Installation, Operation, and Maintenance Manual

VELTRON DPT 2500-plus
Microprocessor Based Ultra-Low Range Pressure & Flow "Smart" Transmitter
Version 1.0X
Installation, Operation & Maintenance

Air Monitor Corporation provides complete technical support between the hours of 7 a.m. and 5 p.m. PST, M-F

Contact our Service Department
Toll Free: 1-800-AIRFLOW

or fax us at 1-707-526-2825
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1 – GENERAL INFORMATION

1.1 – DESCRIPTION

The VELTRON DPT 2500-plus is an ultra-low differential pressure "smart" transmitter designed to convert the low magnitude pressure signals generated by airflow stations and probes, or static pressure sensors into an output signal (4-20mA, 0-5VDC or 0-10VDC) linear to pressure or flow.

Each VELTRON DPT 2500-plus is equipped with numerous standard features: A multi-line LCD used during configuration/calibration and for display of process; AUTO-zero for elimination of transmitter zero error; user selectable primary signal noise filter, input power isolation; capability of 10:1 flow or 100:1 pressure turndown; and an optional NEMA 12 enclosure (NEMA 1 is standard).

1.2 – THEORY OF OPERATION

High and low pressure signals generated by airflow stations and probes, or static pressure sensors act upon opposite sides of a flexible diaphragm within the transducer. The differential between the two pressure signals displaces the diaphragm; the magnitude of the displacement being measured creates an electrical DC output from the transducer. After undergoing A/D conversion, the resulting digital signal representing differential pressure or velocity pressure can be "manipulated" within the microprocessor: square rooted for velocity or flow application; scaled for units of measure and area for process output; and scaled for local data display. The built-in microprocessor runs the program that provides the following basic functions: Timing, logic, and mathematical operations, analog input signal multiplexing, analog input/output calibration, automatic zeroing valve operation, User Setup menu system, and display (LCD) indication.
2 – PERFORMANCE SPECIFICATIONS

2.1 – TRANSMITTER

Accuracy. 0.25% of Natural Span, including hysteresis, deadband, non-linearity, and non-repeatability.

Type. Differential pressure, flow, and mass flow.

Ranges. Natural Spans | Bi-Polar Natural Spans
---|---
0 to 25.00 IN w.c. | –10.00 to 10.00 IN w.c.
0 to 10.00 IN w.c. | –5.00 to 5.00 IN w.c.
0 to 2.00 IN w.c. | –2.00 to 2.00 IN w.c.
0 to 1.00 IN w.c. | –1.00 to 3.00 IN w.c.
0 to 0.50 IN w.c. | –0.50 to 0.50 IN w.c.
0 to 0.25 IN w.c. | –0.25 to 0.25 IN w.c.
0 to 0.10 IN w.c. | –0.10 to 0.10 IN w.c.
0 to 0.05 IN w.c. | –0.05 to 0.05 IN w.c.

Span Rangeability. The calibrated span can be down ranged to 40% of the Natural Span.

Stability. ±0.5% of Natural Span for six months.

Temperature Effect.
Zero. None; corrected by AUTO-zero.
Span. 0.015% of Natural Span/°F.

Mounting Position Effect. None; corrected through transmitter automatic zeroing.

Span and Zero Adjustment. Digital, via internally located pushbuttons.

Low Pass Filtration. Response time to reach 98% of a step change is adjustable from 0.5 to 256.0 seconds.

Overpressure and Static Pressure Limit. 25 psig.

Automatic Zeroing.
Accuracy. Within 0.1% of calibrated span.
Frequency. Every 1 to 24 hours on 1 hour intervals.

Temperature Limits. –20 to 180°F Storage; +40 to 140°F Operating.

Humidity Limits. 0-95% RH, non-condensing.

2.2 – INDICATION

Display. A backlit, graphical LCD providing single line of data display. Also used for programming.

2.3 – OUTPUTS

Analog Output. Single output linear to pressure, flow, or massflow configurable via jumper to 0-5V, 0-10V, or 4-20mA.

2.4 – POWER

Power Supply. Standard 24VAC (16-30VAC) or 24VDC (16-40VDC).

Power Consumption. Standard: 8VA at 24VAC; 6VA at 24VDC.

Circuit Protection. Power input is isolated, fused, and reverse polarity protected.
3 – FEATURES

3.1 – USER SETUP MENU

The microprocessor program contains a User Setup menu system for setting user selectable parameters. Four pushbuttons, allow the user access to the menu for setting configuration modes and values. Refer to the Configuration Programming (Section 5.6) instructions for operation details. Also contained in the User Setup menu is all input and output calibration. The calibration method is completely digital and contains no analog potentiometer adjustments which are susceptible to drift. Non-volatile memory is used for storing all setup parameters and calibration values, and will remain unchanged after set, even when power to the unit is off.

3.2 – TRANSMITTER HOLD

Certain operations performed by the microprocessor place the unit into a Hold mode. This occurs when the User Setup menu system is activated or when an AUTO-zero is performed. When in Hold, all Normal mode processing is halted, and the output is held at its last value prior to Hold. Normal operation is indicated by the "CPU Activated" (dot) in the lower left of the display blinking at a rate of four times per second. A Hold mode is indicated by the "CPU Activated" (dot) blinking at a rate of once per second.

3.3 – AUTOMATIC ZEROING

At periodic intervals the microprocessor will automatically execute an AUTO-zero cycle consisting of the following sequence: The transmitter output and display signals are put on Hold; a valve is activated which disconnects the process high pressure from the high port of the transducer and connects the process static pressure to both sides of the transducer, creating a true zero differential pressure; after a brief stabilization period, the transducer zero offset signal is measured and stored in memory; the valve is deactivated and after a brief period for process signal stabilization, the Hold is released and Normal process measurement resumes. will be displayed whenever AUTO-zero cycle is in progress.

During Normal operation, the zero offset value stored in memory is subtracted from subsequent transducer readings until the next AUTO-zero cycle occurs and repeats the process. For calibration purposes a switch is provided which allows the user to manually activate the zeroing valve AUTO-zero On/Off and Interval are available and configurable using the User Setup menu.

3.4 – DATA DISPLAY

The large integral display is a backlit graphical LCD that displays the current measured process, and is used during configuration.

3.5 – HIGH TURNDOWN RATIO OPERATION

The VELTRON DPT 2500-plus transmitter, with its high level of accuracy and automatic zeroing circuitry, can maintain linear output signals on applications requiring velocity turndown of 10 to 1 (equal to a velocity pressure turndown of 100 to 1).

3.6 – ENCLOSURE

The VELTRON DPT 2500-plus transmitter is packaged in a NEMA Type 1 enclosure with standard industrial process connections. A NEMA Type 12 enclosure is optionally available.

3.7 – MULTIPLE OPERATING POWER SELECTIONS

The VELTRON DPT 2500-plus can be powered by 24VAC or 24VDC.
4 – INSTALLATION

4.1 – RECEIVING AND INSPECTION

• Carefully remove the VELTRON DPT 2500-\textit{plus} from the shipping container and inspect for any damage. If any damage has occurred in transit, contact freight carrier.

• Save the shipping container for possible future use in returning the VELTRON DPT 2500-\textit{plus} to the factory for recalibration.

• Review the Factory Set-Up Information Sheet provided with the unit and verify the WO # and Serial # match those on the VELTRON DPT 2500-\textit{plus}. Verify that the configuration recorded on the Factory Set-Up Information Sheet is correct for your application. If not, contact Air Monitor's Customer Service Department at 1-800-AIRFLOW for further guidance.

\textbf{Note:} The VELTRON DPT 2500-\textit{plus} has been configured and calibrated to customer specified parameters (see "Factory Setup Information Sheet" provided with the unit), and requires no additional calibration/verification prior to installation.

4.2 – LOCATION

• The standard version of the VELTRON DPT 2500-\textit{plus} is a NEMA 1 enclosure suitable for most clean indoor locations. If additional protection is required, mount unit in an enclosure with adequate NEMA rating.

• The industrial version of the VELTRON DPT 2500-\textit{plus} is housed in a NEMA 12 enclosure (see NEMA ratings for degree of protection).

• The ambient temperature of the selected mounting location must be between +40º to 120ºF. Consideration should be given to units exposed to direct sunlight.

• The selected mounting location should be rigid and free of vibration.
4.3 – MOUNTING

Mounting

– Tools Required: Electric drill; #25 (0.1495") bit; screwdriver or nutdriver; and four #8-32 self-tapping machine screws.
– The VELTRON DPT 2500-plus can be mounted in any position provided it is secured using all four mounting holes.
– Reasonable consideration should be given to clearances for pressure and electrical connections.
– Once a suitable location is found, use the unit as a template to mark the centers of the four mounting holes.
– Drill four pilot holes at the marked locations. With the unit in position, install the four #8-32 screws.
4.4 – PROCESS CONNECTIONS

The VELTRON DPT 2500-Plus comes standard with brass 1/8" FPT connection fittings (or special fittings if ordered). To these connect the appropriate fittings for the type and size of signal tubing used. Although any size tubing can be used, the response time of the VELTRON DPT 2500-Plus to process change can increase if there is an increase in tubing size or an increase in tube length. The following table lists recommended tube size versus length.

<table>
<thead>
<tr>
<th>Signal Line Length</th>
<th>Recommended Tube Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 50’</td>
<td>1/4”</td>
</tr>
<tr>
<td>50’ to 200’</td>
<td>3/8”</td>
</tr>
<tr>
<td>Over 200’</td>
<td>1/2”</td>
</tr>
</tbody>
</table>

When connecting the VELTRON DPT 2500-Plus to an airflow measuring device, connections must be completed as follows:

– High port on the VELTRON DPT 2500-Plus connects to Total Pressure from the airflow measuring device.
– Low port on the VELTRON DPT 2500-Plus connects to Static Pressure from the airflow measuring device.

When connecting the VELTRON DPT 2500-Plus for positive room pressurization, connections must be completed as follows:

– High port on the VELTRON DPT 2500-Plus connects to sensor from monitored room.
– Low port on the VELTRON DPT 2500-Plus connects to reference sensor.

When connecting the VELTRON DPT 2500-Plus for negative room pressurization, connections must be completed as follows:

– High port on the VELTRON DPT 2500-Plus connects to reference sensor.
– Low port on the VELTRON DPT 2500-Plus connects to sensor from monitored room.

**CAUTION**

It is extremely important that no pressure be present in signal tubing at the time of installation, and the orientation of High and Low pressure signal lines is maintained between the source and the VELTRON DPT 2500-Plus.

When making any tubing connections or changing fittings, use a 9/16” wrench to prevent the 1/8” FPT bulkhead fitting from turning.
4.5 – POWER/SIGNAL CONNECTIONS

All wiring is done at the terminal strip of the VELTRON DPT 2500-plus. The cover needs to be opened or removed to gain access to the terminal strip. On the industrial version, the signal/power wires need to be routed through the conduit connection on the bottom side of the enclosure. It is recommended that wiring be between 14 awg and 22 awg, and no more than two wires should be connected to any one terminal. Follow Figure 4.2 below to connect the Power/Signal wires.

Figure 4.2

POWER 24V AC/DC. Power required by the VELTRON DPT 2500-plus must be connected to the two terminals labeled LINE(+) and NEUT(–). Earth ground should be connected to the terminal labeled EARTH. Power Supply must be 20-28VAC or 20-32VDC.

OUTPUT. This output is sourced (powered) by the VELTRON DPT 2500-plus, and can be configured for 0-5VDC, 0-10VDC, or 4-20mA. Review the Factory Set-Up Information Sheet for your unit’s configuration.

- 0-5VDC: Minimum load resistance is 2500 ohms.
- 0-10VDC: Minimum load resistance is 5000 ohms.
- 4-20mA: Maximum load resistance is 750 ohms.

4.6 – OUTPUT SELECTION

Selection of output type (0-5V, 0-10V, or 4-20mA) is made via jumpers J1 through J3 (see Figure 4.2). The selection of voltage or current output is made with J1 and J3 which both must be in the same position V or I. The selection of 5V or 10V is made with J2. (If current is selected with J1 and J3, J2 has no effect, and can be left in either position.)

Note: If output jumpers are changed from factory setting, output calibration should be performed (see Section 6.4) to ensure accurate outputs.

4.7 – DISPLAY CONTRAST ADJUSTMENT

To compensate for different ambient lighting conditions and viewing angles, the VELTRON DPT 2500-plus display’s contrast can be adjusted for optimum visibility. Contrast is adjusted using potentiometer R20 (see Figure 4.2). Turn R20 clockwise to increase contrast (darken characters relative to background) or counterclockwise to decrease contrast.
5 – OPERATION

5.1 – INTRODUCTION

The VELTRON DPT 2500- plus has been configured and calibrated at the Factory to customer specified parameters which are recorded on the VELTRON DPT 2500- plus Factory Information Set-Up Sheet, provided with the unit. Review this information and verify that the VELTRON DPT 2500- plus set-up is correct for your application. If any problems or discrepancies are detected, contact Air Monitor's Customer Service Department at 1-800-AIRFLOW prior to proceeding.

5.2 – START-UP

1. After Installation has been verified in accordance with Section 4 apply power

2. Display will briefly indicate:

   VELTRON DPT 2500 plus
   Version 1.00*
   Dot will blink at a rate of once per second.
   *Your actual version may be different.

   Followed by:

   VELTRON DPT 2500 plus
   Version 1.00
   Thanks for Choosing
   AIR MONITOR

   After 5 seconds, display will indicate:

   VELTRON DPT 2500 plus
   Version 1.00
   auto zero

   for approximately 5 seconds (to perform AUTO-zero), and then return to Normal display mode, and the dot in the lower left of the display indicating CPU Activated will blink rapidly (4 times per second). This is Normal operation mode and no further user interface is required. If, however, user would like to verify configuration or change user selectable parameters, continue to Section 5.4 entitled "CONFIGURATION".
5.3 – NORMAL OPERATION

Under *Normal* operation the VELTRON DPT 2500-*plus* display will continuously indicate the current monitored process variable, as the example below shows.

```
10,000
● CFM
```

**AUTO-zero.** At periodical intervals* (see Factory Set-Up Information Sheet) the AUTO-zero cycle will be initiated. When this occurs, the display values and outputs will remain constant and **auto zero** will appear in the upper right of the display for the duration of the AUTO-zero cycle.

This cycle will not occur if AUTO-zero has been turned OFF in configuration programming (see Section 5.9).

The AUTO-zero cycle can be manually activated by user (if ON in configuration programming) by simultaneously pressing **X** and **↑**. Cover must be removed to gain access to pushbuttons (see Section 5.4).

If **auto zero** remains on after the AUTO-zero cycle is complete or flashes rapidly, refer to Section 8 - Troubleshooting for required action.

5.4 – CONFIGURATION

The VELTRON DPT 2500-*plus* onboard microprocessor controls Configuration: Operating parameter selection; input/output activation and scaling, display scaling, and transducer calibration.

The customer can verify configuration and change certain parameters (within defined ranges) by entering the VELTRON DPT 2500-*plus* Configuration mode. This is accomplished using the four pushbuttons located beneath the VELTRON DPT 2500-*plus* display cover. See Figure 4.2 for location of pushbuttons.

To gain access to the programming pushbuttons, the cover must be removed.

**CAUTION:** With cover removed, ESD (electrostatic discharge) precautions should be observed at all times to protect sensitive components.
5.5 – PUSHBUTTON DEFINITION

The four pushbuttons used to interface with the VELTRON DPT 2500-\textit{plus} are identified by their symbols. The symbols are defined as follows:

\[\arrowup: \text{UP} \quad \arrowdown: \text{DOWN} \quad \arrowright: \text{ENTER} \quad \arrowleft: \text{ESCAPE}\]

In addition to Configuration programming, pushbuttons can be used for certain functions when in the \textit{Normal} operation mode. The following list describes the pushbutton function when in the \textit{Normal} operation mode and in the User Setup (programming).

**When in Normal Operation Mode.**

\[\arrowleft + \arrowup: \text{Manually activates AUTO-zero (if AUTO-zero is ON).}\]

\[\arrowdown + \arrowup: \text{Displays VELTRON DPT 2500-}\textit{plus} \text{ and software version number. While software version is displayed, press } \arrowup \text{ and work order number and serial number will be displayed. Press } \arrowdown \text{ and ID (if any) will be displayed. Press } \arrowleft \text{ and the display will go back to the Normal operation mode.}\]

\[\arrowdown \text{ then } \arrowright: \text{Activates the User Setup menu.}\]

**When in User Setup.**

\[\arrowup \text{ or } \arrowdown: \text{Use to scroll to the desired Main Menu item.}\]

\[\arrowdown \text{ or } \arrowup: \text{Use to scroll to the value or mode within a parameter.}\]

\[\arrowright: \text{Enters user into specific selection sub-menu from Main Menu Selection.}\]

\[\arrowleft: \text{Displays current setting of selected Parameter. Enters the selected value or setting into memory}\]

\[\arrowleft: \text{Use as an escape key to exit Main Menu selection to avoid scrolling to "Return to MAIN MENU".}\]

The following pushbutton combinations can be used to more quickly set user selected values (i.e. Process Min and Max Values, Transducer Operating Span, etc.).

\[\arrowup^* + \arrowleft: \text{Increase the second column digit.}\]

\[\arrowdown^* + \arrowleft: \text{Decrease the second column digit.}\]

\[\arrowup + \arrowdown: \text{Increase the third column digit.}\]

\[\arrowup + \arrowdown: \text{Decrease the third column digit.}\]

\[\arrowup^* + \arrowleft \text{ and } \arrowdown^* + \arrowright: \text{Increase the fourth column digit.}\]

\[\arrowdown^* + \arrowleft \text{ and } \arrowdown^* + \arrowdown: \text{Decrease the fourth column digit.}\]

\*Must be pressed and held before other button(s) are pressed.

**Note:** Pushbuttons are momentary type and should be quickly pressed and released to initiate desired change, unless otherwise instructed to press and hold.
5.6 – CONFIGURATION PROGRAMMING

With power ON and initialization complete (see Section 5.2), press and display will indicate:

| USER SETUP |

Pressing will enter the user into the Main Menu of configuration programming. The display will indicate:

| Transmitter Scaling and Configuration |

By using and , the user can scroll through the following selections:

<table>
<thead>
<tr>
<th>MAIN MENU SELECTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter Scaling &amp; Configuration</td>
<td>Allows for the configuration of process variable such as: Square root ON/OFF, process type, process minimum/maximum/units, and percent lockdown.</td>
</tr>
<tr>
<td>Low Pass Filter Selection</td>
<td>Selects amount of filtering applied to transducer output and to the display</td>
</tr>
<tr>
<td>AUTO-zero Configuration</td>
<td>Turns AUTO-zero function ON or OFF, and selects activation interval.</td>
</tr>
<tr>
<td>Transducer Span Selection</td>
<td>Allows for displaying the natural span of the installed transducer, and selecting the operating span.</td>
</tr>
<tr>
<td>Transmitter Input Calibration</td>
<td>Allows for the zeroing and spanning transmitter analog Inputs.</td>
</tr>
<tr>
<td>Transmitter Output Calibration</td>
<td>Allows for the zeroing and spanning of transmitter analog Outputs.</td>
</tr>
<tr>
<td>Exit User Setup</td>
<td>Returns display to Normal operation.</td>
</tr>
</tbody>
</table>
5.6 – CONFIGURATION PROGRAMMING (con’t)

Once the desired Selection is displayed, its sub-menu can be entered by pressing .

To better understand the process of Configuration Programming, arrows with pushbutton designations have been included on the following flow chart of AUTO-zero Configuration. This will aid in the navigation of the Configuration Programming Process.

This example of navigation is similar for all Main Menu selections.

The remainder of this Section details steps to verify or change Configuration Programming of all Main Menu Selections.

At any time while in the Main Menu, User can return to Normal operation mode by pressing or scrolling to:

<table>
<thead>
<tr>
<th>EXIT</th>
<th>User Setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>and pressing .</td>
<td></td>
</tr>
</tbody>
</table>
5.7 – TRANSMITTER SCALING & CONFIGURATION

This Main Menu selection is where all application specific data is entered to configure the VELTRON DPT 2500-\textit{plus} for a unique application. Typical data includes: Process Type, Process Units, Process Minimum/Maximum, and Output Lockdown.

Note: Factory has entered data in this section based on customer supplied information. Data can be reviewed and verified by scrolling through the individual menu items or reviewing the Factory Set-Up Information sheet provided with the unit. Review this information \textbf{BEFORE} making any changes, as they can have a significant affect on the operation of the VELTRON DPT 2500-\textit{plus}.

\begin{itemize}
  \item \textbf{User Setup Main Menu}
    \begin{itemize}
      \item EXIT User Setup
      \item Trans. Scaling & Config.
      \item Low Pass Filter Selection
    \end{itemize}
  \item \textbf{Trans. Scaling & Configuration}
    \begin{itemize}
      \item Square Root Off/On Selection
      \item Process Type Selection\footnote{Available only if Square Root is ON. If Square Root is OFF, Process Type is Differential Pressure (D.P.).}
      \item Process Units Selection
      \item Process Format Selection
      \item Process Minimum Selection
      \item Process Maximum Selection
      \item Output Lockdown Selection\footnote{25000 to 25000 depends on process Type and Format}
      \item Return to Main Menu
    \end{itemize}
  \item Default selection shown.
    \begin{itemize}
      \item Square Root Off/On \textbf{ON}
      \item Process Type \textbf{TRANSMITTER FLOW}
      \item Process Units FLOW \textbf{CFM}
      \item Process Format FLOW \textbf{XX,XXX CFM}
      \item Process Minimum FLOW \textbf{0 CFM}
      \item Process Maximum FLOW \textbf{10,000 CFM}
      \item Output Lockdown \textbf{10.00\% FS Output}
    \end{itemize}
  \item Available selections:
    \begin{itemize}
      \item Square Root Off/On \textbf{ON} or \textbf{OFF}
      \item Process Type \textbf{Transmitter Flow} or \textbf{Transmitter Velocity}
      \item Process Units \textbf{FLOW} \textbf{CFM}
      \item Process Format \textbf{FLOW} \textbf{XX,XXX CFM}
      \item Process Minimum \textbf{FLOW} \textbf{0 CFM}
      \item Process Maximum \textbf{FLOW} \textbf{10,000 CFM}
      \item Output Lockdown \textbf{10.00\% FS Output}
      \item Return to \textbf{MAIN MENU}
    \end{itemize}
\end{itemize}
5.7 – TRANSMITTER SCALING & CONFIGURATION (con't)

1. While in Main Menu, use ↑ or ↓ to scroll to:

2. Press ▶ to enter Transmitter Scaling & Configuration menu. Display will indicate:

3. Press ∇ and display will indicate current setting of Square Root (OFF or ON).

4. Use ↑ or ↓ to change setting. Once desired setting is displayed, press ▶, new setting will be stored in memory and display will return to Transmitter Scaling & Configuration menu as in Step 2.

   Note: If user desires not to change the setting and return to the Transmitter Scaling & Configuration sub-menu, press X. Unit will remain programmed as it was originally.

5. Use ↑ or ↓ to select remaining parameters to be changed within the Process Configuration sub-menu.

   See the following Units Lists for the available Process Units selections for the appropriate Process Type.
   See the following Format List for the available Process Format selections.

6. Follow Step 4 to make any changes to parameters.

7. To return to the Main Menu, select Return to Main Menu in the Transmitter Scaling & Configuration menu and press ▶.

Note: If Process Minimum is selected to be a value greater than zero (0), Output will not increase until the actual process exceeds this selected value. This is known as “Zero Suppression”.

Zero Suppression (Process Minimum) can be set up to 60% of the Process Maximum selected.

Display of process is not affected by this selection, and will indicate the actual process value.
## 5.7 – TRANSMITTER SCALING & CONFIGURATION (con't)

### UNITS LIST

**for Process Type – Flow**

<table>
<thead>
<tr>
<th>UNIT OF MEASUREMENT</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>cubic feet per second</td>
<td>CFS</td>
</tr>
<tr>
<td>cubic feet per minute</td>
<td>CFM</td>
</tr>
<tr>
<td>cubic feet per hour</td>
<td>CFH</td>
</tr>
<tr>
<td>liters per second</td>
<td>l/s</td>
</tr>
<tr>
<td>liters per minute</td>
<td>l/m</td>
</tr>
<tr>
<td>liters per hour</td>
<td>l/hr</td>
</tr>
<tr>
<td>cubic meters per second</td>
<td>m3/s</td>
</tr>
<tr>
<td>cubic meters per minute</td>
<td>m3/m</td>
</tr>
<tr>
<td>cubic meters per hour</td>
<td>m3/hr</td>
</tr>
<tr>
<td>Actual cubic feet per second</td>
<td>ACFS</td>
</tr>
<tr>
<td>Actual cubic feet per minute</td>
<td>ACFM</td>
</tr>
<tr>
<td>Actual cubic feet per hour</td>
<td>ACFH</td>
</tr>
<tr>
<td>Actual liters per second</td>
<td>Al/s</td>
</tr>
<tr>
<td>Actual liters per minute</td>
<td>Al/m</td>
</tr>
<tr>
<td>Actual liters per hour</td>
<td>Al/hr</td>
</tr>
<tr>
<td>Actual cubic meters per second</td>
<td>Am3/s</td>
</tr>
<tr>
<td>Actual cubic meters per minute</td>
<td>Am3/m</td>
</tr>
<tr>
<td>Actual cubic meters per hour</td>
<td>Am3/h</td>
</tr>
<tr>
<td>Standard cubic feet per second</td>
<td>SCFS</td>
</tr>
<tr>
<td>Standard cubic feet per minute</td>
<td>SCFM</td>
</tr>
<tr>
<td>Standard cubic feet per hour</td>
<td>SCFH</td>
</tr>
<tr>
<td>Standard liters per second</td>
<td>Sl/s</td>
</tr>
<tr>
<td>Standard liters per minute</td>
<td>Sl/m</td>
</tr>
<tr>
<td>Standard liters per hour</td>
<td>Sl/hr</td>
</tr>
<tr>
<td>Standard cubic meters per second</td>
<td>Sm3/s</td>
</tr>
<tr>
<td>Standard cubic meters per minute</td>
<td>Sm3/m</td>
</tr>
<tr>
<td>Standard cubic meters per hour</td>
<td>Sm3/h</td>
</tr>
<tr>
<td>Normal liters per second</td>
<td>Nl/s</td>
</tr>
<tr>
<td>Normal liters per minute</td>
<td>Nl/m</td>
</tr>
<tr>
<td>Normal liters per hour</td>
<td>Nl/hr</td>
</tr>
<tr>
<td>Normal cubic meters per second</td>
<td>Nm3/s</td>
</tr>
<tr>
<td>Normal cubic meters per minute</td>
<td>Nm3/m</td>
</tr>
<tr>
<td>Normal cubic meters per hour</td>
<td>Nm3/h</td>
</tr>
<tr>
<td>pounds per second</td>
<td>lb/s</td>
</tr>
<tr>
<td>pounds per minute</td>
<td>lb/m</td>
</tr>
<tr>
<td>pounds per hour</td>
<td>lb/hr</td>
</tr>
<tr>
<td>Tons per hour</td>
<td>T/hr</td>
</tr>
<tr>
<td>Tons per day</td>
<td>T/day</td>
</tr>
<tr>
<td>grams per second</td>
<td>gm/s</td>
</tr>
<tr>
<td>kilograms per hour</td>
<td>kg/hr</td>
</tr>
<tr>
<td>Percent</td>
<td>%</td>
</tr>
</tbody>
</table>
## 5.7 – TRANSMITTER SCALING & CONFIGURATION (con't)

### UNITS LIST
for Process Type – Velocity

<table>
<thead>
<tr>
<th>UNIT OF MEASUREMENT</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>feet per second</td>
<td>FPS</td>
</tr>
<tr>
<td>feet per minute</td>
<td>FPM</td>
</tr>
<tr>
<td>feet per hour</td>
<td>FPH</td>
</tr>
<tr>
<td>meters per second</td>
<td>m/s</td>
</tr>
<tr>
<td>meters per minute</td>
<td>m/m</td>
</tr>
<tr>
<td>meters per hour</td>
<td>m/hr</td>
</tr>
<tr>
<td>Actual feet per second</td>
<td>AFPS</td>
</tr>
<tr>
<td>Actual feet per minute</td>
<td>AFPM</td>
</tr>
<tr>
<td>Actual feet per hour</td>
<td>AFPH</td>
</tr>
<tr>
<td>Actual meters per second</td>
<td>Am/s</td>
</tr>
<tr>
<td>Actual meters per minute</td>
<td>Am/m</td>
</tr>
<tr>
<td>Actual meters per hour</td>
<td>Am/hr</td>
</tr>
<tr>
<td>Standard feet per second</td>
<td>SFPS</td>
</tr>
<tr>
<td>Standard feet per minute</td>
<td>SFPM</td>
</tr>
<tr>
<td>Standard feet per hour</td>
<td>SFPH</td>
</tr>
<tr>
<td>Standard meters per second</td>
<td>Sm/s</td>
</tr>
<tr>
<td>Standard meters per minute</td>
<td>Sm/m</td>
</tr>
<tr>
<td>Standard meters per hour</td>
<td>Sm/hr</td>
</tr>
<tr>
<td>Normal meters per second</td>
<td>Nm/s</td>
</tr>
<tr>
<td>Normal meters per minute</td>
<td>Nm/m</td>
</tr>
<tr>
<td>Normal meters per hour</td>
<td>Nm/hr</td>
</tr>
<tr>
<td>Percent</td>
<td>%</td>
</tr>
</tbody>
</table>
5.7 – TRANSMITTER SCALING & CONFIGURATION (con't)

<table>
<thead>
<tr>
<th>UNIT OF MEASUREMENT</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches of water column</td>
<td>in.WC</td>
</tr>
<tr>
<td>inches of mercury</td>
<td>in.Hg</td>
</tr>
<tr>
<td>pounds per square inch, gauge</td>
<td>psig</td>
</tr>
<tr>
<td>Pascals</td>
<td>Pa</td>
</tr>
<tr>
<td>kilo Pascals</td>
<td>kPa</td>
</tr>
<tr>
<td>bars</td>
<td>bars</td>
</tr>
<tr>
<td>millibars</td>
<td>mbars</td>
</tr>
<tr>
<td>millimeter of water column</td>
<td>mm WC</td>
</tr>
<tr>
<td>millimeter of mercury</td>
<td>mm Hg</td>
</tr>
<tr>
<td>kilograms per square meter</td>
<td>kg/m2</td>
</tr>
<tr>
<td>Percent</td>
<td>%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FORMAT LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>X.XXXX</td>
</tr>
<tr>
<td>XX.XXX</td>
</tr>
<tr>
<td>XXX.XX</td>
</tr>
<tr>
<td>X.XXX.X</td>
</tr>
<tr>
<td>XX,XXX</td>
</tr>
<tr>
<td>XXX,XX0</td>
</tr>
<tr>
<td>XXXXX,X00</td>
</tr>
</tbody>
</table>
5.8 – LOW PASS FILTER

User can select level of Process filtering applied to the transducer output*. Levels are 0 to 10, with 0 representing no filtering, 1 representing minimal filtering (0.125 sec time constant), and 10 representing maximum filtering (64 sec time constant).

* This filtering affects the output and display.

Display filter only affects the display and is a multiplier to the Process filter. (Note: Process filter must be set to a value other than zero for the display filter to be effective).

1. While in Main Menu, use ↑ or ↓, to scroll to:

2. Press → to enter Low Pass Filter Selection menu. Display will indicate:

3. Press ← and display indicates current setting of Process Filter; 0 (none) to 10 (maximum).

4. Use ↑ or ↓ to change setting. Once desired setting is displayed, press → , new setting will be stored in memory and display will return to Process Filter Selection menu as in Step 2.

   Note: If user desires not to change the setting and return to Main Menu, press ← . Unit will remain programmed as it was originally.

5. Use ↑ or ↓ to select remaining parameters to be changed.

6. Follow Step 4 to make any changes.

7. To return to Main Menu, select Return to MAIN MENU in Low Pass Filter Selection Menu and press →.
5.9 – AUTO-zero CONFIGURATION

User can turn AUTO-zero function ON or OFF, and select activation interval.

1. While in Main Menu, use ↑ or ↓ to scroll to:

2. Press → to enter AUTO-zero Configuration menu. Display will indicate:

3. Press ← and display will indicate current setting of AUTO-zero (OFF or ON).

4. Use ↑ or ↓ to change setting. Once desired setting is displayed, press →, new setting will be stored in memory and display will return to AUTO-zero Configuration menu as in Step 2.

   Note: If user desires not to change the setting and return to AUTO-zero Configuration menu press X. Unit will remain programmed as it was originally.

5. Use ↑ or ↓ to select remaining parameters to be changed.

6. Follow Step 4 to make any changes to parameters.

7. To return to Main Menu select Return to MAIN MENU in AUTO-zero Configuration menu and press →.
5.10 – TRANSDUCER SPAN SELECTION

Displays the natural span (maximum full scale span) of the transducer installed in the VELTRON DPT 2500-plus. The displayed natural span is for user/technician reference only and should not be changed unless a new transducer of differential natural span has been installed. Also displays the operating span.

1. While in Main Menu, use ↑ or ↓ to scroll to:

2. Press ▲ to enter Transducer Span Selection menu. Display will indicate:

3. Press ▲ and display indicates the natural span of the installed transducer (0.05, 0.10, 0.25, 0.50, 0.75, 1.00, 1.50, 2.00, 2.50, 3.00, 5.00, 10.00, 15.00, 25.00, 50.00, 100.00, 150.00, 200.00, or 250 in. WC).

4. Use ↑ or ↓ to change setting. Once desired setting is displayed press ▲. New setting will be stored in memory and display will return to Main Menu.

Caution: Only change setting if a transducer of different natural span has been installed.

Note: If user desires not to change the setting and return to Main Menu, press ◯. Unit will remain programmed as it was originally.

5. Use ↑ or ↓ to select remaining parameters to be changed.

6. Follow Step 4 to make any changes to parameters.

7. To return to Main Menu, select Return to MAIN MENU in Transducer Span Selection Menu and press ▲.

Note: If unit is configured as bi-polar, Xdcr Natural Span selections will be in the form of ±x.xx, and Xdcr Operating Span will have a Min and Max selection.
5.11 – TRANSMITTER INPUT CALIBRATION

See Section 6.3 – Calibration for details on Transmitter Input Calibration.

User Setup Main Menu

- Transducer Span Selection
- Transmitter Input Calib.
- Transmitter Output Calib.

Transmitter Input Calib.

- Input Zero Calibration
- Input Span Calibration
- Return to MAIN MENU

See Calibration Instructions

5.12 – TRANSMITTER OUTPUT CALIBRATION

See Section 6.4 – Calibration for details on Transmitter Output Calibration.

User Setup Main Menu

- Transmitter Input Calib.
- Transmitter Output Calib.
- Exit User Setup

Transmitter Output Calib.

- Output Zero Calibration
- Output Span Calibration
- Return to MAIN MENU

See Calibration Instructions
This section will detail steps necessary to calibrate the VELTRON DPT 2500-plus. Calibration is accomplished using the four programming push buttons detailed in Section 5.

This section can be accomplished with the VELTRON DPT 2500-plus mounted in its operating location or at a test bench in a calibration lab.

If calibrated at a test bench, the VELTRON DPT 2500-plus should be positioned in the same attitude as in its operating location.

6.1 – REQUIRED EQUIPMENT

1. Digital Manometer capable of reading to the nearest 0.001" w.c.
2. Digital Multimeter.
3. Source of clean, dry instrument air.
4. Adjustable low pressure regulator, such as AMC "Low Pressure Air Source" or equal.

6.2 – PREPARATION

1. Turn Power to the VELTRON DPT 2500-plus OFF.
2. Remove or open cover of the VELTRON DPT 2500-plus.
3. Slide switch "AZ Valve" to the ON position (see Figure 4.2).
4. Remove Low and High pressure signal lines to the VELTRON DPT 2500-plus.
5. Remove all wires connected to output terminals OUT and COM.
6. Turn Power ON.
6.3 – TRANSMITTER INPUT CALIBRATION

6.3.1 For Units With Positive or Negative Differential Pressure Spans.

Zero pressure and transducer natural span pressure will be applied to the VELTRON DPT 2500-plus, unit will be programmed to recognize these pressures as zero and span for transmitter input calibration.

1. While in Main Menu, scroll to: Transmitter Input Calibration
2. Press ↓, and display will indicate: Input Zero Calib.
3. Press ↓, and display will indicate: Input Zero Calib. -- Push ENTER --
4. Slide switch S1 - "AZ Valve" to the ON position.
5. Press ↓, and display will indicate: Transducer Zero Settle Time:4
Display will count down to 0, after which it will indicate: Input Zero Done -- Push ESCAPE --
6. Press X and then ↑, display will indicate: Input Span Calib.
7. Press ↓, and display will indicate: Input Span Calib. -- Push ENTER --
8. Slide switch S1 - "AZ Valve" to the OFF position.
9. Apply input pressure (as read on manometer) to the High port of the VELTRON DPT 2500-plus. Adjust pressure to equal the transducer natural span value (see Factory Set-Up Information Sheet for this value).
10. Press ↓, and display will indicate: Transducer Span Settle Time:4
Display will count down to 0, after which it will indicate: Input Span Done -- Push ESCAPE --
Note: If pressure input is less than 40% or greater than 110% of transducer’s Natural span value (see Factory Set-Up Information Sheet), display will indicate:

Bad Input Span
-- Push ESCAPE --

If this occurs, check input pressure (as read on manometer), and readjust as necessary. Press X and repeat Steps 7 through 10.
11. Remove input pressure from High port on VELTRON DPT 2500-plus.
12. Press X and then ↑, display will indicate: Return to MAIN MENU
13. Press ↓, and display will return to Main Menu.
6.3 – TRANSMITTER INPUT CALIBRATION (con’t)

6.3.2 For Units With Bi-Polar Spans.

Minimum and maximum transducer natural span pressure will be applied to the VELTRON DPT 2500-plus, unit will be programmed to recognize these pressures as zero and span for transmitter input calibration.

1. Connect input pressure to Low Port of VELTRON DPT 2500-plus.

2. While in Main Menu, scroll to:

3. Press \( \text{ } \), and display will indicate:

4. Press \( \text{ } \), and display will indicate:

5. Slide switch S1 - "AZ Valve" to the OFF position.

6. Apply input pressure (as read on manometer) to the Low Port of the VELTRON DPT 2500-plus.

7. Press \( \text{ } \), and display will indicate:

8. Press \( \text{x} \) and then \( \text{ } \), display will indicate:

9. Press \( \text{ } \), and display will indicate:

10. Connect input pressure to the High Port of the VELTRON DPT 2500-plus.

11. Apply input pressure (as read on manometer) to the High Port of the VELTRON DPT 2500-plus.

12. Press \( \text{ } \), and display will indicate:

Note: If pressure input is less than 40% or greater than 110% of transducer's maximum (positive) Natural span value range (see Factory Set-Up Information Sheet), display will indicate:

If this occurs, check input pressure (as read on manometer), and readjust as necessary. Press \( \text{x} \) and repeat Steps 9 through 12.
6.3 – TRANSMITTER INPUT CALIBRATION (con't)

6.3.2 (con't)

13. Remove input pressure from High port on VELTRON DPT 2500-plus.

14. Press \( \times \) and then \( \uparrow \), display will indicate:

15. Press \( \downarrow \), and display will be in Main Menu.

Return to MAIN MENU
### 6.4 – TRANSMITTER OUTPUT CALIBRATION

1. Scroll Main Menu to: **Transmitter Output Calibration**

2. Press ➧, and display will indicate: **Output Zero Calib.**

3. Press ➧, and display will indicate: **Output Zero Calib. Perform Calibration**

4. Connect a DMM set for the type of output your unit is configured for DMM should be reading minimum value of (4.00 ± 0.01mA or 0 ± 0.01VDC).

5. If DMM is reading out of tolerance, use ➧ or ➧ to adjust VELTRON DPT 2500-*plus* output for an acceptable DMM reading.

Depending on DMM's selected range the ➧ or ➧ button may need to be pressed and held for a period of time before any change occurs in the DMM's display. To speed up changes in output, pushbutton combinations can be used. The following chart lists these combinations along with the associated change in output.

<table>
<thead>
<tr>
<th>PUSHBUTTON COMBINATION</th>
<th>4-20mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>➧ only</td>
<td>+0.001mA</td>
</tr>
<tr>
<td>➧ only</td>
<td>–0.001mA</td>
</tr>
<tr>
<td>➧ + X</td>
<td>+0.01mA</td>
</tr>
<tr>
<td>➧ + X</td>
<td>–0.01mA</td>
</tr>
<tr>
<td>➧ + X</td>
<td>+0.1mA</td>
</tr>
<tr>
<td>➧ + X</td>
<td>–0.1mA</td>
</tr>
<tr>
<td>➧ + X and ➧</td>
<td>+1.0mA</td>
</tr>
<tr>
<td>➧ + X and ➧</td>
<td>–1.0mA</td>
</tr>
</tbody>
</table>

*Must be pressed and held before other button(s) are pressed.*
6. Once an acceptable zero reading is obtained press \( \text{zero} \) and then \( \text{zero} \) and display will indicate:

7. Press \( \text{zero} \), and display will indicate:

8. With DMM still connected as in Step 4, reading should be at maximum value of 20.00 ± 0.01mA, 5.00 ± 0.01VDC, or 10.00 ± 0.01VDC.

9. If DMM is reading out of tolerance, use \( \text{up} \) or \( \text{down} \) to adjust VELTRON DPT 2500-\( \text{plus} \) output for an acceptable DMM reading.

10. Once an acceptable span reading is obtained, press \( \text{zero} \) and then \( \text{zero} \) and display will indicate.

11. Press \( \text{zero} \) and scroll Main Menu to:

12. Press \( \text{zero} \) and VELTRON DPT 2500-\( \text{plus} \) will return to Normal mode of operation.
7 – MAINTENANCE

The VELTRON DPT 2500- plus is a solid state device having few mechanical parts requiring special periodic maintenance. The following maintenance steps are not requirements, but guidelines for establishing a maintenance program for your specific installation.

Operating experience should be used to set frequency of specific types of maintenance.

7.1 – CLEANLINESS
– Verify condensation (or other sources of liquids) are not present inside the VELTRON DPT 2500- plus.

7.2 – MECHANICAL
– Verify pressure signal connections are secure.
– Inspect pressure signal lines for any cracks or leaks.
– Verify mounting hardware is secure.

7.3 – ELECTRICAL
– Periodically inspect all wiring to the VELTRON DPT 2500- plus for good connections and absence of corrosion.

7.4 – CALIBRATION
– VELTRON DPT 2500- plus should have calibration verified annually as a minimum.
## 8 – TROUBLESHOOTING

Personnel should be familiar with the operation of the VELTRON DPT 2500-plus (see Section 5) before performing any troubleshooting.

Note: Prior to performing any troubleshooting, turn power OFF. After 10 seconds, turn power switch ON. If problem still exists, proceed with troubleshooting steps.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Display and &quot;CPU Activated&quot; • is not blinking.</td>
<td>– Verify input power is present at the correct voltage as listed on label at the Power Terminals.</td>
</tr>
<tr>
<td></td>
<td>– Check fuse F1 (1 amp) (see Figure 4.2 for location).</td>
</tr>
<tr>
<td>No output or incorrect output with display responding correctly to process change.</td>
<td>– Review Factory Set-Up Information Sheet for type of output (4-20mA, 0-5V or 0-10V).</td>
</tr>
<tr>
<td></td>
<td>– Check analog output terminal strip wiring for proper installation.</td>
</tr>
<tr>
<td></td>
<td>– Perform Transmitter Output Calibration (see Section 6).</td>
</tr>
<tr>
<td>Both output and display are incorrect or not responding to process change.</td>
<td>– Verify pressure signal lines are connected correctly.</td>
</tr>
<tr>
<td></td>
<td>– Verify AUTO-zero valve switch is in the OFF position.</td>
</tr>
<tr>
<td></td>
<td>– Check for leaky or obstructed lines between VELTRON DPT 2500-plus and process sensor.</td>
</tr>
<tr>
<td></td>
<td>– Disconnect pressure signal lines and apply light finger pressure to &quot;High&quot; port while monitoring analog output for change. If no change, contact Factory for further information.</td>
</tr>
<tr>
<td>AUTO-zero Function is not working.</td>
<td>– Verify AUTO-zero is ON and interval is properly set (see Section 5.9).</td>
</tr>
<tr>
<td></td>
<td>– Verify AUTO-zero valve switch is in the OFF position.</td>
</tr>
<tr>
<td>auto zero is continuously lit.</td>
<td>– Zero value measured during AUTO-zero cycle is between 90% and 100% of operating span.</td>
</tr>
<tr>
<td></td>
<td>Transmitter Input Calibration should be performed as soon as possible (see Section 6.3).</td>
</tr>
<tr>
<td>auto zero is flashing rapidly.</td>
<td>– Zero value measured during AUTO-zero cycle is greater than 100% of operating span.</td>
</tr>
<tr>
<td></td>
<td>Transmitter Input Calibration should be performed immediately (see Section 6.3).</td>
</tr>
<tr>
<td>Process Signal is Unreliable is displayed on Line 1 of display.</td>
<td>– Verify pressure signal lines are connected correctly (see Section 4.4).</td>
</tr>
<tr>
<td></td>
<td>– Verify process is operating within design parameters specified on Factory Set-Up Sheet.</td>
</tr>
<tr>
<td></td>
<td>– Verify pressure signal line bulkhead fittings on the transmitter housing have not been spun causing internal signal tubing to twist.</td>
</tr>
</tbody>
</table>

If after following the Troubleshooting steps the VELTRON DPT 2500-plus continues to operate improperly, contact the Service Department for further assistance (see Section 10).
The following drawing with part numbers list components of the VELTRON DPT 2500-plus that are easily replaced by the user.

To inquire about price and availability of a specific part number, please contact the Customer Service Department at:

Phone: 1-707-544-2706
Fax: 1-707-526-2825
1-800-AIRFLOW

When contacting the Customer Service Department about parts, please have the applicable Factory Set-Up Information sheet available for reference.

*NOTE: REFER TO FACTORY SETUP INFORMATION SHEET TO DETERMINE WHICH TRANSDUCER IS UTILIZED IN YOUR UNIT.
10 – CUSTOMER SERVICE

10.1 – CUSTOMER SERVICE/TECHNICAL SUPPORT

Air Monitor Corporation provides in-house technical support for our products:

Monday through Friday
7 am to 5 pm (pst)
Phone: 707-544-2706 or 1-800-AIRFLOW
Fax: 707-526-2825

Additionally, on-site technical assistance is available. Before contacting the Customer Service Department, please ensure any applicable troubleshooting steps outlined in Section 8 have been performed.

10.2 – REPAIRS/RETURNS

If after contacting the Customer Service Department it is determined that equipment will require return to Air Monitor Corporation for further repair, a Return Authorization number will be issued by the Customer Service Department. A Confirmation of Return Authorization with shipping instructions will be sent via facsimile.

Equipment to be returned to Air Monitor should be returned in its original shipping container if possible. If this is not possible, ensure equipment is packaged sufficiently to protect it during shipment.

CAUTION
All damage occurring during transit is the Customer's responsibility.

List the Return Authorization (R/A) number on the packing list and clearly mark this number on the outside of each shipping container.

Costs associated with return of equipment to Air Monitor are the customer's responsibility regardless whether the repair/return is under warranty.

10.3 – WARRANTY REPAIRS/RETURNS

Once the Customer Service Department determines that the equipment repair is under warranty, the item will be repaired and returned to the customer at no charge.

10.4 – NON-WARRANTY REPAIRS/RETURNS

Customer will be invoiced for all parts and labor required for the repair of equipment. Return shipping charges will also be added to invoice.

10.5 – FIELD SERVICE

Requests for field service should be made to the Customer Service Department, who will coordinate sending a technician to customer's site.

Phone: 707-544-2706 or 1-800-AIRFLOW
Fax: 707-526-2825

Upon completion of work, technician completes a Field Service Report and gives a copy to the customer. Field service is charged on a daily basis and all travel expenses are also added to customer's invoice.