Pressure MAX PM-1-XL-M Digital Pressure Meter

Operator's Manual

PRONK TECHNOLOGIES

This Operator's Manual relates to Pressure MAX PM-1-XL-M with SW 1.0 or higher.

This product is intended for testing purposes only and is not used in diagnostics, treatment or any other capacity where it would come in contact with a patient.

The device shall only be used with the AC power cord provided or with AA Alkaline or Lithium batteries.

Operate this product using only accessories provided by Pronk Technologies.

If this equipment is used in a manner not specified by Pronk Technologies, the protection provided by the equipment may be impaired.

Service and calibration must be performed by Pronk Technologies or a designated service organization approved by Pronk Technologies. Verify proper service and calibration by reviewing certification document returned with the device.

To dispose this product, contact Pronk Technologies at support@pronktech.com. We will issue a RMA and pay for return shipment.

Contact Information

Sales: 800-609-9802

Technical Support: 800-541-9802

FAX: 818-768-5606

Email: support@pronktech.com

Website: www.pronktech.com

Table of Contents

Basic Operation

- Press the Zero/Power ⬤ button to turn the unit on
- Press the Zero/Power ⬤ button to zero pressures
- Connect to WIDE or NARROW pressure port depending on desired pressure range
- Press Units/Menu ⬤ button to change units of measure
- Hold Zero/Power ⬤ button to turn the unit off

Overview

The Pressure MAX (PM-1) Digital Pressure Meter is quick to set up, easy to use and ready to go where you need to be. PM-1 has three ports to measure pressure: a wide port, a narrow port, and a differential port as shown below. The PM-1 can measure air, gas, or liquid (note: liquid measure via wide port only). The PM-1 also has very useful features, such as a Peak Pressure indicator, built-in Timer, and the ability to set multiple pressure targets. Pressures are displayed in your choice of eleven units of measure, selectable with a press of a button. The Pressure MAX is equipped with Pronk *Mobilize™* wireless connectivity.
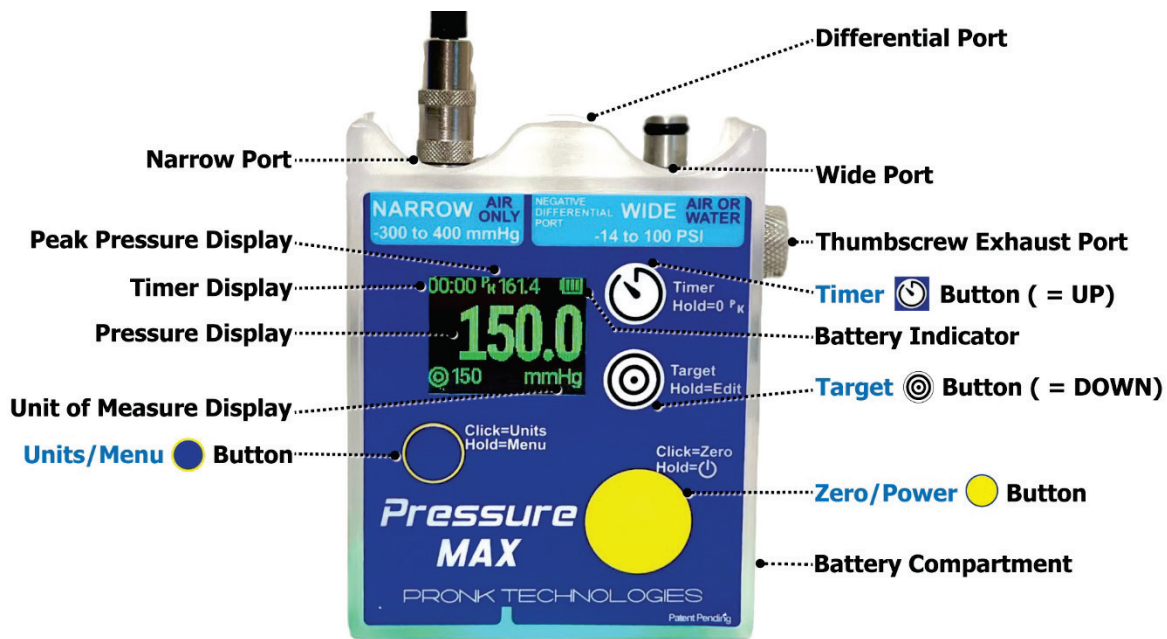
Batteries and Power

Install the AA batteries in the correct orientation as labeled inside the battery compartment. See figure at right. The PM-1 can also be powered by a standard Pronk 6VDC 2.0 A power supply. When on battery, the PM-1 will shut down if not used for 20 minutes. Battery life is up to 30 hours, depending on the type of battery used. A battery level meter indicator is visible in the upper right side of the display.

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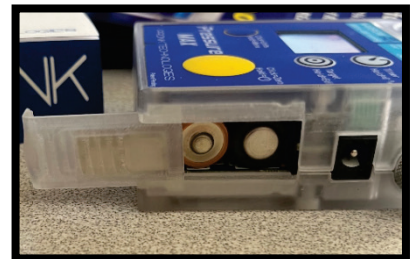
## Dual Pressure Channels

The PM-1 has two pressure ports.

WIDE pressure port is for measuring larger pressure values, -14 to 100 PSI.

NARROW pressure port measures lower pressure ranges, -300 to 400 mmHg, and it does so with remarkable accuracy and precision (see PM-1 Specifications).

The WIDE port is configured with a bleed screw that enables it to be used with either liquid or gas, while the NARROW port is recommended for use with gasses only. The PM-1 will automatically select which port to display, based upon which port has pressure applied to it. When pressure is applied to a port, the PM-1 will lock the display onto that port and will continue showing only that port for 30 seconds after pressure is released. If no pressure is applied to either port, the PM-1 will toggle the display between the two ports every two seconds so users can see if either port needs zeroing. The NARROW port display will always show an additional digit of resolution over the WIDE port display.

Peak Pressure

The PM-1 captures the peak pressure value and displays it in the top-center of the screen next to the ^P_K icon as shown below. Peak value can be cleared by holding the Timer/0 ^P_K 🕐 button. Peak pressures will also zero when the units setting is changed (see "Selecting Units of Measure," below).

Hold Button = Zero Peak Pressure
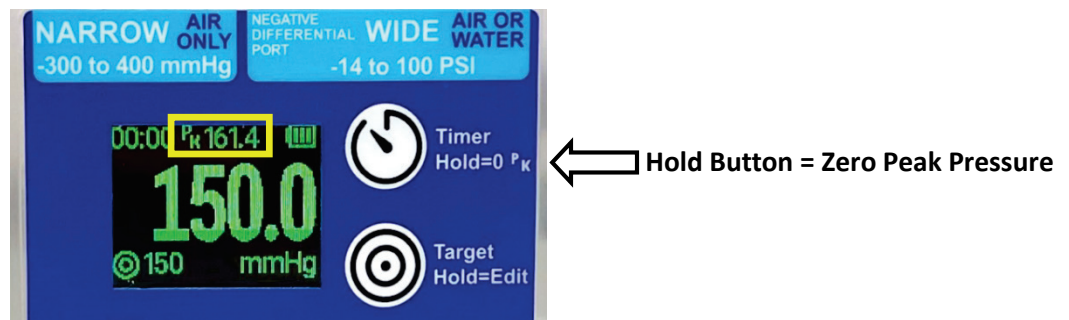
Timer

Tapping the Timer ⏲ button will cycle through:

- Timer start
- Timer stop
- Timer reset

Selecting Units of Measure

Tapping the Units/Menu ⬤ button will rotate through the available units of measure. There are 11 units of measure available: mmHg, PSI, cmH$_2$0, atm, mbar(a), mbar(g), bar(a), bar(g), kPa, inHg, inH$_2$0.

To filter unneeded units of measure, they can be turned off as follows:

- Hold the Units/Menu ⬤ button.
- Use the Timer ⏲ button (scroll UP) or Target ◎ button (scroll DOWN) (see image on p. 4) to scroll to the CUSTOMIZE UNITS selection. Tap the Zero/Power ⬤ button to select.
- Use the Timer ⏲ button (scroll UP) or Target ◎ button (scroll DOWN) (see image on p. 4) to scroll through the units of measure. Use the Zero/Power ⬤ button to uncheck any unwanted units of measure.
- Tap the Units/Menu ⬤ button when done.

Thumbscrew Exhaust Port

The Pressure MAX WIDE port can be used for measuring pressure of gas or liquids. When switching between measuring liquids and gasses, it can be useful to remove the fluids from the system before measuring gas pressures and to remove air bubbles before measuring fluid pressures. To remove the liquid or gas from the system:

- Loosen the Thumbscrew Exhaust Port (see figure on p. 4).
- Lay the unit flat.
- Flush the unit with a syringe until there is no gas or liquid exiting.
- Tighten the Thumbscrew Exhaust Port. A firm finger tightness is sufficient.

Differential Pressure Readings

Both WIDE and NARROW ports can read gauge pressures. This is the pressure of the port minus current atmospheric pressure. Atmospheric pressure is read via the center 'Negative Differential Port' which is normally left open to the air. However, sometimes it is useful to measure the difference between two pressures. For example, when fluid is flowing through an orifice, flow rate can be measured by looking at the pressure difference between the two sides of the orifice. To make these sorts of measurements, the 'Negative Differential Port' can be connected to one side of the reading setup, and the WIDE or NARROW port can be connected to the

other. In this configuration, the PM-1 will read the pressure difference across the setup. Reading accuracy will be ± 1%, and the range of the negative port is limited to ±1 bar or about ±14 PSI.

Working with Pressure Targets

The Pressure Target feature of the PM-1 gives you a way to check pressure values without needing to see the pressure value on the display. When a target is enabled, the PM-1 will show the target value in the center of the display and:

- If pressure is *out of tolerance and below target*, case and display are lit blue.

- If pressure is *within tolerance of target*, case and display are lit green. If beeping is enabled via the Menu (use Units/Menu ⬤ button), unit will also beep slowly.

- If pressure is *out of tolerance and above target*, case and display are lit red.

To enter Target mode or to switch between targets: tap the Target ◎ button (see p. 4). To exit Target mode, tap either the Units/Menu ⬤ button or the Target ◎ button when the last target is displayed.
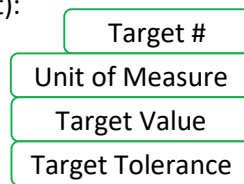
How to Set Pressure Targets

The PM-1 has five programmable Pressure Targets. Each Target has four fields (see figure, right): Target #, Unit of Measure, Target Value, and Target Tolerance.

To edit a target, press and hold the Target ◎ button.

1. **Select a Target # to edit:** initially, "TARGET #1" will be highlighted in blue. To select a different Target # for editing, press ⬤ to select the **Target #** field. Then scroll to the desired Target # by using the Timer 🕐 (= UP) or Target ◎ (= DOWN) buttons. Press ⬤ again to select that Target #.

2. **Select Unit of Measure:** after the target # has been selected, use the ◎ button to highlight the **Unit of Measure** (i.e., **Units**) field. (Note: if a Target # is not currently in use, the **Units** field will say 'off.') Press ⬤ to select the **Units** field for editing. Then use the 🕐 or ◎ button to scroll to the desired Unit of Measure. Then press ⬤ again to Select.

3. **Select Target Value:** use the ◎ button to highlight the Target Value field. Press ⬤ to select the Target Value field for editing, then use the 🕐 or ◎ button to scroll to the desired Target Value. Then press ⬤ again to store the Target Value.

4. **Select Tolerance:** after you have selected the desired Target Value, use the ⊚ button to highlight the Tolerance field. Press ⬤ to select the field for editing, then use the 🕑 or ⊚ button to scroll to the desired Tolerance. Press ⬤ again to store the Tolerance.
5. **Save the Pressure Target:** press the Units/Menu ⬤ button to save this Pressure Target.

Additional Menu Features

To enter Menu mode, press and hold the Units/Menu ⬤ button. Scroll through the highlighted menu options displayed by using the Timer 🕑 button (= UP) or Target ⊚ button (= DOWN). Press ⬤ to select.

A. **Trend:** shows a trend of 15 minutes of pressure readings, taken at intervals of one minute.
B. **Edit Targets:** gives an alternate entry to edit Targets (see section above).
C. **Beep:** will turn on or off the audible tone for targets by highlighting with the 🕑 or ⊚ buttons and using ⬤ to toggle.
D. **Customize Units:** see "Selecting Units of Measure" section on p. 7.
E. **Service:** for Pronk authorized service personnel only (password protected).

Press the Units/Menu ⬤ button to return to the home screen.

Using a Pole Clamp

A pole clamp, bench clamp, or any other ¼"-20 threaded accessory can be attached in the center of the bottom of the PM-1. Mount Clamp (Part Number 501-9923) can be used as a pole or bench clamp. Ensure that the ¼"-20 stud on any clamp or accessory does not extend more than 0.250 inch into the PM-1.

Accessories

STANDARD ACCESSORIES:

Carrying Case, (1) PM-1WCH: 2 feet of high pressure ¼ in. ID tubing with (1) PMC Female to ¼ in. barb fitting, (1) PMC Female to ¼ in. barb fitting, (4) PMC Male to ¼ in. barb fitting, (1) ¼ in. x 1/8 in. barbed reducer, (1) ¼ in. x 3/8 in. barbed reducer, (1) Female Luer to ¼ in. barb fitting, (1) Adapt-PM1QD: 2 in. low pressure 1/8 in. ID tubing with (1) Quick Disconnect fitting, and (1) 1/8 in. barbed T fitting, (2) AA alkaline batteries and (1) Power Supply.

OPTIONAL ACCESSORIES:

Mounting Clamp Part Number 501-9923. ¼ in.-20 threaded.

Configuring Accessory Hoses

The NARROW port of the PM-1 utilizes a 0.2 inch barrel quick disconnect that is commonly used for NIBP fittings for patient monitors and others. Your PM-1 kit includes a female connector for this, as well as a length of low pressure hose. Because the low pressure hose is used for the NARROW port, it is easy to manually reconfigure different connectors onto the hose.

The WIDE port of the PM-1 utilizes a 5/16 inch barrel quick disconnect fitting which is supported by several manufacturers in different materials and configurations. The accessory fittings supplied by Pronk are CPC PMC series parts, which is a cost-effective, durable Delrin series material of compatible parts which are rated to 120 psi and widely available. A few parts in this series are shown below:

Gender	Hose Barb Size	Part Number
Male	1/16"	PMC2201
Male	1/8"	PMC2202
Male	1/4"	PMC2204 (Pronk P# 102-4036)
Female	1/6"	PMC1701
Female	1/8"	PMC1702 (Pronk P# 102-4032)
Female	1/4"	PMC1704 (Pronk P# 102-4040)

The WIDE port accessory hoses and fittings supplied can be configured in different ways. A high pressure hose must be used to support the full range of WIDE port pressures, and manually removing this hose from fittings after installation is often not feasible. So, advance planning of the hose configuration is necessary. In the suggestion below, an 18 inch PMC F-F extension hose is built, in addition to a number of PMC male-based adapter hoses. This configuration has good flexibility and is very cost-effective for building a large library of adapter hoses.
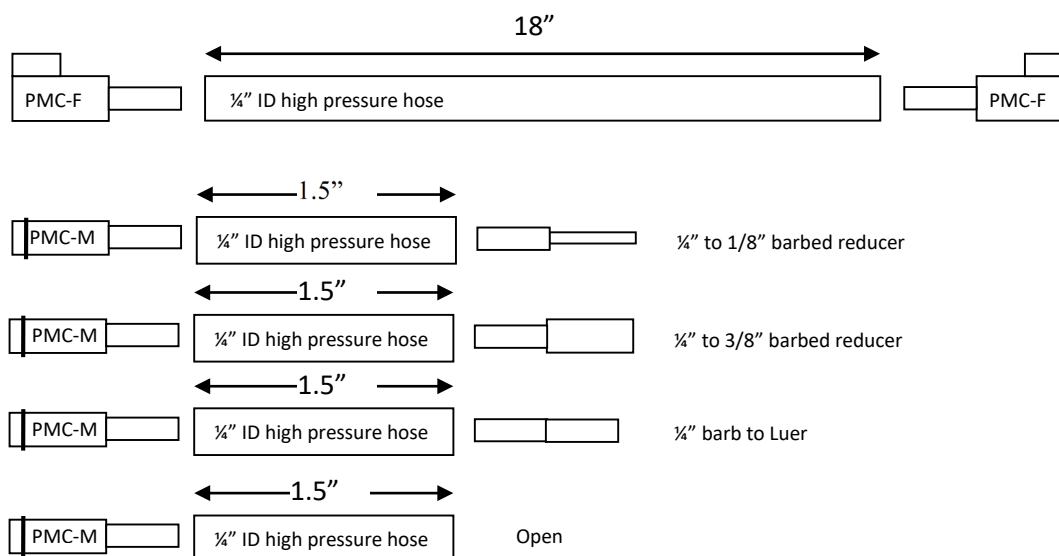
A different configuration could be built to use an M-F extension hose rather than the F-F extension hose. This configuration has the advantage that the adapter hoses can be used directly on the PM-1 without the use of the extension hose, but since the PMC Female parts are roughly four times the cost of the PMC Male parts, it is not as cost effective for building a large library of different adapter hoses.

Pronk *Mobilize* Wireless Connectivity

The PM-1 integration of the Pronk Mobilize Wireless Solution provides automated testing and data collection capabilities. Mobilize integration is indicated by "Pressure MAX Mobilize" printed on the device and/or by the part number ending in "-M."

Fluid Height Units of Measure

Units of Measure that are based on fluid height must be referenced to a specific fluid temperature and value of gravity. The PM-1 references these measures to g= 9.80665m/s2, Water Temp= 4° C, and Mercury Temp = 0° C.

These are the most standard modern values, but in some older documents, InHg and InH2O can reference 60° F, which would give slightly different values.

Temperature Range Errors

The PM-1 is only validated to its specified accuracy over its specified temperature range. Beyond this temperature range, it will stop showing pressure and instead show an error message and the measured temperature value. To avoid temperature errors, keep your PM-1 in the passenger compartment when traveling by car or plane, and indoors when possible. To quickly recover from temperature errors, place the PM-1 in an area within temperature specifications (I.E pocket next to your body).

PM-1 Limited Warranty

The Pressure MAX PM-1 Digital Pressure Meter is warranted against defects in materials and workmanship for a period of forty-eight (48) months from the date of shipment to the original purchaser. Warranty is valid only to the original buyer. Defective equipment should be returned freight prepaid to Pronk Technologies. Equipment returned with defective parts and assemblies shall be either repaired or replaced at the manufacturer's sole discretion. This warranty is not applicable if the unit has been opened, if repair has been attempted, if the unit has been damaged due to operation outside the environmental and power specifications for the product, or due to improper handling or use. If any fault develops, notify Pronk Technologies (see Returns and Repairs, below) giving full details of the difficulty, and include the model and serial number of the device. Upon receipt of shipping instructions, forward the device prepaid and repairs will be made at the factory. The foregoing warranty is in lieu of all other warranties expressed or implied, including but not limited to any implied warranty or merchantability, fitness or adequacy for any particular purpose or use. Pronk Technologies shall be liable only for repair or replacement of the PM-1 and optional features. Pronk Technologies shall not be liable for any incidental or consequential damages.

Order Cancellation and Refund Policy

You may return your item within 14 days of delivery for a full refund. We are unable to exchange items (however, if you received a defective or incorrect item, we will be happy to make an exchange). Item(s) returned for refund must be in its original condition, undamaged and with no missing parts, packed in its original packaging, and include both the original receipt and an RMA number.

We will notify you via e-mail or fax of your refund once we have received and processed the returned item. You can expect a refund in the same form of payment originally used for purchase within 7 to 14 business days of our receiving your return.

Returns and Repairs

Please call Pronk Technologies' Service Department at 800-541-9802 to obtain a Return Merchandise Authorization (RMA) number and the shipping address. Returns should be packaged securely in the original packaging materials. The RMA number should be clearly marked on the packaging. If the return is for a new item and is a result of our error, we will make arrangements for payment of return shipping. Otherwise, items should be returned freight prepaid to Pronk Technologies.

Services

Calibration is recommended on an annual basis. The Pronk PM-1 calibration procedure must be followed by an authorized calibration company using NIST traceable fixtures defined in the procedure to guarantee the device meets all specifications.

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