

Description

The Room Pressure Monitor is used to measure differential pressure in the range of 0.125 to 1"wc or 30 to 250 Pa. It combines precision high sensitivity silicon sensing capabilities and the latest ASIC technology to substantially reduce offset errors due to changes in temperature, stability to warmup, long term instability and position sensitivity. It is ideal for monitoring pressure for air or other clean inert gas. It features field selectable bi-directional pressure ranges and output signal types for the most flexible application. The device has an on-board auto-zero function, backlit LCD and alarm function with silence switch.

Before Installation

Read these instructions carefully before installing and commissioning the Room Pressure Monitor. Failure to follow these instructions may result in product damage. Do not use in an explosive or hazardous environment, with combustible or flammable gases, as a safety or emergency stop device or in any other application where failure of the product could result in personal injury. Take electrostatic discharge precautions during installation and do not exceed the device ratings.

Mounting

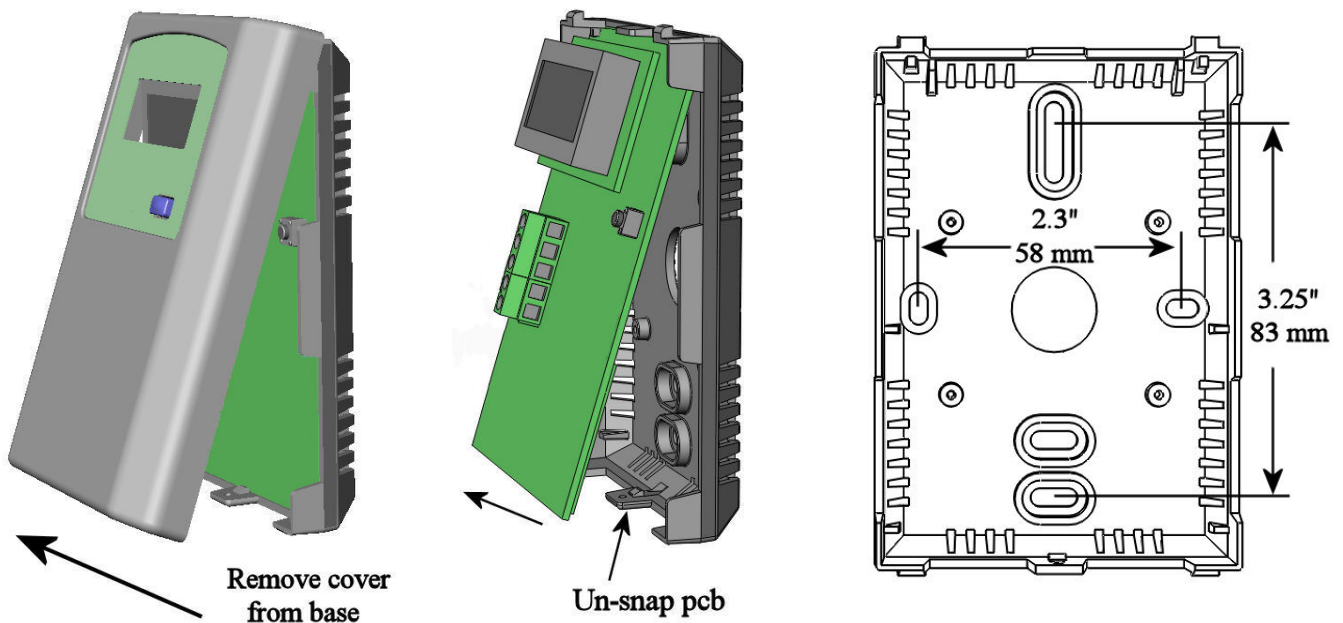
The RP installs directly on a standard electrical box and should be mounted about four to five feet from the floor of the area to be controlled. Leave enough space in the wall box to connect the pressure tubing and avoid locations with severe vibrations, excessive moisture or rapid temperature changes. To prevent erroneous readings due to air disturbances within the wall cavity, seal the conduit leading to the junction box.

The cover is hooked to the base at the top edge and must be removed from the bottom edge first. Use a small screwdriver to carefully pry each bottom corner if necessary. If a security screw is installed on the bottom edge, then it may have to be loosened or removed also. Tip the cover away from the base and sit it aside.

The pcb must be removed from the base to access the mounting holes. Follow usual anti-static procedures when handling the pcb and be careful not to damage any components. The pcb is removed by pressing the enclosure base to un-snap the latch near the bottom edge, then the pcb can be lifted out of the base. Sit the pcb aside until the base is mounted on the wall.

After the base is screwed to an electrical box or the wall using the appropriate holes, pull the wires through the wiring hole in the center of the pcb and then reinstall it in the enclosure base. Ensure the pcb is snapped into the base securely and correctly.

The remote pressure pickup (mounted on an electrical wall plate) is typically mounted on the opposite side of the wall outside the room being monitored. It also mounts directly to a standard electrical box four to five feet from the floor. If the remote buzzer option is used, simply mount it directly to a standard electrical box also.



Hardware Setup

The analog output type must be set before the device is connected. Slide the pcb **OUTPUT** switch to either **Vdc** or **mA** for the required output signal type, either 0-5/10 Vdc or 4-20 mA. Operating parameters may be set via the menu after the device is connected.

Wiring Instruction

The transmitter has standard screw block connectors. Use shielded twisted pair wiring of at least 22 AWG for all connections and do not run device wires in the same conduit with wiring used to supply inductive loads such as motors. Disconnect the power supply before making any connections to prevent electrical shock or equipment damage. Make all connections in accordance with national and local electrical codes.

This is a 3-wire sourcing device. Connect the positive dc or the ac voltage hot side (24 Vac/dc ± 10%) to the **POWER** terminal. The supply common is connected to the **COMMON** terminal. The device is reverse voltage protected and will not operate if connected backwards. It has a half-wave rectified power supply so the supply common is the same as the signal common. Several devices may be connected to one power supply and the output signals all share the same common. Use caution when grounding the secondary of a transformer or when wiring multiple devices to ensure the ground point is the same on all devices and the controller.

The analog output is available on the **PRES OUT** terminal. This signal is switch selectable for either voltage or 4-20 mA active output. In voltage mode the output can be set to 0-5 or 0-10 Vdc via the menu. The current output operates in the Active mode and does not require a loop power supply. This means **the signal current is generated by the transmitter and must not be connected to a powered input or device damage will result.** Check the controller Analog Input to determine the proper connection before applying power. Both current and voltage signals are referenced to the **COMMON** terminal. The voltage output signal has a minimum load that it is able to drive, similarly the current signal has a maximum load. Follow the ratings in the Specification section or inaccurate readings may result.

The **RELAY** output is a normally open dry contact. This signal can be used to directly control an alarm, ventilation fan or may be connected to a digital input of the BAS for status monitoring. Ensure any load connected to the relay is within the relay rating in the Specification section.

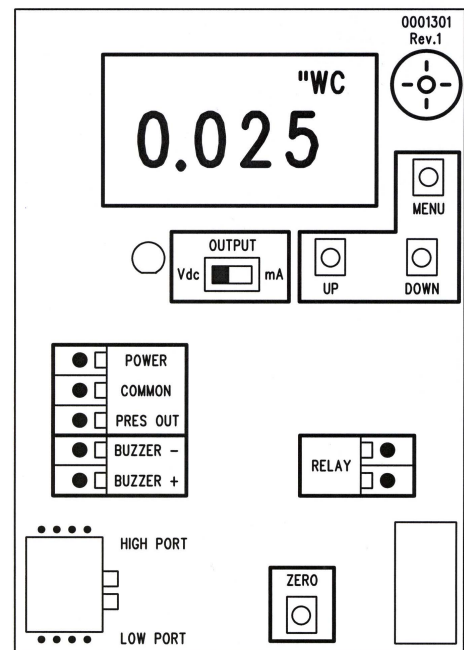
The remote buzzer is an optional component that can be installed to give a remote indication of an alarm condition. The **BUZZER** output requires two wires (+ and -) to operate the 24 Vdc remote buzzer. Follow the polarity indications on both units when making the connections.

Pneumatic Connections

The two pressure ports are labeled **High Port** and **Low Port** on the pcb. The output signal reads a positive value when the port pressure is higher on the **High** port than the **Low** port so ensure these ports are connected correctly. One port will be left open to measure the room pressure where the device is installed and the other port is connected to a remote pickup outside the room to measure the differential pressure.

Use 1/16" ID flexible silicone tubing for the pressure connections. Tube size adapters are included to allow the use of 1/8" ID tubing. Arrange the tubing to minimize stress on the connections and ensure there are no kinks in the tubing. The tubing should be routed through the pcb access hole and out the back of the enclosure base.

Ensure the tubing to be used is clean and do not allow material to fall into the pressure ports as contamination could damage the sensor. When removing tubing use care to avoid breaking the ports. In some cases it is better to cut the tubing off rather than pulling it off but be careful not to cut the fitting or an air leak may occur.



Power Up Instruction

Before turning on the power, verify all wiring to ensure that it complies with the wiring instructions described above and verify that the output signal type is correctly selected on the pcb. Also, review the specifications to ensure the power supply is correct and that the pressure is within the correct range. The product should be allowed to warm-up for several minutes before attempting to verify accuracy.

Operation can be verified by measuring the output signal. For voltage output configuration, measure the voltage between the **PRES OUT** and **COMMON** terminals. The voltmeter should read between 0-5 or 0-10 Vdc depending on the output range selected. For current output configuration, insert a mA meter in series with the **PRES OUT** terminal and it should read between 4 and 20 mA.

Upon applying power to the device the alarm condition is set to off so the relay, buzzer, LED and remote alarm are off. The analog output is set to the midpoint and the LCD will display the software version number such as 1.00 for 5 seconds. All keys are disabled during start-up mode. At the end of the start-up mode the device will enter normal operation.

Normal Operation

For a bipolar range such as ± 1 "wc, the pressure applied to the **High** port should be higher than pressure applied to the **Low** port for a positive output response. In this case, differential pressure can be measured using both ports. If the **High** port has a positive pressure with respect to the **Low** port, then the output indicates a positive pressure. Negative pressure is indicated if the **High** pressure is less than the **Low** pressure. The output pressure can be calculated as follows:

4-20 mA	Pressure = [(Output current – 4 mA) / 16 mA] x 2 x Range – Offset
0-5 Vdc	Pressure = (Output voltage / 5 V) x 2 x Range – Offset
0-10 Vdc	Pressure = (Output voltage / 10 V) x 2 x Range – Offset

In the case of ± 1 "wc, 4 mA or 0 V = -1 "wc and 20 mA or 5 V or 10 V = +1 "wc. Since the transmitter is linear, 0 "wc would be 12 mA or 2.5 V or 5 V.

During normal operation the device reads the pressure sensor and calculates the pressure value depending on the device model ranges and the selected pressure range. The pressure value is displayed on the LCD and sent to the analog output.

The output signal may be affected by the pressure averaging time setting in the menu. The pressure averaging setting controls how many readings are averaged to form the output value. The pressure averaging time defaults to 5 seconds and can be set from 1 to 60 seconds. This value effectively filters the output to prevent noise and false alarms.

The device also compares the output pressure value to the alarm setpoints and takes appropriate action. If the pressure value exceeds either setpoint then an alarm condition is set and the device will operate in alarm mode. Alarm mode activation is controlled by certain delay times and user settings described later. The device also monitors the keys and takes appropriate action if a key is pressed.

Alarm Operation

The alarm feature includes an on-board buzzer, silence switch, control relay, remote buzzer connection and LED.

The alarm feature has several settings that can be controlled by the setup menu. The device has two alarm trip points designated the high pressure alarm limit and the low pressure alarm limit. The high pressure alarm defaults to 50% of the maximum pressure range and the low pressure alarm defaults to 50% of the minimum pressure range. For example, if the device is set to a ± 1 "wc range, then the default low pressure alarm limit will be -0.5 "wc and the default high pressure alarm limit will be +0.5 "wc. This is the same result for Pa ranges.

The alarm setpoints can be set over the pressure range with certain conditions. For this example the pressure range is ± 1 "wc.

- the low pressure alarm limit cannot go below the minimum pressure range setting (-1.0 "wc).
- the high pressure alarm limit cannot go above the maximum pressure range setting (+1.0 "wc).
- the high pressure alarm limit must always be greater than the low pressure alarm limit.
- the minimum alarm span (high alarm - low alarm) must be at least 25% of the pressure span (2 "wc x 25% = 0.5 "wc).
- if the minimum span is reached while adjusting one of the alarm limits, then the other alarm limit will be "pushed".

In this example for the ± 1 "wc range, these are some possible alarm settings: -1.0 to -0.5 "wc, -0.75 to -0.25 "wc, -0.5 to 0 "wc, -0.25 to 0.25 "wc, 0 to 0.5 "wc, 0.5 to 1.0 "wc.

The alarm also has settings for on delay and off delay which can be set via the menu. Both of these default to 5 seconds but may be changed from 1-59 seconds or 1-10 minutes. For an alarm condition to be set the pressure value must exceed either alarm trip point for more than the alarm on delay time. For an alarm condition to be reset the pressure value must return to a non-alarm value for more than the alarm off delay time.

When an alarm condition is set the red LED will flash, the relay output will activate, the local buzzer will sound and the remote buzzer output will activate. If the alarm condition is reset, all four outputs will de-activate. The LED flashes at a rate of 1 second on / 1 second off, the relay and remote buzzer are held on and the local buzzer sounds at a rate of 1 second on / 5 seconds off.

The alarm can be silenced by pressing the front cover silence switch during an alarm condition. In this case the buzzers and relay will de-activate but the LED continues to flash until the alarm condition is removed. The alarm silence time can be set in the menu to 1-60 minutes or forever and the default is 30 minutes. This means that if the silence switch is pressed and the alarms are silenced (and the alarm condition is not reset) then the alarm will re-activate after the silence time has expired. For the default setting of 30 minutes, the alarm buzzers and relay will activate again after 30 minutes of silence if the alarm condition still exists. If the delay is set to forever, then the alarms will not activate again in silence mode until the alarm condition is cleared and another alarm condition is set.

The alarm can be disabled by the user by holding the front cover silence switch for 5 seconds. It can be re-enabled by holding the switch again for 5 seconds. When the alarm is disabled, the OFF icon will be lit on the LCD and no alarms will be activated.

The local alarm buzzer volume can be set or muted via the menu and an alarm test can be initiated via the menu. The alarm test will force an alarm condition to be set. Since the menu has a 5 minute time-out, if the alarm is left on it will reset after 5 minutes back to a normal condition.

Auto Zero Operation

A sensor auto zero can be initiated by pressing and holding the internal ZERO switch for at least 3 seconds. If both pressure ports are close to zero pressure (open to ambient), then the device will calibrate with a new zero point.

Setup Menu Operation

The Setup Menu can be accessed by pressing the internal <MENU> key at any time after the start-up mode.

The system suspends operation when in the menu and holds the last pressure value on the output. If an alarm condition was present then it will be reset to enter the menu and alarm operation is disabled while in the menu (except for alarm test). If the setup menu is not active for 5 minutes (no key press), then the menu will exit and the device returns to normal operation. When the menu is active, the silence key operation becomes the <UP> key as shown on the pcb silkscreen.

<MENU> Press and release the <MENU> key to enter the Setup Menu

- 1. 0-5V, 0-10V This item sets the analog output voltage span to either 0-5 (default) or 0-10 Vdc. Use <UP> or <DOWN> to toggle 0-5 or 0-10.

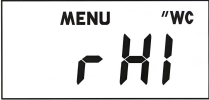











<MENU>

- 2. "wc, Pa The pressure scale defaults to "wc. Use <UP> or <DOWN> to toggle it to Pa.



<MENU>

3.  HI, LO The pressure range defaults to HI. Pressure ranges per model are shown below:
 RP01 = HI (± 1 "wc or ± 250 Pa), LO (± 0.5 "wc or ± 125 Pa)
 RP02 = HI (± 0.25 "wc or ± 60 Pa), LO (± 0.125 "wc or ± 30 Pa)
 This can be changed to LO using <UP> or <DOWN>.
 <MENU>
4.  1-60" The pressure averaging time defaults to 5 seconds. This can be changed from 1-60 seconds using <UP> or <DOWN>.
 <MENU>
5.  x.xx, xxx The high pressure alarm limit defaults to (+ range max x 50%). This equals + 0.5 "wc for the ± 1 "wc range, + 125 for the ± 250 Pa range, etc. It can be changed using <UP> or <DOWN> throughout the range. Resolution for each range is: ± 1 "wc (0.05), ± 0.5 "wc (0.02), ± 0.25 "wc (0.01), ± 0.125 "wc (0.01), ± 250 Pa (10), ± 125 Pa (5), ± 60 Pa (2) and ± 30 Pa (1). Note that the ± 250 Pa range must be displayed as /10 such that it is - 25H to 25H.
 <MENU>
6.  x.xx, xxx The low pressure alarm limit defaults to (- range max x 50%). This equals - 0.5 for the ± 1 "wc range, - 125 for the ± 250 Pa range, etc. It can be changed using <UP> or <DOWN> throughout the range. Note the restrictions as described in Alarm Operation section.
 <MENU>
7.  1-59", 1-10' The alarm on delay defaults to 5" (seconds). It can be changed from 1-59" (seconds) and 1-10' (minutes) using <UP> or <DOWN>.
 <MENU>
8.  1-59", 1-10' The alarm off delay defaults to 5" (seconds). It can be changed from 1-59" (seconds) and 1-10' (minutes) using <UP> or <DOWN>.
 <MENU>
9.  1-60', F The alarm silence time defaults to 30' (minutes). It can be changed from 1-60' (minutes) or F for forever using <UP> or <DOWN>.
 <MENU>

10.  0, 1, 2 The buzzer volume defaults to 2 (high volume). It can be changed to 0 (off) or 1 (low volume) using <UP> or <DOWN>.
- <MENU>
11.  0, 1 The LCD backlight defaults to 1 (on). It can be toggled to 0 (off) using <UP> or <DOWN>.
- <MENU>
12.  OFF, On The alarm test defaults to OFF. It can be set to On using <UP> or <DOWN>.
- <MENU> Exits the Setup Menu and returns to normal operation.

Specifications

Pressure Ranges	RP01	± 1 "wc, ± 0.5 "wc, ± 250 Pa, ± 125 Pa
	RP02	± 0.25 "wc, ± 0.125 "wc, ± 60 Pa, ± 30 Pa
Accuracy		± 1% FS of selected range (± 2% for 0.125 "wc and 30 Pa ranges)
Stability		± 1% FS max (1 year)
Thermal Effect		< ± 3.5% FS max, 5 - 50 °C (41 - 122 °F)
Response Time		1 - 60 Seconds (menu selectable)
Proof Pressure		100 "wc (24.9 kPa)
Burst Pressure		200 "wc (49.8 kPa)
Operating Conditions		0 - 60 °C (32 - 140 °F), 0 - 90 %RH non-condensing
Storage Temperature		-40 - 70 °C (-40 - 158 °F)
Media Compatibility		Dry air or inert gas
Zero Adjust		Pushbutton auto-zero
Power Supply		24 Vac/dc ± 10%
Power Consumption		70 mA max with alarms on
Output Signal		4-20 mA (3-wire), 0-5 or 0-10 Vdc (3-wire), (field selectable)
Output Drive		750 Ω max (4-20 mA), 2 KΩ min (voltage)
LCD Display		3 ½ digit LCD, 0.45" digit height, unit symbols and backlight
Alarm Relay		NO contact, 2 Amps @ 120 Vac or 30 Vdc
Alarm Trip Point		Upper and Lower alarms adjustable over the pressure range
Alarm Delay		0 to 10 Minutes (menu selectable)
Wiring Connections		Screw terminal block (14 to 22 AWG)
Pressure Connections		Ports for 1/16" ID tubing (1/8" ID adapters included)
Enclosure		Wall mount enclosure, 3.3" w x 4.7" h x 1.15" d (84 x 119 x 29 mm)
Weight		115 g (4 oz)

Outside Air Static Pressure Probe

The Outside Air (OSA) Static Pressure Probe is used to measure the atmospheric pressure outside of a building. This pressure can be used as a reference when measuring the building static pressure, which is simply the pressure difference between the inside and outside of the building and is typically less than 0.1 "wc.

The OSA Pressure Probe is used in conjunction with a differential pressure transmitter. Connect the transmitter low pressure port to the OSA probe and the transmitter high pressure port to a suitable pickup within the building to effectively measure the differential pressure between the inside and outside of the building.

The OSA probe will provide an accurate outdoor static pressure to the transmitter by significantly reducing the dynamic effects of the wind action. By creating a laminar flow of air through the horizontal tube and then measuring the pressure perpendicular to the air flow at the vertical tube, the true outdoor static pressure is obtained. An internal brass filter in the pickup further reduces the pressure dynamics and prevents blockages due to insects, pollen and moisture.

The OSA probe can be conveniently mounted directly on the side of the building using two screws and the 1/4" air line is simply connected to the barbed coupling. Ensure the assembly is mounted such that the horizontal tube is parallel with the ground.

