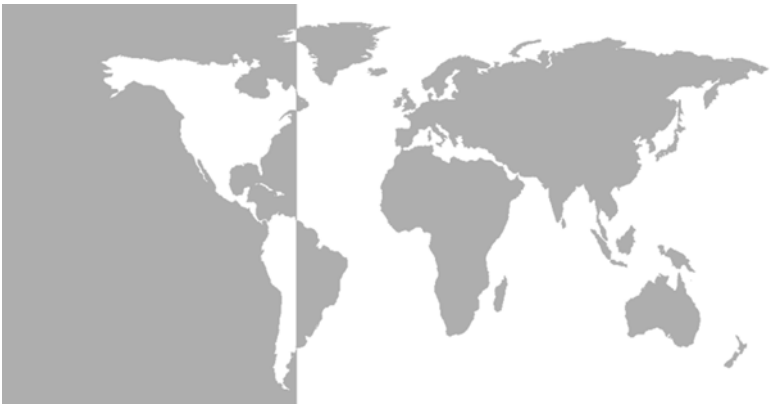
GE
Sensing



HygroTrace
Moisture Transmitter

User's Guide

GE
Sensing

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User's Guide
916-102A3
September 2007

The *HygroTrace Moisture Transmitter* is a GE Panametrics product.
GE Panametrics has joined other GE high-technology sensing businesses under a new name—GE Sensing.

Warranty

Each instrument manufactured by GE Infrastructure Sensing, Inc. is warranted to be free from defects in material and workmanship. Liability under this warranty is limited to restoring the instrument to normal operation or replacing the instrument, at the sole discretion of GE. Fuses and batteries are specifically excluded from any liability. This warranty is effective from the date of delivery to the original purchaser. If GE determines that the equipment was defective, the warranty period is:

- one year from delivery for electronic or mechanical failures
- one year from delivery for sensor shelf life

If GE determines that the equipment was damaged by misuse, improper installation, the use of unauthorized replacement parts, or operating conditions outside the guidelines specified by GE, the repairs are not covered under this warranty.

The warranties set forth herein are exclusive and are in lieu of all other warranties whether statutory, express or implied (including warranties or merchantability and fitness for a particular purpose, and warranties arising from course of dealing or usage or trade).

Return Policy

If a GE Infrastructure Sensing, Inc. instrument malfunctions within the warranty period, the following procedure must be completed:

1. Notify GE, giving full details of the problem, and provide the model number and serial number of the instrument. If the nature of the problem indicates the need for factory service, GE will issue a RETURN AUTHORIZATION NUMBER (RAN), and shipping instructions for the return of the instrument to a service center will be provided.
2. If GE instructs you to send your instrument to a service center, it must be shipped prepaid to the authorized repair station indicated in the shipping instructions.
3. Upon receipt, GE will evaluate the instrument to determine the cause of the malfunction.

Then, one of the following courses of action will then be taken:

- If the damage is covered under the terms of the warranty, the instrument will be repaired at no cost to the owner and returned.
- If GE determines that the damage is not covered under the terms of the warranty, or if the warranty has expired, an estimate for the cost of the repairs at standard rates will be provided. Upon receipt of the owner's approval to proceed, the instrument will be repaired and returned.

Table of Contents

Introduction

The GE Sensing **HygroTrace** is a compact moisture transmitter designed for measuring ultra-low water content in the ultra high purity and semiconductor markets and related applications. The **HygroTrace** measures water content in nitrogen or argon gas in the range of 0 to 100 ppb_v with trending analysis beyond the calibrated range. The unit features an integrated display and a six-button keypad, and is housed in an aluminum enclosure. The **HygroTrace** operates on 24 VDC and provides 4-20 mA analog and RS485 digital outputs.

The **HygroTrace** uses an aluminum oxide sensor manufactured with semiconductor techniques. The patented measurement technique enables the **HygroTrace** to respond very quickly to both dry-to-wet and wet-to-dry situations. The technique applies a temperature pulse to 'dry' the sensor. Then, the re-adsorption rate is measured while holding a constant sensor temperature. This measurement is proportional to the moisture concentration in the sample gas. As a result, the **HygroTrace** offers the sensitivity and response time needed to effectively measure parts per billion levels of moisture.

Installation

Sample System Guidelines

The **HygroTrace** transmitter is typically installed in a sample system or on the bypass stream of an ultra-high purity gas distribution system. The factory recommends that the unit be installed in a sample system to protect the sensor from coming in contact with damaging elements in the process, and to allow the transmitter to be removed for service without interrupting the main process gas flow.

Before constructing a sample system, consult a GE Sensing applications engineer and adhere to the guidelines below. See Figure 1 on page 2 for an example of a sample system.

Sample System Guidelines (cont.)

- A sample system should be kept very simple. It should contain as few components as possible and all or most of those components should be located downstream of the measurement location.
- Sample system components should not be made of material that will affect measurement. Most common filters and pressure regulators are not suitable for sample systems because they have wetted parts that may adsorb or release moisture, etc. into the sample system. They may also allow ambient contamination to enter the sample system. If possible, use stainless steel material for all wetted parts.
- The transmitter should be installed perpendicular to the sample inlet. For dimensions and other requirements see *Specifications* on page 26.

Note: *A typical sample system for the hygrometer will use VCR components.*

Note: *At least 5 feet of 1/4" tubing, if vented to the atmosphere, should be installed on the outlet to prevent back diffusion of ambient moisture into the sample tee cell of the* **HygroTrace**.

- Sample systems should be leak-tested prior to operation to verify the integrity of the connections, components and fittings. Tighten any loose fittings.

IMPORTANT: *Caution must be taken when pressurizing or depressurizing the sample system to prevent damage to the moisture sensor.*

Figure 1: Sample System Example

Insertion into the Sample System/Process

!CAUTION!
If the HygroTrace is being installed directly into the process line, consult the factory for proper installation instructions and precautions before beginning the following procedure.

!CAUTION!
No maintenance of the sensor can be performed in the field. Accessing the sensor chamber will break the VCR seal and should be done only at the factory.

To install the transmitter, refer to Figure 2 below and use a wrench to thread the female 1/4” fittings of the sample system or process line onto the 1/4” male VCR fittings of the tee sample cell configuration.

Figure 2: HygroTrace Installation

Standard Wiring Connections

Note: *The* **HygroTrace** *is not certified for use in Hazardous (Classified) locations.*

This procedure is for those units not connected to a computer.

The transmitter must be wired using the factory-supplied cable (two meters in length). If an alternate length is required, please contact the factory for assistance.

Note: *If cables need to be lengthened, refer to Table 1 on page 5 to splice an extension onto the existing cable. Connect positive to positive and negative to negative.*

Use the following steps to wire the transmitter to the system.

1. Align the red dot with the red mark (see Figure 3 below) and push the connector on the transmitter cable into the mating connector on the transmitter module. Make sure the pins are properly aligned. Once it is inserted, push the cable connector until it locks into place.

Figure 3: Transmitter Cable Connection

Standard Wiring Connections (cont.)

2. Using the flying leads at the other end of the transmitter cable, connect the transmitter to the power supply and data acquisition system (DAS) as shown in Figure 4 on page 6. Refer to Table 1 below for a description of the leads in the factory-supplied cable.

Table 1: Cable Lead Connections - No PC

Lead	Connection Description
Red	(+) 24VDC 1 AMP
Black	(–) 24VDC 1 AMP
Orange	(+) 4-20mA Output
Blue	(–) 4-20mA Output
Cable Braid	System Ground

3. Trim any unused leads back to the outer cable jacket in order to remove the bare tinned wire and prevent accidental short circuits.

The **HygroTrace** is now ready for operation.

Note: *To remove the probe cable, pull back the spring-loaded sleeve and pull the cable out of the connector.*

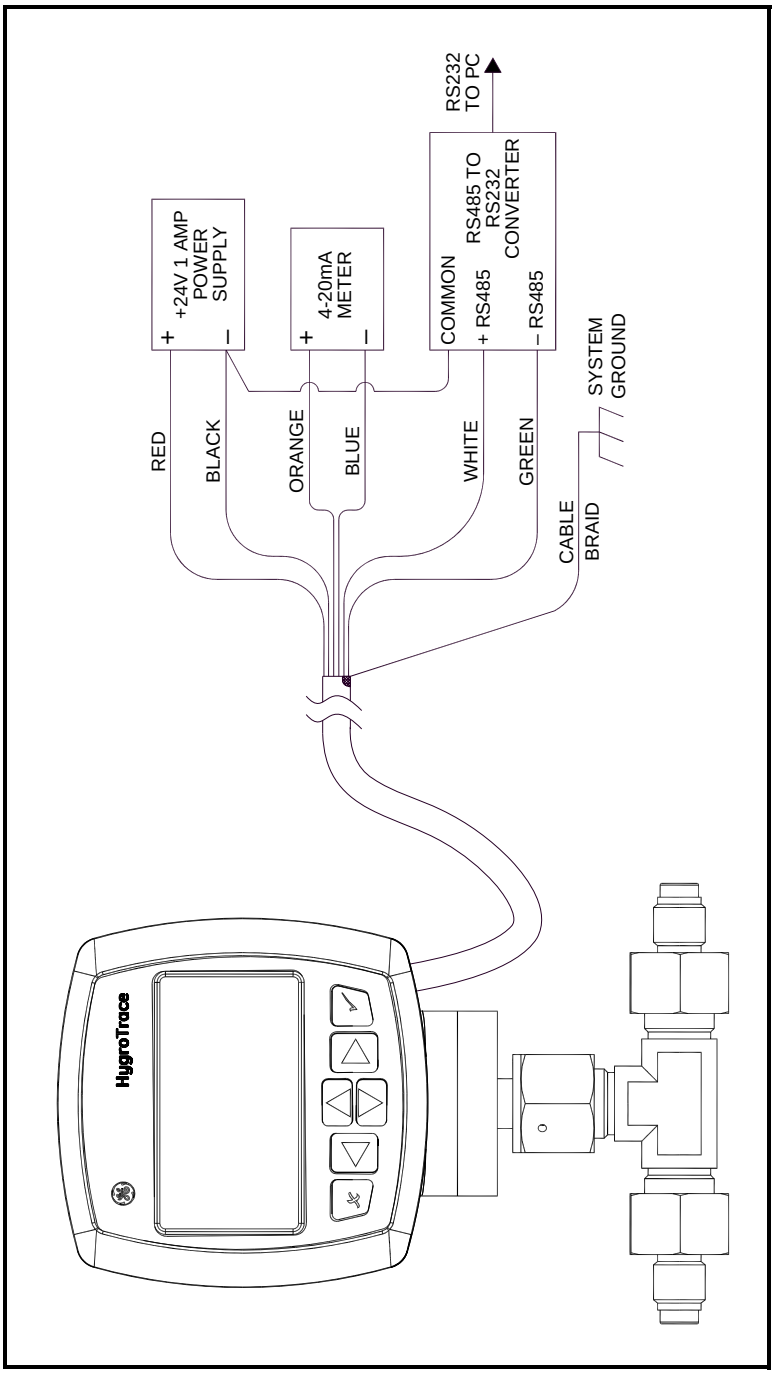


Figure 4: Standard Wiring Connections (ref. dwg #702-684)

Digital Communications Wiring Connections

If the unit is to be operated using **PanaView™** instrumentation software installed on a computer, an RS232/RS485 converter must be used and the wiring must be set up as follows.

The transmitter must be wired using the factory-supplied cable (two meters in length).

Note: *To lengthen cables, refer to Table 2 below to splice an extension onto the existing cable. Connect positive to positive, negative to negative, and ground to ground.*

Note: *EMI ferrite shielding may be required for communication through an ungrounded serial port. Please consult the factory for guidance.*

Use the following steps to wire the transmitter to the system.

1. Align the red dot with the red mark (see Figure 3 on page 4) and push the connector on the transmitter cable into the mating connector on the transmitter module. Make sure the pins are properly aligned. Secure the connectors by pushing the cable connector until it locks in place.
2. Using the flying leads at the other end of the transmitter cable, connect the transmitter to the power supply, the data acquisition system (DAS) and the computer as shown in Figure 4 on page 6. Refer to Table 2 below for a description of the leads in the factory-supplied cable.

Table 2: Cable Lead Connections - with PC

Lead	Connection Description
Red	(+) 24VDC 1 AMP
Black	(–) 24VDC 1 AMP
Orange	(+) 4-20mA Output
Blue	(–) 4-20mA Output
White	(+) RS485
Green	(–) RS485
Cable Braid	System Ground

Digital Communications Wiring Connections (cont.)

3. Trim any unused leads back to the outer cable jacket in order to remove the bare tinned wire and prevent accidental short circuits.

The **HygroTrace** is now ready for operation.

Note: *To remove the probe cable, pull back the spring-loaded sleeve and pull the cable out of the connector.*

Powering Up

After the **HygroTrace** is wired as described in the previous sections, power may be applied to the unit. The transmitter takes up to 60 seconds to initialize and begin normal operation. If the sensor has been exposed to ambient conditions of less than 10% RH for less than 72 hours, the **HygroTrace** will meet its specified accuracy within 24 hours following startup.

Using the HygroTrace

Keypad Features

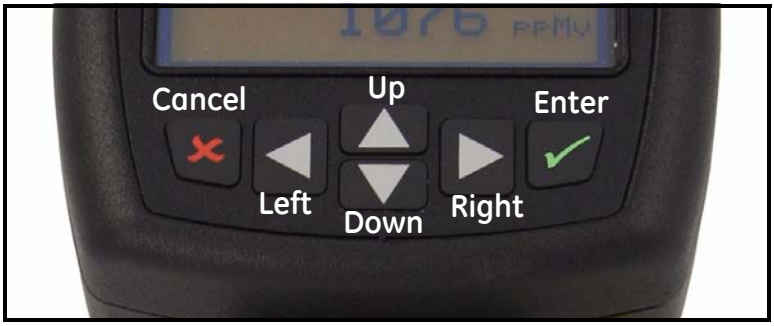


Figure 5: HygroTrace Keypad

The **HygroTrace** has only six keys: four arrow keys, a **Cancel** ✘ key and an **Enter** ✓ key.

Use the arrow keys to navigate among menu choices, and to increment/decrement numeric entries.

Use the **Cancel** ✘ key to cancel a numeric entry change, or exit a menu.

Use the **Enter** ✓ key to accept a numeric entry or select a menu option.

The Default Display

Figure 6 on page 11 shows the normal, default display of the **HygroTrace**/TFM.

- **Menu Prompt Area** - Titles, prompts, status displayed here.
- **Measurement** - 3 ½ digits (0 - 1999). Automatic decimal placement based on range.
- **Unit Symbol** - ppb = Parts Per Billion water by volume.
- **Keypad Lock Indicator** - Unlock sequence required to modify settings.
- **Measurement Progress Bar - HygroTrace** takes ~2 minutes to acquire data and complete the measurement. The progress bar gives a visual indication of the measurement status.
- **Warning/Error Indicator** - In the absence of an error, this region is blank. *Errors* that effect the quality of the measurement (e.g. heater failure) are indicated in **ALL CAPITAL** letters. *Warnings* that indicate problems detected with the measurement are indicated in **Mixed Case** letters. Refer to Table 3 below.

Table 3: Warning/Error Messages

No.	Label	Type	Description
0	Status OK	----	No Errors detected.
3	Sns Ovr Rng	WARN	The calculated PPBv value is greater than the highest calibration point, and is an extrapolation.
12	Acquiring...	WARN	Displayed at startup while the **HygroTrace** collects data for the first measurement.
101	HTR FAIL LO	ERROR	The heater failed to reach the desired temperature in the time allotted.
102	HTR FAIL HI	ERROR	The heater exceeded 200°C.
204	Sns Too Wet	WARN	The sensor is exposed to excessive moisture conditions.

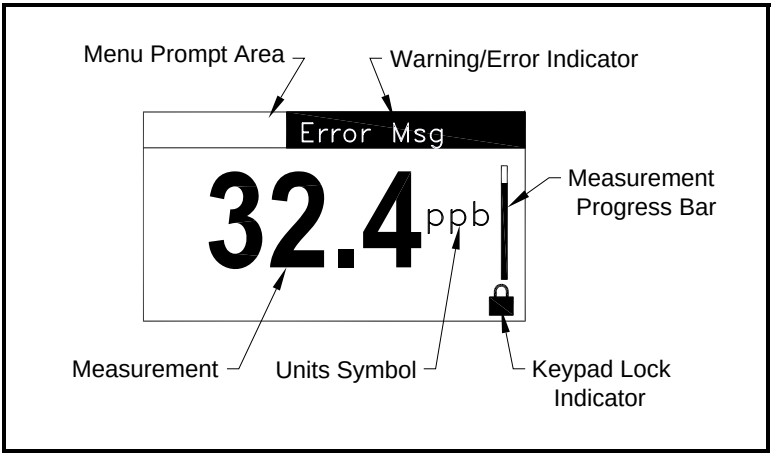


Figure 6: Default Display

Unlocking the Keypad

After power-on, the **HygroTrace** keypad is locked. It is necessary to enter the keypad unlock sequence to make any changes to the **HygroTrace**.

Similar to a mobile phone, the **HygroTrace** will prompt the operator to unlock if any key is pressed. A passcode is required to use certain factory service features only.

To unlock the keypad, press **Cancel** ✘, **Enter** ✓, **Cancel** ✘ in sequence.

Accessing the Menus

After successfully unlocking the keypad, the **HygroTrace** will display the Main Menu (see Figure 7 on page 12). Use the arrow keys to highlight the menu item desired. Refer to the Menu Map, Figure 9 on page 23.

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.

Accessing the Menus (cont.)

Note: *Menu items displayed with an ellipsis (…) will bring up more choices, while those without take immediate action.*

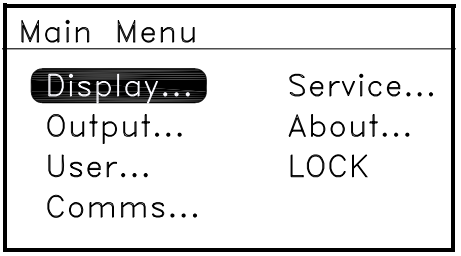


Figure 7: Main Menu

Entering Numeric Values

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

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

Use the **up** arrow key ▲ and **down** arrow key ▼ 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.

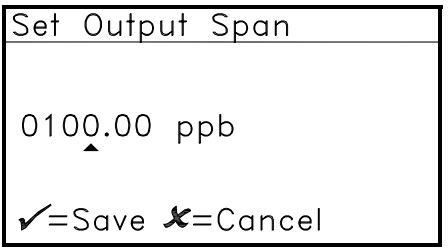
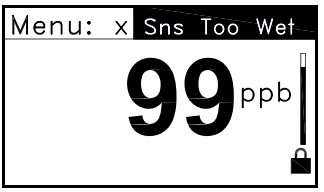


Figure 8: Numeric Entry

Setting Up the Transmitter

After proper installation, the **HygroTrace** 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 the digital outputs. Refer to the Menu Map, Figure 9 on page 23, and complete the following steps. Upon startup, the **HygroTrace** proceeds through several displays until a screen similar to the following appears:



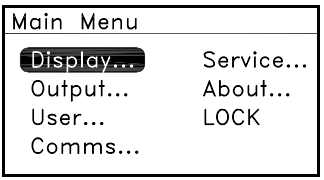
The symbol in the lower right corner indicates that the screen is locked.

To unlock the screen, press

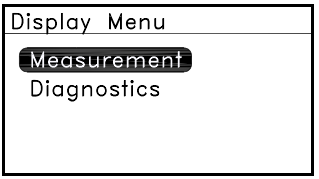
Cancel, **Enter**, **Cancel**.

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.*

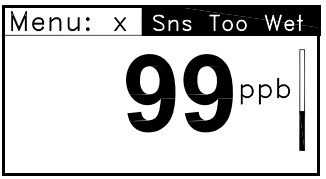
Display



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



To show the primary ppb_v display, select Measurement and press **Enter**. A screen similar to the following appears:



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

Diagnostics - has limited access. The service passcode is required. For a description, see Diagnostics on page 29.

4-20 Analog Output and Error Reporting

The **HygroTrace** has a single 4-20 mA analog (recorder) output. Normally, the output reports the measurement in ppb_v using a user-specified range. The default range is 0-100 ppb_v; that is, 4 mA represents the zero (0 ppb_v), and 20 mA represents the span (100 ppb_v) value.

The recorder output can exceed this range, within limits. A measurement greater than the span will be reported up to 20.5 mA, and a reading below the zero will be reported down to 3.8 mA. Faults are indicated by readings outside this range.

These faults will be indicated by a 3.5 mA signal:

- **No Data** - transmitter has not completed a measurement cycle, so it cannot report.
- **No Calibration** - transmitter was not programmed with calibration data.
- **Out of Range** - measurement cannot be determined with the given calibration.

These faults will be indicated by a 21.1 mA signal:

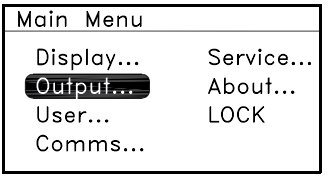
- **Heater Fail Low** - heater failed to reach the operating setpoint.
- **Heater Fail High** - heater exceeded its operating limit.

Limits are taken from the NAMUR Recommendation NE 043.
Measurement is valid from 3.8 mA to 20.5 mA.
Fault is indicated by ≤3.6 mA or ≥21.0 mA.

The **HygroTrace** has a special operating mode used to dry the sensor (see *Sensor Dry Down* on page 19). When in Dry Down mode, the unit will report a fixed output of 20.5 mA, the maximum valid measurement. When returned to normal operation, the output returns to reporting the actual measurement.

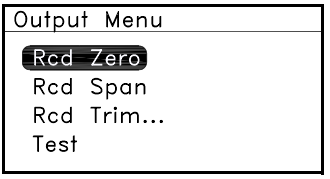
In the case of a measurement exceeding the maximum calibration value, the output will be limited to the maximum valid signal, 20.5 mA. The **HygroTrace** will never produce a negative reading (less than 0 ppb).

Outputs

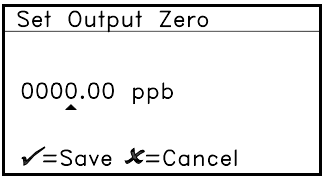


To set up outputs, from the Main Menu select Output... and press **Enter**. The following screen appears:

Recorder Zero

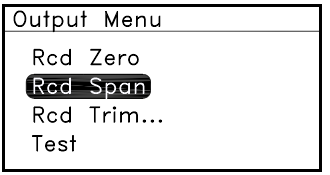


To specify the ppb reading equivalent to 4 mA, select Rcd Zero and press **Enter**. A screen similar to the following appears:

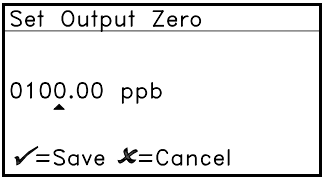


Use the arrow keys to change the output value. Press **Enter** to save (or **Cancel** to keep the previous value), and return to the Output Menu.

Recorder Span

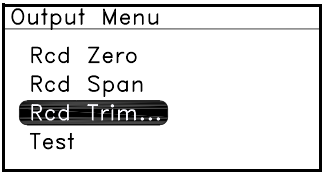


To specify the ppb reading equivalent to 20 mA, select Rcd Span and press **Enter**. A screen similar to the following appears:

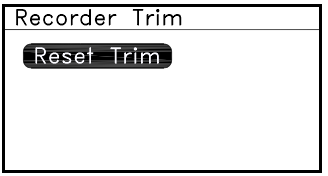


Use the arrow keys to change the output value. Press **Enter** to save (or **Cancel** to keep the previous value), and return to the Output Menu.

Recorder Trim

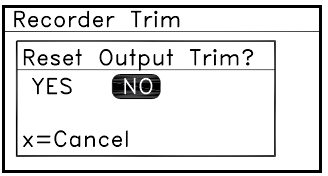


To adjust/calibrate the 4-20 mA output, select Rcd Trim... and press **Enter**. The following screen appears:



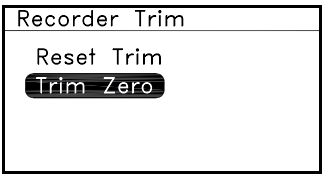
To return an adjusted 4-20mA calibration to the factory defaults, press **Enter**. The following screen appears.

Note: *Resetting the Trim erases any previous values before calibrating the output.*



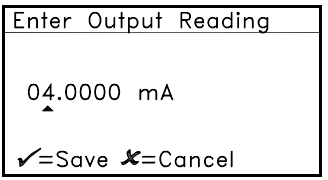
Select YES or NO and press **Enter**, or press **Cancel**. If you select NO or press **Cancel**, the unit returns to the previous screen and no change is made to the 4-20mA calibration.

If you select YES, the following screen appears to adjust and calibrate the 4-20mA signal.



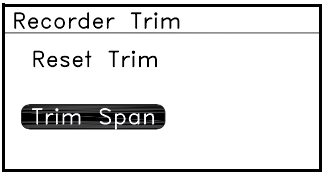
With Trim Zero highlighted, to adjust the 4 mA output from the factory default, press **Enter** and a screen similar to the following appears.

Note: *The* **HygroTrace** *will attempt to output exactly 4.00 mA. The operator should read the output, in mA, at the DAS or other indicator, and enter that value as follows.*



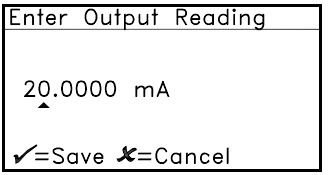
Use the arrow keys to change the output value. Press **Enter** to save (or **Cancel** to keep the previous value), and return to the Recorder Trim menu.

Recorder Trim (cont.)



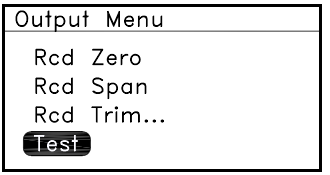
If a new Trim Zero was saved, the Trim Span is now highlighted. To adjust the 20 mA output from the factory default, press **Enter** and see a screen similar to the following:

Note: *The* **HygroTrace** *will attempt to output exactly 20.00 mA. The operator should read the output, in mA, at the DAS or other indicator, and enter that value in the following screen.*

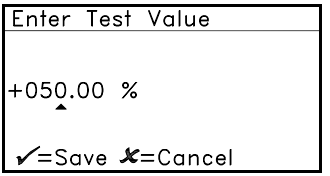


Use the arrow keys to change the output value. Press **Enter** to save (or **Cancel** to keep the previous value), and return to the Recorder Trim menu. Press **Cancel** twice to return to the Main Menu.

Test

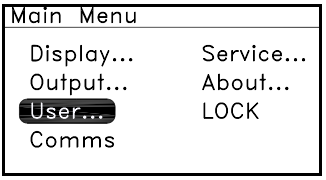


To force the 4-20 mA output to a specified percent of scale, select Test on the Output Menu and press **Enter**. A screen similar to the following appears.

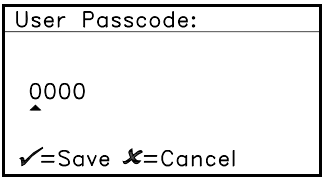


Use the arrow keys to change the test value. Press **Enter** to save (or **Cancel** to keep the previous value), and return to the Output Menu. Press **Cancel** to return to the Main Menu.

User

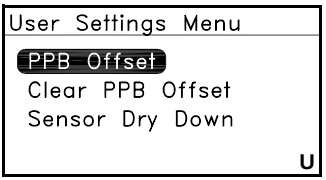


To specify an offset value in PPB and add to the measured PPB value, or to dry down the sensor, select User... on the Main Menu, press **Enter** and see the following screen:

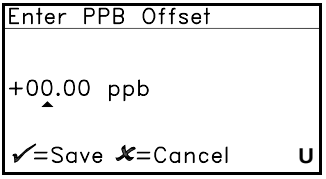


Use the arrow keys to enter the user passcode (2719), press **Enter** and the following screen appears. The User Mode indicator **U** appears in the lower right corner of the screen.

PPB Offset

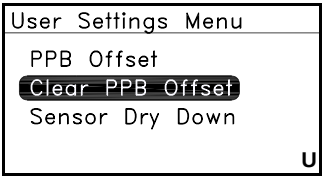


To specify a PPB offset value, select PPB Offset, press **Enter** and the following screen appears:

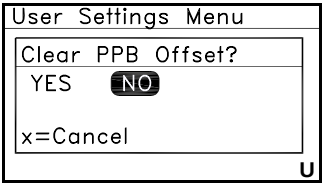


Use the arrow keys to enter the PPB offset desired, press **Enter** and the screen returns to the User Settings Menu.

Clear PPB Offset



To clear the PPB offset entered above, select Clear PPB Offset and press **Enter**. The following screen appears. Press **Cancel** to return to the Main Menu or proceed to the next option.



Select YES or NO and press **Enter**, or press **Cancel**. If you select NO or press **Cancel**, the unit returns to the previous screen and the PPD offset is not cleared.

If you select YES, the PPB Offset is cleared and the unit returns to the previous screen.

Sensor Dry Down

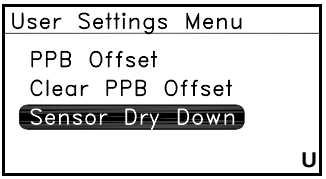
Following factory calibration, the **HygroTrace** is vacuum packaged to minimize sensor uptake of ambient moisture during shipment and storage. Once the unit is installed in the process or sample system, it is recommended that the user establish a nominal sample flow of 1 SLM and initiate a manual dry down of the sensor using the Sensor Dry Down option in the User Settings Menu.

The initiation of this dry down cycle depends on the exposure of the unit to ambient moisture conditions. The criteria for exposure is detailed below. It is recommended that the heater control be set to 190°C for 24 hours following initial installation. The dry down cycle must be manually started and stopped by the user.

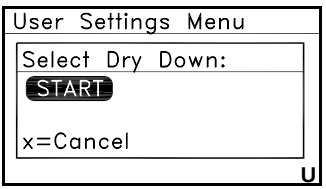
General rule of thumb: >72 hours @ <10% RH or
>24 hours @ >40% RH

This sensor-drying procedure can be repeated following prolonged exposure to ambient moisture conditions. This will ensure the highest accuracy for moisture measurement.

Note: *When in Dry Down mode, the unit will report a fixed output of 20.5 mA, the maximum valid measurement. When returned to normal operation, the output will return to reporting the actual measurement.*



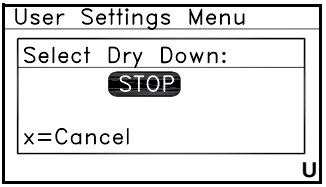
To initiate a manual dry down of the sensor, select Sensor Dry Down in the User Settings Menu. Press **Enter** and the following screen appears:



Press **Enter** to start the Sensor Dry Down (or press **Cancel** to not begin a sensor dry down cycle) and return to the previous screen. If you pressed **Enter**, the Sensor Dry Down has begun.

Note: *The sensor will be heated to and remain at 190°C until the user stops this cycle.*

Sensor Dry Down (cont.)

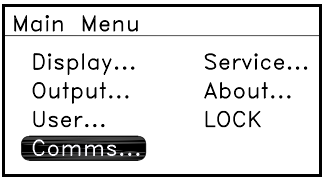


To stop the Sensor Dry Down, select it again on the User Settings Menu, press **Enter**, and this screen appears. Press **Enter** to stop the Sensor Dry Down (or press **Cancel** to continue) and return to the previous screen.

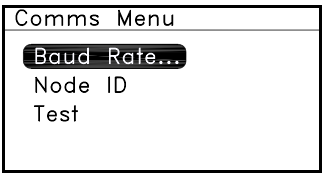
Note: *If you pressed **Enter**, the **Sensor Dry Down** has ended.*

Communications

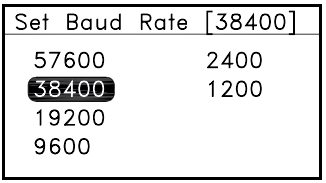
Baud Rate



To change the baud rate, select Comms... on the Main Menu, press **Enter** and the following screen appears:



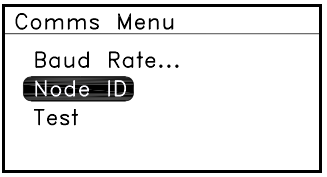
Select Baud Rate... and press **Enter**. A screen similar to the following appears.



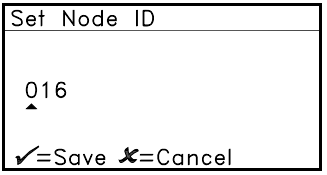
Use the arrow keys to select a new baud rate and press **Enter**. The number at the top right side of the screen changes. Press **Cancel** to return to the Comms Menu.

Node ID

Note: *If more than one* **HygroTrace** *is on the RS485 network, each unit must have a unique ID.*

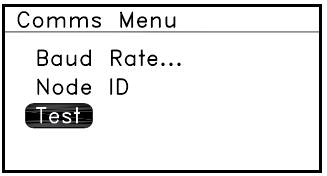


To change the node ID, select Node ID on the Comms Menu, then press **Enter** and the following screen appears:



Use the arrow keys to change the node ID value. Press **Enter** to save (or **Cancel** to keep the previous value), and return to the Comms Menu.

Test



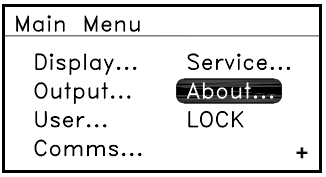
To test the serial connection over RS485, select Test and press **Enter**. The **HygroTrace** will transmit a short message, "HygroTrace Comm Test - Node 16", over RS485 for testing the serial connection.

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

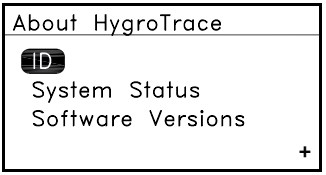
Service - has limited access. The service passcode is required. For a description of the service menu, see Service on page 30.

About

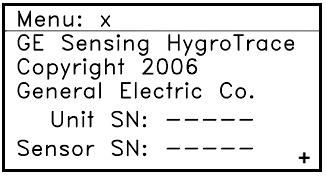
To access **HygroTrace** copyright and software version information, and instrument data such as unit and sensor serial numbers, the number of sensor hours and the system uptime:



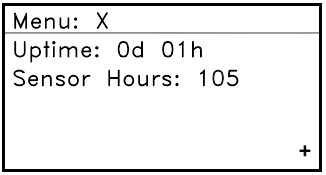
Select About on the Main Menu screen and press **Enter**. The following screen appears:



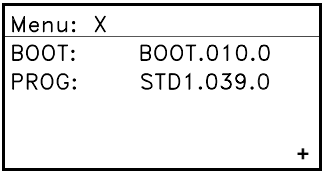
To access **HygroTrace** copyright and serial number information, select ID on the About HygroTrace screen and press **Enter**. A screen similar to the following appears:



To return to the About HygroTrace menu, press **Cancel**. To access up time information, select System Status and press **Enter**. A screen similar to the following appears.

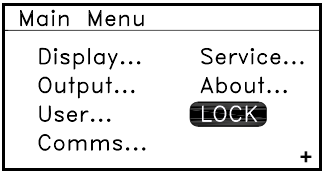


To return to the About HygroTrace menu, press **Cancel**. To access software version information specific to the unit, select Software Versions and press **Enter**. A screen similar to the following appears.



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

LOCK



To lock the unit from further changes, select LOCK on the Main Menu and press **Enter**. To restore access to the unit menus, press **Cancel**, **Enter**, **Cancel**.

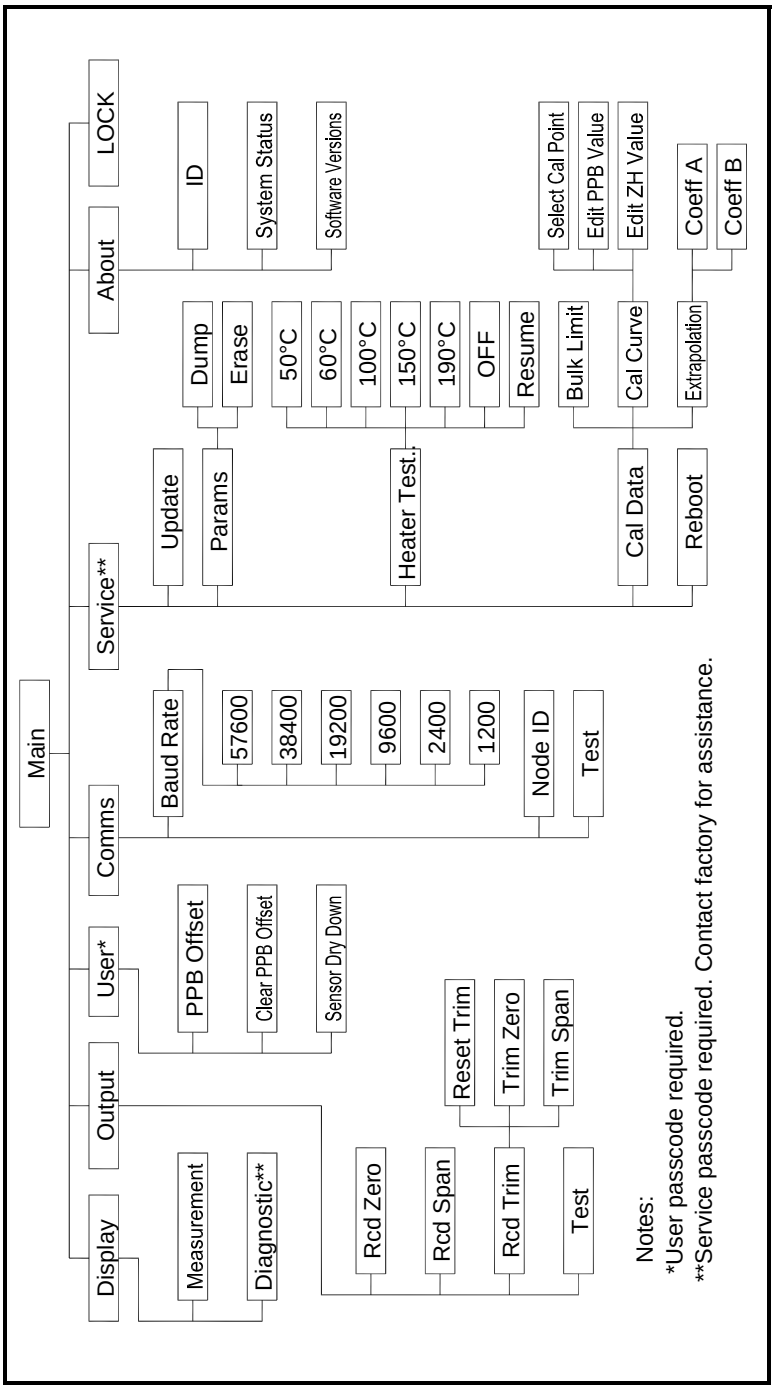


Figure 9: Menu Map

Menu Item Descriptions

Display

1. **Measurement** - Show the primary ppb_v display
2. **Diagnostics -** (Service passcode required)

Output

1. **Rcd Zero** - Specify the ppb reading equivalent to 4 mA
2. **Rcd Span** - Specify the ppb reading equivalent to 20 mA
3. **Rcd Trim** - Adjust/calibrate the 4-20 mA output
   a. **Reset Trim** - Clear trim values prior to recalibrating output
   b. **Trim Zero** - Adjust the 4 mA output
   c. **Trim Span** - Adjust the 20 mA output
4. **Test** - Force the 4-20 output to a specified percent of scale

User - (User passcode required)

1. **PPB Offset** - Enter PPB Offset
2. **Clear PPB Offset** - Clear PPB Offset
3. **Sensor Dry Down** - Dry the Sensor

Comms

1. **Baud Rate** - Specify the data rate for RS485 communications
2. **Node ID** - Specify the PanaView Network Node ID
3. **Test** - Force meter to transmit an ID message for test purposes

Service - (Service passcode required)

1. **Update** - Update the unit software.
2. **Params** - Access the parameter storage.
   a. **Dump** - Dump the parameter storage.
   b. **Erase** - Erase the EPROM.
3. **Heater Test** - Test the heater.
   a. **50°C to 190°C** - Select the temperature for testing.
   b. **OFF** - Turn the heater off.
   c. **Resume** - Resume normal measurement operation.

Menu Item Descriptions (cont.)

4. **Cal Data** - Change the calibration data.
   a. **Bulk Limit** - Set the bulk limit.
   b. **Cal Curve** - Set a calibration point and edit PPB and ZH values.
   c. **Extrapolation** - Set coefficient A and/or B.
5. **Reboot** - Reboot and return to the initial screen.

About - Display Product, Copyright, and Version information.

LOCK - Lock the keypad.

Specifications

General

Measurement Range:

- 0 to 100 ppb_v with trend indication beyond the calibrated range

Compatible Gases:

- Nitrogen and Argon

Process Gas Temperature Range:

- 14°F to 95°F (–10°C to 35°C)

Storage Temperature:

- –40°F to 158°F (–40°C to 70°C)

Operating Temperature:

- 14°F to 95°F (–10°C to 35°C)

Warm-Up Time:

- Meets specified accuracy within 24 hours, after sensor exposure <72 hours @ 25°C and 60% RH

Calibrated Uncertainty @ 77°F (25°C):

- ±20% of reading or ±5 ppb_v, whichever is greater

Response Time:

- Less than 20 min. for 95% of 25 ppb_v step change

Electrical

Power:

- 20 to 28VDC, 20 Watts

Analog Output:

- 4 to 20 mA, 400Ω load max

Digital Output:

- RS485

Output Resolution:

- 14 bits

Display:

- 128 X 64 LED backlit LCD
- Display of primary measurements and diagnostics

Mechanical

Sample Connection:

- In-line flow, ¼" male VCR process connection

Sample Flow Rate:

- 1 to 4.3 SCFH (0.5 to 2 SLM)

Operating Pressure:

- 0-10 psig (0 to 0.69 bar)

Proof Pressure:

- 3000 psig (207 bar)

Enclosure:

- Aluminum construction; black color; powder coated finish
- Overall Dimensions (H x W x D): 7.3 in x 4.6 in x 2.5 in (185 mm x 117 mm x 63.5 mm)
- Weight: 2.5 lbs (1.13 kg)

Moisture Sensor

Sensor Type:

- Thin-film aluminum oxide moisture sensor

Calibration:

- Each sensor is individually computer-calibrated against known moisture concentrations.

Calibration Interval:

- Sensor recalibration by GE is recommended every 6 to 12 months depending on the application.

Certification

- Complies with EMC Directive 89/336/EEC and PED 97/23/EC for DN < 25
- UL 508

Figure 10: Certification Label (for information only)

Appendix

The Diagnostics and Service menus are intended for factory-trained personnel only, and access is limited by requiring a service passcode. These menus allow the factory default data, including calibration data and sensor parameters, to be adjusted. Please contact an applications or service engineer at GE Sensing if access to these menus is required. Normal operation of the **HygroTrace** does not require access to the information contained in these menus.

Diagnostics

A Diagnostics Display page can be selected from the Display Menu (see Figure 11 below), but can be accessed only by using the service passcode.

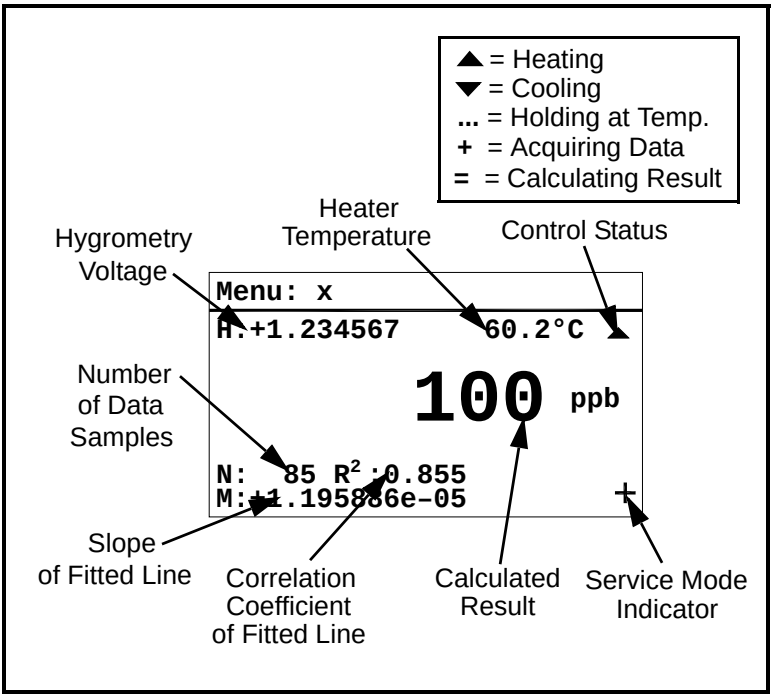
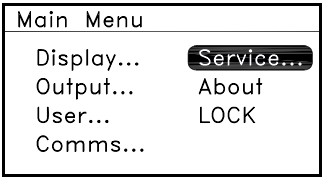


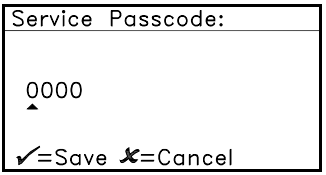
Figure 11: Diagnostics Display

!CAUTION!
No maintenance of the sensor can be performed in the field. Accessing the sensor chamber will break the VCR seal and should be done only at the factory.

Service



To access the Service Menu, select Service... on the Main Menu and press **Enter**. The following screen appears:

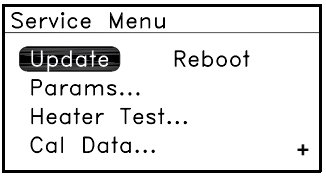


Use the arrow keys to enter the Service Passcode. Press **Enter** and the following screen appears:

Update

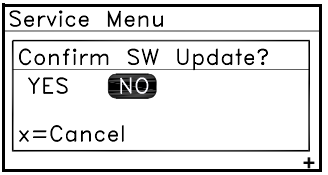
Due to product improvements or software enhancements, it may be necessary to install new software provided by GE Sensing. This is done over the RS485 digital communications link, using a PC application capable of performing an XMODEM file transfer.

Note: *For updates, the baud rate setting on the* COMMS *menu is ignored. Updates will use the following parameters:*
Baud Rate: 38400
Word Size: 8 bits
Stop Bits: 1
Parity: None
Flow Control: None/disabled

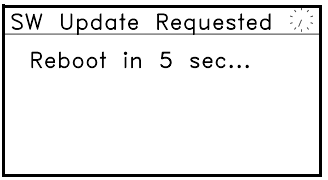


To update the instrument software, select Update on the Service Menu, press **Enter** and the following screen appears:

Update (cont.)



Select YES or NO and press **Enter**, or press **Cancel**. If you select NO or press **Cancel**, the unit returns to the previous screen. If you select YES, the following screen appears.

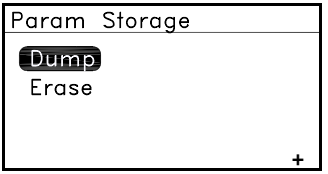


The **HygroTrace** software is updated and the unit reboots (returns to power up, proceeds through several initiation displays and returns to normal operation).

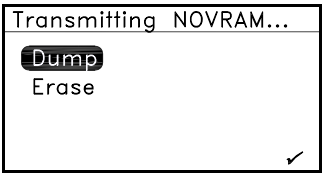
Parameter Storage

Dump

This function transmits the contents of the EEPROM used for calibration and parameter storage via the RS485 digital link. It is provided to assist GE Sensing service personnel in maintaining the product.



To dump the parameter storage, select Dump, press **Enter** and the following message appears at the top of the screen for a few seconds.

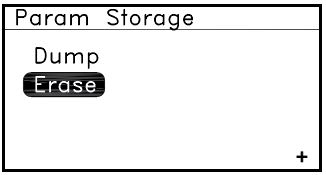


When the dump is complete, Param Storage reappears.

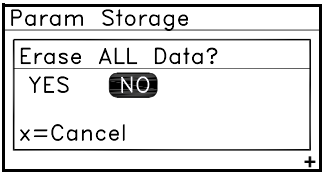
Erase

Note: Erase *will delete **ALL** calibration and user settings. The* **HygroTrace** *will be incapable of performing accurate measurements until this data is restored.*

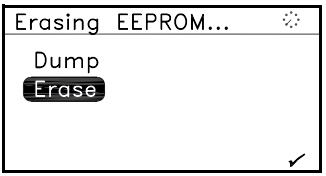
Note: *This function is provided to assist GE Sensing service personnel in maintaining the product.*



To erase the EPROM, select Erase, press **Enter** and the following message appears at the top of the screen for a few seconds.

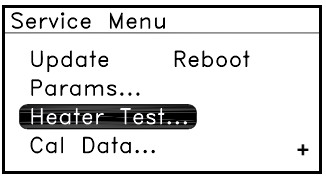


Select YES or NO and press **Enter**, or press **Cancel**. If you select NO or press **Cancel**, the unit returns to the previous screen. If you select YES, the following message appears.

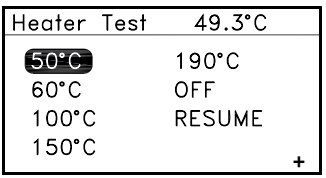


When the erasure is complete, Param Storage reappears. To return to the Service Menu, press **Cancel**.

Heater Test



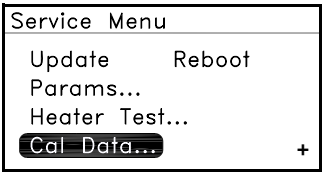
To perform a test of the heater, select Heater Test..., press **Enter** and a screen similar to the following appears:



Use the **arrow** keys to select the appropriate temperature to test, and press **Enter**. The temperature in the upper right corner of the screen should approximate the one selected.

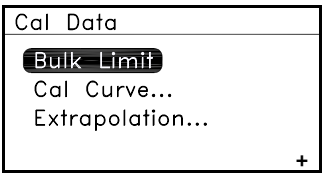
To turn off the test, select OFF and press **Enter**. The temperature in the upper right corner of the screen returns to its original value. To resume normal operation, select RESUME and press **Enter**. Press **Cancel** to return to the Service Menu.

Calibration Data

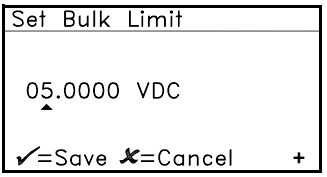


To change the calibration data, select Cal Data... on the Service Menu, press **Enter** and the following screen appears:

Bulk Limit



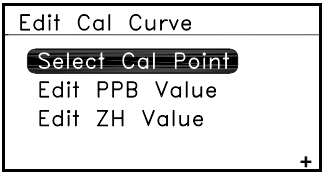
To set the bulk limit, select it on the screen and press **Enter**. The following screen appears:



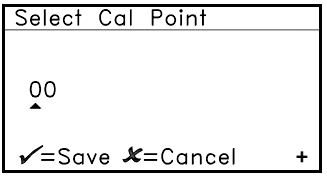
Use the arrow keys to change to the desired value and press **Enter** (or **Cancel** to keep the previous value). The screen returns to the Cal Data menu.

Calibration Curve

To edit the calibration curve, select Cal Curve... on the Cal Data menu and press **Enter**. The following screen appears:



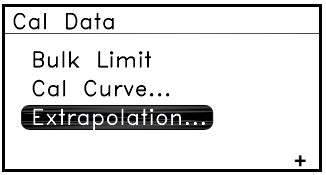
To set a calibration point, highlight Select Cal Point, press **Enter** and the following screen appears.



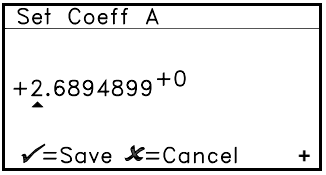
Use the arrow keys to enter the desired calibration point to change and press **Enter** (or **Cancel** to keep the previous value). The screen returns to Edit Cal Curve.

Proceed in the same way to Edit PPB Value and/or ZH Value to change the PPB and/or ZH value for a particular calibration point. Then select the next calibration point and repeat the process. When Edit Cal Curve is complete, press **Cancel** to return to the Cal Data menu.

Extrapolation

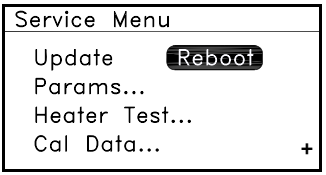


To set coefficients A and/or B, select Extrapolation... and press **Enter**. Select the coefficient to change, press **Enter** and a screen similar to the following appears:

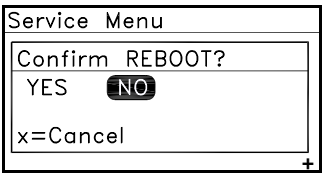


Use the arrow keys to change to the desired value and press **Enter** (or **Cancel** to keep the previous value). The screen returns to the Extrapolation menu. Press **Cancel** twice to return to the Service Menu.

Reboot



To reboot the meter and return to the initial screen, select Reboot and press **Enter**. The following screen appears.



Select YES or NO and press **Enter**, or press **Cancel**. If you select NO or press **Cancel**, the unit returns to the previous screen. If you select YES, a reboot occurs.

Note: *The* **HygroTrace** *returns to power up, proceeds through several initiation displays and returns to normal operation.*

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