Single-Channel Hygrometer

User's Manual

910-291-OEM Rev. D
December 2011

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Information Paragraphs

- **Note** *paragraphs provide information that provides a deeper understanding of the situation, but is not essential to the proper completion of the instructions.*
- **Important** *paragraphs provide information that emphasizes instructions that are essential to proper setup of the equipment. Failure to follow these instructions carefully may cause unreliable performance.*
- **Caution!** paragraphs provide information that alerts the operator to a hazardous situation that can cause damage to property or equipment.
- **Warning!** paragraphs provide information that alerts the operator to a hazardous situation that can cause injury to personnel. Cautionary information is also included, when applicable.

Safety Issues

WARNING! It is the responsibility of the user to make sure all local, county, state and national codes, regulations, rules and laws related to safety and safe operating conditions are met for each installation.

Auxiliary Equipment

Local Safety Standards

The user must make sure that he operates all auxiliary equipment in accordance with local codes, standards, regulations, or laws applicable to safety.

Working Area

WARNING! Auxiliary equipment may have both manual and automatic modes of operation. As equipment can move suddenly and without warning, do not enter the work cell of this equipment during automatic operation, and do not enter the work envelope of this equipment during manual operation. If you do, serious injury can result.

WARNING! Make sure that power to the auxiliary equipment is turned OFF and locked out before you perform maintenance procedures on the equipment.

Qualification of Personnel

Make sure that all personnel have manufacturer-approved training applicable to the auxiliary equipment.

Personal Safety Equipment

Make sure that operators and maintenance personnel have all safety equipment applicable to the auxiliary equipment. Examples include safety glasses, protective headgear, safety shoes, etc.

Unauthorized Operation

Make sure that unauthorized personnel cannot gain access to the operation of the equipment.

Environmental Compliance

Waste Electrical and Electronic Equipment (WEEE) Directive

The manufacturer is an active participant in Europe's *Waste Electrical and Electronic Equipment* (WEEE) take-back initiative, directive 2002/96/EC.

The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way.

The crossed-out wheeled bin symbol invites you to use those systems.

If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

Chapter 1. Features and Capabilities

Chapter 2. Installation

Chapter 3. Operation and Programming

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Chapter 1. Features and Capabilities

1.1 Introduction

This instrument is a microprocessor-based, single-channel hygrometer that measures moisture content in gases. It is intended for *Original Equipment Manufacturer* (**OEM**) applications, and is suitable for a wide range of process conditions that require real-time moisture measurement.

The hygrometer accepts any calibration range provided with probes (see Chapter 5, *Specifications* for more information). It comes equipped with two standard alarm relays, one fault alarm relay, and a single analog output. It also has onboard data logging capability using an micro SD card.

1.2 Electronics Unit

The hygrometer displays measurement data on a liquid crystal display (**LCD**). You can program your unit and enter probe information using the keys on the front panel (see Figure 1). It accepts line voltages of a universal power supply from 100 to 240 VAC, or 24 VDC, depending on what is ordered.

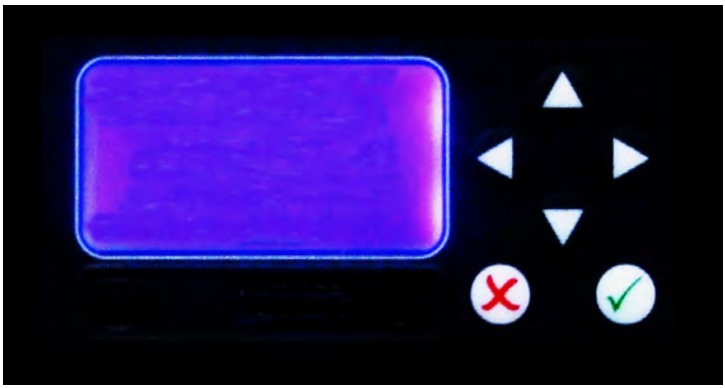


Figure 1: Front Panel

1.3 Probes

The *moisture probe* is the part of the system that comes in direct contact with the process. The hygrometer uses a probe (see examples in Figure 2 and Figure 3) to measure dewpoint temperature in °C or °F. The sensor assembly is secured to the probe mount and is protected with a sintered stainless steel shield (see Figure 2).

Note: *Other types of shields are available upon request.*

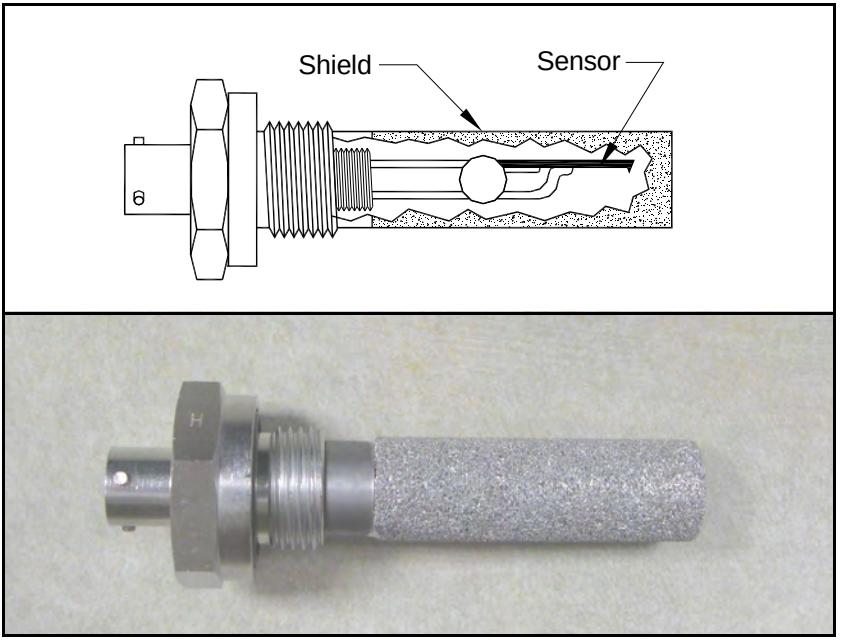


Figure 2: Aluminum-Oxide Moisture Probe

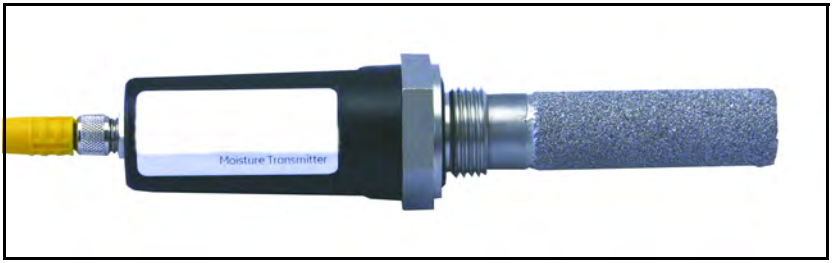


Figure 3: Moisture Transmitter

Chapter 2. Installation

2.1 Introduction

Installing the *Single-Channel Hygrometer* includes the following steps:

- selecting the recorder output
- mounting the electronics unit
- mounting the sample system
- installing the probe into the sample system
- wiring the input power
- wiring the probe and alarm connections

WARNING! To ensure safe operation, the *Single-Channel Hygrometer* must be panel mounted and operated as described in this manual. Also, be sure to follow all applicable local safety codes and regulations for installing electrical equipment.

Note: *For the non-enclosure* Single-Channel Hygrometer *package, please refer to Appendix D for mounting and installation.*

2.2 Selecting the Recorder Output

Note: *By default, the recorder is set to the current output.*

Note: *The customer will provide their own cable for connecting the recorder. Acceptable cables range from 16 to 26AWG.*

The *Single-Channel Hygrometer* has one isolated analog recorder output. The recorder output provides either a current or voltage signal, which is set by switch **S1** on the main PC board.

Complete these steps to check or reset switch **S1** (see Figure 8 on page 7).

WARNING! Never connect line voltage or any other power input to the recorder output terminals.

1. Make sure the *Single-Channel Hygrometer* is turned off and unplugged.

WARNING! The *Single-Channel Hygrometer* must be isolated or disconnected from all voltage sources before changing the recorder output.

2. Remove the screw at the top of the back panel (see Figure 4).

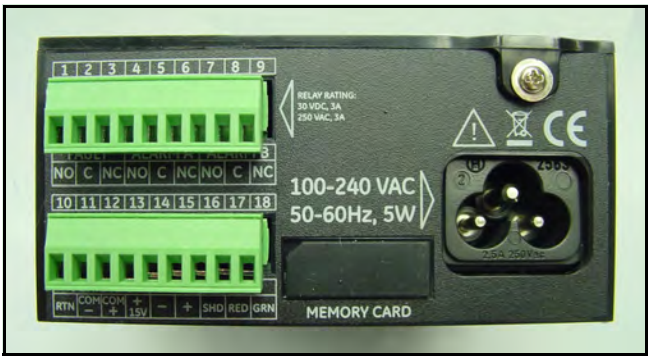


Figure 4: Back Panel

2.2 Selecting the Recorder Output (cont.)

3. Lift the back edge of the cover (see Figure 5), slide the cover back (see Figure 6), and lift it from the enclosure (see Figure 7 on page 6).

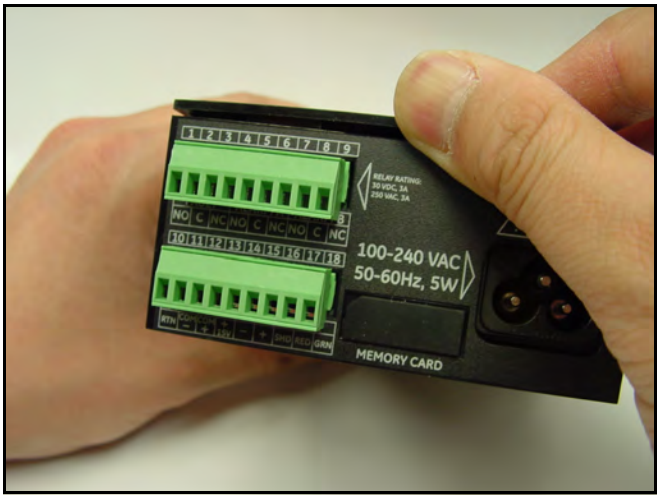


Figure 5: Lifting the Back Edge of the Cover

Figure 6: Sliding the Cover Back

2.2 Selecting the Recorder Output (cont.)

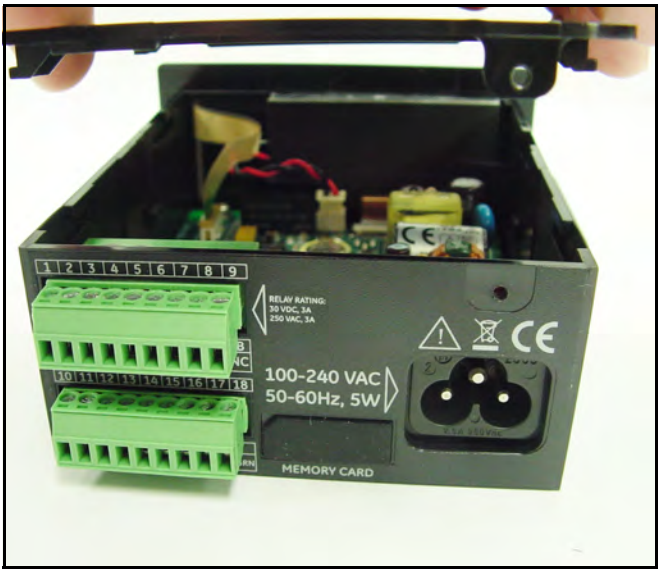


Figure 7: Lifting the Cover

2.2 Selecting the Recorder Output (cont.)

4. Locate switch **S1** (see Figure 8, highlighted area).

CAUTION! Use proper ESD grounding prior to changing the switch.

5. Set switch **S1** to the desired position: **V** for voltage or **I** for current.

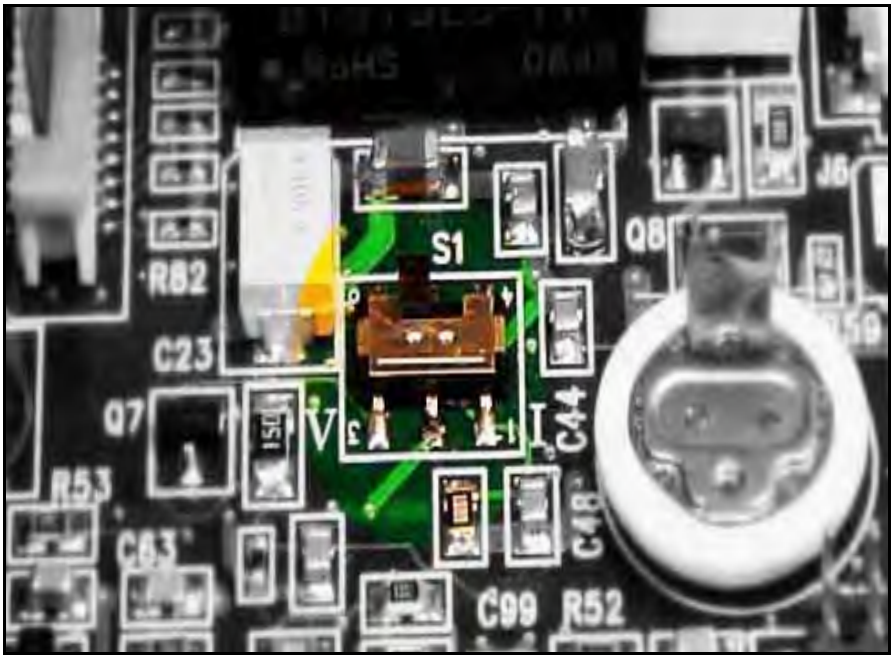


Figure 8: Switch S1 on the Main PC Board

6. After setting the switch, replace the cover and reinsert the rear enclosure screw.

2.3 Mounting the Electronics Unit

The *Single-Channel Hygrometer* unit can be installed in a panel up to 0.25 in. (6 mm) thick. See Appendix A, *Outline and Installation Drawings*, for the required panel cutout dimensions.

IMPORTANT: *For* **NEMA 4** *and* **IP66** *installation, the* Single-Channel Hygrometer *must be mounted in a rigid, flat panel using the panel gasket and both mounting brackets provided.*

2.3.1 Basic Mounting

To mount the *Single-Channel Hygrometer* in a panel with a basic 94 mm (3.69”) x 46 mm (1.81”) opening, refer to the following figures and complete the following steps:

1. Remove the side panel mount label prior to installation.

Figure 9: Removing Side Panel Mount Label

2.3.1 Basic Mounting (cont.)

2. Slide the small gasket along the *Single-Channel Hygrometer* and place it around the back of the display (see Figure 10).

Figure 10: Installing the Gasket Behind the Display

3. Slide the *Single-Channel Hygrometer* into the panel cutout (see Figure 11).

Figure 11: Sliding the Hygrometer into the Panel Cutout

2.3.1 Basic Mounting (cont.)

4. Behind the panel, insert the mounting brackets into the side holes provided (see Figure 12).

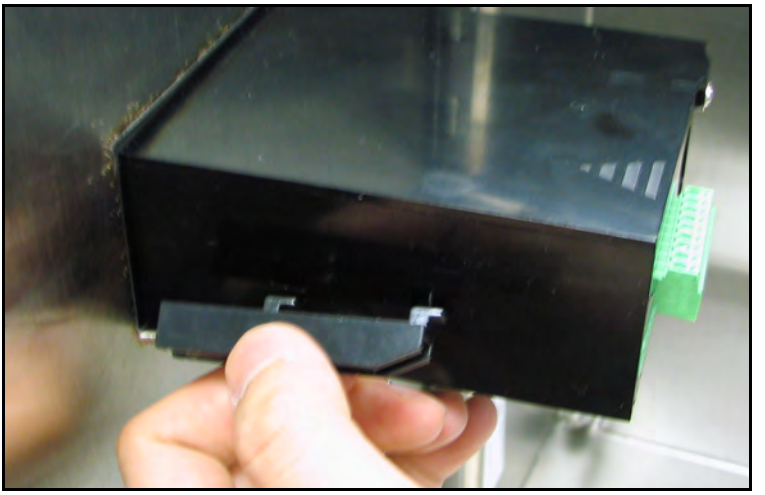


Figure 12: Installing the Mounting Brackets

5. Hold the chassis and lock each mounting bracket in place by sliding it toward the rear of the *Single-Channel Hygrometer* (see Figure 13).

Figure 13: Locking the Mounting Brackets in Place

2.3.1 Basic Mounting (cont.)

6. Use a screwdriver to extend the bracket screws to the back of the panel and secure the hygrometer in the panel cutout (see Figure 14).

Figure 14: Securing the *Single-Channel Hygrometer* to the Panel

7. Using a feeler gauge behind the gasket, check the compression, and tighten the bracket screws until the gap is 0.028” ±0.002” (see Figure 15).

Figure 15: Checking the Gasket Compression

2.3.2 Adapter Plate Mounting

Some customers may need to retrofit a *Single-Channel Hygrometer* into a cut-out sized for previous OEM panel-mount hygrometers. The previous generations were of a larger size requiring a 5.40” (137.2 mm) W x 2.65” (67.3 mm) H cut-out. The *Single-Channel Hygrometer* is smaller, requiring a 3.69” (94 mm) W x 1.81” (46 mm) H cut-out. For those customers who need to retrofit the larger panel cut-out sizes, an optional adapter plate is available. See Appendix A, *Outline and Installation Drawings*, for the required panel cutout.

1. Fit the larger gasket around the adapter plate (see Figure 16).

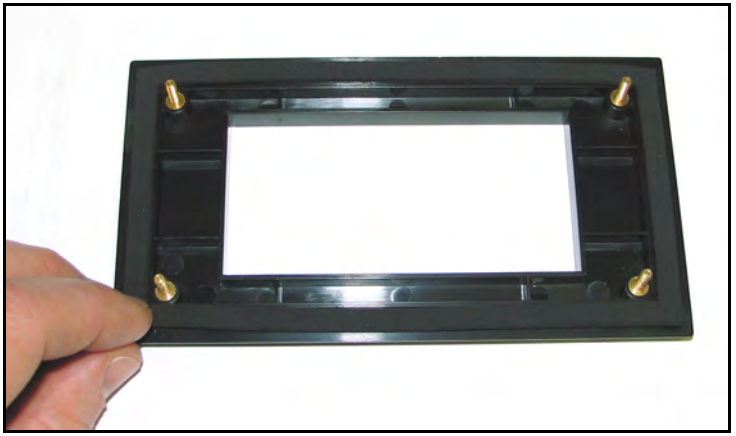


Figure 16: Installing the Adapter Plate Gasket

2.3.2 Adapter Plate Mounting (cont.)

2. Fit the adapter plate into the panel cutout (see Figure 17).

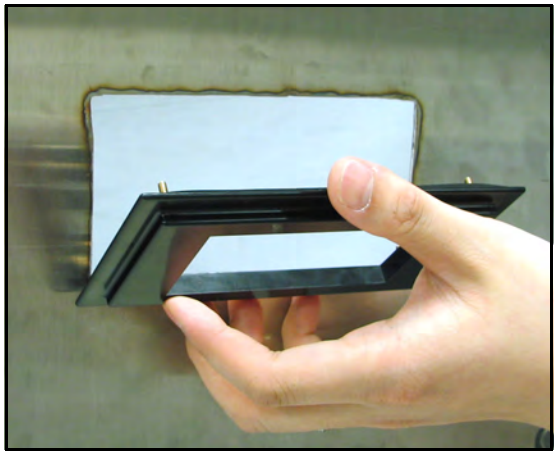


Figure 17: Inserting the Adapter Plate

3. Behind the panel, place the metal backing plate over the four adapter plate mounting screws (see Figure 18).

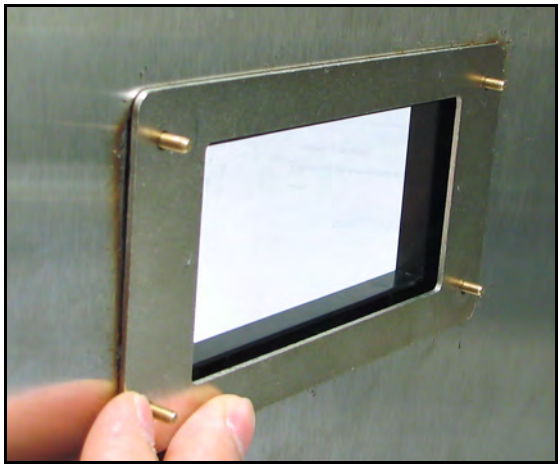


Figure 18: Applying the Backing Plate

2.3.2 Adapter Plate Mounting (cont.)

4. Apply nuts to the four screws and secure the assembly to the panel (see Figure 19 and Figure 20). Use a feeler gauge behind the gasket, check the compression, and tighten the nuts until the gap is 0.032” ±0.002”.

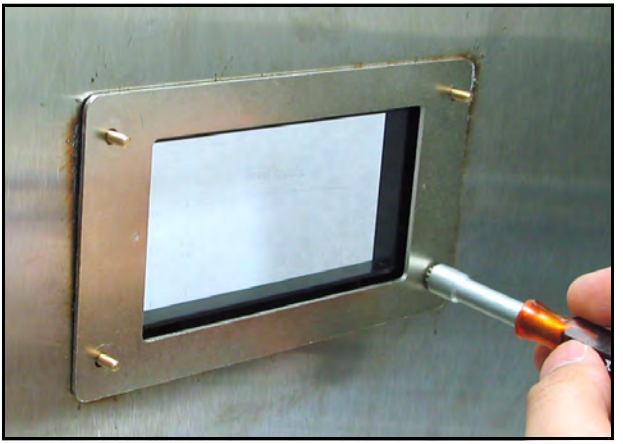


Figure 19: Securing the Assembly to the Panel

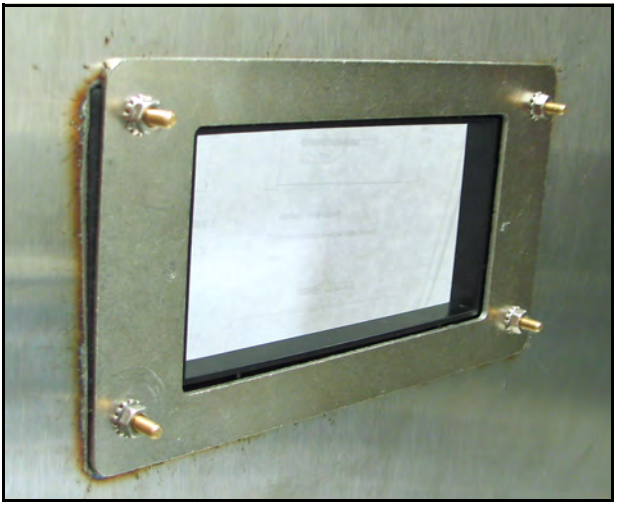


Figure 20: Plate Assembly Mounting Complete

2.3.2 Adapter Plate Mounting (cont.)

Now mount the *Single-Channel Hygrometer* using steps 1-6 in *Basic Mounting* on page 8. Re-verify the adapter plate gap after the *Single-Channel Hygrometer* is mounted to the adapter plate. The installation should appear similar to Figure 21 and Figure 22.

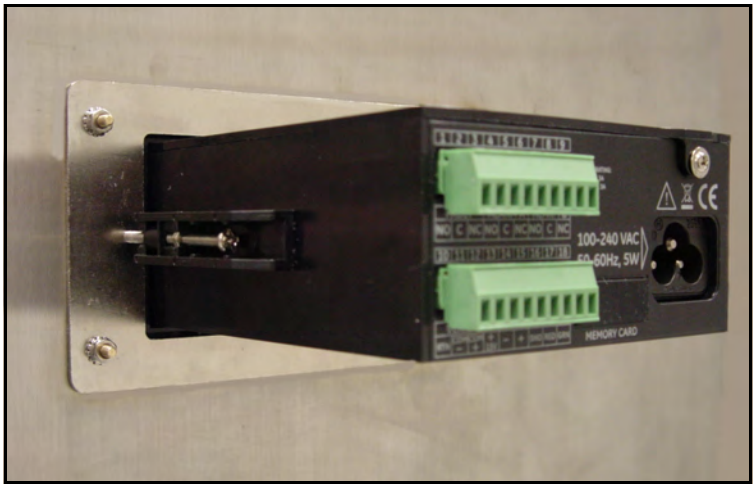


Figure 21: Hygrometer Installation with Adapter Plate - Rear

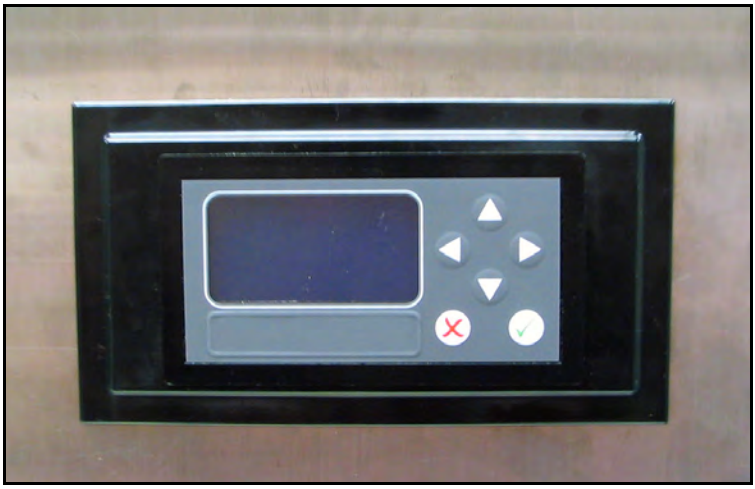


Figure 22: Hygrometer Installation with Adapter Plate - Front

2.4 Mounting the Sample System

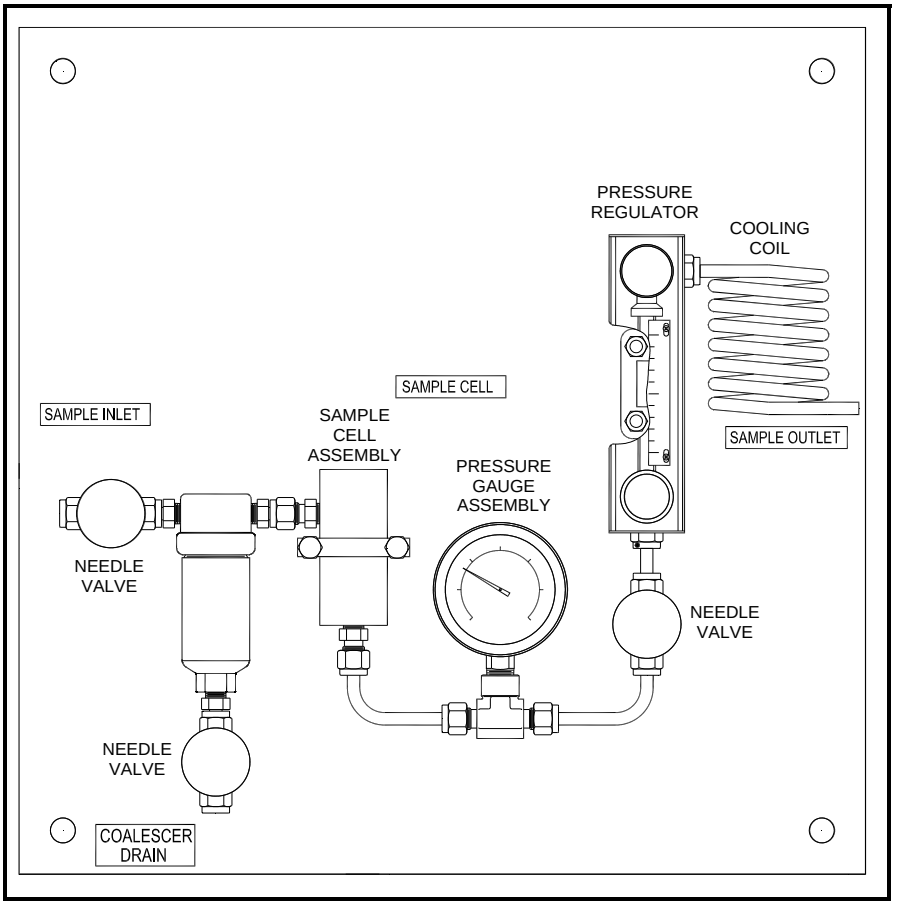


Figure 23: Typical Sample System

2.4 Mounting the Sample System (cont.)

The sample system is normally fastened to a flat metal plate that has four mounting holes.

Complete the following steps to mount the sample system:

1. Fasten the sample system plate or enclosure to a vertical wall or panel with a bolt in each of the four corners.
2. Connect the sample system inlet to the process and the outlet to the return, using appropriate stainless steel fittings and tubing.

CAUTION! Do not start the process flow through the system until the probe has been properly installed (see the following section).

2.5 Installing the Probe

Probes are usually installed in a sample system to protect them from any damaging elements in the process. The probe is mounted in a cylindrical container called the **sample cell**, which is included as part of your sample system.

Probes are mounted into the sample system or process line with 3/4-16 straight threads that are sealed with an o-ring. Other fittings are available for special applications.

CAUTION! If the probe is to be mounted directly in the process line, without a sample system, consult the factory for proper installation instructions and precautions.

Refer to Figure 24 on page 18, and complete these steps to install the probe into the sample cell:

1. Insert the probe into the sample cell and thread the probe into the sample cell fitting. Make sure you do not to cross the threads.
2. Tighten the probe securely.

2.5 Installing the Probe (cont.)

3. Identify the sample cell inlet port as the connection that is perpendicular to the installed probe.

CAUTION! For maximum protection of the aluminum oxide sensor, the probe shield should always be left in place.

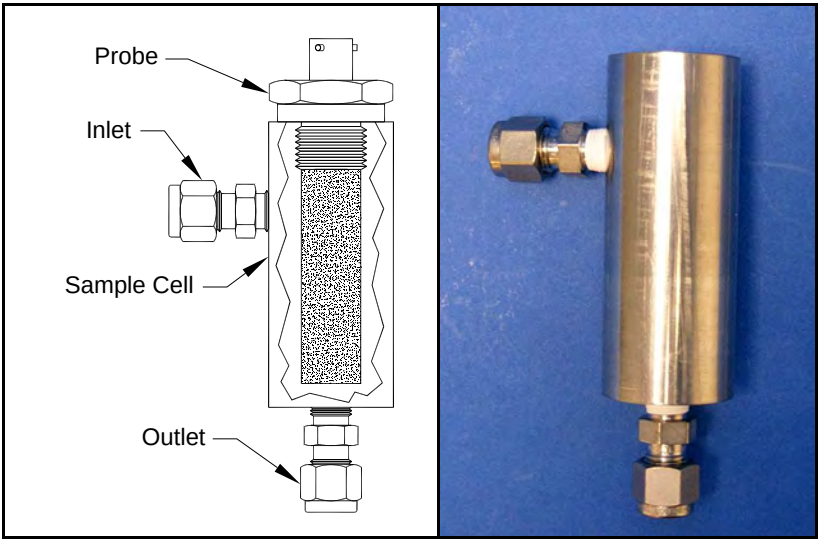


Figure 24: Probe/Sample Cell Assembly

2.6 Wiring the System

Wiring the *Single-Channel Hygrometer* system includes these steps:

- connecting the probe
- connecting the recorder output
- connecting the alarms
- installing the power cable

WARNING! To ensure safe operation, the *Single-Channel Hygrometer* must be installed and operated as described in this manual. Also, be sure to follow all applicable local safety codes and regulations for installing electrical equipment.

2.6 Wiring the System (cont.)

The **CAUTION!** symbol is a reminder that *Single-Channel Hygrometer* components can be damaged if electrical connections are not correctly made.

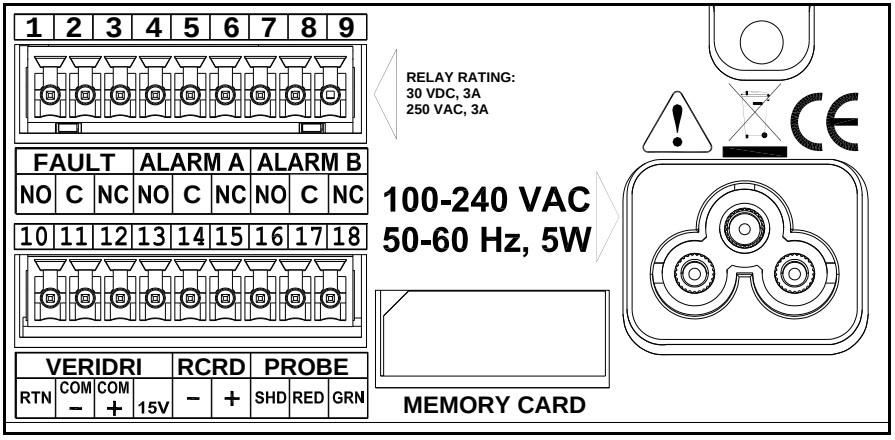


Figure 25: Hygrometer Rear Panel Connections - AC Version

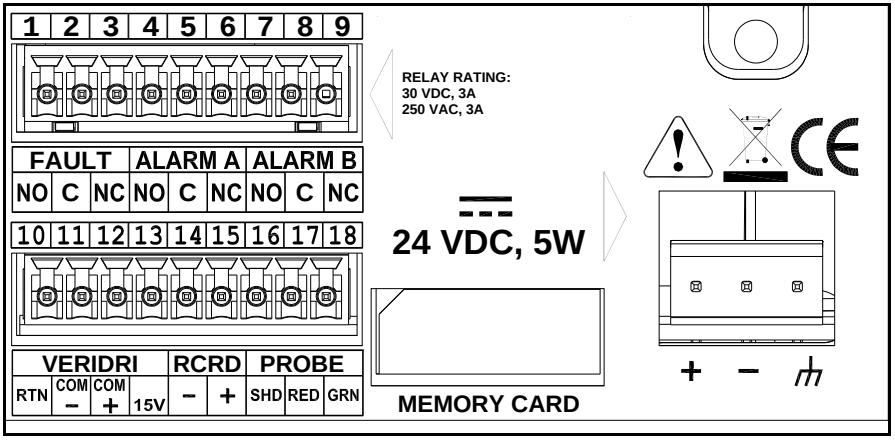


Figure 26: Hygrometer Rear Panel Connections - DC Version

2.6 Wiring the System (cont.)

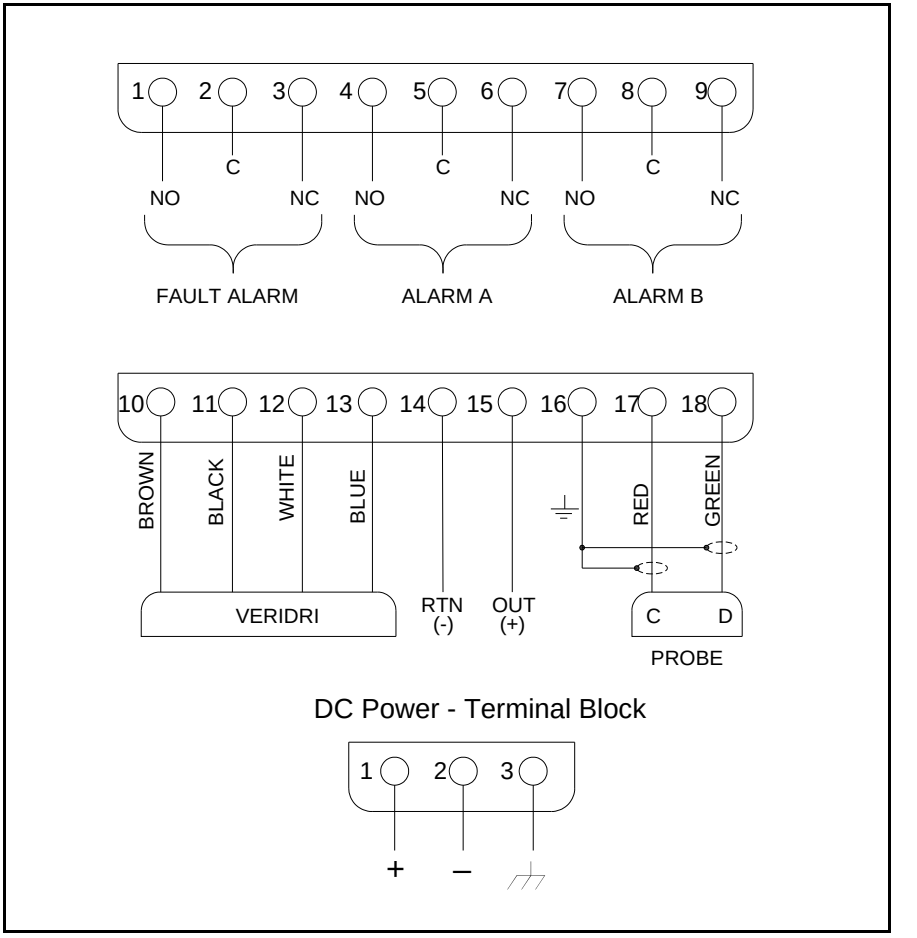


Figure 27: *Single-Channel Hygrometer* Wiring Diagram

2.6.1 Connecting a Standard Probe

The probe must be connected to the hygrometer with a continuous run of *two-wire shielded cable*. When connecting the probe, protect the cable from excessive strain (bending, pulling, etc.) and do not subject the cable to temperatures above 65°C (149°F) or below –50°C (–58°F).

Note: *Standard factory-assembled cables are available in lengths up to 600 meters (2000 feet).*

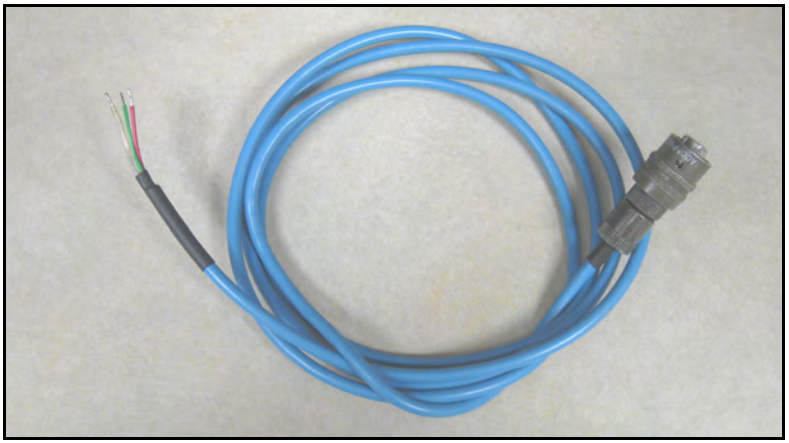


Figure 28: Two-Wire, Shielded, Aluminum-Oxide Moisture Probe Cable

To connect the probe cable, refer to Figure 25 on page 19 and Figure 29 and Figure 30 on page 22, and complete the following steps:

1. Insert the end of probe cable with the bayonet-type connector onto the probe and twist the shell clockwise until it snaps into a locked position (approximately 1/8 turn).

IMPORTANT: *Ensure that the power is off before proceeding.*

2. Connect the end of the probe cable with the three leads to the lower terminal block (pins 16, 17 and 18) on the back of the hygrometer.

2.6.1 Connecting a Standard Probe (cont.)

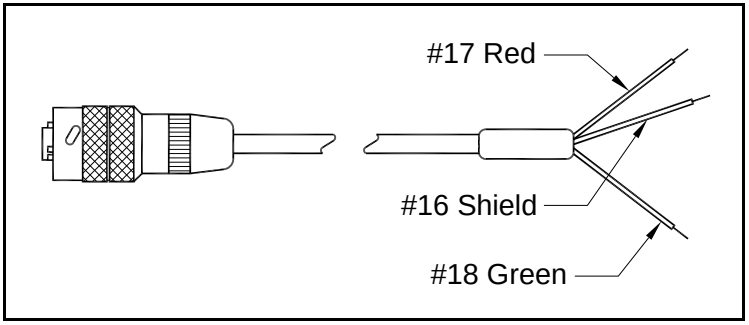


Figure 29: Aluminum-Oxide Moisture Probe Cable Connections

IMPORTANT: *To maintain good contact at the terminal block and to avoid damaging the pins on the wiring connector, pull the connector straight off (not at an angle) the terminal block. Then, make the cable connections while the connector is off the unit. Finally, after the wiring is complete, push the connector straight onto the terminal block (not at an angle).*

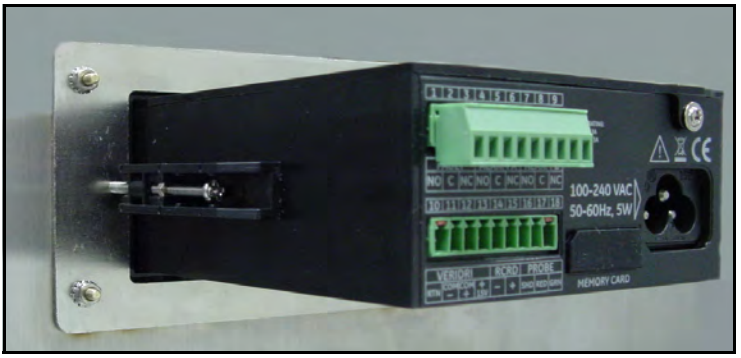


Figure 30: Bottom Connector Removed

2.6.1 Connecting a Standard Probe (cont.)

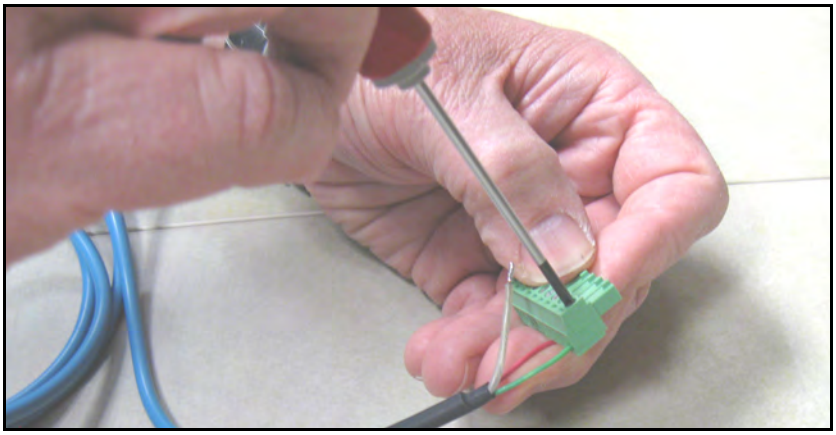


Figure 31: Making Probe Cable Connections to the Connector

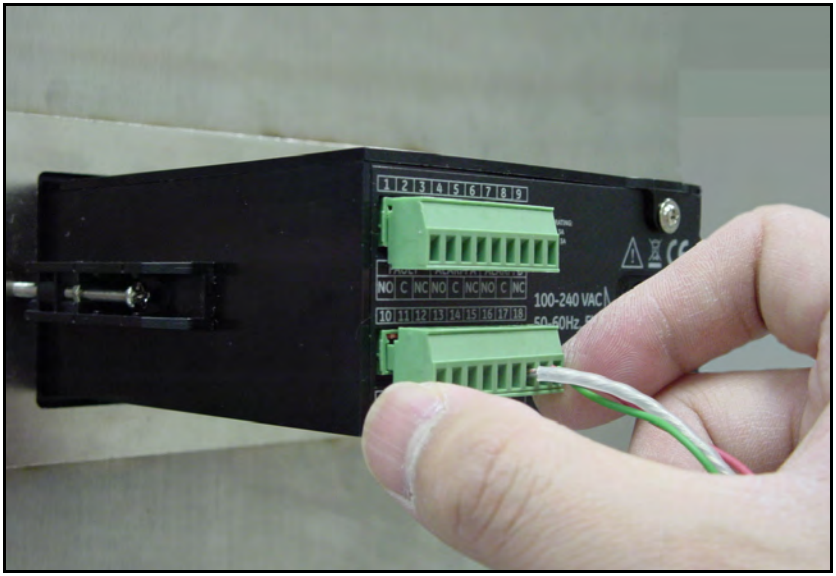


Figure 32: Reinserting the Connector into the Terminal Block

2.6.2 Connecting a Moisture Transmitter

Use the following steps to wire the *Moisture Transmitter* to the hygrometer.

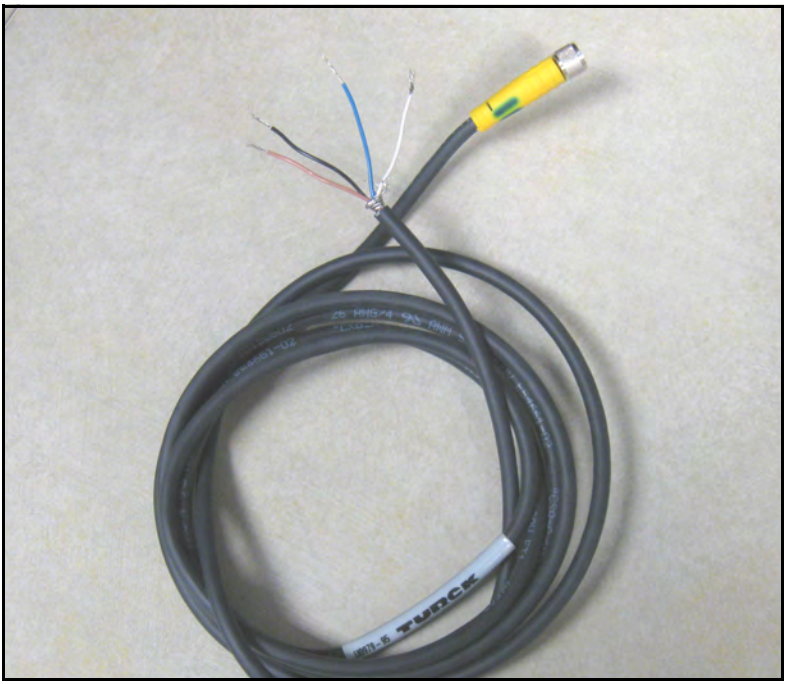


Figure 33: Moisture Transmitter Cable

1. Insert the end of probe cable with the connector onto the probe and twist the connector head clockwise until it is secure.

IMPORTANT: *Ensure that the power is off before proceeding.*

2.6.2 Connecting a Moisture Transmitter (cont.)

2. Using the flying leads at the end of the special probe cable, connect the probe to the lower terminal block (pins 10, 11, 12 and 13) on the back of the hygrometer (see Table 1 and Figure 35 and Figure 36 on page 26).

Table 1: Moisture Transmitter Wiring Connections

Wire Color	Pin Number	Designation
Brown	10	RTN
Black	11	COM –
White	12	COM +
Blue	13	+15V

IMPORTANT: *To maintain good contact at the terminal block and to avoid damaging the pins on the wiring connector, pull the connector straight off (not at an angle) the terminal block. Then, make the cable connections while the connector is off the unit. Finally, after the wiring is complete, push the connector straight onto the terminal block (not at an angle).*

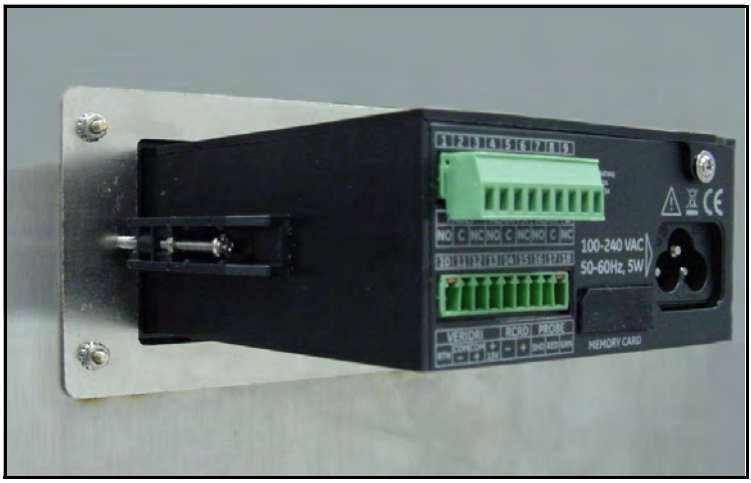


Figure 34: Bottom Connector Removed

2.6.2 Connecting a Moisture Transmitter (cont.)

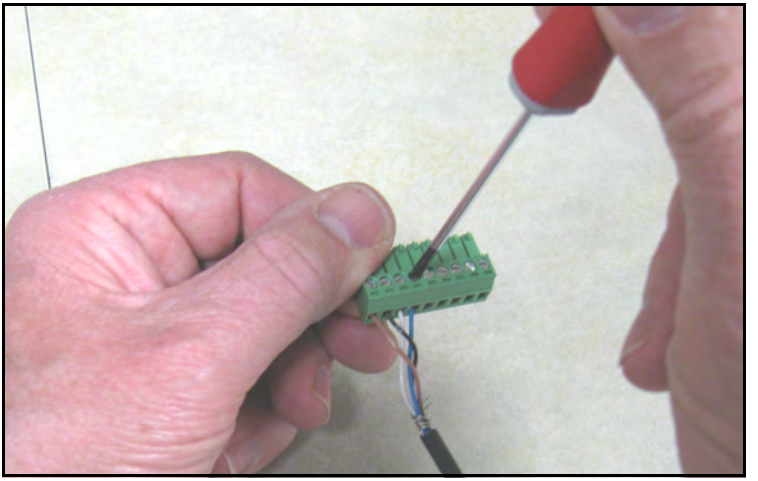


Figure 35: Wiring the Cable to the Connector

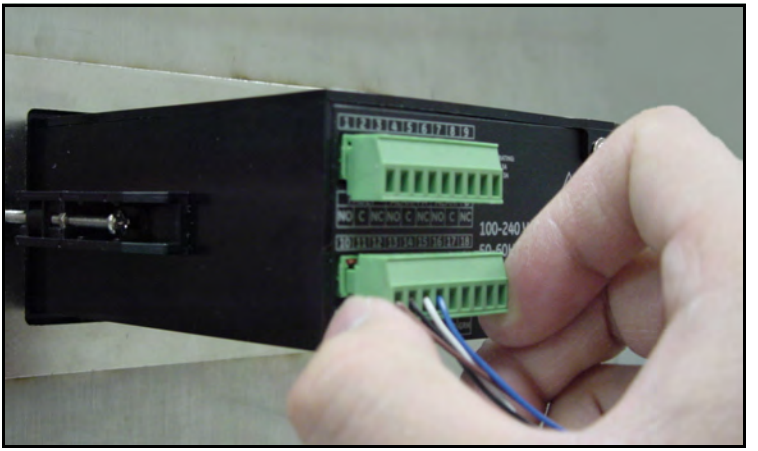


Figure 36: Reinserting the Connector into the Terminal Block

Note: *When there is a* No Link *error for the* Moisture Transmitter*, check the wiring to ensure proper connections and make sure there is no short between the* +15V *and* RTN.

2.6.3 Connecting the Recorder Outputs

IMPORTANT: *Ensure that the power is off before proceeding.*

Connect your recorder to the lower terminal block on the back of the *Single-Channel Hygrometer* (pins 14 and 15), as shown in Figure 25 and Figure 26 on page 19.

IMPORTANT: *To maintain good contact at each terminal block and to avoid damaging the pins on the connector, pull the connector straight off (not at an angle), make cable connections while the connector is away from the unit, and push the connector straight on (not at an angle) when the wiring is complete.*

2.6.4 Connecting the Relays

Note: *The customer will provide their own cable for connecting the alarm relays. Acceptable cables range from 16 to 26AWG.*

The *Single-Channel Hygrometer* has one fault alarm relay and two high/low alarm relays. Each alarm relay is a single-pole, double-throw contact set that contains the following contacts:

- Normally Open (**NO**)
- Common (**C**)
- Normally Closed (**NC**)

Table 2: Pin Designations for Relay Contacts

	Fault	Alarm A	Alarm B
Normally Open	1	4	7
Common	2	5	8
Normally Closed	3	6	9

2.6.4a Connecting the High/Low Alarms (A and B)

IMPORTANT: *Ensure that the power is off before proceeding.*

Each of these alarms can be set to trip on either a high or low condition. For a high alarm, the alarm will trip if the input exceeds the setpoint. For a low alarm, the alarm will trip if the input drops below the setpoint. Make connections to the Alarm A and Alarm B upper terminal block on the back of the *Single-Channel Hygrometer*, as shown in Figure 25 and Figure 26 on page 19.

IMPORTANT: *To maintain good contact at each terminal block and to avoid damaging the pins on the connector, pull the connector straight off (not at an angle), make cable connections while the connector is away from the unit, and push the connector straight on (not at an angle) when the wiring is complete.*

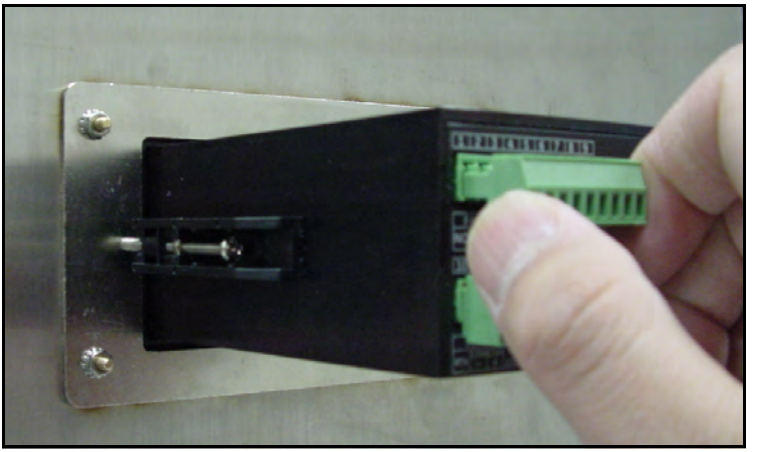


Figure 37: Removing the Upper Connector

2.6.4b Connecting the Fault Alarm

If enabled, the fault alarm trips when one or more of the following faults occurs:

- power failure
- range error (configurable)
- watchdog function system reset

Note: *The* watchdog function *is a supervisory circuit that automatically resets the unit whenever a system error occurs.*

The fault alarm may operate in *fail-safe* mode and uses *pins 2 and 3* to provide a *"normally closed"* contact. When the *Single-Channel Hygrometer* is operating in a non-fault state, the fault alarm relay is energized to open the contact between pins 2 and 3. When a fault occurs, the fault alarm relay is de-energized to close the contact between pins 2 and 3.

Note: *The contact between pins 1 (normally open) and 2 works in the opposite way. The alarm is energized to close the contact during ordinary operation and the alarm is de-energized to open the contact when there is a fault.*

IMPORTANT: *Ensure that the power is off before proceeding.*

To wire the fault alarm, make connections to the upper terminal block on the back of the *Single-Channel Hygrometer*, as shown in Figure 25 and Figure 26 on page 19.

IMPORTANT: *To maintain good contact at each terminal block and to avoid damaging the pins on the connector, pull the connector straight off (not at an angle), make cable connections while the connector is away from the unit, and push the connector straight on (not at an angle) when the wiring is complete.*

2.6.5 Installing the AC Power Cable

To install the AC power cable, included with the *Single-Channel Hygrometer*, plug the female connector end of the cable into the male connector on the rear panel (see Figure 25 on page 19, Figure 38 and Figure 39).

Figure 38: Inserting the AC Power Cable

Figure 39: The AC Power Cable Installed

2.6.6 Installing the DC Power Cable

The DC power cable (with 14 to 26 AWG wires) is supplied by the customer. Use the following instructions to connect the cable to the *Single-Channel Hygrometer.*

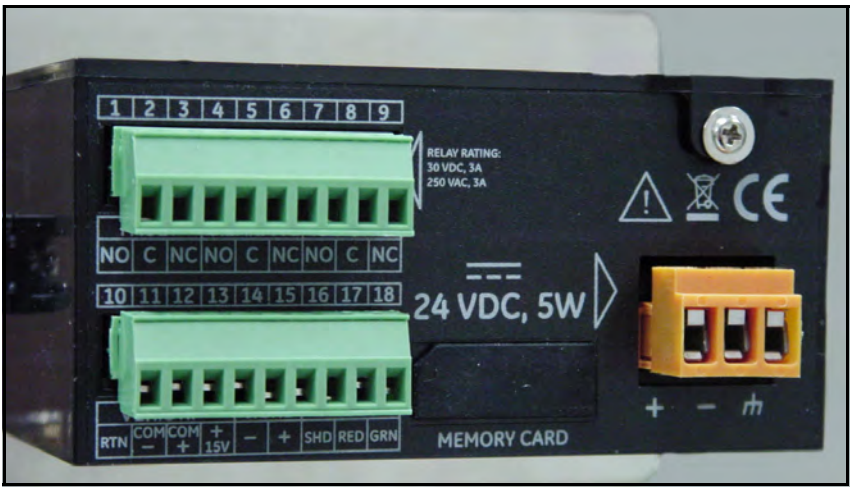


Figure 40: Rear Panel Connections - DC Version

1. Remove the DC Connector from the rear panel (see Figure 41).

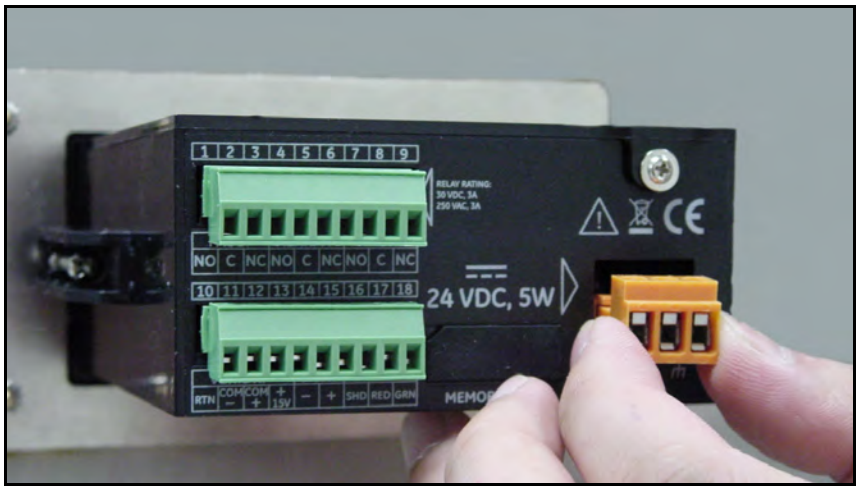


Figure 41: Removing the DC Connector

2.6.6 Installing the DC Power Cable (cont.)

2. Strip each conductor of the DC power cable by approximately 3/8".

3. Insert each wire into the appropriate slot (+, – and chassis) and tighten each screw to secure them in place.

IMPORTANT: *Ensure that the chassis ground connection is properly grounded.*

4. Reinsert the DC connector into the rear panel (see Figure 42).

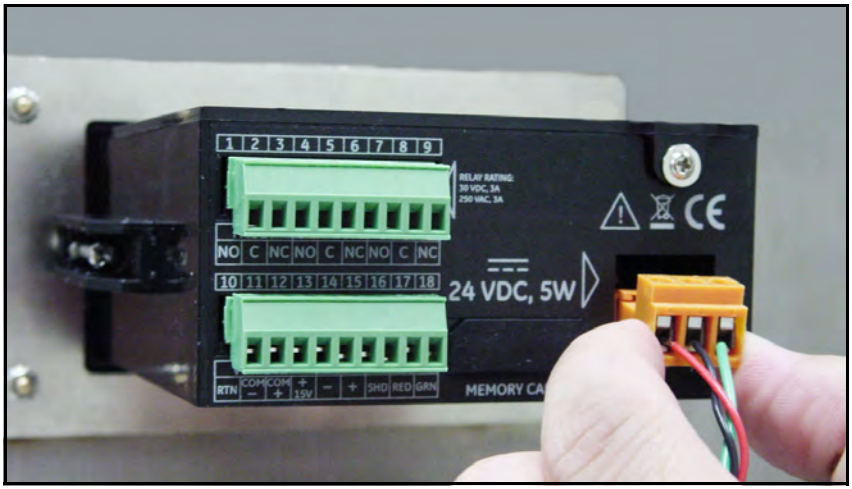


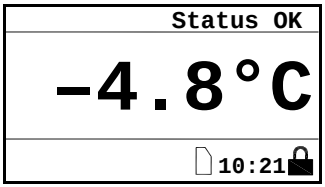
Figure 42: Reinserting the DC Connector

Chapter 3. Operation and Programming

3.1 Using the *Single-Channel Hygrometer*

3.1.1 Starting Up

After proper installation, the *Single-Channel Hygrometer* transmitter can be set up to accommodate the user's requirements. Typically, the user may need to configure the analog outputs, trim the analog outputs, and program logging. Refer to a Menu Map, Figure 49 on page 94 when using an *Aluminum-Oxide Moisture Probe*, or Figure 50 on page 95 when using a *Moisture Transmitter*, and complete the following steps. Upon startup, the *Single-Channel Hygrometer* proceeds through several displays until a screen similar to the following appears:



After startup, the screen will need to be unlocked. To unlock the screen, press

✘ ✓ ✘
Cancel, **Enter**, **Cancel**.

Note: *In most instances; use the* **Enter** *key to save an entry and/or move ahead to the following screen; use the* **Cancel** *key to reject an entry and/or return to the previous screen.*

3.1.2 Accessing the Menus

After successfully unlocking the keypad, press **Cancel** ✘. The *Single-Channel Hygrometer* will display the Main Menu (see Figure 43). Use the arrow keys to select the menu item desired. Refer to *Menu Map*, Figure 49 on page 94.

Press **Enter** ✓ to select the highlighted item. Many menu items will display another menu. Use **Cancel** ✘ to return to the previous menu page. Pressing **Cancel** ✘ from the Main Menu will return the screen to the Measurement Display.

Note: *Menu items displayed with an ellipsis (shown as a series of three dots after the menu item) will bring up more choices, while those without take immediate action.*

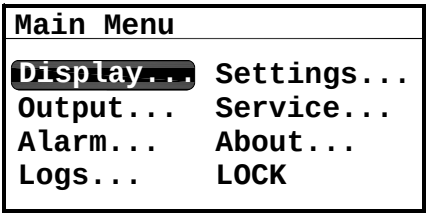


Figure 43: Main Menu

3.1.3 Entering Numeric Values

Since the *Single-Channel Hygrometer* has no numeric keypad, numeric values are entered using a "combination lock" style of entry:

Use the **left** ◀ and **right** ▶ arrow keys to select the digit to change. The digit selected will be indicated with a ▲.

Use the **up** ▲ and **down** ▼ arrow keys to increment or decrement the digit.

Note: *If incrementing or decrementing a digit would cause the numeric value to exceed its allowable range (maximum/minimum value), the digit will not change.*

Press **Enter** ✓ to save the new value and return, or **Cancel** ✗ to return, leaving the original value intact.

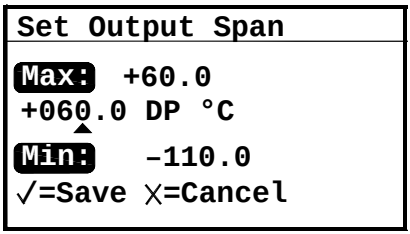
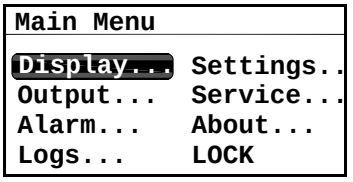


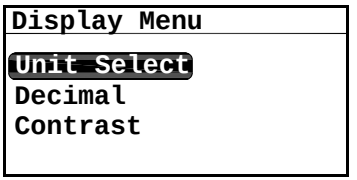
Figure 44: Numeric Entry

3.2 Setting Up the Display

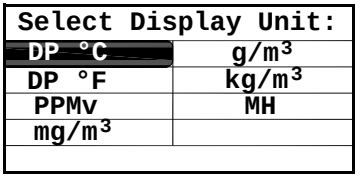


When the screen is unlocked, touch the **Cancel** ✘ key and the Main Menu appears with several options. To set up the display, select Display... and press **Enter** ✓. The following screen appears:

3.2.1 Selecting Primary Units



To select units for the primary display, select Unit Select and press **Enter** ✓. The following screen appears:

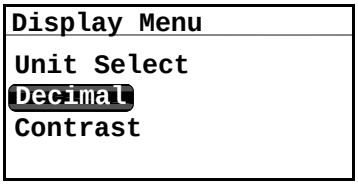


Use the arrow keys to select the desired units and press **Enter** ✓. The screen returns to the Display Menu.

Note: *If the* Moisture Transmitter *is being used,* FH *replaces* MH.

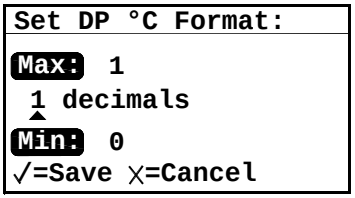
Note: *If the ppmv software version was purchased, PPMv, mg/m^3, g/m^3, and kg/m^3 will be available.*

3.2.2 Setting Decimal Places



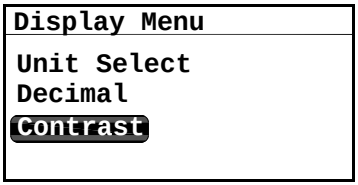
To set the decimal places for unit values, from the Display Menu use the arrow keys to select Decimal and press **Enter** ✓. The following screen appears.

The decimal places setting determines the number of digits displayed for the value to the right of the decimal symbol ("**.**"), if possible.

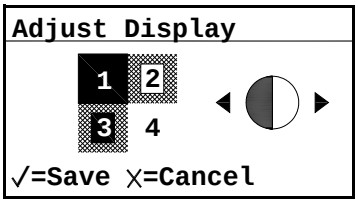


Use the arrow keys to change the number of decimal places and press **Enter** ✓, or press **Cancel** ✗ if no changes are necessary. The screen returns to the Display Menu.

3.2.3 Contrast



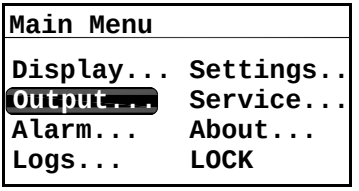
To modify the display contrast, from the Display Menu use the arrow keys to select Contrast and press **Enter** ✓. The following screen appears.



Use the Right/Left arrow keys to increase/decrease display contrast. Press **Enter** ✓ to save the changes, or press **Cancel** ✗ to return to the previous setup. The screen returns to the Display Menu.

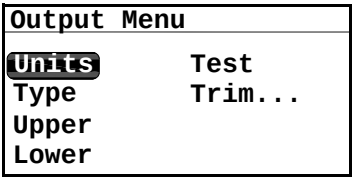
3.3 Setting Up the Output

3.3.1 Entering the Output Menu

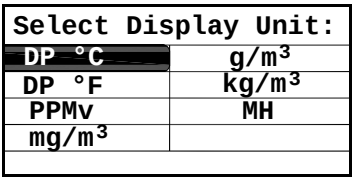


To set up the output, from the Main Menu choose Output... and press **Enter** ✓. The following screen appears.

3.3.2 Selecting Output Units



From the Output Menu, select Units and press **Enter** ✓. The following screen appears.



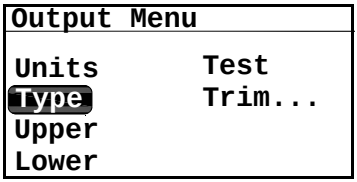
Use the arrow keys to select the unit type and press **Enter** ✓. The screen returns to the Output Menu:

Note: *If the* Moisture Transmitter *is being used,* FH *replaces* MH.

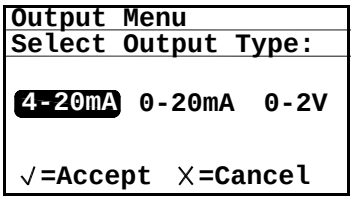
Note: *If the ppmv software version was purchased, PPMv, mg/m^3, g/m^3, and kg/m^3 will be available.*

3.3.3 Selecting an Output Type

Note: Before changing the output type, refer to Section 2.2 Selecting the Recorder Output *on page 4 to make sure that Switch S1 is at the correct setting (V for voltage or I for current).*

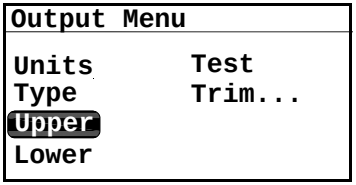


To change the output type, from the Output Menu select Type and press **Enter** ✓. A screen similar to the following appears:

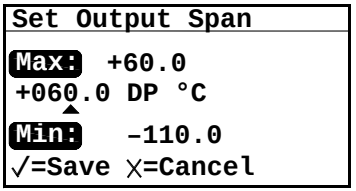


Use the arrow keys to select a new output type. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the Output Menu.

3.3.4 Changing the Upper Output Span

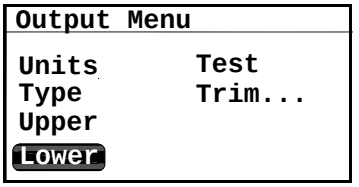


To adjust the upper output span, from the Output Menu select Upper and press **Enter** ✓. A screen similar to the following appears.

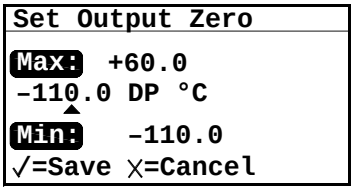


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to Output Menu.

3.3.5 Changing the Lower Output Span



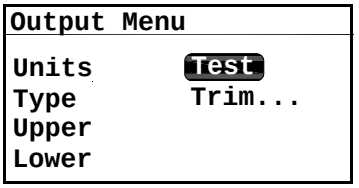
To adjust the lower output span, from the Output Menu select Lower and press **Enter** ✓. A screen similar to the following appears.



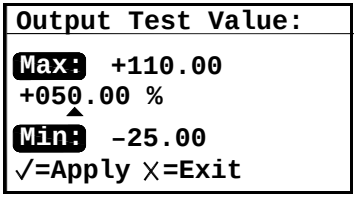
Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to Output Menu.

3.3.6 Testing the Output

The Test Menu causes the *Single-Channel Hygrometer* to generate a 0- or 4-20mA output, or a 0-2V output, at the percent of scale selected. For example, in 4-20mA operation, 0% = 4mA, 50% = 12mA, 100% = 20mA. This allows the proper function of recording or SCADA equipment to be verified. In 0-20 operation, 0% = 0mA, 50% = 10mA, 100% = 20mA



To test system output, from the Output Menu select Test and press **Enter** ✓. The *Single-Channel Hygrometer* will proceed to check the settings, and a screen similar to the following will appear.

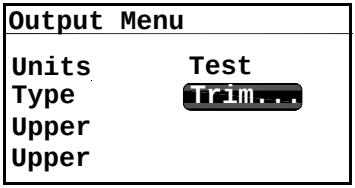


Use the left and right arrow keys to select each digit to be changed, and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the Output Menu.

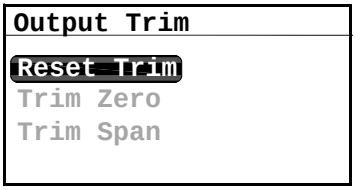
Check your output wiring. If the reading on your SCADA or DCS is off slightly, you may use the Trim feature to trim the output zero or span.

3.3.7 Trimming the Outputs

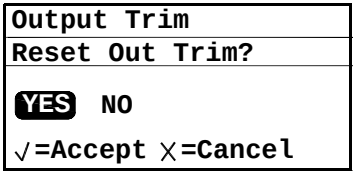
The Trim Menu enables the operator to compensate for differences in measurement of the 0/4-20 mA or 0-2V outputs by connected recorders or SCADA equipment. To trim the output:



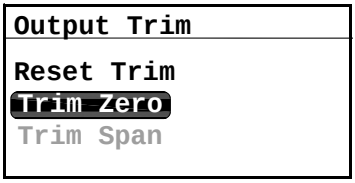
Select Trim from the Output Menu and press **Enter** ✓. The following screen appears.



When performing a Trim operation, the *Single-Channel Hygrometer* unit requires you to first reset the trim. To reset the trim output, select Reset Trim and press **Enter** ✓. The following screen appears.



Use the left or right arrow keys to select YES and press **Enter** ✓. This cancels any previous trim values, and returns the hygrometer to its factory adjustment. The display returns to the previous screen.

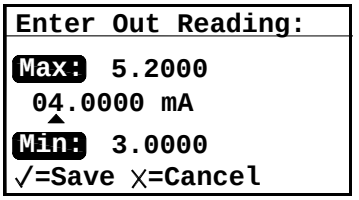


To trim the zero value, select Trim Zero and press **Enter** ✓. A screen similar to the following appears.

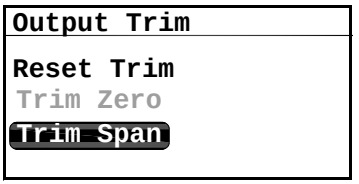
This will cause the *Single-Channel Hygrometer* to output 4.000 mA or 0.4V on the output being trimmed. The output value should then be read using the connected recorder, SCADA equipment, or DVM. Enter the value read from the connected equipment as the Zero Trim value, as follows:

Note: *Since you cannot trim 0 mA or 0 V for negative offsets, trim for the lower end of the scale is at the 4 mA or 0.4 V output level.*

3.3.7 Trimming the Outputs (cont.)

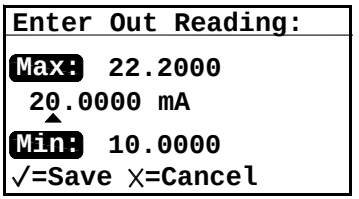


Use the left and right arrow keys to select each digit to be changed, and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value).



The Output Trim menu returns with Trim Span highlighted. To change the span value, press **Enter** ✓. A screen similar to the following appears.

This will cause the *Single-Channel Hygrometer* to output 20.000 mA on the output being trimmed. The output value should then be read using the connected recorder, SCADA equipment, or DVM. Enter the value read from the connected equipment as the Span Trim value.



Use the left and right arrow keys to select each digit to be changed, and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value).

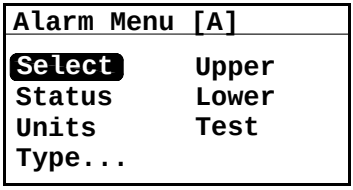
Trimming is complete. Accuracy can be verified using the Test Menu, above.

Example: Trim is reset, then Trim Zero is selected. The SCADA input reports 3.977 mA.
The operator enters “3.977” as the Zero Trim value.
Trim Span is selected. The SCADA input reports 19.985 mA.
The operator enters “19.985” as the Span Trim value.
The *Single-Channel Hygrometer* will adjust the output accordingly to true the output as read by the customer recorder, SCADA or DVM.
Using the Test Menu, the operator verifies that a test value of 0% now reads 4.000 mA at the SCADA equipment, and a test value of 100% now reads 20.000 mA.

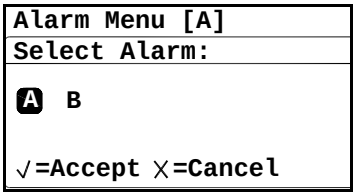
3.4 Setting Up Alarms

Note: *The* Single-Channel Hygrometer *is equipped with two programmable high/low alarm relays and one fault alarm.*

3.4.1 Selecting an Alarm Output

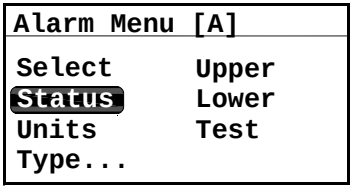


To set up alarm outputs, on the Main Menu choose Alarm and press **Enter** ✓. From the Alarm Menu choose Select and press **Enter** ✓. A screen similar to the following appears.

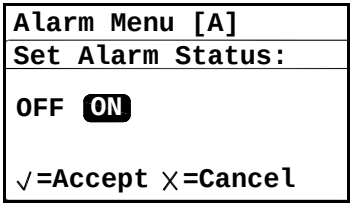


Use the arrow keys to select the output (A or B) to be set up and press **Enter** ✓. The display returns to the Alarm Menu.

3.4.2 Selecting Alarm Status

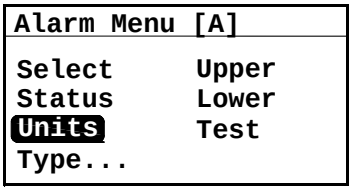


To select the alarm status, from the Alarm Menu select Status and press **Enter** ✓. The following screen appears:

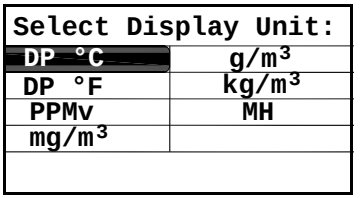


Use the arrow keys to select OFF or ON and press **Enter** ✓. The display returns to the Alarm Menu.

3.4.3 Selecting Alarm Units



To select alarm units, from the Alarm Menu select Units and press **Enter** ✓.

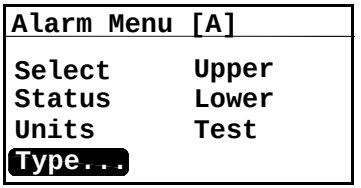


Use the arrow keys to select a unit. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the Alarm Menu.

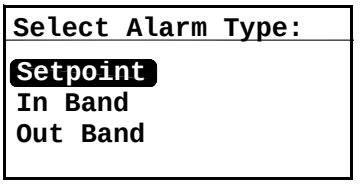
Note: *If the* Moisture Transmitter *is being used,* FH *replaces* MH.

Note: *If the ppmv software version was purchased, PPMv, mg/m^3, g/m^3, and kg/m^3 will be available.*

3.4.4 Selecting an Alarm Type



To change the alarm type, from the Alarm Menu select Type and press **Enter** ✓. A screen similar to the following appears:



Use the arrow keys to select an alarm type. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the Alarm Menu.

3.4.4 Selecting an Alarm Type (cont.)

- SetPoint: Alarm activates when parameter exceeds upper limit, and deactivates when parameter is less than lower limit.
- Inner Band: Alarm activates when parameter is between upper and lower limits.
- Outer Band: Alarm activates when parameter is outside upper and lower limits.

3.4.5 How the Alarm Types Work

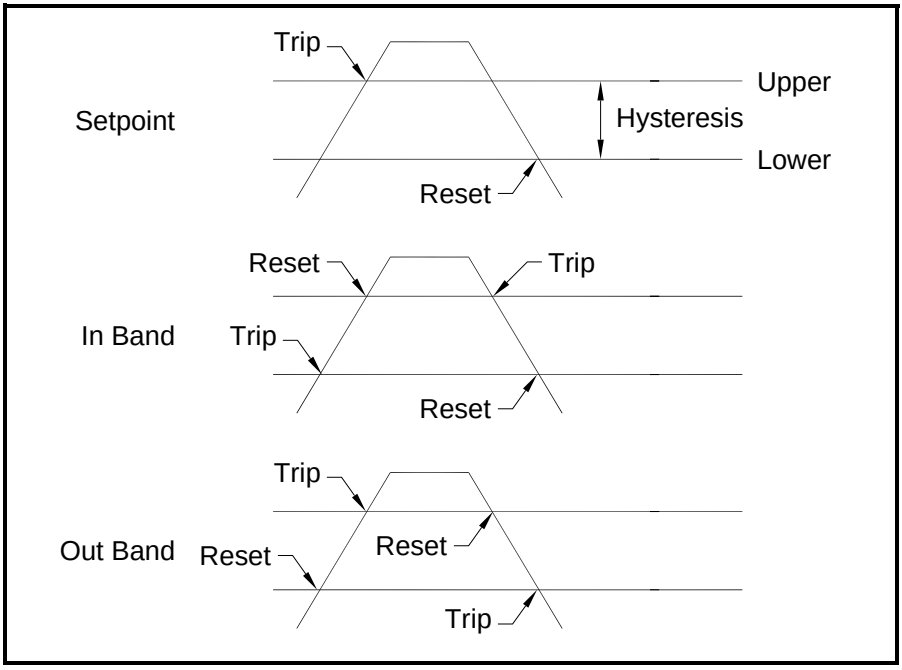
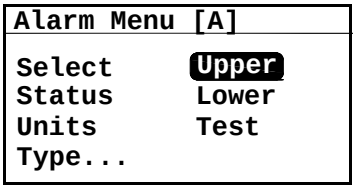
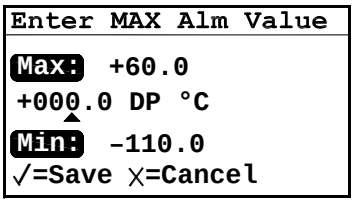


Figure 45: Example of Alarm Types

3.4.6 Changing the Upper Alarm Span

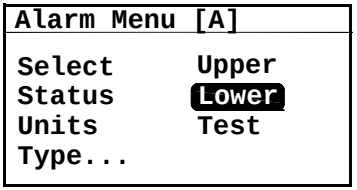


To adjust the upper alarm span, from the Alarm Menu select Upper and press **Enter** ✓. A screen similar to the following appears.

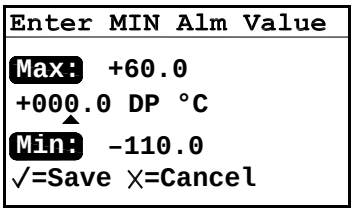


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✘ to keep the previous value), and return to the Alarm Menu.

3.4.7 Changing the Lower Alarm Span

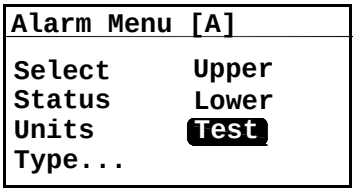


To adjust the lower alarm span, from the Alarm Menu select Lower and press **Enter** ✓. A screen similar to the following appears.

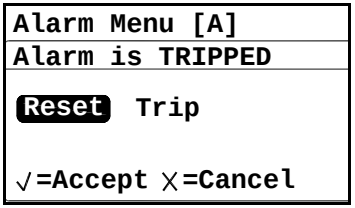


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✘ to keep the previous value), and return to the Alarm Menu.

3.4.8 Testing the Alarm Relays



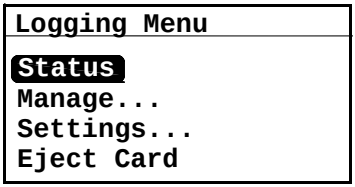
To test the alarm relay, and devices connected to it, from the Alarm Menu select Test and press **Enter** ✓. A screen similar to the following appears.



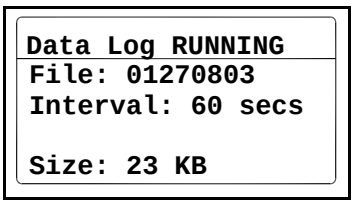
Use the left and right arrow keys to select Reset or Trip and press **Enter** ✓. If Reset was selected, the message Alarm is RESET appears. If Trip was selected, the message Alarm is Tripped appears. Press **Cancel** ✘ to return to the Alarm Menu.

3.5 Logging

3.5.1 Checking the Data Log Status



To check the data log status, from the Logging Menu select Status and press **Enter** ✓. A screen similar to the following appears.

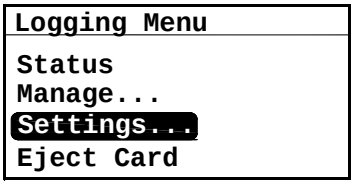


The current data log status is displayed. After about 10 seconds, the screen returns to the Logging Menu.

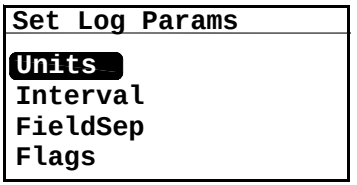
3.5.2 Log Settings Menu

Note: *To access the* Settings... *option under the* Logging Menu, *the log file must be stopped (see* Starting/Stopping Log Files *on page 51.*

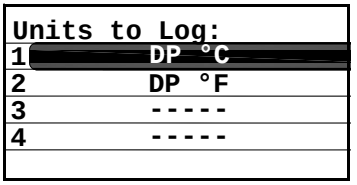
3.5.2a Setting Log Units



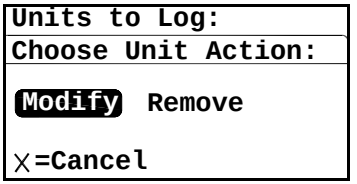
From the Logging Menu select Settings... and press **Enter** ✓. The following screen appears.



To set units to log, from the Set Log Params menu, select Units and press **Enter** ✓. The following screen appears.

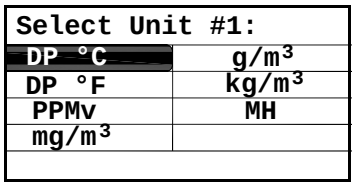


Use the arrow keys to select the unit to log, and press **Enter** ✓. The following screen appears.



To change the unit setting, select Modify and press **Enter** ✓. The following screen appears.

3.5.2a Setting Log Units (cont.)



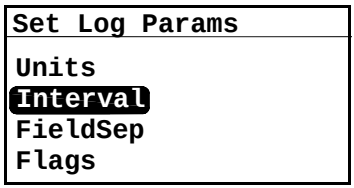
Use the arrow keys to select the unit to be represented by #1 and press **Enter** ✓. The screen returns to the Units to Log menu.

Note: *If the* Moisture Transmitter *is being used,* FH *replaces* MH.

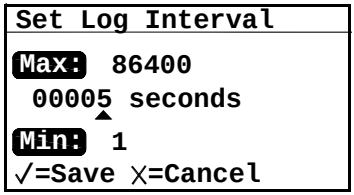
Note: *If the ppmv software version was purchased, PPMv, mg/m^3, g/m^3, and kg/m^3 will be available.*

To remove a unit, from the Units to Log menu, select Remove and press **Enter** ✓. Select the unit to be removed, press **Enter** ✓, and the unit is deleted. Press **Cancel** ✗ to return to the Set Log Params menu.

3.5.2b Setting the Log Interval

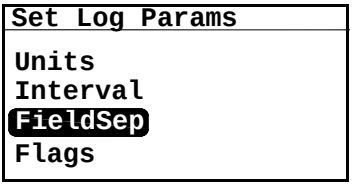


To set the log interval, from the Set Log Params menu, select Interval and press **Enter** ✓. The following screen appears.

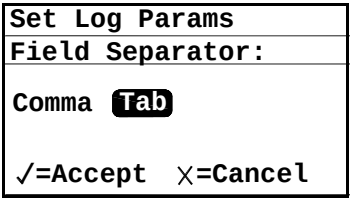


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the Set Log Params menu.

3.5.2c Setting a Field Separator



To designate a mark to separate the log fields, from the Set Log Params menu select FieldSep and press **Enter** ✓. The following screen appears.

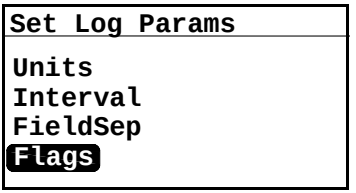


Use the arrow keys to select the mark used to separate the log fields and press **Enter** ✓. The screen returns to the Set Log Params menu.

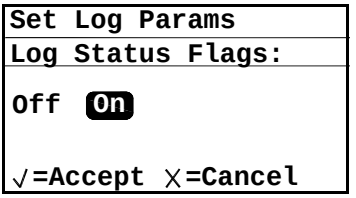
3.5.2d Setting Log Status Flags

Note: *The flags used to identify the log status are as follows:*

Range Err	**No Comm**	**Bad Message**	**No Data**	**Read Err**
Over Range	**No Link**	**Auto Cal**	**No Cal**	**ADC Failure**
Under Range	**Bad CRC**	**No Refs**	**Write Err**	**Cal Error**



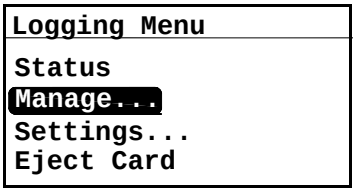
To turn log status flags on or off, from the Set Log Params menu select Flags and press **Enter** ✓. The following screen appears.



Use the arrow keys to select OFF or ON and press **Enter** ✓. The screen returns to the Set Log Params menu.

Press **Cancel** ✘ to return to the Logging Menu.

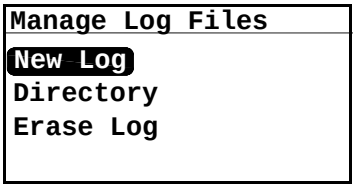
3.5.3 Managing Log Files



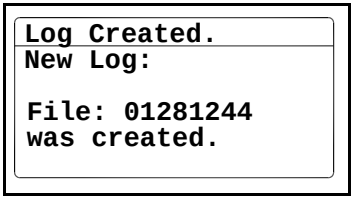
To manage the log file status, from the Logging Menu select Manage and press **Enter** ✓. If no log has been created, the following screen appears.

3.5.3a Creating a New Log

Note: *In order for the new log option to be available, there can be no log running or paused. If there is any previous log running/paused, it will need to be closed. Once closed, the closed log file cannot be resumed.*



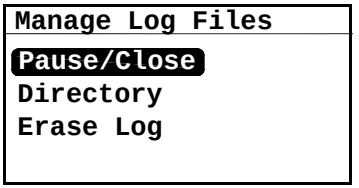
To create a new log, from the Manage Log Files menu select New Log and press **Enter** ✓. A screen similar to the following appears.



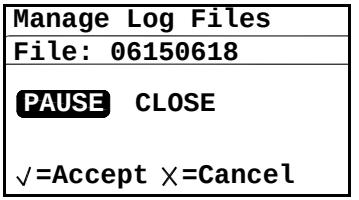
A file name is assigned by the hygrometer to the new log. This name corresponds to the date and time the log is started. A log started on May 1 at 4:37 pm will be named 05011637. After 10 seconds, the screen returns to the Manage Log Files menu.

Note: *When a new log is created, the* Manage Log Files *menu changes to the following screen.*

3.5.3b Pausing a Log



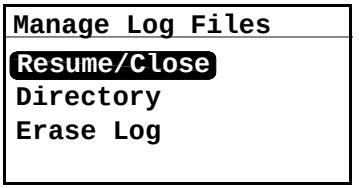
When a new log is created, it can be paused or closed. To pause the log, from the Manage Log Files menu select Pause/Close and press **Enter** ✓. The following screen appears.



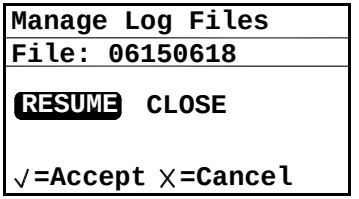
Select Pause and press **Enter** ✓. the screen returns to the Manage Log Files menu.

Note: *When a log is paused, the* Manage Log Files *menu changes to the following screen.*

3.5.3c Resuming a Log



A paused log can be resumed or closed. To resume the log function, from the Manage Log Files menu select Resume/Close and press **Enter** ✓. The following screen appears.

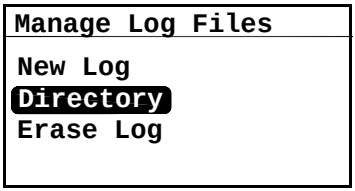


Select Resume and press **Enter** ✓. the screen returns to the Manage Log Files menu.

Note: *When a log is resumed, the* Manage Log Files *menu displays the Pause/Close option again.*

Note: *If a log is running and it reboots due to a power failure, it will always return to the previous state prior to the power failure. If it was running, it will continue to run. If it was paused, it will stay paused and can be resumed.*

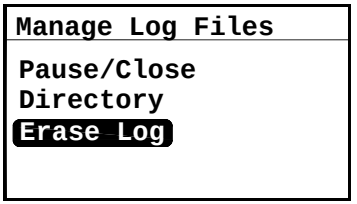
3.5.3d Viewing the Log Directory



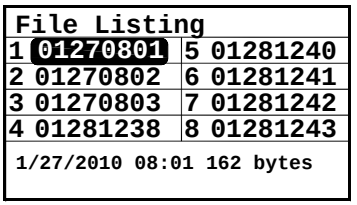
To view the existing log names, select Directory and press **Enter** ✓. A screen similar to the following appears.

When a listing is highlighted, the date, time and size of each log appears at the bottom of the screen. Use the arrow keys to move from one listing to another. To return to the Manage Log Files menu, press **Cancel** ✘.

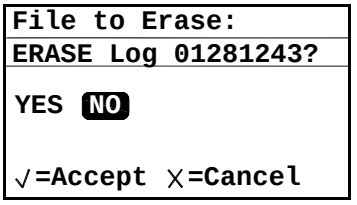
3.5.3e Deleting Log Files



To erase an existing log file(s), from the Manage Log Files menu, select Erase Log and press **Enter** ✓. The File Listing screen appears.



Using the arrow keys, move to the listing to be deleted, and press **Enter** ✓. The following screen appears.



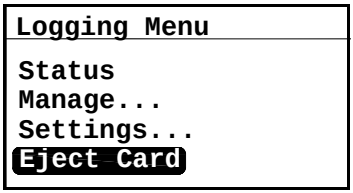
Using the arrow keys, select YES to erase the listing, or NO to save the listing. Press **Enter** ✓ and the screen returns to File Listing. If YES was selected, the particular number is gone. If NO was selected, the number is still present.

Press the **Cancel** ✘ key to return to the Manage Log Files menu.

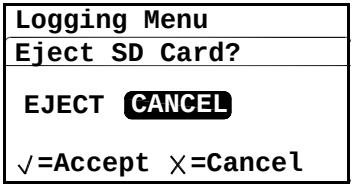
3.5.4 Ejecting the SD Card

Removing the MicroSD card requires two steps. First, the active files must be closed. This step is referred to as ejecting the SD Card. The MicroSD card can now be removed from the *Single-Channel Hygrometer*.

Note: *Physically removing the MicroSD card from the* hygrometer *without performing the eject routine below may result in data loss. This will not result in damage to either the MicroSD card or to the Single-Channel Hygrometer.*



To eject the SD card, from the Logging Menu, select Eject Card and press **Enter** ✓. The following screen appears.



Use the arrow keys to select EJECT or CANCEL and press **Enter** ✓. The screen returns to the Logging Menu.

Press **Cancel** ✗ to return to the Main Menu.

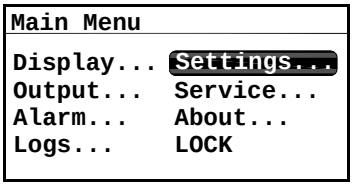
Note: *If* EJECT *was selected, the MicroSD card may now be removed from the* Single-Channel Hygrometer*. To remove and read the card see* Reading the MicroSD Card *on page 97.*

3.5.5 Viewing Data Logs

Any MicroSD card reader may be used to read the MicroSD card. The log file is in text format, therefore, any word processing or spreadsheet program may be used to read the data.

Refer to Appendix C for examples on how to work with log files.

3.6 Setting Other Information

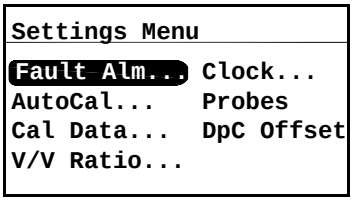


To change other settings, from the Main Menu select Settings... and press **Enter** ✓. The following screen appears.

3.6.1 Entering the Passcode

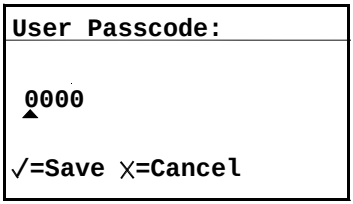
The Settings Menu is the only menu that requires a passcode. The passcode is a four-digit number that enables only authorized users to enter setup data. The Single-Channel Hygrometer prompts you to enter the passcode when you enter the Settings Menu. See page 79 for your default passcode.

3.6.2 Setting the Fault Alarm



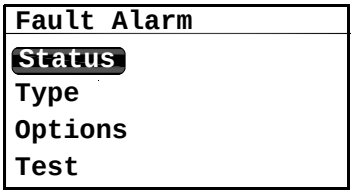
To configure the fault alarm, from the Settings Menu select Fault Alarm and press **Enter** ✓. The following screen appears.

Note: *To access the* Fault Alarm *menu, the* User Passcode *is required (see section 3.6.1 above).*

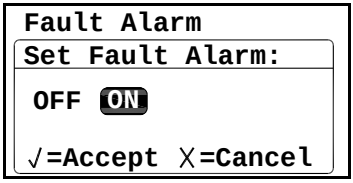


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Once the passcode has been entered, press **Enter** ✓ and the following screen appears.

3.6.2a Setting Fault Alarm Status



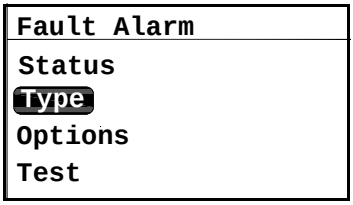
To check the status of the fault alarm, from the Fault Alarm menu, select Status and press **Enter** ✓. The following screen appears.



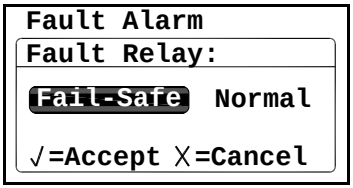
To change the status of the fault alarm, select OFF or ON and press **Enter** ✓. The screen returns to the Fault Alarm menu.

3.6.2b Setting the Fault Relay Type

Note: *For more information on the meaning of relay types, see section 2.6.4b Connecting the Fault Alarm on page 29.*

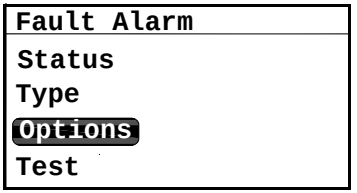


To check and/or change the fault relay type, select Type and press **Enter** ✓. The following screen appears.

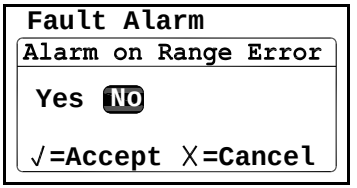


To change the type of fault relay, select the other option and press **Enter** ✓. The screen returns to the Fault Alarm menu.

3.6.2c Setting Fault Alarm Options

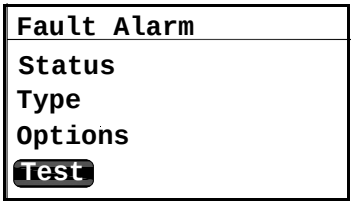


To view the status other options select Options and press **Enter** ✓. The following screen appears.

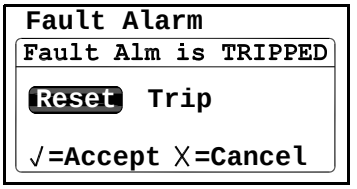


To change the status of the range error alarm, select Yes or No and press **Enter** ✓. The screen returns to the Fault Alarm menu. Press **Cancel** ✗ to return to the Settings Menu.

3.6.2d Testing the Fault Alarm



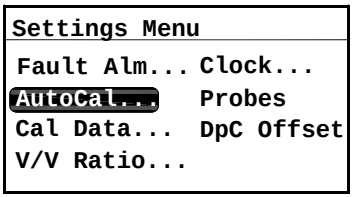
To test the fault alarm, select Test and press **Enter** ✓. The following screen appears.



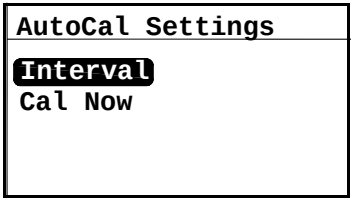
To reset the fault alarm, select Reset and press **Enter** ✓. To trip the fault alarm, select Trip and press **Enter** ✓. Press **Cancel** ✗ twice to return to the Settings Menu.

3.6.3 Setting Autocal

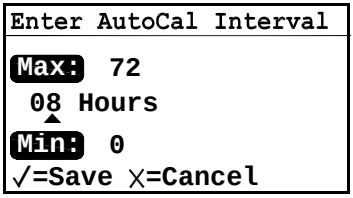
Note: *To enter the* Autocal Settings *menu, you must be using a standard* Aluminum-Oxide Moisture Probe. *If a* Moisture Transmitter *is being used,* AutoCal *is not necessary and will not be accessible.*



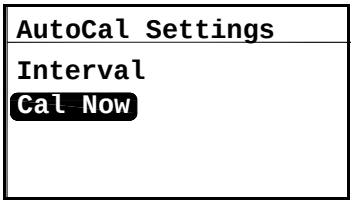
To change the Autocal settings, from the Settings Menu select AutoCal and press **Enter** ✓. The following screen appears.



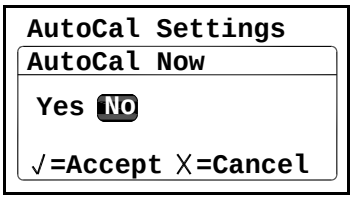
To change the Autocal interval settings, select Interval and press **Enter** ✓. A screen similar to the following appears.



Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✘ to keep the previous value), and return to the AutoCal Settings menu.



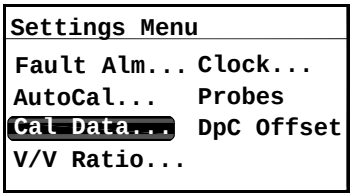
To accept or reject AutoCal, select Cal Now and press **Enter** ✓. A screen similar to the following appears.



To accept AutoCal, select Yes. To reject AutoCal select No. Press **Enter** ✓ to confirm your selection and return to the AutoCal Settings menu.

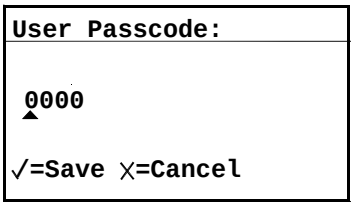
3.6.4 Setting Calibration Data 1

Note: *If you are using an* Aluminum-Oxide Moisture Probe, *the following steps will apply. If you are using a* Moisture Transmitter, *see* Setting Calibration Data 2 *on page 63.*

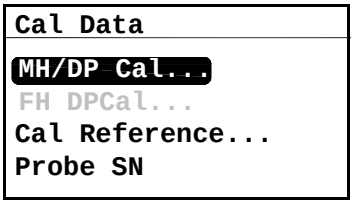


Note: *To update calibration data, from the Settings Menu select Cal Data and press* ***Enter*** ✓. *The following screen appears.*

Note: *To access the Cal Data menu, the User Passcode is required (see section 3.6.1 on page 56).*

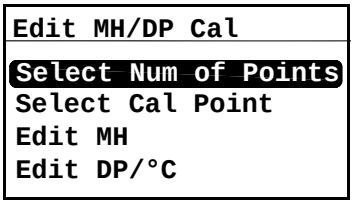


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Once the passcode has been entered, press **Enter** ✓ and the following screen appears.

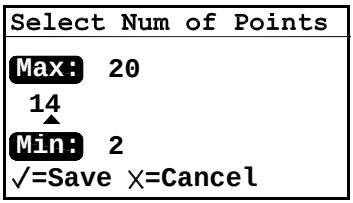


If you are using an Aluminum-Oxide Moisture Probe, the MH/DP Cal will be highlighted. Press **Enter** ✓. The following screen appears.

3.6.4a Selecting the Number of Points

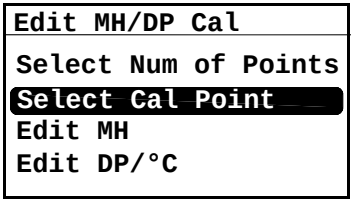


To select the number of points, highlight Select Num of Points and press **Enter** ✓. The following screen appears.

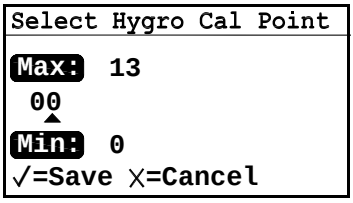


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the Edit MH/DP Cal menu.

3.6.4b Selecting the Calibration Point

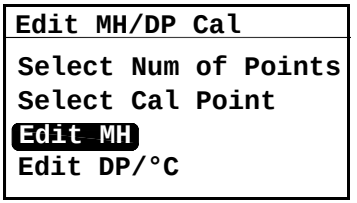


To select the calibration point, highlight Select Cal Point and press **Enter** ✓. The following screen appears.

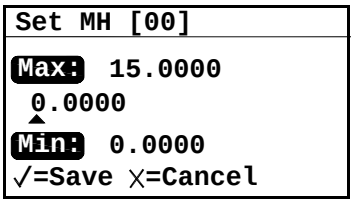


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the Edit MH/DP Cal menu.

3.6.4c Setting the MH Calibration

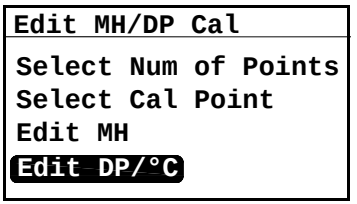


To set up the MH calibration, highlight Edit MH and press **Enter** ✓. The following screen appears.

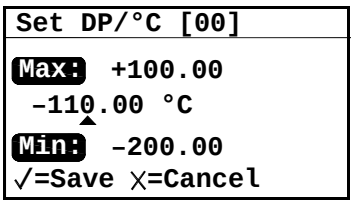


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✘ to keep the previous value), and return to the Edit MH/DP Cal menu.

3.6.4d Setting the Dew Point Calibration



To set up the dew point calibration, highlight Edit DP/°C and press **Enter** ✓. The following screen appears.

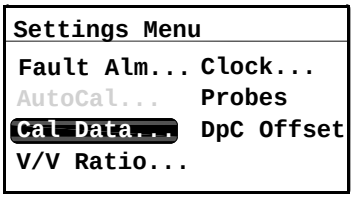


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✘ to keep the previous value), and return to the Edit MH/DP Cal menu.

Press **Cancel** ✘ to return to the Cal Data menu.

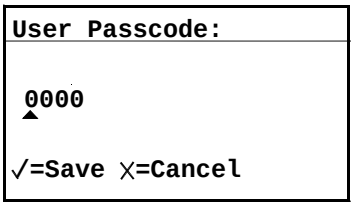
3.6.5 Setting Calibration Data 2

Note: *If you are using a* Moisture Transmitter*, the following steps will apply. For an* Aluminum-Oxide Moisture Probe*, see* Setting Calibration Data 1 *on page 60.*

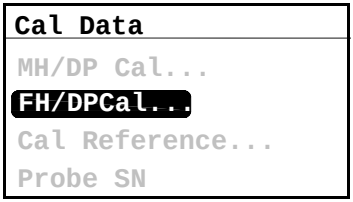


To view calibration data, from the Settings Menu select Cal Data and press **Enter** ✓. The following screen appears.

Note: *To access the Cal Data menu, the User Passcode is required (see section 3.6.1 on page 56).*

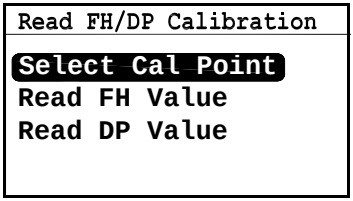


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Once the passcode has been entered, press **Enter** ✓ and the following screen appears.

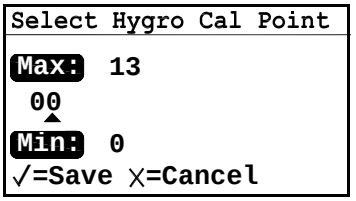


If you are using a *Moisture Transmitter,* the FH/DPCal will be highlighted. Press **Enter** ✓. The following screen appears.

3.6.5a Selecting the Calibration Point

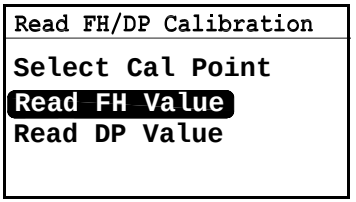


To select the calibration point, highlight Select Cal Point and press **Enter** ✓. The following screen appears.

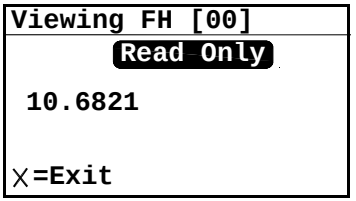


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the Edit MH/DP Cal menu.

3.6.5b Reading the FH Value

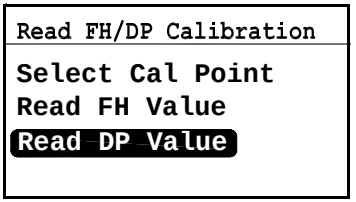


To view the FH value, highlight Read FH Value and press **Enter** ✓. The following screen appears.

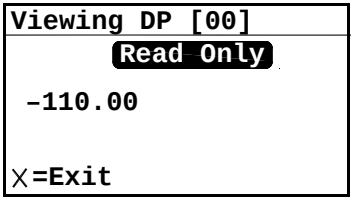


The FH value is for viewing only. When you are ready, press **Cancel** ✗ to return to the Read FH/DP Calibration menu.

3.6.5c Reading the DP Value



To view the DP value, highlight Read DP Value and press **Enter** ✓. The following screen appears.



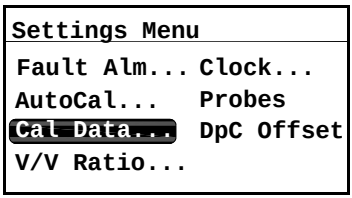
The DP value is for viewing only. When you are ready, press **Cancel** ✗ to return to the Read FH/DP Calibration menu.

Press **Cancel** ✗ twice to return to the Settings Menu.

3.6.6 Reading and Setting the Calibration References

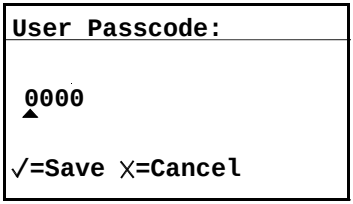
Note: *The following procedure applies only if an* Aluminum-Oxide Moisture Probe *is being used. If a* Moisture Transmitter *is used,* Cal Reference*... is not accessible.*

IMPORTANT: *The* Single-Channel Hygrometer *is factory programmed with high and low reference MH values. These values are generated from a factory lab calibration and should not be changed without first consulting factory technical support. Changes to these values will alter the accuracy of the unit measurements.*

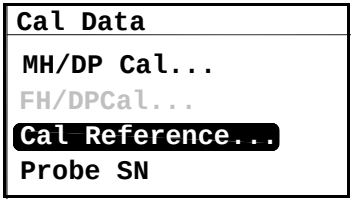


To update calibration data, from the Settings Menu select Cal Data and press **Enter** ✓. The following screen appears.

Note: *To access the Cal Data menu, the User Passcode is required (see section 3.6.1 on page 56).*

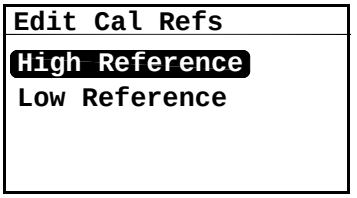


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Once the passcode has been entered, press **Enter** ✓ a screen similar to the following appears.

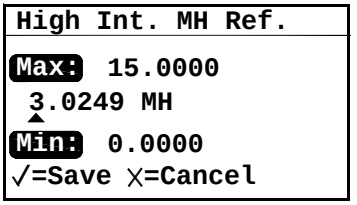


To view and/or edit the calibration reference settings, select Cal Reference and press **Enter** ✓. The following screen appears.

3.6.6a Setting the Calibration High Reference

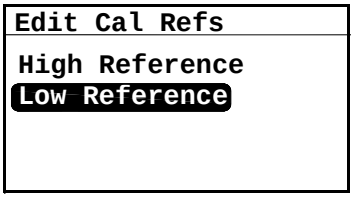


To update high reference settings, from the Edit Cal Refs menu select High Reference and press **Enter** ✓. A screen similar to the following appears.

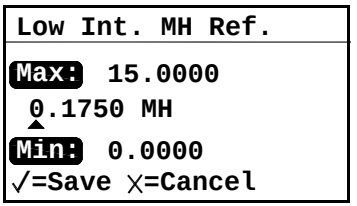


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Once the changes have been made, press **Enter** ✓. The screen returns to the Edit Cal Refs menu.

3.6.6b Setting the Calibration Low Reference



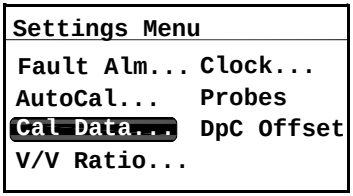
To update low reference settings, from the Edit Cal Refs menu select Low Reference and press **Enter** ✓. A screen similar to the following appears.



Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Once the changes have been made, press **Enter** ✓. The screen returns to the Edit Cal Refs menu.

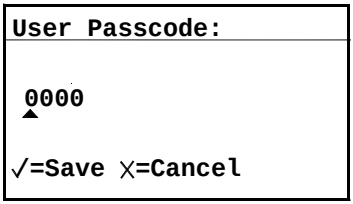
3.6.7 Entering the Aluminum-Oxide Moisture Probe Serial Number

Note: *The following procedure applies only if an* Aluminum-Oxide Moisture Probe *is being used. If a* Moisture Transmitter *is used,* Probe SN *is not accessible.*

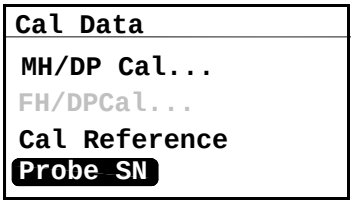


To update the probe serial number, from the Settings Menu select Cal Data and press **Enter** ✓. The following screen appears.

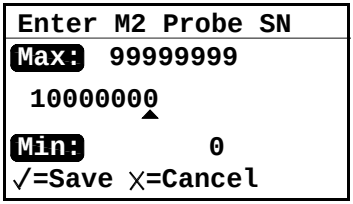
Note: *To access the Cal Data menu, the User Passcode is required (see section 3.6.1 on page 56).*



Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Once the passcode has been entered, press **Enter** ✓ a screen similar to the following appears.



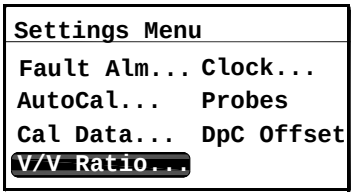
To view and/or edit the probe serial number, select Probe SN and press **Enter** ✓. The following screen appears.



Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Once the changes have been made, press **Enter** ✓. The screen returns to the Cal Data menu.

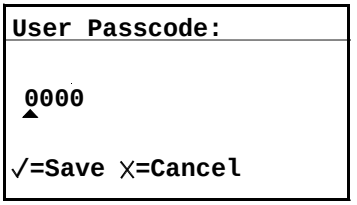
3.6.8 Setting the Volume Mixing Ratio

Note: *Setting the* Volume Mixing Ratio *is an optional feature, available only if the ppmv software version was purchased.*



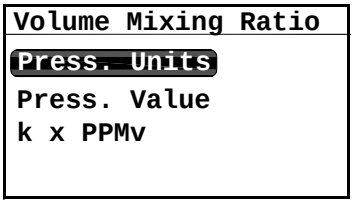
Note: *To set the volume mixing ratio, from the Settings Menu select V/V Ratio and press* **Enter** ✓. *The following screen appears.*

Note: *To access the Cal Data menu, the User Passcode is required (see section 3.6.1 on page 56).*

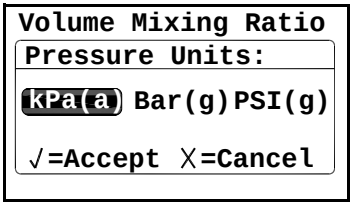


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Once the passcode has been entered, press **Enter** ✓ and the following screen appears.

3.6.8a Setting the Pressure Units

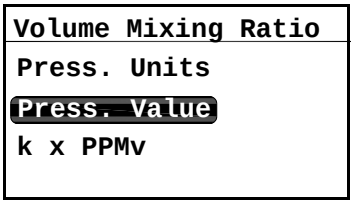


To set the pressure units, select Press. Units and press **Enter** ✓. The following screen appears.

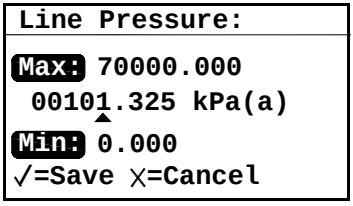


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the previous menu.

3.6.8b Setting the Pressure Value

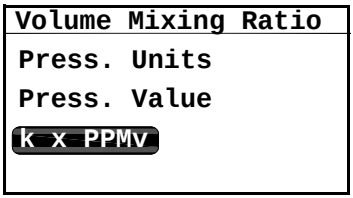


To set the pressure value, select Press. Value and press **Enter** ✓. The following screen appears.

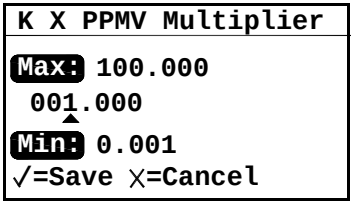


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the previous menu.

3.6.8c Setting the k x PPMv Multiplier

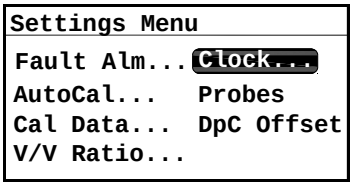


To set the k x PPMv multiplier, select k x PPMv and press **Enter** ✓. The following screen appears.



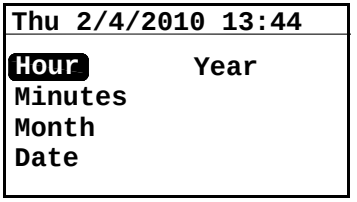
Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the previous menu.

3.6.9 Resetting the Time

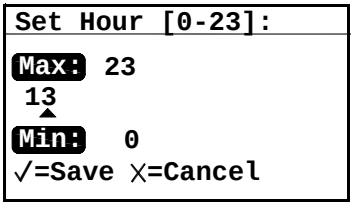


To reset the time, from the Settings Menu select Clock and press **Enter** ✓. The current time appears on the following screen.

3.6.9a Setting the Hour

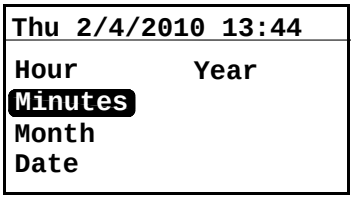


To change the hour, select Hour and press **Enter** ✓. The following screen appears.

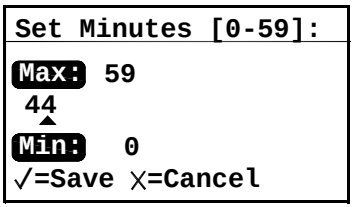


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✘ to keep the previous value), and return to the previous menu.

3.6.9b Setting the Minutes

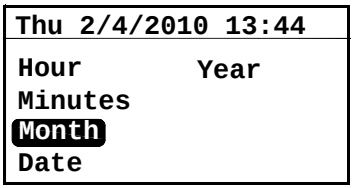


To change the minutes, select Minutes and press **Enter** ✓. The following screen appears.

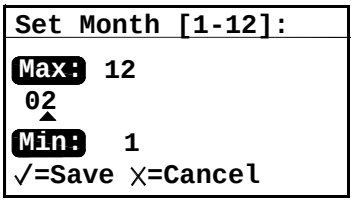


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✘ to keep the previous value), and return to the previous menu.

3.6.9c Setting the Month

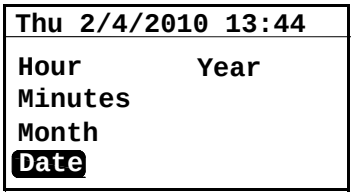


To change the month, select Month and press **Enter** ✓. The following screen appears.

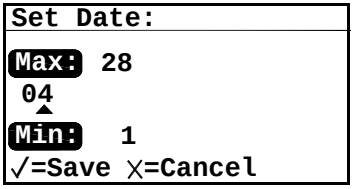


Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✘ to keep the previous value), and return to the previous menu.

3.6.9d Setting the Date

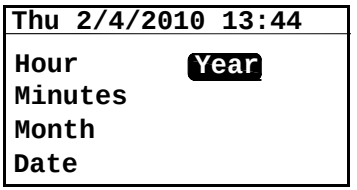


To change the date, select Date and press **Enter** ✓. The following screen appears.

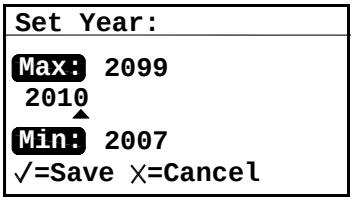


Use left and right arrow keys to select the digit to be changed. Use up and down arrow keys to change the value. Press **Enter** ✓ to save (or **Cancel** ✗ to keep the previous value), and return to the previous menu.

3.6.9e Setting the Year



To reset the year, select Year and press **Enter** ✓. The following screen appears.



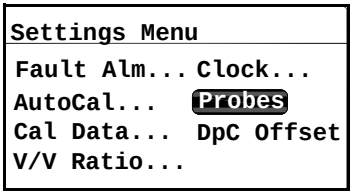
Use the left and right arrow keys to select each digit to be changed. Use the up and down arrow keys to change the value. When finished, press **Enter** ✓ and return to the previous menu, then press **Cancel** ✗ to return to the Settings Menu.

Note: *The* Service *menu is accessible only to service engineers and requires the use of a Factory-Level passcode.*

3.6.10 Selecting the Probe Type

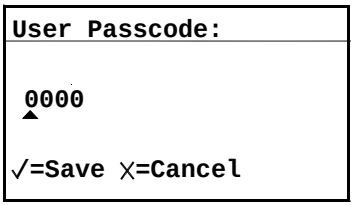
Note: *Use the following procedure to select the probe type.*

IMPORTANT: *Changing the probe setting will default the output and alarm settings to DPC. Also, the default fault trip point values will be set along with the default output range values.*

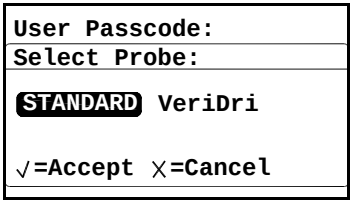


From the Settings Menu select Probes and press **Enter** ✓. The following screen appears.

Note: *To access the Probes menu, the User Passcode is required (see section 3.6.1 on page 56).*



Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Once the passcode has been entered, press **Enter** ✓ and the following screen appears.

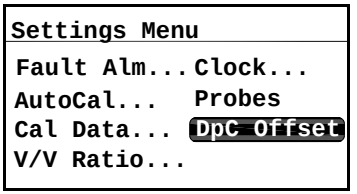


Use the left or right arrow key to select the correct probe type and press **Enter** ✓. The *Single-Channel Hygrometer* reboots in 5 seconds.

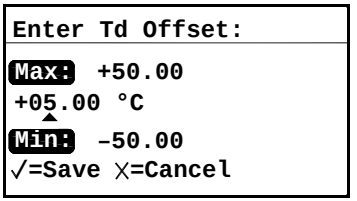
3.6.11 Setting a Constant DP °C Offset

This feature enables the customer to add a constant DP °C offset to their reading. It allows for positive or negative offset limiting to +/- 50°C. It works only within the calibrated range of the sensor. Alarms A & B are based on the offset value, and likewise, they will work only within the calibrated range of the sensor.

Note: *Use the following procedure to set the DP °C Offset.*



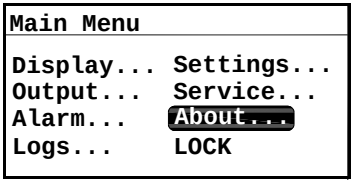
From the Settings Menu select DpC Offset and press **Enter** ✓. The following screen appears.



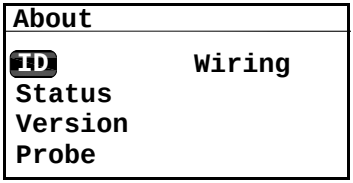
Use the left and right arrow keys to select each digit to be changed and the up and down arrow keys to increase or decrease its value. Press **Enter** ✓ to save (or **Cancel** ✘ to keep the previous value), and return to the previous menu.

3.7 Viewing System Information

3.7.1 Checking the ID

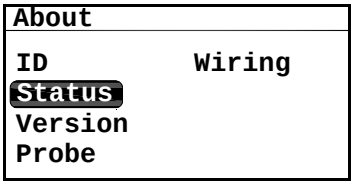


To check identification information, from the Main Menu, select About and press **Enter** ✓. The following screen appears.

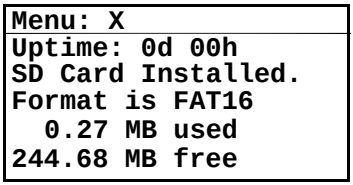


To check the identity information, select ID and press **Enter** ✓. A screen appears with serial numbers for the *Single-Channel Hygrometer* unit and the probe. To return to the About menu, press **Cancel** ✗.

3.7.2 Checking the Status

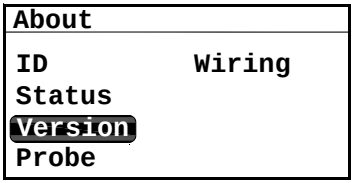


To check the status of the *Single-Channel Hygrometer*, from the About menu select Status and press **Enter** ✓. A screen similar to the following appears.

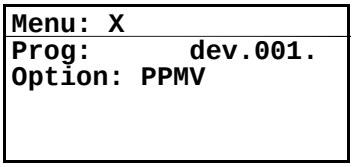


The information includes the amount of space being used and that which is free. To return to the About menu, press **Cancel** ✗.

3.7.3 Checking the Software Version

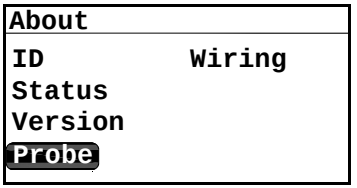


To check the software version, from the About menu select Version and press **Enter** ✓. A screen similar to the following appears.

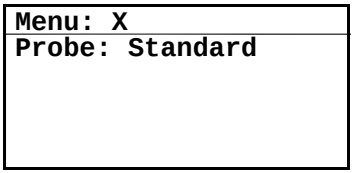


The information includes the program number and any options. To return to the About menu, press **Cancel** ✗.

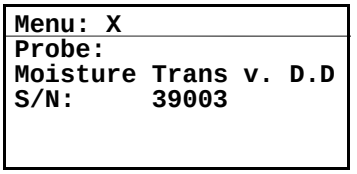
3.7.4 Checking the Probe



To check the probe details, from the About menu select Probe and press **Enter** ✓. A screen similar to one of the following appears.

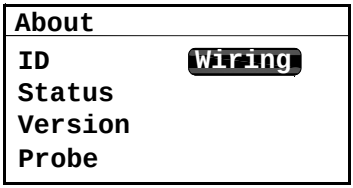


Data when using a standard probe. To return to the About menu, press **Cancel** ✗.

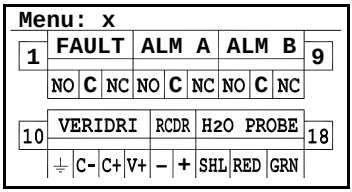


Data when using a special probe. To return to the About menu, press **Cancel** ✗.

3.7.5 Checking the Wiring

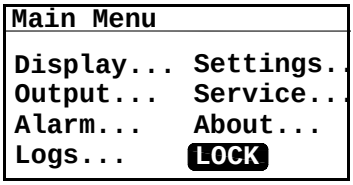


To view the *Single-Channel Hygrometer* wiring diagram, from the About menu select Wiring and press **Enter** ✓. A screen similar to the following appears.



To return to the Main Menu, press **Cancel** ✘ twice.

3.8 Locking the Menu



To lock the ability to make changes to the menu, select LOCK and press **Enter** ✓. The screen returns to the normal reading.

Note: *To unlock the menu, refer to* Starting Up *on page 36.*

[no content intended for this page]

Your passcode is 2719.

Please remove this page and put it in a safe place for future reference.

Chapter 4. Service and Maintenance

4.1 Introduction

The *Single-Channel Hygrometer* is designed to be maintenance and trouble free. However, because of severe process conditions and other factors, minor problems may occur from time to time. Some of the most common problems and recommended maintenance procedures are discussed in this chapter. If you cannot find the information you need in this chapter, please consult GE for help.

CAUTION! Do not attempt to troubleshoot the Single-Channel Hygrometer beyond the instructions in this chapter. If you do, you may damage the unit and void the warranty.

This chapter covers the following topics:

- common problems
- replacing/recalibrating moisture probes
- cleaning the front panel

Proceed to the appropriate section to perform any of the above tasks.

4.2 Common Problems

If the *Single-Channel Hygrometer* measurements read too wet or too dry, or if they do not make sense, there may be a problem with either the probe or a process component. Use the descriptions of common problems in Table 3 on page 82 to troubleshoot and solve such problems.

Table 3: Troubleshooting Guide for Common Problems

Possible Cause	Response and Action
Symptom: The accuracy of the moisture sensor is questioned.	
There is insufficient time for the system to equilibrate.	**Response:** Reads too wet during dry down conditions or too dry in wet up conditions. **Action:** Change the flow rate. A change in dew point indicates the sample system is not at equilibrium or there is a leak. Allow sufficient time for sample system to equilibrate and moisture reading to become steady. Check for leaks.
Dew point at the sampling point is different from the dew point of the main stream.	**Response:** Reads too wet or too dry. **Action:** Readings may be correct if the sampling point and main stream do not run under the same process conditions. The different process conditions cause readings to vary. If sampling point and main stream conditions are the same, check sample system pipes, and any pipe between the sample system and main stream for leaks. Also, check sample system for adsorbing water surfaces, such as rubber or plastic tubing, paper-type filters, or condensed water traps. Remove or replace the contaminating parts with stainless steel parts.
Sensor or sensor shield is affected by process contaminants	**Response:** Reads too wet or too dry **Action:** Clean the sensor and the sensor shield, then reinstall the sensor.
Sensor is contaminated with conductive particles.	**Response:** Reads high dew point. **Action:** Clean the sensor and the sensor shield, then reinstall the sensor. Also, install a proper filter (i.e. sintered or coalescing element).
Sensor is corroded	**Response:** Reads too wet or too dry **Action:** Return probe to factory for evaluation.
Stream particles causing abrasion.	**Response:** Reads too wet or too dry. **Action:** Return probe to factory for evaluation.

4.3 Replacing/Recalibrating Moisture Probes

For maximum accuracy, moisture probes should be returned to the factory for recalibration every 6–12 months, depending on the application. Under very severe conditions, more frequent calibrations are recommended However, under very mild conditions, less frequent calibrations are necessary. Contact an applications engineer for your specific recommended calibration frequency

All new or recalibrated moisture probes must be installed in accordance with the instructions in Chapter 2, *Installation*.

IMPORTANT: *To maintain good contact at the terminal block and to avoid damaging the pins on the wiring connector, pull the connector straight off (not at an angle) the terminal block. Then, make the cable connections while the connector is off the unit. Finally, after the wiring is complete, push the connector straight onto the terminal block (not at an angle).*

After the probe has been installed and wired, enter the probe calibration curve data as described in Chapter 3, *Operation and Programming*. Each probe is shipped with its own *Calibration Data Sheet*, which includes the serial number for that probe.

4.4 Cleaning the *Single-Channel Hygrometer* Front Panel

When necessary, use the procedure below to clean the front panel. You will need the following:

- Clean, lint free cloth
- Cleaning solution (soap and warm water)

To clean the front panel:

1. Moisten the cloth with the cleaning solution.
2. Gently wipe the front panel clean.
3. Use a dry cloth to dry the front panel.

Chapter 5. Specifications

5.1 Electronics

Input:

moisture signal from a thin-film aluminum oxide moisture sensor on a standard probe or a special probe

Intrinsic Safety:

external safety barrier for moisture input (optional)

Analog Output:

single, isolated recorder output for dew point,
internally optically isolated, 10-bit (0.1%) resolution

0–2 V: 10 kΩ minimum load resistance
0–20 mA: 400 Ω maximum series resistance
4–20 mA: 400 Ω maximum series resistance

Outputs are user-programmable within the range of the instrument and the corresponding probe.

Alarm Relays:

1 fault alarm and 2 programmable high/low alarms:

	Standard
Form C SPDT Relays:	3A @ 250VAC
	3A @ 30VDC

Standard designs are available for the high/low alarms, set to trip at any level within the range of the instrument, and programmable from the front panel.

5.1 Electronics (cont.)

Alarm Setpoint Repeatability:

±0.1°C dew point

MicroSD:

Supports MicroSD and MicroSDHC (high capacity) cards up to 32 GB, with individual logs up to 4 GB in size. The factory-supplied card has a capacity of 2 GB (2,000,000,000 bytes), or over 45 million average log records.

Note: *The* Single-Channel Hygrometer *unit has been fully tested with* SanDisk MicroSD/SDHC and Kingston MicroSD *cards. It is therefore recommended that the customer use* SanDisk *or* Kingston *brand cards.*

Configurations:

panel-mount, PC board

Display:

128 x 64 matrix LCD display with LED backlight

Front Panel:

weatherproof membrane front panel display/keypad meets **NEMA 4** and **IP66** requirements (panel-mount version only)

Display Functions:

dew point temperature °C or °F, or sensor signal MH or FH

Input Power:

option 1, AC: universal power 100-240 VAC @ 50-60 Hz
option 2, DC: 24 VDC nominal ±10%

Power Dissipation:

AC units: 5 W maximum
DC units: 5 W maximum

5.1 Electronics (cont.)

Temperature:

operating: –20° to +60°C
storage: –40° to +70°C

Warm-Up Time:

meets specified accuracy within three minutes

Dimensions:

panel-mount: 2.24 x 4.09 x 4.79 in. (H x W x D)
(57 x 104 x 121.78 mm)
cutout required: 1.81 x 3.69 in. (H x W)
(46 x 93.6 mm)
board-mount: 5.9 x 5.1 x 2.2 in. (H x W x D)
(150 x 130 x 56 mm)

European Compliance:

complies with EMC Directive 2004/108/EC and 2006/95/EC Low Voltage Directive (Installation Category II, Pollution Degree II)

5.2 Moisture Measurement

Sensor Type:

thin-film aluminum oxide moisture sensor probe

Moisture Probe Compatibility:

compatible with all aluminum-oxide moisture probes and moisture transmitters

Traceability:

All moisture probe calibrations are traceable to National Institute of Standards and Technology (NIST) standards or National Physical Lab, U.K. (NPL) as accredited by Irish National Accreditation Board (INAB).

5.2 Moisture Measurement (cont.)

Probe Cable Length:

Aluminum-Oxide Probe: 2,000 ft (600 m) maximum
Moisture Transmitter: 1,000 ft (300 m) maximum

Moisture Probe Pressure Rating:

Aluminum-Oxide Probe 1: 5 microns Hg to 75 psig (5 barg)
Aluminum-Oxide Probe 2: 5 microns Hg to 5,000 psig (345 barg)
Moisture Transmitter: 5 microns Hg to 5,000 psig (345 barg)

Dew/Frost Point Temperature:

Overall Calibration Range:
–110° to 60°C

Available Calibration Range Options:
Standard: –80° to 20°C with data to –110°C
Extended High: –80° to 60°C with data to –110°C

Accuracy:
±2°C from –65° to 60°C
±3°C from –110° to -66°C

Repeatability:
±0.5°C from –65° to 60°C
±1.0°C from –110° to -66°C

Appendix A. Outline and Installation Drawings

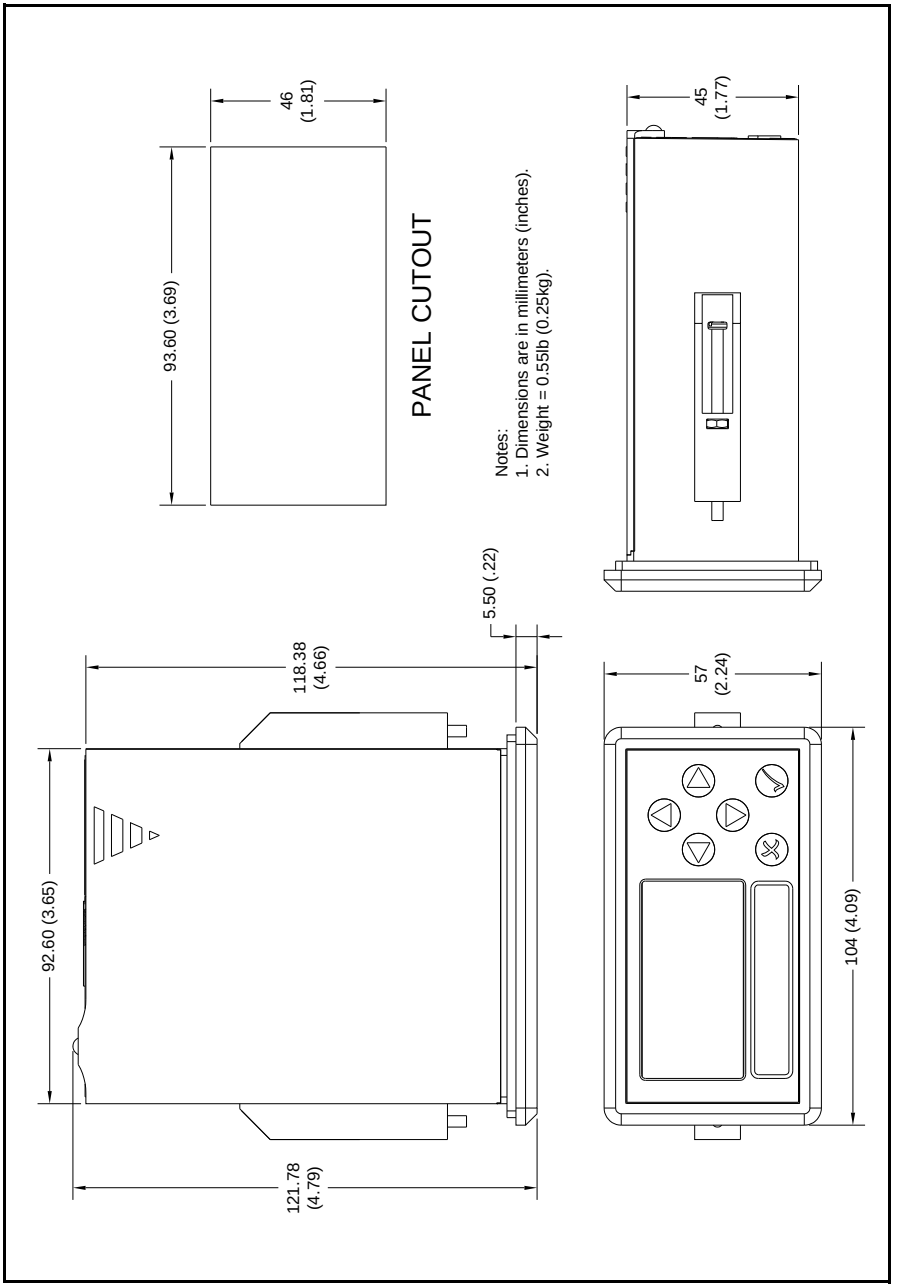


Figure 46: Outline and Mounting Diagram (ref. dwg #712-1550)

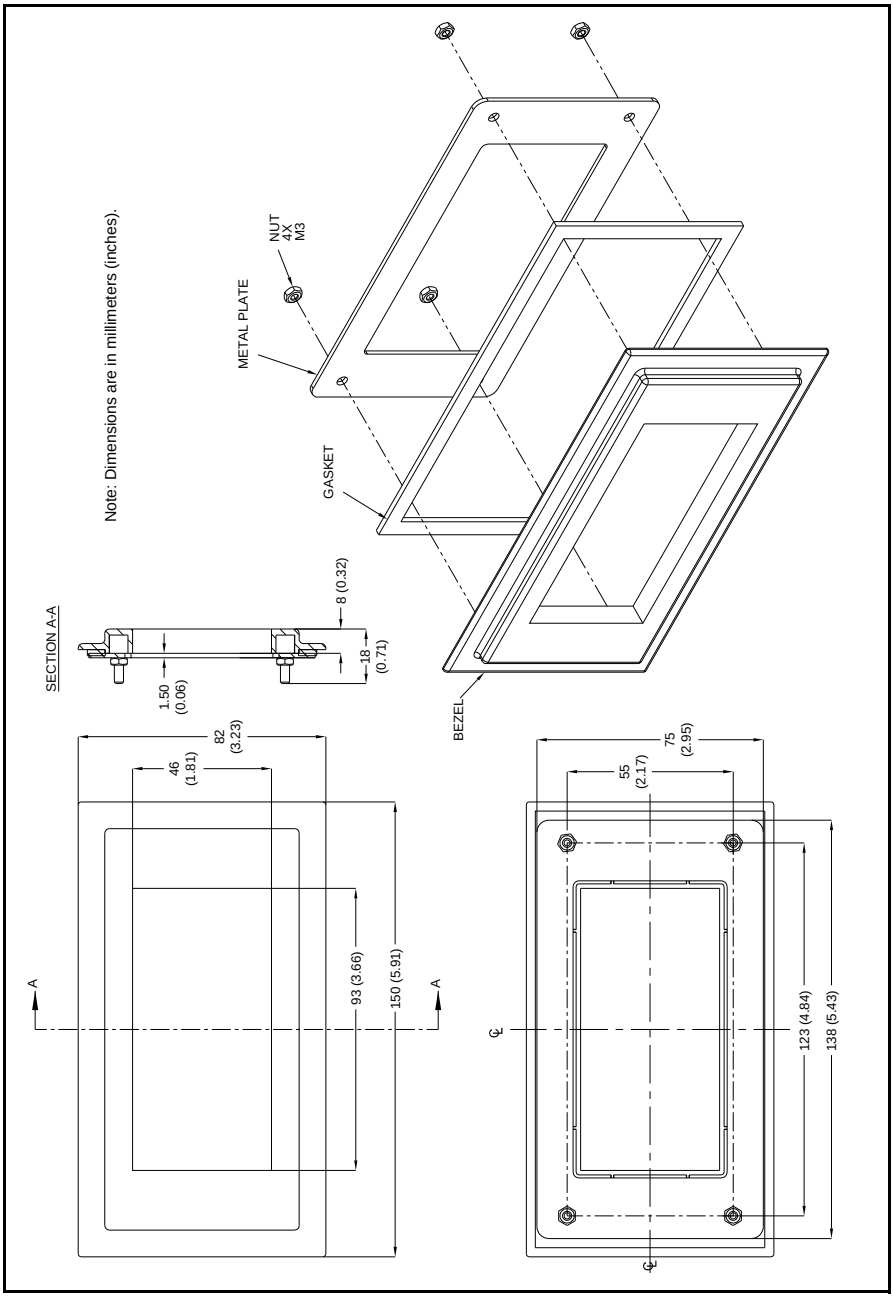


Figure 47: Optional Adapter Plates (ref. dwg #705-1297)

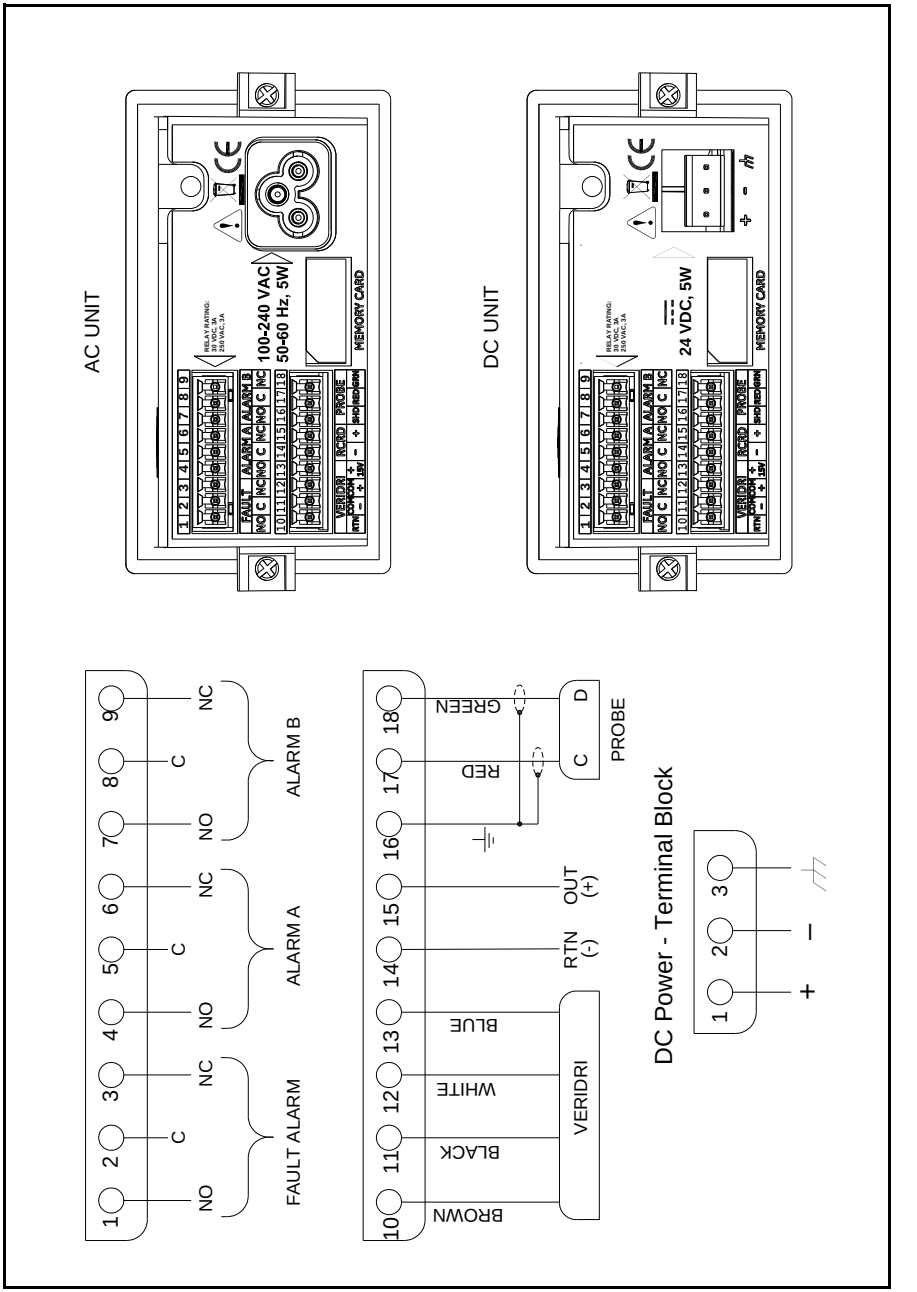


Figure 48: Interconnection Diagram (ref. dwg #702-1015)

Appendix B. Menu Maps

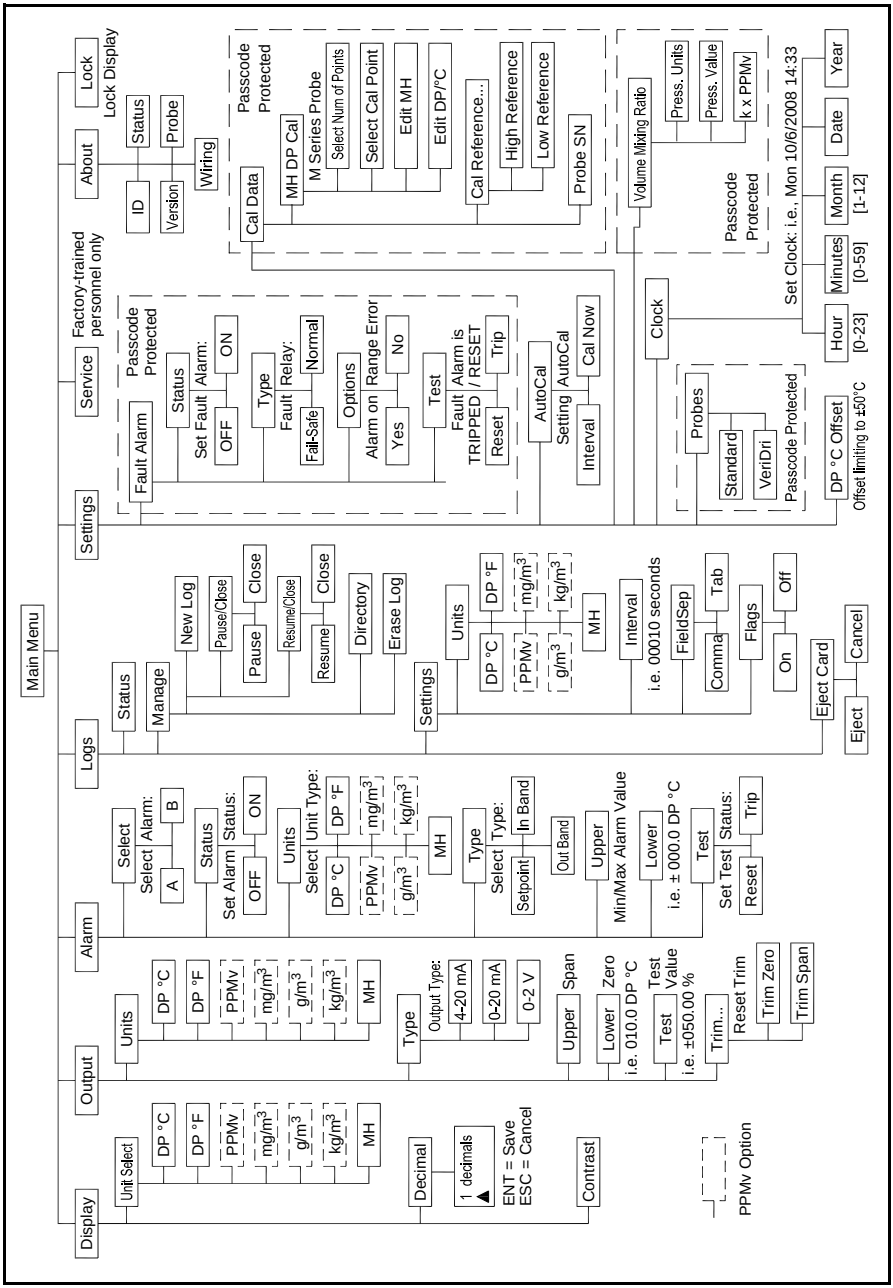


Figure 49: Main Menu Map Using an Aluminum-Oxide Moisture Probe

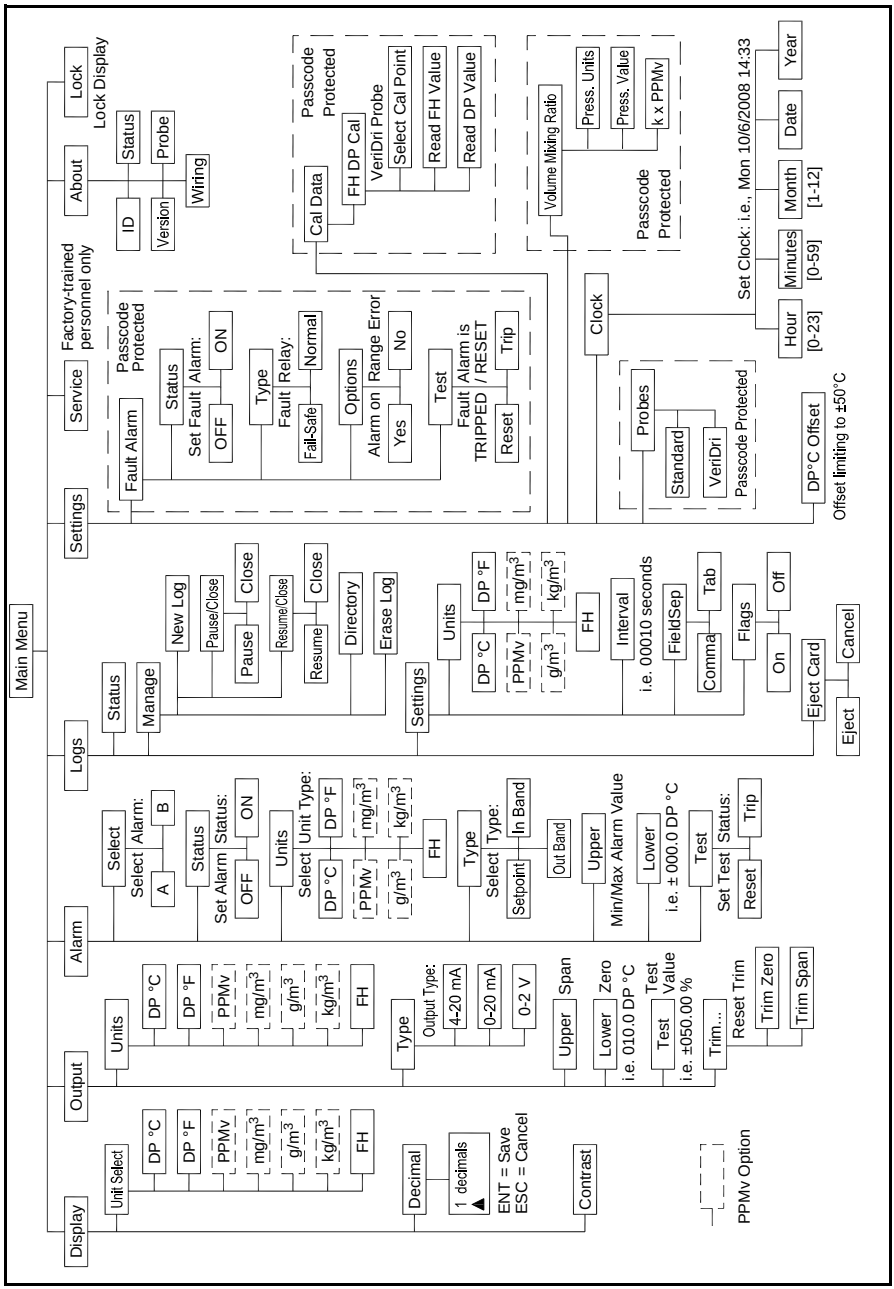


Figure 50: Main Menu Map Using a Moisture Transmitter

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Appendix C. Reading the MicroSD Card

C.1 Removing the Card

IMPORTANT: *Before removing the MicroSD Card, refer to section* 3.5.4 Ejecting the SD Card *on page 55, to first stop the data log.*

1. Locate the memory card in the lower center of the rear panel and pull the flexible cover from the left. The cover hangs from the right side (see Figure 51 and Figure 52).

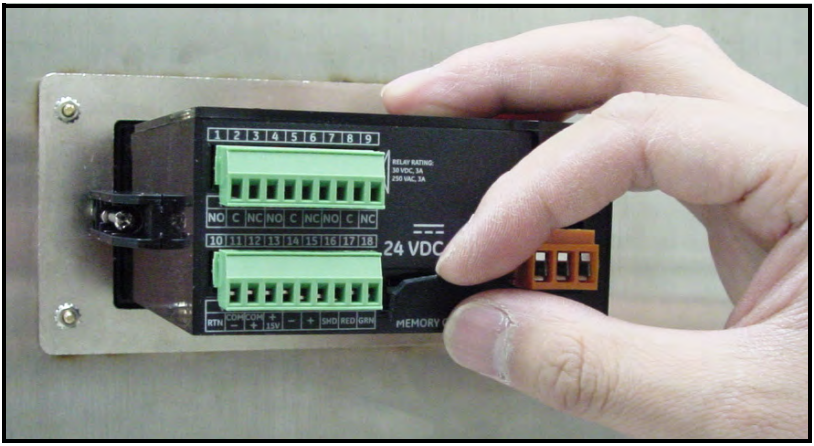


Figure 51: Pulling the Flexible Cover

Figure 52: The Opened Memory Card Holder

C.1 Removing the Card (cont.)

2. Push in the memory card until it clicks and pull it from the *Single-Channel Hygrometer* chassis (see Figure 53 and Figure 54).

Figure 53: Pushing in on the MicroSD Card

Figure 54: Removing the MicroSD Card

C.1 Removing the Card (cont.)

3. Plug the memory card into a card reader and insert the reader into a computer (see Figure 55 and Figure 56).

Figure 55: Plugging the Reader into a PC

Figure 56: The Reader Plugged In

C.2 Accessing the Files

1. From the PC, open My Computer and find the device (see Figure 57).

Figure 57: Locating the Device

2. Click on Removable Disk and a screen similar to Figure 58 on page 101 appears.

C.2 Accessing the Files (cont.)

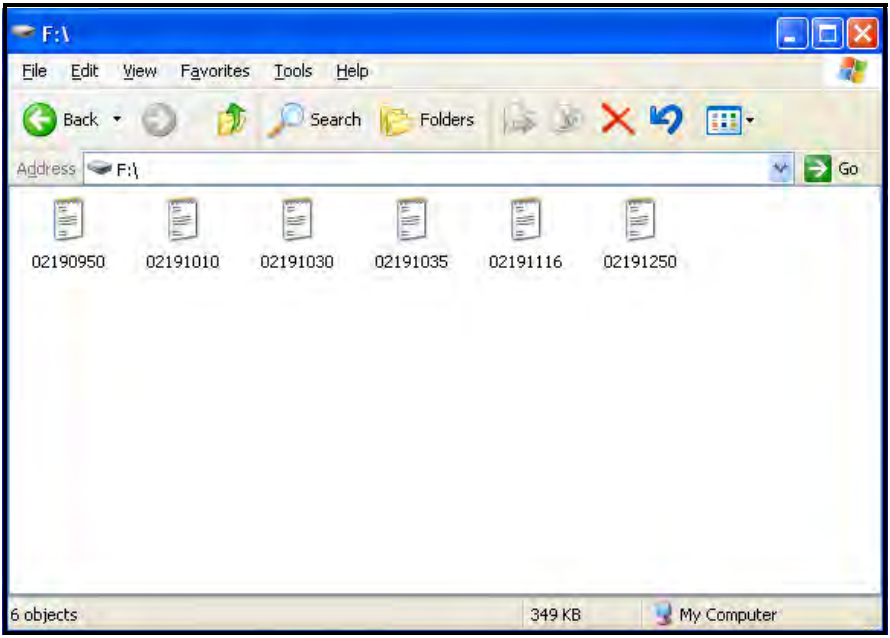


Figure 58: List of Log Files

3. Click on the desired file and a screen similar to Figure 59 appears.

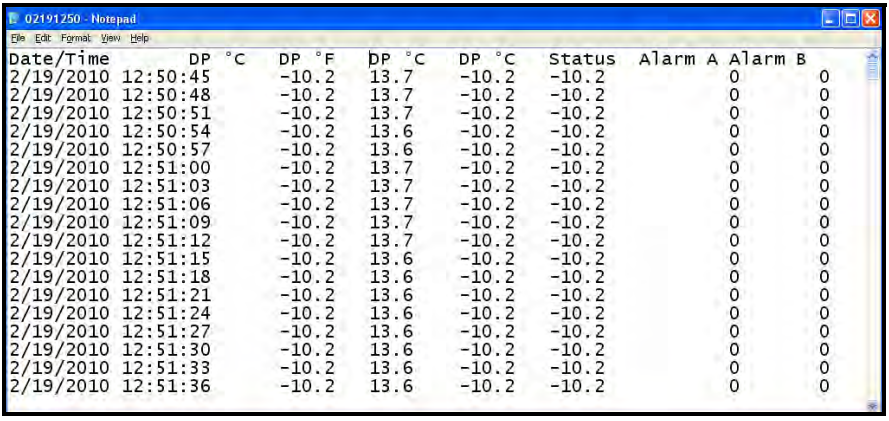


Figure 59: Log File Notepad

C.2 Accessing the Files (cont.)

4. Log files can be opened with a text editor. Open Excel and select Open.

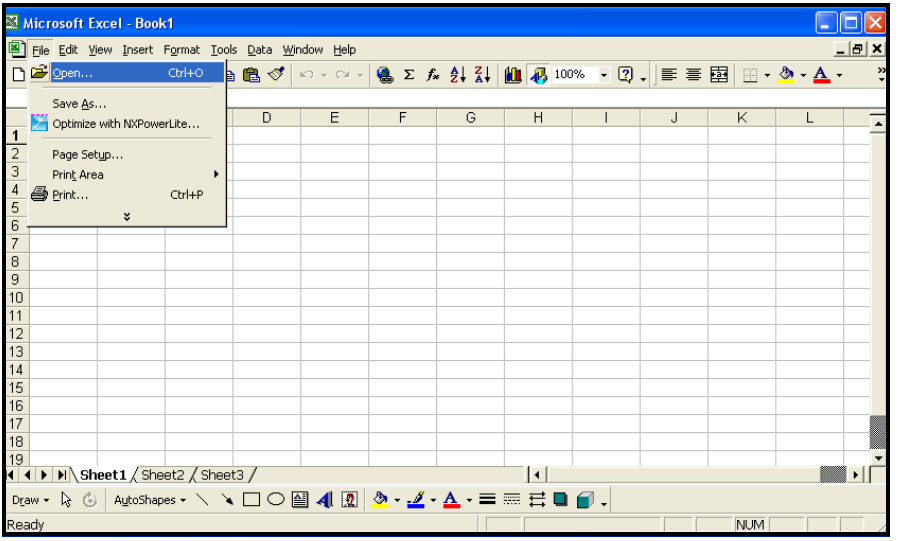


Figure 60: Importing Log Files to Excel

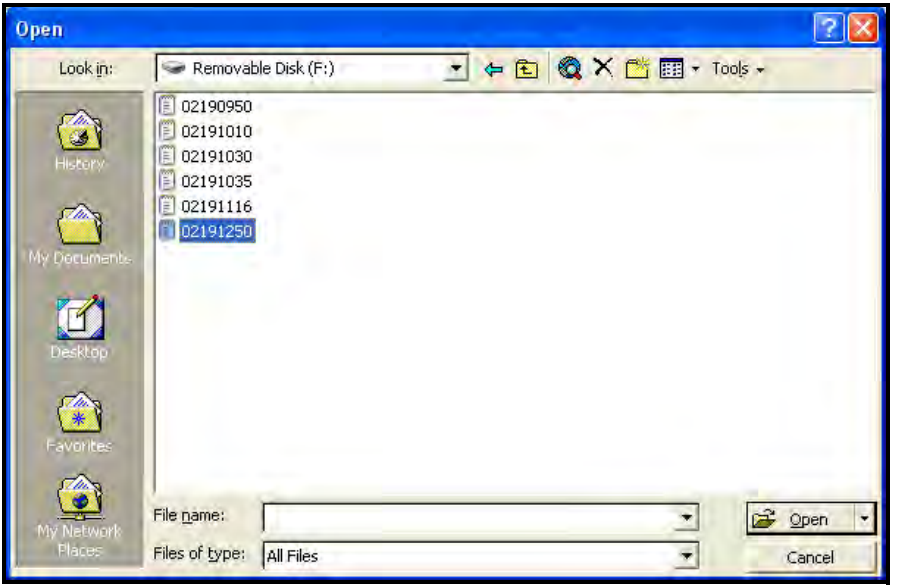


Figure 61: Selecting the Log File to Open

C.3 Setting Up the Files

5. Open the file by clicking twice on the number.

Note: *Ensure that the file type equals all types.*

The following screen appears (see Figure 62).

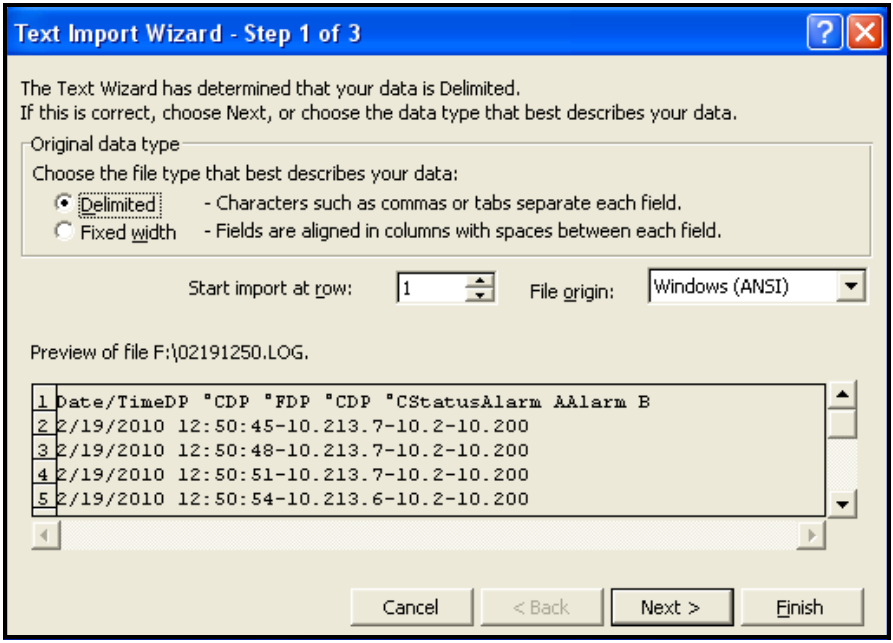


Figure 62: Excel Import Wizard 1

6. Follow the directions on the screen, make changes if necessary, and click on Next >. The following screen appears (see Figure 63 on page 104).

C.3 Setting Up the Files (cont.)

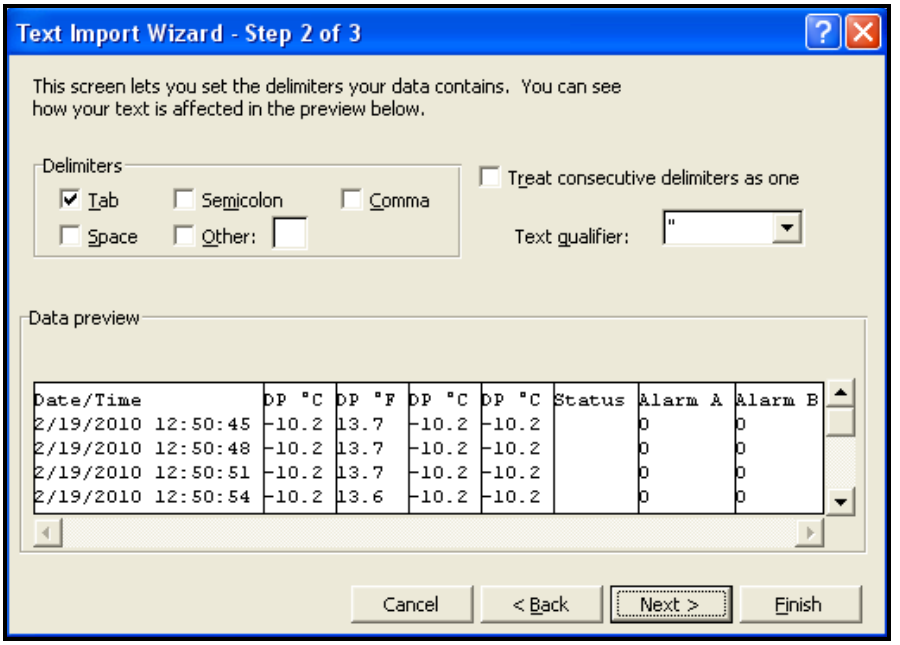


Figure 63: Excel Import Wizard 2

7. Set the desired data delimiters, and click on Next >. The following screen appears (see Figure 64 on page 105).

C.3 Setting Up the Files (cont.)

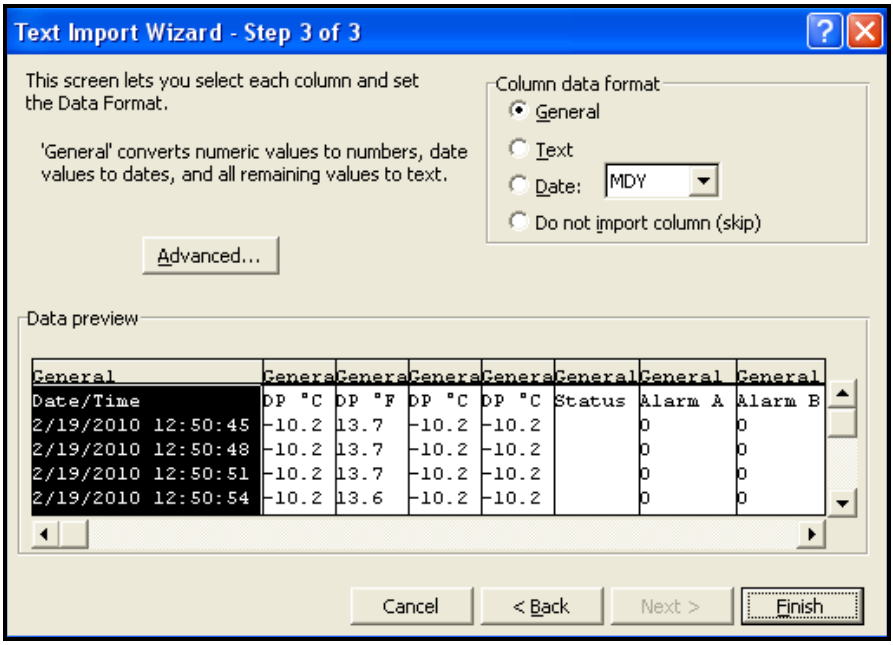
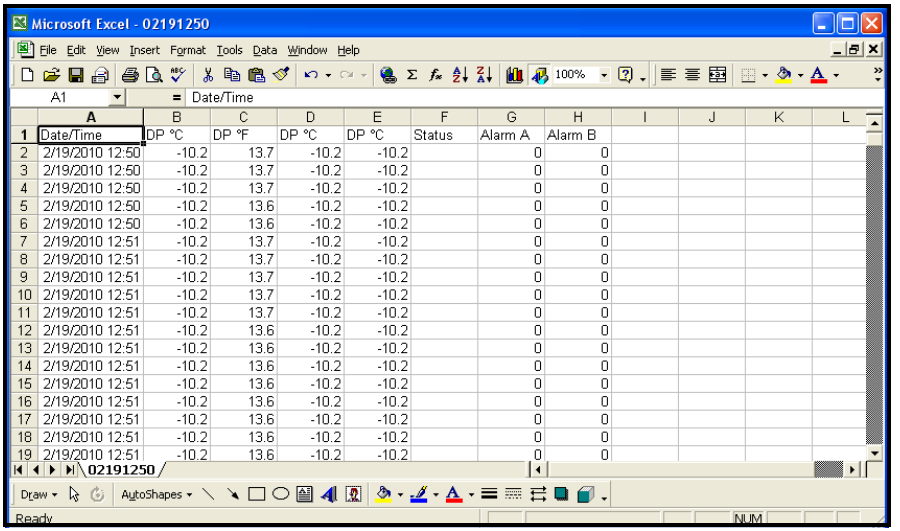


Figure 64: Excel Import Wizard 3

8. Select each column and set the data format for it (see Figure 64).
9. When the setup is complete, click on Finish, and a screen similar to Figure 65 on page 106 appears.

C.3 Setting Up the Files (cont.)



	A	B	C	D	E	F	G	H
1	Date/Time	DP °C	DP °F	DP °C	DP °C	Status	Alarm A	Alarm B
2	2/19/2010 12:50	-10.2	13.7	-10.2	-10.2		0	0
3	2/19/2010 12:50	-10.2	13.7	-10.2	-10.2		0	0
4	2/19/2010 12:50	-10.2	13.7	-10.2	-10.2		0	0
5	2/19/2010 12:50	-10.2	13.6	-10.2	-10.2		0	0
6	2/19/2010 12:50	-10.2	13.6	-10.2	-10.2		0	0
7	2/19/2010 12:51	-10.2	13.7	-10.2	-10.2		0	0
8	2/19/2010 12:51	-10.2	13.7	-10.2	-10.2		0	0
9	2/19/2010 12:51	-10.2	13.7	-10.2	-10.2		0	0
10	2/19/2010 12:51	-10.2	13.7	-10.2	-10.2		0	0
11	2/19/2010 12:51	-10.2	13.7	-10.2	-10.2		0	0
12	2/19/2010 12:51	-10.2	13.6	-10.2	-10.2		0	0
13	2/19/2010 12:51	-10.2	13.6	-10.2	-10.2		0	0
14	2/19/2010 12:51	-10.2	13.6	-10.2	-10.2		0	0
15	2/19/2010 12:51	-10.2	13.6	-10.2	-10.2		0	0
16	2/19/2010 12:51	-10.2	13.6	-10.2	-10.2		0	0
17	2/19/2010 12:51	-10.2	13.6	-10.2	-10.2		0	0
18	2/19/2010 12:51	-10.2	13.6	-10.2	-10.2		0	0
19	2/19/2010 12:51	-10.2	13.6	-10.2	-10.2		0	0

Figure 65: Successful Excel Import

The log file is now properly formatted for graphing or analysis.

Appendix D. The Non-Enclosure Package

Caution! Risk of electric shock.

1. Mount the MTS6 package in an enclosed panel where no hazardous live wires are exposed. See Figure 66 for dimensions.

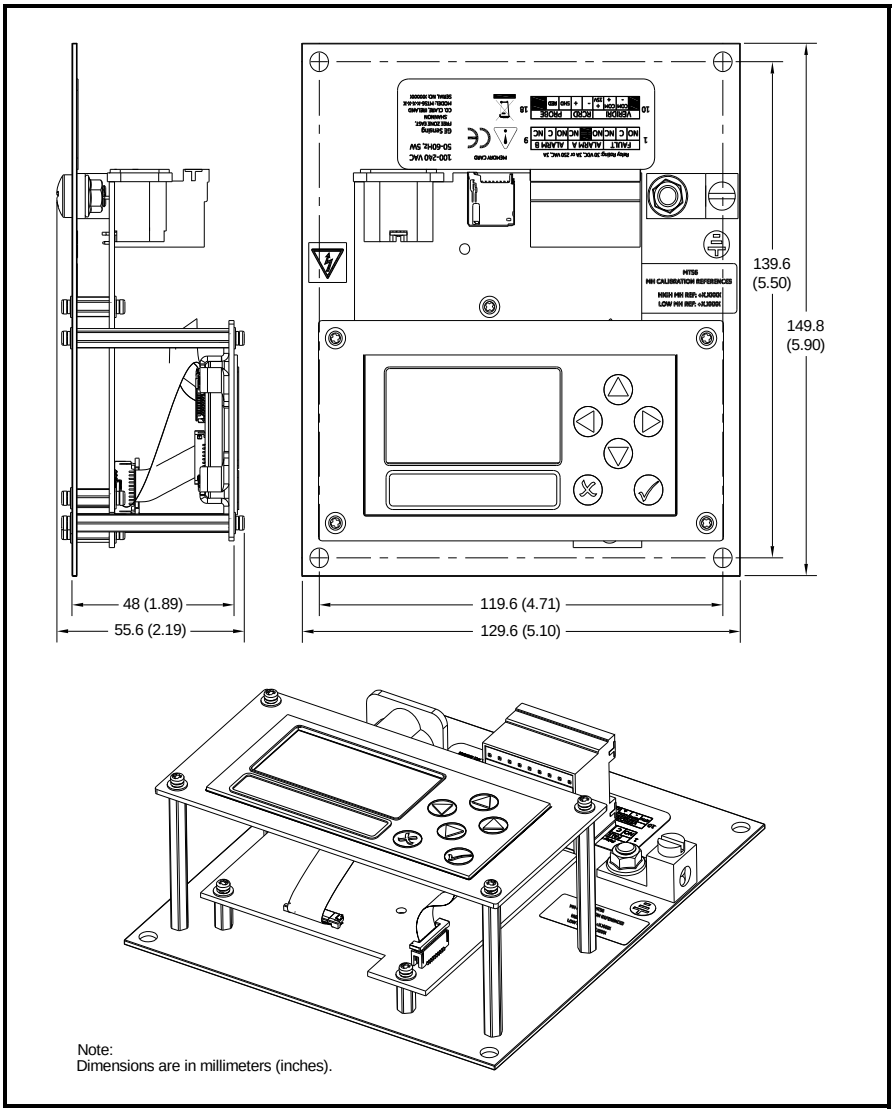


Figure 66: Non-Enclosure Package Outline (ref. dwg #712-1687)

2. Ground the *Single-Channel Hygrometer* baseplate using the provided ground lug.
3. Connect the *Single-Channel Hygrometer* unit according to the local electrical code.

A

B

C

D

E

F

G

I

L

M

N

O

P

R

S

T

V

W

[no content intended for this page]