

Model 8620

EVERWATCH®

***Room
Pressure
Monitor***

User's Guide

Model 8620

EVERWATCH®

**Room
Pressure
Monitor**

User's Guide

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INTRODUCTION

The EVERWATCH User's Guide describes how to operate, configure, calibrate, maintain and troubleshoot the Model 8620 EVERWATCH® Room Pressure Monitor. Please read this guide thoroughly before using the EVERWATCH.

This guide assumes that the EVERWATCH has been properly installed. Refer to the Installation and Checkout Instructions if there is any question as to whether the EVERWATCH has been installed properly.

The User's Guide has been divided into the following chapters to simplify its use.

Chapter 1 describes how to program the EVERWATCH.

Chapter 2 describes how to operate the EVERWATCH.

Chapter 3 describes how to configure the EVERWATCH.

Chapter 4 describes how to calibrate the EVERWATCH.

Chapter 5 describes how to maintain the EVERWATCH.

Chapter 6 describes how to troubleshoot the EVERWATCH.

Appendix A lists the EVERWATCH specifications.

Appendix B describes the EVERWATCH theory of operation.

Appendix C describes how the EVERWATCH is wired.

Appendix D contains a flow chart of the configuration menus.

References to the EVERWATCH keypad and digital display are highlighted in this guide as follows:

Example: Press the LOW ALARM key to display the low alarm set point.

A black four-pointed star ◆ is used throughout this guide to call attention to important notes or comments.

Step-by-step instructions are denoted by numbered circles ❶.

HELP!

Technical assistance and customer service:

Contact TSI Industrial Test Instruments Group at 1-800-777-8356.

CHAPTER ONE

GETTING STARTED

Configuration

The rooms and the environment in which the EVERWATCH operates vary from facility to facility. There are a variety of ways to display and use the information gathered by the EVERWATCH. The configuration procedure is used to program the EVERWATCH to present the information in the manner desired.

The EVERWATCH has the versatility required to operate in a variety of configurations. The EVERWATCH comes from the factory configured for typical operating requirements.

Before beginning to reconfigure the EVERWATCH, take a few minutes to review the configuration procedures found in Chapter Three. Use the configuration worksheet to determine how to configure the EVERWATCH to suit your requirements.

Calibration

The EVERWATCH Room Pressure Monitor is a very versatile device which will work with a variety of rooms. The EVERWATCH is calibrated at the factory to each sensor. **It is imperative that the sensor and monitor be kept as a matched set.** Insure that the serial number on the monitor matches the number on the sensor.

If the room configuration is unique, "such as 8 ft long tube" the system should be calibrated to the new setup. The calibration procedure is quite simple and can be accomplished in a matter of minutes with a little preparation and practice.

Before beginning to calibrate the EVERWATCH, take a few minutes to review the calibration procedures found in Chapter Four. A portable air velocity meter and the calibration instructions are all that are needed to get started.

CHAPTER TWO

OPERATION

The EVERWATCH Room Pressure Monitor is easy to use. Its operation is simple and straightforward. All the information you need to know about the room pressure is displayed on the monitor's front panel. All calibration and configuration programming is accessible through the keypad.

From an operations standpoint, the EVERWATCH functions on two levels:

1. The EVERWATCH has a front panel display which provides indication of the room pressure and alarm conditions via a digital display, indicator lights and an audible alarm.
2. The EVERWATCH has front panel controls for checking alarm set points, testing the unit for proper operation, resetting alarms, silencing alarms, and programming calibration and configuration data.

Specific details about the EVERWATCH front panel display and controls are described on the following pages.

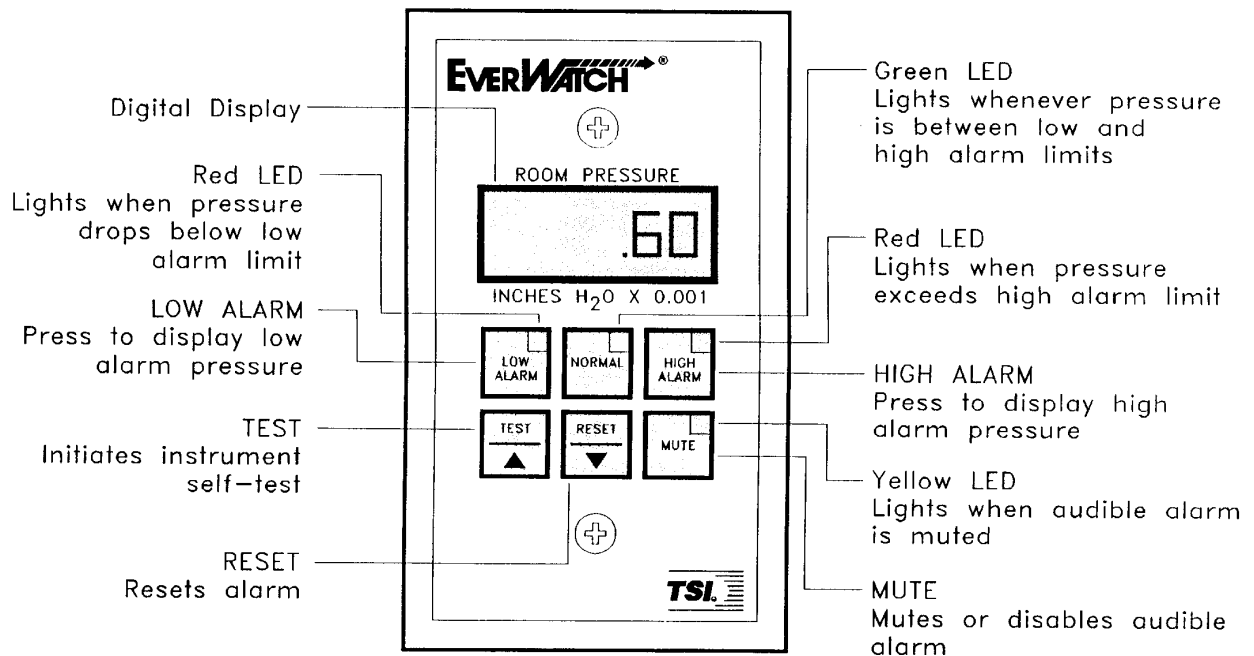


Figure 1. EVERWATCH Front Panel Display and Controls.

Front Panel Display

Digital Display

The digital display indicates the room pressure with respect to REFERENCED CORRIDOR, calibration and configuration menus, and error messages. The display indicates the room pressure continuously, the error messages when they occur, and the calibration and configuration menu items when either of these programming modes is selected.

Low Alarm Light

The red LOW ALARM light indicates low room pressure. The LOW ALARM light turns on when the magnitude of the room pressure drops below, or is in the opposite direction of the low room pressure alarm set point. When the lights are configured for alarm follow operation, the LOW ALARM light remains on until the room pressure returns to normal. When the lights are configured for alarm latch operation, the LOW ALARM light remains on until the room pressure returns to normal and the RESET key has been pressed.

Normal Light

The green NORMAL light indicates that the room pressure is in the normal range. The NORMAL light is on when the room pressure is between the low room pressure alarm set point and the high room pressure alarm set point.

High Alarm Light

The red HIGH ALARM light indicates high room pressure. The HIGH ALARM light turns on when the magnitude of the room pressure exceeds in the same direction as the high room pressure alarm set point. When the lights are configured for alarm follow operation, the HIGH ALARM light remains on until the room pressure returns to normal. When the lights are configured for alarm latch operation, the HIGH ALARM light remains on until the room pressure returns to normal and the RESET key has been pressed.

Mute Light

The yellow MUTE light indicates that the audible alarm is disabled. The MUTE light turns on when the audible alarm has been disabled. The audible alarm will not sound as long as the MUTE light is on.

Audible Alarm

The audible alarm indicates alarm conditions. The audible alarm sounds when the room pressure is in an alarm condition. When the audible alarm is configured for alarm follow operation, the alarm continues to sound until the MUTE key is pressed or the room pressure returns to normal. When the audible alarm is configured for alarm latch operation, the audible alarm remains on until the MUTE key has been pressed, or the room pressure returns to normal and the RESET key is pressed.

The audible alarm can also be muted by closing the contact closure input (pins 9-10 on back connector). With the contact closure input closed, the mute light turns on and the audible alarm will not sound.

- ◆ There is a 10 second delay between when the pressure triggers an alarm and when the monitor shows the alarm condition. This is used so the alarms don't trigger when someone opens a door to enter or leave the room.

Front Panel Controls The front panel controls operate as follows when configured using the standard factory installed default parameters:

LOW ALARM Key

The LOW ALARM key is used to display the low room pressure alarm set point on the digital display. The low room pressure set point is displayed when the LOW ALARM key is pressed.

NORMAL Key

The NORMAL key is used to gain access to the calibration and configuration menus. Refer to Chapters 3 and 4 for configuration and calibration instructions.

HIGH ALARM Key

The HIGH ALARM key is used to display the high room pressure alarm set point on the digital display. The high room pressure alarm set point is displayed when the HIGH ALARM key is pressed.

TEST Key

The TEST key is used to initiate an instrument self-test. The monitor display, indicator lights, audible alarm, and internal electronics are tested when the TEST key is pressed.

RESET Key

The RESET key is used to reset the low and high room pressure alarm lights and alarm contacts. Alarm lights and contacts are reset when the room pressure has returned to normal and the RESET key is pressed. The RESET key is also used to reset error messages. See the troubleshooting guide in Chapter 6 for details.

MUTE Key

The MUTE key is used to silence and/or disable the audible alarm. An audible alarm can be silenced at anytime by pressing the MUTE key. The audible alarm can be disabled by pressing the MUTE key when the audible alarm is not sounding and the yellow MUTE light is off. The yellow MUTE light turns on when the audible alarm has been disabled.

- ◆ The mute light will turn on when the contact closure input is closed. Pressing the MUTE key has no affect in this configuration.

CHAPTER THREE

CONFIGURATION

The EVERWATCH is a very versatile device which may be set to operate in a variety of configurations. This chapter is a guide for configuring the EVERWATCH.

The configuration menu is used to select the low alarm set point, high alarm set point, display period, alarm light response, alarm relay response, audible alarm response, elevation correction and analog output resolution. The items to be configured are arranged sequentially in the configuration menu. The configuration data is stored in memory when the configuration menu is exited and the EVERWATCH is returned to normal operation. A flow chart diagramming the configuration procedure is included in Appendix D.

The EVERWATCH is shipped with a set of default values already programmed in memory. These default values are listed on the Configuration Worksheet in Table 1. Use the Configuration Worksheet to select the desired configuration parameters for the intended application.

Table 1. EVERWATCH Configuration Worksheet.

| <u>Function</u> | <u>Display</u> | <u>Range/Options</u> | <u>Default Value</u> | <u>User Value</u> |
|--------------------------|----------------|---|----------------------|-------------------|
| Low Alarm | L AL | OFF, -195.00 to 195.00 inches H ₂ O X 0.001 in 0.05, 0.50, 5.00 increments depending on the magnitude of the alarm◆. | OFF | |
| High Alarm | H AL | OFF, -195.00 to 195.00 inches H ₂ O X 0.001 in 0.05, 0.50, 5.00 increments depending on the magnitude of the alarm◆. | OFF | |
| Display Averaging Period | dSPL | 2 to 10 seconds (in 1 second increments) | 5 | |
| Alarm light | LEdS | Latch (LA) or Follow (UnLA) | LA | |
| Alarm Relay | rLYS | Latch (LA) or Follow (UnLA) | LA | |
| Audible Alarm | AUD | Latch (LA) or Follow (UnLA) | LA | |
| Alarm Disable | dSbL | On or OFF | On | |
| Elevation | ELEV | 0 - 10,000 feet in 1000 feet increments | 0 | |
| Analog Output | AOUT | 1, 10 and 100. 1 is maximum, 100 is minimum range | | |
| Access Code | PASS | On or OFF | OFF | |

- ◆ The magnitude of the alarm increments changes with the magnitude of the set point. ① When the magnitude of the setpoint is less than 10.00 inches H₂O X 0.001, the increments equal 0.05 inches H₂O X 0.001. ② When the magnitude of the setpoint is between 10.00 and 100.00 inches H₂O X 0.001, the increments equal 0.50 inches H₂O X 0.001. ③ When the magnitude of the setpoint is greater than 100.00 inches H₂O X 0.001, the increments equal 5.00 inches H₂O X 0.001.

Description of Configuration Menu Functions

| <u>Display</u> | <u>Function</u> | <u>Description</u> |
|----------------|--------------------|---|
| CO n F | Configuration Menu | The configuration menu function indicates the configuration menu is about to be entered. |
| CO d E | Access Code | The access code function prevents unauthorized access to the configuration menu. This function is not enabled and is not indicated on the display on initial start-up. The access code function is enabled by turning the access code enable function on (See PASS Below). |
| L AL | Low Alarm | The low alarm function is used to set the low alarm set point. The low alarm set point may be set to OFF, or it may be set between -195.00 and 195.00 inches H ₂ O X 0.001. A low room pressure alarm condition is initiated when the magnitude of the room pressure falls below, or is in the opposite direction of, the low alarm set point. |
| H AL | High Alarm | The high alarm function is used to set the high alarm set point. The high alarm set point may be set to OFF, or it may be set between -195.00 and 195.00 inches H ₂ O x 0.001. A high room pressure alarm condition is initiated when the magnitude of the room pressure rises above the high alarm set point. |

- ◆ There is a 0.50 inches H₂O x 0.001 dead band between the low alarm set point and high alarm set point which prevents the alarm set points from overlapping. For example, when the low alarm set point is set at .50 inches H₂O x 0.001 the lowest the

high alarm set point can be set is 1.00 inches H₂O × 0.001. If the magnitude of the alarms is greater than 100.00, the deadband increases to 5.00 inches H₂O × 0.001.

- ◆ The alarm set points must have the same sign. Normal room pressure should lie between the high and low alarm set points.
For example, if the low alarm is -0.50 inches H₂O × 0.001, the lowest high alarm set point is -1.00 inches H₂O × 0.001.

| | | |
|------|--------------------------|--|
| dSPL | Display Averaging Period | The display averaging period function is used to set the display averaging period. The display averaging period may be set between 2 and 10 seconds. The display averaging period is the period of time over which the room pressure readings are averaged before being displayed. The longer the display averaging period, the more stable the display. See Appendix B for an in-depth description. |
| LEdS | Alarm Light | The alarm light function is used to select whether the low and high alarm lights latch in an alarm condition(LA) or follow an alarm condition(UnLA). When alarm latch is selected, the alarm light turns on in an alarm condition and remains on until the room pressure returns to normal and the RESET key is pressed. When alarm follow is selected, the alarm light turns on in an alarm condition and off when the room pressure returns to normal. |
| rLYS | Alarm Relay | The alarm relay function is used to select whether the low and high alarm relay latch in an alarm condition(LA) or follow an alarm condition(UnLA). When alarm latch is selected, the alarm relay contacts close in an alarm condition and remain closed until the room pressure returns to normal and the RESET key is pressed. When alarm follow is selected, the alarm |

| | | |
|------|--------------------------|---|
| | | relay contacts close in an alarm condition and open when the room pressure returns to normal. |
| Aud | Audible Alarm | The audible alarm function is used to select whether the audible alarm latches in an alarm condition(LA) or follows an alarm condition(UnLA). When alarm latch is selected the audible alarm turns on in an alarm condition and remains on until the room pressure returns to normal and the RESET key is pressed. When alarm follow is selected the audible alarm turns on in an alarm condition and off when the room pressure returns to normal. |
| dSbL | Alarm Disable | The alarm disable function is used to select whether the audible alarm can (On) or cannot (OFF) be disabled from the keypad. |
| ELEV | Elevation Correction | The elevation correction function is used to correct the pressure readings to changes in air density that occur at different elevations. |
| AOUt | Analog Output Resolution | This enables the user to select the range of the analog output. This value can be set to 1, 10, or 100. 1 represents a range from -0.1 to 0.1 inches H ₂ O. 10 represents a range of -0.01 to 0.01 inches H ₂ O and 100 represents a range from -0.001 to 0.001 inches H ₂ O. |
| PASS | Access Code | The access code enable function is used to select whether an access code is required (ON) or not required (OFF) to enter the configuration menu. |
| End | End Configuration | Identifies the end of the configuration menu. |

| | | |
|------|------|---|
| SAVE | Save | The save function confirms that any new values entered have been saved to memory. Save is displayed only when new values have been entered. |
|------|------|---|

Configuration Procedure

The EVERWATCH is configured as follows:

Enter the Configuration Menu

- ❶ Press and hold the NORMAL key until CONF is indicated on the display, then release the NORMAL key.
- ❷ Press and release the NORMAL key to select the configuration menu.
- ❸ If L AL is indicated on the display, the access code enable function is set to off and an access code is not required to enter the configuration menu. Skip to the next page for instructions describing how to set the low alarm set point.

If COdE is indicated on the display, the password enable function is set to on and an access code is required to gain access to the configuration menu. Enter the configuration menu access code as follows:.

Enter Configuration Menu Access Code

Press and release the LOW ALARM key.
 Press and release the TEST key.
 Press and release the RESET ALARM key.
 Press and release the HIGH ALARM key.
 Press and release the LOW ALARM key.

If the access code is entered correctly, the configuration menu is entered and L AL is indicated on the display.

- ◆ The configuration and the calibration access codes are not the same. The configuration access code allows access to the configuration menu only.
- ◆ The access code must be entered within 40 seconds (approximately eight seconds per keystroke). COdE flashes on and off five times between keystrokes. If the next access code key is not pressed within this time period, the configuration menu is exited. The audible alarm sounds briefly each time a keystroke has been entered. If an incorrect code is entered, an error message (ERR) flashes on the display, the audible alarm sounds and the configuration menu is exited.

Set the Low Alarm Set Point

- ❶ Confirm that L AL is indicated on the display.
- ❷ Press and release the NORMAL key to display the current low alarm set point.
- ❸ Use the ▲ or ▼ keys to change the low alarm set point value.
- ❹ Press and release the NORMAL key to save the displayed value. L AL is indicated on the display.
- ❺ Press and release the ▼ key to step to the next menu item.

Set the High Alarm Set Point

- ❶ Confirm that H AL is indicated on the display.
- ❷ Press and release the NORMAL key to display the current high alarm set point.
- ❸ Use the ▲ or ▼ keys to change the high alarm set point.
- ❹ Press and release the NORMAL key to save the displayed value. H AL is indicated on the display.
- ❺ Press and release the ▲ key to step to the next menu item, or the ▼ key to return to the previous menu item.

Set the Display Averaging Period

- ❶ Confirm that dSPL is indicated on the display.
- ❷ Press and release the NORMAL key to display the current display averaging period.
- ❸ Use the ▲ or ▼ keys to change the value of the display averaging period.
- ❹ Press and release the NORMAL key to save the displayed value. dSPL is indicated on the display.
- ❺ Press and release the ▲ key to step to the next menu item, or the ▼ key to return to the previous menu item.

Set the Low and High Alarm Light Configuration

- ❶ Confirm that LEdS is indicated on the display.
- ❷ Press and release the NORMAL key to display the current alarm light configuration.
- ❸ Press and release the ▲ key to select latched (LA) operation, or the ▼ key to select alarm follow operation (unLA).
- ❹ Press and release the NORMAL key to save the displayed value. LEdS is indicated on the display.
- ❺ Press and release the ▲ key to step to the next menu item, or the ▼ key to return to the previous menu item.

Set the Low and High Alarm Relay Contact Configuration

- ❶ Confirm that rLYS is indicated on the display.
- ❷ Press and release the NORMAL key to display the current alarm relay contact configuration.
- ❸ Press and release the ▲ key to select latched (LA) operation, or the ▼ key to select alarm follow operation (unLA).
- ❹ Press and release the NORMAL key to save the displayed value. rLYS is indicated on the display.
- ❺ Press and release the ▲ key to step to the next menu item, or the ▼ key to return to the previous menu item.

Set the Audible Alarm Configuration

- ❶ Confirm that Aud is indicated on the display.
- ❷ Press and release the NORMAL key to display the current audible alarm configuration.
- ❸ Press and release the ▲ key to select latched (LA) operation, or the ▼ key to select alarm follow operation (unLA).
- ❹ Press and release the NORMAL key to save the displayed value. Aud is indicated on the display.
- ❺ Press and release the ▲ key to step to the next menu item, or the ▼ key to step to the previous menu item.

Enable/Disable the Audible Alarm

- ❶ Confirm that dSbL is indicated on the display.
- ❷ Press and release the NORMAL key to display the current status of the audible alarm disable function.
- ❸ Press and release the ▲ key to turn the audible alarm disable function on, or the ▼ key to turn the audible alarm disable function off.
- ❹ Press and release the NORMAL key to save the displayed value. dSbL is indicated on the display.
- ❺ Press and release the ▲ key to step to the next menu item, or the ▼ key to return to the previous menu item.

Set the Elevation Correction Factor

- ❶ Confirm the ELEV is indicated on the display.
- ❷ Press and release the NORMAL key to display the current elevation setting, in feet above sea level.
- ❸ Use the ▲ and ▼ keys to set the value closest to your elevation.
- ❹ The elevation changes in increments of 1,000 feet, with a maximum value of 10,000 feet.
- ❺ Press and release the NORMAL key to save the displayed value. ELEV is indicated on the display.
- ❻ Press and release the ▲ key to step to the next menu item, or the ▼ key to return to the previous menu item.

Set the Analog Output Resolution

- ❶ Confirm that AOuT is indicated on the display
- ❷ Press and release the NORMAL key to display output value for resolution.
- ❸ Press and release the ▲ or the ▼ to set the desired resolution to 1, 10 or 100. See the specifications in Appendix A for the analog output ranges and resolutions.
- ❹ Press and release the NORMAL key to save the displayed value. AOuT is indicated on the display.
- ❺ Press and release the ▲ key to step to the next menu item, or the ▼ key to return to the previous item.

Enable/Disable the Access Code Function

- ❶ Confirm that PASS is indicated on the display.
- ❷ Press and release the NORMAL key to display the current status of the access code enable function.
- ❸ Press and release the ▲ key to turn the access code enable function on, or the ▼ key to turn the access code enable function off.
- ❹ Press and release the NORMAL key to save the displayed value. PASS is indicated on the display.
- ❺ Press and release the ▲ key to step to the next menu item, or the ▼ key to return to the previous menu item.

Exit the Configuration Menu

- ❶ Confirm that End is indicated on the display.
 - ❷ Press and release the ▲ key to exit the configuration menu, SAVE is indicated momentarily on the display if there has been a change in the configuration.
- ◆ The EVERWATCH automatically exits the configuration menu and returns to normal operation if more than five minutes elapse between keystrokes. All changes to the configuration menu values are then automatically saved.

CHAPTER FOUR

CALIBRATION

The EVERWATCH Room Pressure monitor can be calibrated to special systems. This should only be done if the system is unusual, such as "8 ft long tube etc". Follow these steps to calibrate the room pressure monitor:

- ❶ Enter calibration procedure.
- ❷ Set velocity calibration span.
- ❸ Exit calibration procedure.

A Portable Air Velocity Meter, such as the TSI VELOCICALC® or VELOCICALC® is all that is needed to calibrate the EVERWATCH. This chapter contains all the information needed to calibrate the EVERWATCH.

- ◆ **The EVERWATCH sensor and monitor are calibrated at the factory as a matched set. It is imperative that the sensor and monitor be kept as a matched set.**

Calibration Procedure

Turn power to the EVERWATCH on and allow the unit to warm up before beginning the calibration procedure. The keypad is disabled and SENS is indicated on the display for approximately 15 seconds while the sensor and monitor electronics stabilize.

Enter the Calibration Menu

- ❶ Press and hold the NORMAL key until CONF is indicated on the display, then release the NORMAL key.
- ❷ Press and release the ▼ key to display CAL.

If you press the ▼ key twice SET will be indicated on the display. SET is a special maintenance procedure. Press the ▲ to display CAL on the screen at this point.

- ❸ Press and release the NORMAL key until COdE is indicated on the display. An access code is required to enter the calibration procedure. Enter the calibration access code as follows:

Enter Calibration Menu Access Code

Press and release RESET key.
Press and release LOW ALARM key.
Press and release NORMAL key.
Press and release TEST key.
Press and release RESET key.

If the access code is entered correctly, the calibration menu is entered, the audible alarm will sound and the velocity in FPM is indicated on the display.

- ◆ The calibration and configuration access codes are not the same. The calibration access code allows access to only the calibration procedure.
- ◆ The access code must be entered within 40 seconds (approximately eight seconds per keystroke). COdE flashes on and off five times between keystrokes. If the next access code key is not pressed within this time period, the calibration procedure is exited. The audible alarm sounds briefly each time a keystroke has been entered. If an incorrect access code is entered, or if more than 8 seconds elapse between keystrokes and an error message (ERR) flashes on the display, the calibration procedure is exited.

Set the Velocity Calibration Span

- ❶ Confirm that the sensor is displaying the velocity in FPM.
 - ❷ Set pressure controls of room to normal operation.
 - ❸ Place the sensor of the air velocity meter in an opening between the measured room and the reference space (i.e. a laboratory and the adjoining corridor). This opening can be a door or a window which is open an inch or so.
 - ❹ Compare the velocity indicated on the EVERWATCH display to the velocity (in fpm) measured by the portable air velocity meter. Hold down the ▲ and ▼ keys to adjust the velocity indicated on the display to match the velocity measured by the portable air velocity meter.
 - ❺ Press and hold the NORMAL key to save the calibration span data. Release once SAVE is indicated on the display. The system then returns to normal operation.
- ◆ If you plan to operate at both positive and negative pressure differentials, this procedure should be repeated with the pressure differential reversed.

CHAPTER FIVE

MAINTENANCE AND REPAIR

Velocity Sensor Cleaning

The EVERWATCH is almost maintenance free. An occasional sensor cleaning is all that is needed to insure that the EVERWATCH is operating at optimum performance.

Significant build-up of dust or dirt on the pressure sensor can degrade its performance. It is recommended that the pressure sensor be periodically inspected for accumulation of contaminants. The frequency of these inspections is dependent upon the quality of the room air drawn across the sensor. Quite simply, if the air in the room is dirty, the sensor will require more frequent examinations and cleaning.

CAUTION: Turn power to EVERWATCH off prior to cleaning the velocity sensor. Do not use compressed air to clean the pressure sensor.

Accumulations of dust or dirt can be removed with a soft-bristled brush (such as an artist's brush). Alcohol, acetone, or trichlorethane may be used as a solvent to remove other contaminants if required.

WARNING: Do not attempt to scrape contaminants from the pressure sensor. The pressure sensors are quite durable, however scraping will cause mechanical damage and possibly break the sensor. Mechanical damage due to scraping voids the pressure sensor warranty.

Replacement Parts

All components of the EVERWATCH are field replaceable. Contact TSI Industrial Test Instruments Group at (800) 777-8356 in the U.S. and Canada, (001 612) 490-2711 outside the U.S., or your nearest TSI Field Representative for replacement part pricing and delivery.

| <u>Part Number</u> | <u>Description</u> |
|--------------------|--------------------|
| 800321 | Pressure Sensor |
| 800311 | Sensor Cable |
| 800104 | Pressure Monitor |
| 800420 | Transformer |
| 800414 | Transformer Cable |

◆ **The EVERWATCH sensor and monitor are calibrated at the factory as a matched set. It is imperative that the sensor and monitor be kept as a matched set.**

CHAPTER SIX

TROUBLESHOOTING

Table 2. Troubleshooting

| Symptom | Corrective Action |
|---|--|
| The display is blank | <p>Check the wiring for power and continuity.</p> <p>Is the circuit breaker on?</p> <p>Is there proper voltage at the transformer primary?</p> <p>Is there 24 VAC at the transformer secondary?</p> <p>Is there 24 VAC at the monitor terminal block pins 1 and 2?</p> <p>Turn power off, then back on again (in case fuse was blown). Power has to be removed to reset the internal fuse on the EVERWATCH. If display is still blank, then send the monitor and sensor back to TSI to be replaced and calibrated.</p> |
| The display fluctuates | Check and adjust the display averaging period. |
| The indicated room pressure and the average room pressure are not the same. | <p>Check cleanliness of the pressure sensor. Remove all contaminants.</p> <p>Check the pressure sensor for obstructions. Remove any obstructions.</p> <p>Calibrate the EVERWATCH.</p> |
| "SEnS Err" is indicated on the display | <p>Check the sensor wiring and connections for continuity.</p> <p>Send sensor and monitor back to TSI for sensor replacement and recalibration.</p> |

| Symptom | Corrective Action |
|--|--|
| "dATA Err" is indicated on the display | The operating parameters or data may have been lost or changed by an electrical disturbance. |
| "CAL Err" is indicated | <p>Configure the EVERWATCH.</p> <p>The factory calibration data has been corrupted by an electrical disturbance.</p> <p>Send monitor and sensor back to TSI for recalibration.</p> |

APPENDIX A

SPECIFICATIONS

| | Model 8620 <u>English Units</u> |
|----------------------------------|---|
| Room Pressure Display | |
| Range | -0.19999 to +0.19999 inches H ₂ O |
| Resolution | 5% of reading |
| Accuracy | ±10% of reading, ±0.00001 inch H ₂ O |
| Display Update | 1 second |
| Response Time | Adjustable (2-10 Seconds) |
| Low Alarm Range* | -0.19500 to +0.19500 inches H ₂ O |
| High Alarm Range* | -0.19500 to +0.19500 inches H ₂ O |
| Alarm Contacts | SPST (N.C.) 0.5 amps at 10 watts max, 24 VAC max. Contacts close in alarm conditions and loss of power. |
| Room Pressure Analog Output | |
| Type (linear) | 0 to 10 VDC or 4 to 20 mA |
| Range | Variable -0.100 to +0.100 inches H ₂ O -0.0100 to +0.0100 inches H ₂ O -0.00100 to +0.00100 inches H ₂ O |
| Resolution | Variable 1.0% of range for 0 - 10 VDC 1.2% of range for 4 - 20 mA |
| Response Time | 1 second |
| Operating Temperature | 32 to 120°F |
| Temperature Compensated Range | 55 to 95°F |
| Input Power | 24 VAC, 5 watts max |
| Dimensions | 5 in. x 3.125 in. x 1 in. |
| Weight | 0.75 lb |

* Adjustable in increments dependent on magnitude of the alarm set point.

Specifications are subject to change without notice.

APPENDIX B

THEORY OF OPERATION

Introduction to EVERWATCH The Model 8620 EVERWATCH Room Pressure Monitor continuously monitors room pressure by measuring the velocity of the air flow between two rooms. The room pressure in inches H₂O is calculated from the velocity reading as follows

$$\text{Pressure} = 0.62 \times 10^{-7} \times \left(\frac{V^2}{C}\right) / D$$

D is a density correction factor that takes into account the current elevation setting.

C is the discharge coefficient used to correct Bernoulli's equation to additional energy loss due to friction between the air and the sensor.

The EVERWATCH indicates low and high room pressure with audible and visual alarms. The EVERWATCH also provides relay outputs for low and high alarms as well as an analog output for remote monitoring of room pressure.

EVERWATCH Components The EVERWATCH Room Pressure Monitor consists of three basic components and their associated cable assemblies. These components are:

| <u>Part Number</u> | <u>Description</u> |
|--------------------|--------------------|
| 800321 | Pressure Sensor |
| 800311 | Sensor Cable |
| 800104 | Pressure Monitor |
| 800420 | Transformer |
| 800414 | Transformer Cable |

All of these components are included when a standard Model 8620 EVERWATCH is ordered.

Technical Description

Pressure Sensor

The sensor assembly consists of two air velocity sensors and a temperature compensation sensor. The velocity sensors are heated to 35°C above the ambient air temperature by the monitor electronics. The temperature compensation sensor corrects for changes in the ambient air temperature, forcing the velocity sensors to remain at constant temperature over the ambient air temperature (constant overheat).

The velocity sensors and temperature sensor form two legs of a Wheatstone bridge as shown in Figure 2. The bridge circuit forces the voltages at points A and B to be equal. Air flowing past the velocity sensors cools the sensors, and reduces their resistance. This causes the voltage at point A to decrease. The operational amplifier instantly responds to this change by increasing the power at the top of the bridge until the voltage at point A increases and is equal to the voltage at point B. As more air flows past the sensor, more power is required to maintain a balanced bridge. Thus, the power required at the top of the bridge to maintain a constant overheat is directly related to the velocity of the air flowing past the sensor. This is the principal of operation of all constant-temperature thermal anemometers. The velocity is concurrent to pressure in the monitor.

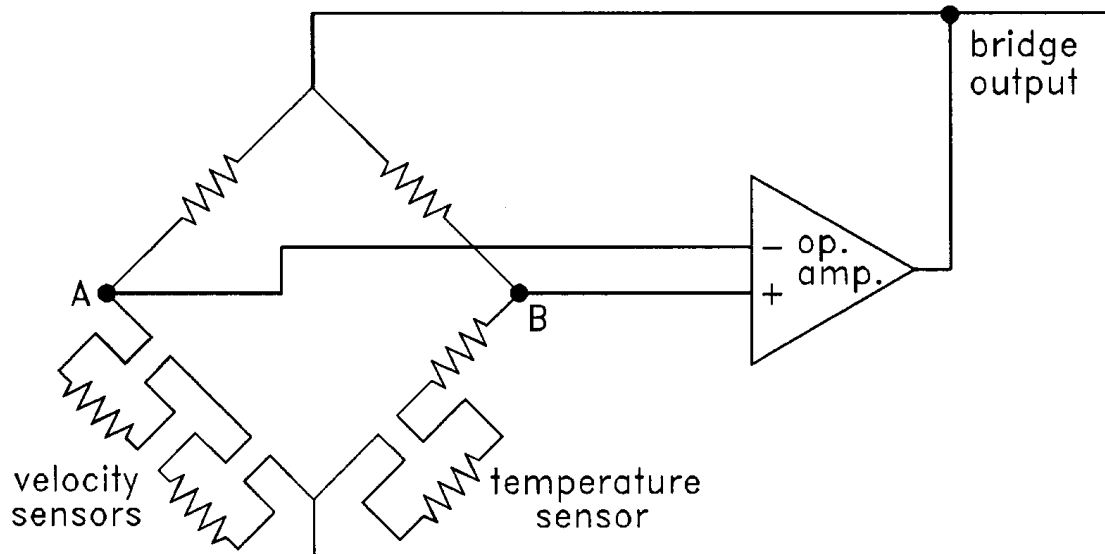


Figure 2. EVERWATCH Bridge Circuit.

Two velocity sensors are needed to sense the direction of the pressure differential. The two sensors are placed in series in the pressure sensor. This way one of the sensors shields the other one depending on the direction of the flow. The voltage drop across each sensor is different because of the shielding. The sensor with less of a drop is the one on the side of higher pressure. The voltage drop across each sensor is measured and the direction of flow is determined.

Monitor Electronics

When power is applied to the EVERWATCH the internal microcomputer retrieves data stored in nonvolatile memory, executes self-diagnostic tests, and begins monitoring the room pressure.

The microcomputer reads the voltage at the top of the bridge circuit every second and calculates the room pressure. It stores 10 consecutive readings in memory, saving the most recent reading and discarding the oldest reading. The microcomputer uses these readings to calculate the value shown on the digital display.

The monitor display is updated every second. The value displayed is a running average. The length of the running average is a function of the display averaging period selected. The display averaging period can be set for between 2 and 10 seconds. In general the larger the display period, the more stable the display reading. This is further illustrated in Table 3.

Table 3. Display Averaging Period Example

| Reading Inches H ₂ O X 0.001 | Display Period | | |
|--|----------------|-------|--------|
| | 2 sec | 5 sec | 10 sec |
| 1.00 | | | |
| 1.20 | 1.10 | | |
| .90 | 1.05 | | |
| 1.00 | .95 | | |
| 1.10 | 1.05 | 1.05 | |
| .95 | 1.05 | 1.05 | |
| 1.00 | 1.00 | 1.00 | |
| 1.00 | 1.00 | 1.00 | |
| 1.50 | 1.25 | 1.10 | |
| 1.30 | 1.40 | 1.15 | 1.10 |
| .95 | 1.15 | 1.15 | 1.10 |
| 1.30 | 1.15 | 1.20 | 1.10 |
| 1.10 | 1.20 | 1.25 | 1.10 |
| .80 | .95 | 1.10 | 1.10 |
| 1.00 | .90 | 1.05 | 1.10 |

◆ Display resolution is 5% with the 3rd significant digit rounded to a 0 or 5.

Alarms

The EVERWATCH microcomputer constantly compares the measured room pressure to the programmed low and high alarm set points and indicates the current condition via visual alarms, an audible alarm and alarm contacts.

Visual Alarms

The EVERWATCH has alarm lights which indicate both low and high alarms. The alarm lights can be configured for alarm latch operation or alarm follow operation.

Alarm Latch Operation. The alarm lights turn on when an alarm condition exists and remain on until the room pressure returns to normal and the monitor is reset. When the magnitude of the room pressure falls below or is in the opposite direction of the low alarm set point, the LOW ALARM light turns on. The LOW ALARM light remains on until the room pressure magnitude rises above the low alarm setpoint and the RESET key is pressed. Similarly, when the room pressure magnitude exceeds in the same direction as the high alarm set point, the HIGH ALARM light turns on. The HIGH ALARM light remains on until the room pressure falls below the high alarm set point and the RESET key is pressed.

- ◆ There is a 10 second delay between the time an alarm occurs and the time that the lights turn on. This to prevent alarms from triggering when someone enters or leaves the room.

Alarm Follow Operation. The alarm lights turn on and off automatically. When the magnitude of the room pressure falls below or is in the opposite direction of the low alarm set point the LOW ALARM light turns on. The LOW ALARM light turns off when the room pressure rises to the low alarm set point plus 0.10 inches H₂O X 0.001. Similarly, when the room pressure magnitude exceeds in the same direction as the high alarm set point the HIGH ALARM light turns on. The HIGH ALARM light turns off when the room pressure falls to the high alarm set point minus 0.10 inches H₂O X 0.001.

- ◆ There is a 10 second delay between the time an alarm occurs and the time that the lights turn on. This is to prevent alarms from triggering when someone enters or leaves the room.
- ◆ A fixed 0.10 inches H₂O X 0.001 differential prevents the alarm lights from bouncing in and out of alarm when the room pressure is close to the alarm set point.

Audible Alarm

The EVERWATCH has an audible alarm which sounds during low and high alarm conditions. The audible alarm can be configured for alarm latch operation or alarm follow operation. An audible alarm may be silenced at any time by pressing the MUTE key. The audible alarm can also be silenced by closing the contact closure input (pins 9 - 10 on the back connector). This allows the user to have the ability to remotely silence an alarm.

Alarm Latch Operation. The audible alarm turns on when an alarm condition exists and remains on until the room pressure returns to normal and the monitor is reset. When the magnitude of the room pressure falls below or is in the opposite direction of the low alarm set point, the audible alarm turns on. The audible alarm remains on until the room pressure magnitude rises above the low alarm setpoint and the RESET key is pressed. Similarly, when the room pressure magnitude exceeds in the same direction as the high alarm set point, the audible alarm turns on. The audible alarm remains on until the room pressure falls below the high alarm set point and the RESET key is pressed.

- ◆ There is a 10 second delay between the time an alarm occurs and the time that the audible alarm sounds. This is to prevent the alarm from sounding when someone enters or leaves the room.
- ◆ The audible alarm will not sound if the contact closure input is closed.

Alarm Follow Operation. The audible alarm turns on when an alarm condition exists and turns off automatically when the room pressure returns to normal. When the magnitude of the room pressure falls below or is in the opposite direction of the low alarm set point, the audible alarm turns on. The audible alarm turns off when the room pressure magnitude rises to the low alarm set point plus 0.10 inches H₂O X 0.001. Similarly, when the room pressure magnitude exceeds in the same direction as the high alarm set point the audible alarm turns on. The audible alarm turns off when the room pressure falls below the high alarm set point minus 0.10 inches H₂O X 0.001 differential.

- ◆ There is a 10 second delay between the time an alarm occurs and the time that the audible alarm turns on. This is to prevent the alarm from sounding when someone enters or leaves the room.
- ◆ A fixed 0.10 inches H₂O X 0.001 dead band prevents the audible alarm from bouncing in and out of alarm when the room pressure is close to the alarm set point.

Alarm Relay Contacts

The EVERWATCH has alarm relay contacts for remote monitoring of both low and high alarms. The alarm contacts can be configured for alarm latch operation or alarm follow operation.

Alarm Latch Operation. The alarm contacts close when an alarm condition exists and remain closed until the room pressure returns to normal and the monitor is reset. When the magnitude of the room pressure falls below or is in the opposite direction of the low alarm set point, the low alarm contacts close. The low alarm contacts remain closed until the room pressure magnitude rises above the low alarm setpoint and the RESET key is pressed. Similarly, when the room pressure magnitude exceeds in the same direction as the high alarm set point the high alarm contacts close. The high alarm contacts remain closed until the room pressure falls below the high alarm set point and the RESET key is pressed.

- ◆ There is a 10 second delay between the time an alarm occurs and the time that the contacts close. This is used to keep the contacts open when someone enters or leaves a room.

Alarm Follow Operation. The alarm contacts open and close automatically. When the magnitude of the room pressure falls below or is in the opposite direction than the low alarm set point, the low alarm contacts close. The low alarm contacts open when the room pressure magnitude rises to the low alarm set point plus 0.10 inches H₂O X 0.001. Similarly, when the room pressure magnitude exceeds in the same direction as the high alarm set point, the high alarm contacts close. The high alarm contacts open when the room pressure falls to the high alarm set point minus 0.10 inches H₂O X 0.001.

- ◆ There is a 10 second delay between the time an alarm occurs and the time that the contacts close. This is used to keep the contacts open when someone enters or leaves a room.
- ◆ A fixed 0.10 inches H₂O X 0.001 differential prevents the alarm contacts from bouncing in and out of alarm when the room pressure is close to the alarm set point.

Analog Output

As stated previously, the microcomputer reads the voltage at the top of the bridge circuit every second and calculates the room pressure. It then takes this signal and outputs a linear 0 to 10 volts direct current (VDC) or 4-20 mA (DC) analog output which corresponds to the measured (real-time) room pressure. The range of the output is configured in the AOUt menu. A setting of 1 corresponds to a range of -100.00 to 100.00 inches H₂O X 0.001 while a setting of 10 corresponds to -10.00 to 10.00 inches H₂O X 0.001. A setting of 100 reads to a range of -1.00 to 1.00 inches H₂O X 0.001. With the ranges, a 0 room pressure differential is represented by an output of 5 volts, or 12 mA. With a range setting of 1, 100.00 inches H₂O X .001 room pressure is represented by an output of 10 volts or 20 mA. If the pressure is over the range, the output remains at maximum or minimum depending on direction of flow.

- ◆ The Analog Output is set to 0 to 10 volts or 4 to 20 mA depending upon the model ordered.

APPENDIX C

EVERWATCH WIRING DIAGRAM

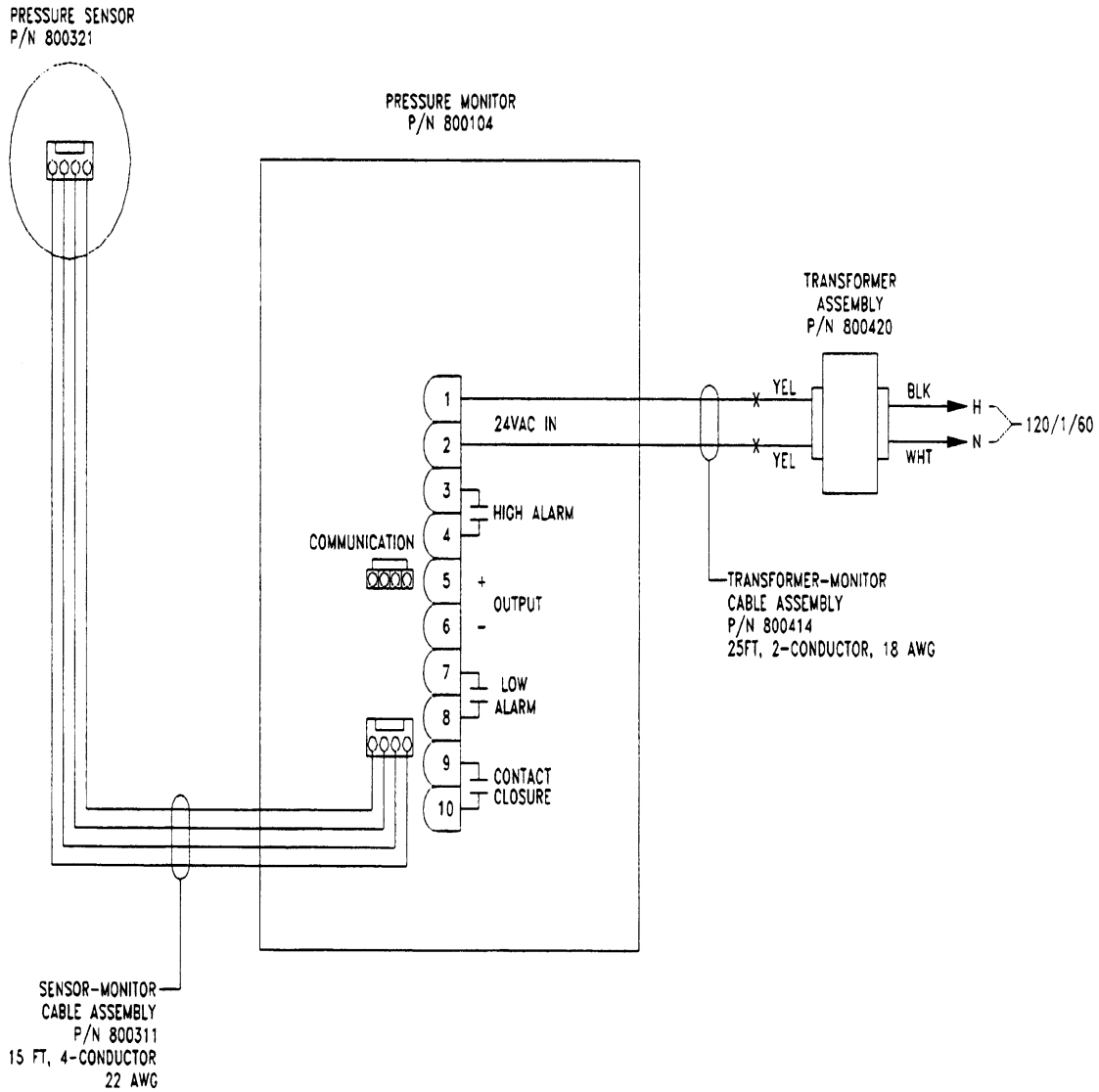


Figure 3. EVERWATCH Wiring Diagram.

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APPENDIX D
FLOW CHART
