FLUKE®
Calibration

Sales Guide

2271A Industrial Pressure Calibrator

1. Product Positioning

The 2271A is the preferred pressure calibration solution for Industrial Calibration Laboratories because it is a complete solution that covers three times the workload of the competition in a single instrument while simplifying installation, setup, and operation.

2. Value Proposition

Workload Coverage – The external module design and very wide control range allows for easy re-ranging, allowing the 2271A to cover a wider range than the competition. One device can calibrate more items, allowing for faster payback for the customer. The modular design allows for easy expansion, allowing for the workload coverage to grow with your workload.

Complete Solution – Pressure Calibration requires more than just a reference standard. Those items, such as vertical test stands, electrical measurement, and HART communication are included on the 2271A. Integrated design allows for simpler training, faster setup, and less cost to operate. The optional contamination prevention system protects this investment for an even more complete solution.

3. Key Selling Point

Fluke Cal Product Features	Fluke Cal Advantages	Fluke Cal Benefits
• Pressure Measurement using PM200 modules, 0.02% FS with ranges from -100 kPa to 20 MPa (-15 to 3000 psi) • Electrical Measurement Module with measurement of mA and V dc, 24 V supply, and HART communication • Dual vertical test ports for easy, tool-free connections of multiple units under test. • Optional CPS protects the investment from contamination	• PM200 modules are easily removed and installed, allowing for quick and easy re-ranging of the system • Modular design of EMM simplifies maintenance, as main chassis does not have to go back for recalibration • Dual test ports increases throughput and reduces setup time for a calibration • Optional CPS allows for easy calibration of liquid filled gauges without prior cleaning	• One chassis can cover an extremely wide range. The range of coverage can be easily expanded as needs change and grow. • Complete, closed-loop calibration of pressure transmitters and HART enabled pressure devices • Reduce costs by reducing setup and cleaning time • Single, full function interface simplifies usage and reduces training time.

4. Target Customer

The target segment works in an industrial calibration laboratory. Specifically, those who currently, or will in the near future, need to calibrate or perform function testing on pressure transmitters, dial gauges, switches, and similar devices with accuracies in the 1% to 0.1% region. This includes facilities that support aerospace, pharmaceutical, oil and gas, and process plant verticals.

5. Who Do I Call

- Instrument Shops
- Calibration Laboratory Supervisors
- Process Instrument Repair Departments
- Dial Gauge Manufacturers
- Calibration Technicians

6. Typical Applications

Dial Gauge Calibration – Traditional analog dial gauges are available in a variety of pressure ranges and accuracy classes. Depending upon the application the gauge is used in, it will require routine recalibration. The 2271A provides an easy and efficient way to perform this calibration. The vertical test mounts simplify the mounting of the gauge, reducing the setup time for the calibration. The automated pressure control allows the user to move quickly from one test point to the next, without the manual labor or potential gross overshoots that are common with a manual pressure pump approach. The jog wheel allows for easy jogging of pressure, so that the dial gauge's needle can be placed on the cardinal point.

Dial Gauge Manufacturing – A manufacturing production process normally lends itself well to automation. The manufacturing of dial gauges is still a very manual intensive process because normally an operator is still needed to physically observe the indication of the gauge and make mechanical adjustments. The 2271A can improve the efficiency of the process by speeding up the generation and stabilization of the pressure. In addition, a dial gauge manufacturer can truly see a doubling of their throughput due to the dual test port design of the 2271A, as it is common to manufacture multiple gauges of the same range simultaneously.

Pressure Switch Testing – Pressure switches are devices that open or close an electrical circuit based upon a pressure. They are used in a wide variety of process, oil and gas, power generation, and similar industries. They can be key components in a pressure safety system, and thus will need routine checking to insure their operation. To test a pressure switch, you need a way to ramp pressure at a given rate and simultaneously observe the state of the electrical circuit. The 2271A has a built-in switch test procedure that does exactly that. It is able to automate the ramping of pressure in multiple directions and record the pressure at which the switch changes state.

Pressure Transmitter Calibration – Pressure transmitters are defined here as devices that measure pressure and output an electrical signal (such as milliamps or volts dc) that is proportional to the pressure. In industrial applications, the most common output is 4 to 20 mA. The 2271A includes the Electrical Measurement Module, which is able to measure 0 to 30 V dc and 4 to 20 mA (either while supplying 24 V dc power or using an external power source). With the Pressure Transmitter Task, the calibration of a pressure transmitter can be done fully closed-loop. In addition, the EMM includes basic HART communication capability, allowing for trimming of HART pressure transmitters.

Low Accuracy, Digital Gauge Calibration – More and more, digital gauges are replacing traditional analog dial gauges in many applications. Depending upon the application, these digital gauges, while relatively low accuracy, still require calibration. The 2271A allows for easy connection of these gauges and, with the PM200 measurement modules, provides a cost-effective, efficient solution for calibrating a large number of gauges.

7. Competitive Comparison

Complete Solution

Model	Vertical Test Ports	DUT Supply Voltage	DUT Output Measurement	HART Comm	Switch Test	Leak Test	Tool Free Modules	Contamination Prevention
Fluke 2271A	2	✓	✓	✓	✓	✓	✓	Optional
GE PACE	0	✗	✗	✗	Optional	Optional	✗	✗
Additel 780	Optional	✓	✓	✓	✓	✓	✗	Optional – Just filter
Mensor CPC 4000	0	✗	✗	✗	✗	✓	✗	✗

Wide Range of Coverage

A key benefit of the 2271A is its ability to cover a wide range of pressures. This coverage allows it to be used to calibrate more devices, thus justifying the initial expense. For comparison, consider a situation where a user needs to calibrate pressure gauges/transmitters with pressure ranges from 100 kPa (15 psi, 1 bar) to 20 MPa (3000 psi, 200 bar) with accuracies of 0.25% range. The user would like to maintain a 4:1 ratio for all ranges.

The 2271A can have two pressure measurement modules installed at any one time. The modules are very easily installed and thus the pressure range of the calibrator can be easily changed to meet the current needs. To cover a wide range, the unit can be sold with multiple PMM's. Competitive products do not allow for as easy switching of modules (or require more expensive modules).

Model	Configuration Description	Range Covered	Price (USD)
Fluke 2271A	1 chassis, with 5 PM200 modules: PM200-G20M PM200-G10M PM200-G4M PM200-G1M PM200-BG250K	100 kPa to 20 MPa (15 to 3000 psi)	$17,300
GE PACE (Druck)	1 PACE 5000 Chassis with: CM2-3000 CM1-300 CM1-50	100 kPa to 20 MPa (15 to 3000 psi)	$26,079
Additel 780 (ConST 822)	2 chassis (3K psi and 1K psi), with ranges: CP3K CP1K CP300 CP100 CP30	100 kPa to 20 MPa (15 to 3000 psi)	$24,475
Mensor CPC 4000	chassis 1: Range A = 3000 psi, 0.02% IS-50 Range B = 400 psi, 0.02% IS-50 chassis 2: Range A = 50 psi, 0.02% IS-50	100 kPa to 20 MPa (15 to 3000 psi)	$16,000* *External Test Stand and digital multimeter not included in pricing

Pricing is US List Price. GE and Additel pricing taken from US distributor websites. Mensor pricing is best estimate (exact configurations not available through distribution).

To cover the extremely wide range, the GE and Additel controller packages are much more expensive and require either multiple chassis and/or time consuming change-out of modules. The Mensor CPC 4000 solution is potentially less expensive, except that the user would also need to purchase/create external test stands and a digital multimeter.

2271A Versus Other Technologies

	Advantages	Disadvantages
2271A	Can be fully automated Easy to use Removes operator influences	Higher Price
Pressure Comparator with digital gauge	Low Cost Requires manual operation, but is simple enough in concept that people feel comfortable using it	Manual operation – cannot be automated Operator influences can impact performance Can only connect one reference gauge at a time – harder to switch ranges
Deadweight Tester	Is a "primary" standard and often times has a longer calibration interval Can provide a very stable pressure	Requires knowledge of local gravity Not very transportable – requires a weight set Can't make fine, incremental changes to the pressure Operator influences will impact performance

8. Common Objections

Comparative Pricing – The 2271A is priced at a premium position in the marketplace. Pricing is such that with an acceptable workload the customer will see a solid return on investment. In situations where a customer is comparing the price of a 2271A directly against a competitor product the 2271A may initially appear at a disadvantage. Certain steps must be taken:

1) The previous pages detail the ways that the 2271A is advantageous over the competition. Customers need to be educated on these points so that the decision is not left to price alone but is a valid view of the overall performance. Customer should look at what auxiliary devices will be required for competitors versus the "complete solution" that the 2271A provides.
2) The overall price of a system is extremely dependent upon the configuration. The most advantageous scenario is one where the configuration is based strictly off of the customer's actual needs and not the competitor's configuration. It's possible that the competitor has convinced the customer that his full needs do not need to be met or cannot be met. By looking at the full needs, we may be able to provide a solution where the competitor can't, thus locking them out of the opportunity.

Need for PM600 module support – The 2271A supports only the PM200 modules. If a customer needs the PM600 measurement performance, then they should look towards the 6270A Modular Pressure Controller. The PM600 is not supported in order to support the price point of the 2271A.

Requirement for supply pressure (Why is there no internal gas compressor?) – The 2271A requires an external gas supply. There are other products on the market (Additel 780) that have an optional gas compressor/intensifier.

1) Acquiring and refilling nitrogen bottles is much less expensive than a dedicated gas booster/intensifier. The full cost of the additional Additel accessories is approximately $15,000 USD. The monthly cost for maintaining nitrogen cylinders is normally under $100 (some regions may vary).
2) Depending upon the environment where the equipment is used, compressing ambient air (especially to high pressures like what would happen here) will result in contamination such as debris and liquids to be introduced into the system. Liquid generated by compressing ambient air will corrode and damage the inside of the system. While steps may be taken to alleviate this, such as installing a dryer, these are half steps compared to the extremes that a gas supplier is able to go to when insuring the purity of the gas.

Calibration at the Module Level – Some customers/auditors will question the validity of performing calibrations on the module level. An application note is available fully exploring this question. There are many steps taken to convert the pressure physically impacting the pressure sensor into a value shown on the display. The design of the 2271A is such that the steps that affect the calibration all take place in the module. The only steps performed by the chassis are a measurement unit conversion and the actual displaying of the pressure. The unit conversion has been validated to insure that it is correctly performed. The displaying of the measurement only impacts the overall uncertainty through the displayed resolution. This can be selected by the user and does not alter the calibration (calibration is performed with maximum resolution). Therefore, it is appropriate to perform the calibration on the modular level.

9. Product Demonstration

If the demo unit is shipped with the measurement modules installed, ensure that the modules are completely screwed in (turn the knob until the torque limiting feature is engaged).

Things to highlight:

1) **How simple it is to control a pressure. Turn the unit on, apply supply pressure, and connect the test port to a DUT (or plug the test port). Type in a setpoint on the main screen, enter a value, press enter, and then press control. The controller should quickly go to the setpoint. Do not go through every menu item (especially not prior to controlling a pressure). You do not want to give the customer the impression that he needs to do a lot of configuration and setup to use the product.**
2) **Highlight how easy it is to change out a measurement module. With supply pressure connected, and the unit turned on, pull out a measurement module. Pass the module around the room and let everyone "feel" the robustness and quality of the module design.**
3) **Cover only those features on the UI that will be of interest to the user.**
    a. **If the user asks if a particular pressure unit is included, then click on the pressure unit and show the user that it is present (assuming it is one of the ones supported).**
    b. **Show the user the uncertainty calculation in the top right corner and how it can help protect them against improper measurements.**
    c. **If the users' native language is different from English, then switch the UI to their native language prior to arriving at the users' facility (whenever possible).**
    d. **Prior to the demonstration, setup an example transmitter or device task (depending upon the customer's workload). Keep the number of setpoints short and show them how easy it is to run a procedure (ideal if done with a pressure transmitter so it can be fully automated).**

10. Ordering Information

A complete system consists of a chassis and at least one measurement module.

Main Chassis

There are four main chassis to choose from. The difference between each is the connection type for the back manifold (NPT or BSP) and the style of the test port connections on the top (P3000 or HC20). The back manifold connection type is normally a function of regional preference (US = NPT, Europe = BSP, etc.). The test port connections on the top are a matter of personal preference. If a customer has a P3000 deadweight tester or P5500 pressure comparator and is happy with that style of pressure connection, then you should choose the P3000 test port. The HC20 test port will provide simpler operation in most all applications and should be the default.

The main chassis includes the Pressure Control Module (PCM) and the Electrical Measurement Module (EMM).

Item	Model Noun	Description
4755274	2271A-NPT-P3K	BENCHTOP PRESSURE CONTROLLER/CALIBRATOR,NPT,P3000 TESTPORT 20 MPA(3000 PSI)
4755288	2271A-BSP-P3K	BENCHTOP PRESSURE CONTROLLER/CALIBRATOR,NPT,P3000 TESTPORT 20MPA(3000 PSI)
4755256	2271A-NPT-HC20	BENCHTOP PRESSURE CALIBRATOR,NPT,STD TEST PORT,20 MPA(3000 PSI)
4755263	2271A-BSP-HC20	BENCHTOP PRESSURE CALIBRATOR,BSP,STD TEST PORT,20 MPA(3000 PSI)

PM200 Pressure Measurement Modules

See the brochure or Extended Specifications document for exact specifications. Modules with a G or BG in the suffix operate natively in gauge mode. To operate in absolute mode, a barometric reference module needs to be included in the system. The PM200-A100K or BRM600-A100K can be used as the barometric reference module, depending upon the accuracy required. Two modules can be installed at any one time. There is no limit to the overall number of modules that can be used with a system (customer could buy six modules and swap them out depending upon usage needs).

The PM200 modules listed here are the same as what is available with the 6270A (modules can be used with either instrument). With the launch of the 2271A we are introducing a new PM200 pressure range, the PM200-BG60K, as shown below.

Item	Model Noun	Description
4363844	PM200-BG2.5K	Pressure Measurement Module,-2.5 to 2.5 kPa (-10 to 10 inH2O)
4363859	PM200-BG35K	Pressure Measurement Module,-35 to 35 kPa (-5 to 5 psi) gauge
4380037	PM200-BG40K	Pressure Measurement Module,-40 to 40 kPa (-6 to 6 psi) gauge
4566171	PM200-BG60K	Pressure Measurement Module, -60 to 60 kPa (-8.7 to 8.7 psi) gauge
4363867	PM200-A100K	Pressure Measurement Module,100 kPa (15 psi) abs
4363871	PM200-BG100K	Pressure Measurement Module,-100 to 100 kPa(-15 to 15 psi) gauge
4363880	PM200-A200K	Pressure Measurement Module,200 kPa (30 psi) abs
4363898	PM200-BG200K	Pressure Measurement Module,-100 to 200 kPa(-15 to 30 psi) gauge
4380055	PM200-BG250K	Pressure Measurement Module,-100 to 250 kPa(-15 to 36 psi)gauge
4363906	PM200-G400K	Pressure Measurement Module,0 to 400 kPa (0 to 60 psi) gauge
4363914	PM200-G700K	Pressure Measurement Module,0 to 700 kPa (0 to 100 psi) gauge
4380062	PM200-G1M	Pressure Measurement Module,0 to 1 MPa (0 to 150 psi) gauge
4363923	PM200-G1.4M	Pressure Measurement Module,0 to 1.4 MPa (0 to 200 psi) gauge
4363938	PM200-G2M	Pressure Measurement Module,0 to 2 MPa (0 to 300 psi) gauge
4380070	PM200-G2.5M	Pressure Measurement Module,0 to 2.5 MPa (0 to 360 psi) gauge
4363945	PM200-G3.5M	Pressure Measurement Module,0 to 3.5 MPa (0 to 500 psi) gauge
4380081	PM200-G4M	Pressure Measurement Module,0 to 4 MPa (0 to 580 psi) gauge
4363950	PM200-G7M	Pressure Measurement Module,0 to 7 MPa (0 to 1000 psi) gauge
4363961	PM200-G10M	Pressure Measurement Module,0 to 10 MPa (0 to 1500 psi) gauge
4363977	PM200-G14M	Pressure Measurement Module,0 to 14 MPa (0 to 2000 psi) gauge
4363989	PM200-G20M	Pressure Measurement Module,0 to 20 MPa (0 to 3000 psi) gauge

Accessories

The following accessories are available for use with the 2271A.

Item	Model Noun	Description
4755364	CASE-2270	Shipping Case, 2271A
4456654	CASE-PMM	Shipping Case, 3 PMM Modules
4755295	PK-2271A-NPT-HC20	Lines and Fittings Kit, 2271A-NPT-HC20
4755301	PK-2271A-BSP-HC20	Lines and Fittings Kit, 2271A-BSP-HC20
4755312	PK-2271A-NPT-P3K	Lines and Fittings Kit, 2271A-NPT-P3K
4755320	PK-2271A-BSP-P3K	Lines and Fittings Kit, 2271A-BSP-P3K
4456687	PMM-CAL-KIT-20M	Pressure Measurement Module Calibration Kit, 20 MPa (3000 psi)
4755358	DS70-KIT-EMM	Electrical Measurement Module Docking Station
4755402	CPS-2270-20M-HC20	Contamination Prevention System, 20 MPa (3000 psi), HC20 Test Port
4755416	CPS-2270-20M-P3K	Contamination Prevention System, 20 MPa (3000 psi), P3000 Test Port
3584473	VA-PPC/MPC-REF-110	Vacuum Pump Package,110V
3584486	VA-PPC/MPC-REF-220	Vacuum Pump Package,220V

CarePlans

Since the Pressure Measurement Modules (PM200) require recalibration, both Gold and Silver CarePlans are available. Silver CarePlans are available for the chassis.

Chassis CarePlans

Item	Model Noun	Description
4796677	SCP2271A-TEST	1 YR SCP, 2271A PRESSURE CALIBRATOR CHASSIS
4796704	SCR2271A-TEST	1 YR SCP RENEWAL, 2271A PRESSURE CALIBRATOR CHASSIS

PM200 CarePlans

Item	Model Noun	Description
4624154	GCPPM200-ACR	1 YR GCP, PM200 LOW ACC PRESSURE MEAS MODULE ACRCAL
4624187	GCRPM200-ACR	1 YR GCP RENEWAL, PM200 LOW ACC PRESSURE MEAS MODULE ACRCAL
4624397	SCPPM200-ACR	1 YR SCP, PM200 LOW ACC PRESSURE MEAS MODULE ACRCAL
4624432	SCRPM200-ACR	1 YR SCP RENEWAL, PM200 LOW ACC PRESSURE MEAS MODULE ACRCAL

Contamination Prevention System (CPS) Care Plans

Item	Model Noun	Description
4796614	SCPCPS2270-RBR	1 YR SCP, 2270 CONTAMINATION PREVENT SYS RBR

Sample Configurations

Recommended Demo Configuration (NPT regions)

Item	Model Noun	Description
4655256	2271A-NPT-HC20	BENCHTOP PRESSURE CALIBRATOR,NPT,STD TEST PORT,20 MPA(3000 PSI)
4755295	PK-2271A-NPT-HC20	LINES AND FITTINGS KIT FOR 2271A-NPT-HC20
4755364	CASE-2270	REUSABLE TRANSIT CASE FOR 227X
4363938	PM200-G2M	Pressure Measurement Module,0 to 2 MPa (0 to 300 psi) gauge
4363867	PM200-A100K	Pressure Measurement Module,100 kPa (15 psi) abs

Recommended Demo Configuration (BSP regions)

Item	Model Noun	Description
4755263	2271A-BSP-HC20	BENCHTOP PRESSURE CALIBRATOR,BSP,STD TEST PORT,20 MPA(3000 PSI)
4755301	PK-2271A-BSP-HC20	LINES AND FITTINGS KIT FOR 2271A-NPT-HC20
4755364	CASE-2270	REUSABLE TRANSIT CASE FOR 227X
4363938	PM200-G2M	Pressure Measurement Module,0 to 2 MPa (0 to 300 psi) gauge
4363867	PM200-A100K	Pressure Measurement Module,100 kPa (15 psi) abs

Calibration of Wide Variety of Low Accuracy Devices

Item	Model Noun	Description
4655256	2271A-NPT-HC20	BENCHTOP PRESSURE CALIBRATOR,NPT,STD TEST PORT,20 MPA(3000 PSI)
4363938	PM200-G2M	Pressure Measurement Module,0 to 2 MPa (0 to 300 psi) gauge
4363867	PM200-A100K	Pressure Measurement Module,100 kPa (15 psi) abs
4363945	PM200-G3.5M	Pressure Measurement Module,0 to 3.5 MPa (0 to 500 psi) gauge
4363950	PM200-G7M	Pressure Measurement Module,0 to 7 MPa (0 to 1000 psi) gauge
4363977	PM200-G14M	Pressure Measurement Module,0 to 14 MPa (0 to 2000 psi) gauge
4363989	PM200-G20M	Pressure Measurement Module,0 to 20 MPa (0 to 3000 psi) gauge
4456693	CPS-20M	Contamination Prevention System 20 MPa (3000 psi)

If BSP fittings are preferred, then change 2271A-NPT-HC20 to 2271A-BSP-HC20

Adjust PMM ranges as necessary

11. Schedule

At launch, the product will be on an 8–10 week lead time. We will proactively keep the sales channel informed of improvements as we move to a 4–5 week lead time.

12. Sales and Marketing Documents

For a complete list of available Sales and Marketing Documents, please see the 2271A Launch Page found at http://us.flukecal.com/2271A-Launch.

13. FAQs

Does COMPASS software support the 2271A?

A release of COMPASS is scheduled to coincide with the 2271A launch that will include auto-detect support for the 2271A and the PM200 Measurement modules (when used with the PMM Calibration Kit)

Can the 2271A be used as an AutoGen component to float a PG7000 piston?

Piston flotation is not supported with the 2271A.

Can any module be used in any slot?

Yes. All slots are identical, allowing for any PMM (including barometers) to be used on any slot.

Can I add higher pressure later?

Yes. All chassis and control modules are rated for 20 MPa (3000 psi), even if they are only purchased with lower range modules. To expand the range of the unit, simply purchase a new measurement module.

Do I need a DVU for low differential pressure control?

It is not strictly mandatory to use a DVU for low differential pressure control but it will provide better performance.

Will the 2271A support PM600 modules?

No. If a customer requires the measurement performance of the PM600 modules, then direct them to the 6270A.

What is included in the lines and fittings kit?

Each lines and fittings kit includes the lines and fittings necessary to connect to supply pressure (terminating in male ¼ NPT or ¼ BSP depending upon kit), test system (terminating in male ¼ NPT or ¼ BSP depending upon kit), and vacuum supply.

Can we do screen shots?

The 2271A has a built-in feature for capturing screen shots. Simply hold down the "SAVE" button and the screen will be saved. The image file can then be retrieved over the USB interface.