

Replacing a PCS 400 with the 6270A Modular Pressure Controller/Calibrator

Application Note

The 6270A Modular Pressure Controller/Calibrator is an effective drop-in replacement for the Mensor PCS 400 Pressure Calibration System in most applications. In addition to the basic functions required to replace the PCS 400, the 6270A also offers advanced design, performance and features to improve pressure calibration capabilities. This application note summarizes some of the benefits of upgrading to the 6270A as well as detailing the steps for configuring and installing the 6270A as a replacement to the PCS 400.



Benefits of upgrading

There are many benefits to upgrading from the legacy PCS 400 to the 6270A Modular Pressure Controller/Calibrator:

- Workload coverage
- Control performance
- Maintainability/serviceability
- Expandability

Let's explore these benefits in more detail.

Workload coverage

The PCS 400 was able to be configured with up to two main measurement ranges and a barometric reference sensor. Each range had a specification based upon percent-full scale (either 0.01% or 0.025%). In addition, the maximum available pressure range on the PCS 400 was 14 MPa (2000 psi). The 6270A allows for up to five ranges to be installed at one time plus easy re-ranging of the unit by replacing the modules. You can have one instrument that provides very wide coverage from vacuum to 20 MPa (3000 psi).

Measurement performance

Mensor PCS 400 utilized silicon-based pressure sensors for its on-board calibration reference standards. The accuracy specification provided in the manual is 0.010% FS. A long-term stability specification of 0.010 % FS is also provided. The recommended calibration interval provided in the user manual is six months. The specifications provided below for the Fluke Calibration 6270A include one-year measurement stability.

Fluke Calibration 6270A offers two pressure measurement modules class options to replace and improve upon the function of the PCS 400 while balancing cost and performance:

- I. The silicon-based cost-effective PM200 module offers 0.02% full scale total one-year measurement uncertainty specification. For many applications where the PCS 400 was used (especially those that made use of the optional 0.025% FS accuracy), the PM200 modules will be more than adequate.

II. PM600 module offers 0.01% reading total one-year measurement uncertainty specification from 30% to 100% of the module full scale. Most of the PM600 modules offer gauge, absolute and vacuum measurement standard. In many cases, one PM600 module can effectively replace the function of both ranges and barometric option of the PCS 400.

Control performance

The 6270A provides control precision of 0.001% of the active range. The PCS 400 had a specification of 0.004% full scale. The active range aspect of the specification is very important. For example, if both units are configured with 7 MPa (1000 psi) and 700 kPa (100 psi) ranges, then the PCS 400 control precision would be ± 0.28 kPa (± 0.04 psi at) all pressures. The 6270A would be ± 0.07 kPa (0.01 psi) at pressures above 700 kPa (100 psi) and ± 0.007 kPa (± 0.0001 psi) at pressures below 700 kPa (100 psi). The 6270A will provide a stable pressure with a relatively fast time to setpoint.

Maintainability/serviceability

The 6270A is designed with a focus on maintenance and service. The modular design allows for reduced downtime during recalibration. Control functionality is also encapsulated in a module, making troubleshooting and repair of any control performance issues. The focus on serviceability is seen throughout the design. For example, the removable connection manifold allows for easy repair if the port connection threads are damaged due to misuse.

Expandability

Your calibration needs change with time. The 6270A can change with your needs. You can change the pressure range or measurement performance of the instrument by adding pressure measurement modules. This can be done without sending any part of the instrument back to the factory for reconfiguration. Simply install the new pressure measurement modules and start controlling pressure.

Configuring a 6270A

Selecting a pressure module

PCS 400 controllers were configured with one or two ranges and an optional barometric reference sensor to allow operation in absolute pressure mode. The 6270A can accommodate up to five installed pressure modules with 35 module options to choose from, so there are numerous ways to configure a 6270A to replace any configuration of PCS 400.

To select the right pressure modules for the 6270A, first consider the required pressures and

accuracies for your application. There are two classes of pressure measurement modules for the 6270A. The PM200 modules have a one-year specification of 0.02% full scale. For most applications where the performance of the PCS 400 was sufficient, the PM200 modules are a good choice.

The PM600 modules have a one-year specification of 0.01% reading from 30% to 100% span. Depending upon your measurement needs, it is feasible that both ranges of the PCS 400 can be replaced with a single PM600 module.

Measuring barometric reference pressure

A barometric reference sensor was an available option on the PCS 400. Choosing this option allowed the instrument to be used in absolute mode. If gauge mode PM200 modules are used with the 6270A, then a barometric reference option is recommended for operation in absolute mode. There are two modules available that can be used for measuring the barometric reference pressure.

Model	1-year specification
PM200-A100K	0.1 % FS
BRM600-BA100K	0.01 % reading

When a barometric reference sensor is used to allow for absolute mode pressure measurements, the performance of the barometer has a greater impact on the overall measurement at lower pressures compared to higher pressures. For many applications, the PM200-A100K is acceptable for pressure ranges of 500 psi or greater. The BRM600-BA100K is preferred for lower pressure ranges.

The majority of PM600 modules are inherently absolute mode. They are capable of measuring in both gauge and absolute mode without the use of an additional barometer. Adding the barometer can improve the measurement performance in absolute mode. In most situations where the PCS 400 measurement performance was acceptable, the additional improvements provided by the barometer are not necessary.

Selecting the test port manifold

There are three versions of the 6270A main chassis. The difference between the versions is the connection types on the back of the instrument. The connection types can be changed by removing and replacing the rear connection manifold. Removal of the manifold is done by removing the four screws and sliding the manifold out the back of the instrument. The PCS 400 had 7/16-20 SAE pressure connections. Therefore, the most direct replacement is the 6270A-7/16.

Model	Supply, exhaust, test, and reference connections	Vent connection
6270A-NPT	1/4 NPT	1/8 NPT
6270A-BSP	1/4 BSP (parallel)	1/8 BSP (parallel)
6270A-7/16	7/16-20 SAE	5/16-24 SAE

Installation and setup

Rackmount installation

An optional rackmount kit is available for the 6270A. This kit allows for installing the 6270A in a standard 19-inch rack, just like the optional rackmount kit that was available for the PCS 400. The PCS 400 was 4U high, and the 6270A is 3U high. Thus, the 6270A will fit into the same vertical space in the cabinet as the PCS 400, with an additional 45 mm (1.75 inches) left over.

Physical connections

Replacing a PCS 400 with a 6270A is extremely straightforward with regards to making the physical pressure connections on the back of the instrument. The PCS 400 had four ports. The 6270A has four corresponding ports that serve the same exact purpose.

6270A Port	PCS 400 Port	PCS 400 Port
Supply	Supply	Supply pressure used to control pressure on the test port. Should be set to full scale + 15% or full scale + 100 kPa (15 psi), whichever is greater.
Exhaust	Exhaust	Either left open to atmosphere or connected to a vacuum pump for sub-atmospheric control. When operating at high pressures, a muffler is recommended (installed standard on the 6270A)
Test	Measure/Control	Connect the Unit Under Test
Reference	Reference	If a barometric reference sensor is used, it is connected to this port. Normally left open to atmosphere or tied to the reference port of the unit under test
Vent	N/A	Left open to atmosphere.

Emulating remote communication

The 6270A can be placed in PCS 400 remote emulation mode. To set remote emulation mode from the front panel, press SETUP. In the main setup menu, select INSTRUMENT SETUP and then REMOTE PORT. Pressing EMULATION MODE allows you to select PCS 400. For a complete listing of all supported commands, see the 6270A Programmers Reference Guide. A null modem cable was used when communicating to a single PCS 400. The 6270A uses the same cable. Complex applications where multiple PCS 400 units were connected to the same serial bus or when the optional BCD output was used are not supported with the 6270A.

Conclusion

The Fluke Calibration 6270A Modular Pressure Controller/Calibrator is the latest generation of pressure controller from Fluke Calibration. With the 6270A, you get the service and support of Fluke Calibration, the industry leaders in pressure calibration.

Fluke Calibration. Precision, performance, confidence.™

Electrical	RF	Temperature	Pressure	Flow	Software
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