

# Replacing PACE 6000 with the 6270A Modular Pressure Controller/Calibrator

## Application Note

The 6270A Modular Pressure Controller/Calibrator is an effective drop-in replacement for the GE Druck PACE 6000 Modular Pressure Controller/Indicator in most applications. 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 PACE 6000.



### Benefits of upgrading

There are many benefits to upgrading to the 6270A Modular Pressure Controller/Calibrator, including:

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

Let's explore these benefits in more detail.

### Workload coverage

The PACE 6000 supports up to two pressure ranges at one time. Re-ranging the instrument can be done by disconnecting all of the pressure and vacuum lines running to an from the instrument and then replacing one of the instrument's modules. The 6270A allows for up to five modules to be installed at one time and allows you to re-range the unit by quickly and easily replacing modules through the front panel.

### Measurement performance

The PACE 6000 utilizes silicon-based pressure sensors for its on-board calibration reference standards. Its measurement specification is typically cited to be as good as 0.005 % reading +0.005 % full scale. This specification includes the combined effects of non-linearity, hysteresis, and repeatability. It does not include long-term

stability, which is an additional 0.01 % reading per year. The specifications provided below for the Fluke Calibration 6270A include one-year measurement stability.

Fluke Calibration 6270A offers two pressure measurement module class options to balance cost and performance. The specifications provided for the 6270A are inclusive of all influences, including one-year stability. The precision specification shows what the specification would be without the one-year stability. This is shown in Figure 1.

- I. The silicon-based, cost-effective PM200 module offers 0.02 % full scale total one-year measurement uncertainty specification.
- 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.

### Control performance

The 6270A provides control precision of  $\pm 0.001\%$  of the active range. This specification allows for proper pressure stability at both high and low pressures. For example, if the 6270A is configured with a 300 psi range and a 3000 psi range, then the control precision will be  $\pm 0.003$  psi at lower pressures (300 psi and below) and  $\pm 0.03$  psi for higher pressures. The PACE 6000 has a similar specification of  $\pm 0.001\%$  full scale.

### 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. You can install the new module in less than a minute, without having to change any of your pressure lines connected to the instrument. The system can then automatically switch between modules as necessary.

### Configuring a 6270A

#### Selecting a pressure module

The PACE 6000 is available with a choice of three different accuracy classes (CM0, CM1, and CM2). The 6270A pressure modules are available in two accuracy classes, with the PM200 modules providing 0.02% FS uncertainty for one year (for most ranges) and the PM600 providing 0.01% reading uncertainty for one year.

Figure 1 shows a comparison of the specifications across the given pressure range. The uncertainty of the PACE 6000 has been estimated as the summation of the precision specification and the long term stability specification.

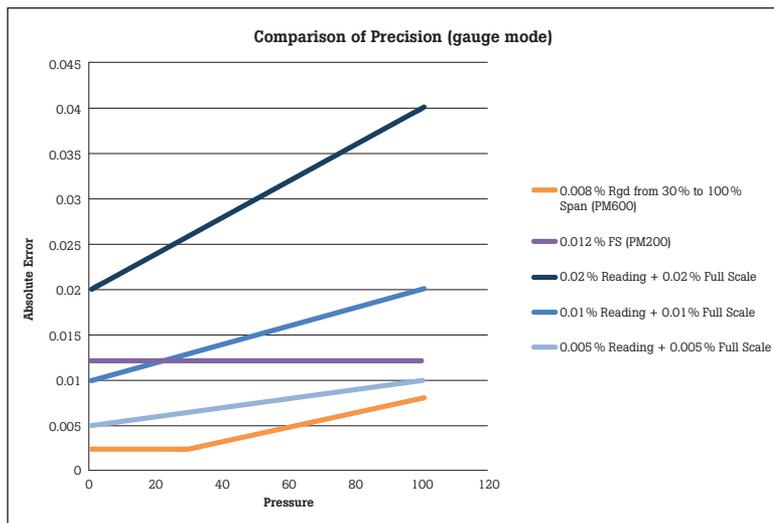


Figure 1. Comparison of percent full scale, percent reading, and percent reading plus percent full scale specifications.

PACE 6000, SI units		PACE 6000, psi			PM200	PM600
2.5	kPa	0.35	psi	gauge	PM200-BG2.5K	-
7	kPa	1	psi	gauge	-	PM600-BG15K*
20	kPa	3	psi	gauge	-	-
35	kPa	5	psi	gauge	PM200-BG35K	PM600-G100K*
70	kPa	10	psi	gauge	-	PM600-G100K*
100	kPa	15	psi	gauge	PM200-BG100K	PM600-G100K
200	kPa	30	psi	gauge	PM200-BG200K	PM600-A350K*
350	kPa	50	psi	gauge	-	PM600-A700K*
700	kPa	100	psi	gauge	PM200-G700K	PM600-A700K
1	MPa	150	psi	gauge	PM200-G1M	PM600-A1.4M
2	MPa	300	psi	gauge	PM200-G2M	PM600-A2M
3.5	MPa	500	psi	gauge	PM200-G3.5M	PM600-A3.5M
7	MPa	1000	psi	gauge	PM200-G7M	PM600-A7M
10	MPa	1500	psi	gauge	PM200-G10M	PM600-A10M
13.5	MPa	2000	psi	gauge	PM200-G14M	PM600-A14M
17.2	MPa	2500	psi	gauge	-	PM600-A20M
21	MPa	3000	psi	gauge	PM200-G20M	PM600-A20M

Figure 2. Recommended ranges when replacing a PACE 6000 with a 6270A

\* The exact range is not available, but the required range is within the percent reading region of the given PM600 range.

The 6270A pressure modules are available in a number of ranges, as shown in Figure 2. The PM200 and PM600 provide different levels of performance, allowing it to cover many different applications.

### Measuring barometric reference pressure

A barometric reference sensor is an available option on the PACE 6000. Choosing this option allows 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 barometer's performance 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 PACE 6000 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. To remove the manifold, simply remove the four screws and slide the manifold out the back of the instrument. The pressure connections on the PACE 6000 are 1/8 BSP. Adaptors are available where necessary.

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

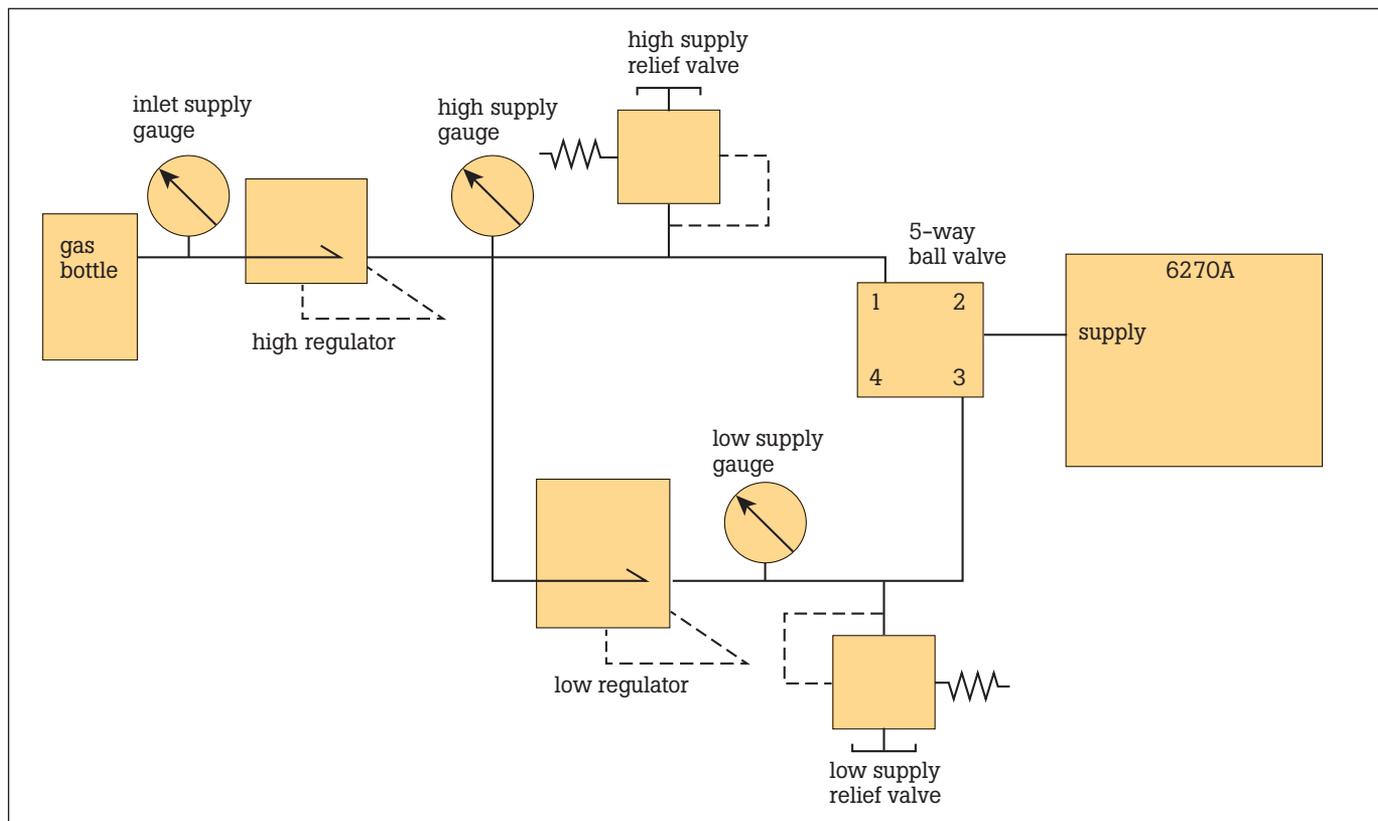
#### Rackmount installation

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 PACE 6000. Both the PACE 6000 and the 6270A are 3U high, so they take up the same amount of vertical space in a rack system.

#### Physical connections

The PACE 6000 is available in dual range configurations. This configuration requires two test ports (outlet) and two supply pressures. The 6270A allows for a more simplified setup, where there is only one test port and one supply pressure.

If the low range on the PACE 6000 is no less than 10% of the high range (for example 3000 psi and 300 psi), then simply connect the higher supply pressure to the 6270A supply port. The low range supply pressure regulator is no longer required. If the low range is less than 10% of the high range, then the low range supply regulator still needs to be used. A simple way to set up a manual system for doing this is to use a five-way switching valve to switch the supply port on the 6270A to either the low or high pressure supply (see figure 1). An example five-way switching valve is Swagelok part number SS-43ZF2 (note: this valve has a full scale working pressure of 2500 psi). A five-way switching valve is used instead of a three-way valve to ensure that the pressure is automatically vented when switching between supply sources. Connect the 6270A supply port to the common port on the valve. Connect the supply pressures to two of the four other ports. The two ports should be opposite each other. By doing this, when switching from the high to the low pressure supply, the pressure line to the controller is vented so that the low pressure regulator won't be back-fed with high pressure. If the low regulator being used allows for being back-fed with higher pressure, then a three-way valve can be used in place of the five-way valve.



**Figure 1.** Using a five-way switching valve to switch the supply port on the 6270A to either the low or high pressure supply

**Emulating remote communication**

The 6270A can be placed in PACE 6000 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 PACE 6000. For a complete listing of all supported commands, see the 6270A Programmers Reference Guide. When using RS-232, the 6270A requires a null modem cable, where the PACE 6000 uses a straight cable. Null modem adaptors and cables are readily available.

**Conclusion**

The Fluke Calibration 6270A offers many benefits. The ability to use five modules simultaneously allows for wide pressure range coverage, and that coverage can be easily expanded as your needs change. A true modular design provides improved uptime. With the 6270A you get the service and support of Fluke Calibration, the industry leaders in pressure calibration.

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