Room Pressure — Door monitor
With USB data logging

Model RPL-10 v2
Pressure Range: -0.10 to 0.10 in-wg

Model RPL-10B v2
Optional Pressure range -0.20 to +0.20 in-wg

Manual Applies to v2 model with software version 1.6

Contents:

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General Description

Intended for use in laboratories, clean rooms and other critical spaces, the RPL-10 provides continuous monitoring and logging of room pressure, door status and, optionally, relative humidity and temperature.

An output relay is provided with normally closed and normally open contacts which may be used for connection to the building systems. This relay activates in the event static pressure falls outside the programmed range. A 0-5v output proportional to pressure is provided for potential connection to building systems. Unit is powered by a plug-in wall mount UL listed 12v DC power supply.

Box Contents:

The box contains the following items:

- Operator Display unit
- Wall mount static pressure port
- 10 feet of 1/8" vinyl tubing with 6" of 3/32" tubing and reducing coupler
- 3/32" 90 degree elbow
- Wall mount plug-in AC adapter with 6' cable
- Magnetic door switch complete with 10 foot cable and plug

If optional Humidity/Temperature sensor is ordered, a static pressure port including these sensors and 10 foot cable will be substituted for the standard static pressure port.

Installation

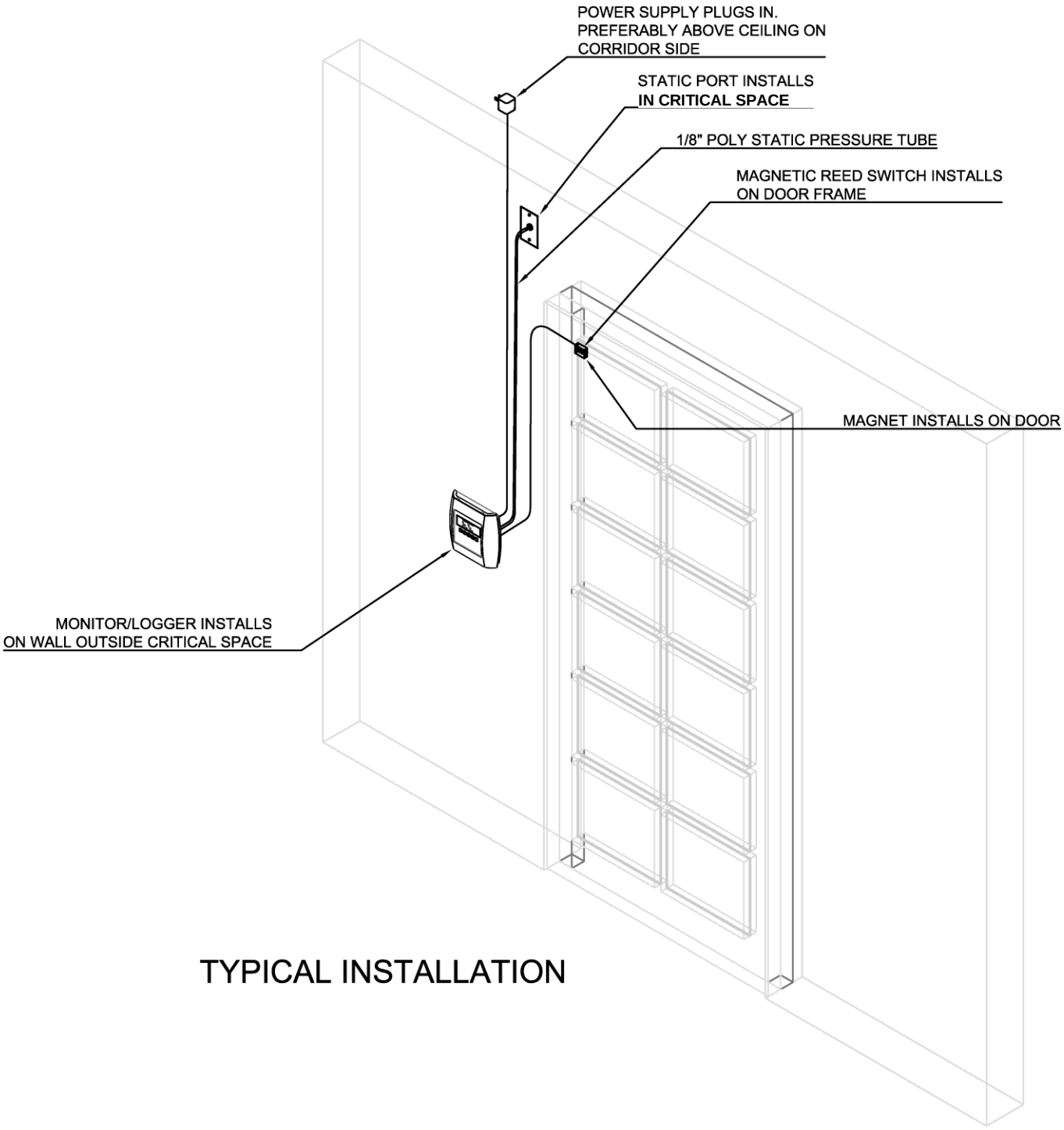
A basic installation consists of the following general steps:

- Mount the static pressure port in the space to be monitored
- Mount the operator display unit back pan to the wall in the adjacent space
- Connect the vinyl tubing between the high port on the circuit board and the static pressure port in the monitored space
- Connect the AC adapter to the circuit board
- Install door sensor switch to door frame and connect to circuit board
- Power up the unit by plugging in the AC adapter

The following minimum steps must be completed after the unit has been powered.

- Zero the pressure sensor
- Configure alarm set points

Detailed Installation Instructions – refer to drawing below for general layout.



TYPICAL INSTALLATION

Mount the static pressure port in the wall

The static pressure port should be mounted in the critical space when the display unit is mounted in the corridor. Opposite arrangement is also possible except when using the temperature and humidity option in which case the sensors much be in the critical space. The included tubing will allow for connection between the fitting on the circuit board of the operator display unit and the static pressure port. Since these are a different size, a short length of smaller diameter tubing is provided along with a reducing coupler. The larger size is to be connected to the static port and the smaller diameter connects to the back of the display unit. Select a draft-free location for the static pressure port and drill a hole to enable the vinyl pressure tubing to be routed from the display panel to the static pressure port. Route the vinyl tubing through the wall between the two locations with the small end of the tubing at the display panel. Attach the large end of the tubing to the static pressure port and mount the static pressure port to the wall.

If the optional room temperature and humidity sensor was specified, the static pressure port housing will also contain a small circuit board with plug. Route the supplied cable alongside the static pressure tubing and plug in each end.

Mount the Operator Display Unit back pan

Remove the two screws that hold the back pan to the front of the display unit and mount the back pan to the wall. Holes are provided which will align with a standard single gang electrical box if available. If tubing and wires will be routed through a hollow wall, then place the back pan on the wall temporarily and mark the wall for cutting or drilling.

Route the low voltage supply wire

Locate a receptacle for the AC adapter and route the low voltage wire from there to the operator display panel. (see wiring diagram)

Install the door sensor

Install the magnetic switch on the door frame. The magnet is to be attached to the door such that when the door is closed, the magnet and switch are within 6mm (1/4”) of each other.

The wire should be routed to the control panel and plugged into the door switch connector (see wiring diagram)

Connect the vinyl tubing

If the display panel is mounted in the corridor, connect the small end of the tubing to the positive pressure port (see wiring diagram). If the display panel is mounted inside the critical space, connect the tubing to the negative pressure port.

Connect the AC adapter

Plug in the black plug to the circuit board (see wiring diagram).

Mount the Display panel to the back pan

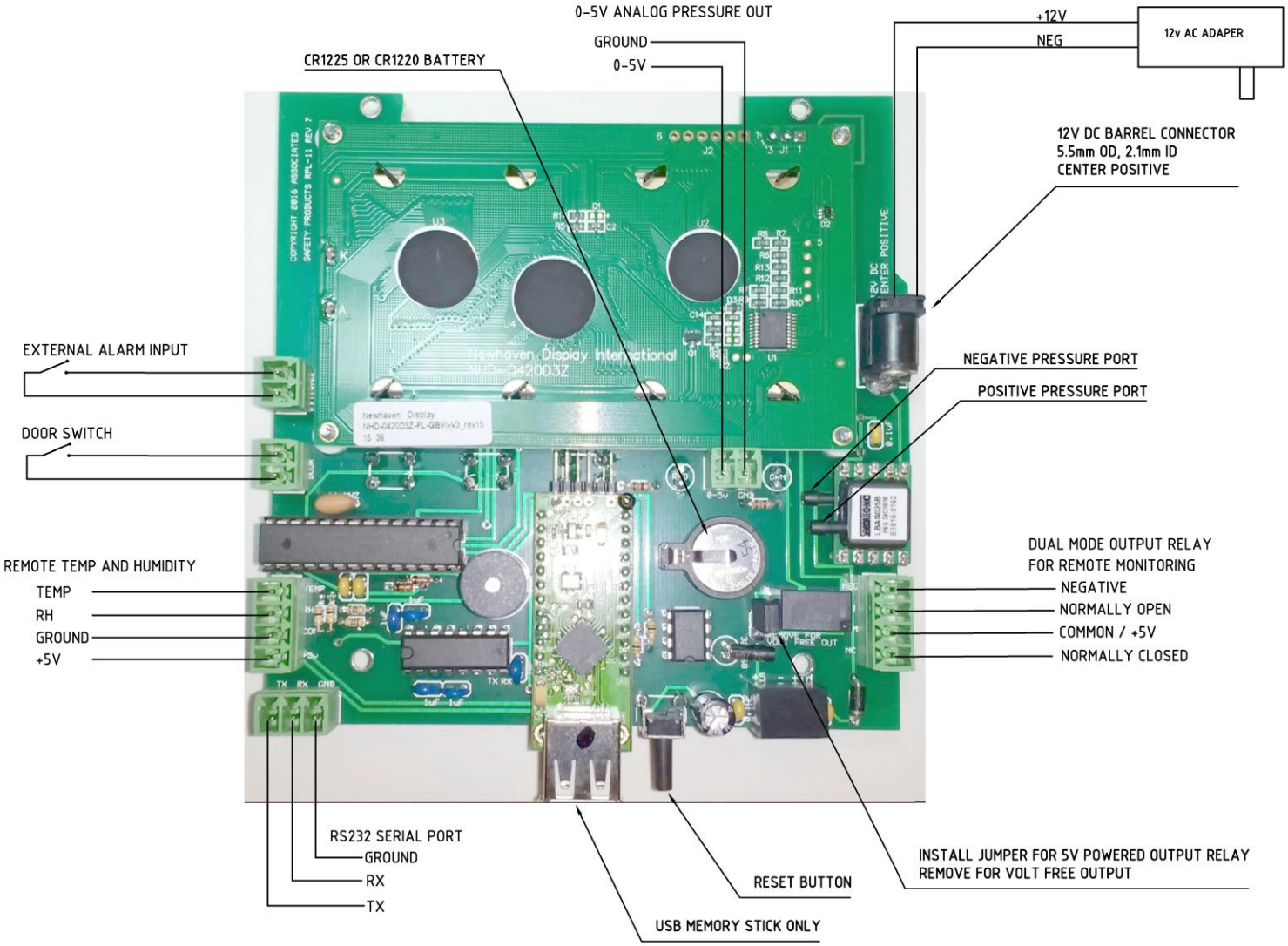
Carefully position the wires and tubing so they will not be pinched or kinked and mount the display panel to the back pan. The standard tubing kit includes a 90 degree fitting which can be used if kinking of the small diameter tubing is a problem. The display panel hooks on the back pan at the top. Install the two screws at the bottom. Since the unit will use the pressure in the immediate area within and around the display panel as the reference pressure, **the housing must be exposed to the same pressure as the room.** For this reason, **holes in the wall behind**

the display panel should be sealed if there is any possibility of airflow through hollow walls or penetrations behind the display panel.

Power Up the unit by plugging in the AC adapter
Proceed to operation and setup – see below.

Wiring Diagram

Below is a general layout and wiring for the operator control panel.



Summary of connections:

<u>Door Switch</u> – one or more magnetic door switches may be connected to this input. Multiple door switches are to be wired in series.

<u>External Alarm Input</u> – a volt free contact connected to this input can be used to trigger the external alarm feature of the monitor. Combined with the output relay on another room pressure monitor this will allow the status of a second monitor to be displayed and logged. Since the external alarm will also trigger the output relay, multiple alarms can be chained together so that all alarms ring in the event that any one alarm is triggered. Alarm is triggered when the external contact is closed. Note: this is meant to be connected to a volt free relay input. Connecting to a powered output from other equipment will not work and any voltage greater than 5 volts will cause equipment damage.

Temp and Humidity – optional remote temperature and humidity sensor connection.

RS232 Serial Port – This is a standard serial port which can be used to capture logging output.

3V Battery – CR1225 or CR1220 lithium battery maintains clock during power outage.

Power – 12V DC power provided by AC adapter. Note: Do not plug power connection into any other connector. Product damage will result.

Dual Model Output relay – If the jumper is removed then the output relay is volt free with common, Normally Open and Normally closed contacts. Relay actuates when unit is in alarm. Normally Open and Normally Closed contacts are available. Relay is rated at 0.5A up to 30V.

If using a remote display panel (not another monitor), then the jumper can be installed. In this case, there will be a 5v positive output on the common terminal and 5v output at the normally closed terminal. During an alarm event, the NC terminal will go low and the NO terminal will provide 5v. In this way a remote display panel with Power, Safe and Alarm lights can be operated with no additional power supply required.

It is critical that the jumper be removed prior to making a connection to an external power supply. Feeding higher than 5v back though the relay will cause product damage. When connecting this to another RPL-10 equipped with the external input, the jumper must be removed and the connection should be made between NO and Common terminals.

0-5v Output – This is a raw analog output from the pressure sensor. The standard sensor ranges from -0.1 in-wg to +0.1 in-wg centered at 2.5 volts. Scale is 0.05 in-wg per volt. Output load resistance should be at least 10kΩ to avoid drawing too much current from the sensor. An optional -0.2 to +0.2 sensor may be used. In this case output scale factor is 0.10 in-wg per volt.

Reset Button – This small black button is accessible on the bottom of the unit next to the USB socket. This will interrupt the power while pressed and can be used when a reboot is required.

USB Socket – Used for the connection of a USB flash drive only. A Lexar model S50 drive is recommended.

Notice: Optional connections do not include plugs. Contact your supplier if these plugs are required.

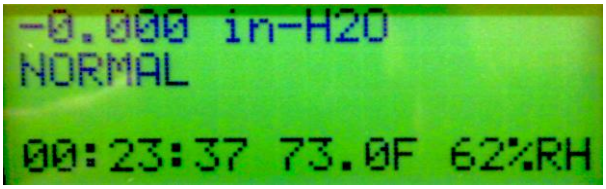
Software configuration
See menu items below. At minimum the sensor must be zeroed and the upper and lower alarm limits set.

Operation

On-screen menus are accessed by pressing the up or down buttons until the desired menu is shown and then pressing enter. All the menus and available options are shown and discussed below.

Main Menu
The main menu has no options, but is meant to display the most useful information to the operator. Pressure is displayed in the chosen units as well as alarm status. If there are past alarms that have not been acknowledged, the words "CHECK PAST ALARM" will be shown. From the main menu, pressing UP or DOWN will access the user level sub-menus. If the optional temperature and humidity sensor is connected, this screen will show this information on the bottom right in place of the date. **Audible alarms can be muted from this menu by pressing ENTER.** When there is an alarm, information will be displayed on the second line of this screen. If the alarm is a high or low room pressure the word PRESSURE will replace the work NORMAL. If the alarm is due to the room door left open, the word DOOR will appear. If the alarm is from an external source, the word EXTERN will show.

Main Menu without optional RH/Temp sensor



Main Menu with optional RH/Temp sensor

Main Menu showing all three alarm conditions

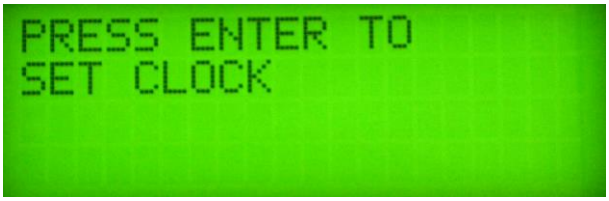
User Menus
The user menus are meant to be used regularly by users of the monitor and are not restricted by password. These are accessed from the main menu by pressing the UP or DOWN button until the desired menu is displayed. Pressing ENTER will access the options within each user menu.

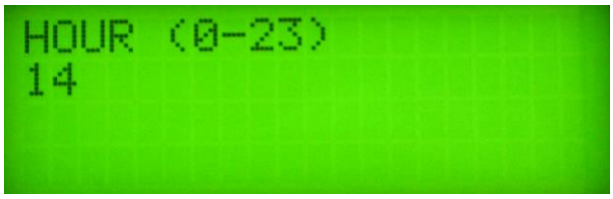
Acknowledge alarms

When an alarm condition has existed in the past, even if conditions have returned to normal, the display will continue to indicate the time of past alarm events. There will also be a blinking red LED and an intermittent beep. These may be cleared by selecting the Acknowledge alarm menu and pressing enter. This will not clear current alarm conditions.

Set Clock

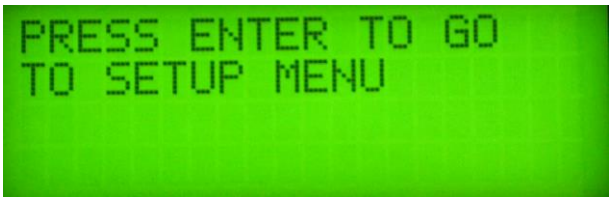
The time maybe set using the set clock menu. Pressing enter will step through setting the Hour, Minute, Second, Day, Month and Year. Each value is changed by pressing UP / DOWN and saved by pressing ENTER.

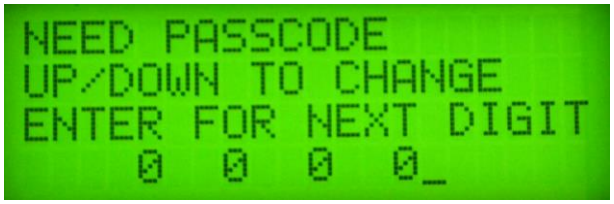




Setup Menu

The setup menu provides access to all the setup parameters which are normally only changed when the unit is initially installed. This is protected by a four digit pass code. Each digit is changed individually by pressing the UP/DOWN button. ENTER advances to the next digit. An incorrect pass code will return to the main menu.

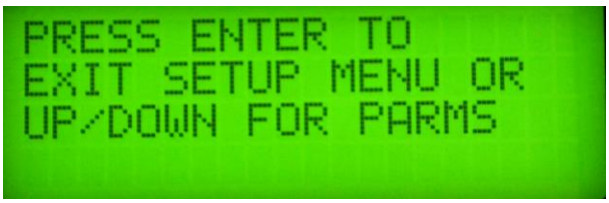




The default pass code is “0000”

SETUP MODE

Once in setup mode, numerous menus are available to set parameters (PARMS). From the first setup menu, pressing UP/DOWN will access the individual parameter menus shown below. Pressing ENTER from this menu will exit back to run mode.



Lower Limit

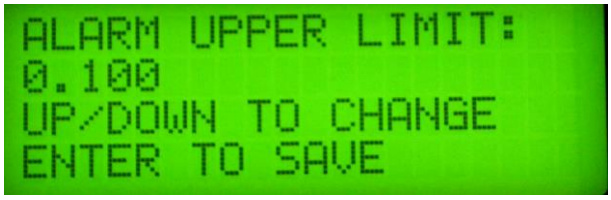
The alarm lower limit is set in inches of water regardless of the display units selected elsewhere. Press UP/DOWN to change the setting, ENTER will save and exit back to Setup menu. Allowable Range -0.25 to +0.25

Avoid setting this outside the range of the sensor installed.

Upper Limit

The alarm upper limit is set in inches of water regardless of the display units selected elsewhere. Press UP/DOWN to change the setting, ENTER will save and exit back to Setup menu. Allowable Range -0.25 to +0.25

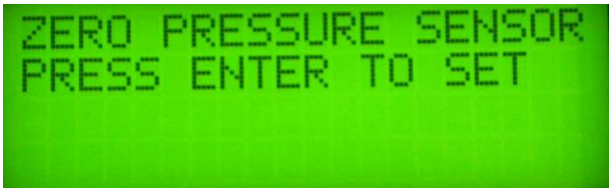
Avoid setting this outside the range of the sensor installed.



Zero Pressure Sensor

The differential pressure sensor must be zeroed after installation. It is required to ensure that the pressure is zero. Wait 30 seconds with the pressure at zero before initiating the zeroing function. To ensure the pressure is at zero, remove the sensor tubing from the back of the unit. Turning off the supply and exhaust air systems should also work.

During the zeroing process a number is displayed. This represents the internal analog reading and should be between 500 and 525. Small fluctuations during the zeroing process are normal, but large changes are a sign of unstable airflow or pressure conditions and will likely result in an invalid zero measurement.

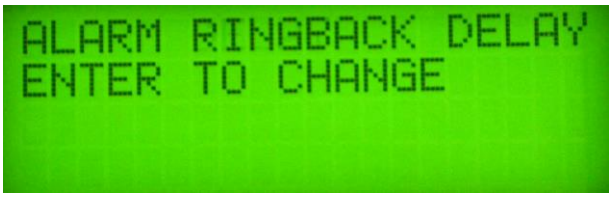


Alarm Delay

The alarm delay determines how many seconds an alarm condition must exist before setting off the audible alarm. Press UP/DOWN to change the setting. ENTER will save and exit back to Setup menu. Allowable Range 1 to 250 seconds

Alarm Ringback Delay

The Alarm Ringback delay determines how many seconds the audible alarm will be muted when enter is pressed during an alarm condition. Press UP/DOWN to change the setting. ENTER will save and exit back to Setup menu. Allowable Range 1 to 600 seconds.



Audible Alarm ON/OFF

The audible alarm can be disabled using this menu item. Press UP/DOWN to change. Enter will save and exit back to the Setup menu.

Ringback ON/OFF

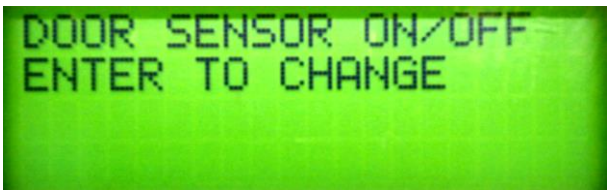
The Ringback function described above can be turned on or off. If Ringback is turned off, the alarm will remain muted indefinitely when the user presses ENTER during an alarm condition. Press UP/DOWN to change. ENTER will save and exit back to the Setup menu.

Alarm Latching ON/OFF

The Alarm Latching function causes the red light to flash and the alarm to “chirp” (if audible alarm is on) periodically as long as an unacknowledged past alarm exists. In this way, a user’s attention is drawn to the fact that at some point in the past, room conditions did not meet established limits even if everything is within limits at the present time. Press UP/DOWN to enable or disable this function. Enter will save and exit back to the Setup menu.

Door Sensor ON/OFF

If the door sensor is not installed or required, then this function can be disabled. If the door sensor function is disabled, no door open alarm will sound. Press UP / DOWN to enable or disable this function. Enter will save and exit back to the Setup menu. If the door sensor is disabled, log files will indicate “Door Closed” at all times.

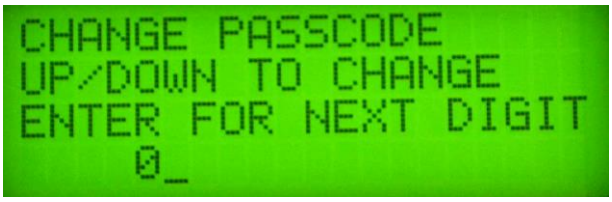


Measurement Units

Display unit can be selected. Choices are Imperial (in-wg and Fahrenheit) or Metric (Pascals and Celsius). Regardless of display units, settings and data logging are always in Imperial measures. Press UP / DOWN to toggle between Imperial and Metric. Enter will save and exit back to the Setup menu

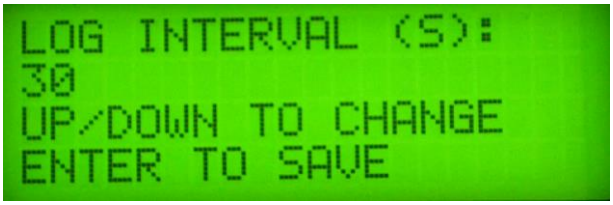
Passcode Change

The passcode can be changed using this menu. Press ENTER to change. Each digit is changed individually by pressing the UP / DOWN button. Pressing Enter advances to the next digit. After all four digits are set, pressing ENTER exits back to the setup menu. Record the new passcode in a safe place.



Logging Interval

The logging interval determines how often the pressure and door status is written to the USB flash drive. It is set in seconds. Press UP/DOWN to change the setting. ENTER will save and exit back to Setup menu. Allowable Range 15 to 3600 seconds.



Logging

Pressing enter will give the choice of ON or OFF. Toggle to the desired selection and scheduled logging will be started or stopped. A USB flash drive must be plugged in to the device for logging to occur as data is written directly to the flash drive.

A file will be created on the USB flash drive in standard Comma Separated Value (.CSV) format which can be opened with spreadsheet software such as Excel. Note that if the temperature sensor is installed without the accompanying humidity sensor, humidity will still be logged as 0%RH.

During logging the word LOG will appear briefly in the upper right hand side of the screen. In the event that there is no USB drive present, the word ERR will appear after logging and will persist until either the logging feature is turned off or logging is successful. After installing a USB drive, the next logging attempt may result in an ERR indication. Subsequent attempts should be successful and the ERR should clear.

Avoid inserting or removing a USB drive while the word LOG showing. If there is a USB flash drive inserted and the word ERR persists for more than two logging cycles, it is likely that the USB drive is incompatible with the unit or is corrupt. Try another USB drive. If this fails, the unit may need to be reset. Use the small black reset button on the bottom next to the USB socket. Corruption of USB drives may occur if they are removed from the PC without following the "safely remove" procedure.

Serial Port Logging

The serial port outputs a logging string in the following format:

With temperature and Humidity installed.

```
11:31:59,12/30/2014,-0.000,in-wg,36,%RH,70.5,F,EXTERNAL CLEAR,DOOR CLOSED,
```

Note: if the temperature only sensor option is installed, the logging format will be the same as above however the humidity will be logged as 0%RH.

Without temperature and Humidity installed.

```
11:34:12,12/30/2014,-0.000,in-wg,EXTERNAL CLEAR,DOOR CLOSED,
```

Serial settings are 9600 bps, 8N1, no handshake. Serial port output is always on and is sent at the logging interval set above.

Pressure Compensation

The pressure reading can be adjusted by the percentage shown. In general this should only need to be adjusted to compensate for altitude. Since the pressure is determined by a mass flow principle, compensation is required for locations that are significantly above sea level. 100% is the default setting. Allowable Range is 50 to 150%. Use the chart below to determine an appropriate setting for your altitude. Press UP/DOWN to change the setting. ENTER will save and exit back to Setup menu.

Altitude above sea level (ft)	Pressure Compensation (%)	Altitude above sea level (ft)	Pressure Compensation (%)
0	100	5500	122
500	102	6000	125
1000	104	6500	127
1500	105	7000	130
2000	108	7500	132
2500	110	8000	135
3000	112	8500	137
3500	114	9000	140
4000	116	9500	143
4500	118	10000	145
5000	120		

Temperature Offset

The temperature reading can be adjusted up or down to compensate for small sensor errors or errors caused by the position of the sensor. In general this should only need to be adjusted by a small amount. If significant adjustment is needed, then there may be a defective sensor. 0 is the default setting. Allowable Range is -200 to 200 measured in 1/10 of one degree (F). As an example, adjusting this to 15 will increase the displayed and logged temperature by 1.5 degrees F. Press UP/DOWN to change the setting. ENTER will save and exit back to Setup menu. Regardless of display unit setting, this parameter is always measured in Fahrenheit.

Humidity Offset

The humidity reading can be adjusted up or down to compensate for small sensor errors or errors caused by the position of the sensor. In general this should only need to be adjusted by a small amount. If significant adjustment is needed, then there may be a defective sensor. 0 is the default setting. Allowable Range is -30 to 30 %RH. As an example, adjusting this to 5 will increase the displayed and logged humidity reading by 5 %RH. Press UP/DOWN to change the setting. ENTER will save and exit back to Setup menu.

Testing

In order to ensure that the monitoring and alarm system is functional, all critical features must be fully tested by a qualified person at least monthly.

Warranty

LIMITATION OF WARRANTY AND LIABILITY

The Manufacturer warrants the goods sold hereunder, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for TWELVE (12) months, or the length of time specified in the operator's manual, from the date of shipment to the customer. This warranty period is inclusive of any statutory warranty. This limited warranty is subject to the following exclusions:

- The manufacturer does not provide additional warranty on major components manufactured by others - only the original manufacturer's warranty applies.
- Unless specifically authorized in a separate writing by manufacturer, the manufacturer makes no warranty with respect to, and shall have no liability in connection with, goods which are incorporated into other products or equipment, or which are modified by any person other than the manufacturer.

The foregoing is IN LIEU OF all other warranties and is subject to the LIMITATIONS stated herein. **NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE**.
TO THE EXTENT PERMITTED BY LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF THE MANUFACTURER'S LIABILITY FOR ANY AND ALL LOSSES, INJURIES, OR DAMAGES CONCERNING THE GOODS (INCLUDING CLAIMS BASED ON CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) SHALL BE THE RETURN OF GOODS TO THE MANUFACTURER AND THE REFUND OF THE PURCHASE PRICE, OR, AT THE OPTION OF THE MANUFACTURER, THE REPAIR OR REPLACEMENT OF THE GOODS. IN NO EVENT SHALL THE MANUFACTURER BE LIABLE FOR ANY SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES. THE MANUFACTURER SHALL NOT BE RESPONSIBLE FOR INSTALLATION, DISMANTLING OR REINSTALLATION COSTS OR CHARGES. No Action, regardless of form, may be brought against The manufacturer more than 12 months after a cause of action has accrued. The goods returned under warranty to the manufacturer's factory shall be at Buyer's risk of loss, and will be returned, if at all, at the manufacturer's risk of loss.
Buyer and all users are deemed to have accepted this LIMITATION OF WARRANTY AND LIABILITY, which contains the complete and exclusive limited warranty of MANUFACTURER. This LIMITATION OF WARRANTY AND LIABILITY may not be amended, modified or its terms waived, except by writing signed by an Officer of MANUFACTURER.