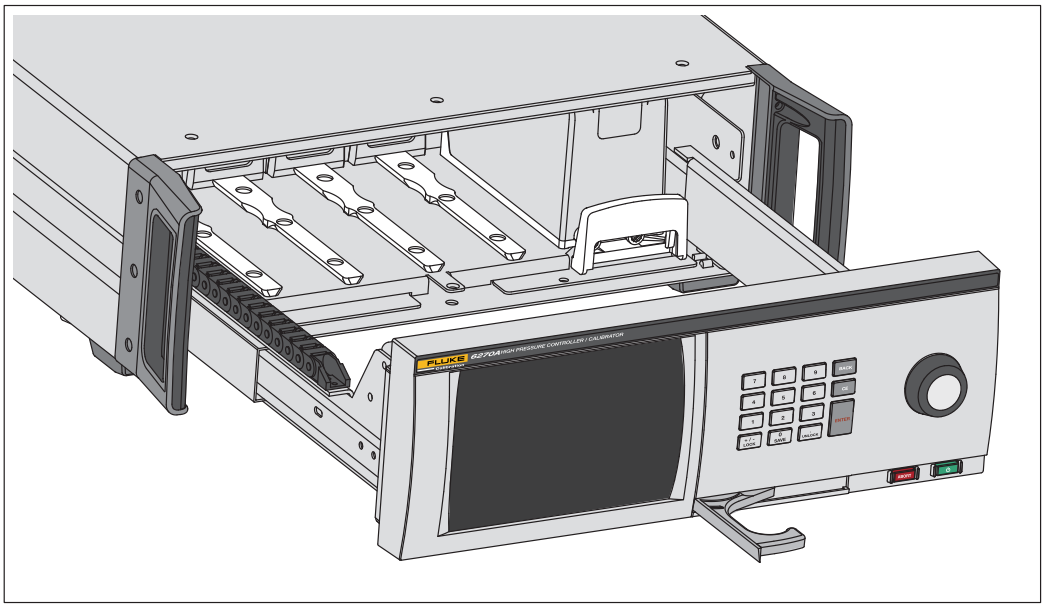
To prevent damage to the sensors inside the modules, do not drop the modules.

1. Remove the PCM from its shipping box.
2. Remove any protective plastic covers from the PCM pressure ports.
3. Confirm the O-rings are properly installed on each pressure port and are not damaged.
4. Open the Module Bay as described in the *Access the Module Bay* section.
5. The PCM location in the Module Bay is on the far right. Align the track on the bottom of the PCM with the PCM slot inside the Module Bay. See Figure 4.
6. Slide the PCM into place.
7. Tighten the two hex bolts on the front of the PCM with a nutdriver. Torque to 0.5 N·m to 0.7 N·m (4 lbf · in to 6 lbf · in).

⚠Caution

To prevent damage to the internal manifold, do not over torque.

8. Close and latch the front panel.



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Figure 4. PCM Installation

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Barometer Module

For absolute measurements, a barometer module (BRM600-BA100K, PM200-A100K, PM500-BA120K, or PM500-A120K) must be installed unless the PMM is inherently absolute mode (refer to the PMM specifications). Install the barometer module in any of the open slots and select it as the atmospheric module from the Atmosphere menu, (**Setup Menu>Measure Setup>Atmosphere**). See *Atmosphere* for more information.

Rear-Panel Manifold Pressure Connections

The Product comes with one of three types of manifolds installed:

- NPT
- BSP
- SAE

The type of manifold is marked on its lower right corner. Table 4 lists the different manifolds and port sizes. Manifold installation is explained in the *Maintenance* section.

Table 4. Rear-Panel Manifolds

Manifold	SUPPLY	EXHAUST	TEST	Reference (REF)	VENT
NPT [1]	1/4 inch NPT	1/4 inch NPT	1/4 inch NPT	1/4 inch NPT	1/8 inch NPT
BSP [2]	1/4 inch BSP	1/4 inch BSP	1/4 inch BSP	1/4 inch BSP	1/8 inch BSP
SAE [3]	7/16-20 SAE	7/16-20 SAE	7/16-20 SAE	7/16-20 SAE	5/16-24 SAE

[1] Requires the use of PTFE tape on the male adapter to ensure a good seal.
[2] Bonded seal is required to ensure a good seal.
[3] O-ring is required (which is normally included on the fitting) to ensure a good seal.

An accessory lines and fittings kit can be purchased to supply the common adapters used to connect to the manifolds. See *User-Replaceable Parts and Accessories* for more information.

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SUPPLY Port

The pressure SUPPLY port must be connected to a regulated source of clean, dry air or nitrogen as directed in *Specifications*. Fluke Calibration recommends that tubing be at least 3 millimeters (1/8 inch) inside diameter and properly rated for the pressure.

Connect the pressure supply to the SUPPLY port on the rear panel of Product. The supply port connection is 1/4 inch NPT, 1/4 inch BSP, or 7/16-20 SAE female. Use a pressure-connecting hose or tube of the appropriate pressure rating.

The supply pressure should be equal to the greater of 70 kPa (10 psi) or 110 % of the maximum Product control pressure. The supply pressure should never exceed 23 MPa (3300 psi). Lower gas pressure sources can be used, but should exceed the maximum desired test output pressure by at least 10 %.

⚠Caution

To prevent damage to the system, make sure to select the correct size adapter fitting with the correct thread type. Ensure that all hardware used is rated to adequate working pressure, and that all equipment is in proper working order (for example, no cracks or stripped threads).

To prevent damage to the Product, be sure to connect the pressure supply to the SUPPLY port. Connecting to another port can damage the Product.

EXHAUST Port (Vacuum Pump if Required)

The included muffler is normally installed in the EXHAUST port. Remove the muffler when you connect a vacuum pump to the EXHAUST port. A vacuum pump is required to control pressure below 20 kPa (3 psi) gauge. Tubing should have a minimum inside diameter of 6 millimeters (1/4 inch). In confined areas, pipe the exhaust port outside to prevent an accumulation of nitrogen. It is acceptable to add tubing to the exhaust port for the primary purpose of reducing noise. Do not block the exhaust tube.

⚠Caution

To prevent damage to the Product:

- **Never connect a pressure supply to or plug the Product EXHAUST port.**
- **To avoid building up pressure on the EXHAUST port or on a vacuum pump connected to the EXHAUST port, the vacuum source should either be continuously ON or the EXHAUST port should be bypassed to atmosphere when the vacuum source is OFF. This is because when a supply pressure is applied to the Product SUPPLY port and the Product is not in the vent ON condition, there is typically a constant gas exhaust through the Product EXHAUST port.**
- **When controlling down in pressure, the Product will exhaust gas through the EXHAUST port. The flow of this gas can be greater than what the vacuum pump can support. When working at higher pressures, Fluke Calibration recommends that the vacuum pump be turned off and equipped with an auto-vent valve.**

TEST Port

Pressure instruments and devices to be tested are connected to the TEST port. Tubing connected from the Test port to the load volume should have an internal diameter >3 millimeter (1/8 inch). Tubing should be <5 meters (15 feet) when minimum diameter tubing is used.

To prevent oils, grease, solvents, and water that could be present in a Unit Under Test (UUT) from contaminating the Product, a Contamination Prevention System (CPS) is available for use with the Product. The CPS sits on a bench inside a test stand that provides a platform to test pressure instruments and devices. The CPS connects directly to the TEST port. For more information, see *Contamination Prevention Accessory (CPS)*.

Note

Excessive leaks in the test volume affect control stability and possibly cause measurement errors in the UUT.

⚠Caution

To prevent damage to the Product, when the Product is connected to a system with liquid contaminants, take proper precautions to purge the system and test line. Not doing so can cause Product contamination and result in a need for non-warranty service.

Note

Minimize the length of the test connection tubing to enhance control performance and reduce pressure setting time.

The Product pressure control will not operate properly if there are excessive leaks in the test system. The maximum acceptable leak rate for optimal automated pressure control operation and to ensure in tolerance measurements with default pressure control parameters is ±0.5 % of set pressure/minute (0.0083 % of set pressure/second). In DYNAMIC CONTROL mode, to handle higher test system leak rates, use CUSTOM CONTROL to increase the Ready Tolerance.

REF Port

The REF port (Reference port) is open to atmosphere for gauge measurements or it can be connected to the reference port of the pressure instruments and devices to be tested.

Instruments with a low full-scale pressure range require special handling to assure their performance. These instruments are sensitive to atmospheric pressure changes, including disturbances in the atmospheric pressure. The reference side must be carefully controlled or changes due to wind, air handlers, doors shutting, and more will cause major variations. The Product tracks these changes but it may not track in the same way as the pressure device under test. To control these changes, Fluke Calibration recommends that the reference port (also referred to as the "test-(test minus)" or "low" port of all relevant devices be tied to the REF port of the Product.

The REF port can be sealed from atmosphere in most applications where the test times are relatively short. This isolates the port from pressure changes in the atmosphere and results in very stable pressure measurement and control.

If the test times are relatively long, in addition to connecting the reference ports together, they should also be connected to a buffer tank with a large volume (size depends on application). Vent the tank to atmosphere through a small orifice bleeder valve at the other end of the tank. Shield the entire reference assembly from rapid fluctuations in air temperature and flow. Set the vent valve experimentally. In an environment with no temperature change, the vent valve is closed. In an environment with no pressure fluctuations the vent valve is wide open. The appropriate setting varies but a good compromise can be found. To see the variations, connect the reference as discussed and open the test port to atmosphere. In Measure mode, the Product indicates the variations. A good filter can be used in place of the valve if it provides nearly the correct restriction of air flow.

One consideration is that if the reference port is completely sealed from atmosphere, its pressure changes due to barometric pressure changes or temperature changes in the environment. If the pressure in the REF port becomes lower than the barometric pressure, then a vacuum pump needs to be attached to the EXHAUST port to allow the Product to control down close to 0 psig.

For Products that have a BRM installed, the barometer is tied to the reference port. When Gauge mode is used, connect the REF port as noted above. When used in the Absolute mode, if the ambient pressure is not stable, sealing the reference port from atmosphere improves the control stability of the Product.

VENT Port

The VENT Port ties the internal volume to atmosphere when the Product is vented.

Note

Leave the VENT port open to atmosphere to ensure proper operation of the Product.

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Controller Settings (Setup Menu)

When the Product is first used, set the user preferences from the Setup menu. From the Main screen, touch **SETUP**. The UI shows the Setup menu.

Setup Menu

The Setup menu leads to these submenus:

Measure Setup – This menu has options and parameters for pressure measurement. See *Pressure Measurement Settings* for detailed information on each menu item.

Tasks - This menu contains selections to configure and run pre-programmed jobs (tasks). See *Tasks* for detailed information on each menu item.

Module Information - This menu contains selections to view the PMM configuration and also make selections regarding which PMMs and mode to use. See *Module Selection* for detailed information on each menu item.

Diagnostic - This menu contains options and parameters to run a diagnostic troubleshooting tool to help identify system, measurement, control, and remote communication problems. See *Diagnostics* for detailed information on each menu item.

Control Setup - This menu contains options and parameters for pressure control. See *Pressure Control Settings* for detailed information on each menu item.

Instrument Setup - This menu contains general instrument options and parameters. See the subsequent section for detailed information on each menu item.

Note

Once inside the menu structure, touch the arrows at the top of the screen to move backward within the menu paths.

The procedures for these tasks are listed in their respective sections of the manual.

Instrument Setup Menu

The Instrument Setup menu (**Setup>Instrument Setup**) includes these submenus, which are explained in the next sections:

- Instrument Settings
- Remote Port
- External 24 V
- CPS
- Isolation Valve
- Uncertainty
- About This Instrument
- Restore Factory Default

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Instrument Settings Menu

To set user preferences, from the Instrument Setup menu, touch the **Instrument Settings** tab. The Instrument Settings menu is shown.

The sections of the Instrument Settings menu are explained in Table 5.

Note

*A password is required to change the **Date/Time** and **Security** parameters. See* Change Password *below for information about how to change the default password.*

Table 5. Instrument Settings Menu

Tab	Description
Language	Use this screen to change the UI language. Touch the **Language** tab to select **English**, **Italian**, **Spanish**, **Russian**, **Portuguese**, **Simplified Chinese**, **German**, **Japanese**, **French**, **Korean, Czech,** or **Slovak**. From Main menu, hold the **Unlock** button for 3 seconds and the system goes to the Language Selection menu.
Date/Time	The date and time are set from this menu. Use **MM/DD/YYYY**, **DD/MM/YYYY**, or **YYYY-MM-DD** (M= Month, D=Date, Y=Year). To change the format of the date, touch the **Format** tab, select the format and touch **Exit**. To change the date and time, touch the parameter to change (Month, Day, Year) and use the keypad on the right to key in the new value. Push **ENTER** to store the value(s).
Display	Use this menu to adjust aspects of the Display. Touch the **Display** tab to get to the **Brightness** and **Screen Timeout** parameters. For display brightness, touch **Brightness** tab and use the keypad on the front of the Product to adjust the percentage. The screen can also be set to turn off (timeout) after a certain amount of time. Touch the arrow on the Screen Timeout tab and select **1**, **5**, **10**, **15**, or **30 minutes**. **Never** can also be selected.
Decimal	Specify a decimal separator for your region, either "." or ",". To change the selected separator, touch the **Decimal** tab.
Screen Capture	The Product can save up to 5 screen captures. When the Product is connected to a computer using a USB cable, the Product shows as a disk drive on the computer. Screen captures can be copied from the Product to the computer. Touch the **Screen Capture** tab to enter the menu. From this menu, existing screens can be captured with the **Next** button or deleted with the **Delete** or **Delete All** buttons.
Clear All Files	When you push the **Clear All Files** button, you are prompted for the password. When you enter the correct password, any screen capture files are erased.

Table 5. Instrument Settings Menu (cont.)

Tab	Description
Change Password	The integrity of Product calibration is protected by a security password that must be entered before new calibration constants can be saved to non-volatile memory. The password also protects the ability to set the date for the internal real-time clock. If the password has not been entered, the Product is secured. Once the password is entered, the Product is unsecured. The Product secures itself when it is reset or when the Setup menus are closed. The Product can be unsecured at any time over the remote interface with the CAL_SECURE command and by entering the password. The Product prompts for the password to unsecure the Product before it can accept new values to be eventually secured. The password contains 1 to 8 digits and is factory set to **6270**. To change the password: 1. Touch **Setup Menu>Instrument Setup>Instrument Settings>Security**. The Product prompts for the current password. 2. Use the numeric keypad to enter the current password. 3. To change the password over the remote interface use the CAL_PASSWD command. *Note* *If the new password is lost, contact Fluke Calibration Customer Service. A new password will be provided.*

Remote Port Menu

Use the Remote Port menu to change or view the USB, GPIB, RS-232, and Ethernet port settings explained in Table 6.

Table 6. Remote Port Menu

Tab	Description
USB Setup	Use this menu to change the remote interface (Remote IF) to be from a Computer or Terminal. The End of Line character (EOL) can be specified as Carriage Return (CR), Line Feed (LF), or Carriage Return and Line Feed (CRLF).
RS-232 Setup	Use this menu to specify the RS-232 communication parameters. The editable parameters are: • Data Bits • Stop Bits • Flow Control • Parity • Baud • EOL • Remote IF • Set EOF • Touch **Defaults** to reset the RS-232 port to its default values.
Emulation Mode	From this menu, and with remote commands, the Product can emulate a variety of different instruments. Refer to the *Remote Programmers Manual* on the Product CD for a list of emulated products.
GPIB (IEEE-488) Address	Specify the GPIB Address from this tab. Touch the tab and use the numeric keypad on the Product or PC to change the address.
Ethernet Setup	Use this menu and the numeric keypad or PC keypad to specify or edit these parameters: • Host Name • IP Address • Gateway • Subnet Mask • DHCP (ON or OFF) • Remote IF (interface) • Port
External 24 V Menu	Use this menu to select which driver port on the rear of the Product is in use. See *External Driver Configuration* for more information.

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Table 6. Remote Port Menu (cont.)

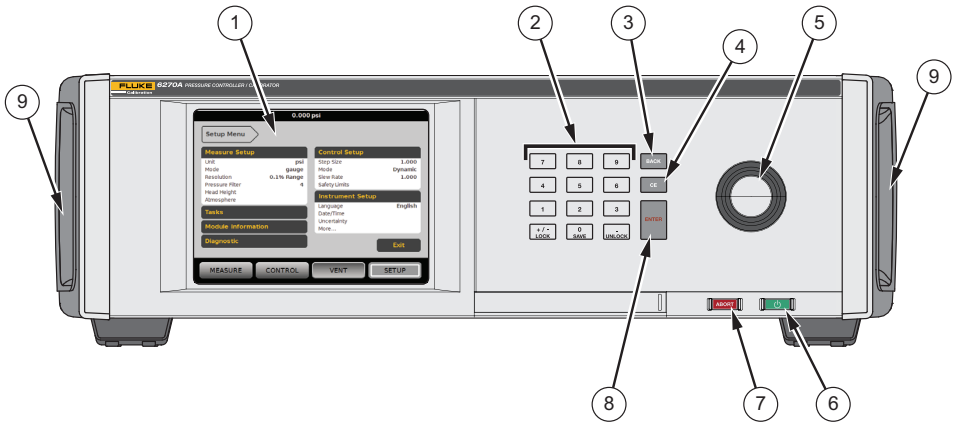
Tab	Description
CPS	Use this tab to choose if a Contamination Prevention System (CPS) is installed. See *Contamination Prevention Accessory (CPS)* for more information.
Isolation Valve Menu	Use this menu to verify whether an isolation valve is installed on the Primary, Auxiliary 1, or Auxiliary 2 port.
Uncertainty Menu	Use this menu to view or change uncertainty parameters. Editable parameters are: • Head Height Uncertainty • Include Control Uncertainty • Additional Uncertainty Component 1 • Additional Uncertainty Component 2 • Show Uncertainty • See the Tech Note *Guide to Determining Pressure Measurement Uncertainty for 6270A Pressure Controller/Calibrator Pressure Modules* located at http://www.Flukecal.com.
About this Instrument	This page of the menu is for information purposes only. It is useful information for the user and any technician that might work on the Product. The information on the page includes: • Model Number • Serial Number • Revision (of the Firmware) • User Interface
Restore Factory Default	To restore the Product to factory settings, touch this tab and then **OK**.

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Front-Panel Features

This section is a reference for the front and rear panel features and the User Interface (UI) touchscreen. The front-panel features (including all controls, displays, indicators, and terminals) are shown and explained in Table 7.

Table 7. Front-Panel Features



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Item	Description
①	The color touch-sensitive display shows the measured pressure, control setpoint, and other active conditions and messages. The display provides controls not available with the keys alone. The interface is made up of multiple menus, described in *User Interface*.
②	Numbered keys to change numerical values on the Product user interface. To enter a value, touch an editable section of the display and then change the numerical values with the numbered keys. When entering a new number, there is no need to push back or **CE** to clear the current number. Simply type the new number. Push **ENTER** to accept and set the entry. For example, to set an output of 100 psi, select the editable field on the touchscreen and then push **1** **0** **0** **ENTER**. *Note* *The Product will only control pressure when in the Control mode. See* Control Mode *for more information.*
③ **BACK**	Backspace key - As a new output value is entered with the numbered keys, use the backspace key to delete the last key entry.
④ **CE**	Clear Entry clears the value entry in progress.

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Table 7. Front-Panel Features (cont.)

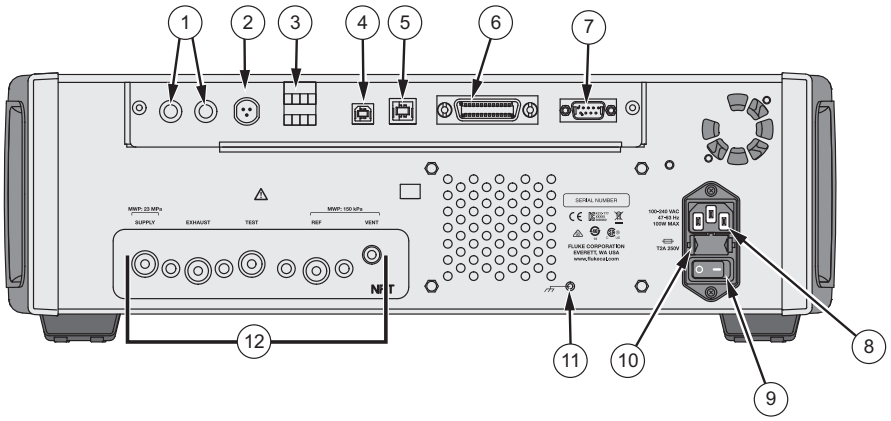
Item	Description
⑤	Use the Jog Wheel to make fine adjustments to the applied pressure. When turned, the applied pressure changes by the least significant digit based on the measurement resolution refer to *Measurement Resolution* for more information. Jogging the pressure with the Jog Wheel adjusts the Setpoint value in any mode but will only actively change the applied pressure while in Control mode. See the subsequent section for more information on jogging pressure. Turn counter-clockwise to decrease pressure or clockwise to increase.
⑥ 	Puts the Product into standby mode. In standby, the display is off and the keys are disabled. Standby mode also disables remote operation. See *Turn on the Product*.
⑦ 	Emergency abort button that immediately vents the system pressure and stops all pressure control. In addition, remote communication is stopped and the Product enters a safety mode until manually deactivated. See *Vent* and *Abort* for more information.
⑧  **(ENTER)**	Enter key used to accept and set numerical entries.
⑨	Handles

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Rear-Panel Features

Rear-panel features (including all terminals, sockets, and connectors) are shown in Table 8.

Table 8. Rear-Panel Features



Item	Description
① Switch Test Jacks	Switch test inputs used to connect a pressure switch to the Product for pressure switch testing. See *Switch Test*. **⚠Caution** **To avoid damage to the Product, do not connect more than 30 V (with respect to Chassis ground) to these terminals.**
② System Bus Connector	Connector for system stacking. See *System Stacking* for more information.
③ 24 V External Drivers	The external drivers are 24 V dc outputs that can be individually controlled in the Setup menu. Drivers also operate specific accessories such as the Contamination Prevention System (CPS). See *Contamination Prevention System (CPS)*. When an accessory is connected and turned on in the Setup menu, the software automatically reserves the use of that driver for the accessory and changes the state of the driver as necessary to operate the accessory. For more information on the drivers, see *External Driver Configuration*.
④ Rear USB Port	USB 2.0 remote operation interface – When this port is used to connect the Product to a PC, the Product is seen by the PC as a serial COM port or external drive. Screen captures and test results can be moved from the Product to the PC. Refer to the *Remote Programmers Manual* for more information on remote operation.
⑤ Ethernet Connector	100 Base/T Ethernet Connector for Remote Operation Interface. Refer to the *Remote Programmers Manual* for more information on remote operation.

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Table 8. Rear-Panel Features (cont.)

Item	Description
⑥ IEEE-488 Connector	IEEE-488.2 remote operation interface. Refer to the *Remote Programmers Manual* for more information on remote operation.
⑦ RS-232 Connector	RS-232 remote operation interface. Refer to the *Remote Programmers Manual* for more information on remote operation.
⑧ AC PWR INPUT Connector	A grounded male three-prong connector that accepts the mains power cord.
⑨ Master ON/OFF Switch	Supplies and disconnects mains power to the unit. This switch must be in the ON (I) position before the Standby button on the front panel will function.
⑩ F1 Fuse Holder	Line power fuse. See *Fuse Replacement* for fuse rating information and the fuse replacement procedure.
⑪ Chassis Ground Pem Nut	A Pem nut that is internally grounded to the chassis. If the Product is the location of the ground reference point in a system, this binding post can be used for connecting other instruments to earth ground. (The chassis is normally connected to earth ground through the three-conductor line cord instead of through the earth ground binding post.)
⑫ Removable Manifold/Pressure Connection	All of the pressure connections are made on the rear panel through a removable manifold. The manifold comes in three localized versions: NPT, BSP, and SAE. See *Rear-Panel Manifold Pressure Connections* for more information. See Specifications for pressure limitations for each port.

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Turn on the Product

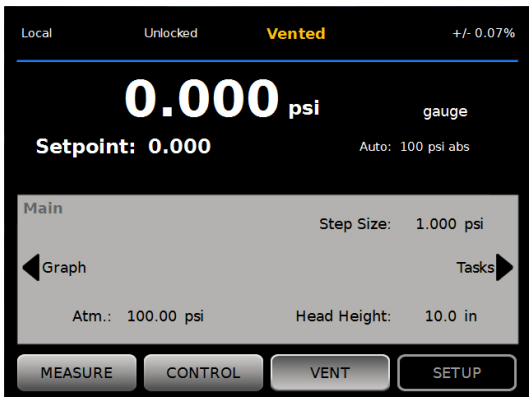
To turn on the Product, turn on the main power switch, located on the left-rear of the Product when looking at it from the front. When the Product is turned on, it takes approximately 50 seconds to complete its power-up process. Push ⏻ on the front right side of the Product.

Note

Push ⏻ to place the Product into standby at any time.

For the Product to perform to listed specifications, a warm-up period is required after the Product is turned on or when a new PMM is installed.

After the power-up process, the Product shows the Main menu (see Figure 5).



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Figure 5. Main Screen

Warm-up

For the Product to perform to the specifications listed in this manual, a 15-minute warm-up period is required after the Product is turned on. Additional ambient temperature acclimation can be required.

Main Menu

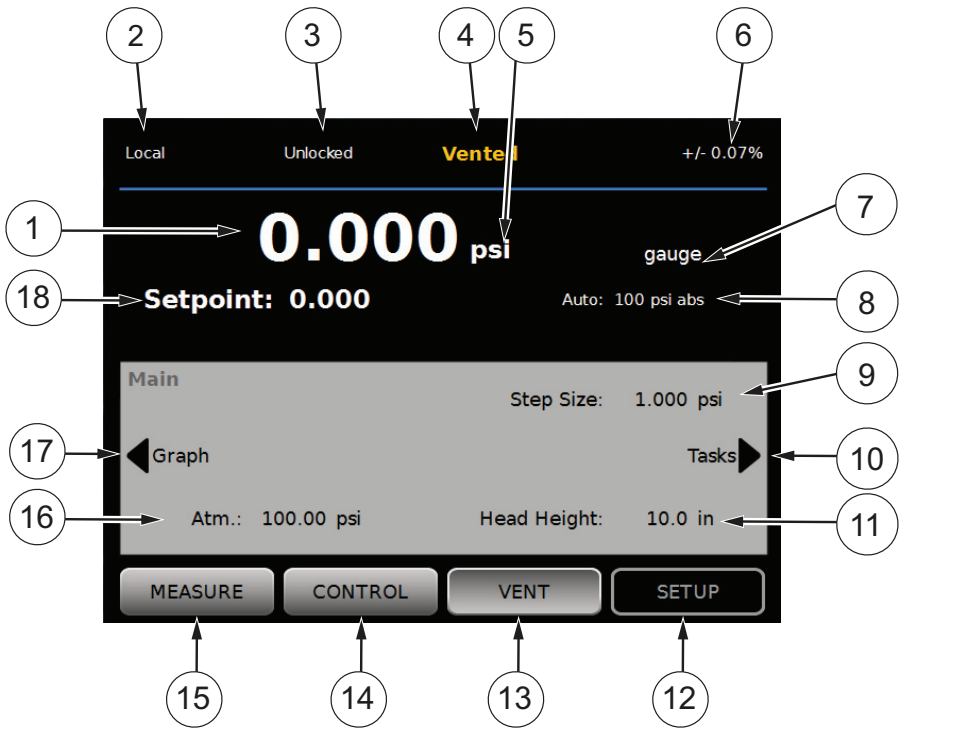
Use the Main menu to access functions and menus are accessed. Refer to Table 9 for information about each Main menu item. The submenus for Control Settings, Graph, and Tasks are in Tables 10, 11, and 12.

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Table 9. Main Menu



Item	Indicator/Name	Function
①	Pressure Measurement	Shows the pressure measured by the active PMM.
②	Local / Remote	Shows when the Controller is under remote operation by a PC. See the *6270A Remote Programmers Guide* for more information. *Note* *When the Product enters Remote mode, the front panel is automatically locked to prevent accidental changes. See ③.*
③	Locked/Unlocked	When the screen is locked, the front panel keys and touch display are locked. Push and hold down UNLOCK for 4 seconds to lock or unlock the screen.
④	Measurement Indicator	Shows when the pressure is stable and ready for a measurement. The indications are: (Green) Ready, (Yellow) Vented, (White) Not Ready. See *Pressure Measurement* for more information.
⑤	Unit of Measure	Shows the unit of measure and opens a menu to change the unit of pressure.

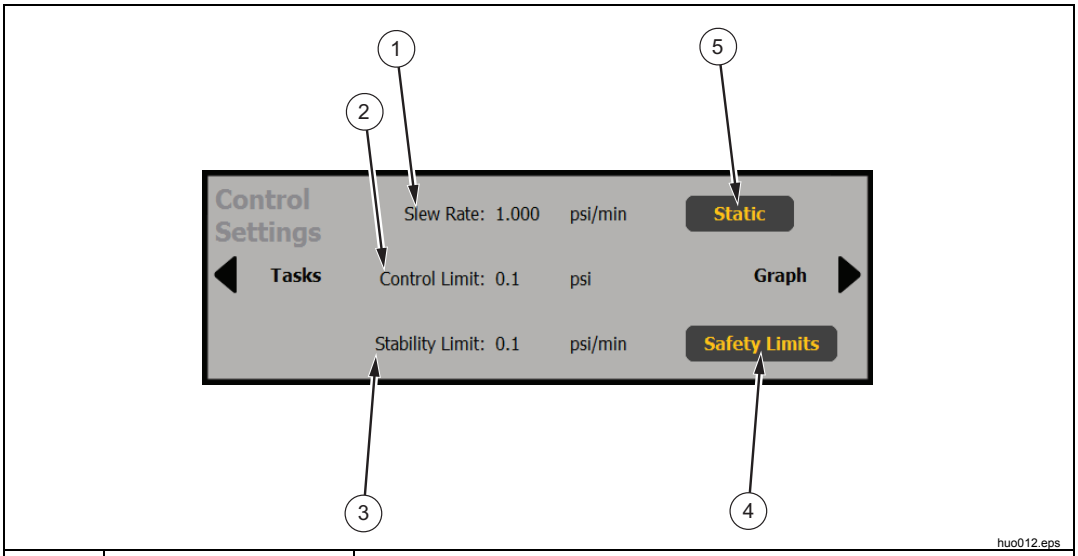
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Table 9. Main Menu (cont.)

Item	Indicator/Name	Function
⑥	Measurement Uncertainty	Shows the measurement uncertainty based upon the uncertainty of the currently-selected PMM and the settings in the Uncertainty Setup menu. See Table 6.
⑦	Measurement Mode	Shows the active measurement mode and opens a menu to change the measurement mode. Modes supported - Absolute, Gauge, and Tare.See *Unit and Custom Units*. See *Measurement Modes*.
⑧	PMM Selection Mode and Current Range	Opens a menu to manually select a specific PMM or to select an automatic selection mode. See *Module Selection*.
⑨	Step Size	Adjust the step size amount. To the left are the keys to step up or down by the amount set in the field.
⑩	Tasks	Menu that gives quick access to the pre-programmed tasks. See *Tasks*.
⑪	Head-height Correction	Shows the current head-height correction and opens a menu that contains user-configurable settings for head height, units, and type of gas in use. See *Head Height*.
⑫	SETUP	Opens the Setup menu. See *Instrument Setup Menu*.
⑬	VENT [1]	When this mode is selected, the Product vents at a controlled rate versus a much faster rate if the emergency abort button is pushed. See *Vent and Abort* and *Operating Modes*.
⑭	CONTROL	When this mode is selected, the Product actively controls to a target pressure. The Control mode relies on the settings in the Control Setup menu to control pressure. See *Operating Modes*.
⑮	MEASURE	When this mode is selected, the Product stops pressure control to let the user record a measurement. Pressure control will not resume until Control is pushed. See *Operating Modes*.
⑯	Atm	Select the barometric reference to use or set a custom atmospheric value to use for absolute measurements.
⑰	Graph	Opens the Graph page of the menu.
⑱	Target Pressure	Shows the current target pressure value and opens a menu to set a target pressure. See *Set Target Pressure (Setpoint)*.
[1]	Venting while a program or task is running cancels the action.	

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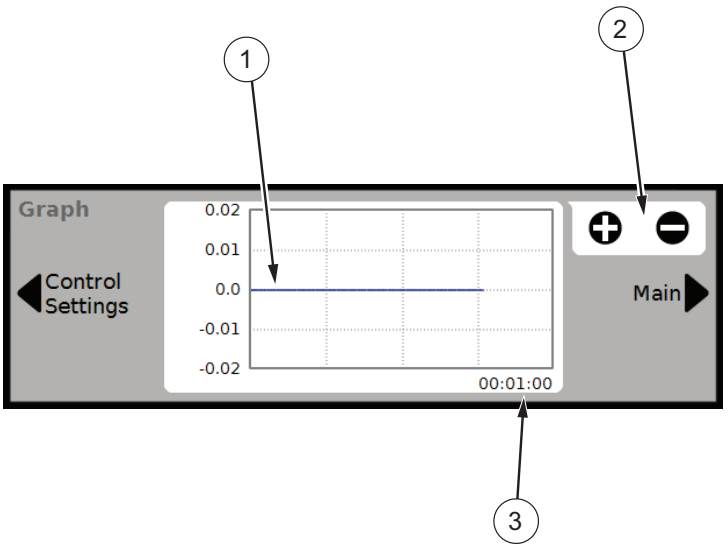
Table 10. Control Settings



Item	Indicator/Name	Function
①	Slew Rate	The slew rate is a user-configurable control parameter to adjust how fast the Product controls pressure to the setpoint.
②	Control Limit (Shown only when Static is selected)	Related and used only with the Static Control mode, the control limit is used to set an upper and lower pressure limit around the Setpoint. The Product keeps the pressure within defined user limits. See *Static Control Mode* and *Control Limits (Only for Static Control)*.
	Stability Limit (Shown only when Static is selected)	Related and used only for the Static Control mode, the stability limit is a configurable tolerance to define the ready condition for the measurement. The measurement indicator shows “Not Ready” until the pressure is as stable as the value set in the stability limit. See *Stability Limits (Only for Static Control)* for more information.
	Ready Tolerance (Shown only when Dynamic is selected. Not shown in figure)	Related and used only with Dynamic Control mode, the Ready Tolerance is a configurable band to define the ready condition for the measurement. The band creates a positive and negative boundary around the Setpoint pressure that is specified in pressure units or %range of selected module. The measurement indicator shows “Not Ready” until the pressure is stable within the band. See *Ready Tolerance* for more information
③	Safety Limits	Protective user-configurable limits to protect the UUT from over-pressure. An upper, lower, and vent limit can be manually set. See *Safety Limits*.
④	Pressure Control Mode	Shows and switches the active control mode between Dynamic and Static. See Pressure Control Settings.

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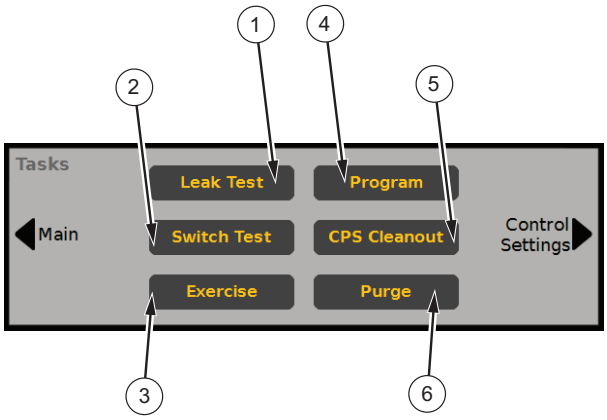
Table 11. Graph



Item	Indicator/Name	Function
①	Graph	Scalable graph that shows the current pressure and historical pressure behavior for up to 96 hours of elapsed time. This graph is an informational tool only and cannot be saved.
②	Zooms	Magnifies the graph by adjusting the time scale.
③	Time Scale	Shows the time scale of the graph.

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Table 12. Tasks



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Item	Indicator/Name	Function
①	Leak Test	Opens a menu to configure and do a leak test on the system. See *Leak Test*.
②	Switch Test	Preprogrammed task to test a pressure switch dead band.
③	Exercise	Opens a menu to configure and exercise a UUT. See *Exercise*.
④	Program	Automated testing interface to make, edit, modify, save, and run a user-configured automated test. See *Program*.
⑤	CPS Cleanout (Disabled when CPS is OFF in the Setup Menu)	Predefined sequence that cleans out the CPS with low pressure. Useful after testing a very dirty UUT where cross contamination could be a factor.
⑥	Purge (Disabled when CPS is OFF in the Setup Menu)	Opens a menu to configure and purge the plumbing in the Product. See *Purge (if CPS installed)*.

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Operation

This section explains the pressure control settings of the Product.

Operating Modes

The product has three operating modes: Control, Measure, and Vent.

Control Mode – When in Control mode, the Product actively controls pressure as defined by the Setpoint and will keep the pressure near the Setpoint per the active control mode (see *Control Modes*). Control is the only mode where the Product actively controls pressure. The setpoint value can be changed in any of the three modes, but the Product is idle until **CONTROL** is touched.

Vent Mode – When in Vent mode, all pressure on the test port is vented to atmosphere.

Measure Mode – When in Measure mode, the Product is holding pressure and pressure control is idle. This mode provides a method to take a measurement without control noise.

Set Target Pressure (Setpoint)

Target pressure or “Setpoint” is the numerical value of the pressure that the Product controls when commanded. The Setpoint number can be entered into the Setpoint field while in any of the operation modes (Measure, Control, and Vent) however, the Product will not control pressure to the Setpoint unless it is in Control mode. While in the Control mode, if a new Setpoint number is entered and accepted, the Product immediately controls to the Setpoint. Once at the Setpoint, the Product then uses the active Control mode to keep the pressure between the upper and lower limits (see *Control Modes*).

Note

Jogging the pressure with the Jog Wheel adjusts the Setpoint value in any mode but will only actively change the applied pressure while in Control mode. See the subsequent section for more information on jogging pressure.

To set a setpoint pressure:

1. Touch the setpoint field to activate the field.
2. Use the numeric keyboard to enter the number.
3. Push **ENTER** to accept. It is not necessary to touch **Clear** to enter a new value, just key in the new value and it will overwrite the previous value. At any time, touch outside the field to cancel the entry.

Step Pressure Up or Down

The pressure Setpoint can be changed with the Step function. The Step function is used primarily when taking pressure steps in equal pressure increments and is only available when in Control mode. The size of the pressure step is user-defined. To step the pressure, enter a value for the step size and then use the up and down arrows in the Main Display area to step that amount.

Jog Pressure

The Jog function is most often used when calibrating mechanical gauges such as a dial gauge and the user wishes to change the pressure until the mechanical gauge indicates a cardinal point. The user can then read the higher resolution Calibrator to determine the actual pressure value when the mechanical gauge is indicating a cardinal point. To jog the pressure, rotate the jog wheel clockwise or counter-clockwise to increment or decrement the pressure by the lowest significant digit of the active measurement resolution. For example, if **0.01** measurement resolution is set and the unit is psi, turning the Jog Wheel will increment the pressure by **0.01** psi per knob detent.

Vent and Abort

Touch **Vent** to completely vent the applied pressure at a controlled rate. When **Vent** is pushed, the Product prompts for confirmation before venting to prevent accidental venting or accidently canceling tests. If **Vent** is touched when a test is in progress and the dialog is confirmed, the test immediately stops and the Product vents all pressure in the system. To protect the operator and to remove pressure from the system before maintenance, the vent is also actuated when the front panel is opened to remove pressure from the system.

The Product has an automatic pressure-relief function called Auto Vent that releases pressure if it exceeds upper or lower pressure limits. See the *Auto Vent* section for more information on this feature.

For emergency pressure relief, the red **Abort** button on the bottom right of the front panel, immediately vents all pressure from the system and cancels any program or task in progress. In addition, the Product enters a safety mode and disconnects remote operation. The Product stays in this mode until exiting safety mode by confirming the on-screen dialog.

⚠Caution

To avoid equipment damage, use the Abort button for emergency situations only. Abort vents pressure as quickly as possible without restriction. This rate of pressure drop could damage some sensitive UUTs.

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Pressure Measurement

A visual measurement indicator on the UI (also known as the Ready indicator) indicates when pressure control settings are satisfied and pressure can be measured. See Table 1313 for a list of measurement indicators and their definitions. See P*ressure Control Settings* for detailed control settings information for different control modes.

Table 13. Measurement Indicator

Indicator	Definition
Not Ready	Indicates control settings are not satisfied. The Product cannot make a measurement at this time.
Ready	Indicates control settings are satisfied. The Product can make a measurement at this time.
Vented	This is shown when the Product is vented to indicate that the Product can now make an ATM or 0 psig measurement.

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Pressure Control Settings

This section explains the pressure control settings of the Product. Some of these settings can be accessed on the main screen but all are located in the Control Settings in the Setup Menu.

Control Modes

The Product offers two different control modes to control pressure:

- **Dynamic** mode sets the target pressure and constantly adjusts to maintain the target.
- **Static** mode sets the target pressure and stops controlling, adjusting only when the measured pressure has exceeded specific limits.

The subsequent sections give more information on each mode.

Dynamic Control Mode

Dynamic Control sets the pressure to the target value and then controls pressure to keep it within the Ready Tolerance at the Setpoint value, see Figure 6. Dynamic Control is beneficial for most applications because it automatically compensates for changes to the system from adiabatic affects and small leaks. Dynamic Control is the default control mode when the Product is turned on.

Note

Dynamic Control generates a very small amount of pressure noise due to continuous pressure control. The pressure noise is undetectable in most UUTs. For high-end sensitive UUTs where pressure noise is a concern, use Static Control for the test.

The default dynamic Ready Tolerance value is 0.005 % of range. On the **Setup>Control Setup** screen, use the **Specify as % Range** setting to set the control settings as % Range or pressure unit values. Fluke Calibration recommends that you leave this set to **Yes** so the control settings scale appropriately when different ranges are active. See Figure 6.

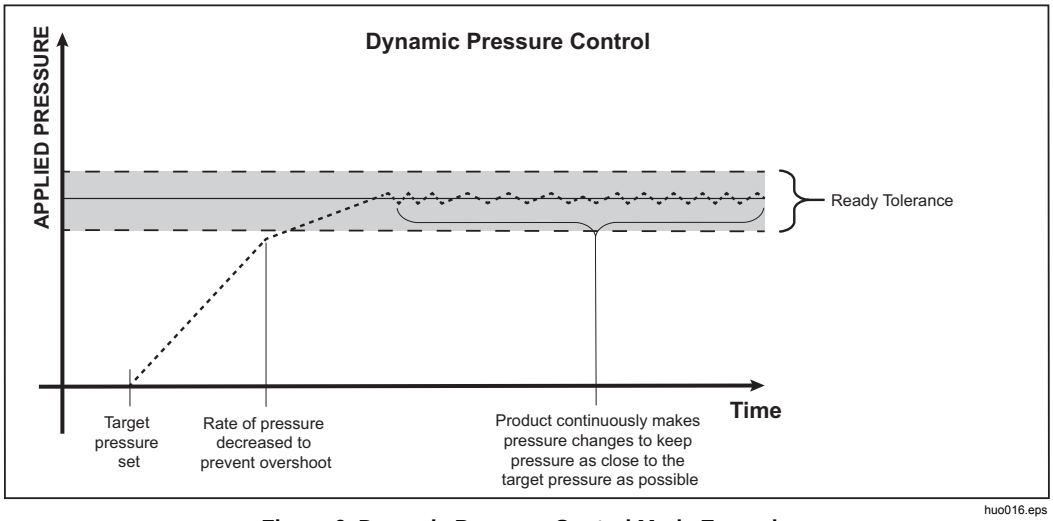


Figure 6. Dynamic Pressure Control Mode Example

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As an example, if the range is 2000 psi, the default Ready Tolerance is 0.1 psi (2,000 psi x 0.005 % = 0.1 psi). At a target pressure of 1000 psi, the Product gives a Ready condition if the pressure is between 999.9 psi and 1000.1 psi.

Static Control Mode

Static Control sets the pressure slightly above or below the target pressure value and then turns off active pressure control, see Figure 7. The pressure is allowed to naturally change until it is outside the Control Limit band. This pressure control sequence repeats until the target pressure is changed or the test is complete.

The advantage of this control mode is that pressure can be set and measured without noise from the pressure control system. Static Control shows in the user interface as Static. A Ready indication is predicated on pressure being inside the Control Limit and the rate of change of pressure is less than the Stability Limit.

The default Control Limit is zero (0) and the default Stability Limit is 0.7 kPa/min (0.1 psi/min).

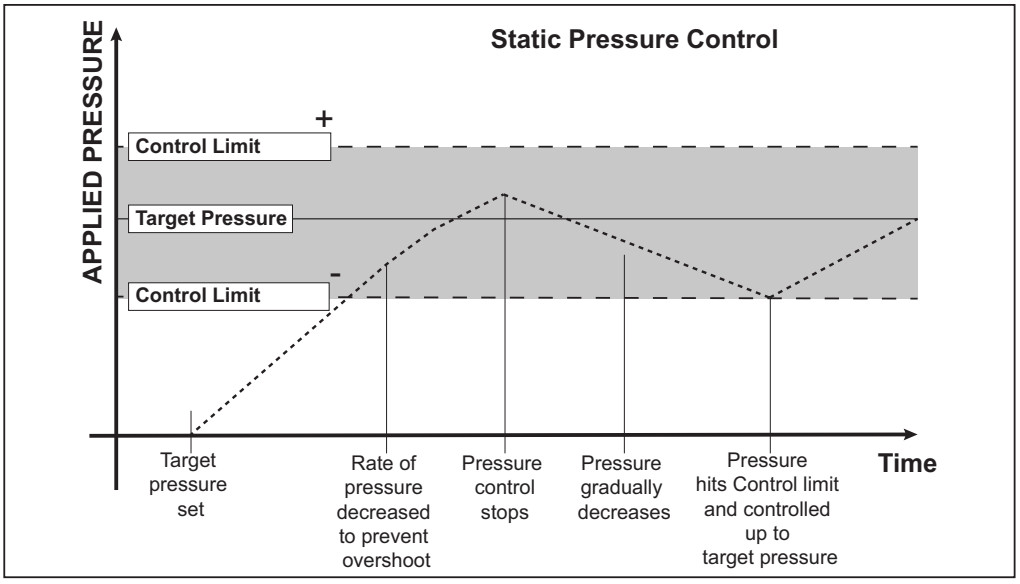


Figure 7. Static Pressure Control Mode Example

As an example, if the target value is 1,000 psi and the Control Limit is manually set to 0.5 psi, and the Stability Limit is set to 0.1 psi/min, the Product gives a **Ready** condition when the pressure is between 999.5 psi and 1000.5 psi and the rate of change of pressure is <0.1 psi/min.

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Slew Rate (Rate of Pressure Change)

Slew Rate is a user-defined maximum pressure rate of change. The Product controls this pressure with minimum overshoot into a wide variety of external volumes at its highest slew rate. In most applications Fluke Calibration recommends that the slew rate be set at its maximum rate value. This provides the highest speed control without jeopardizing overshoot or control stability properties. In applications where the device under test could be damaged by high rate of pressure change, it can be necessary to slow down the slew rate (control speed). The Product control algorithm limits the rate of pressure change to the slew rate. On calibrators with full-scale pressures ranges <70 kPa (10 psi), it is common to reduce the slew rate to <25 % of full scale/min to improve on control overshoot characteristics.

Safety Limits

The Product has user-configurable safety limits that protect (UUT) from being inadvertently over-pressured. See below for more information on each limit. (**Setup>Control Setup>Safety Limits**).

Upper Limit

The upper limit is a safety limit that protects the UUT from being inadvertently over-pressured. The upper limit is typically set just over the full-scale pressure of the UUT. If a Setpoint greater than the user-defined upper limit is entered, the Product does not accept the value and generates an error code. While in Control mode, if pressure exceeds the user-defined limit, the Product changes to the Measure mode and again shows an error message.

Lower Limit

This is the same as the high limit except it protects the UUT from low pressure limits.

Auto Vent

This is the defined maximum pressure that the Product can reach prior to venting the test port to atmosphere.

Pressure Measurement Settings

The Pressure Measurement menu contains all options and parameters related to how the Product measures pressure. See the subsequent sections for more information on each setting.

Unit and Custom Units

The Product offers a large selection of standard engineering units that can be selected to satisfy a majority of calibration requirements. Table 14 lists the standard units that come with the Product. To select a unit, touch **Setup>Measure Setup>Unit** and select the necessary unit.

Special calibrations can require an uncommon or special unit of measure. These nonstandard units are referred to on the Product as Custom Units. For custom units, touch **Setup>Measure Setup>Custom Units**. From this screen, enter the necessary parameters for a maximum of four custom units.

Table 14. Pressure Units

Abbreviation	Full Name	Conversion (Multiply to convert to kPa)
MPa	megapascal	1000
kPa	kilopascal	1
hPa	hectopascal	0.1
Pa	pascal	0.001
mmH_2OC	conventional millimeters of water	0.00980665
psi	pound-force per square inch	6.894757
inH_2O 4 °C	inch of water (4 °C)	0.249082008
inH_2O 20 °C	inch of water (20 °C)	0.248642103
inH_2O 60 °F	inch of water (60 °F)	0.24884
inH_2O 25 °C	inch of water (25 °C)	0.248502277
bar	bar	100
mbar	millibar	0.1
kgf/cm²	kilogram-force per square centimeter	98.0665
atm	standard atmosphere	101.325
cmH_2O 4 °C	centimeter of water (4 °C)	0.098063783
Torr	Torr	0.1333224
mTorr	millitorr	0.0001333224
mmHg 0 °C	millimeter of mercury (0 °C)	0.133322
cmHg 0 °C	centimeter of mercury (0 °C)	1.33322
inHg 0 °C	inch of mercury (0 °C)	3.38638
inHg 60 °F	inch of mercury (60 °F)	3.37685
knots	knots indicated airspeed	per NASA TN D-822
km/hr	kilometer per hour	per NASA TN D-822
feet	feet altitude	per MIL-STD-859A
meters	meters altitude	per MIL-STD-859A

Measurement Modes

The three Measurement Modes on the Product are Absolute, Gauge, and Tare:

Absolute Mode – An absolute pressure measurement is made in relation to a perfect vacuum. A value of 0 represents a perfect vacuum. Certain ranges of PMMs are intrinsically absolute mode measurement modules. This is designated in their model number by having an 'A' at the beginning of the range designation section of the model number (for example, PM600-A700K). In addition, an inherently gauge mode module (represented by a 'G' at the beginning of the range designation section of the model number) can be used to measure absolute pressure if combined with a Barometric Reference Module.

Gauge Mode – A gauge pressure measurement is made in relation to atmospheric measurement. A value of 0 represents a pressure measurement taken at atmospheric pressure. Certain ranges of PMMs are inherently gauge mode measurement modules. This is designated in their model number by having a 'G' or 'BG' at the beginning of the range designation section (for example, PM600-G100K). A 'BG' designation means bi-directional gauge and thus has the ability to measure both positive and negative gauge (also referred to as vacuum) pressures. In addition, certain intrinsically absolute modules have a built-in barometer, allowing them to measure absolute, gauge, and negative gauge pressures.

Tare Mode – When the Tare mode is initiated, the current pressure reading is zeroed out of the measurement. This provides a method for an intrinsically absolute measurement module to be used to measure gauge mode measurements when not equipped with an internal barometer. This is only appropriate when atmospheric pressure is sufficiently stable.

Depending on the selection of pressure modules installed, one of the above modes may not be available.

Note

The Product shows vacuum pressures as negative values (for example, -465 mmHg). Some vacuum gauges do not show a negative sign (-) in front of the reading because they are used for only vacuum measurements (the vacuum gauge would show "465 mmHg psi vacuum" without the negative sign). To prevent misinterpretation of the vacuum gauge reading compared to the negative value on the Product, look at the gauge face or user documentation to see how the vacuum gauge shows vacuum pressures.

Measurement Resolution

Touch the reading on the display to open the **Resolution** screen to change the measurement resolution. The Measurement Resolution selections are 0.1%, 0.01%, 0.001%, or 0.0001% of the active PMM range (shown as "Range" on the UI).

Module Selection

The Product selects the active pressure measurement module in these different ways:

Auto – This is the default setting. The Product selects the module with the lowest pressure range that is sufficient to measure the current pressure.

Fast – The Product selects the module with the lowest pressure range that is sufficient to measure the Setpoint. With this method, the Product does not switch ranges during an upward pressure application but instead switches immediately to the required range and stays on that range.

Fixed – The Product always keeps the user-selected range active. With this selection, a setpoint outside the measuring range of the selected module cannot be entered.

Pressure Filter

The pressure filter allows user adjustment from 1 to 99 values in a rolling average. Typically the value has been set to 15 as default.

AutoZero

Pressure measurement devices naturally drift with time. This drift appears as an offset at zero pressure and/or throughout the range. To ensure the accuracy of the measurement, it is important to correct for this drift whenever possible. This correction changes the zOffset (AutoZero) value for the module.

Gauge Mode

The zero correction in gauge mode is performed automatically when the system is vented and the pressure is stable. At that time, the internal valves are configured such that the test port and reference port see the same pressure and that pressure is open to atmosphere through the vent port. Zero gauge pressure is defined as atmospheric pressure. In this condition, the pressure measurement modules, by definition, measure zero gauge pressure. When the system is vented and stable, zero correction is automatic, regardless of the setting for AutoZero.

Absolute Mode

See *PM500 Full Scale ≤700 kPa Absolute Zeroing* for information on zeroing absolute PM500 modules ≤700 kPa absolute.

Zero correction in absolute mode can be done automatically or manually when the system is vented and the pressure is stable. To zero an absolute sensor, the barometric pressure must be known.

If a system has multiple absolute mode pressure modules, then a module can be selected to measure the vented barometric pressure and serve as the AutoZero reference pressure source. This should always be the module with the lowest uncertainty at atmospheric pressure (normally the lowest range absolute module). Select the Slot number of this module in the AutoZero menu (**Setup Menu>Measure Setup>AutoZero**). When the zero correction is performed, all other absolute mode modules will be corrected so their output equals the reading of the selected reference module. If a module is selected as the AutoZero reference, but is then removed from the system, the system reverts to manual zeroing mode. The system returns to AutoZero mode when the selected module is returned to the system or when you select a different module.

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If a sufficiently accurate module is not included in the system, select the Manual Entry zeroing mode in the AutoZero menu (**Setup Menu>Measure Setup>AutoZero**). In this mode, push the zero button on the main display to initiate the zeroing routine when the system is vented and stable. Enter the current barometric pressure as determined through an external reference such as a barometer or piston gauge. The value must be between 75 kPa to 110 kPa (11 psi to 16 psi). Do no enter zero (0) for this value or the pressure readings will be offset by about 100 kPa (14.6 psi) in absolute mode.

Atmosphere

From the Atmosphere menu (**Setup Menu>Measure Setup>Atmosphere**), select the barometric reference module (BRM600-BA100K, PM500-BA120K, PM500-A120K, or PM200-A100K) or manually enter a barometric pressure value from an external lab barometer. A barometer module must be installed to select a module for the atmospheric pressure source. If Manual Entry is selected, enter a suitable Uncertainty value because in absolute mode (and also Auto or Fast mode, not Fixed mode) the active module is selected by the lowest uncertainty of the module and the atmospheric uncertainty value (if used). If the uncertainty value is unrealistically low, the manually-entered value of atmospheric pressure may be used and cause incorrect module selection.

Head Height

For calibration of a unit under test (UUT) at a different height than the Product, it is necessary to make a head-height correction. The head-height correction is the vertical difference between the reference plane of the UUT to the bottom of the display on the Product in inches, millimeters, or centimeters. See Figure 8.

After the measurement is made, the measurement value is entered into the Product (**Setup Menu>Measure Setup>Head Height**). From the Head Height screen, the measurement units and as medium (N2, Air) can be set. Additionally, the Head Height direction and uncertainty for the UUT, Auxiliary 1, and Auxiliary 2 chassis' can be set. Auxiliary Chassis 1 and 2 are available when an additional chassis is connected to the primary chassis. Select ABOVE if the UUT is above the Product and select BELOW if the UUT is below the Product.

Note

Failure to make a head-height correction can result in an inaccurate pressure measurement.

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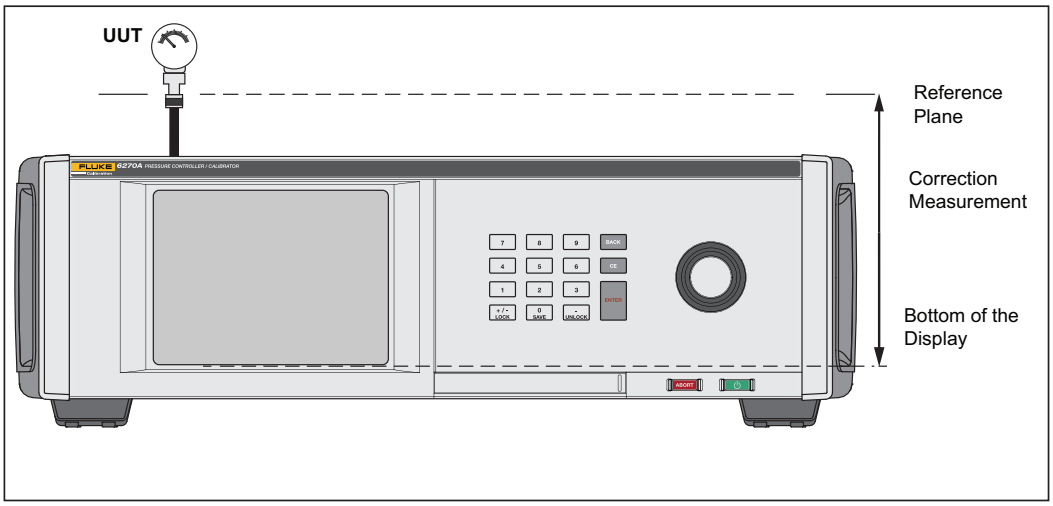


Figure 8. Head-Height Correction

PM500 Absolute Zeroing

This section explains how to zero the native absolute mode of PM500 pressure modules while in the Product, see Table 15.

Table 15. Absolute PM500 Pressure Modules

Model	Range	Nominal Zeroing Pressure
PM500-A120K	0.08 kPa to 120 kPa	0.080 kPa
PM500-A160K	0.08 kPa to 160 kPa	0.080 kPa
PM500-A200K	0.08 kPa to 200 kPa	0.080 kPa
PM500-A350K	0.08 kPa to 350 kPa	0.080 kPa
PM500-A700K	0.08 kPa to 700 kPa	0.080 kPa
PM500-A1.4M	35 kPa to 1,400 kPa	ATM [1]
PM500-A2M	70 kPa to 2,000 kPa	ATM [1]
[1] Atmospheric (ATM) Pressure is in the range of 70 kPa to 103 kPa.		

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Required Equipment

This sections lists the minimum required equipment to zero a PM500, see Table 16.

Table 16. PM500 Zeroing Minimum Required Equipment

Equipment	Note
6270A	Mainframe/chassis for PM500 Pressure Modules
Vacuum Sensor	For ranges 700 kPa absolute and below. See Table 17 for maximum allowable measurement uncertainty.
Absolute Pressure Reference	For 1.4 MPa and 2 MPa ranges. See Table 17 for maximum allowable measurement uncertainty.
Vacuum Pump	For PM500s that are zeroed sub-atmospheric (700 kPa Absolute). Must be able to evacuate to a pressure <80 Pa.
Metering (Bleed) Valve	
Tubing	As needed.
Fittings/Valves	As needed.

Table 17 lists the maximum reference measurement uncertainty required for zeroing to maintain published specifications.

Table 17. Maximum Reference Measurement Uncertainty

Model	Maximum Measurement Uncertainty [±]
PM500-A120K	0.0035 kPa (26 mTorr)
PM500-A160K	0.0045 kPa (34 mTorr)
PM500-A200K	0.0025 kPa (19 mTorr)
PM500-A350K	0.0100 kPa (75 mTorr)
PM500-A700K	0.0245 kPa (184 mTorr)
PM500-A1.4M	0.050 kPa (0.0073 psi)
PM500-A2M	0.070 kPa (0.0102 psi)

PM500 Full Scale ≤700 kPa Absolute Zeroing

To zero the PM500:

1. Open the Module Bay and install the PMM into any available slot.
2. Make sure the Product is on and properly warmed up.
3. From the display, push SETUP and then **Module Information** on the Setup Menu.
4. On the Module Information screen (**Setup Info>Module Information**) select the appropriate slot number of the pressure module that you will zero. The selected Slot menu opens.
5. Select **Zero Module** from the Slot menu.
6. Connect the vacuum sensor, vacuum source, bleed valve, and applicable hardware and tubing to the Test Port of the Product. Figure 9 shows an example setup. Connect the bleed valve as close to the vacuum pump as possible and the reference vacuum sensor as close as possible to the test port.

   An optional 3-way ball valve can be installed at the test port (Figure 9). This setup keeps the vacuum sensor in-situ with the ability to isolate the vacuum sensor when not being used to zero PMMs. When the vacuum sensor is isolated, the test port can be used for other processes.

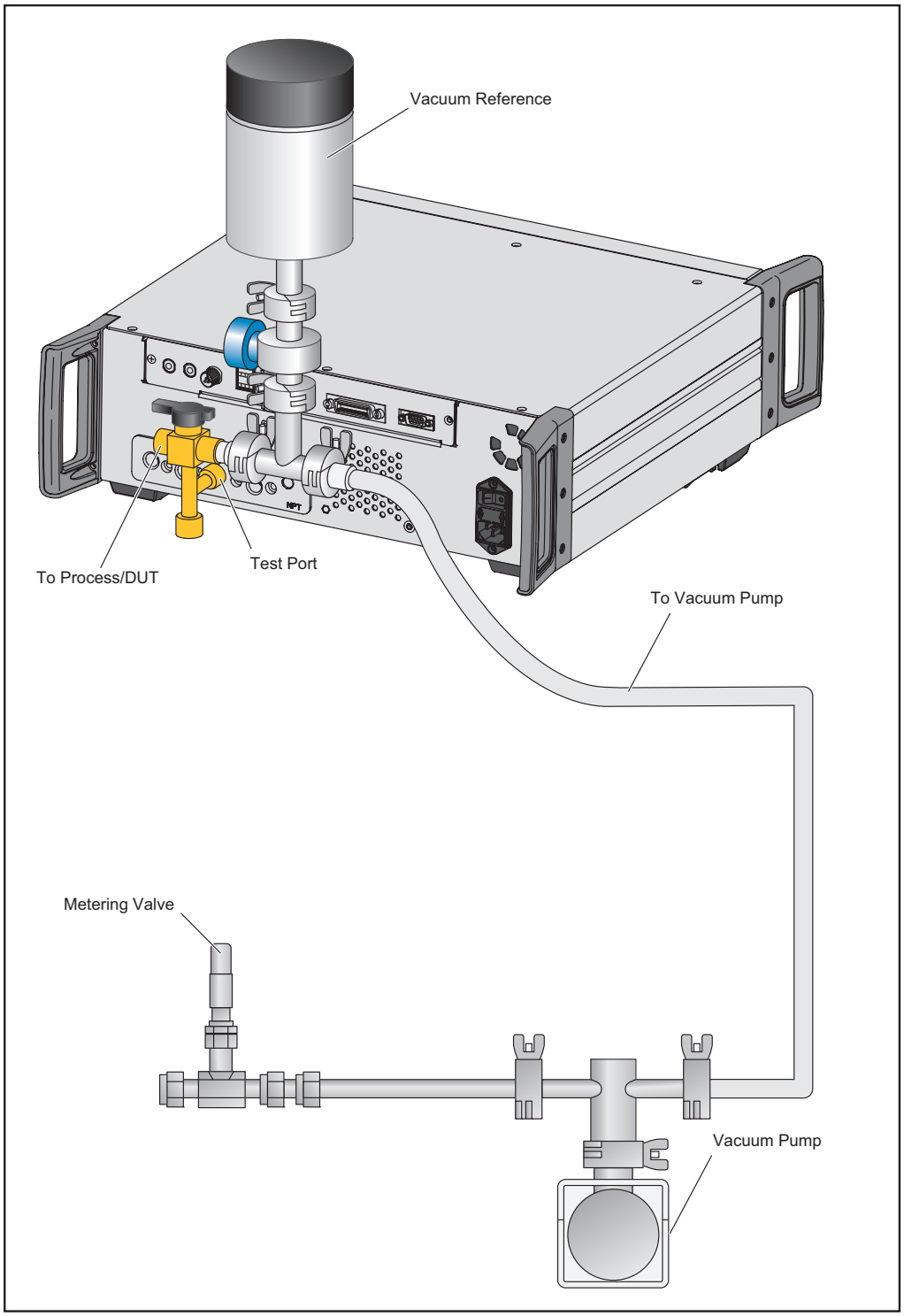


Figure 9. Zero by Vacuum Setup

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7. Use the bleed valve to adjust the pressure/vacuum to 0.08 kPa absolute (±0.01 kPa) and allow the pressure to stabilize.
8. Read the pressure indication from the Vacuum Reference (not on the Product) and enter the value in the **Vacuum Reading** field and select the **Zero** button from the Zero Module menu. The PMM pressure indication reflects the zero-corrected pressure when the zeroing process is complete.
9. Select the BACK to view the zOffset (AutoZero) value in the Calibration Coefficients section of the screen.

PM500 Full Scale >700 kPa Absolute Zeroing

Zero correction in absolute mode is automatic when a module is selected as the AutoZero reference and the system is vented.

Ensure a sufficiently-accurate module is available if you use automatic zeroing. Table 17 lists the maximum allowable uncertainty required to zero the PMM.

If a module is not selected as an AutoZero reference, use manual zeroing mode to zero the PMM. See *AutoZero>Absolute Mode* for more information.

Tasks

Tasks are pre-programmed routine functions that quickly perform common tests and tasks. The tasks are: Leak Test, Switch Test, Exercise, Program, CPS Cleanout and CPS Purge.

Note

CPS tasks are greyed out and disabled if the CPS is not turned on in the settings. See Contamination Prevention System (CPS)*. The subsequent sections provide more information on each task.*

Leak Test

This function performs an automated leak test to show the rate of pressure loss. To determine this, the Product uses the settings in the test to set the pressure to a Setpoint value. Once stable, the Product turns off pressure control to measure the pressure loss. To help determine if a leak is external to the system or inside of the system, change the leak test mode to internal or external. To run an Internal Leak test the optional External Isolation Valve accessory must be installed.

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To run a leak test, set a few parameters to tell the Product how to perform the leak task. Those parameters are:

Setpoint Pressure – The target pressure of the test.

Stability – This tells how long the pressure is dynamically stabilized at the Setpoint before the test starts. The test does not start until the Product shows the ready indication for the amount of time prescribed.

Duration – After reaching the stability time, the test starts and the Product changes to Measure mode. The system then measures the rate of pressure loss. When the test ends, the average rate of pressure loss per minute is shown.

Mode – Select Internal or External from this menu. To run an Internal Leak test, the optional External Isolation Valve accessory must be installed. When internal is selected, the test port is isolated and the UUT and hoses are not tested. If external is selected, all connections, hoses, and UUTs connected are pressurized. During the leak test, push the Information (**i**) icon to see more detailed status. This same screen shows at the end of the Leak Test.

Switch Test

To test a pressure switch:

1. Go into the **SETUP** menu.
2. Connect the unit under test (UUT) to the switch test terminals on the rear of the Product with the pressure switch terminals to the pressure switch contacts (de-energized dry contacts). The polarity of the terminals does not matter. Connect the test port of the Product to the input of the pressure switch.
3. Select **Tasks>Switch Test**. The **Switch Test** menu is shown. Use the touchscreen and keypad to enter the switch test values.
4. Configure the test:

   Start – Minimum Setpoint pressure

   End – Maximum Setpoint pressure for the test

   Rate – This is the slew rate to determine how quickly the pressure will increase or decrease. For sensitive switches, Fluke Calibration recommends a slower rate.

   Direction – Select whether to increase then decrease pressure (up and down), or a one time upward test (single).
5. Touch Run to start the test. The task bar shows the progress of the test and also the state of the switch (Open or Closed). The test is fully automated and progress can be viewed at any time.

   The Product changes the pressure over the specified range at the required rate. When the switch changes state, the Product records the pressure. The results of the switch test are shown on the display when the test completes.

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Exercise

The Exercise function repeatedly pressurizes a UUT to reduce the effects of hysteresis. The Exercise menu specifies a maximum and minimum Setpoint pressure and how many times to repeat the routine (cycles).

To Exercise, set a few parameters so the Product can do the task. These parameters are:

Maximum – Max Setpoint

Minimum – Minimum Setpoint

Cycle – How many times to repeat

Delay – How long to stay at setpoint when reached

Control at Target – If ON, the Product uses the dynamic control mode to keep pressure at the Setpoint. If OFF, the Product uses static pressure control at the Setpoint.

Program

The Program function allows the setup of custom pressure sequences. The Program menu specifies the naming of the program, creation of the program steps, system Measure setup, Controller setup and UUT uncertainties. The full setup is stored as part of the Named Program and resides with the chassis.

Run - Runs the selected program.

New - Enter File name - up to 25 characters, Starting and End Pressure, number of steps Up/Down, Dwell Time (time at setpoint), Max Time (continues to next step, regardless of Dwell time). Supports 99 programs, each program can have up to 99 steps.

Cycles - Number of times to repeat the selected program up to 99.

Edit - modify program: edit, add, or delete specific program steps.

Measure Setup - Adjust system Resolution and Head height Parameters. These parameters can be automatically loaded from the existing system settings.

Control Setup - Adjust system Control Limits, Ready Tolerance, Mode – Static/Dynamic. These parameters can be automatically loaded with the existing system settings.

UUT - Enter the UUT uncertainty details.

Use UUT Tolerance:	**Yes/No** Select Yes or No to use the UUT tolerance or not. Select **Yes** to display an ok prompt that requires user action to continue to the next program step. Select **No** to allow the test to continue without a prompt.
Threshold Tolerance:	Setting threshold tolerance value
Relative Tolerance:	Setting relative tolerance value
Combination Method:	**Greater of /Addition**

Combine the Threshold Tolerance and Relative Tolerance. At each pressure you would calculate the threshold and the relative and use whichever is greater or as addition.

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Purge (if CPS installed)

Use Purge to empty the test system connected to the CPS of liquid or particulate contaminates by pressurizing and venting the test system plumbing through the CPS. Fluke Calibration recommends to do this before you perform a calibration if contaminates might be present. To purge the system, the Product pressurizes to the user-defined purge pressure and then vents to the plastic waste container. The Product repeats the process for the number of cycles that are set.

To run a purge process:

1. Select the **Purge** Task to enter the menu.
2. Set the Pressure, 100 kPa (15 psi) for example.
3. Set the number of cycles.
4. Select **Run** to start the purge process.

CPS Cleanout (if CPS Installed)

CPS Cleanout is a function that pushes contaminates from the sump of the CPS to the waste bottle. A low pressure / flow rate is set to clean out the CPS for the specified amount of time. This same function occurs each time the CPS is controlling downward or venting with the pressure <170 kPa (25 psi). See *CPS Cleaning* for more information on cleaning the screen and replacing the filter in the CPS.

Contamination Prevention System (CPS)

Note

Maximum working pressure (MWP) of the CPS is 20 MPa (3,000 psi.)

The Contamination Prevention System (CPS) is a Product accessory used to protect the Product from contamination from the UUT. The CPS accomplishes this through these methods:

- The CPS is electrically connected to the Product. On downward pressure excursions, the CPS releases the pressure through its vent valve. While the precise pressure control is done in the Product, the major downward change in pressure is accomplished through the CPS. This results in uni-directional flow between the Product and the CPS.
- Substances from the UUT drop into a sump system that uses gravity to trap any liquids. The sump is routinely purged when the system is vented.
- The CPS also includes both a sintered and coalescing filter.

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⚠Caution

To prevent damage to the Product:

- **Do not use the CPS if it is not turned on in the Settings.**
- **Service the filters regularly. Service frequently if the UUT has a large amount of fluid in it or is very dirty.**
- **Do not let the fluid in the bottle fill to the top.**

⚠Warning

To prevent injury:

- **Do not use with flammable or combustible liquids.**
- **Only use the CPS with a pressure controller rated for no greater than the MWP of the CPS 20 MPa (3,000 psi).**

Install the CPS

To install the CPS:

1. Place the CPS on a solid surface near the Product. The CPS is heavy enough to sit on a bench and if desired, can be bolted to a bench.
2. Connect the electrical cable from the CPS to the DRV1, DRV2, and DRV3 connections on the back of the Product.
3. Connect the test port of the Product to the pressure port on the back of the CPS.
4. Before the CPS can be used, enable it in the Setup menu on the Product (**SETUP>Instrument Setup>CPS**).

⚠Caution

To avoid Product damage, the CPS must be enabled or the Product can be exposed to contamination.

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CPS Use

The CPS is available in two different test port styles: HC20 and P3000. The HC20 test port is a M20 connection and includes a set of adapters for tool-free, hand-tight connection to common pressure fittings. The P3000 test port uses a left-handed threaded connection. Tool-free, hand tight connections to common pressure fitting types can be made with the included adapters. To use the CPS, connect the UUT to the top test port on the CPS using the method described below:

⚠ Caution

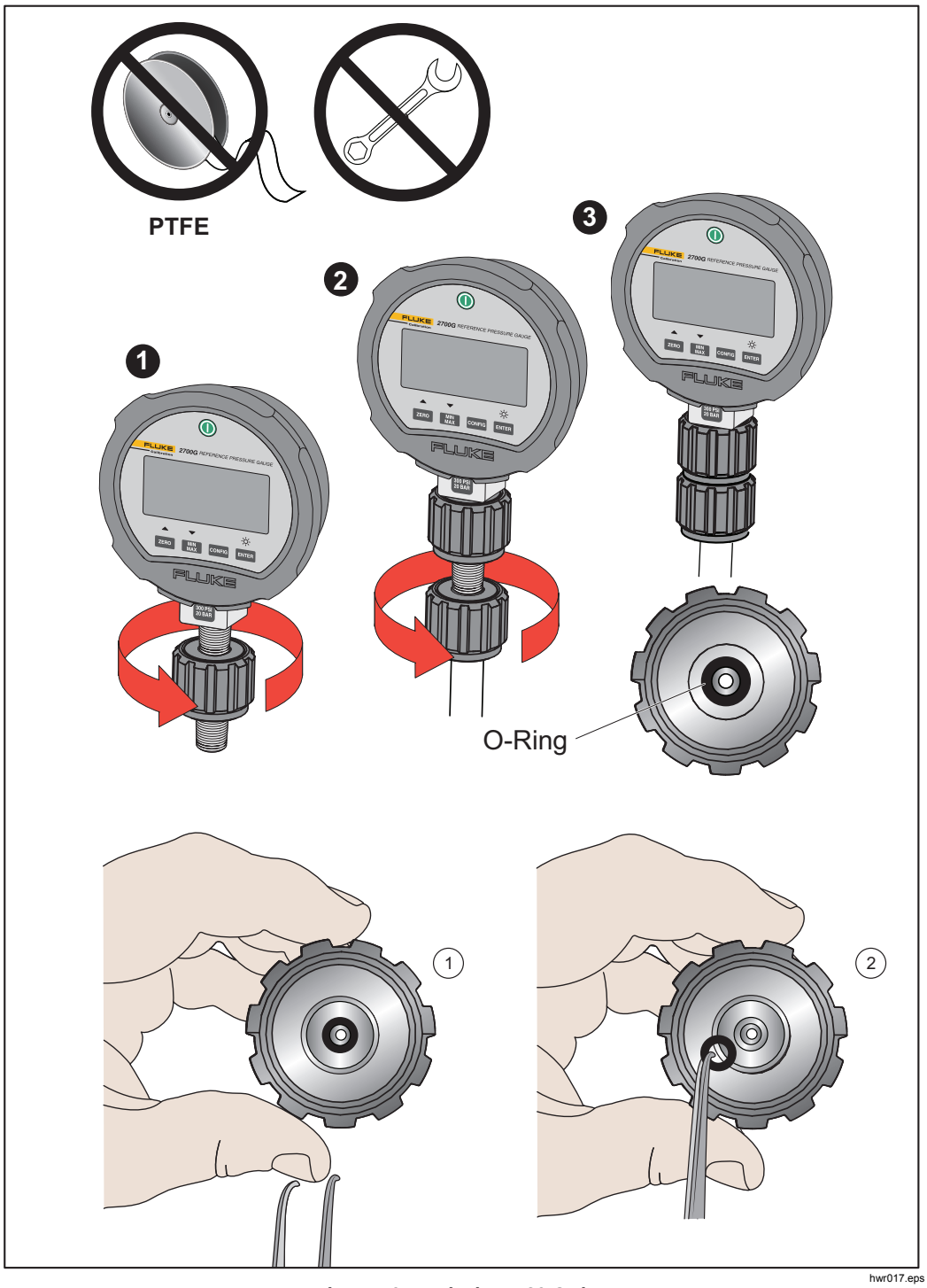
To prevent Product damage or damage to a gauge:

- **DO NOT use PTFE tape on these connections. This prevents a correct seal. The Gauge Adapter sealing system can be hand-tight sealed up to 20 MPa (3000 psi). Wrenches or similar tools are not required. Over tightening can cause damage to threads or sealing faces.**
- **Before connection, ensure that there is an O-ring fitted to the test port.**
- **Check that the sealing face of the device to be fitted is clean and undamaged, as scratches or dents can form leak-paths.**

HC20

The HC20 test port has an M20 X1.5 female thread and an O-ring inside. It is easy to connect UUTs which have M20 X 1.5 male threads. The M20 test ports have varied adapters, which are used to connect different UUTs with other male threads, such as NPT or BSP M14 X 1.5. These adapters seal on an O-ring and thus do not require PTFE tape. See Figure 9.

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Figure 10. Replacing M20 O-ring

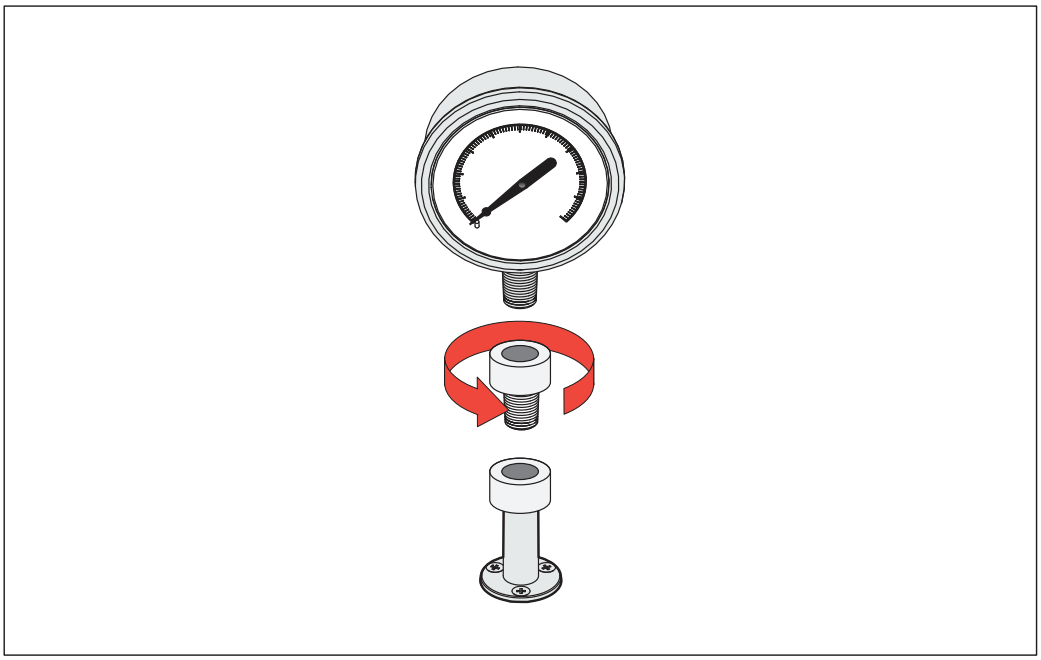
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P3000

Note

The thread on the test port, and the lower part of the gauge adapters is LEFT-HANDED. The following procedure details the correct method for mounting devices using these adapters:

1. Screw the appropriate gauge adapter fully on to the UUT, see Figure 10.



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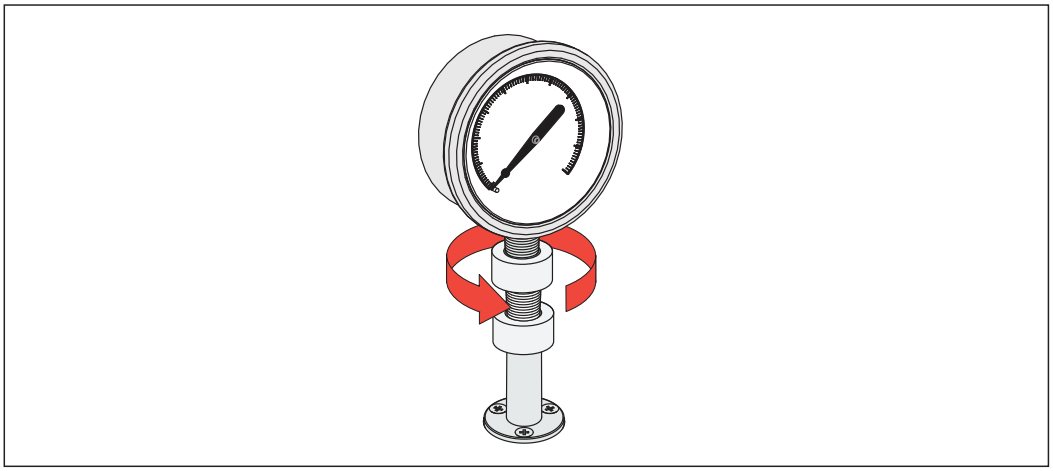
Figure 11. Screw on Gauge Adapter

2. Screw assembly down COUNTER-CLOCKWISE on to test port, see Figure 11.

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Note

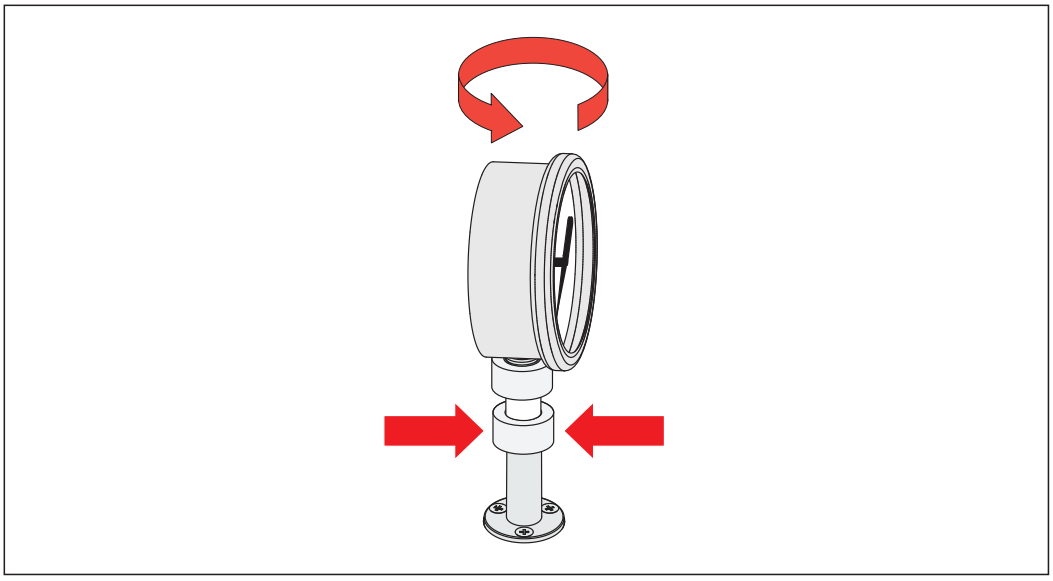
Hand-tight is sufficient. Ensure that the bottom face contacts the O-ring on the test port.



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Figure 12. Connect Assembly to Test Port

3. To adjust the position to face forward, hold the gauge adapter and turn the instrument COUNTER-CLOCKWISE, so that it faces forward, see Figure 12.

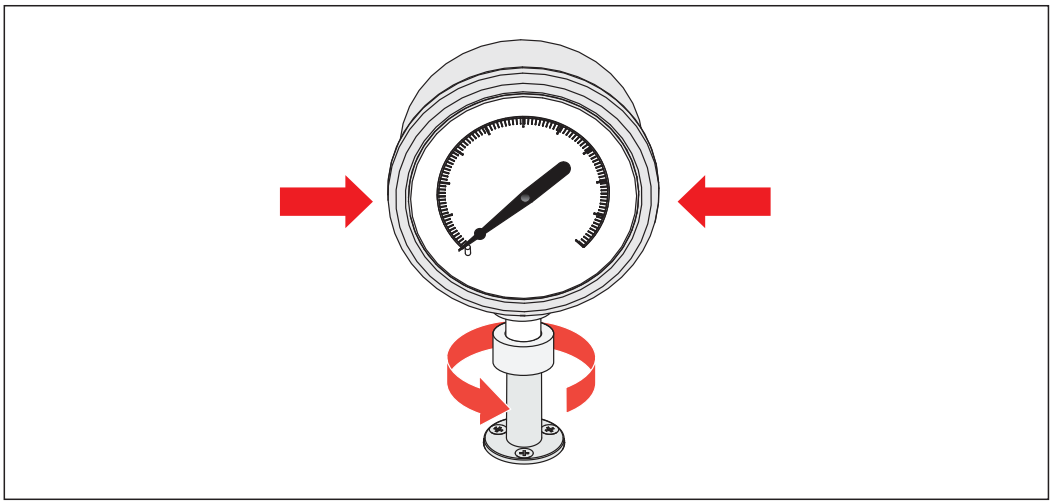


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Figure 13. Adjust Gauge Position

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4. Hold the instrument steady, while turning the gauge adapter COUNTER-CLOCKWISE until it pulls down onto the O-ring, see Figure 13.



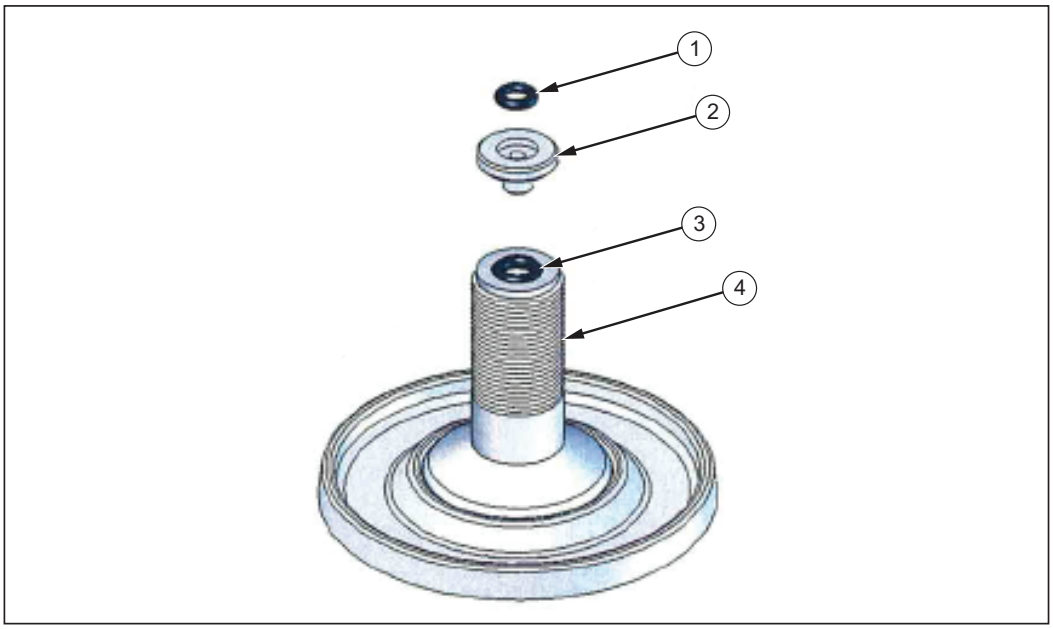
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Figure 14. Tighten Gauge

Test Port Insert

For devices with 1/8 BSP or NPT mounting threads, the diameter of the thread is very close to the effective sealing diameter of the O-ring fitted to the test port. See Table 18 and Figure 14.

This can make it difficult to achieve a good seal. When mounting these devices, use the test port insert (stored in the spare seals container).



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Figure 15. Test Port Insert

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Table 18. Test Port Inserts - Parts List

Item	Description	Part
1	O-ring	3865163
2	Test Port Insert	3919892
3	O-ring	3865195
4	Test Port	4542465

To calibrate panel-mounted gauges with pressure connections in the rear, use an Angle Adapter such as the Fluke P5543. The Product operates the CPS without any further interaction required by the operator.

Disconnect the CPS

To disconnect the CPS, ensure that the system is vented then disable the CPS in the settings. It is important that the CPS is disabled in the firmware if it is physically disconnected from the system. Failure to do so could result in the system not being able to vent pressure. Once disabled in the firmware, the CPS can be disconnected both electrically and pneumatically.

CPS Cleaning

The CPS requires periodic cleaning. See the *6270A Service Manual* for detailed CPS component information. To clean the CPS, see Figure 16:

1. Vent the CPS.
2. Remove the waste bottle ③ from the side opening of the CPS bracket and safely dispose of the contents.
3. Drop the sump ①.
4. Pull down the filter assembly ②.
5. Unscrew the lower screen retainer from the bottom of the filter assembly.
6. Pull out the metal screen and rinse with soapy water or alcohol.
7. Inspect the white coalescing filter. If saturated with oil particles, it needs to be replaced. The coalescing filter cannot be cleaned.
8. Reverse these steps to reassemble the CPS.

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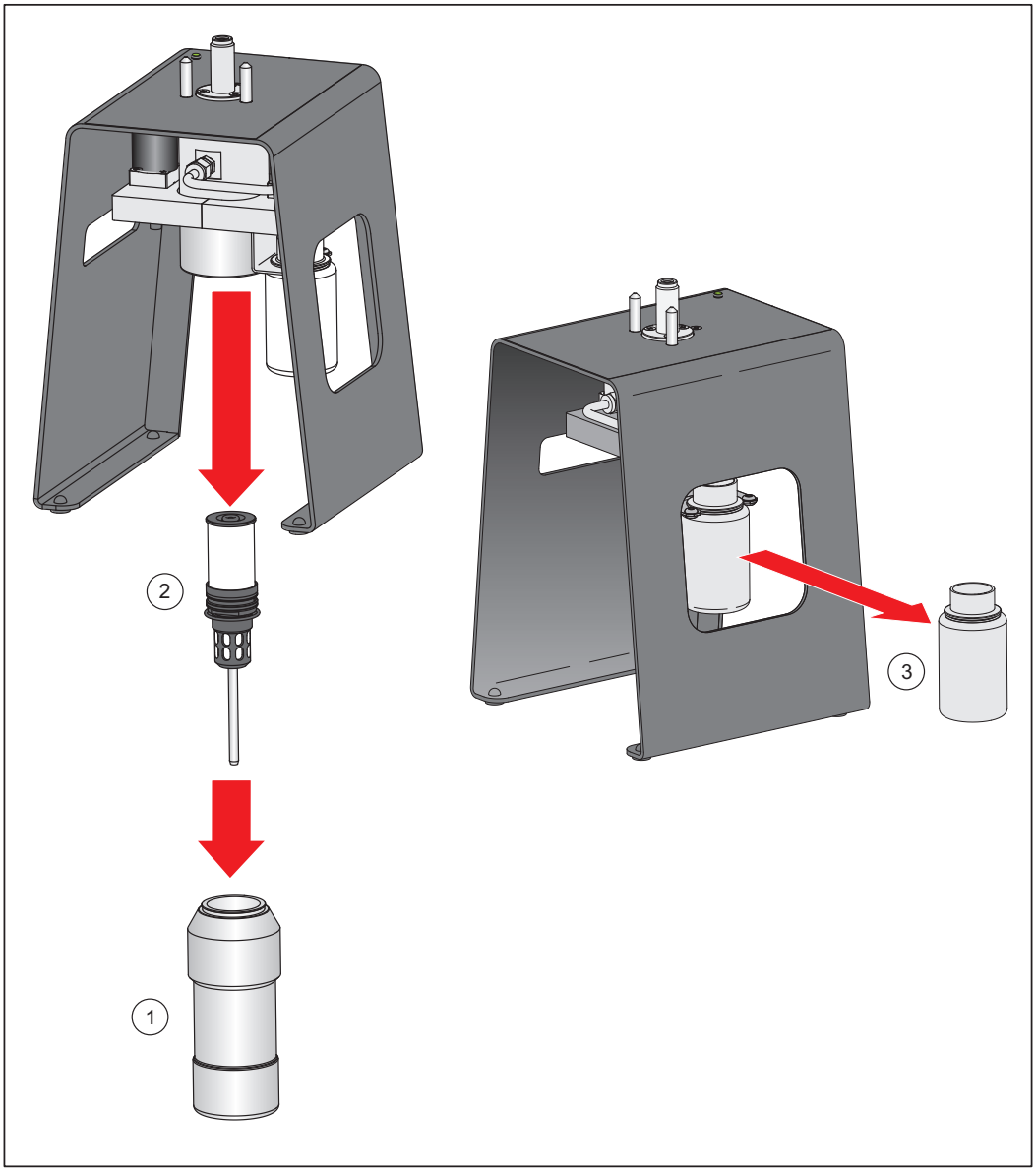


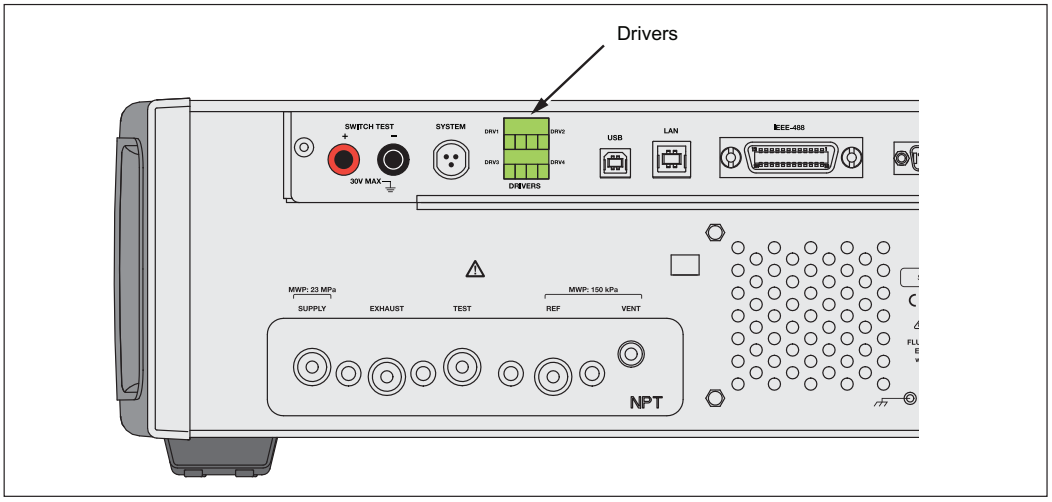
Figure 16. Clean the CPS

External Driver Communication

The Product has four external 24 V dc powered drivers. These drivers support several optional accessories and can support the driving of solenoids for customized solutions. The driver status can be set with the display and remote interfaces.

Each driver is a low-side switched 24 V dc component. Each Channel includes a PTC-type resettable fuse.

Maximum continuous power per channel is 10 W and total continuous power maximum for all 4 channels combined is 24 W. See Figure 17.



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Figure 17. Drivers

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Configure the Driver

Turn the CPS and/or isolation valve accessories on from the Instrument Setup menu (**Setup>Instrument Setup**). Both require the correct pneumatic connections and electrical connections. Touch the **External 24V** tab to see or set the state of the external drivers. Touch the **Isolation Valve** tab to set up the isolation valve.

Drivers are identified in the External 24V menu and on the rear panel of the Product as DRV1, DRV2, DRV3, DRV4 (see Figure 18). Each solenoid uses two wires, one wire goes into each connector.

- DRV1 uses the two top left inputs
- DRV2 uses the two top right inputs
- DRV3 uses the two bottom left inputs
- DRV4 uses the two bottom right inputs

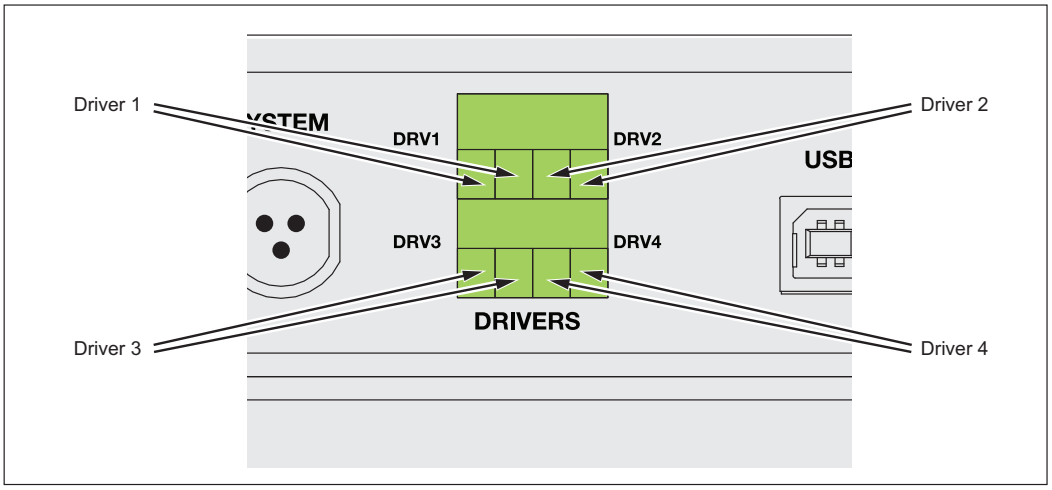


Figure 18. Driver Location

Several of the drivers support specific accessories such as the CPS and Isolation valve for system stacking.

- DRV1: CPS Valve used for Purge below 170 kPa (25 psi)
- DRV2: CPS Valve used for pulsed downward control above 170 kPa (25 psi)
- DRV3: CPS LED
- DRV4: External Isolation Valve

See the associated appendices for additional information on these accessories.

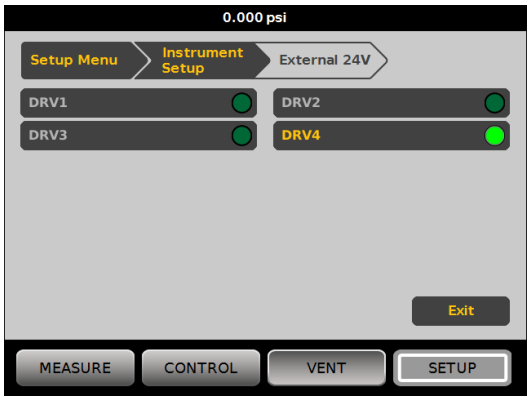
The External 24 V menu (**Setup>Instrument Setup>External 24V)** also shows the driver states for any auxiliary chassis when working in a system with multiple chassis.

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In these primary functions, the solenoid drive is modulated to reduce power consumption during continuous use.

Figure 19 shows the status of the drivers.

- On is designated by a light green indicator (DRV4)
- Off is designated by a dark green indicator (DRV1, DRV2, DRV3)



huo011.bmp

Figure 19. External 24V Screen

If drivers are dedicated to a given accessory, then DRV# will be greyed out and the status cannot be altered with the touchscreen interface.

In Figure 17, the CPS is installed so DRV1, DRV2 , DRV3 are greyed out. If the isolation valve option is installed, DRV4 is greyed out.

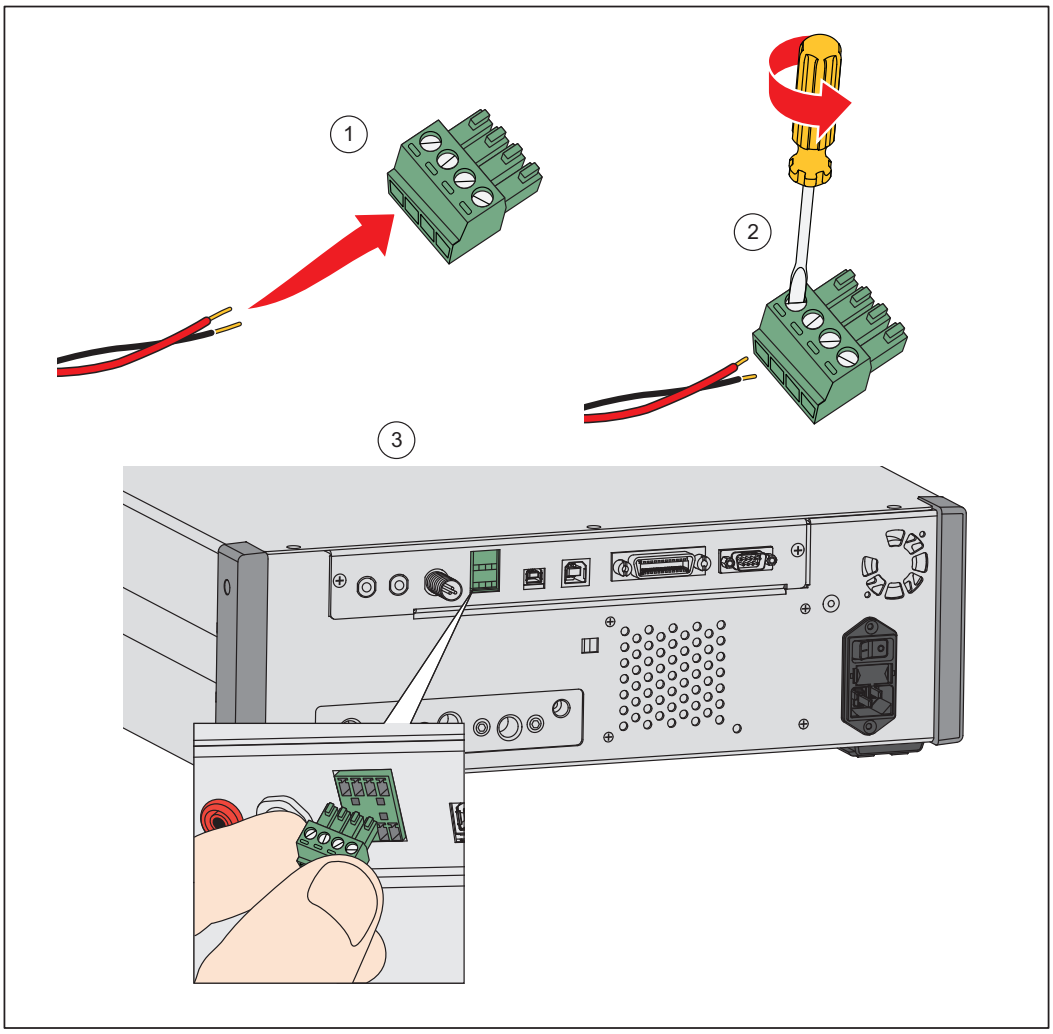
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Driver Electrical Connections

The CPS uses DRV1, DRV2, and DRV3 on the Product. For more information about the CPS, see *Contamination Prevention System (CPS)*. For typical connections, see Figure 20.



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Figure 20. Driver Connections

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External Isolation Valve

The isolation valve accessory isolates the Product from the external test port and connects to DRV4.

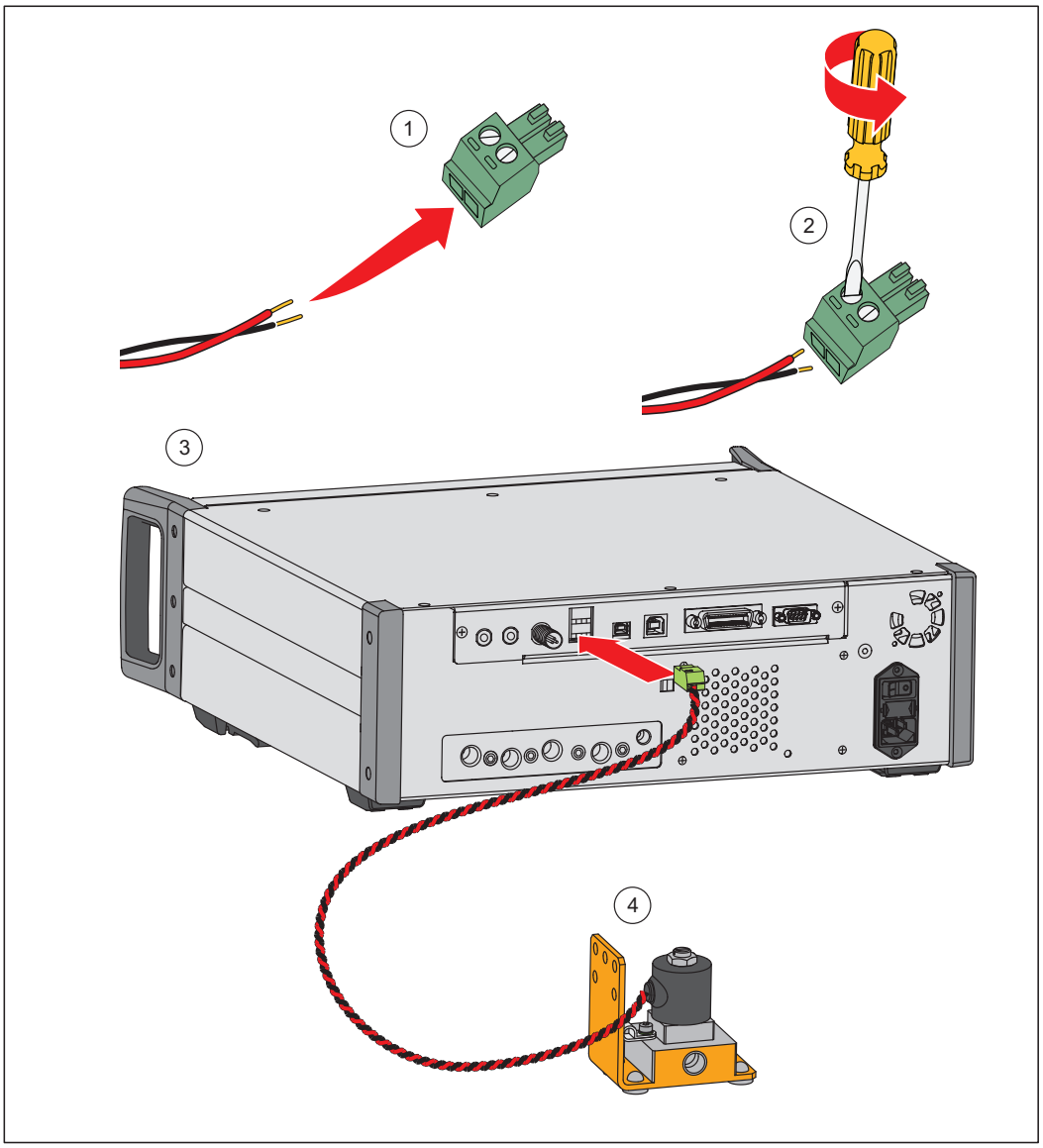
Once installed, make sure to turn on the isolation valve function in the UI as detailed in prior section.

The isolation solenoid is connected to a bracket that allows for the item to be mounted in a variety of fashions, including:

- Tabletop
- Side rails of a standard rack system
- Shelf in a rack system
- Panel in a rack system

Connect the valve to the valve drivers on the Product. The length of the cable is 1.2 meters (4 feet) and is terminated to a connector that plugs directly into DRV4. See Figure 2121.

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Figure 21. External Isolation Valve Connection

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System Stacking

To expand the ranging capability of the Product, it can be connected to one or two other pressure controllers that support the system stacking feature. This could potentially make a single system with up to 15 pressure ranges. When connected, the Primary system remotely operates the Auxiliary systems. When stacked, a fixed range can be selected from any of the other connected controllers or have the Primary controller automatically switch ranges as it normally would in the Fast or Auto modes.

Note

A specific isolation valve must be installed on the test port to isolate the test port(s) of the controllers not measuring or controlling pressure (see setup). This valve prevents over pressurizing the other controllers with lower range PMMs installed.

System Setup

To set up the system for stacking, extra accessory kits must be purchased:

- Electrical Connection Kit (part number 4579115) contains the necessary electrical system connections and wires shown in Figure 20.
- 20 MPa (3000 psi) Test Port Isolation Valve (part number 4581266) contains a single isolation valve and electrical connection. Does not include fittings or hoses. See Figure 19.

Contact Fluke Calibration for purchase information.

To set up the system:

1. Turn the Products off.
2. Install the Product into a rack that allows access to the rear panel.

Note

The Products can be placed on top of each other, but Fluke Calibration highly recommends a rack installation. A rack mount kit is available User Replaceable Parts.

⚠Warning

To prevent injury:

- **Do not use the feet to prop the Products up if the systems are placed on top of each other.**
- **Use two handles to lift and carry the Product.**

3. Install the Isolation Valves as follows (repeat for each controller):
   a. Connect the pressure line to the port labeled “LOW” to the TEST Port on the rear panel.
   b. Connect the pressure line to the port labeled “HIGH” to the UUT. Use splitters where necessary to connect to the UUT. See Figure 22.
   c. Connect the electrical connection from the Isolation Valve to the DRV4.

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4. Connect the systems together with the electrical wire and splitters provided in the kit. For the splitters that do not connect to a system, make sure the end cap is connected.
5. Connect the reference ports (REF) together on all Products that are connected. This ensures all Products are sharing the same atmospheric pressure.
6. Connect the pressure supply line to the SUPPLY port of each Product.
7. Install the PMMs if not previously installed.

Note

To get the best performance from the stacked system, Fluke Calibration recommends grouping the pressure ranges together logically by pressure ranges with the highest ranges in the primary unit. If high and low ranges are mixed in the different Products, the primary controller must switch between the controllers in the system more often and will result in longer setpoint times.

8. Turn on the Product that will be the primary controller.
9. On the primary controller, touch the head height value on the front menu and input the head-height correction for each Product. For ease of measurement, the reference is the bottom of the display on the front panel.

Note

- *Failure to input the head height correction for each unit could result in inaccurate measurements. See the Head Height section.*
- *Turn the Primary system on first.*
- *The Product that is connected to the PC for remote operation should be the Primary system. It is not necessary to make remote PC connections to all the controllers, just the Primary controller.*

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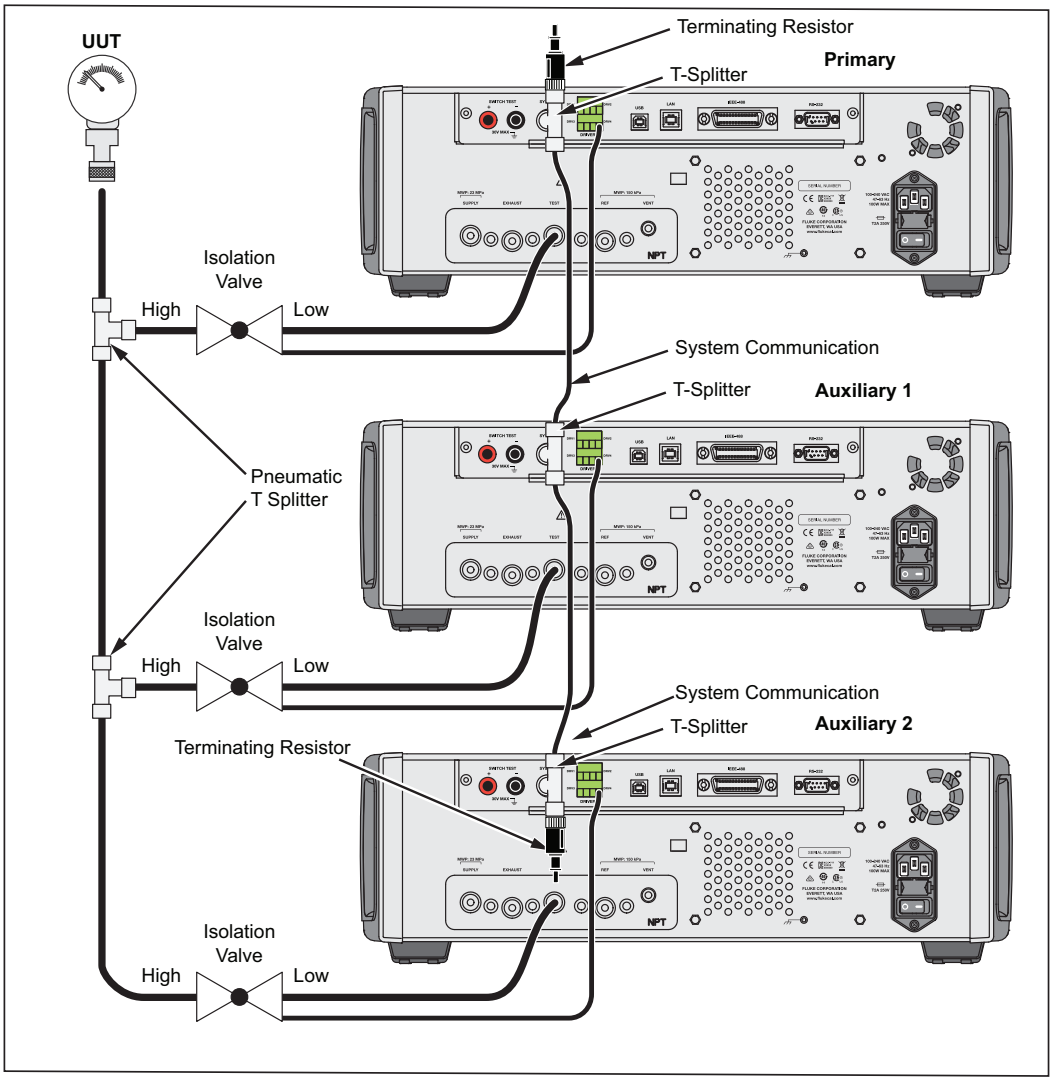
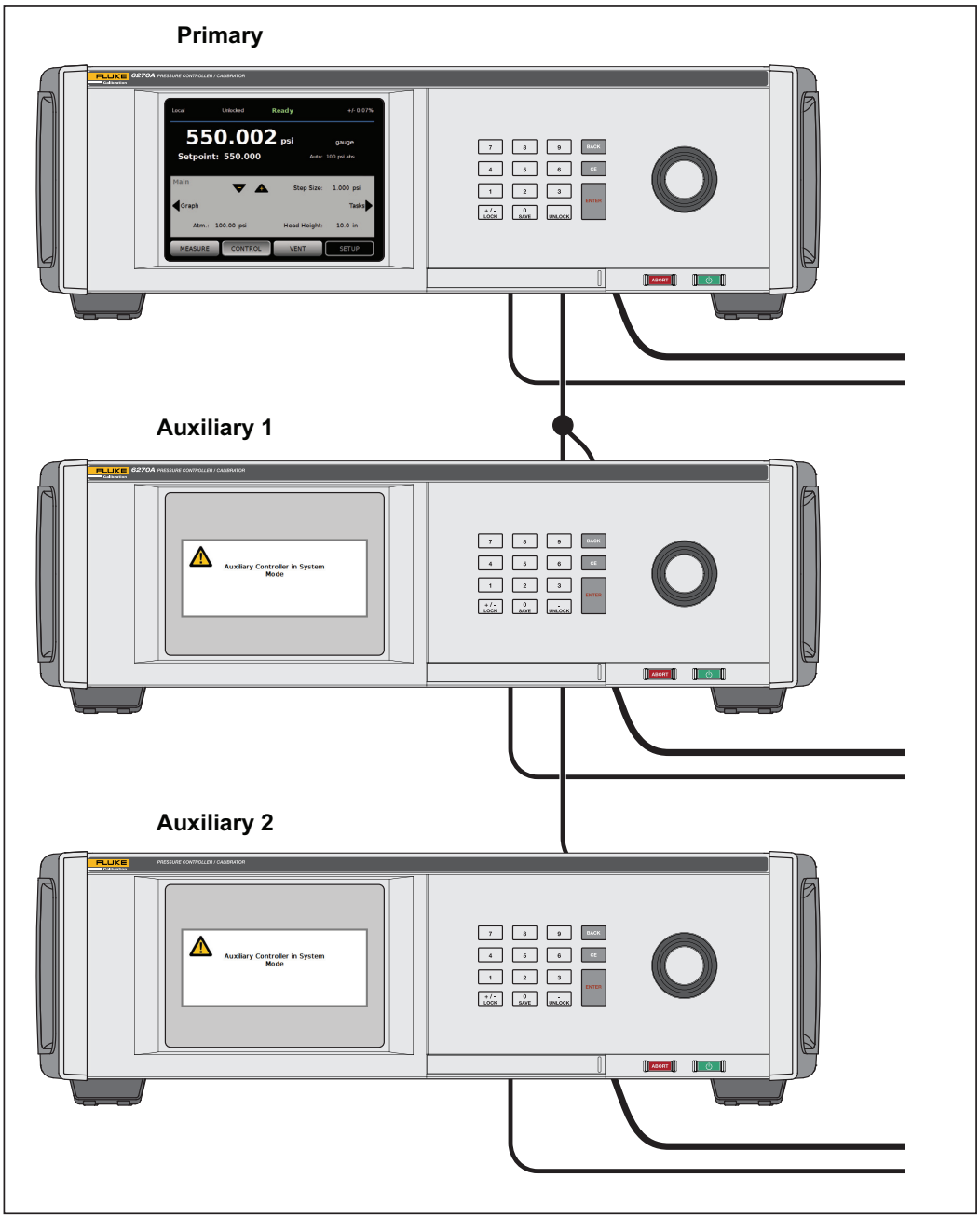


Figure 22. System Stacking Connections

Operation

All operation of the stacked system is done through the Primary controller either with the front panel or remotely. This is no different than when used as a single unit. Programs, Tasks, Diagnostics, and other features are available and can be used in stacked mode. When connected, the system uses the settings of only the Primary controller, which eliminates the need to configure each controller. When connected, the Primary system detects the other systems connected and automatically identifies them as Auxiliary 1 and Auxiliary 2 (see Figure 23). All manual control of the Auxiliary units is disabled with the exception of the Abort button. If at any time the Primary unit is turned off, the Auxiliary systems shows a dialog box letting the user know that the connection to the Primary unit has been lost.



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Figure 23. Primary and Auxiliary Controllers

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Maintenance

This section explains routine operator maintenance necessary to keep the Product in optimal condition. For intensive maintenance tasks, such as troubleshooting or repair, see the *6270A Service Manual*. The Service Manual also contains the calibration adjustment procedures. See *Contact Fluke Calibration* for more information.

Fuse Replacement

Access the fuse from the rear panel. The fuse rating label below the fuse holder shows the correct replacement fuse ratings for each operating voltage.

⚠⚠Warning

To prevent possible electrical shock, fire, or personal injury:

- **Turn the Product off and remove the mains power cord. Stop for two minutes to let the power assemblies discharge before you open the fuse door.**
- **Use only specified replacement fuses, see Table 16.**

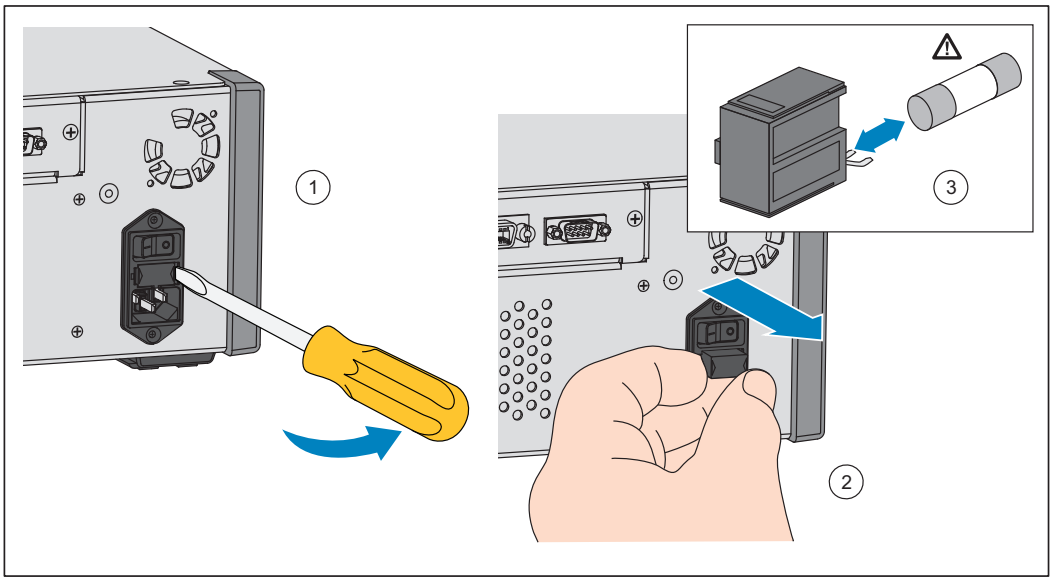
To replace the fuse, refer to Figure 24:

1. Disconnect the mains power cord.
2. With a standard screwdriver, release the fuse holder door.
3. Pull out the fuse holder.
4. If necessary, replace the fuse.
5. Reinsert the fuse holder.
6. Close the fuse holder door.

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Table 19. Replacement Fuses

Fuse Description	Fluke Part Number
⚠ FUSE 2A 250V LONGSB 5X20MM	1297149



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Figure 24. Access the Fuse

Clean the Exterior

To clean the Product, wipe it with a cloth that is lightly dampened with water or mild detergent. Do not use aromatic hydrocarbons, chlorinated solvents, or methanol-based fluids. To clean the display, use a soft cloth lightly dampened with alcohol.

⚠Caution

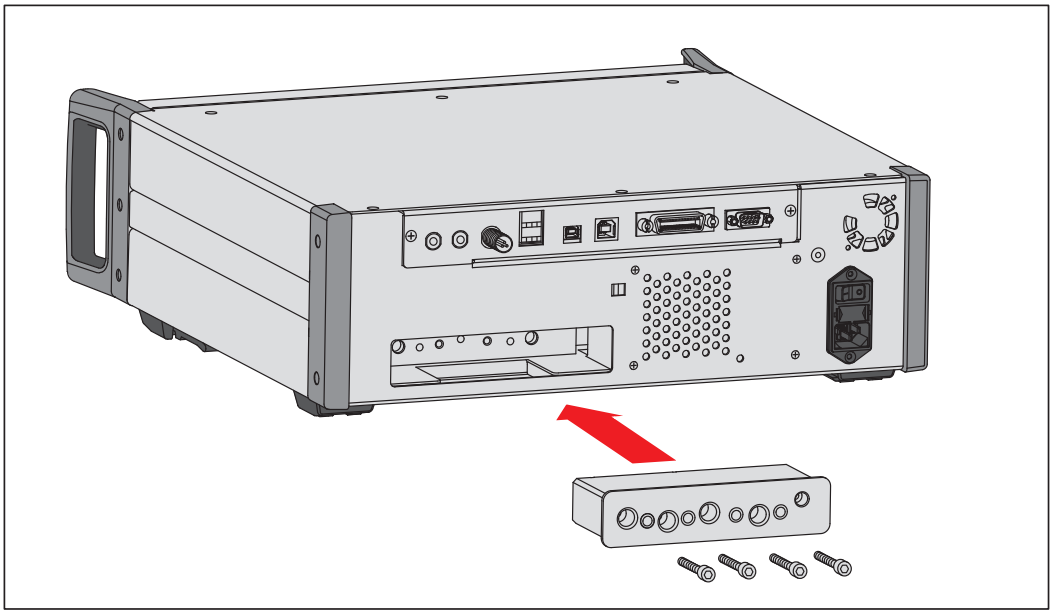
Do not use aromatic hydrocarbons or chlorinated solvents for cleaning. They can damage the plastic materials used in the Product.

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Manifold Replacement

The rear-panel manifolds can be easily changed while retaining their connections. For example, if the Product is in a rack and must be removed for service, the manifold can be taken out of the Product while all necessary hoses and inputs are left connected.

The rear-panel manifold can be easily removed if the port threads become damaged. To remove the manifold, loosen the four manifold bolts and pull the manifold out. Replace the manifold and tighten the four bolts, torque: 6.2 N·m (55 lbf in). See Figure 2525.



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Figure 25. Manifold Installation

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Reset Controller Settings

Some of the Setup menus have a reset button that reset the settings on the current menu to the default values. Reset only resets the settings on the screen being viewed and no others. This is a helpful troubleshooting tool in case an accidental change was made to the values.

A factory reset function is available in the Instrument Setup Menu that when pushed, resets the Product to its original factory settings.

Diagnostics

The Diagnostics menu provides helpful system information, tools, and functions to help troubleshoot and keep the system in good working operation.

Note

If the Product is configured as a system, the Diagnostics menu shows all of the controllers connected to it in the Diagnostics menu.

The Diagnostics menu is broken into these sections which are explained in the next sections:

- System
- Measure
- Control
- Remote Interface

System

The System Diagnostics menu provides information on these system components:

Door Switch – This is a mechanical-electrical switch located near the front panel that senses when the front panel is open. When open, the system is vented and the module information screen is shown. When closed, the system operates normally. If the status is “Open” when the door is closed, the switch could be malfunctioning or need adjustment.

Test Port Vent Valve – This is a normally-closed isolation valve installed on the internal pressure manifold. When the system is in Vent mode, this valve should be open. In other modes, such as Control and Measure, the valve should be Closed. If the status is different than that described, the valve may be malfunctioning.

Ref Port Vent Valve – This is a normally-closed isolation valve installed on the internal pressure manifold. The valve is open when the system is vented and closed at all other times. If the status is different than that described, the valve may be malfunctioning.

Measure

The Measure diagnostics menu provides information on each PMM connected:

PMM – This is the PMM range and name.

Pressure – This is the pressure measured by the sensor in the PMM in the applicable mode (gauge, or absolute).

Temperature – This is the ambient temperature inside the PMM. The temperature inside the PMM can be as much as 5 °C higher than room temperature during normal operation.

Test Valve and Ref Valve – This is a normally-closed isolation valve installed on the internal pressure manifold in front of each PMM. The test valve isolates pressure to the PMM and is controlled by the internal software. When a PMM is selected in the Module Selection menu, the test valve should be open. For manual testing and troubleshooting, select a single PMM and test the valve. In other modes such as Fast and Auto, the Product opens and closes the valves based on a control algorithm. If the status is different than that described, the valve may be malfunctioning. See the Service Manual for replacement instructions.

The menu also has a Pneumatic Self Test function located at the bottom of the menu that automatically tests each PMM to see if the valves are opening and closing properly. The system controls pressure as necessary and monitors the valve states. If a valve is not functioning properly, an error with information is shown that indicates which valve is malfunctioning.

Control

The Control Diagnostics menu provides information about the PCM:

Port Pressure – This menu shows the pressure measurement at the test port, supply port, and exhaust port. Note that the supply port pressure actively reads only when in control mode.

Control Module – This menu shows the PCM model number, serial number, and firmware revision.

Control Coefficients – This menu shows the control coefficients (C0) the PCM is using. To change the coefficients, tune the PCM using the Autotune function located in this menu.

Autotune – The Autotune function is a fully automated procedure that runs the Product through a series of pressures across its ranges. The Product then alters the control coefficients to provide the best overall control performance. Autotune should only be done when the control performance is unacceptable. The system must be leak free, have sufficient volume, and all items on the test port must be rated for the maximum pressure of the system.

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Remote Interface

The Remote Interface Diagnostics menu provides information on remote communication by monitoring the input and output communication. The menu contains independent diagnostics for RS-232, USB, Ethernet, GPIB, and the System Bus communications.

RS-232 – Shows the Receive and Transmit data for this interface.

USB – Shows the Receive and Transmit data for this interface.

Ethernet – Shows the Receive and Transmit data for this interface.

GPIB – Shows the Receive and Transmit data for this interface.

System Bus – Shows the subsequent data for this interface.

- Receive
- Transmit
- Fault

Troubleshooting

Table 17 explains minor troubleshooting issues. For issues outside of the scope of this section, the Product may require service. See *How to Contact Fluke Calibration.*

Table 20. Troubleshooting

Problem	Probable Cause	Action
Electrical Problems		
Product does not turn on	Not plugged in	Verify Product is plugged in and power is available.
	Power not available	Check the fuse per instruction in this manual.
	Fuse blown	Verify the main power switch is ON.
		Check the fan. If the fan is on or solenoid click is heard, see the “Display does not turn on” problem.
		If the fan is not on, have the power supply serviced. Verify internal power connections.
Display does not turn on	Chassis power issue	Verify that power is supplied, see above.
	Screen saver is activated	Verify power to front panel. ABORT and ⏻ should be lit.
	Power plug to front panel is loose	Verify the ⏻ is in the ON state.
	Display panel failure	If ⏻ is yellow, then push it to turn on display.
		Open front panel and verify the power plug is connected to the front panel.

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Table 20. Troubleshooting (cont.)

Problem	Probable Cause	Action
Electrical Problems		
Display is on with graphics but no numbers	USB interface to front panel is disconnected	Open the front panel door, check the USB cable connection to the front panel.
		Reinstall the USB cable connection.
Rear panel drivers not operating	Loose connection	Inspect the connection.
	Exceeded maximum power rating	Allow internal fuse to cool and retry. Verify the rating of the external solenoids.
		Limit current of external solenoids.
Pressure Generation or Indication Problems		
Product will not enter control mode	Modules not installed (PCM and 1+ modules)	Verify modules are properly installed. Door must be closed and properly sensed as closed. Confirm door status and pressure supply to PCM.
	PMMs not fully installed	Follow steps outlined in *Installation and Setup* to ensure that all modules are properly installed.
	No pressure supply	Apply proper supply pressure.
	Door not closed	Make sure the front panel is closed.
	Internal door-close sensor failed	Check the sensor. Send the Product to Fluke Calibration for repair.
	System in remote operation mode	
No pressure measurement is shown	Door not closed	Verify front panel is closed, verify the USB connection to front panel is proper, verify Product is installed.
	PMM not installed	Install a PMM (see *Installation and Setup).*
	PCM not installed	Install a PCM (see *Installation and Setup).*

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Table 20. Troubleshooting (cont.)

Problem	Probable Cause	Action
Pressure Generation or Indication Problems		
Product does not reach target pressure	Pressure supply too low	Verify pressure supply, perform leak check.
	Leak	Verify Test port is leak tight.
	Valves require service	Send the Product to Fluke Calibration for repair.
	Target pressure set higher than the highest ranged PMM.	Install a PMM with the appropriate range.
	Slew Rate set to zero	Increase slew rate.
While using measure mode, pressure is leaking	No supply pressure	Provide supply pressure if not connected.
Product does not control down	Blocked exhaust port	Remove shipping plugs or excessive restriction.
	Setpoint applied below atmosphere	Connect vacuum pump.
	Slew Rate set to zero	Increase slew rate.
No remote communications	Communication settings are not correct	See *Remote Port Menu*.
	Improper command syntax	Verify cable type (null modem).
	Cables are the wrong type or not properly connected	Use the correct cables and connections.
	Confirm setting in the Product	

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Error Codes

If an error occurs during Product operation or control, an error message is shown on the display. Errors can be caused by:

- Incorrect control that uses the front panel, (for example, attempts to force a prohibited mode or overloading of output terminals)
- Product fault.

These messages are shown in Table 21. All error messages are shown in a frame that overlaps the main screen.

Table 21. Error Codes

Error Number	Error Message
0	No Error
103	Invalid Separator
104	Data Type
109	Missing Parameter
110	Command Header
113	Command Unknown
114	Header Suffix
201	Remote Required
221	Settings Conflict
222	Out of Range
281	Cannot create program
282	Illegal Program Name
284	Program Currently Running
285	Program Syntax Error
286	Program Runtime Error
313	Calibration Data Lost
315	Configuration Data Lost
330	Self-Test Failed
350	Queue Overflow
400	Query Error
500	Controller Malfunction
501	High Limit Exceeded
502	Low Limit Exceeded
503	Slew Limit Exceeded

Table 21. Error Codes (cont.)

Error Number	Error Message
521	Pressure Overrange
533	Case Pressure Overrange
538	Automatic Vent
543	Supply Pressure Low
545	Sensor Communication
546	Sensor Calibration Lost
550	Zero Aborted
600	Factory Data Lost
601	Calibration Mode Required
603	Waiting for Calibration
707	Pressure Too High
800	Solenoid Over-Temperature
802	Control Sensor Out of Range
803	Controller Communication
804	AutoTune Failed

User-Replaceable Parts and Accessories

Table 22 lists the part numbers of each user-replaceable part or accessory for the Product. Product installation, training, and Gold and Silver Care Plans are also available. For more information on these items and accessories, see *Contact Fluke Calibration*.

Table 22. User-Replaceable Parts and Accessories

Description	Fluke Part Number	Total Quantity
Mains Power Cord - North American	284174	1
Mains Power Cord - Europe	769422	1
Mains Power Cord - UK	769455	1
Mains Power Cord - Swiss	769448	1
Mains Power Cord - Australia	658641	1
Mains Power Cord - South Africa	782771	1
Mains Power Cord - Thailand	4362094	1
Mains Power Cord - Denmark	2477031	1
Mains Power Cord - Brazil	3841347	1
6270A Safety Information	4454642	1
6270A User Documentation CD	4454992	1
Y6270 Rack-mount Kit Instruction Sheet	4456631	1
PCM installation Tool	4628864	1
PCM Module STD-20M; Pressure Control Module, Standard Turndown	4428630	1
⚠ FUSE 2A 250V LONGSB 5X20MM	1297149	1
6270-2011 NPT Manifold	4379983	1
6270-2012 BSP Manifold	4379990	1
6270-2021 7/16-20 SAE Manifold	4454164	1
5700A-2043-01,BOTTOM FOOT, MOLDED, GRAY #7	868786	4
WT-630564, TILT STAND	2650711	1
Handle	3468883	2
Bolts for rear-panel manifold	4560793	4

Table 19. User-Replaceable Parts and Accessories (cont.)

Accessories		
Electrical Connection Kit	Contact Fluke Calibration	1
Y6270 RACK MOUNT KIT, 19 IN WIDTH, 3U		1
CASE-6270 Shipping Case, 6270A w/ CPS		1
CASE-PMM Shipping Case, 3 PMM Modules		1
PK-6270-NPT Lines and Fittings Kit, 6270A NPT		1
PK-6270-BSP Lines and Fittings Kit, 6270A BSP		1
PK-6270-7/16 Lines and Fittings Kit, 6270A 7/16-20		1
PMM-CAL-KIT-20M Pressure Measurement Module Calibration Kit, 20 MPa (3000 psi)		1
CPS-20M Contamination Prevention System 20 MPa (3000 psi)		1
TST-20M Test Station, 20 MPa (3000 psi)		1
VA-PPC/MPC-REF-110 Vacuum Pump Package,110 V		1
COMPASS-P-BAS-SNGL COMPASS Software, Pressure Calibration Software – Basic, Single User		1
COMPASS-P-ENH-SNGL COMPASS Software, Pressure Calibration Software – Enhanced, Single User		1
COMPASS-P-BAS-L COMPASS for Pressure, Additional User License, Basic		1
COMPASS-P-ENH-L COMPASS for Pressure, Additional User License, Enhanced		1
PK-VALVE-20M, Isolation Valve 20 MPa (3000 psi)		1
6270-SYS-CBL, 6270 System Cable Kit		1
CDG-REF-1TORR, CDG with Butterfly Valve, 1 Torr		1
PK-PMM-ZERO, Interconnection Kit for PMM Absolute Zeroing		1

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