Instruction

MI 611-262
August 2018

Model 876PH Intelligent Transmitter for pH, ORP, and ISE Measurement with HART® Communications

Schneider Electric™

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Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER
DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING
WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION
CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE
NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

1. Introduction

The 876PH Intelligent Transmitter converts pH, ORP, or ISE measurements to a 4 to 20 mA output signal with a superimposed HART digital signal for remote configuration and monitoring. A human/machine interface is integral to the device and provides simplified menu-driven configuration, calibration, status, and diagnostic procedures.

Two electronic configuration options are available for the 876PH transmitter: 876PH-T and 876PH-S Model Code selections.

876PH-T Model Codes include HART communications and accept inputs from conventional analog pH, ORP, ISE, or pre-amplified analog pH or ORP sensors.

876PH-S Model Codes include HART communications, but are dedicated for use with Schneider Electric "Smart" pH sensors, specifically the Schneider Electric PH10-*S Model Code sensors and Schneider Electric PH12-****S Model Code sensors (collectively referred to as Schneider Electric smart pH sensors in the remainder of this document). The Schneider Electric smart pH sensors contain integral, digital electronics and communicate digitally with the 876PH-S transmitter. Non-volatile memory in the Schneider Electric smart pH sensors stores calibration parameters, date of manufacture, serial number, sales order number, model code, slope, asymmetry, aging, service prediction (-S only), and response time of the sensor. Thus, a sensor calibrated on an 876PH-S transmitter or computer in a lab or instrument shop can be transferred to an 876PH-S in a plant or field location without requiring re-calibration at the point of use. A real-time clock enriches the history log of the 876PH-S transmitter.

876PH transmitters support remote configuration with a HART hand-held communicator or PC-based configurator. The LCD indicator can display one, two, or three measurement variables. Two levels of configurable passcode protection are standard. Two configuration programs can be stored in the 876PH-T version and restored at any time to facilitate a quick and easy change to a presaved configuration.

NOTE

Unless otherwise noted, information in this document pertains to all 876PH models.

Reference Documents

Table 1. Reference Documents

Document Number	Document Description
PSS 6-1C3 A	Models PH10 and ORP10 Analog and Smart Electrochemical Sensors and Accessories for pH and ORP Measurements
PSS 6-1C5 A	PH12 Series Electrochemical Sensors and Accessories for pH and ORP Measurement
DP 611-260	Dimensional Print – 876PH, 876EC, and 876CR Transmitters
MI 611-206	Instruction – Intrinsic Safety Connection Diagrams and Nonincendive Circuits
MI 611-208 (a)	Instruction – Electrochemical Products Safety Information
MI 611-205	PH10 pH Sensors and ORP10 ORP Sensors - Installation, Troubleshooting, Maintenance, and Parts List
MI 611-214	PH12 Series pH and ORP Sensors and Accessories - Installation, Troubleshooting, and Maintenance
PL 611-260	Parts List – 876PH, 876EC, and 876CR Transmitters
PSS 6-1A4 A	Model 876PH Intelligent Transmitter for pH, ORP, and ISE Measurement with HART Communication Protocol
MI 020-520	PC50 Intelligent Field Device Tool with Advanced DTM Library (Chapters 8 and 9 for 876PH-T and 876PH-S, respectively)

a. Available in many languages via our website. For help downloading this document contact our Global Customer Support Center.

Factory Default Passcode

The factory default passcode for both Administrator and User is 0800.

2. Quick Start

NOTE

This Quick Start chapter only applies to pH measurements. For ORP or ISE measurements, see other chapters of this manual.

The purpose of this section is to:

- Help you wire your transmitter
- Select the language to be displayed on the local display
- Familiarize you with the instrument configuration as received from the factory
- Assist you in verifying that your transmitter is in calibration
- Explain normal operation in Measure mode.

Wiring

,

⚠ DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION, OR ARC FLASH

Wiring installation must comply with existing local regulations.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

SAFETY HAZARD

Follow all agency requirements. For agency requirements, see MI 611-206 (FM, CSA) or MI 611-208 (ATEX, IECEx).

Failure to comply with agency requirements can result in death or serious injury.

NOTICE

POTENTIAL RFI/EMI INTERFERENCE

To minimize RFI/EMI effect, use grounded metal conduit on sensor cable and input power leads.

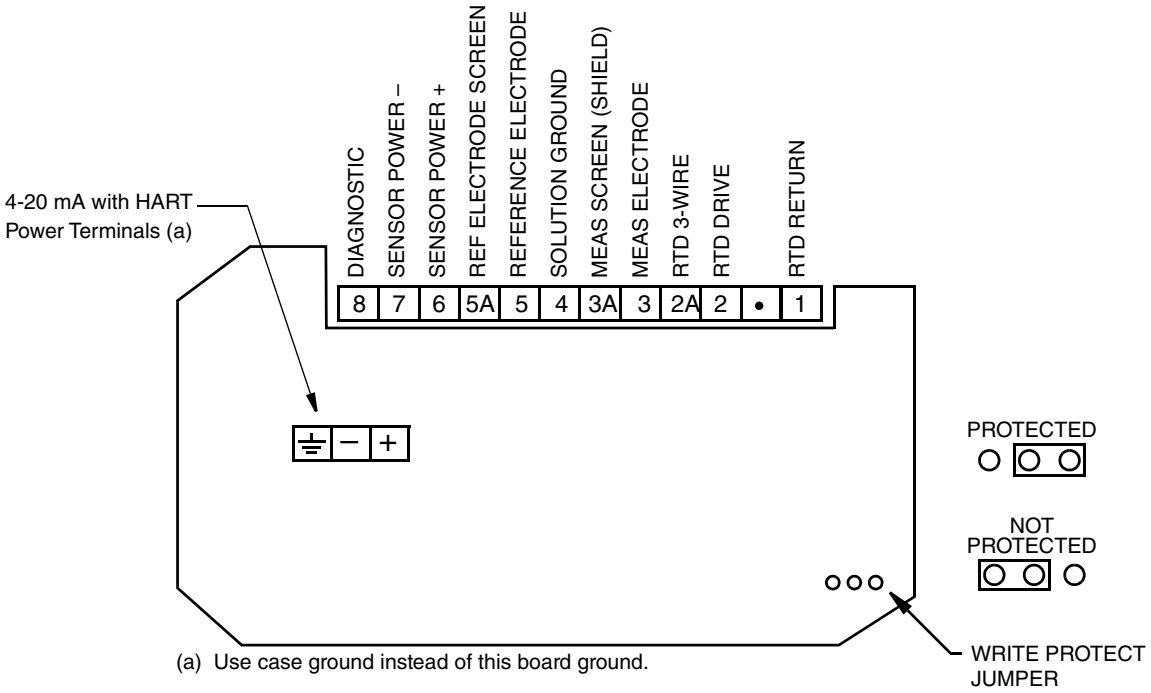
Failure to follow these instructions can degrade, impair, or prevent electrical circuit performance.

Your 876PH Transmitter is a 2-wire transmitter. As such, it transmits output over the same two wires through which it receives power. Connect this power/output signal to the power terminals at the left of the printed wiring board inside the faceplate of your transmitter and the signal from your measurement sensor to the corresponding numbered terminals at the top of the terminal board. See Figure 1 and Figure 2

To access these terminals, remove the four screws in the corners of the bezel/keypad and open the hinged bezel/keypad downward.

NOTICE
HAZARD OF EQUIPMENT DAMAGE
The bezel/keypad does not open a full 180°. Do not press on it while wiring.
Failure to follow these instructions can result in equipment damage.

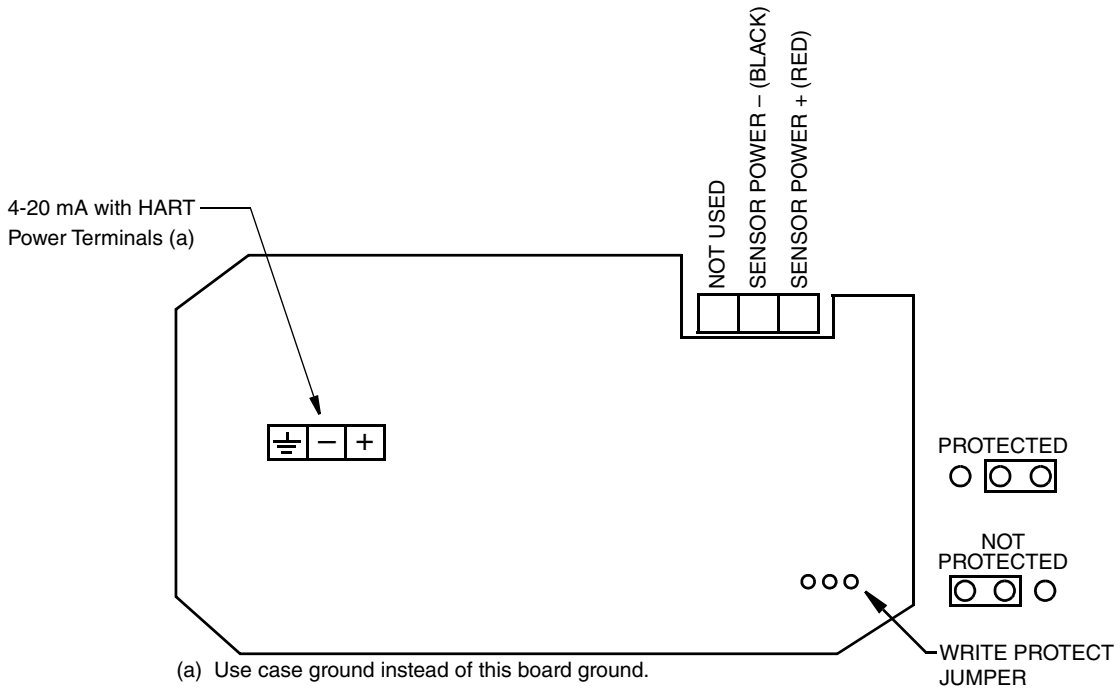
Figure 1. Wiring Connections for 876PH-T Transmitter



NOTES:

1. There must be at least 250 ohms total resistance between the PC-based configurator or HART communicator and the power supply.
2. When using non-Schneider Electric sensors for simultaneous pH and ORP measurement, connect pH electrode to 3, reference electrode to 5, and ORP electrode to 4.

Figure 2. Wiring Connections for 876PH-S Transmitter



NOTE:
There must be at least 250 ohms total resistance between the PC-based configurator or HART communicator and the power supply.

Selecting the Language on the Local Display (876PH-S only)

The first time you power up your 876PH-S transmitter, an initial start-up screen is displayed from which you can select the language to be displayed. You can choose any of the following languages:

- English
- French
- German
- Italian
- Spanish
- Portuguese
- Russian

Figure 3 shows the start-up screen:

Figure 3. Initial Start-Up Screen

NOTE

If a sensor is connected to the transmitter when it is powered up for the first time, the initial start-up screen which allows the selection of a language will display right away. If the transmitter is not connected to a sensor, a screen with the word "English" displays for 90 seconds before the initial start-up screen appears.

To select a language:

1. Use the up and down arrows to select the language you want to display.
2. Select `ENTER` to save the selected language.
3. If `ENTER` is not selected within 90 seconds, the transmitter will default to English and start normally. The initial start-up screen will not be shown again.

NOTE

You can change the language at any time from the `Advanced Configure > Languages` selection (see "Language (876PH-S only)" on page 72).

Checking Transmitter Configuration

Enter the Configuration mode by pressing the `Function` key and then the `Config` key. At the prompt, enter the passcode and press `ENTER`.

NOTE

The factory default passcode for both the Administrator and User is 0800.

Using the arrow keys, you can step through the current product configuration. Configuration Structure Diagrams for 876PH-S and 876PH-T can be found in Appendix A and Appendix B, respectively. The factory default values are listed in Appendix C. The values in your transmitter as delivered will differ from these if a non-default configuration was specified in your order. A **User Configuration** column is provided in the table in Appendix C where you can make any notations you wish about your specific configuration.

When viewing these values, check that the Buffer Set parameter configured in your transmitter matches the buffer(s) you intend to use in calibrating your device.

Calibration

After wiring your transmitter and checking/changing the configuration, perform a 2-Point calibration. The calibration procedures for 876PH-S and 876PH-T are listed below.

Calibration Procedure for 876PH-S

When a Schneider Electric smart pH sensor is connected to the 876PH-S, its most recent calibration data is uploaded to the transmitter. That calibration data may have come from performing a calibration using an 876PH-S transmitter, as described below, or by performing a calibration using the Schneider Electric smart pH sensor PC interface and DTM.

To enter the Calibration mode, press the `FUNCTION` key and then the `CAL` key. Enter your password if prompted and press `ENTER.` The Calibrate menu option displays. Press `ENTER` to view and edit the calibration parameters listed below (mA Cal, etc.), or press the Down arrow key once to access the Calibrated By menu to enter the name of the person doing the calibration and the calibration day, month, and year.

Calibration Procedure for 876PH-T

To enter the Calibration mode, press the `Function` key and then the `Cal` key. At the prompt, enter the passcode and press `ENTER`. Next, enter the calibrator's name. In the 876PH-T transmitter, also enter calibration day, month, and year, pressing `ENTER` after each. Select Manual or Smart. Then select `Measurement` from the Calibrate screen and follow the prompts for a 2-point calibration to calibrate your transmitter. At the end of a successful calibration, no alerts will be present in the transmitter.

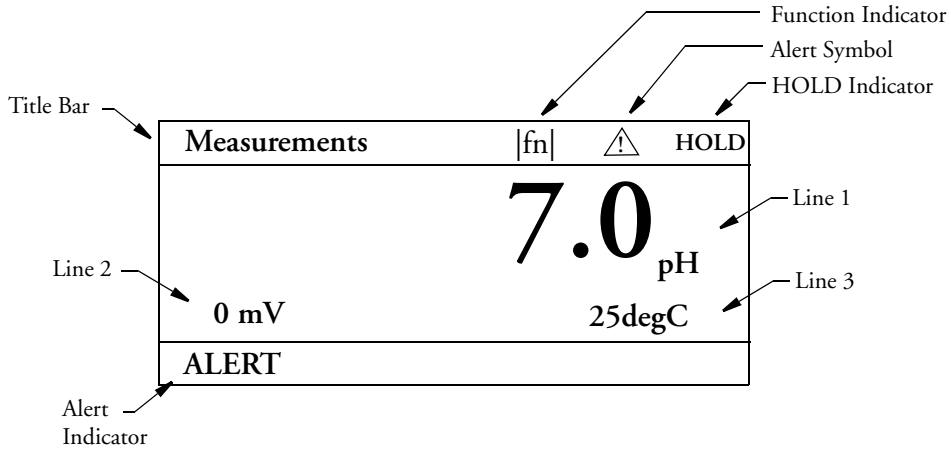
Calibration Incomplete

If a calibration is performed incorrectly, the entered value changes to black on the 876PH local display and the Help key indicates what went wrong, for instance **Calibration Incomplete**.

Basic Operation in Measure Mode

Measure is the normal operating mode of your transmitter. One, two, or three measurements can be displayed depending on the configuration. When the display is configured for single line measurements, the value and unit are usually displayed. Any measurement can be temporarily scrolled onto the display by using the `Up` and `Down` arrow keys. The display returns to the configured values when you press the `Function` key and then the `Measure` key or when the configured timeout period expires. When the transmitter is in Hold state, a `Hold` indication appears in the upper right of the title bar as shown in Figure 4. If there is an alert, a flashing alert symbol is displayed. If in Measure, Status, or Diagnostic mode, the word `ALERT` also flashes in the lower left of the display. When you press the `Function` key, the function indicator is displayed.

Figure 4. Sample 3-Line Measurement Display



Looking for More Information?

For more detailed information, refer to the following sections of this manual:

- For detailed installation information, refer to “Installation” on page 25.
- For detailed explanation of the controls and indicators, refer to “Operation Via Local Display” on page 35.
- For detailed configuration instructions, refer to “Configuration Mode” on page 58.
- For detailed calibration instructions, refer to “Calibration Mode” on page 51.
- For detailed operation from a HART Communicator, refer to “Operation Via HART Communicator” on page 79.

For dimensional information, refer to DP 611-260.

If you need additional help, contact Global Customer Support at 1-866-746-6477 (within U.S.), 1-508-549-2424 (outside U.S.), or contact your local representative.

3. Specifications

Functional and Physical Specifications

Sensors

876PH-T

Virtually any glass or antimony pH, ORP, or ISE sensor including the following:

PH12 Series Sensor

PH10 pH Sensor

ORP10 ORP Sensor

871PH Series pH/ORP Sensor

871A Series pH/ORP Sensor

EP460 pH/ORP Sensor

EP462 pH Sensor

EP466 pH Sensor

EP459A Fluoride Sensor Assembly

Non-Schneider Electric sensors without integral preamplifiers and with compatible temperature compensation elements

876PH-S

PH10-*S Sensor

PH12-****S Sensor

Maximum Distance Between Sensor and Transmitter

With preamplified sensor: 152 m (500 ft)

With non-preamplified sensor that utilizes a driven shield (PH12, PH10-.N, 871A-1, -3; 871PH-5, -6): 15.2 m (50 ft)

With Schneider Electric smart pH sensors: 100 m (328 ft)

Temperature Compensation Inputs

876PH-T

100 ohm platinum RTD, 2- and 3-wire

1000 ohm platinum RTD, 2- and 3-wire

3000 ohm Balco 2-wire RTD

*876PH-S with PH10-*S Sensor*

1000 ohm platinum RTD

*876PH-S with PH12-****S Sensor*

1000 ohm platinum RTD

Solution Temperature

-30 to +200°C (-22 to +392°F)

Ambient Temperature

Electronics: -30 to +70°C (-22 to +158°F)

Display: -20 to +70°C (-4 to +158°F)

Relative Humidity

0 to 90% noncondensing

Environmental and Corrosion Resistant Protection

The enclosure is dusttight and weatherproof as defined by IEC IP66, and provides the environmental and corrosion resistant protection of NEMA Type 4X.

Electromagnetic Compatibility (EMC)

The 876PH Transmitter complies with the requirements of the European EMC Directive 2004/30/EU by conforming to EN 61326-1:2013.

Power Supply Requirements (for 4 to 20 mA output)

12.8 to 42 V dc (see Figure 11)

Load Limitations (for 4 to 20 mA output)

0 to 1300 ohms (see Figure 11)

Measurement Range

876PH-T

pH: -2 to +16 pH

ORP: -2000 to +2000 mV

ISE: 0 to 9999 ppm

Solution Temperature: See sensor specifications.

876PH-S

pH: -2 to +16 pH

ORP: -1800 to +1800 mV

Solution Temperature: See sensor specifications.

Temperature Compensation Range

-30 to +200°C (-22 to +392°F) for pH or ISE

0 to 100°C (32 to 212°F) for ammonia

Approximate Weight

Panel Mounted: 3.1 kg (6.8 lb)

Surface or pipe Mounted: 3.7 kg (8.1 lb) including mounting bracket

Product Safety Specifications

— NOTE

The 876PH Transmitters have been designed to meet electrical safety descriptions listed in Table 2. For detailed information, or status of testing laboratory approvals/certifications, contact Global Customer Support.

Table 2. Product Safety Specifications

Testing Laboratory, Types of Protection and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX II 1 G, Ex ia IIC Ga, intrinsically safe for Zone 0.	Temperature Class T4. Ta = -20 to 60°C.	AA
ATEX II 3 G, Ex ic IIC Gc, intrinsically safe for Zone 2.	Temperature Class T4. Ta = -20 to 60°C.	AN
CSA Ex ia IIC; intrinsically safe for Zone 0; and **CSA** intrinsically safe, Class I, II, III, Division 1, Gas Groups A, B, C, D, E, F, G.	Temperature Class T4. Ta = -20 to 60°C.	CA
CSA Ex nL IIC; energy limited for Zone 2; and **CSA** for Class I, II, III, Division 2, Gas Groups A, B, C, D, E, F, G.	Temperature Class T4. Ta = -20 to 60°C.	CN
FM and **FMc** AEx ia IIC; intrinsically safe for Zone 0; and **FM** and **FMc** intrinsically safe, Class I, II, III, Division 1, Gas Groups A, B, C, D, E, F, G.	Temperature Class T4. Ta = -20 to 60°C.	FA
FM and **FMc** AEx ic IIC; intrinsically safe for Zone 2; and **FM** and **FMc** nonincendive, Class I, II, III, Division 2, Gas Groups A, B, C, D, E, F, G.	Temperature Class T4. Ta = -20 to 60°C.	FN
IECEx Ex ia IIC; intrinsically safe for Zone 0.	Temperature Class T4. Ta = -20 to 60°C.	DA
IECEx Ex ic IIC; intrinsically safe for Zone 2.	Temperature Class T4. Ta = -20 to 60°C.	DN
NEPSI Ex ia IIC Ga; intrinsically safe for Zone 0. (a)	Temperature Class T4. Ta = -20 to +60°C.	NA
NEPSI Ex ic IIC Gc; intrinsically safe for Zone 2. (a)	Temperature Class T4. Ta = -20 to +60°C.	NN
EAC 0 Ex ia IIC X; intrinsically safe for Zone 0.	Temperature Class T4. Ta = -20 to +60°C.	RA
EAC 2 Ex ic IIC X; intrinsically safe for Zone 2. **EAC** 2 Ex nL IIC X; Limited Energy for Zone 2.	Temperature Class T4. Ta = -20 to +60°C.	RN

a. NEPSI options only available with 876PH-T.

4. Installation

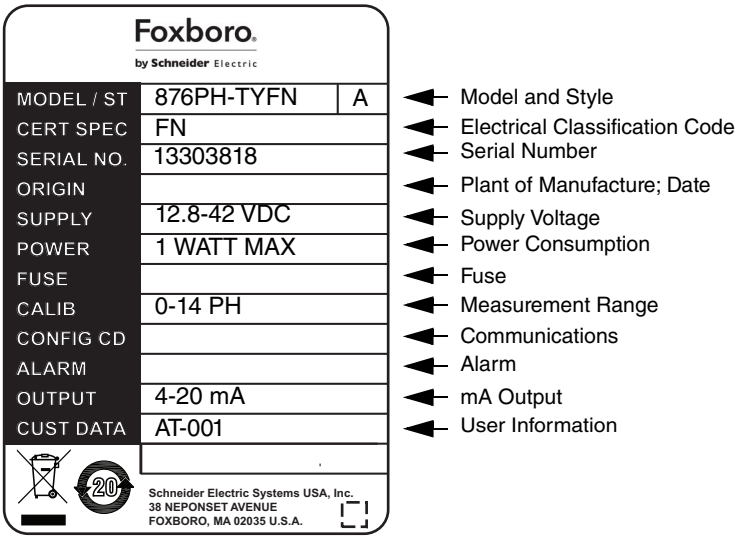
Unpacking

1. Remove the transmitter from the shipping container and check for visible damage.
2. Save the container until you determine that no shipping damage has occurred.
   a. If no damage is observed, proceed to the mounting procedure.
   b. If transmitter has been damaged, notify the carrier immediately and request an inspection report. Obtain a signed copy of the report from the carrier and contact Global Customer Support at 1-866-746-6477 or contact your local representative.

Identification

A data label is fastened to the left side surface of the enclosure. This label provides the model number and other information pertinent to your particular transmitter. Figure 5 shows a sample data label that will be similar to your label.

Figure 5. Sample Data Label



Mounting

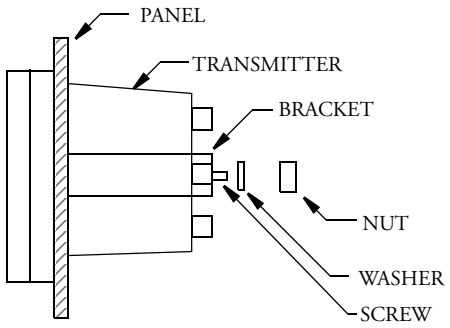
Panel Mounting

Panel mounting of the transmitter is shown in Figure 6.

1. Cut panel to receive instrument.
2. Insert screws in back of instrument.
3. Place instrument into panel and add bracket, washers and nuts from back side.

For panel cutout size, space requirements, and other dimensional data, see DP 611-260.

Figure 6. Panel Mounting



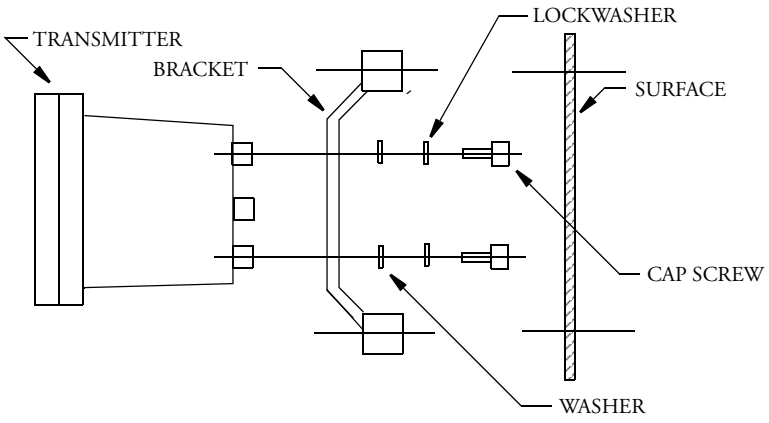
Surface Mounting

Surface mounting of the transmitter is shown in Figure 7.

1. Fasten mounting bracket to transmitter using screws, washers, and lockwashers provided.
2. Fasten mounting plate to surface using appropriate hardware.

For space requirements and other dimensional data, see DP 611-260.

Figure 7. Surface Mounting



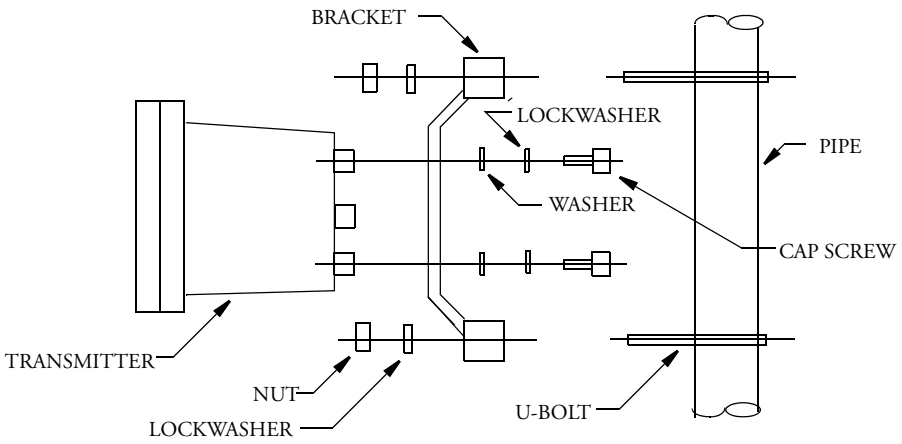
Pipe Mounting

Pipe mounting of the transmitter is shown in Figure 8.

1. Fasten mounting bracket to instrument using hardware provided.
2. Securely fasten mounting bracket to a DN50 or 2-in pipe with U-bolts supplied.

For space requirements and other dimensional data, see DP 611-260.

Figure 8. Pipe Mounting



Wiring

⚠ DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION, OR ARC FLASH

Wiring installation must comply with existing local regulations.

Failure to follow these instructions will result in death or serious injury.

NOTICE

HAZARD OF EQUIPMENT DAMAGE

The bezel/keypad does not open a full 180°. Do not press on it while wiring.

Failure to follow these instructions can result in equipment damage.

NOTICE

POTENTIAL RFI/EMI INTERFERENCE

To minimize RFI/EMI effect, use grounded metal conduit on sensor cable and input power leads.

Failure to follow these instructions can degrade, impair, or prevent electrical circuit performance.

Your 876PH Transmitter is a 2-wire transmitter. As such, it transmits output over the same two wires through which it receives power. Connect this power/output signal and the signal from your measurement sensor as follows:

1. Remove the four screws on the corners of the faceplate and open the hinged door downward. Install proper fittings in the left and right ports in the bottom of the case.

Table 3. Recommended Conduit and Fittings

Material	Conduit	Fitting
Rigid Metal	1/2 inch Electrical Trade Size	T&B (a) #370
Semi-Rigid Plastic	T&B #LTC 050	T&B #LT 50P or T&B #5362
Semi-Rigid Plastic Metal Core	Anaconda Type HV, 1/2 inch	T&B #LT 50P or T&B #5362
Flexible Plastic	T&B #EFC 050	T&B #LT 50P or T&B #5362

a. T&B = Thomas & Betts Corp., 1001 Frontier Road, Bridgewater, NJ 08807

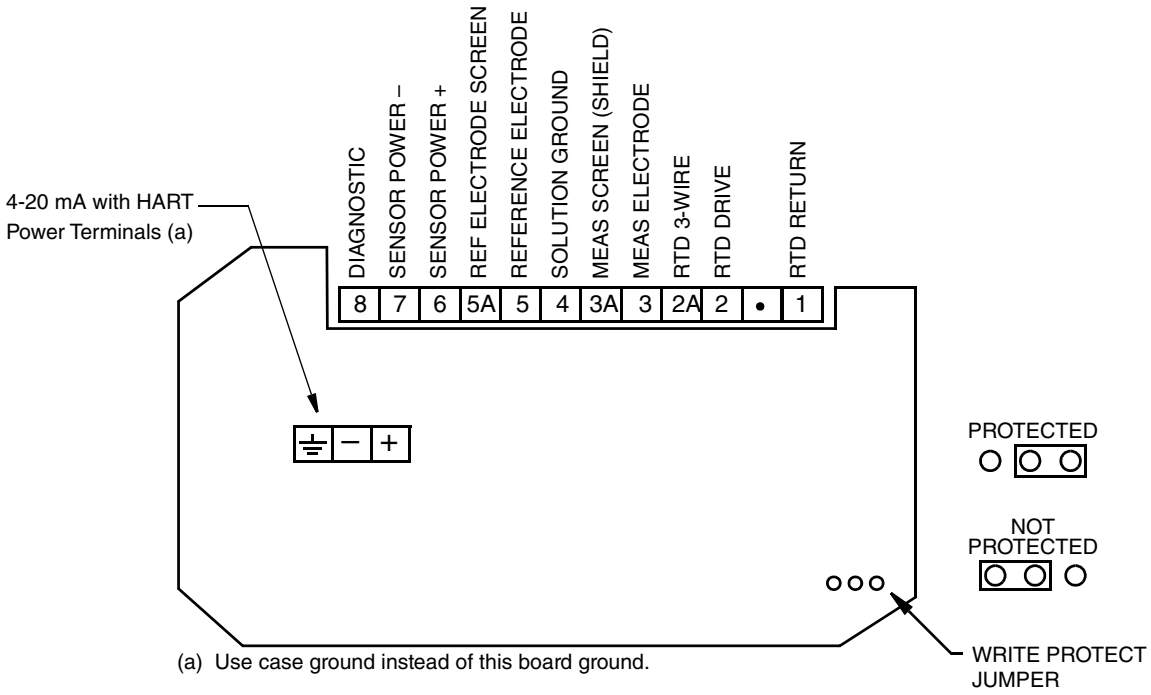
2. Bring your power wires in the left opening in the bottom of the case and attach to the power terminals at the left of the printed wiring board. See Figure 9 and Figure 10.
3. Bring the sensor wires in the right opening in the bottom of the case and attach to the appropriate terminals at the top of the printed wiring board. See Figure 9 and Figure 10. The -S version of the transmitter is shipped with a cord grip fitting sized for use with the Smart sensor. Use this cord grip to help achieve a connection that is impervious to water.

NOTE

To maintain NEMA Type 4X and IEC IP66 protection, plug any unused openings with the plug, gasket, and locknut shown in PL 611-260.

4. Set the Write Protect jumper as shown in Figure 9 and Figure 10.

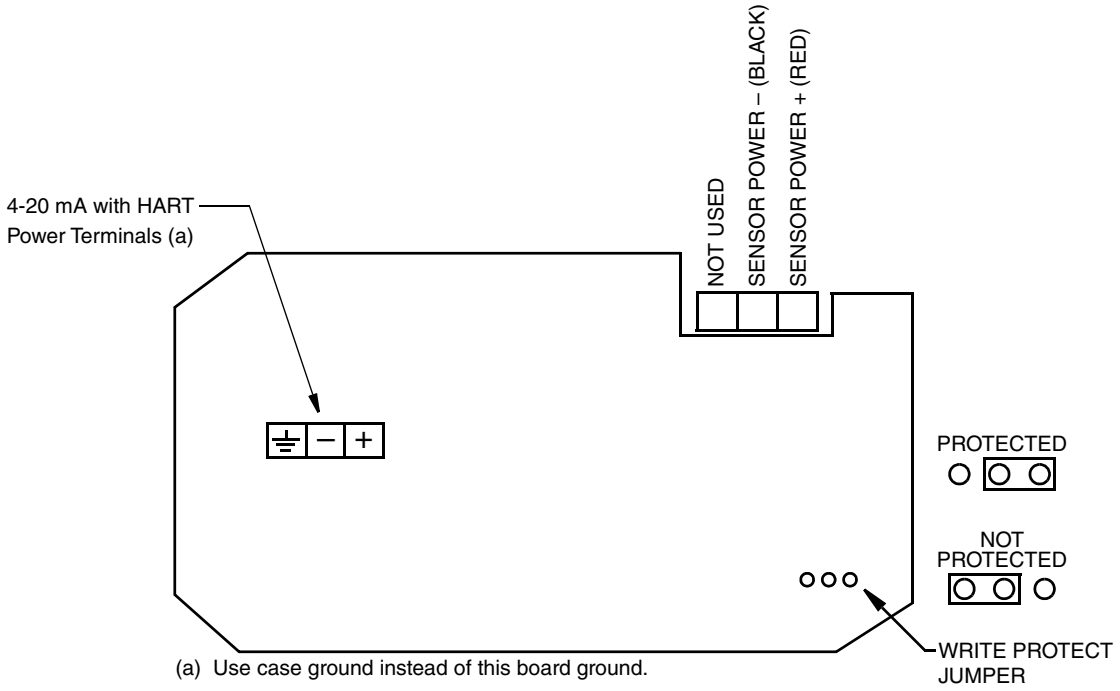
Figure 9. Wiring Connections for 876PH-T Transmitter



NOTES:

1. There must be at least 250 ohms total resistance between the PC-based configurator or HART communicator and the power supply.
2. When using non-Schneider Electric sensors for simultaneous pH and ORP measurement, connect pH electrode to 3, reference electrode to 5, and ORP electrode to 4.

Figure 10. Wiring Connections for 876PH-S Transmitter



NOTE:
There must be at least 250 ohms total resistance between the PC-based configurator or HART communicator and the power supply.

NOTE

When a Schneider Electric smart pH sensor is connected to the 876PH-S transmitter with the power already on, sensor data will be uploaded to the transmitter, which may take up to one minute. If a sensor is already connected to the transmitter when it is powered up, the transmitter will check to see if that sensor is the same one that was last connected and if its data has not changed. If it is the same sensor with the same data, the transmitter uses cached data for immediate operation.

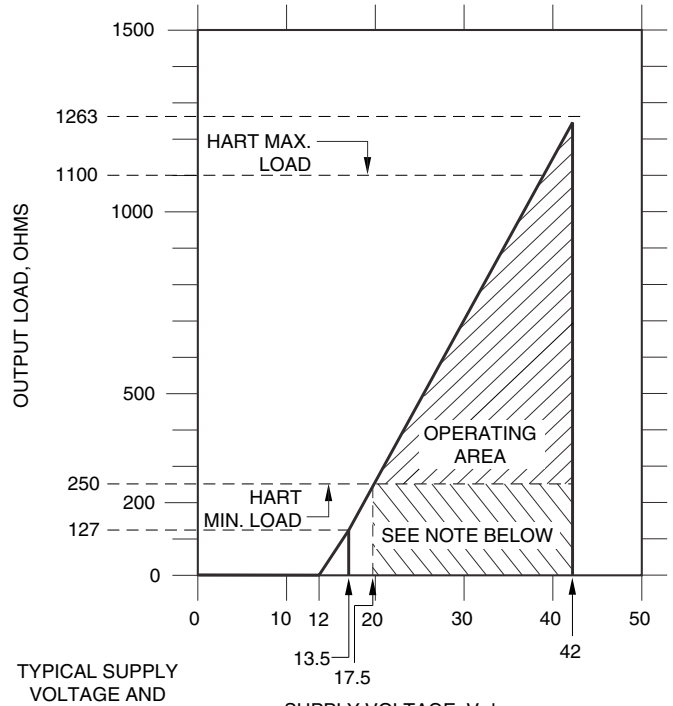
NOTE

When changing from one Schneider Electric smart pH sensor to another, wait for the 876PH-S transmitter to display a Sensor Disconnected message before connecting the new sensor. Do not use a switchbox to change sensors as this will not allow adequate time for the Sensor Disconnect message to appear on the transmitter.

Voltage Load Requirements

The voltage load requirements are given in Figure 11.

Figure 11. HART 4 to 20 mA Output, Supply Voltage vs. Output Load
Hart Supply Voltage Requirements and External Loop Load Limitations for the 876PH-T and 876CR



TYPICAL SUPPLY VOLTAGE AND LOAD LIMITS

V dc	Load (Ohms)
24	445
30	717

NOTE

The minimum and maximum loads for the HART communicator are 250 ohms and 1100 ohms respectively.

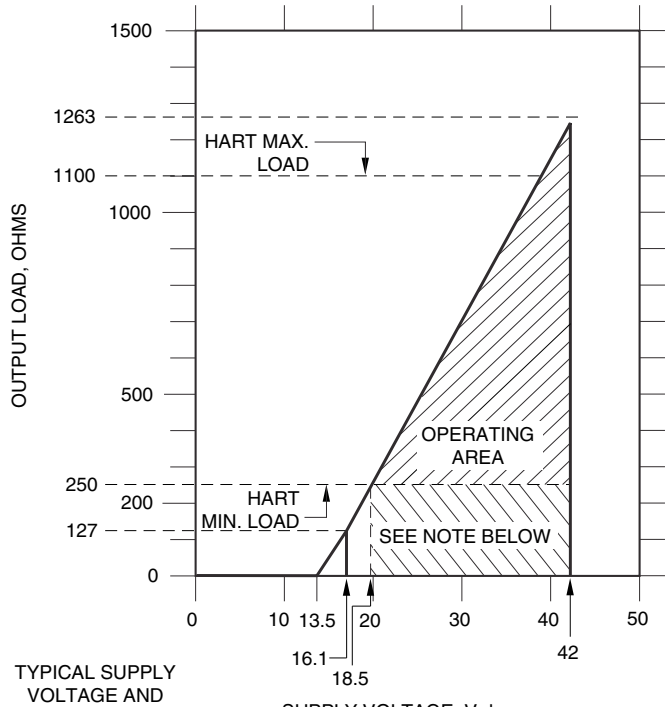
The transmitter can function with an output load outside these limits provided that a remote configurator or HART communicator is not connected to it. Connecting a remote configurator or HART communicator while operating outside these limits could cause output disturbances and/or communication problems.

Examples:

1. For a loop load of 800 ohms, the supply voltage can be any value from 31 to 42 V dc.

2. For a supply voltage of 24 V dc, the loop load resistance can be any value from 0 to 517 ohms (250 to 517 ohms with a PC-Based configurator or a HART Communicator connected to the transmitter).

Figure 12. HART 4 to 20 mA Output, Supply Voltage vs. Output Load
HART Supply Voltage Requirements and External Loop Load Limitations for the 876EC and 876PH-S with Backlight



TYPICAL SUPPLY VOLTAGE AND LOAD LIMITS

V dc	Load (Ohms)
24	445
30	717

NOTE

The minimum and maximum loads for the HART communicator are 250 ohms and 1100 ohms respectively.

The transmitter can function with an output load outside these limits provided that a remote configurator or HART communicator is not connected to it. Connecting a remote configurator or HART communicator while operating outside these limits could cause output disturbances and/or communication problems.

Sensor Cable Length

The length of the cable between an analog sensor and the 876PH-T transmitter can be up to 152 m (500 ft) if using a sensor with an integral preamplifier or used with a remote preamplifier. For an analog sensor without a preamplifier, the length can be up to 15 m (50 ft). The length of the included cable between a Schneider Electric smart pH sensor and an 876PH-S transmitter can be up to 100 m (328 ft).

Write Protection Jumper

Your transmitter has write protection capability which meets the security requirements of ISA-S84.01-1986 for use in safety shutdown systems. This means that the local display and remote electronics can be prohibited from writing to the electronics. Write protection is set by moving a jumper that is located on the printed wiring board behind the front panel. To activate write protection, open the front panel and place it in the 'protect' position. See Figure 9. In the 'Not Protected' position, writing to certain functions can be limited by passcode protection.

NOTE

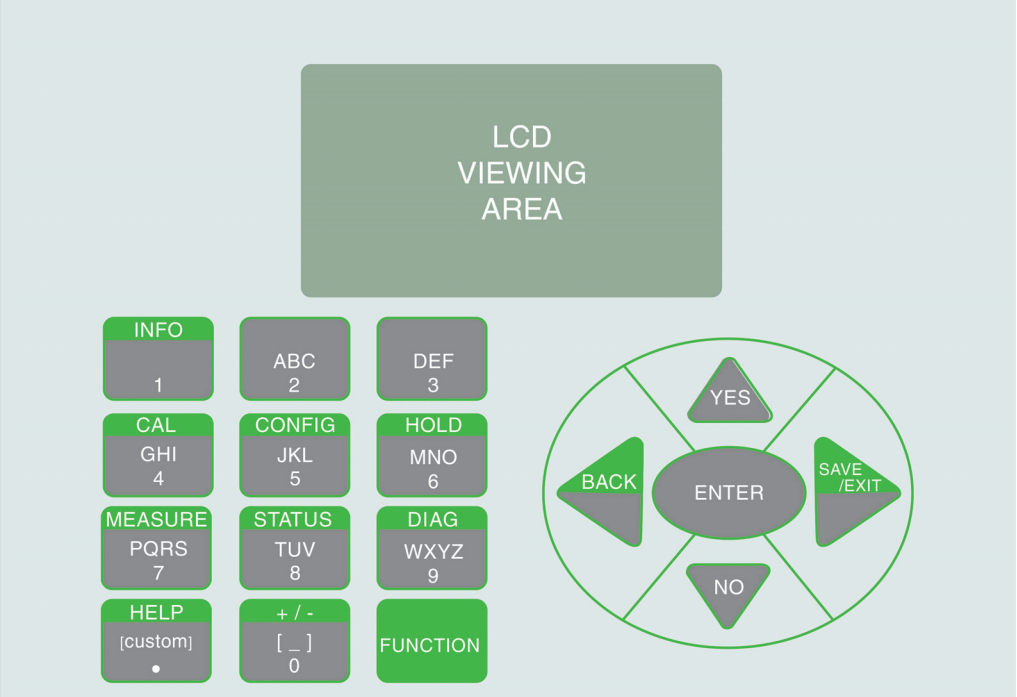
When connecting a Smart pH sensor to the 876PH-S, the write-protect jumper must be in the "NOT PROTECTED" position in order for the sensor to initialize.

5. Operation Via Local Display

Controls and Indicators

Operator controls and indicators are located on the front panel. Figure 13 shows the panel arrangement. Table 4 identifies the function of each element.

Figure 13. Indicators and Controls

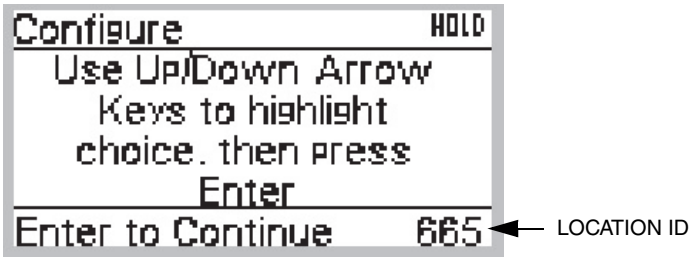


Controls

Table 4. Control Keys

Control Key	Function
FUNCTION Key	Gives you access to the blue function keys.
INFO Key	Describes the present parameter.
CALibration Key	Places the transmitter in Calibration mode. This enables you to calibrate the transmitter automatically to your buffer solutions or manually to values entered.
CONFIGuration Key	Places the transmitter in Configuration mode. This enables you to configure the value or status of each parameter required for your application.
HOLD Key	Places the transmitter in Hold mode. This enables you to hold the output at a determined value while configuring or calibrating the transmitter or performing sensor maintenance.
MEASUREment Key	Places the transmitter in Measurement (normal operation) mode.
STATUS Key	Places the transmitter in Status mode. This enables you to view the measurement and system parameters and thus assess the performance of the loop.
DIAGnostics Key	Places the transmitter in Diagnostic mode. This enables you to further identify specific alerts and possible solutions to an alert flagged in Measurement mode. Also a means to access the history log.
HELP Key	Describes how to use the keypad to perform the present operation. A Location Identifier appears in the lower right corner of the Help screens. (see Figure 14). This identifier may be used by Global Customer Support during troubleshooting.
+/– Key	Changes a + value to a – value and vice versa.
Alpha/Numeric Keys	See explanation below.
Direction (Arrow) Keys	Moves you through the structure diagram and subsequent menus and values.
ENTER Key	Enters the menu item or value selected. This is the only key that actually enacts a change.
BACK Key	Used with the Function key, moves you back one level in the menu structure.
SAVE/EXIT Key	Used with the Function key, asks you if you want to save your entries and then moves you to Measure mode.
YES Key	Used to answer Yes to a Yes/No question.
NO Key	Used to answer No to a Yes/No question.

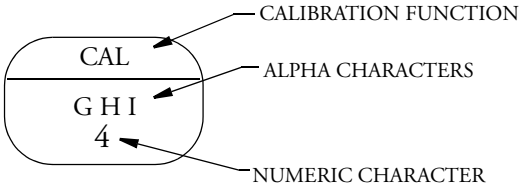
Figure 14. Location ID on Help Screen



The alpha/numeric keys have several functions as follows:

- Access the function shown with a blue background
- Enter numeric values

Enter alpha characters (for example, a HART tag, description, or message).



To enter an alpha character, use the key as you would on a cell phone. For example, to enter the word “Acid”, use the following sequence”

1. Press the “2” key once to enter the “A” and use the Right arrow key to advance to the next character
2. Press the “2” key three times to enter the letter “C” and press the Down arrow key to change it to lower case. Use the Right arrow key to advance to the next character.
3. Press the “4” key three times to enter the letter “I” and press the Down arrow key to change it to lower case. Use the Right arrow key to advance to the next character.
4. Press the “3” key once to enter the letter “D” and press the Down arrow key to change it to lower case.

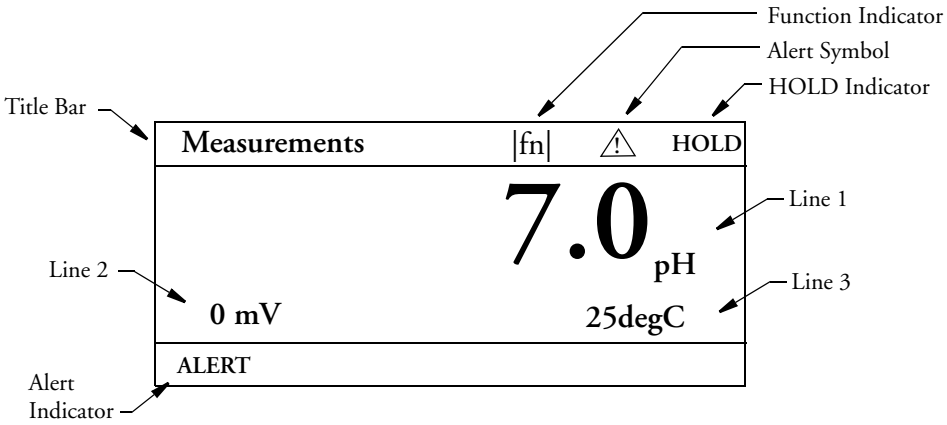
Indicators

The LCD Viewing Area (also referred to as the “display”) can be configured to display one, two, or three measurements. However, any measurement can be temporarily scrolled onto the display by using the `Up` and `Down` arrow keys. The display returns to the configured values when you press the `Function` key and then the `Measure` key or when the configured timeout period expires. When the transmitter is in Hold mode, a `Hold` indication appears in the upper right of the title bar. When you press the `Function` key, the function indicator is displayed. If there is an alert, a flashing alert symbol is displayed. If in Measure, Status, or Diagnostic mode, the word `ALERT` also flashes in the lower left of the display.

NOTE

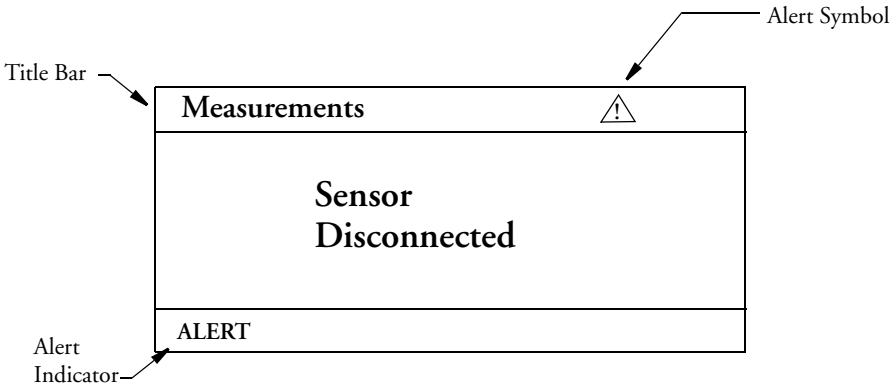
1. If `ALERT` is displayed, details of the alert are shown in the Diagnostic mode.
2. If `CHECK STATUS` is displayed (in the Alert Indicator location), go to Status mode to check the status.

Figure 15. Sample 3-Line Measurement Display - Sensor Connected for 876PH-S



If the sensor is disconnected, an alert **Sensor Disconnected** message displays (flashes).

Figure 16. Sample 3-Line Measurement Display - Sensor Disconnected for 876PH-S



If the alert is related to the sensor, then the `Alert` icon in the `Diagnostics` menu displays: **User Alert, Sensor Missing.**

Multiple Languages (876PH-S only)

The 876PH-S can be operated in a choice among 7 languages. The language displayed may be preconfigured at the factory or it can be set at initial start-up (see “Selecting the Language on the Local Display (876PH-S only)” on page 17). You can also change the language displayed at any time from Configuration mode (see “Language (876PH-S only)” on page 72.

The languages available for operation of the transmitter are:

- English
- French
- German
- Italian
- Spanish
- Portuguese
- Russian

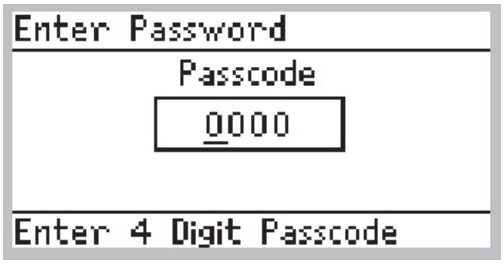
Although the transmitter itself can be operated only in the 7 languages above, configuration can also be carried out in Chinese or Japanese using the DTM.

There is also a menu selection in the Configuration mode to allow you to quickly change the language back to English, even if you cannot read the language displayed. See “Shortcut to English (for 876PH-S only)” on page 60 for details.

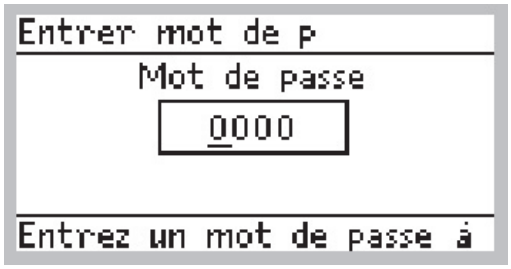
Figure 17 shows an example of an Enter Passcode display in English and French.

Figure 17. Enter Passcode Display in English and French

ENGLISH



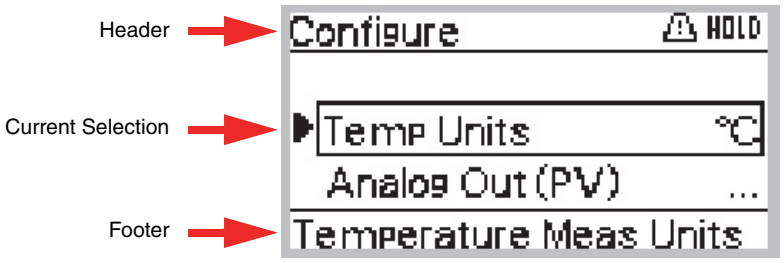
FRENCH



Auto Scrolling Text on the Display (876PH-S only)

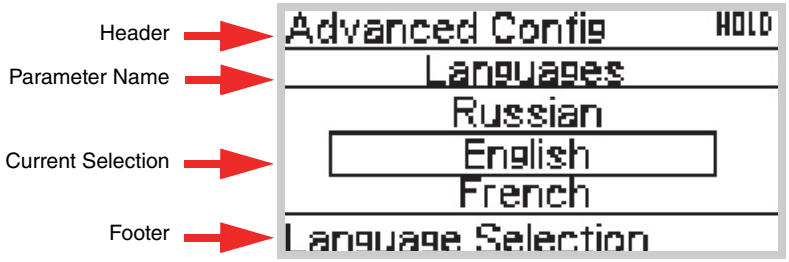
Some of the lines of text are too long to be fully shown on the display. These lines appear to be truncated on the display. The Auto Scroll feature allows a subset of the lines to have the capability to scroll, so that you can read all the text. In general, the header, footer and current selection (which is surrounded by a box) can scroll as needed (see Figure 18).

Figure 18. Three Lines That Can Be Scrolled if Text Is Too Long to Display



If the screen includes a parameter name with a list of selections, a fourth line (the parameter name) can also scroll if it is too long to be displayed (see Figure 19).

Figure 19. Four Lines Can Be Scrolled if the Screen Includes a Parameter Name and a List of Selections



The other lines do not scroll, even if the text is truncated.

Auto Scroll is enabled by default, but you can enable or disable it at any time. If enabled, any of the scrolling lines that are too long to appear on the display begin to scroll from left to right after a brief pause. All lines that scroll move at the same rate. As each line is fully scrolled, it snaps back to its initial position on the display. Once all lines are fully scrolled and have snapped back to their initial position, scrolling stops. If you want to see the lines scroll again, simply choose another selection on the screen, and then choose your initial selection to start auto scrolling again.

Figure 20 shows two English screens. The screen on the left shows an Advanced Configure screen. The Header line needs to be scrolled to be fully displayed (see red arrow). The screen on the right shows that same screen with the Header line fully scrolled before it snaps back to the initial position.

Figure 20. Screen in English (Before and During Scrolling)

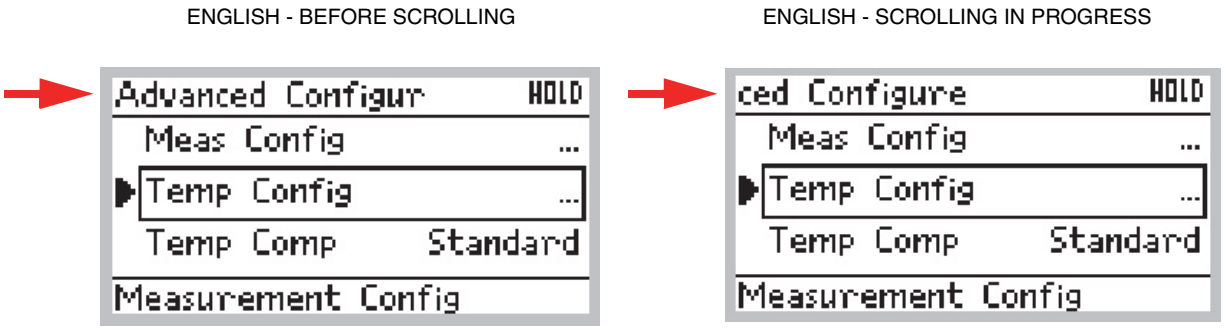
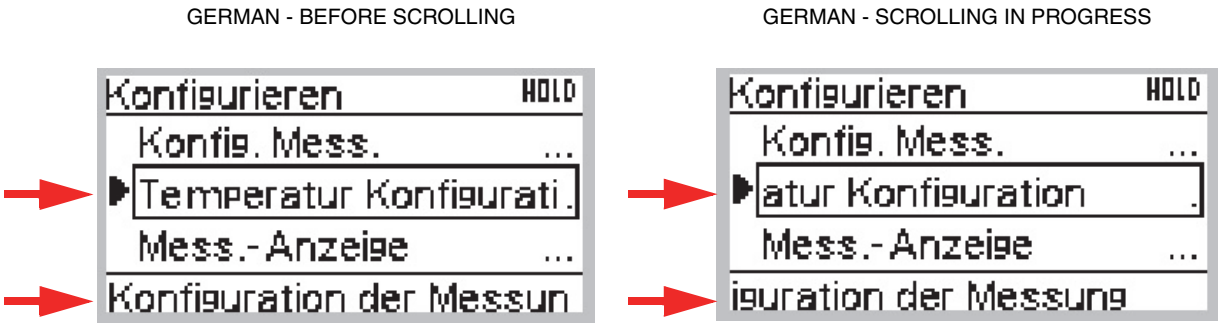


Figure 21 shows two German screens. The screen on the left shows an Advanced Configuration screen with two lines that needs to be scrolled to be fully displayed (see red arrows). The screen on the right shows that same screen with both lines fully scrolled before they snap back to the initial position.

Figure 21. Screen in German (Before and During Scrolling)



Auto Scroll stops immediately when you make a selection using any of the controls.

See “Auto Scroll (876PH-S only)” on page 72 for information on how to enable/disable this feature.

Passcode Access

Two levels of protection are available. Administrator (`Admin Code`) access permits changing the parameters in Configuration as well as specifying the parameters that are accessible to users with User Code access. User (`User Code`) access permits changing and viewing those areas specified by the administrator. Both the Admin Code and User Code are 4-digit passcodes. The passcodes may or may not be the same. They are set as part of configuring the instrument.

Upon entering the Configuration, Calibration, or Hold mode, you may be prompted to enter a passcode. To exit, select another mode.

NOTE

Every passcode entry is added to the history log.

If entering Calibration or Configuration mode and you enter the correct passcode, the transmitter responds in one of three ways depending on how `Automatic Hold` is configured. If `Automatic Hold` is configured `Off`, the display indicates that the transmitter is not in Hold mode. Press `ENTER` to continue. If `Automatic Hold` is configured `Present`, the display indicates that hold is engaged, but that outputs are held at the present level. It then unlocks the mode. If `Automatic Hold` is configured `Manual`, the display briefly displays `Hold Engaged` and then unlocks the mode.

The initial factory default value for both Administrator and User passcodes is 0800.

To bypass the passcode, the administrator must configure a passcode of 0000.

Timeout

If there are no key presses within the configured timeout period, the transmitter discards all changes and reverts to Measure mode. You can also return to Measure mode by pressing the FUNCTION key and then the MEASURE key. If in Configuration or Calibration mode and the automatic hold feature was employed, the output becomes live when the transmitter times out. The timeout feature can be turned off in Configuration mode.

Viewing and Changing Data

In the Configuration, Calibration, Hold, and Diagnostic modes, you need to move through a structure of parameters (using the Arrow keys and ENTER key) to view and/or change the value of a particular parameter. Structure diagrams, located in Appendix A, will aid you in doing this.

NOTE

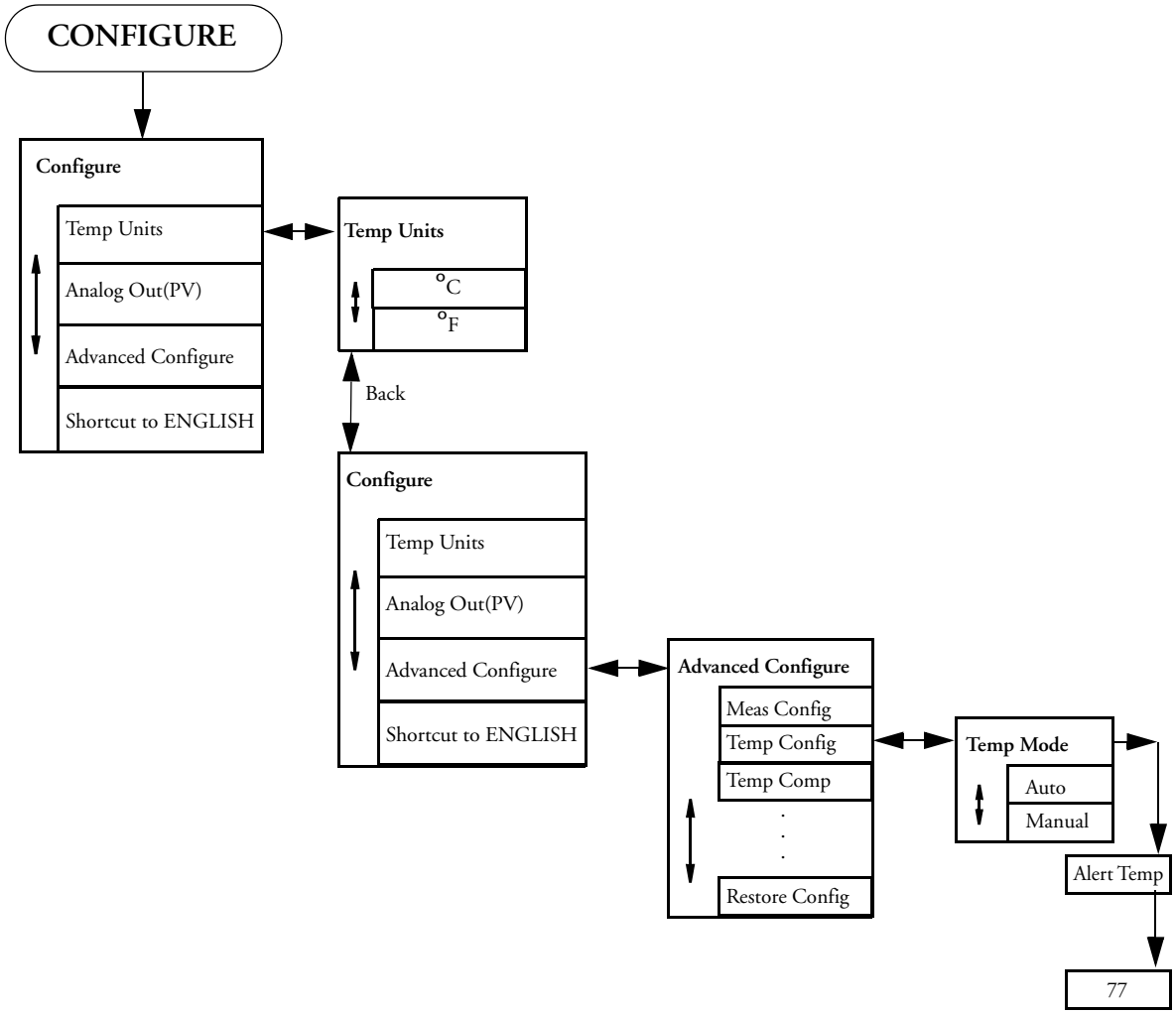
1. The Up and Down arrow keys scroll through a menu in either direction.
2. Using the Function key with the Up and Down arrow keys takes you to the top and bottom of a menu respectively.
3. If a menu selection is invalid, you will see a selection in inverted text (white letters on black background). This choice is not selectable. It will disappear after you make your choice. To keep the selection, use the FUNCTION then Back keys.

The following example will show you how to use the controls to move through the menu structure for the 876PH-S. The keystrokes are similar for 876PH-T (see the Configuration menu structure in Figure 61 for details.) The example shows how to configure temperature features. For the example, assume Fahrenheit temperature units, an automatic temperature mode, and an alert temp value of 77°F. See Figure 22.

1. To enter the Configuration mode, press the FUNCTION key and then the CONFIG key. Enter your password if prompted and press ENTER.
2. The Configure menu displays. Temp Units is highlighted. Press ENTER.
3. Use the Up or Down arrow key to move to °F and press ENTER. This enters your Fahrenheit selection and moves the display back to the Temp Units screen.
4. Press the Down arrow key to move to Advanced Configure. Press ENTER.
5. Press the Down arrow key to move from Meas Config to Temp Config. Press ENTER.
6. The Temp Config screen is displayed. Temp Mode is highlighted. Press ENTER.
7. Use the Up or Down arrow key to move to Auto and press ENTER. This enters your Auto Mode selection.
8. Use the Down arrow key to move to Alert Temp. Press ENTER.
9. The Alert Temp screen is displayed.
10. Press the "7" key twice. Press ENTER. This enters your alert temp value of 77°F and displays the Temp Config screen.

11. Press the FUNCTION and SAVE/EXIT keys to save your configuration.
12. Press the YES key to confirm your changes.

Figure 22. Example of Structure Diagram for 876PH-S Transmitter

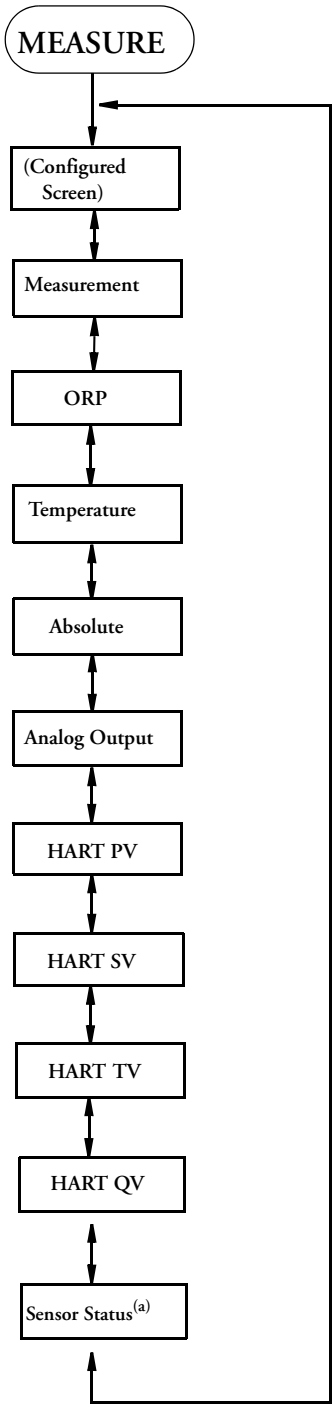


Measure Mode

Measure is the normal operating mode of your transmitter. Depending on your configuration, the display can show 1, 2, or 3 measured values. In Configure mode, you can also configure what to display on each line. The choices are the (pH, ORP, or ISE) measurement, the absolute value of the measurement in millivolts, the temperature, and the analog output (4 to 20 mA). The units are shown with the measured values.

Any measured values can be temporarily scrolled onto the display by using the Up and Down arrow keys. See Figure 23. The display returns to the configured values when you press the FUNCTION key and then the MEASURE key or when the timeout period expires. When the transmitter is in Hold, a hold indication appears in the upper right of the display. If there is an alert, an alert symbol is displayed in the title bar and, if in Measure, Status, or Diagnostic mode, the word ALERT flashes in the lower left of the display. See Figure 4.

Figure 23. Measure Mode Structure Diagram for 876PH-T and 876PH-S Transmitter



(a) Only if Sensor = Schneider Electric smart pH sensor

Status Mode

Refer to Figure 25.

The Status mode enables you to view the measurement and system parameters and thus assess the performance of the loop. You can not edit them in this mode. Measurements and outputs continue while you are in the Status mode.

To enter the Status mode, press the `FUNCTION` key and then the `STATUS` key. Move through the menu by using the Up and Down arrow keys. See Figure 24 for 876PH-T and Figure 25 for 876PH-S. The Status menu contains the following parameters:

NOTE

Parameters are listed in the order they appear in the 876PH-S Status menu. The order of parameters varies slightly for the 876PH-T menu. Parameters apply to both 876PH-S and 876PH-T, unless specifically noted in the Notes column in Table 5.

Table 5. Status Parameters for 876PH-T and 876PH-S

Parameter	Description	Units	Notes
Sensor Status	Status of the connection	Sensor Connected, Sensor Initializing	876PH-S only
Date Time	Current date and time	DDMMYYYY HHMMS	876PH-S only
Temperature	Process temperature measurement	°C, °F	
Temp Status	Status of process temperature	- - -	See Table 6
Slope (mV/pH) (a)	Change in mV/pH or mV/decade of the most recent calibration	mV/pH, mV/decade	If pH or ISE
Slope (%) (a)	Deviation in percent of the slope of the most recent calibration compared to the standard		
Calibration Response	Sensor Calibration Response time value	Seconds Min=1 Max=500	876PH-S only
Asymmetry (a)	Asymmetry potential (mV difference between the theoretical isopotential point and the actual point due to the most recent calibration)	mV	If not ORP
Sensor Service Prediction	OK or # of days remaining before the sensor requires service	Days	876PH-S glass electrode only
Temperature Sensor	Temperature sensor resistance	Ohms	
T Sensor Status	Status of temperature sensor	- - -	See Table 6
Absolute	Uncompensated measurement signal from sensor	mV	
Absolute Status	Status of absolute measurement	- - -	See Table 6
Measurement	Compensated measurement	pH: pH ORP: mV, ISE: ppm, ppb, %	876PH-S only uses pH units
Meas Status	Status of measurement	- - -	See Table 6
Glass	Resistance of glass electrode	kOhm	If Broken Glass diagnostic enabled
Glass Status	Status of glass electrode resistance	- - -	See Table 6
Reference	Reference junction resistance	kΩ∴	If Reference Coating diagnostic enabled

Table 5. Status Parameters for 876PH-T and 876PH-S (Continued)

Parameter	Description	Units	Notes
Ref Status	Status of reference junction resistance	- - -	See Table 6
Calibrated By	Name of last operator to calibrate the transmitter	- - -	For the 876PH-S, displays the name of the last operator to do a measurement calibration on the sensor.
Calibration Date	Date of last calibration (dd_mm_yyyy)	- - -	
T Calibrated By	Name of the last operator to do a temperature calibration on the sensor	- - -	876PH-S only
T Calibration Date	Date of last temperature calibration (dd_mm_yyyy)	- - -	876PH-S only
mA Calibrated By	Name of the last operator to perform an mA calibration	- - -	876PH-S only
mA Calibration Date	Date of the last mA calibration (dd_mm_yyyy)	- - -	876PH-S only
Lo Cal Point (b)	Values at Calibration Point One	mV, pH, conc, ORPmV	
Hi Cal Point (b)	Values at Calibration Point Two	mV, pH, conc, ORPmV	
Analog Output	Analog Output	mA	
Analog Output Status	Status of analog output	- - -	See Table 6
HART PV	PV measurement		
PV Status	Status of PV	- - -	See Table 6
HART SV	SV measurement		
SV Status	Status of SV	- - -	See Table 6
HART TV	TV measurement		
TV Status	Status of TV	- - -	See Table 6
HART QV	QV measurement		
QV Status	Status of QV	- - -	See Table 6
Transmitter Type	Transmitter type	876PH, 876PH-S	
Transmitter MSCODE	Transmitter model code	- - -	876PH-S only
Model Code	Transmitter model code	- - -	876PH-T only
Transmitter SO	Transmitter sales order number	- - -	876PH-S only
Sales Order	Transmitter sales order number	- - -	876PH-T only
Transmitter SN	Transmitter serial number	- - -	876PH-S only
Xmtr Serial Number	Transmitter serial number	- - -	876PH-T only
Transmitter Manufactured	Date manufactured		876PH-S only
Firmware Revision	Transmitter firmware revision level	- - -	
Front End Revision	876PH-T front end revision	- - -	876PH-T only; for Support only
Sensor Revision	Sensor firmware revision level	- - -	876PH-S only
Boot Revision	Protected boot block revision level		For Support only
Transmitter Service	Time the transmitter has been in service since shipped from the factory	Days	876PH-S only
In Service	876PH-T, time in service	Days	876PH-T only
Sensor Service	Time the Sensor has been in service since shipped from the factory	Days	876PH-S only

Table 5. Status Parameters for 876PH-T and 876PH-S (Continued)

Parameter	Description	Units	Notes
Sensor MSCODE	Sensor model code	- - -	876PH-S only
Sensor SN	Sensor serial number	- - -	876PH-S only
Sensor SO	Sensor sales order number	- - -	876PH-S only
Sensor Manufactured	Date on which the Sensor was manufactured	- - -	876PH-S only
HART Tag	HART Tag	- - -	
HART Long Tag	HART long Tag	- - -	HART Version 7
Verbose Tag	876PH-S tag name	- - -	876PH-S only
Tag Name	876PH-T tag name	- - -	876PH-T only
Location	Location of measurement	- - -	
Device Name	Device name	- - -	
HART Descriptor	HART Descriptor	- - -	
HART Message	HART Message	- - -	

a. In multiple point calibrations, this is the slope closest to the isopotential point.
b. In multiple point calibrations, this is the point closest to the isopotential point.

Figure 24. Status Mode Structure Diagram for 876PH-T Transmitter

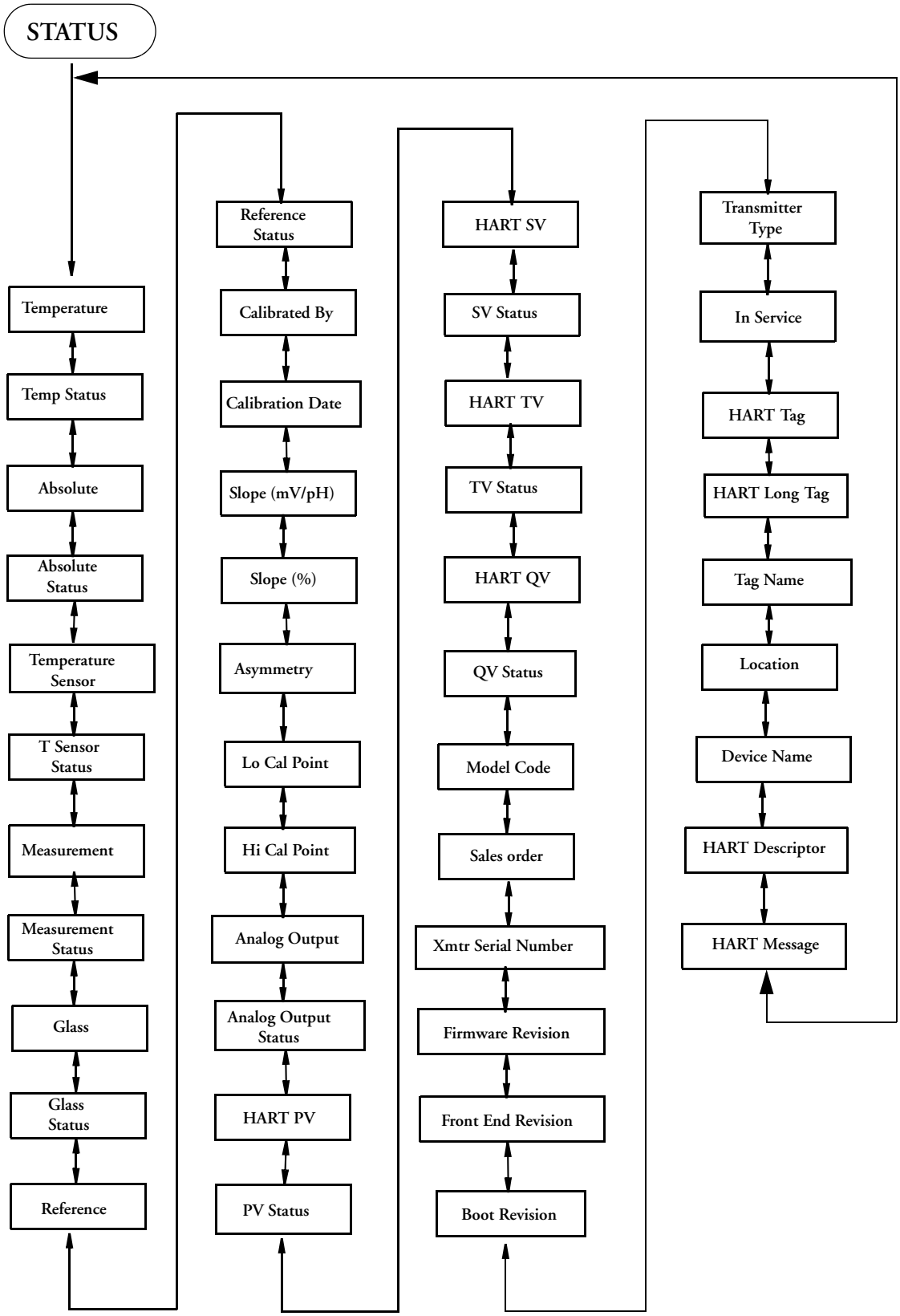


Figure 25. Status Mode Structure Diagram for 876PH-S Transmitter

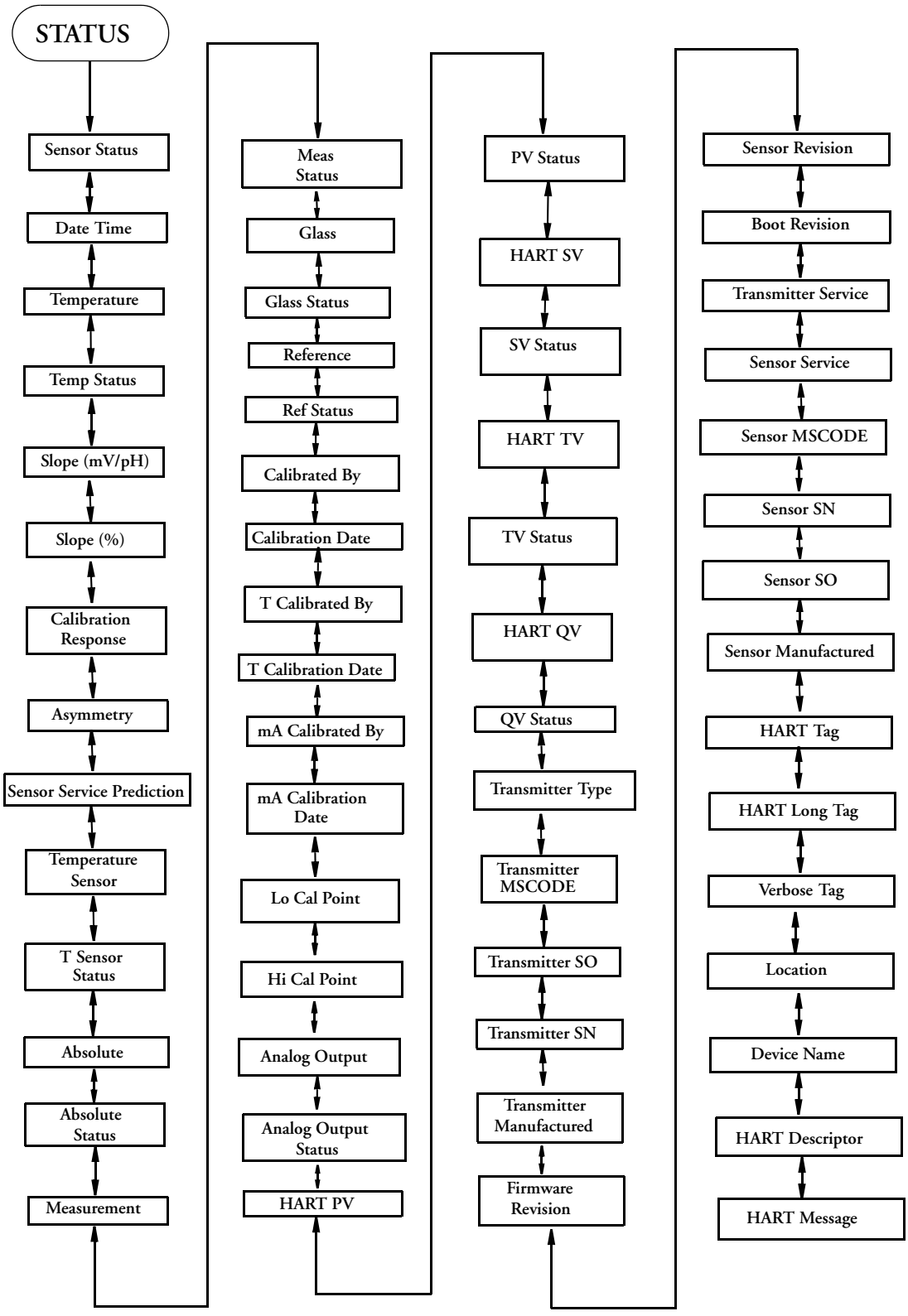


Table 6. Status Messages

Displayed Message	Meaning	Information on That Alert (a)
Meas OK	Measurement OK	OK. Inputs and calculations for the measurement are OK.
1 InputFixed	Input is fixed	OK. Calculation based upon an input is fixed at its manually set value.
Overridden	Measurement is overridden	Measurement has been put into hold mode.
Default	Meas is fixed	OK. Measurement is fixed at the manually set value.
LimitSoftLow	The measurement is approaching the lower limit.	Warning. The measurement is approaching the lower limit.
LimitSoftHi	The measurement is approaching the upper limit.	Warning. The measurement is approaching the upper limit.
InputWarning	Input to measurement has a warning.	Warning. Measurement input has a warning status.
LimitHardLow	Meas below low limit	Alert. The measurement has dropped below hard lower limit.
LimitHardHi	Meas above upper limit	Alert. The measurement has risen above hard upper limit.
1 Input is not Ok	Input to meas not Ok	Alert. An input to the measurement status is not Ok.
MeasStarting	Inputs to meas are not ready	Alert. A to D converter has not yet measured everything for this individual measurement.
InputStarting	Inputs to meas are not ready	Alert. A to D converter has not yet measured everything for this individual measurement.

a. Displayed when the Function and Info keys are pressed for that alert.

Hold Mode

Refer to Figure 26.

NOTE

Hold mode may be protected. See “Passcode Access” on page 41.

The Hold mode enables you to manually hold the output at a determined value, thus allowing you to configure or calibrate the transmitter or perform sensor maintenance without disturbing the control system. Outputs are driven to a preconfigured state or held at their current values. During calibration, the transmitter continues performing live measurements.

NOTICE

OUTPUT NO LONGER CORRESPONDS TO MEASUREMENT

When entering hold, you may want to take your loop out of auto control.

Failure to follow these instructions may send invalid information to the control system.

To enter the Hold mode, press the `FUNCTION` key and then the `HOLD` key. In the Hold mode menu, select `On Present` to hold all values and states at their current level, `On Manual` to set all values and states at desired levels, or `Off` to release a hold.

If you select `On Present` and press the `ENTER` key, the display briefly reads `Hold Engaged` and proceeds to Measure mode and the outputs are held.

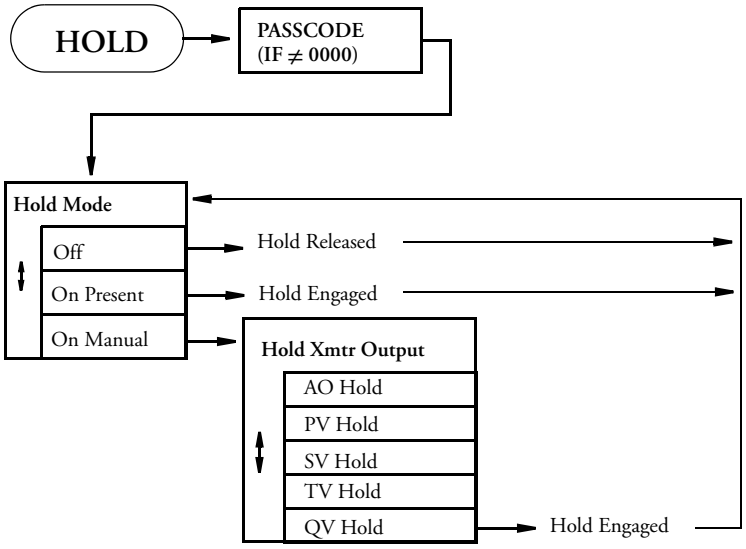
If you select `On Manual` and press the `ENTER` key, the display proceeds to `AO Hold`, the first of a series of parameters to set values and states to desired levels during hold.

To set the output for the analog output, enter a value from 3.6 to 22 mA.

You can also fix the value for PV, SV, TV, and QV individually. When you have finished making the manual selections, the display briefly reads `Hold Engaged` and returns to the Hold mode menu.

To release Hold, press the `FUNCTION` key and then the `HOLD` key. At the Enter Passcode prompt, enter the correct passcode and press the `ENTER` key. If you enter the incorrect passcode, the display repeats the prompt. If you enter the correct passcode, the display opens the Hold mode. Use the Up or Down arrow key to select `Off` and press `ENTER`. The display briefly reads `Hold Released` and returns to the Hold mode menu.

Figure 26. Hold Mode Structure Diagram



NOTE

Additionally, in Configuration mode, you can use the `Automatic Hold` parameter to automatically activate the Hold feature each time you enter Calibration or Configuration mode. In this Configuration mode parameter, you can select `Off`, `Present`, or `Manual`. See Figure 51. If you select `Manual`, you must go to Hold mode to set the values.

Calibration Mode

Refer to Figure 27 for 876PH-S and Figure 28 for 876PH-T.

NOTE

1. Calibration mode may be protected. See “Passcode Access” on page 41.
2. If using the `Automatic Hold` feature, the outputs are held at the present level or a predetermined level. Returning to Measure mode releases the hold.

Up to five calibration selections are available; mA Cal, Measurement, Temperature, ORP, and ORP Restore. See Figure 27 for 876PH-S and Figure 28 for 876PH-T.

For 876PH-S only:

When a Schneider Electric smart pH sensor is connected to the 876PH-S, its most recent calibration data is uploaded to the transmitter. That calibration data may have come from performing a calibration using an 876PH-S transmitter, as described below, or by performing a calibration using the Schneider Electric smart pH sensor PC interface and DTM.

To enter the Calibration mode, press the `FUNCTION` key and then the `CAL` key. Enter your password if prompted and press `ENTER`. The Calibrate menu option displays. Press `ENTER` to view and edit the calibration parameters listed below (mA Cal, etc.), or press the Down arrow key once to access the Calibrated By menu to enter the name of the person doing the calibration and the calibration day, month, and year.

For 876PH-T:

To enter the Calibration mode, press the `Function` key and then the `Cal` key. At the prompt, enter the passcode and press `ENTER`. Next, enter the calibrator's name. In the 876PH-T transmitter, also enter calibration day, month, and year, pressing `ENTER` after each. Select Manual or Smart. Then select `Measurement` from the Calibrate screen and follow the prompts for a 2-point calibration to calibrate your transmitter. At the end of a successful calibration, no alerts will be present in the transmitter.

mA Cal

NOTE

It is not necessary to do a mA Cal (commonly known as mA Trim) unless there is a plant requirement to make the 4 and 20 mA output values exactly match readings on certain plant calibration equipment and the calibration operations done result in a small but unacceptable difference between the transmitter mA output and the test equipment mA readout values.

To perform a mA calibration, select `mA Cal` and press `ENTER`.

1. Connect a digital current meter in the loop.
2. At the prompt `4 mA`, press `ENTER`.
3. At the prompt `Known x.xxx mA`, enter the value `mA` measured and press `ENTER`.
4. At the prompt, `20 mA`, press `ENTER`.
5. At the prompt `Known x.xxx mA`, enter the `mA` value measured and press `ENTER`.
6. When calibration is done, the display reads `Calibration Complete`. Press `ENTER`.
7. Press the function key and then the save key.
8. Select yes to save.

Measurement Calibration

Measurement Calibration is used for `pH, ISE,` or `ORP` as your Measurement.

NOTE

To achieve a multipoint calibration that helps ensure a specified accuracy throughout the entire range capability of the instrument, it is recommended that calibration points be at least 2 pH units apart.

To perform a measurement calibration, select `Measurement` and press `ENTER`.

1. At the prompt, enter the number of calibration points from 1 to 5.
2. At the next prompt, select the standard as `Manual`, `Smart`, or `Process`.

   `Manual` presumes no knowledge by the transmitter of the calibration solution being used. You must enter the exact known value at the calibration temperature. No temperature compensation is applied in the firmware.

   `Smart` presumes use of the configured calibration standards. Solutions are recognized automatically so there is no need for you to enter a known value. The temperature response for the recognized solution is used in the calibration. If none of the solutions provide a unique match (±0.5 pH of nominal buffer value), the calibration reverts to a `Manual` calibration.

   `Process` presumes a grab sample of the process. You must enter a known value at the reference temperature (usually 25°C) from laboratory measurements. The configured application temperature compensation is applied.

NOTE

Process only appears in the menu if you selected `Ammonia` or `Custom` as your type of temperature compensation (See “Temperature Compensation” on page 64).

3. At the prompt, put the sensor in the solution and press `ENTER`.

NOTE

If the Schneider Electric smart pH sensor and 876PH-S transmitter are in use and this step is being carried out in the second buffer solution, this step will be used to measure sensor Calibration Response time. Therefore, it is important to press `ENTER` as soon as possible after placing the sensor in the buffer.

4. If you selected `Manual` in Step 2:
   a. Measurement/Temperature is temporarily displayed while process is stabilizing.
   b. At the prompt, enter the known measurement value at the current temperature and press `ENTER`.
5. If you selected `Smart` in Step 2,
   a. Measurement/Temperature is temporarily displayed while process is stabilizing.
   b. You do not need to enter the known pH values as you did in `Manual`.

6. If you selected `Process` in Step 2:
   a. Measurement/Temperature is temporarily displayed while process is stabilizing.
   b. At the prompt, enter the known measurement value at the reference temperature (25°C) and press `ENTER`.
7. Repeat Steps 3 and 4, 3 and 5, or 3 and 6 as applicable for each calibration point.
8. When calibration is done, the display reads `Calibration Complete`. Press `ENTER`.

NOTE

Selecting Save is necessary after any calibration for it to be recorded.

Temperature Calibration

To perform a Temperature calibration, select `Temperature` and press `ENTER`.

1. At the prompt, enter the number of calibration points as 1 or 2.
2. At the prompt, place the sensor in solution at the low temperature and press `ENTER`.
3. Temperature is temporarily displayed while process is stabilizing.
4. At the prompt, enter the known low temperature and press `ENTER`.
5. If a 2-point calibration, at the prompt, place the sensor in solution at the high temperature and press `ENTER`.
6. At the prompt, enter the known high temperature and press `ENTER`.
7. Temperature is temporarily displayed while process is stabilizing.
8. When calibration is done, the display reads `Calibration Complete`. Press `ENTER`.

NOTE

It is not necessary to perform a temperature calibration unless there is a plant requirement.

ORP Calibration

ORP Calibration is only used for '`pH and ORP`' Measurement. See "pH and ORP (876PH-S)" on page 61 or "pH and ORP (876PH-T)" on page 62.

To perform an ORP calibration, select `ORP` and press `ENTER`.

1. At the prompt, apply the solution and press `ENTER`.
2. ORP is temporarily displayed while process is stabilizing.
3. At the prompt, enter the known measurement value and press `ENTER`.
4. When calibration is done, the display reads `Calibration Complete`. Press `ENTER`.

ORP Restore

ORP Restore enables you to erase an ORP calibration.

To perform an ORP Restore, select `ORP Restore` and press `ENTER`. At the prompt `Erase Calibrations?`, respond `Yes` to erase the calibration and restore the ideal mV calibration performed at the factory; respond `No` to keep the present calibration.

Figure 27. Calibration Menu Structure for 876PH-S Transmitter

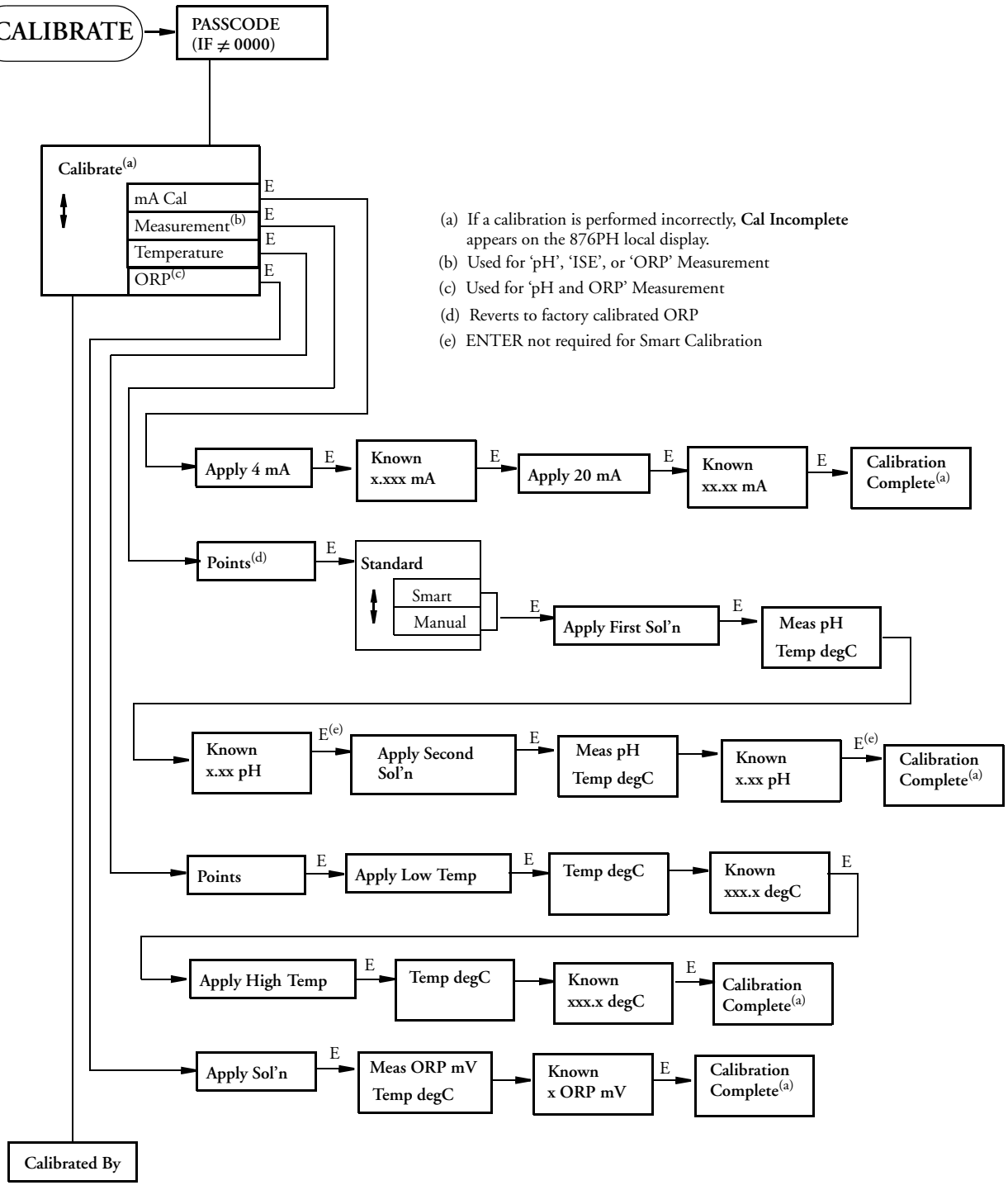
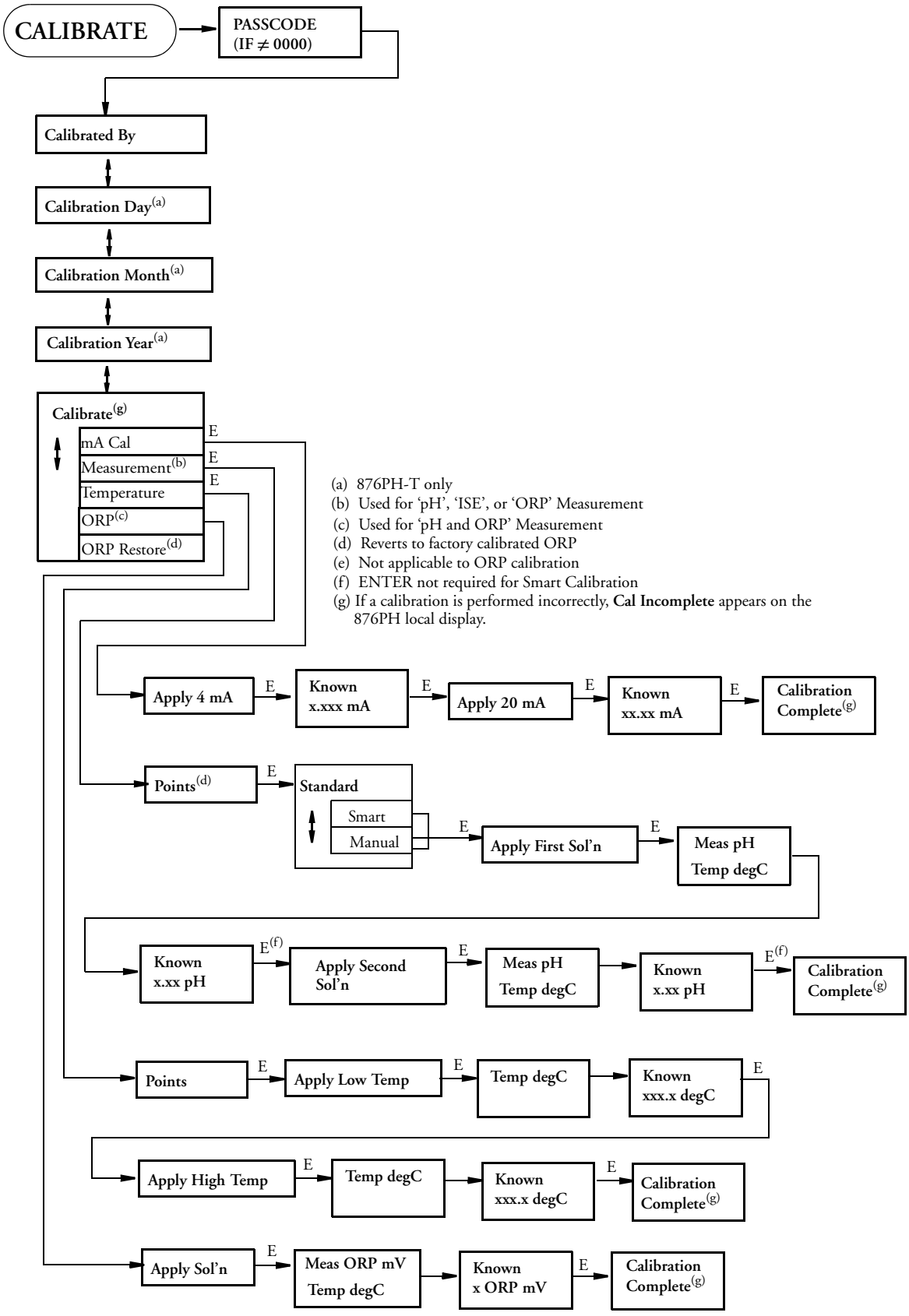


Figure 28. Calibration Menu Structure for 876PH-T Transmitter



Configuration Mode

NOTE

1. Configuration mode may be protected. See “Passcode Access” on page 41.
2. If using the `Automatic Hold` feature, the outputs are held at the present level or a predetermined level. Returning to Measure mode releases the hold.
3. The details of the Configuration menu structure are provided in Appendix A for the 876PH-S and in Appendix B for the 876PH-T. Each section below references the appropriate figure in the Appendix A or B to illustrate the menu structure for your product.

Configuration is the process of establishing functional capability in the transmitter firmware for your application. This section helps you to systematically determine and configure the value or status of each parameter required for your application. It is recommended that you make configuration changes from the beginning of the menu structure forward. This is because menus are forward referencing meaning that if you start at the beginning and work to the end, you achieve a valid configuration. Also, the transmitter validates the configuration when attempting to exit configuration and directs you to any invalid parameters.

To enter the Configuration mode, press the `FUNCTION` key and then the `CONFIG` key. After gaining access to Configuration, the first category in the top level configuration structure (`Temp Units` for 876PH-S and `Sensor` for 876PH-T) is displayed. To view or change another configuration category, press the Up or Down arrow key. When you have located the desired category, press the `ENTER` key. Each category of parameters is shown in subsequent structure diagrams.

NOTE

If there are no key presses within the configured Timeout period, the transmitter reverts to Measure mode and all changes are lost.

Temperature Units

Refer to Figure 41 for 876PH-S and Figure 64 for 876PH-T.

`Temp Units` has its own menu item for the 876PH-S. That same choice is located under the `Temp Conifg` menu for 876PH-T.

Specify `Temp Unit` as `degC` or `degF`. References to temperature appear in the specified units within the transmitter software.

Analog Out(PV)

Refer to Figure 42 for 876PH-S and Figure 66 for 876PH-T.

This section of the structure enables you to specify what measurement the analog output reflects and the minimum and maximum range values for the output just specified. It also enables you to specify the measurement for the HART secondary, tertiary, and quaternary measurements.

First, specify `AO Source Measurement` as `Measurement`, `Temperature`, `ORP`, `Absolute`, `Glass Resistance`, `Reference Res` (reference junction resistance), or `ATC Resistance`.

— NOTE

AO Source Measurement selections are limited by your configuration of sensor and diagnostics.

Next, in `Lower Value` enter the value of that measurement that produces an output of 4 mA and in `Upper Value`, the value of the measurement that produces an output of 20 mA. The lower and upper values must differ by a minimum amount. That minimum span amount is 0.5 pH for pH measurement, 32 mV for ORP measurement, and the amount shown in Table 7 for ISE measurement.

Table 7. Minimum Output Span for ISE Measurement

Scale	Minimum Span
9999	80 ppm
999.9	8 ppm
99.99	0.8 ppm
9.999	0.08 ppm
0.9999	0.008 ppm

Then specify the measurements of `HART SV`, `HART TV`, and `HART QV` as `Measurement`, `Temperature`, `ORP`, `Absolute`, `Glass Resistance`, `Reference Res`, or `ATC Resistance`. The secondary measurement is frequently configured to temperature, the tertiary measurement to Absolute, and the quaternary measurement to ATC Resistance.

Advanced Configuration

The Advanced Configuration section of the menu structure only applies to 876PH-S, but most of the parameters in this section also apply to 876PH-T as noted in the text describing each parameter.

Refer to Figure 43 for 876PH-S.

This section of the structure enables you to specify the following advanced configuration parameters:

- Measurement Configuration
- Temperature Configuration
- Temperature Compensation
- Measurement Display
- AO Failsafe
- HART Digital
- Diagnostics
- Config Timeout
- Transmitter Tags
- Passcode Access
- Date and Time

- Calibration Parameters
- Auto Scroll
- Language
- Restore Configuration

Shortcut to English (for 876PH-S only)

Multiple languages can be displayed on the 876PH-S screen. Regardless of the language displayed, the `Shortcut to ENGLISH` selection allows you to quickly return the display back to English, even if you cannot read the language displayed on the screen.

Refer to Figure 40 and Figure 44 for 876PH-S.

To return to English:

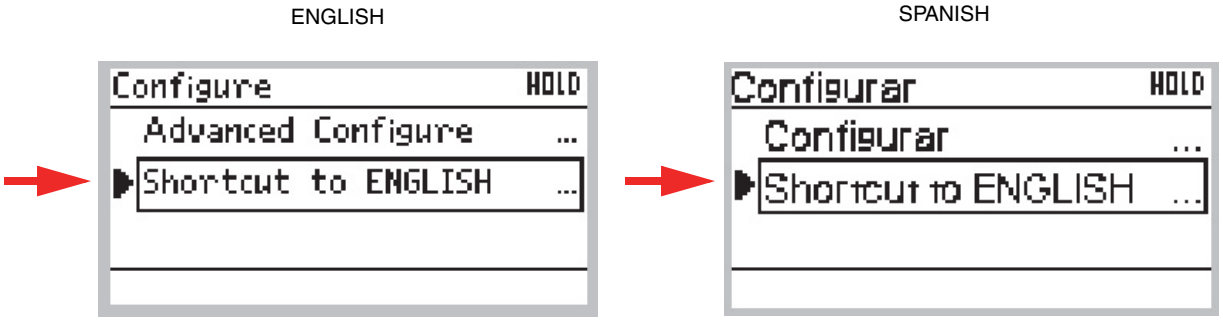
1. Press the `FUNCTION` key and then press the `CONFIG` key. Enter your password if prompted and press `ENTER`.

   If you cannot read the language displayed, you may not understand the prompt, but the `PASSWORD` field will be displayed allowing you to enter the password.

2. The `CONFIG` menu displays. Press the `YES` key (Up arrow) once to move from the first menu item in the `CONFIG` menu to the last item (`Shortcut to ENGLISH`). In every language, this menu selection is displayed in English (see Figure 29).

Figure 29 shows an example of the `Shortcut to English` selection displayed in both English and Spanish screens.

Figure 29. Shortcut to English (in English and Spanish)



3. Press the `FUNCTION` key and then press the `SAVE/EXIT` key (Right arrow). A prompt appears asking if you want to save the changes.
4. Press the `YES` key (Up Arrow).
5. When the screen refreshes, the text on the screen displays in English. Be aware that all lines on the screen may not update at the same time. Wait until all lines on the Measurement display are updated before proceeding.

Sensor

Refer to Figure 62 for 876PH-T.

This section of the configuration structure begins by asking you to specify your type of measurement as `pH`, `pH and ORP`, `ISE Concentration`, or `ORP`.

NOTE

The 876PH-S transmitter does not have the Sensor configuration option. The transmitter reads the type through the Smart sensor

NOTE

Whenever the Measurement type or Electrode is entered and saved, any user calibration is erased and the transmitter reverts to an ideal sensor calibration. For each Schneider Electric smart pH sensor, each one specifies its own measurement type and it is not configurable.

pH (876PH-T Only)

If you selected `pH`, you must specify the electrode as `Glass`, `Antimony`, or `Other`. `Glass` sets the isopotential point at 7 pH. `Antimony` sets it at 1 pH. `Other` allows the isopotential point to be set manually from -2.0 through +16.0 pH. If you selected `Other`, you must also enter the `Slope`.

Next specify the temperature (RTD) type as `2-Wire Pt 100` Ω, `2-Wire Pt 1000` Ω, `3-Wire Pt 100` Ω, `3-Wire Pt 1000` Ω, or `Balco 3 k`Ω.

For the Smart version, the RTD is 1000-Ω only and is not configurable.

Table 8. RTD Type for Schneider Electric Sensors

Schneider Electric Sensor	RTD Type (a)
PH12	3-Wire Pt 100 Ω; 3-Wire Pt 1000 Ω
Other PH10 pH Sensor	2-Wire Pt 100 Ω; 3-Wire Pt 1000 Ω; 2-Wire 3 kΩ Balco
PH10-*S pH Sensor	2-Wire Pt 1000 Ω
PH12-****S pH Sensor	2-Wire Pt 1000Ω
ORP10 ORP Sensor	2-Wire Pt 100 Ω; 3-Wire Pt 1000 Ω; 2-Wire 3 kΩ Balco
871A pH/ORP Sensor	2-Wire Pt 100 Ω; 2-Wire Pt 1000 Ω; 3-Wire Pt 1000 Ω
871PH pH/ORP Sensor	2-Wire Pt 100 Ω; 2-Wire Pt 1000 Ω; 3-Wire Pt 1000 Ω
EP460 pH/ORP Sensor	3-Wire Pt 100 Ω
EP462 pH Sensor	3-Wire Pt 100 Ω
EP466 pH Sensor	3-Wire Pt 100 Ω
EP459 Fluoride Sensor	2-Wire Pt 100 Ω

a. In order to select a 3-wire RTD type, the RTD third wire must be connected to Terminal 2A.

pH and ORP (876PH-S)

Simultaneous pH and ORP measurements can be made with the 876PH-S using the combination pH/ORP versions of the PH12, which are PH12-A**S, PH12-B**S, and PH12-C**S.

pH and ORP (876PH-T)

This allows simultaneous measurement of both pH and ORP using a single reference electrode. Ideally, this would use a single sensor having all three required electrodes, but could use two distinct sensors. Connect the pH electrode to terminal 3, the ORP electrode to terminal 4, and one reference electrode to terminal 5.

When using this configuration, the ±2000 mV range applies independently to both terminals 3 and 5 relative to terminal 4. In other words, pH mV – ORP mV must remain within the ±2000 mV range.

If you selected `pH and ORP`, you must specify the pH electrode as `Glass`, `Antimony`, or `Other`. `Glass` sets the isopotential point at 7 pH. `Antimony` sets it at 1 pH. `Other` allows the isopotential point to be set manually from -2.0 through +16.0 pH. If you selected `Other`, you must also enter the `Slope`.

Next specify the temperature (RTD) type as `Balco 3 kΩ`, `2-Wire Pt 100 Ω`, `2-Wire Pt 1000 Ω`, `3-Wire Pt 100 Ω`, or `3-Wire Pt 1000 Ω`. See Table 8.

NOTE

When using non-Schneider Electric sensors for pH and ORP measurement, see the note on the wiring diagram (Figure 9).

ISE Concentration (876PH-T Only)

If you selected ISE Concentration, you must configure the following:

1. Specify the ion polarity (Electrode) as `Positive` or `Negative`. A positive ion selective mV value becomes more positive as the concentration increases (for example, Na^+, K^+). A negative ion selective mV value becomes more negative as the concentration increases (for example, F^-, S^{-2}). For fluoride measurements, this parameter must be set to negative.
2. Enter the `Isopotential` point from 0.0001 to 9999.9 in concentration units selected in “ISE Concentration (876PH-T Only)” on page 63.
3. Specify the `Valence` as `Monovalent` (for example, F^-) or `Divalent` (for example, S^{-2}).
4. Specify the temperature (RTD) type as `2-Wire Pt 100 Ω`, `2-Wire Pt 1000 Ω`, `3-Wire Pt 100 Ω`, `3-Wire Pt 1000 Ω`, or `Balco 3 k Ω`. See Table 8.

ORP (876PH-S)

With the PH12-S ORP sensor, no temperature type need be selected.

ORP (876PH-T)

If you selected ORP, you only have to specify the temperature (RTD) type. The choices are `Balco 3 kΩ`, `2-Wire Pt 100 Ω`, `2-Wire Pt 1000 Ω`, `3-Wire Pt 100 Ω`, or `3-Wire Pt 1000 Ω`. See Table 8.

Measurement Configuration

Refer to Figure 45 for 876PH-S and Figure 63 for 876PH-T.

The structure of Meas Config is dependent on the type of measurement being made.

pH (876PH-S and 876PH-T)

If your Measurement selection is pH, specify your `pH Resolution` as `0.1 pH` or `0.01 pH`.

Then enter the `Damping` response time (for 90% recovery from a step change). You can enter a time up to 300 seconds expressed in seconds. To increase damping, use a higher response time. Damping applies only to compensated measurement data, not to temperature or absolute data.

pH and ORP

If your Measurement selection was pH and ORP, specify your `Resolution` as `0.1 pH` or `0.01 pH`.

Then enter the `Damping` response time (for 90% recovery from a step change). You can enter a time up to 300 seconds expressed in seconds. To increase damping, use a higher response time. Damping applies only to compensated measurement data, not to temperature or absolute data.

ISE Concentration (876PH-T Only)

If your Measurement selection was ISE Concentration, specify the `ISE Units` as `ppb`, `ppm`, `%`, or `Custom`.

Next, specify the `ISE Scale` as `0.9999`, `9.999`, `99.99`, `999.9`, or `9999`.

If you selected `Custom` as your `ISE Unit`, you must name (text) that unit in `Custom Units`.

Then enter the `Damping` response time (for 90% recovery from a step change). You can enter a time up to 300 seconds expressed in seconds. To increase damping, use a higher response time. Damping applies only to compensated measurement data, not to temperature or absolute data.

Temperature Configuration

Temp Unit (876PH-T only)

— NOTE —

`Temp Unit` displays under the Temp Config selection for 876PH-T. Refer to Figure 64 for 876PH-T.
`Temp Unit` has its own menu selection for 876PH-S. Refer to Figure 41 for 876PH-S.

Specify `Temp Unit` as `degC` or `degF`. References to temperature appear in the specified units within the transmitter software.

Temp Mode

Refer to Figure 46 for 876PH-S and Figure 64 for 876PH-T.

Specify the `Temp Mode` as `Auto` or `Manual`.

In Auto mode, the temperature follows the temperature input RTD and you can set a temperature alert signal value (Alert Temp), in case the RTD alerts, at the temperature at which you expect the process to be operating.

In Manual mode, the temperature can be set at a fixed temperature value (Manual Temp) and resistance inputs on the temperature terminal are ignored.

Temperature Compensation

Refer to Figure 47 for 876PH-S and Figure 65 for 876PH-T.

This section of the structure asks you to specify the temperature compensation if you are measuring pH or ISE.

— NOTE

This section does not appear if you selected ORP as your Measurement.

If pH or pH and ORP was chosen as your Measurement, specify Standard, Ammonia, or Custom. Standard assumes a glass or antimony electrode and applies the Nernst equation. The nominal temperature compensation range is -30 to +200°C (-22 to +392°F). Ammonia compensates for traces of ammonia in addition to the standard compensation. Custom allows you to specify particular solution characteristics into the transmitter's memory. When using Ammonia or Custom compensation, all measurements are corrected back to a reference temperature measurement value. Therefore, you are asked to specify a reference temperature. The reference temperature (Reference Temp) can be set within the temperature compensation range. For Custom, a number of points needs to be specified. The number of points (Points) can be specified from 2 to 21 points. Each point specifies a value at a certain temperature. The temperatures can be set from -30 through + 200°C (-22 through +392°F). The temperature units were specified in the previous section. The values can be specified within the current scale.

— NOTE

The temperature values must be entered in increasing or decreasing order. If an invalid point is entered in the table, the value is highlighted in reverse text. Also, if a valid point which creates an invalid slope is entered, the value is highlighted in reverse text. In either case, no alert message is displayed, but you cannot continue until the value in reverse text is replaced with a valid value.

If ISE Concentration was chosen as your Measurement, you must specify Standard or Custom. Custom causes you to specify a reference temperature and a number of points to plot a compensation curve. The procedure is described immediately above.

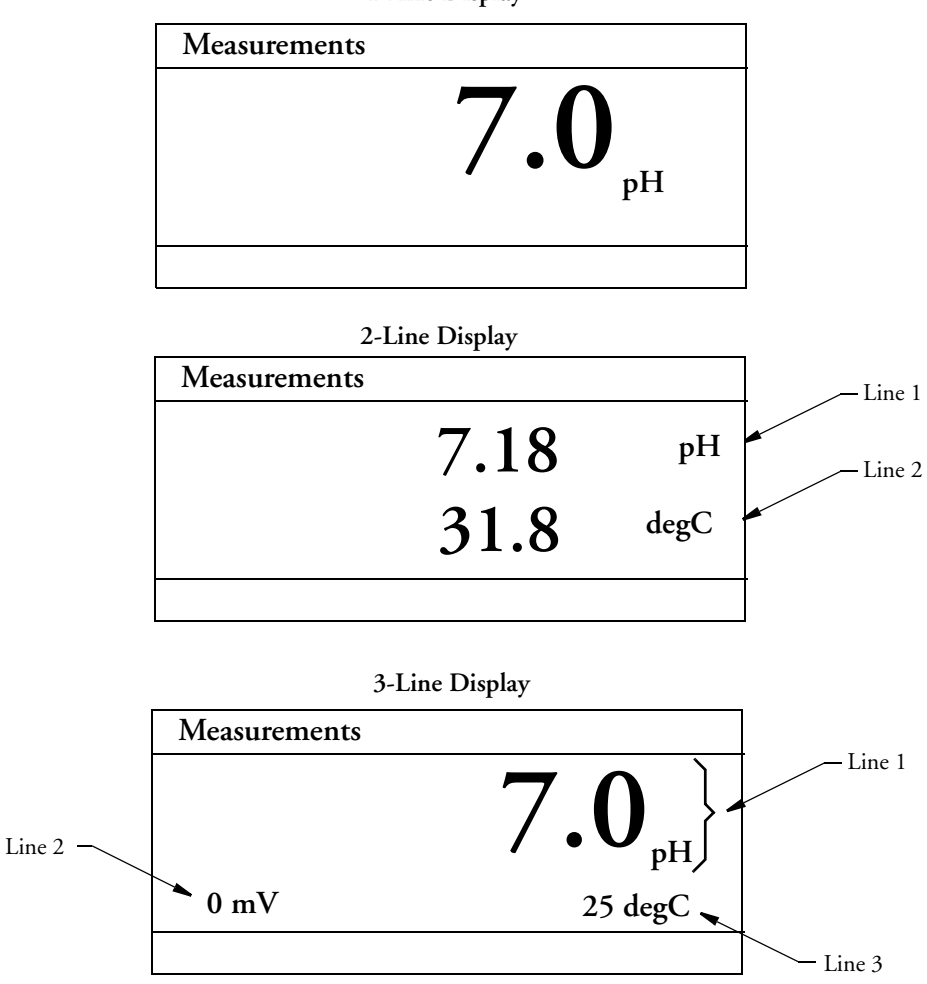
Display Format

Refer to Figure 48 for 876PH-S and Figure 67 for 876PH-T.

The Display Format section of the structure enables you to display one, two, or three measurements. Then you can specify what measurement you want on each line of the display.

In `Display Format`, first specify the number of measurements to be displayed by selecting `Single Line`, `Double Line`, or `Triple Line`. Then specify what measurement you want displayed on `Line 1`, `Line 2` (if Double or Triple), and `Line 3` (if Triple).

Figure 30. Measurement Display



AO Failsafe

Refer to Figure 49 for 876PH-S and Figure 68 for 876PH-T.

NOTE

The AO Failsafe parameter is not available with multidrop communication.

A fail-safe output is delivered for those diagnostic alerts that have been configured `On` as well as other alerts. The AO Failsafe section of the structure enables you to specify the analog output under these alert conditions.

In AO Failsafe, select `Fail Low` to drive the analog output to 3.6 mA; select `Fail High` to drive the analog output to 22 mA; select `Off` to omit this feature (continues to follow the measurement). If `Off` is selected, you must continue to monitor alerts using the HART protocol.

NOTE

1. Configure AO Failsafe to protect your process in case of an alert.
2. If `Fail Low` is selected, the LCD backlight in the 876PH-S will turn off when the Failsafe output is active.
3. A severe loss of operating capability that is detected by an 876PH-S transmitter (for example, an incomplete firmware load), will result in a fail-safe output of 22 mA. This protective feature is not configurable.

HART Digital

NOTE

876PH-S supports HART 7 only. Refer to Figure 50 for 876PH-S.
876PH-T supports HART 5, 6, and 7. See Figure 69 for 876PH-T.

The HART Digital section of the structure enables you to set parameters for HART communication.

`Poll Address`:

Enter a number from 0 through 15 if using HART Version 5.

NOTE

In HART Version 5, address 1 through 15 is reserved for multidrop.

Or, enter a number from 0 through 63 if using HART Version 6 or 7.

`mA Loop Mode` (only applies to HART 6 and 7):

Enter the `mA Loop Mode` as `Active` or `Multi-Drop`.

`Preambles`:

Enter the number of preambles to be sent in a response message from the transmitter to the host, are read only.

`HART Version` (only applies to 876PH-T):

Enter the version of the firmware being used.

NOTE

The Device Description (DD) must match the HART firmware version.
For 876PH-T version HART 5 - - - DD ≤ 14053F
For 876PH-T version HART 6 - - - DD ≥ 140540
For 876PH-T version HART 7 - - - DD ≥ 140580

For 876PH-S version HART 7 - - - DD ≥ 140B80

Diagnostics

Refer to Figure 51 for 876PH-S and Figure 70 for 876PH-T.

This section of the structure allows you to configure alert messages that can appear on your display. In `Diagnostics`, you can elect to enable (`On`) or disable (`Off`) all of the diagnostics or each of the following individually: `Leakage`, `ATC Short`, `ATC Open`, `Comp Range`, `Meas Range`, `Low Slope`, `Sensor Service Prediction, Preamp`, `Reference Coating`, `Broken Glass`, and `Aging`. Each of these is discussed below. A typical approach is to initially disable all of the messages and to enable selected messages later when you find out that you require them. An alert symbol is displayed if a particular diagnostic is enabled and the alert occurs. If the diagnostics detects a alert, the analog output goes to the failsafe value if `AO Failsafe` was configured `On` (see Figure 49).

Leakage

This diagnostic detects and reports a problem of severe liquid leakage into the sensor which causes an ATC short to solution ground. The diagnostic can be enabled or disabled.

ATC Short, ATC Open

This diagnostic detects and reports a problem if the resistance of the temperature compensator is greater or less than the expected resistance of the device configured. The diagnostic for each can be enabled or disabled.

Comp Range

This diagnostic detects and reports that the measurement or temperature is outside the range configured. The diagnostic can be enabled or disabled.

Meas Range

This diagnostic reports that the measurement is over or under the analog output range that is configured. The diagnostic can be enabled or disabled.

Low Slope

This diagnostic detects and reports a problem usually associated with an aging glass electrode. It appears after a multipoint calibration in buffer solutions when the Nernst slope of the sensor becomes less than the user set limit. The limit can be set from 0 through 100 percent. It applies to the slope between any two points. The diagnostic can be enabled or disabled.

NOTE

1. This message does not appear for ORP measurement.
2. In Diagnostics, Low Slope applies to the slope between any two points. In Status mode, the only slope shown is that closest to the isopotential point. Therefore it is possible to show an alert in Diagnostics mode but not in Status mode.

Sensor Service Prediction (876PH-S Glass Electrode Only)

The 876PH-S Transmitter is capable of predicting the number of days remaining before a Schneider Electric smart pH sensor will require service in the form of cleaning, recalibration, reconditioning, or replacement (see MI 611-205 for PH10-*S or MI 611-214 for PH12-****S). The prediction is based on analyzing the trend in slope values stored in the Sensor History Log each time the sensor is calibrated, taking into account the temperature history of the sensor, and estimating the number of days remaining before the slope drops below a user-selectable Prediction Slope Limit. When the number of days remaining before the predicted slope will fall below the limit is less than a user-settable Advance Notice period, a Service Soon warning is displayed.

The Sensor Service Prediction feature has the following outputs:

Prediction Status Indication in Status Menu	Definition
OK	Most recent calibration slope is greater than 90%.
Days Remaining Displayed	Most recent calibration slope is less than 90%. Predicted slope is greater than the Prediction Slope Limit.
Days Remaining Displayed; “Service Soon” alert in Diagnostics screen.	Number of days before the predicted slope will fall below the Prediction Slope Limit is less than or equal to the Advanced Notice period.

Sensor Service Prediction is most effective when a sensor remains in a particular application or measuring point throughout its service life. When a sensor with History Log entries from one application is moved to a different application with different process composition and temperature conditions, Sensor Service Prediction will require a period of time to collect historical data in the new application before it will provide a reliable prediction.

NOTE

When a smart sensor is first connected to the transmitter, it may take up to one minute for the Sensor Service Prediction diagnostic to update.

Preamp (876PH-T Only)

This diagnostic reports an alert on the preamplifier (in the sensor or junction box). It appears if the preamplifier draws too much power. A shorted preamplifier causes the transmitter to cease functioning.

NOTE

If the transmitter is unresponsive, disconnect terminal 6. If the transmitter begins to function, it is a confirmation that the detected problem is in the preamplifier.

Reference Coating

This diagnostic reports an increase in reference junction resistance possibly resulting from a fouled reference junction. The diagnostics check the resistance against solution ground.The message appears if the resistance is greater than the user set limit. The limit can be set from 0 through 200 kΩ. The diagnostic can be enabled or disabled.

Broken Glass

This diagnostic reports an alert in the resistance of a glass electrode in the sensor. Resistance of a glass electrode is checked versus solution ground. An alert appears if the resistance is less than user set limit. The `Glass Lo Limit` value may be entered between 0.10 and 1.10 MΩ. You can also specify a `Cutoff` temperature above which this feature is disabled. `Cutoff` can be set between -30 and +200. The resistance of a glass bulb decreases (roughly is halved) for every 10°C increase in temperature.

— NOTE

The diagnostic is disabled unless the electrode is specifically pH glass.

Aging

This diagnostic reports an aging glass electrode. The message appears after a multipoint calibration in pH buffer solutions when the Nernst slope of the sensor closest to the isopotential point has decreased sequentially five times. The diagnostic can be enabled or disabled.

Auto Hold

Refer to Figure 52 for 876PH-S and Figure 71 for 876PH-T.

The Auto Hold section of the structure enables you to select automatic hold to automatically activate the Hold feature each time you enter Calibration or Configuration mode. In Auto Hold, select `On Present` to hold all output values at their current level; `On Manual` to set all output values at desired levels; or `Off` to omit this feature.

— NOTE

1. If you select `On Manual`, go to Hold mode to change the values.
2. If the Manual Auto Hold value is set lower than the Under Range mA (3.8 mA), the LCD backlight on the 876PH-S will be disabled when the Hold value is active.

Config Timeout

Refer to Figure 53 for 8786PH-S and Figure 72 for 876PH-T.

The Config Timeout section of the structure enables you to specify the time in which the instrument brings you back to the Measure mode from another mode when no keyboard input has occurred. In Measure mode, `Timeout` also controls the time to view a display other than that configured in “Display Format” on page 65 that has been temporarily scrolled into view. Timeout can be configured to `Always Timeout`, timeout in online modes only (`Online Only`) or `Never Timeout`. The `Always Timeout` selection is recommended.

The timeout can be configured separately for front panel (`Front Panel`) and (`HART Communications`) operation. The time can be specified from 30 through 999 seconds.

Transmitter Tags

Refer to Figure 54 for 876PH-S and Figure 73 for 876PH-T.

The Transmitter Tags section of the structure enables you to enter tags to identify your transmitter. Each can have a maximum number of characters as described below. When you have finished entering a tag, press ENTER. These identifications appear in Status mode. For details on entering various characters, see page 37.

Table 9. Transmitter Tags

Tag Name	Characters
HART Message	32
HART Tag	8
HART Long Tag (a)	32
HART Descriptor	16
Tag Name (876PH-T) or Verbose Tag (876PH-S)	14
Location	14
Device Name	6

a. HART Long Tag is only available in Hart 6 or 7.

Passcode Access

Refer to Figure 55 for 876PH-S and Figure 74 for 876PH-T.

The Passcode Access section of the structure enables you to limit access to change and/or view various parameters in the firmware. There are two Passcodes; Administrator Code and User Code. A person possessing the Administrator Code can change and view all parameters as well as establish what a person with User Code can access. A person with a User Code can only change and view what the administrator has allowed. Both codes are four digit codes.

NOTE

1. The initial factory default value for both Administrator and User passcodes is 0800.
2. To bypass the passcode, the administrator must configure a passcode of 0000.

The configuration of this section is done in four steps.

1. In Admin Code, enter the four digit administrator code from 0 through 9999.
2. In User Code, enter the four digit user code from 0 through 9999.
3. In User Change, you can elect to enable (On) or disable (Off) user access to each of the following parameters.

Calibrate	Temp Comp	HART Cfg
Cal Buffers	Sensor Cfg (876PH-T only)	Auto Hold
Hold	PV Cfg	Tags Config
Suspend Alert	Meas Cfg	Timeouts
Resume Alert	Display Cfg	Default Cfg
Clear History	Diag Cfg	

NOTE

1. You can also make one selection to configure access to all the User Change parameters On or Off.
2. The Clear History selection also controls the ability to set the real-time clock in the 876PH-S

4. In User View, you can elect to enable (`On`) or disable (`Off`) user access to each of the following parameters.

Cal Buffers	Diags	Xmtr Tags
Temp Comp	HART	Timeouts
Temp Table	Auto Hold	Default
Display		

NOTE

1. You can also make one selection to configure access to all the User View parameters On or Off.
2. The -S has real time set following passcodes.

Real Time Clock (876PH-S Only)

Refer to Figure 56 for 876PH-S.

The user can change the Real Time Clock by setting the year, month, day, hours and minutes from the `Enter Date Time` selection.

To change the year, choose the year (range is between 2000-2100) and press `ENTER`. To change the month, choose the month (range is between 1-12) and then press `ENTER`. To change the day, choose the day (range is between 1-31), and then press `ENTER`. Similarly, you can change hours and minutes. The Real Time Clock setting is effective immediately and cannot be undone by canceling changes.

Calibration Parameters

Refer to Figure 57 for 876PH-S and Figure 75 for 876PH-T.

The Cal Parameters section of the structure enables you to specify:

- The calibration standard buffer solutions to be used if you are measuring pH and using the `Smart` solution calibration feature.
- The measurement and temperature stability threshold for all calibrations.

Buffer Set

You can select between `American`, `NIST`, `European`, `DIN`, `MERCK`, `JIS 8802`, or `User Selectable` as standard buffer set choices.

The pH values of common buffer solutions are shown in Table 10.

Table 10. pH Value of Common Buffer Solutions

Buffer Solution	pH Values
American	1.68, 4.01, 7.00, 10,01, 12.45
NIST	1.68, 4.01, 6.87, 10,01, 12.45
European	4.61, 7.00, 9.18
DIN	1.68, 4.01, 6.86, 9.18, 12.45
MERCK	4.01, 7.00, 10.00
JIS 8802	1.68, 4.01, 6.86, 9.18, 12.45

If you select `User Selectable`, you can select up to seven buffers from either standard buffer values from Table 10 or you can pick `Custom` and create a buffer with your own pH values. The pH values of the buffers you select must be a minimum of 2 pH apart. If you create a custom buffer, you must enter a nominal pH value for the buffer and then establish a curve of temperature values vs pH values. See Figure 57.

Stability

The `Stability` parameter sets the measurement and temperature stability. It can be set from 25 through 1000%. 25% produces the most accurate measurement and temperature calibration. Therefore it causes the longest calibration time. 100% is recommended for new installations.

Auto Scroll (876PH-S only)

Refer to Figure 59 for 876PH-S.

Auto Scroll is a feature that allows you to view long strings on the display. Select `ON` to enable auto scrolling so that long strings scroll automatically. Select `OFF` to disable Auto Scroll.

Language (876PH-S only)

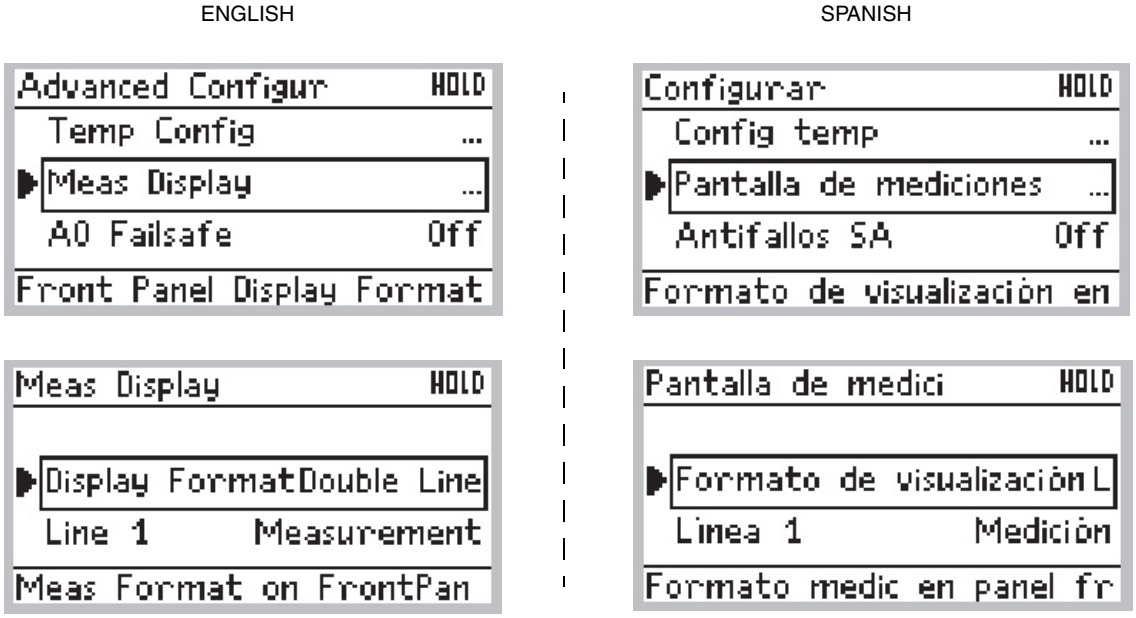
Refer to Figure 59 for 876PH-S.

Select the language that will be displayed on the front panel of the 876PH-S. The languages available are:

- English
- French
- German
- Italian
- Spanish
- Portuguese
- Russian

Figure 31 shows examples of Configuration screens in both English and Spanish.

Figure 31. Measurement Display Screens in English and Spanish



The Configuration mode also includes a `Shortcut to ENGLISH` selection in every language to allow you to quickly return to English if you are unable to read the language that is displayed. See "Shortcut to English (for 876PH-S only)" on page 60.

Restore Configuration

Refer to Figure 60 for 876PH-S and Figure 76 for 876PH-T.

Configuring your transmitter involves the setting of many parameters specific for the application. In some cases, you may wish to employ the transmitter for more than one application (at different times). Rather than having to change several parameters, the 876PH allows you to save up to two unique and complete configuration profiles. The 876PH-T version also includes the calibrations associated with each profile. The 876PH-S version uses only the calibration stored in the sensor, and this is unaffected by the profiles. Either of these two profiles can be restored at any time to facilitate a quick and easy change of the transmitter to a presaved configuration. In addition to the two user profiles, the transmitter also includes a "factory default" configuration which allows you to return the transmitter to its original factory configuration at any time. Refer to Appendix C, "Configuration Table" for the factory configuration.

In `Restore Config`, select `Restore User 1`, `Restore User 2`, or `Restore Factory` and at the question `Restore User 1 Configuration?`, `Restore User 2 Configuration?`, or `Restore Factory Configuration?`, answer `Yes` or `No`.

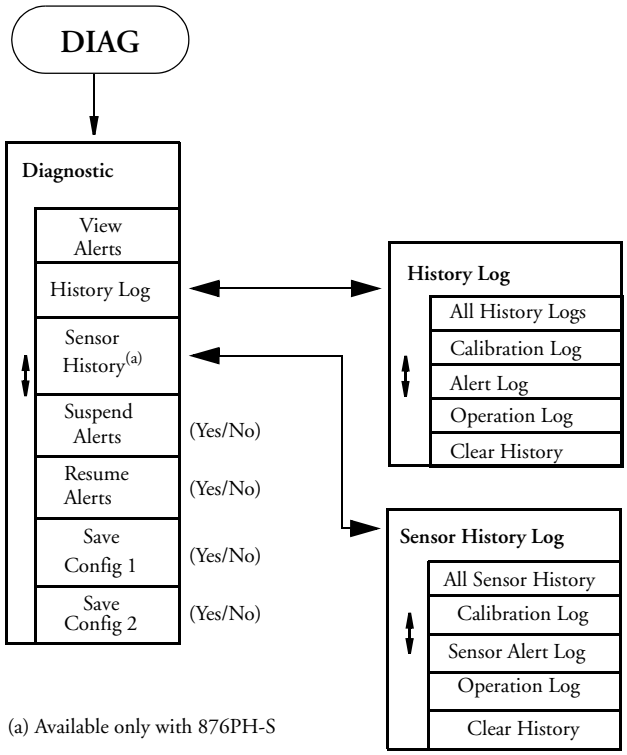
NOTE

The two user profiles are saved in "Save User Configuration" on page 78.

Diagnostic Mode

Refer to Figure 32.

Figure 32. Diagnostic Mode Structure for 876PH-T and 876PH-S Transmitter



The Diagnostic mode enables you to:

- View active alerts
- Suspend those alerts for one hour
- Resume any suspended alerts
- View the History log (Transmitter)
- View the Sensor History log
- Save two user configurations

To enter the Diagnostic mode, press the `FUNCTION` key and then the `DIAG` key. Press `ENTER`. The display returns to Measure mode when you press the `FUNCTION` key and then the `MEASURE` key or when the timeout period expires. If there are no key presses within the configured Timeout period, the transmitter reverts to Measure mode. When the transmitter returns to Measure mode the outputted values are the real values.

View Alerts

Select `View Alerts` to view the most severe alert. Use the Up and Down arrow keys to view other alerts. Four pieces of information are given for each alert: The type of alert, the severity of the alert, the alert itself, and the factory code (see NOTE below regarding factory code). See Figure 33 and Table 11. If there are no alerts, the display reads `No Active Alerts`.

NOTE

The **Factory Code** is not shown on the display. It is available in the **History Log**.

Figure 33. Sample View Alerts Display

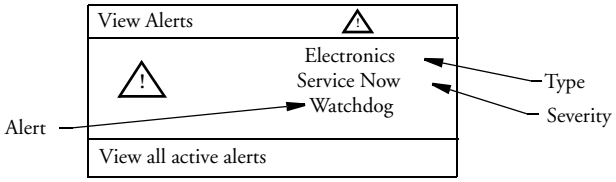


Table 11. List of Possible Alerts

Alert	Severity	Corrective Action
Analog Calibration Lost	User Alert	Contact Global Customer Support
Analog Out of Range	User Alert	Reconfigure analog output settings
ATC Open Circuit (a)	User Alert	1.Check ATC wiring and configuration 2. Replace sensor
ATC Short Circuit (a)	User Alert	1.Check ATC wiring and configuration 2. Replace sensor
Calibration Required	Service Now	Perform measurement calibration
Corrupt Code Flash (program space)	Inoperable	Contact Global Customer Support
Front End Communications (b)	Service Now	Contact Global Customer Support
Meas Calibration Lost (a)	User Alert	Contact Global Customer Support
Measurement Overflow (a)	User Alert	Contact Global Customer Support
No Sensor (c)	User Alert	Check Sensor Connection
Replace RTC Battery (c)	Service Now	Contact Global Customer Support
Sensor Coating (a)	Service Soon	1. Clean sensor 2. Replace sensor
Sensor Glass Aging (a)	Service Soon	1. Perform 2-point calibration 2. Replace sensor
Sensor Glass Broke (a)	User Alert	1. Check cutoff temperature 2. Inspect electrode 3. Replace sensor
Sensor Leaking (a)	User Alert	Replace sensor
Sensor Low Slope (a)	Service Soon	1. Check configuration 2. Repeat calibration 3. Replace sensor
Sensor Service Prediction (a)	Service Soon	1. Check configuration 2. Repeat calibration 3. Replace sensor
Temp Calibration Lost (a)	User Alert	Contact Global Customer Support
Temp Comp Overrange	Service Now	Reconfigure temp comp settings
Temp Comp Table	User Alert	Reconfigure Temp Comp Table Settings See page 64
Temperature Overflow (a)	User Alert	1. Check ATC wiring and configuration 2. Replace sensor
Watchdog	Service Now	Contact Global Customer Support

a. Alert can be suspended.
b. Only for 876PH-T
c. Only for 876PH-S

History Log

History Log contains a set of logs of events for the transmitter. See Table 12. For a set of logs of sensor events, see Sensor History below. Select `History` Log and press `ENTER` to view or erase the transmitter history logs. Use the Up and Down arrow keys to select All History Logs, Calibration Log, Alert Log, Operation Log. You can also select Clear History. however clearing the history log requires entering your passcode.

All sensor-independent parameters in the 876PH-S transmitter can be configured without an attached sensor. When the transmitter detects that a sensor has been connected, it automatically uploads the most recent set of calibration and configuration data from the sensor. If a power cycle occurs, the 876PH-S transmitter uploads the most recent complete set of calibration and configuration data from a connected sensor.

Table 12. Transmitter History Logs

Calibration Log	Alert Log	Operation Log
	Software Alert	
	Alert (See Table 11.)	Suspend Resume
		Hold Manual
		Hold Frozen
		Hold Released
		User Password
		Admin Password
		Invalid Password
		Password Changed
		Config Changed
Cal mA		Cal mA
Calibrated		Calibrated
Cal Temp		Cal Temp
		Serviced
		Factory Passed
	Front End Event	
		Log Cleared
		Session Timeout

Sensor History

Information pertaining to a specific Schneider Electric smart pH sensor is contained in its history log called "Sensor History." The 876PH-S transmitter is used for calibration and sensor configuration, the history of which is appended to the Sensor History log (see Table 13).

The Schneider Electric smart pH sensors store data such as date of manufacture, serial number, sales order number, model code, slope, asymmetry, aging and response time.

Table 13. Sensor History Logs

Calibration Log	Alert Log	Operation Log
Calibrated		Calibrated
		Connected
Electrod Res		Electrod Res
Response Time		Response Time

Suspend Alerts and Resume Alerts

Select `Suspend Alerts` to suspend the present alerts for one hour. The display asks for your passcode. An incorrect passcode returns you to the start of the Diagnostic menu. A correct passcode causes the prompt `Suspend Alert?` to be displayed. If you answer `Yes`, the message `Alerts Suspended` is displayed. After either a `Yes` or `No` reply, the Diagnostic menu is displayed. Each suspended alert is inhibited from reoccurring for one hour from the time the Diagnostic mode is entered.

Select `Resume Alerts` to resume all suspended alerts.

Save User Configuration

Configuring your transmitter involves the setting of many parameters specific for the application. In some cases, you may wish to employ the transmitter for more than one application (at different times). Rather than having to change several parameters, the 876PH-T and 876PH-S versions allow you to save up to two unique and complete configuration profiles. The 876PH-T also allows you to save the profiles with the calibrations associated with each profile.

Either of these two profiles can be restored at any time to facilitate a quick and easy change of the transmitter to a presaved configuration. See "Restore Configuration" on page 73.

Select `Save Config 1` or `Save Config 2` to save your configuration. The display asks for your passcode. An incorrect passcode returns you to the start of the Diagnostic menu. A correct passcode causes the prompt `Save Config #?` to be displayed. If you answer `Yes`, the message `Configuration Saved` is displayed. If you answer `No`, the message displayed is `Action Cancelled`.

6. Operation Via HART Communicator

The DD menus for the 876PH-S and the 876PH-T are different. This chapter provides the HART Online menus for both products.

NOTE

1. For HART communications, a 250 Ω load resistor must be present in the power supply loop.
2. For proper communication with a HART Communicator, the communicator must contain the proper DD for the 876PH Transmitter. This DD is available on our website or any other authorized HART Foundation source.
3. The 876PH-T is device ID 1405 and the 876PH-S is device ID 140B.
4. If the DD shows “access restricted”, start over and re-enter the passcode.

Entering Modes

From the home menu, select the mode to be entered. If `Save to Xmtr` appears, it must be handled before entering a different mode. If a passcode is required, select `Enter Passcode` before accessing a new mode.

Saving Changes

Changes must be saved before going to another mode.

If the `Send` soft key appears on the screen, it must be pressed before saving changes.

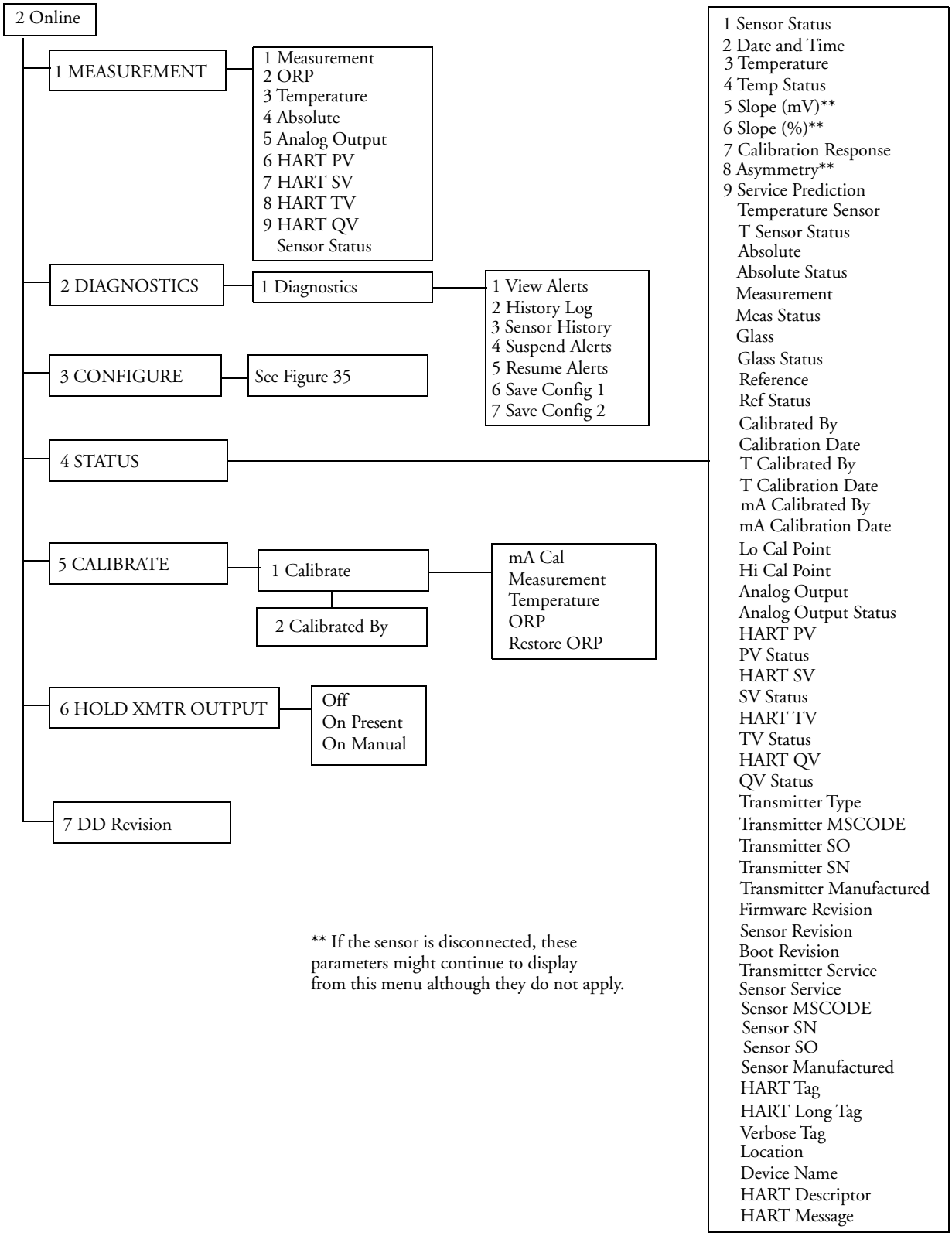
Press `Home`, select `Save to Xmtr`. Answer the `Save changes?` question by selecting `Yes` or `No`, and pressing `ENTER`. If invalid information was entered, the `Fix Invalid Changes?` question appears. `No` discards all changes; `Yes` provides the title of the first parameter with invalid information which must then be resolved.

NOTE

The `Save` soft key refers to a local communicator copy of the parameters, not the transmitter's `Save changes`.

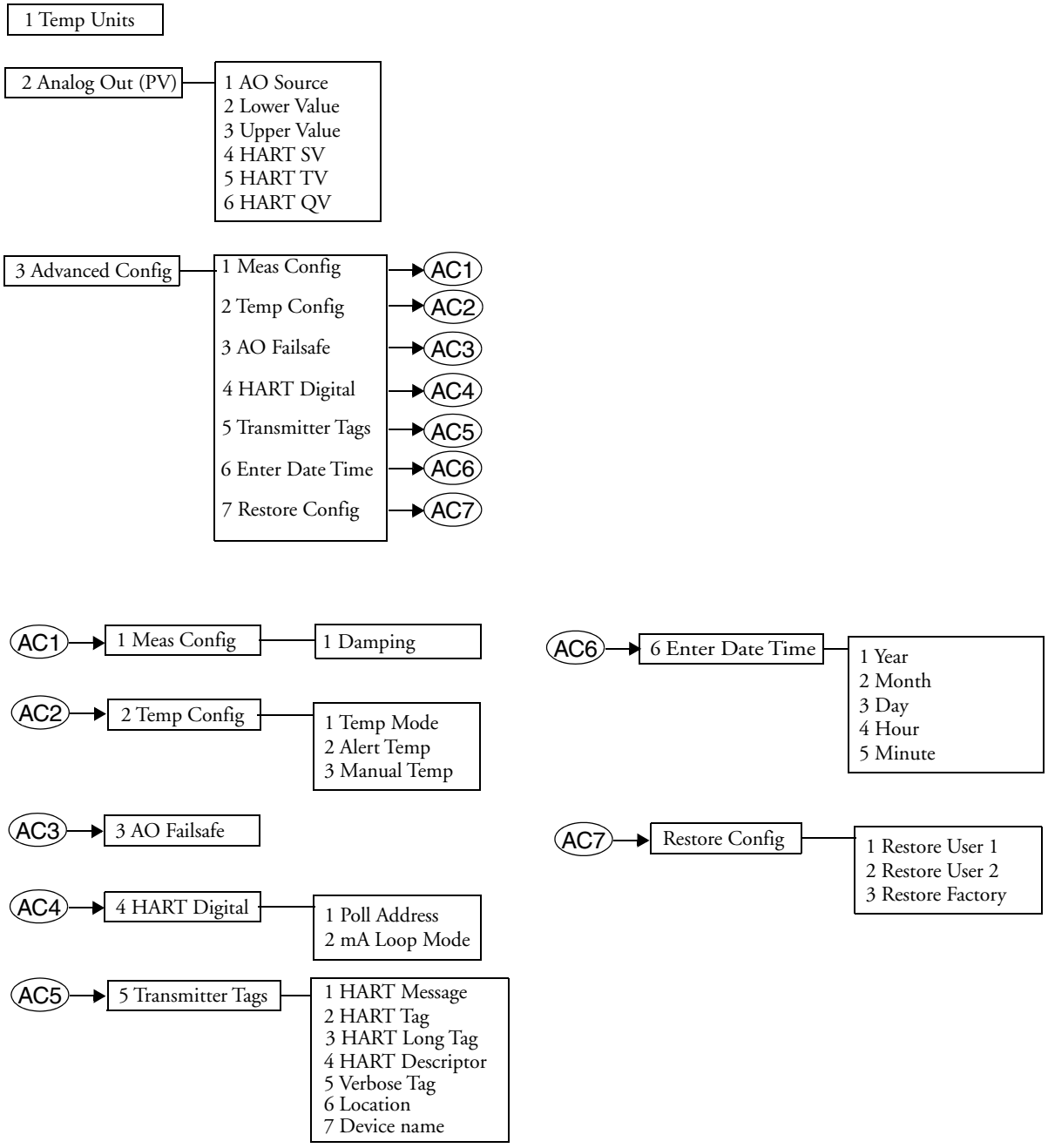
HART Online Menu for 876PH-S

Figure 34. 876PH-S Transmitter Online Menu Tree (1 of 2)



** If the sensor is disconnected, these parameters might continue to display from this menu although they do not apply.

Figure 35. 876PH-S Transmitter Online Menu Tree (2 of 2)



Explanation of Parameters for 876PH-S

This section describes the parameters in the 876PH-S DD menu.

NOTE

1. The fast-key path shown is based on a frequently used configuration. If certain parameters are configured off or infrequently used parameters configured on, the fast-key path may be different.
2. For more detailed explanation of parameters, see "Operation Via Local Display" on page 35.
3. You may need to remove blank spaces from certain fields in order to allow for the complete description to be entered.

Parameter	Fast-Key Path	Explanation
1 Measurement Mode		
Measurement	1,1	Displays the measurement value.
ORP	1,2	Displays Oxidation/Reduction Potential (ORP) value in ORPmV.
Temperature	1,3	Displays the temperature value in specified engineering units.
Absolute	1,4	Displays the absolute (uncompensated) measurement value.
Analog Output	1,5	Displays the analog output in mA.
HART PV	1,6	Displays the HART primary variable.
HART SV	1,7	Displays the HART secondary variable.
HART TV	1,8	Displays the HART tertiary variable.
HART QV	1,9	Displays the HART quaternary variable.
Sensor Status		Displays sensor status.
2 Diagnostic Mode		
View Alerts	2,1,1	Displays the most severe alert and other alerts if desired.
History Log	2,1,2	Used to view or erase one or more diagnostic history logs.
Sensor History	2,1,3	Used to review or erase one or more sensor history logs.
Suspend Alerts	2,1.4	Used to suspend alerts for one hour.
Resume Alerts	2,1,5	Used to resume suspended alerts.
Save Config 1	2,1,6	Used to save your configuration.
Save Config 2	2,1,7	Used to save your configuration.
3 Configure Mode		
Temp Units	3,1	Path to measure related parameters.
Analog Out(PV)	3,2	Path to analog output related parameters.
AO Source	3,2,1	Select the AO Source from the picklist provided.
Lower Value	3,2,2	Enter the measurement value that is to produce 4 mA.
Upper Value	3,2,3	Enter the measurement value that is to produce 20 mA.
HART SV	3,2,4	Select the SV measurement from the picklist provided.
HART TV	3,2,5	Select the TV measurement from the picklist provided.
HART QV	3,2,6	Select the QV measurement from the picklist provided.
Advanced Config	3,3	Path to advanced configuration related parameters.
Meas Config	3,3,1	Path to measurement related parameters.
Temp Config	3,3,2	Path to temperature related parameters.
AO Failsafe	3,3,3	Used to specify the analog output under alert conditions.

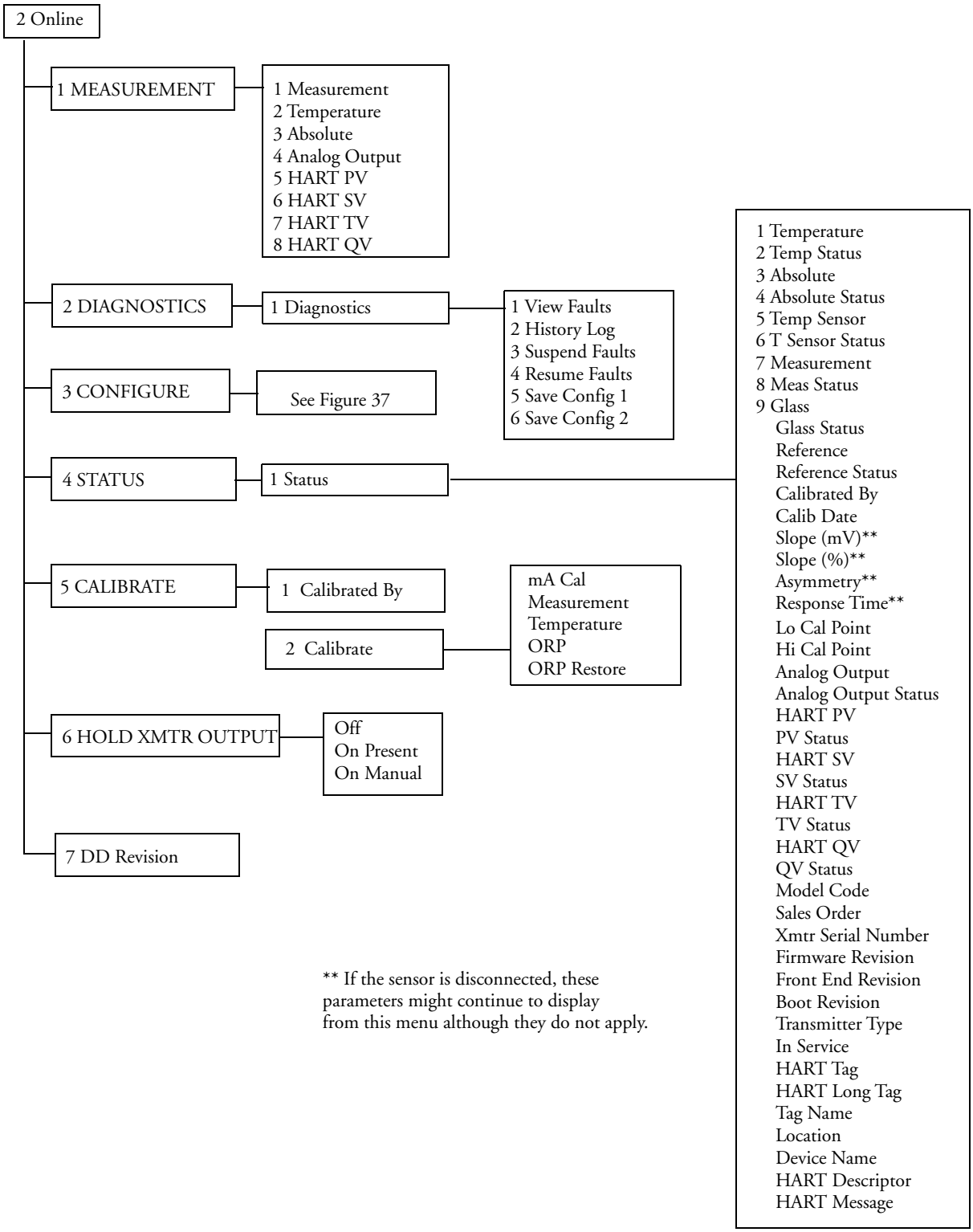
Parameter	Fast-Key Path	Explanation
HART Digital	3,3,4	Path to HART related parameters.
Transmitter Tags	3,3.5	Path to tag related parameters.
Enter Date Time	3,3.6	Enter to date and time to set the real time clock.
Restore Config	3,3,7	Path to restoring the transmitter to a user stored or the factory configuration.
Damping	3,3,1,1	Enter the damping response time.
Temp Mode	3,3,2,1	Select the Temp Mode as Auto or Manual.
Alert Temp	3,3,2,2	If Temp Mode is Auto: Enter a temperature alert signal value.
Manual Temp	3,3,2,3	If Temp Mode is Manual: Enter a fixed temperature.
Poll Address	3,3,4,1	Enter the polling address to a number from 0 through 63. You must select Active or Multi-Drop for the mA Loop Mode.
mA Loop Mode	3,3,4,2	Enter the mA Loop Mode as Active or Multi-Drop.
HART Message	3,3,5,1	Enter a HART Message (up to 32 characters).
HART Tag	3,3,5,2	Enter a HART Tag (up to 8 characters).
HART Long Tag	3,3,5,3	Enter a HART Long Tag (up to 32 characters).
HART Descriptor	3,3,5,4	Enter a HART Descriptor (up to16 characters).
Verbose Tag	3,3,5,5	Enter a Tag Name (up to 14 characters).
Location	3,3,5,6	Enter a Tag Name (up to14 characters).
Device Name	3,3,5,7	Enter a Location (up to 14 characters).
Year	3,3,6,1	Enter year.
Month	3,3,6,2	Enter month.
Day	3,3,6,3	Enter day.
Hour	3,3,6,4	Enter hour.
Minute	3,3,6,5	Enter minute.
Restore User 1	3,3,7,1	Enables you to restore a saved user configuration.
Restore User 2	3,3,7,2	Enables you to restore a saved user configuration.
Restore Factory	3,3,7,3	Enables you to restore the factory configuration.
4 Status Mode		
Sensor Status	4,1	Displays sensor status.
Date and Time	4,2	Displays the date and time when status was collected.
Temperature	4,3	Displays the temperature measurement.
Temp Status	4,4	Displays the status of the temperature measurement.
Slope (mV)	4,5	Displays the change in mV/pH or mV/decade of the most recent calibration.
Slope (%)	4,6	Displays the deviation in percent of the slope of the most recent calibration compared to the standard.
Calibration Response	4,7	Displays the sensor calibration response time in seconds.
Asymmetry	4,8	Displays the asymmetry potential (mV difference between the theoretical isopotential point and the actual point due to the most recent calibration).
Service Prediction	4,9	Displays a string indicating if the sensor needs service. Values can be “Sensor OK”, “Days Remaining”, or “End of Service.”
Temperature Sensor		Displays the temperature sensor resistance.
T Sensor Status		Displays the status of the temperature sensor.
Absolute		Displays the absolute measurement.
Absolute Status		Displays the status of the absolute measurement.
Measurement		Displays the measurement.
Meas Status		Displays the status of the measurement.

Parameter	Fast-Key Path	Explanation
Glass		Displays the resistance of the glass electrode.
Glass Status		Displays the status of the glass electrode.
Reference		Displays the reference junction resistance.
Reference Status		Displays the statue of the reference junction.
Calibrated By		Displays the name of the last operator to perform a calibration.
Calibration Date		Displays the date of last calibration (dd/mm/yyyy).
T Calibrated By		Displays the name of the last operator to perform a temperature calibration.
T Calibration Date		Displays the date of last temperature calibration (dd/mm/yyyy).
mA Calibrated By		Displays the name of the last operator to perform an mA calibration.
mA Calibration Date		Displays the date of last mA calibration (dd/mm/yyyy).
Lo Cal Point		Displays values at the lower calibration point.
Hi Cal Point		Displays values at higher calibration point.
Analog Output		Displays the value of the analog output.
Analog Output Status		Displays the status of the analog output.
HART PV		Displays the HART primary value.
PV Status		Displays the status of the HART primary variable.
HART SV		Displays the HART secondary variable.
SV Status		Displays the status of the HART secondary variable.
HART TV		Displays the HART tertiary variable.
TV Status		Displays the status of the HART tertiary variable.
HART QV		Displays the HART quaternary variable.
QV Status		Displays the status of the HART quaternary variable.
Transmitter Type		Displays the transmitter type.
Transmitter MSCODE		Displays the transmitter model code.
Transmitter SO		Displays the transmitter sales order number.
Transmitter SN		Displays the transmitter serial number.
Transmitter Manufactured		Displays the date the transmitter was manufactured.
Firmware Revision		Displays the firmware revision level.
Sensor Revision		Displays the sensor revision level.
Boot Revision		Displays the boot revision level.
Transmitter Service		Displays the time in service in days.
Sensor Service		Displays the time in service in days for the sensor.
Sensor MSCODE		Displays the sensor model code.
Sensor SO		Displays the sensor sales order number.
Sensor SN		Displays the sensor serial number.
Sensor Manufactured		Displays the date the sensor was manufactured.
HART Tag		Displays the HART Tag name.
HART Long Tag		Displays the HART Long Tag name (version 7).
Verbose Tag		Displays the tag name.
Location		Displays the location of the measurement.

Parameter	Fast-Key Path	Explanation
Device Name		Displays the device name.
HART Descriptor		Displays the HART descriptor.
HART Message		Displays the HART message.
5 Calibrate Mode		
Calibrate	5,1	Path to calibrating parameters.
mA Cal	5,1,1	Used to perform a mA Cal calibration.
Measurement	5,1,2	Used to perform a measurement calibration.
Temperature	5,1,3	Used to perform a temperature calibration.
ORP	5,1,4	Used to perform an ORP calibration.
Restore ORP	5,1,5	Used to restore an uncompensated ORP output.
Calibrated By	5,2	Enter the name of the person calibrating the device and the date of calibration.
6 Hold Xmtr Output		
Off	6,1	Used to release the transmitter from Hold state.
On Present	6,2	Used to hold all values and states at their current level.
On Manual	6,3	Used to hold all values and states at desired levels.
7 DD Revision		Displays the DD revision level.

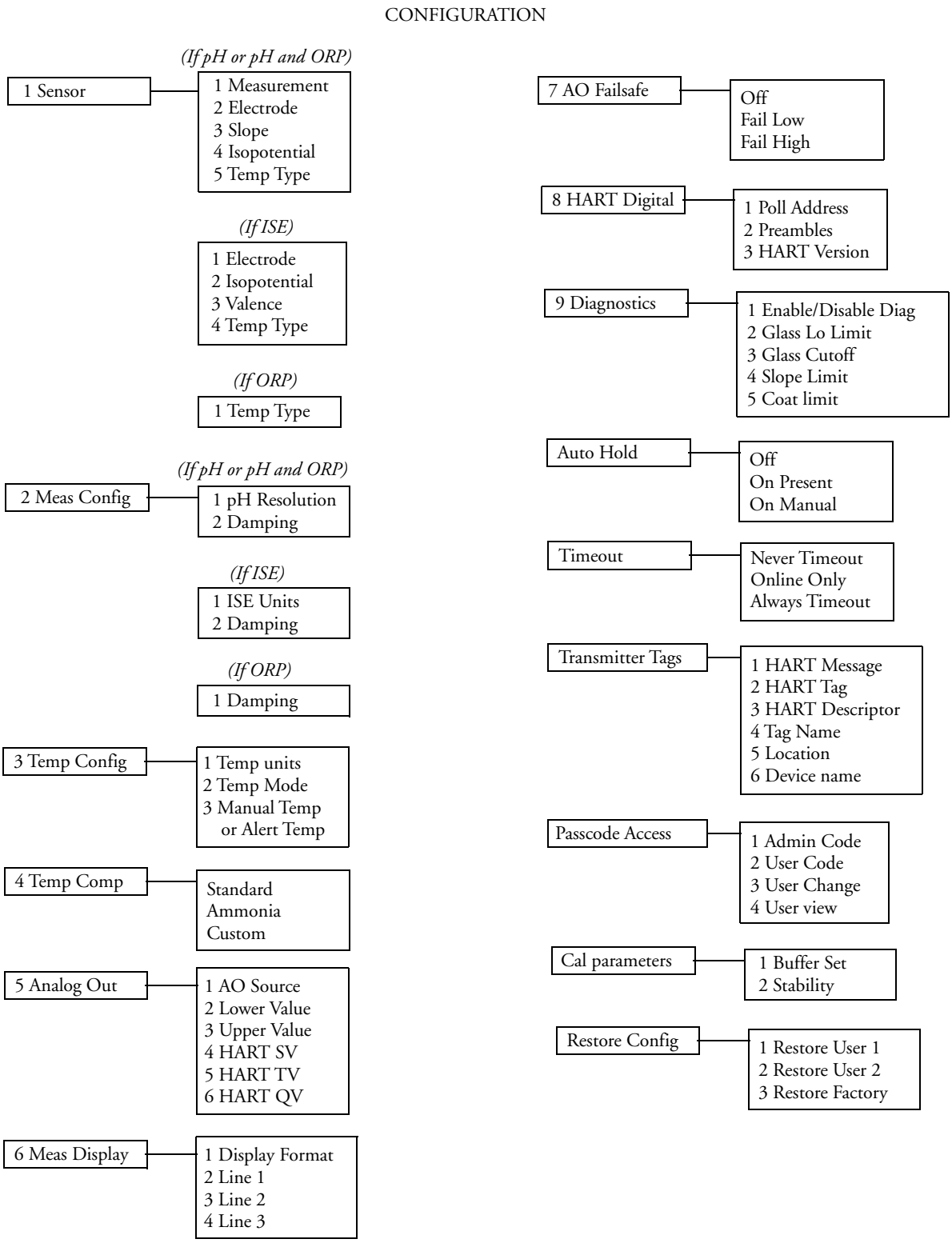
HART Online Menu for 876PH-T

Figure 36. 876PH-T Transmitter Online Menu Tree (1 of 2)



** If the sensor is disconnected, these parameters might continue to display from this menu although they do not apply.

Figure 37. 876PH-T Transmitter Online Menu Tree (2 of 2)



Explanation of Parameters for 876PH-T

NOTE

1. The fast-key path shown is based on a frequently used configuration. If certain parameters are configured off or infrequently used parameters configured on, the fast-key path may be different.
2. For more detailed explanation of parameters, see "Operation Via Local Display" on page 35.
3. You may need to remove blank spaces from certain fields in order to allow for the complete description to be entered.

Parameter	Fast-Key Path	Explanation
1 Measurement Mode		
Measurement	1,1	Displays the measurement value.
Temperature	1,2	Displays the temperature value in specified engineering units.
Absolute	1,3	Displays the absolute (uncompensated) measurement value.
Analog Output	1,4	Displays the analog output in mA.
HART PV	1,5	Displays the HART primary variable.
HART SV	1,6	Displays the HART secondary variable.
HART TV	1,7	Displays the HART tertiary variable.
HART QV	1,8	Displays the HART quaternary variable.
2 Diagnostic Mode		
View Faults	2,1	Displays the most severe fault and other faults if desired.
History Log	2,2	Used to view or erase one or more diagnostic history logs.
Suspend Faults	2,3	Used to suspend faults for one hour.
Resume Faults	2,4	Used to resume suspended faults.
Save Config 1	2,5	Used to save your configuration.
Save Config 2	2,6	Used to save your configuration.
3 Configure Mode		
Sensor	3,1	Path to sensor related parameters.
Measurement	3,1,1	Select the type of measurement (pH, pH and ORP, ISE Concentration, or ORP).
Electrode	3,1,2 (for pH) 3,1,1 (for ISE)	If Measurement is pH or pH and ORP: select Electrode as Glass, Antimony, or Other. If Measurement is ISE: select Electrode (polarity) as Positive or Negative.
Slope	3,1,3	If Electrode is Other: Enter the slope.
Isopotential	3,1,4 (for pH) 3,1,2 (for ISE)	If Measurement is pH, pH and ORP, or ISE: Enter the Isopotential point.
Temp Type	3,1,5 (for pH) 3,1,4 (for ISE) 3,1,1 (for ORP)	Select the Temp Type (RTD) from the picklist provided.
Valence	3,1,3 (for ISE)	If Measurement is ISE: Select the Valence as monovalent or divalent.
Measure Config	3,2	Path to measurement related parameters.
pH Resolution	3,2,1 (for pH)	If measurement is pH: Select pH Resolution as 0.1 or 0.01 pH.

Parameter	Fast-Key Path	Explanation
Damping	3,2,2 (for pH) 3,2,2 (for ISE) 3,2,1 (for ORP)	Enter the damping response time.
ISE Units	3,2,1 (for ISE)	If Measurement is ISE: Select the ISE Unit as ppb, ppm, %, or Custom.
Temp Config	3,3	Path to temperature related parameters.
Temp Units	3,3,1	Select Temp Units as DegC or DegF.
Temp Mode	3,3,2	Select the Temp Mode as Auto or Manual.
Manual Temp	3,3,3	If Temp Mode is Manual: Enter a fixed temperature.
Alert Temp	3,3,3	If Temp Mode is Auto: Enter a temperature alert signal value.
Temp Comp	3,4	If measuring pH or ISE, used to specify temperature compensation as Standard, Ammonia, or Custom.
Analog Out (PV)	3,5	Path to analog output related parameters.
AO Source	3,5,1	Select the AO Source from the picklist provided.
Lower Value	3,5,2	Enter the measurement value that is to produce 4 mA.
Upper Value	3,5,3	Enter the measurement value that is to produce 20 mA.
HART SV	3,5,4	Select the SV measurement from the picklist provided.
HART TV	3,5,5	Select the TV measurement from the picklist provided.
HART QV	3,5,6	Select the QV measurement from the picklist provided.
Meas Display	3,6	Path to display related parameters.
Display Format	3,6,1	Select the Display Format as Single, Double, or Triple.
Line 1	3,6,2	Select the measurement to be displayed on Line 1.
Line 2	3,6,3	Select the measurement to be displayed on Line 2.
Line 3	3,6,4	Select the measurement to be displayed on Line 3.
AO Failsafe	3,7	Used to specify the analog output under fault conditions (Off, Fail Low, Fail High).
HART Digital	3,8	Path to HART related parameters.
Poll Address	3,8,1	Enter the polling address to a number from 0 through 15. A nonzero number specifies multidrop applications.
Preambles	3,8,2	Displays the number of preambles to be sent in a response message from the transmitter to the host.
HART Version (876PH-T only)	3,8,3	Used to specify the HART version.
Diagnostics	3,9	Path to diagnostic related parameters.
Enable/Disable Diag	3,9,1	Turn On or Off the various diagnostics.
Glass Lo Limit	3,9,2	If the Glass diagnostic is On: Enter a low resistance limit.
Glass Cutoff	3,9,3	If the Glass diagnostic is On: Enter a Cutoff temperature.
Slope Limit	3,9,4	If the Low Slope diagnostic is On: Enter the Slope Limit.
Coat Limit	3,9,5	If the Reference Coating diagnostic is On: Enter a Coat (resistance) Limit.
Auto Hold		Used to configure all values and states to be held at their current level (On Present), at a desired level (On Manual) when triggered by a digital signal or when going into Calibration or Configuration mode. Select Off to omit this feature.
Timeout		Used to specify the time in which you are returned to Measure mode when no keyboard input has occurred. Values are Never Timeout, Online Only, or Always Timeout.
Transmitter Tags		Path to tag related parameters.
HART Message		Enter a HART Message (up to 32 characters).
HART Tag		Enter a HART Tag (up to 8 characters).

Parameter	Fast-Key Path	Explanation
HART Descriptor		Enter a HART Descriptor (up to 16 characters).
Tag Name		Enter a Tag Name (up to 14 characters).
Location		Enter a Location (up to 14 characters).
Device Name		Enter a Device name (up to 6 characters).
Passcode Access		Path to passcode related parameters.
Admin Code		Enter a 4-digit Administrator Code.
User Code		Enter a 4-digit User Code.
User Change		Turn On or Off the various parameters the user is allowed to change.
User View		Turn On or Off the various parameters the user is allowed to view.
Cal Parameters		Path to calibration related parameters.
Buffer Set		Select the Buffer from the picklist provided.
Stability		Enter a value (%) for measurement/temperature stability.
Restore Config		Path to restoring the transmitter to a user stored or the factory configuration.
Restore User 1		Enables you to restore a saved user configuration.
Restore User 2		Enables you to restore a saved user configuration.
Restore Factory		Enables you to restore the factory configuration.
4 Status Mode		
Temperature	4,1,1	Displays the temperature measurement.
Temp Status	4,1,2	Displays the status of the temperature measurement.
Absolute	4,1,3	Displays the absolute measurement.
Absolute Status	4,1,4	Displays the status of the absolute measurement.
Temp Sensor	4,1,5	Displays the temperature sensor resistance.
T Sensor Status	4,1,6	Displays the status of the temperature sensor.
Measurement	4,1,7	Displays the measurement.
Meas Status	4,1,8	Displays the status of the measurement.
Glass	4,1,9	Displays the resistance of the glass electrode.
Glass Status		Displays the status of the glass electrode.
Reference		Displays the reference junction resistance.
Reference Status		Displays the statue of the reference junction.
Calibrated By		Displays the name of the last operator.
Calib Date		Displays the date of last calibration (dd/mm/yyyy).
Slope (mV)		Displays the change in mV/pH or mV/decade of the most recent calibration.
Slope (%)		Displays the deviation in percent of the slope of the most recent calibration compared to the standard.
Asymmetry		Displays the asymmetry potential (mV difference between the theoretical isopotential point and the actual point due to the most recent calibration.
Response Time		Displays sensor stability response time.
Lo Cal Point		Displays values at the lower calibration point.
Hi Cal Point		Displays values at higher calibration point.
Analog Output		Displays the value of the analog output.
Analog Output Status		Displays the status of the analog output.
HART PV		Displays the HART primary variable.
PV Status		Displays the status of the HART primary variable.
HART SV		Displays the HART secondary variable.
SV Status		Displays the status of the HART secondary variable.

Parameter	Fast-Key Path	Explanation
HART TV		Displays the HART tertiary variable.
TV Status		Displays the status of the HART tertiary variable.
HART QV		Displays the HART quaternary variable.
QV Status		Displays the status of the HART quaternary variable.
Model Code		Displays the transmitter model code.
Sales Order		Displays the transmitter sales order number.
Xmtr Serial Number		Displays the analyzer serial number.
Firmware Revision		Displays the firmware revision level.
Front End Revision		Displays the front end revision level.
Boot Revision		Displays the boot revision level.
Transmitter Type		Displays the transmitter type.
In Service		Displays the time in service in days.
HART Tag		Displays the HART Tag name.
HART Long Tag		Displays the HART Long Tag name (versions 6 and 7).
Tag Name		Displays the tag name.
Location		Displays the location of the measurement.
Device Name		Displays the device name.
HART Descriptor		Displays the HART descriptor.
HART Message		Displays the HART message.
5 Calibrate Mode		
Calibrated By	5,1	Path to calibrating parameters.
Calibrate	5,2	Enter the name of the person calibrating the device and the date of calibration.
mA Cal	5,2,1	Used to perform a mA Cal calibration.
Measurement	5,2,2	Used to perform a measurement calibration.
Temperature	5,2,3	Used to perform a temperature calibration.
ORP	5,2,4	Used to perform an ORP calibration.
ORP Restore	5,2,5	Used to restore an uncompensated ORP output.
6 Hold Xmtr Output		
Off	6,1	Used to release the transmitter from Hold state.
On Present	6,2	Used to hold all values and states at their current level.
On Manual	6,3	Used to hold all values and states at desired levels.
7 DD Revision		Displays the DD Revision level.

7. Maintenance

⚠ DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION, OR ARC FLASH

This product contains components that have critical safety characteristics. Do not substitute components. Replace components only with identical factory supplied components. Component substitution may impair the electrical safety of this equipment and its suitability for use in hazardous locations.

Failure to follow these instructions will result in death or serious injury.

The maintenance of the 876PH Transmitter is limited to replacement of the bezel/keypad assembly, the display printed wiring assembly (PWA), the processor PWA and the loop power (MAU) PWA. Attempts to repair printed wiring assemblies could result in damage and voiding of the warranty. The recommended repair procedure is return of the transmitter to the factory for repair. For additional information, refer to PL 611-260.

To replace parts, refer to Figure 38.

Figure 38. Exploded View of 876PH Transmitter

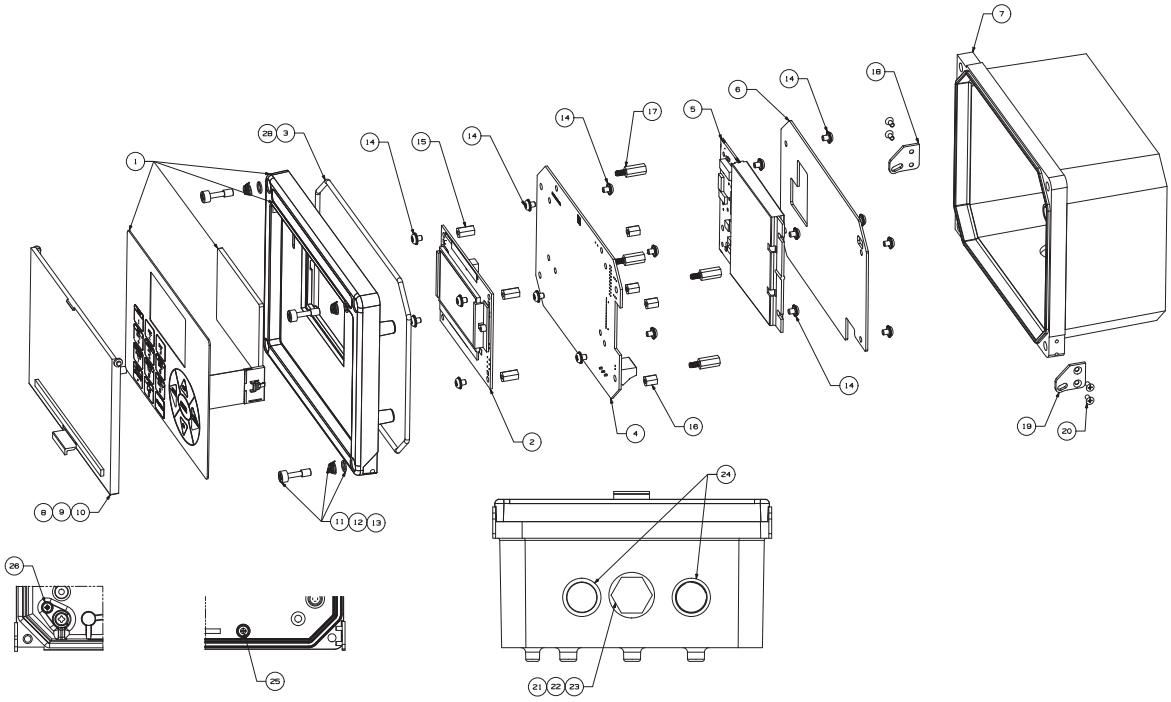
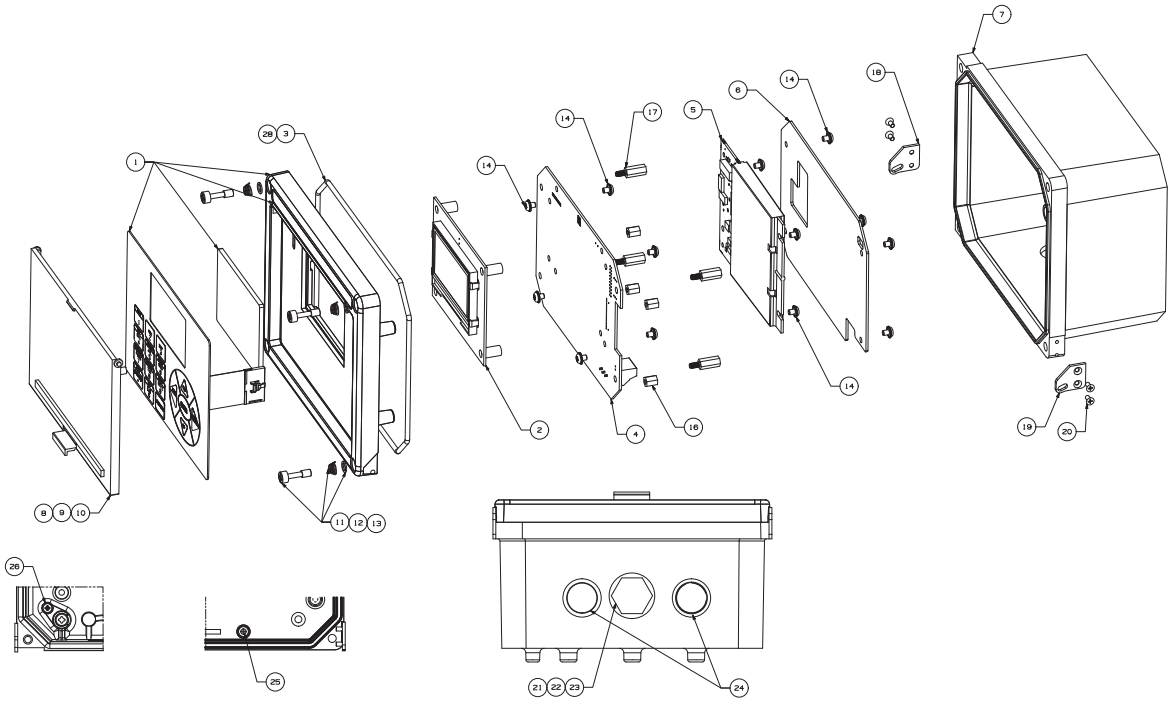


Figure 39. Exploded View of 876PH-S Transmitter



⚠ DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION, OR ARC FLASH

Before replacing parts, verify that power is turned off.

Failure to follow these instructions will result in death or serious injury.

NOTICE

POTENTIAL GENERATION OF ELECTROSTATIC CHARGE

This unit uses printed wiring assemblies with components that are highly susceptible to damage from electrostatic discharge (ESD). Relatively low static potential can rupture sensitive components resulting in degraded device characteristics or failure.
All printed wiring assemblies must be handled with the user grounded via a conductive wrist strap (between 100 Ω and 1 MΩ).

Failure to follow these instructions can result in equipment damage.

Replacing the Bezel/Keypad Assembly (Item 1)

1. Unscrew the four Screws (Item 11) on the corners of the bezel/keypad assembly and open the assembly downward.

NOTICE
HAZARD OF EQUIPMENT DAMAGE
The bezel/keypad does not open a full 180°. Do not press on it while wiring.
Failure to follow these instructions can result in equipment damage.

2. Remove four Screws (Item 14) and remove the Safety Cover (Item 6).
3. Remove four Standoffs (Item 17), remove the ribbon cable, and carefully lift off stack of boards.
4. Remove screw (Item 26) that helps secure the ground wire (Item 25) to the bezel/keypad assembly (Item 1).
5. Remove one of the two door Hinges (Item 18 or 19) by removing the two Screws (Item 20) that helps secure it. Remove the door.
6. Install the new door by reversing Steps 1 though 5.

NOTICE
HAZARD OF EQUIPMENT DAMAGE
When positioning stack of boards on the bezel/keypad assembly bosses, carefully fold the flex ground strap over the lower left boss.
Failure to follow these instructions can result in equipment damage.

Replacing the Loop Power (MAU) PWA (Item 5)

1. Unscrew the four screws (Item 1) on the corners of the bezel/keypad assembly and open the assembly downward

NOTICE
HAZARD OF EQUIPMENT DAMAGE
The bezel/keypad does not open a full 180°. Do not press on it while wiring.
Failure to follow these instructions can result in equipment damage.

2. Remove the wires from power terminals.
3. Remove four Screws (Item 14) and remove the Safety Cover (Item 6).
4. Remove the four Screws (Item 14) that helps secure the MAU PWA (Item 5) to the Standoffs (Item 16).
5. Grasping the MAU PWA on both sides, carefully lift it straight up and off.
6. Install the new MAU PWA by reversing Steps 1 though 5.

Replacing the Processor PWA (Item 4)

1. Remove the MAU PWA as described immediately above.
2. Remove the wires from sensor terminals.
3. Remove the four Screws (Item 14) that helps secure the Processor PWA (Item 4) to the Standoffs (Item 15).
4. Remove four Standoffs (Item 17) and save them.
5. Carefully separate the Processor PWA (Item 4) and Display PWA (Item 7).
6. Remove the four Screws (Item 14) and Standoffs (Item 16) from the Processor PWA (Item 4) and save them.
7. Install the new Processor PWA by reversing Steps 1 though 6.

Replacing the Display PWA (Item 2)

1. Unscrew the four screws (Item 14) on the corners of the bezel/keypad assembly and open the assembly downward.

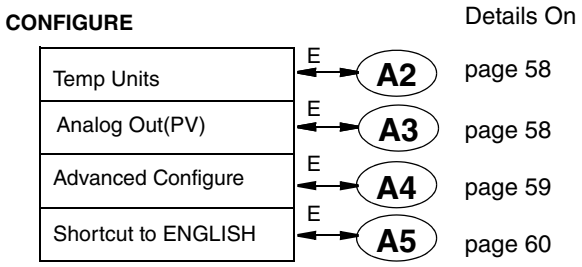
NOTICE
HAZARD OF EQUIPMENT DAMAGE
The bezel/keypad does not open a full 180°. Do not press on it while wiring.
Failure to follow these instructions can result in equipment damage.

2. Remove the wires from power terminals.
3. Remove four Screws (Item 14) and remove the Safety Cover (Item 6).
4. Remove four Standoffs (Item 17), remove the ribbon cable, and carefully lift off stack of boards.
5. Remove the four screws (Item 14) that helps secure the Display PWA to Standoffs (Item 15).
6. Carefully separate the Processor PWA (Item 4) and Display PWA (Item 2).
7. Install the new Display PWA by reversing Steps 1 though 6.

Appendix A. Configuration Structure Diagrams for 876PH-S

876PH-S Transmitter

Figure 40. Configuration Top Level Structure



NOTE

Before entering Configuration mode, you must first enter a proper passcode. The factory default passcode is `0800`.

Figure 41. Temperature Units

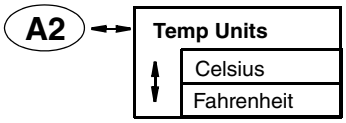
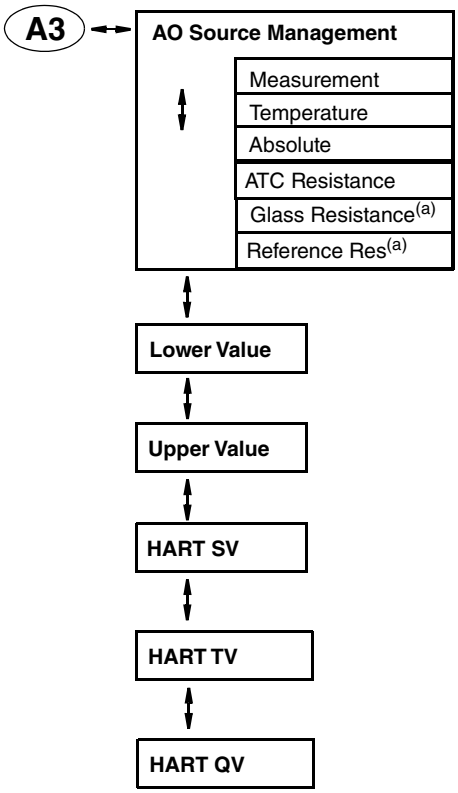


Figure 42. Analog Out(PV) Structure



(a) Only when associated diagnostics are enabled.

Figure 43. Advanced Configuration

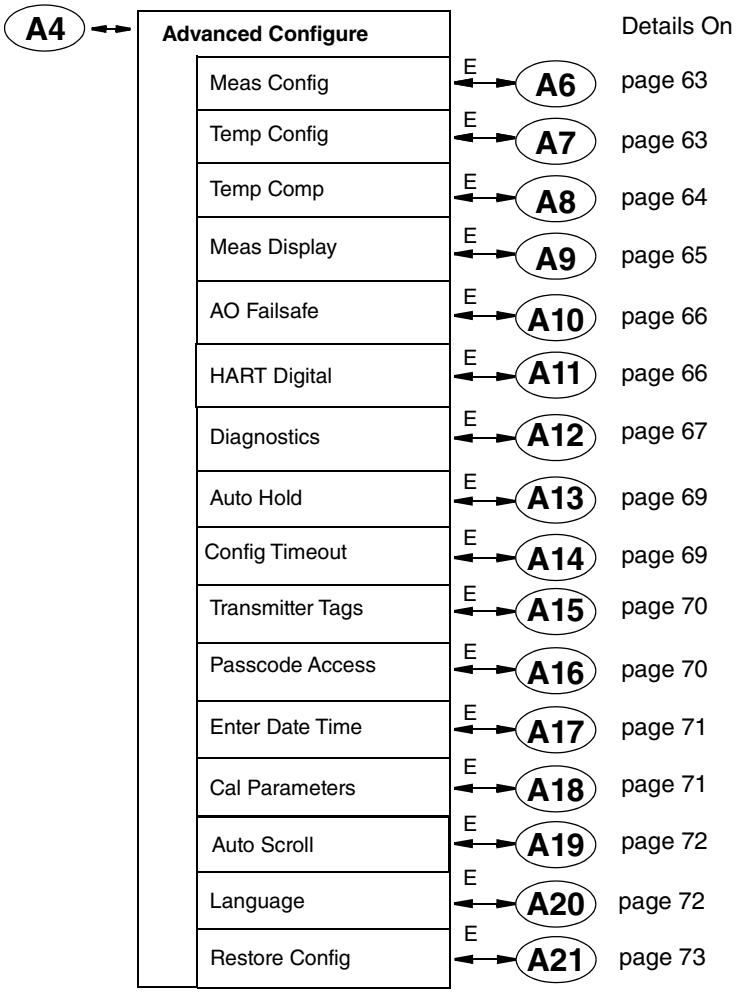


Figure 44. Shortcut to ENGLISH

Figure 45. Measurement Configuration Structure

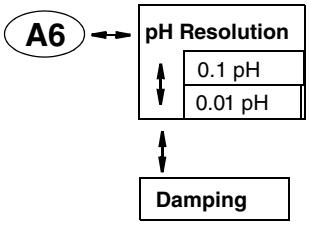


Figure 46. Temperature Configuration Structure

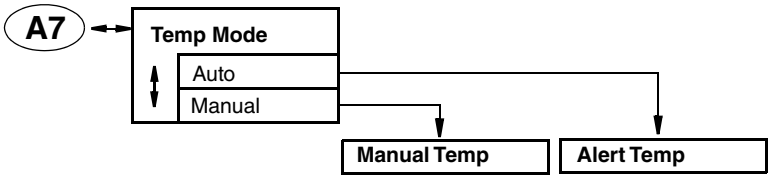
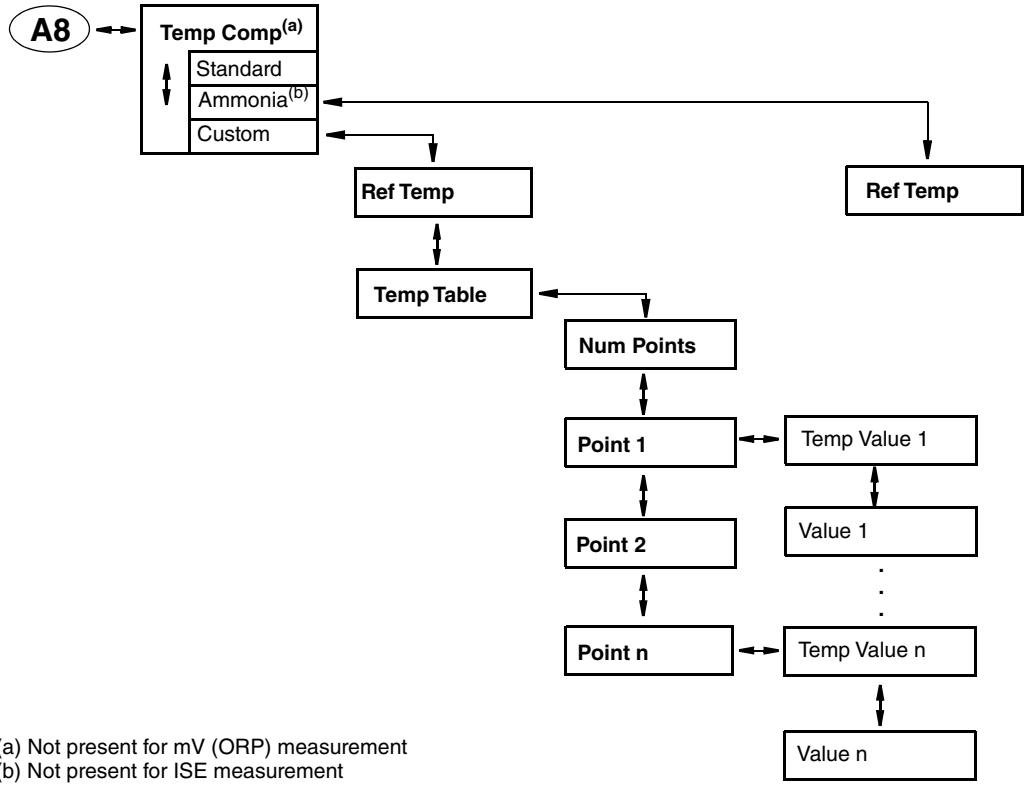


Figure 47. Temperature Compensation Structure



(a) Not present for mV (ORP) measurement
(b) Not present for ISE measurement

Figure 48. Measurement Display Format Structure

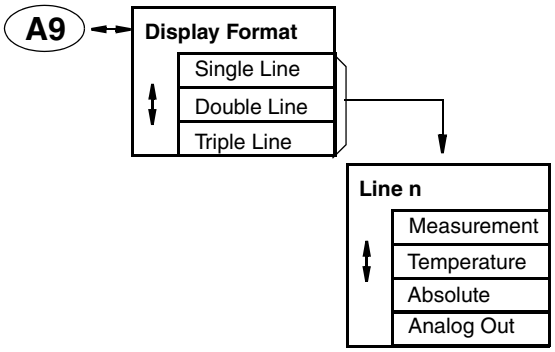


Figure 49. AO Failsafe Structure

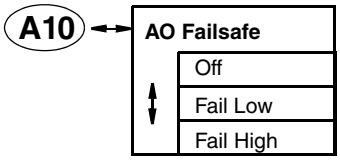


Figure 50. HART Digital Structure

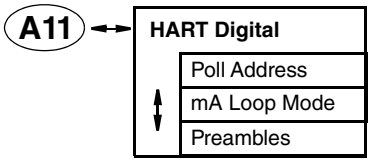
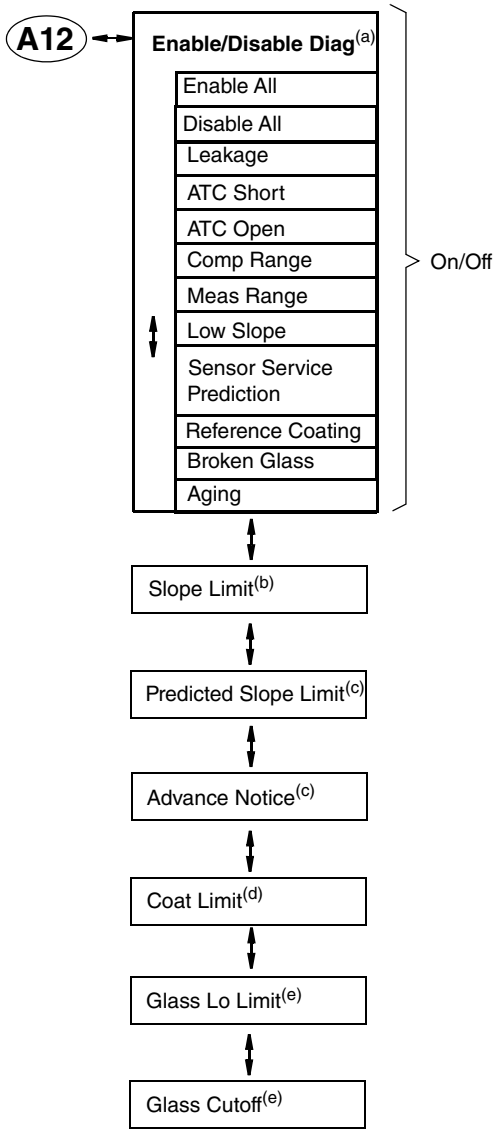
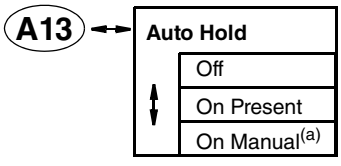


Figure 51. Diagnostics Structure



(a) Selections are limited by your configuration of measurement
(b) If Low Slope configured On
(c) If Sensor Lifetime Prediction configured On
(d) If Reference Coating configured On
(e) If Broken Glass Configured On

Figure 52. Auto Hold Structure



(a) If set to On Manual, the transmitter uses the factory settings for AO Hold, PV Hold, SV Hold, TV Hold, and QV Hold.

Figure 53. Config Timeout Structure

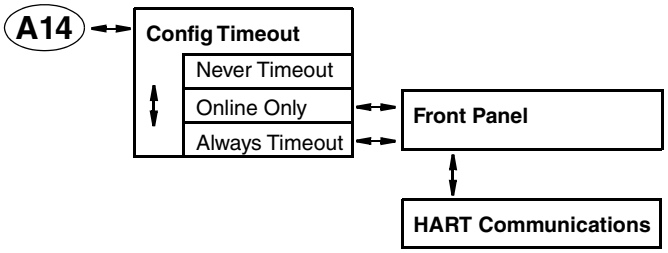


Figure 54. Transmitter Tags Structure

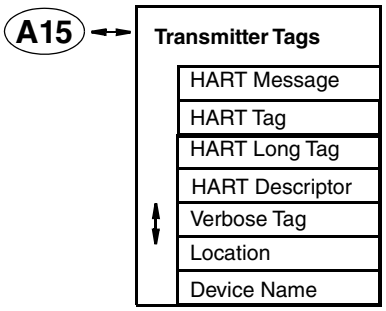


Figure 55. Passcode Access Structure

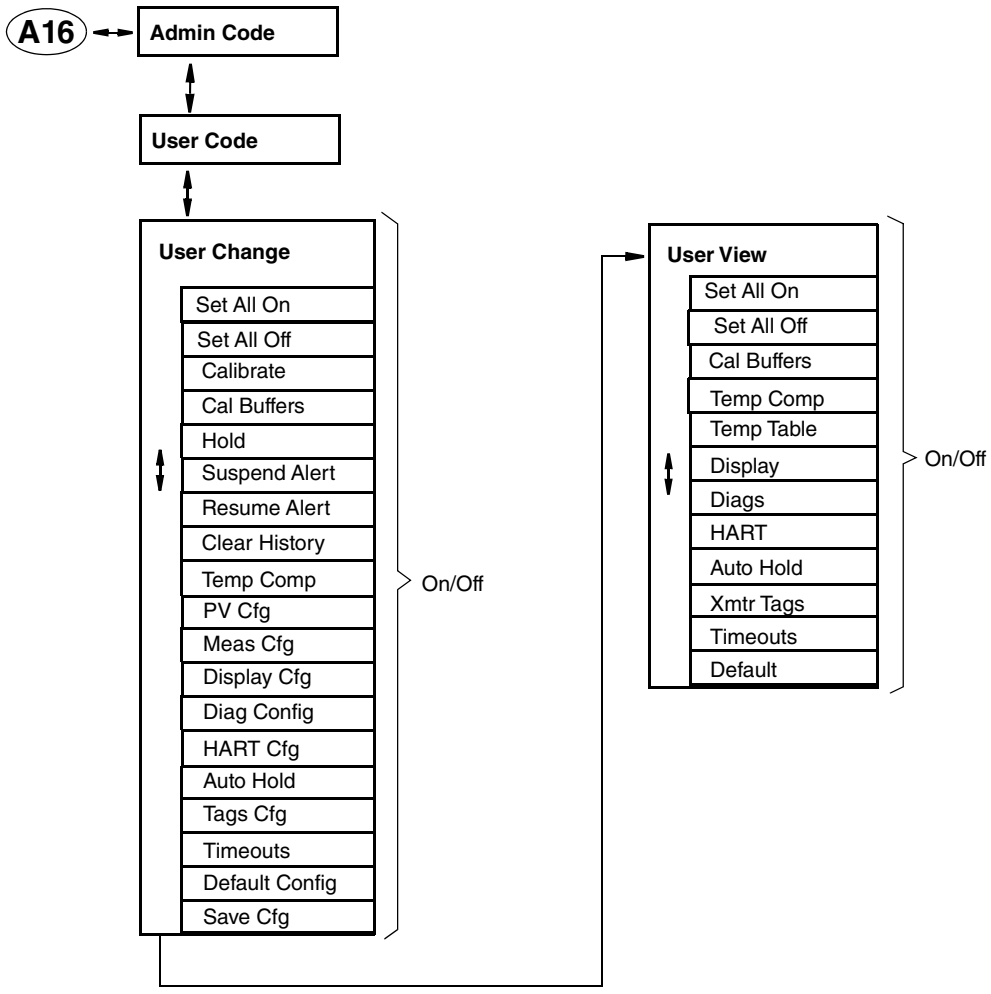


Figure 56. Enter Date Time Structure

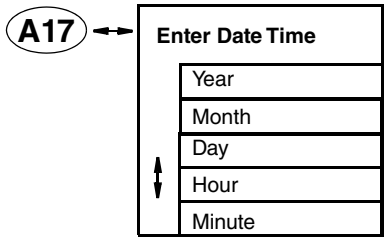
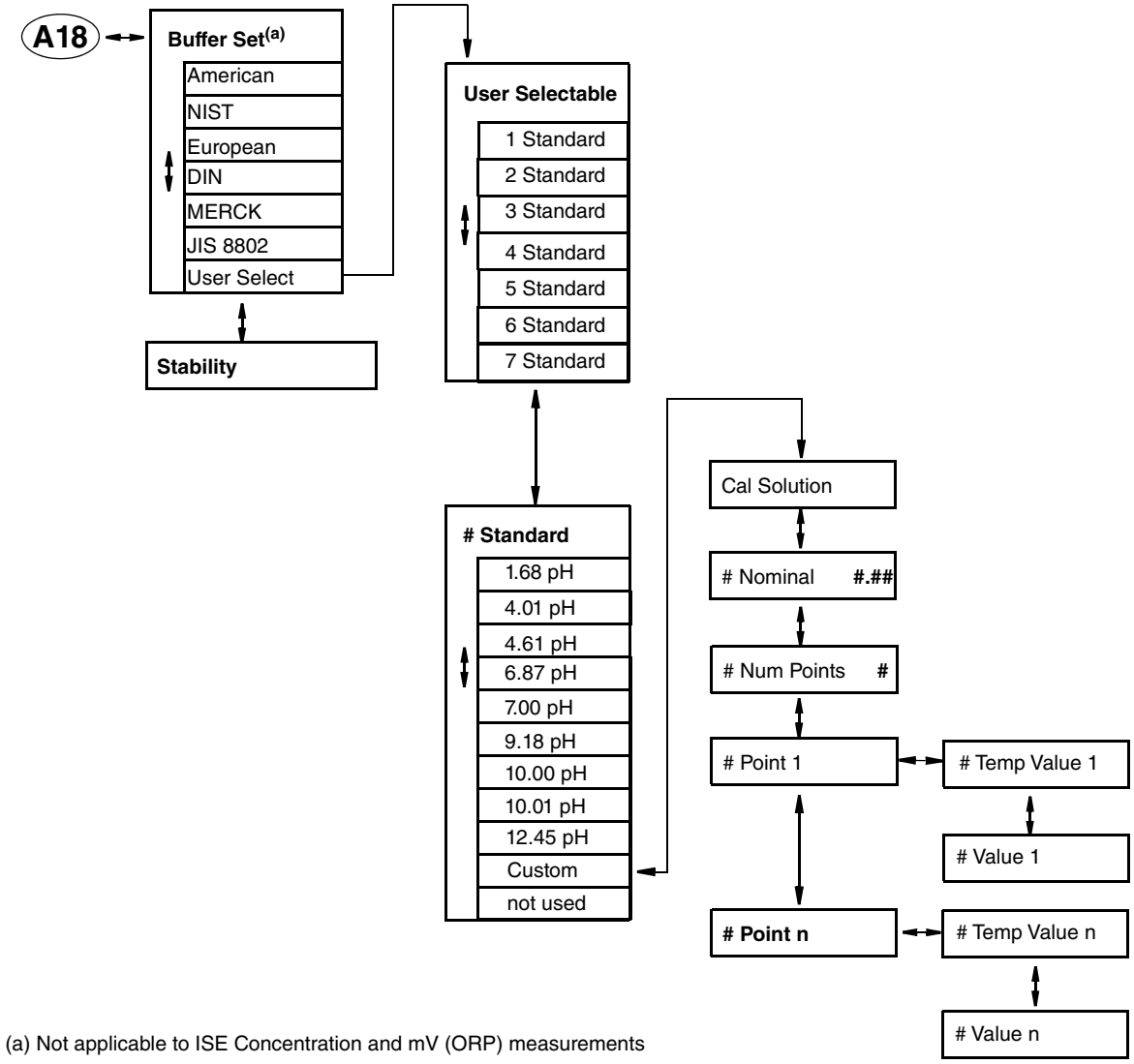


Figure 57. Calibration Parameters Structure



(a) Not applicable to ISE Concentration and mV (ORP) measurements

Figure 58. Auto Scroll

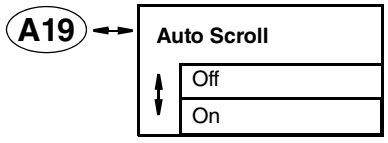


Figure 59. Language Structure

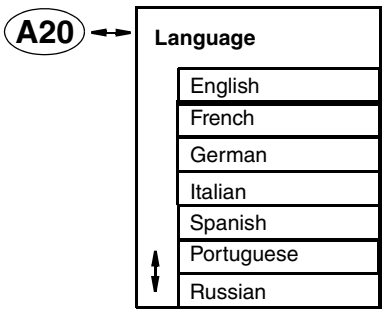
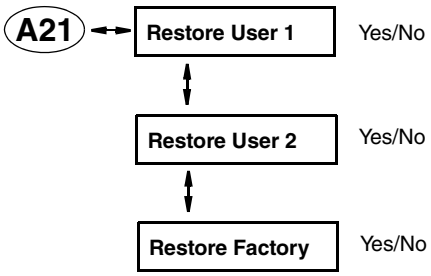


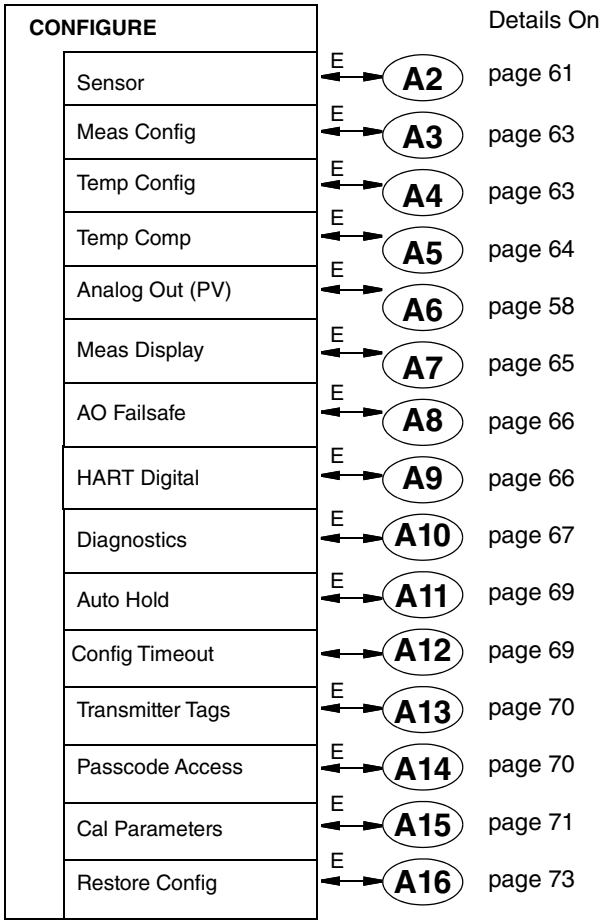
Figure 60. Restore Config Structure



Appendix B. Configuration Structure Diagrams for 876PH-T

876PH-T Transmitter

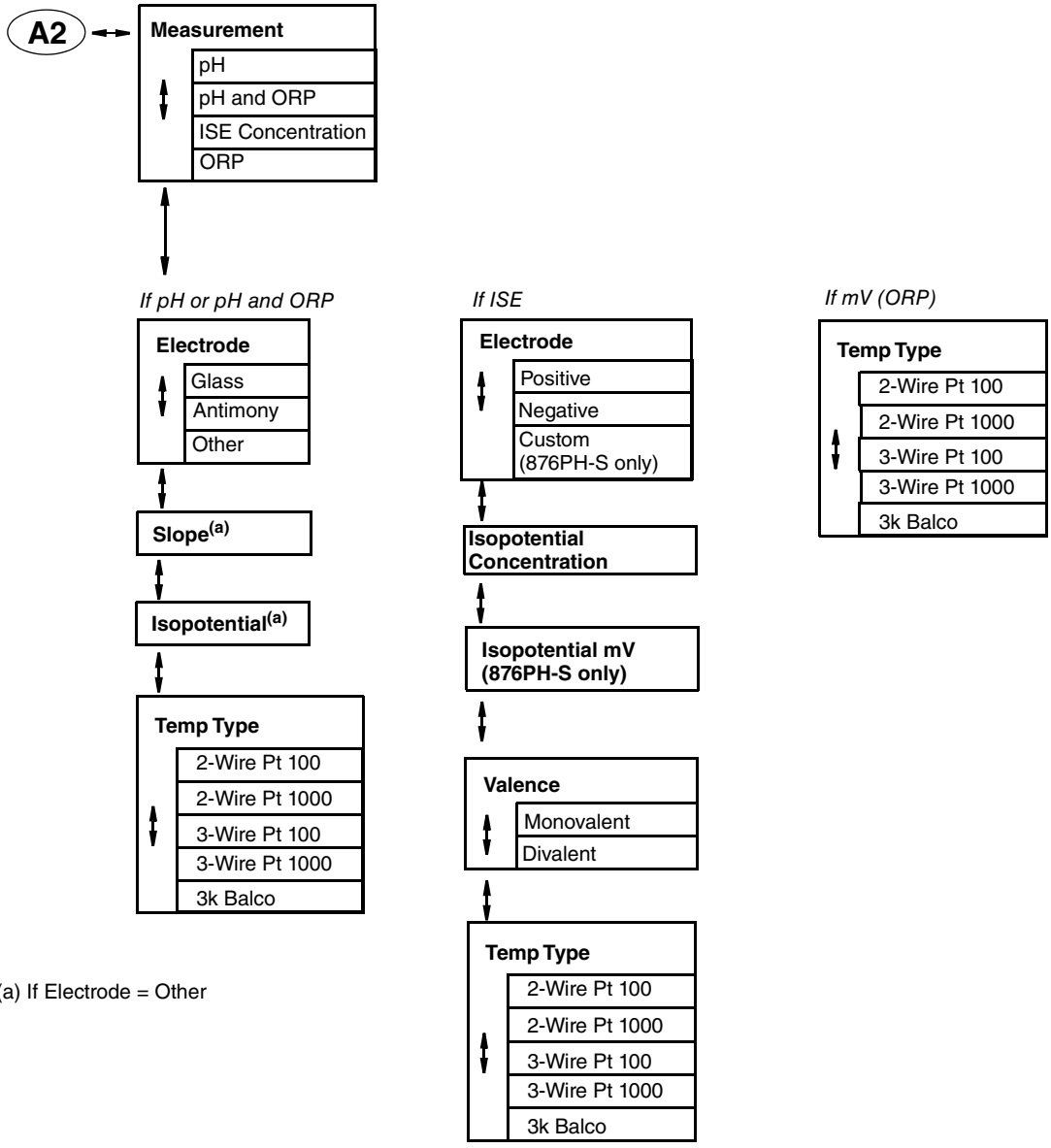
Figure 61. Configuration Top Level Structure



NOTE

1. Before entering Configuration mode, you must first enter a proper passcode. The factory default passcode is `0800`.
2. The Sensor option is available with 876PH-T only.

Figure 62. Sensor Configuration Structure for 876PH-T Only



(a) If Electrode = Other

Figure 63. Measurement Configuration Structure

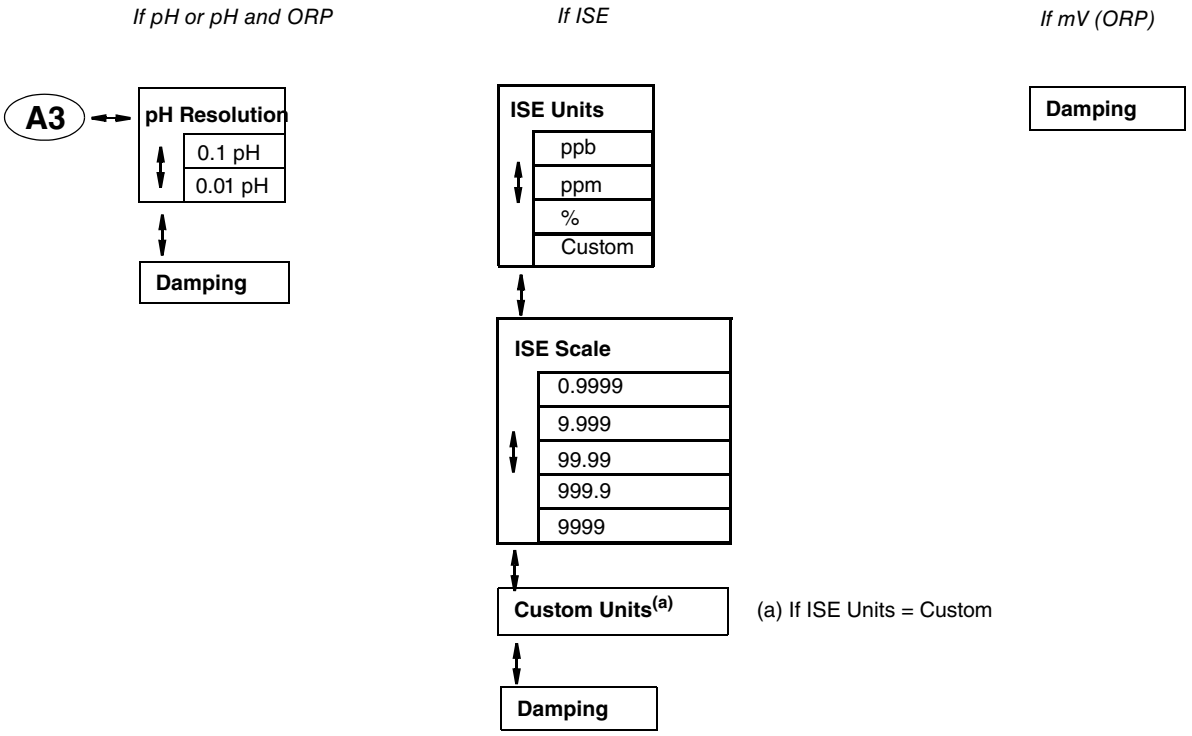


Figure 64. Temperature Configuration Structure

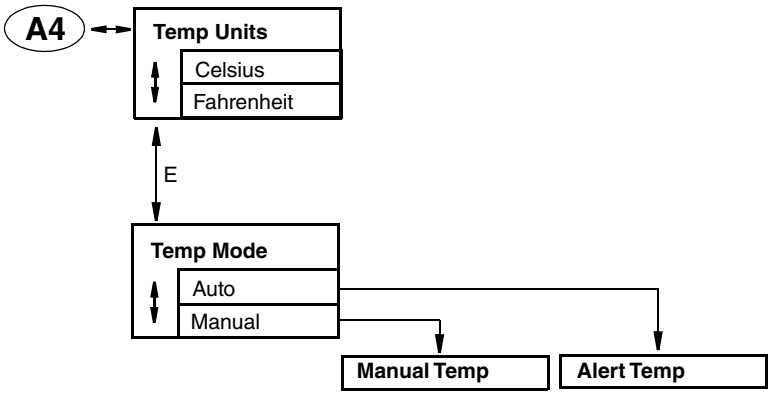
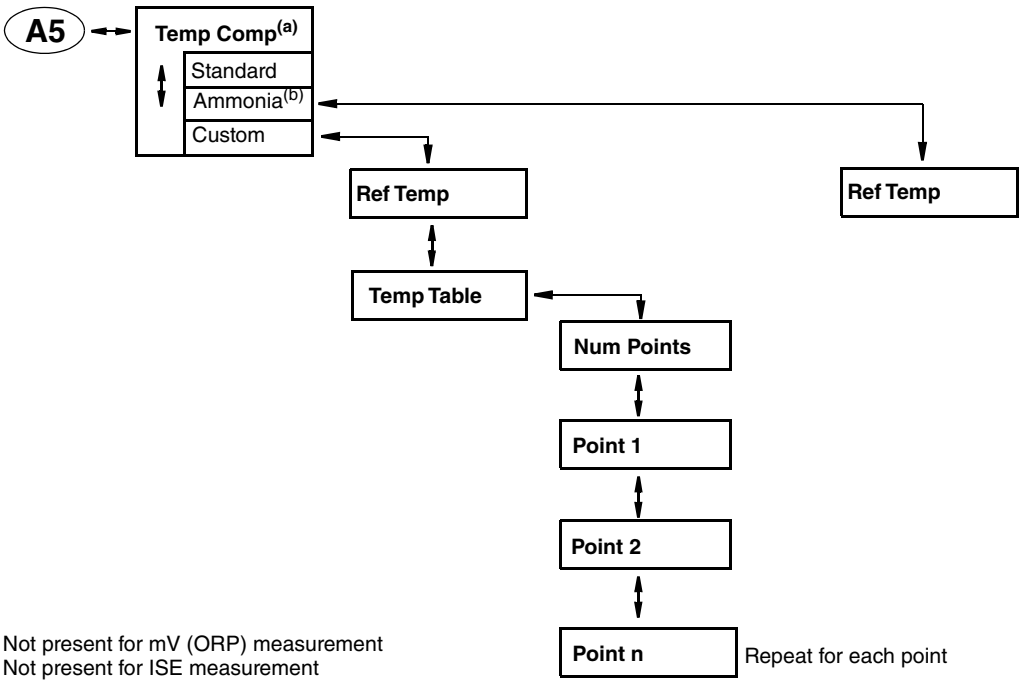


Figure 65. Temperature Compensation Structure



(a) Not present for mV (ORP) measurement
(b) Not present for ISE measurement

Figure 66. Analog Output Structure

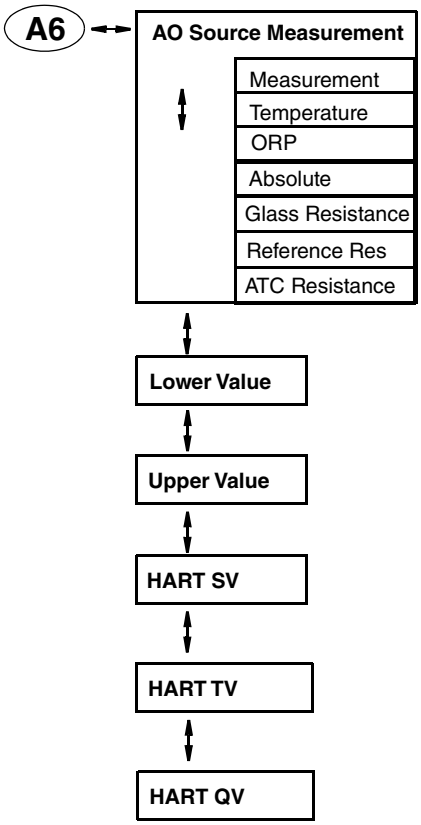
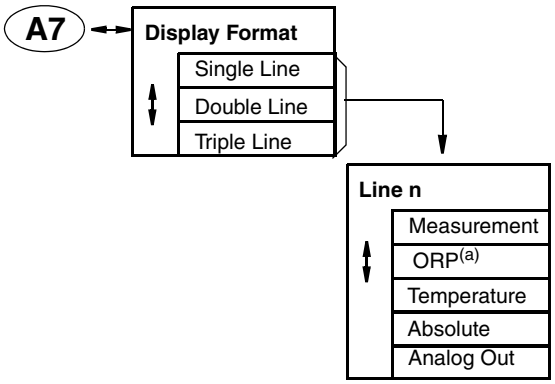


Figure 67. Measurement Display Format Structure



(a) only if Sensor selection was pH and ORP

Figure 68. AO Failsafe Structure

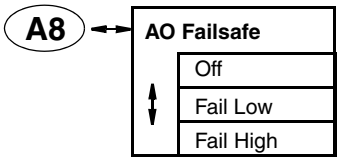


Figure 69. HART Digital Structure

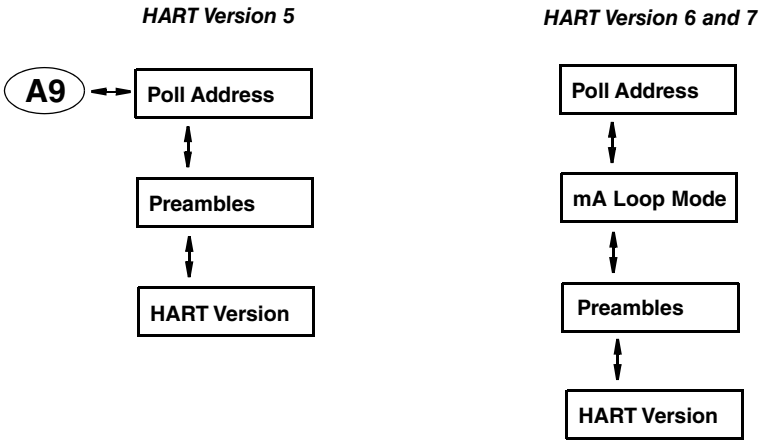
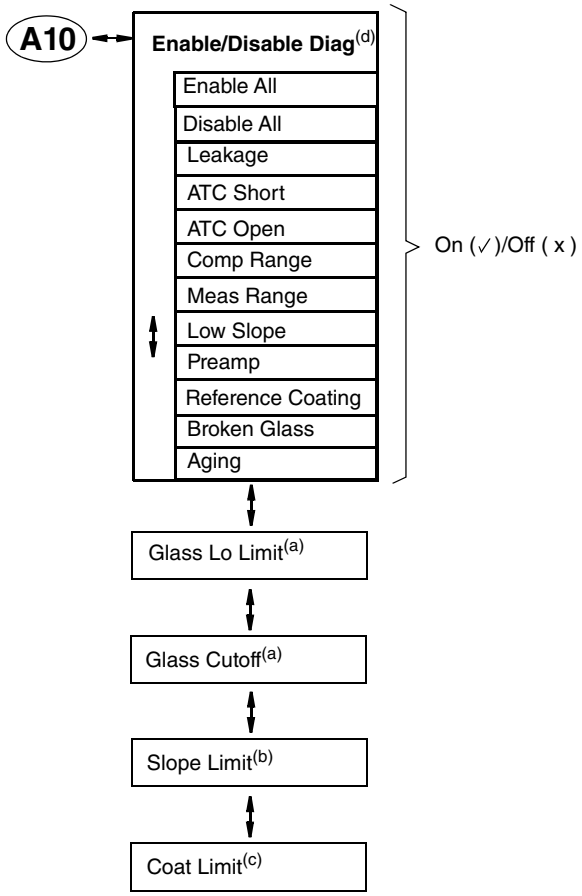


Figure 70. Diagnostics Structure



(a) If Broken Glass Configured On
(b) If Slope configured On
(c) If Reference Coating configured On
(d) Selections are limited by your configuration of measurement

Figure 71. Auto Hold Structure

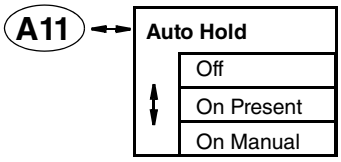


Figure 72. Config Timeout Structure

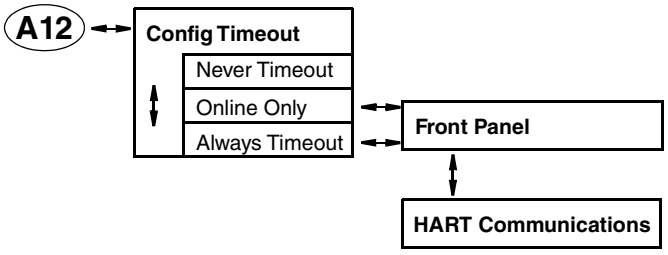


Figure 73. Transmitter Tags Structure

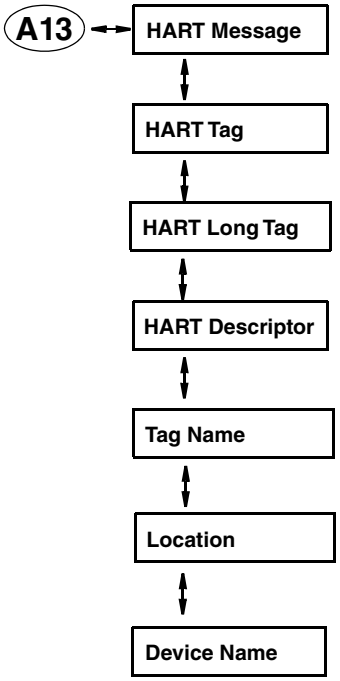
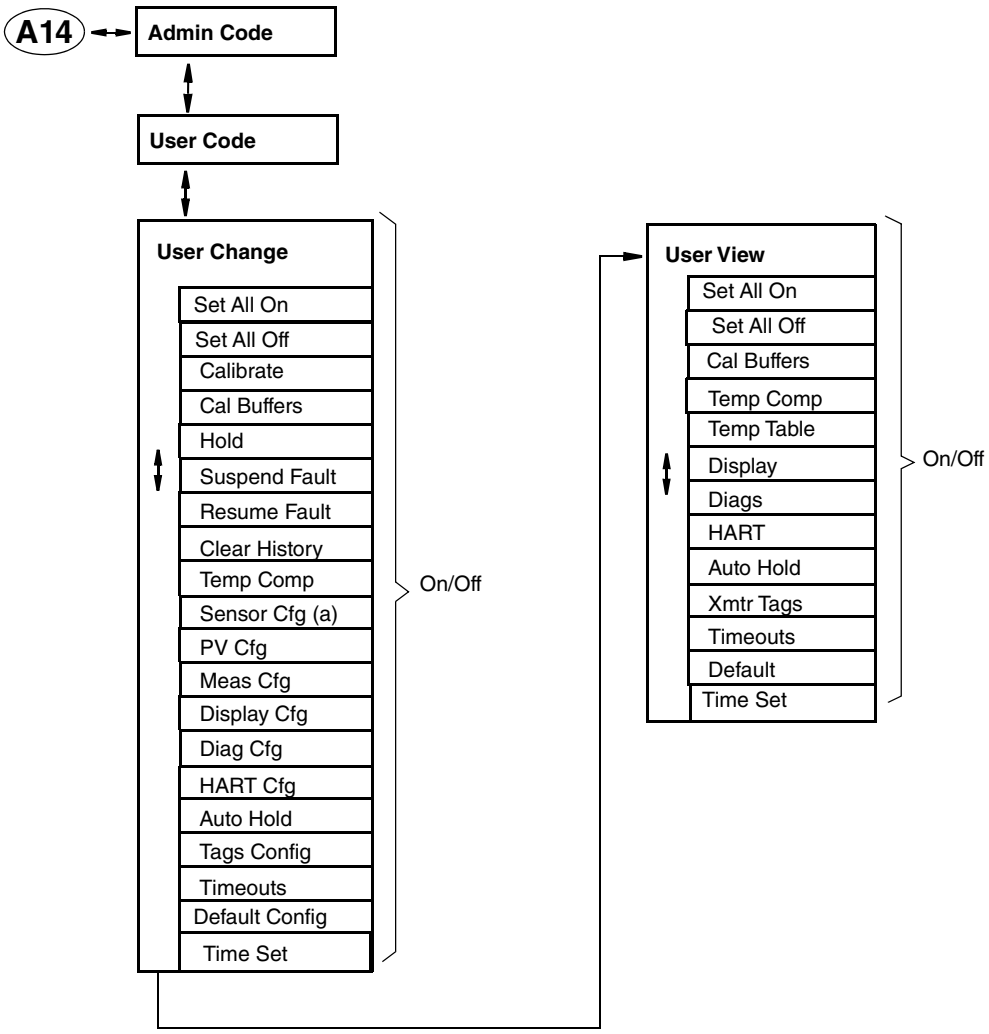
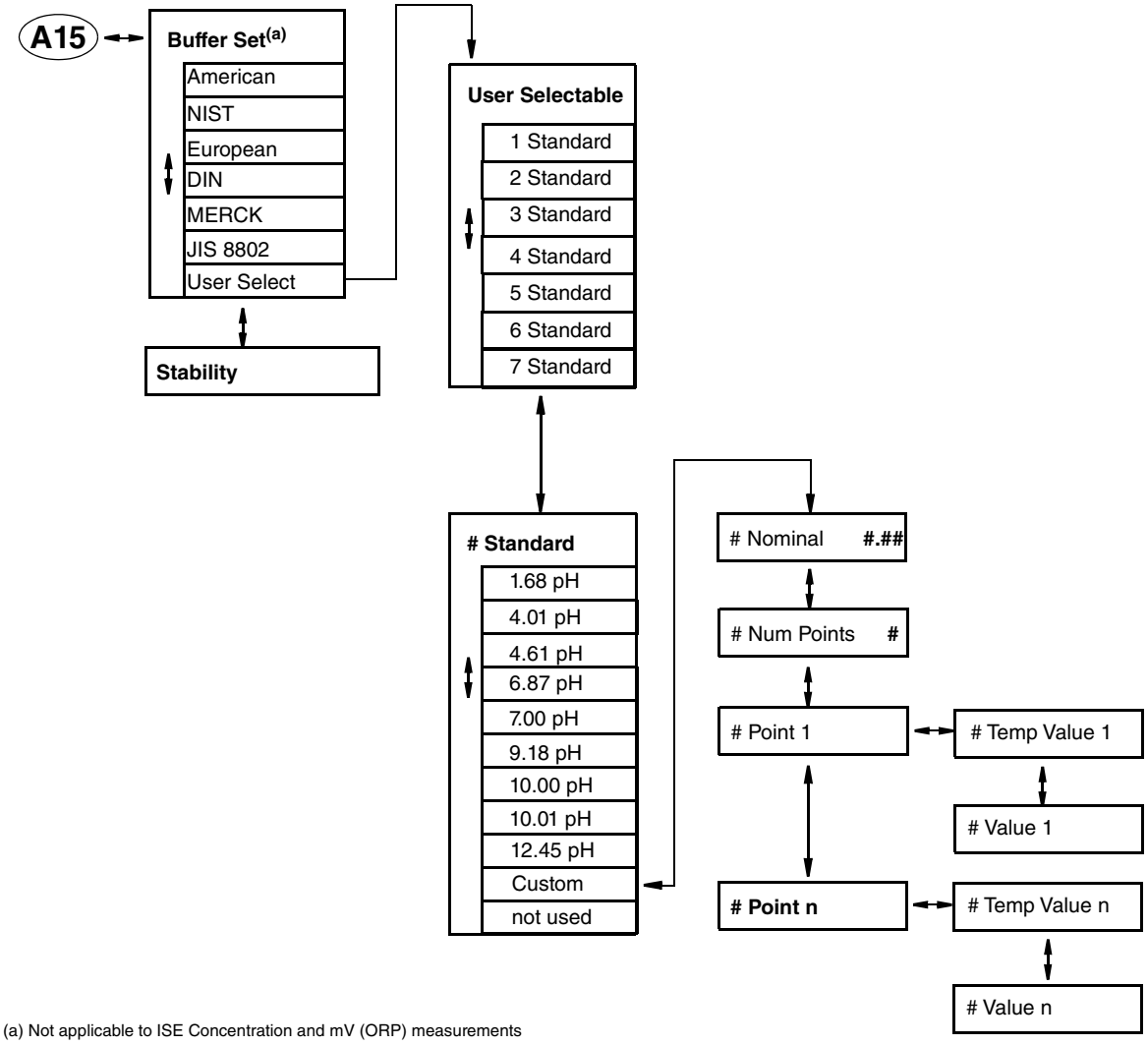


Figure 74. Passcode Access Structure



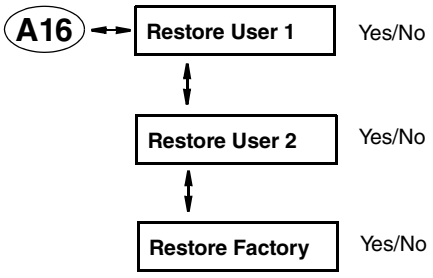
(a) Only applies to 876PH-T.

Figure 75. Calibration Parameters Structure



(a) Not applicable to ISE Concentration and mV (ORP) measurements

Figure 76. Restore Config Structure



Appendix C. Configuration Table

This appendix contains information that helps you configure your transmitter. The information is presented in the form of a table containing each prompt/parameter, its limits, and its factory default value. It also provides space for you to record your specific configuration and notations.

NOTE

Bold print in the Factory Configuration column indicates the configuration resulting from the Configure Factory Defaults menu.

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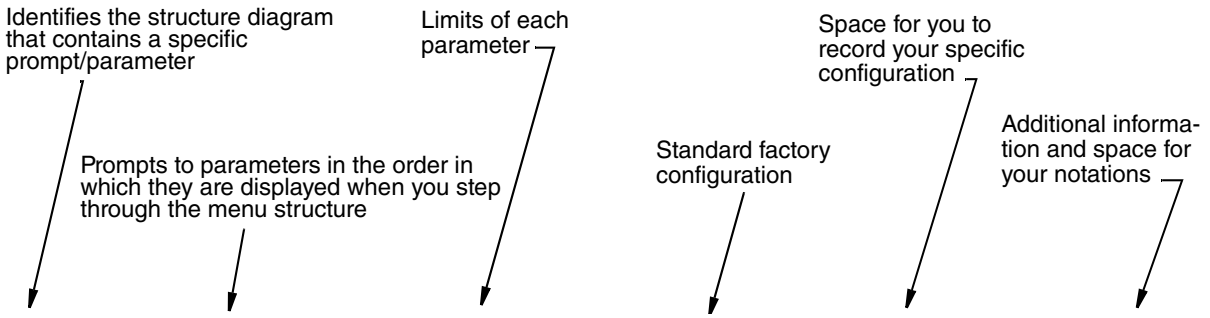

Figure	Prompt/Parameter	Parameter Limits	Factory Configuration	User Configuration	Remarks and Notes
A-1	Config	Temp Units Analog Out(PV) Advance Configure Shortcut to ENGLISH			
A-2	Temp Units	Celsius, Fahrenheit	**Celsius**		
A-3	Analog Out (PV)	- - -	- - -		
	AO Source Measurement	Measurement, Temperature, Absolute, ATC Resistance, Glass Resistance, Reference Res	**Measurement**		Glass Resistance and Reference Res only if appropriate diagnostic is enabled.
	Lower Value		**0 pH**		At 4 mA
	Upper Value		**14 pH**		At 20 mA
	HART SV	Measurement, Temperature, ORP, Absolute, Glass Resistance, Reference Res, ATC Resistance	**Temperature**		
	HART TV		**Absolute**		
	HART QV		**ATC Resistance**		

Figure	Prompt/Parameter	Parameter Limits	Factory Configuration	User Configuration	Remarks and Notes
A-4	Advanced Config	Meas Config Temp Config Temp Comp Meas Display AO Failsafe HART Digital Diagnostics Auto Hold Config Timeout Transmitter Tags Passcode Access Enter Date Time Cal Parameters Auto Scroll Language Restore Config			
A-5	Shortcut to ENGLISH				
A-6	Meas Config	- - -	- - -		
	pH Resolution	0.1 pH, 0.01 pH	**0.01 pH**		
	Damping	0 to 300 seconds	**0**		In seconds
A-7	Temp Config	- - -	- - -		
	Temp Mode	Auto, Manual	**Auto**		
	Manual Temp		**25°C**		If Temp Mode = Manual
	Alert Temp		**25°C**		If Temp Mode = Auto
A-8	Temp Compensation	- - -	- - -		
	Temp Comp	Standard, Ammonia, Custom	**Standard**		
	Ref Temp	-30 through +200 by 0.1°C -4 through +392 by 0.1°F	**25°C**		If Temp Comp = Custom
	Temp Table	- - -	- - -		
	Num of Points	2 through 21	**2**		
	Point n				
	Temperature		**-30°C, +200°C**		
	Value		**7.1, 7.0**		
A-9	Meas Display	- - -	- - -		
	Display Format	Single Line, Double Line, Triple Line	**Double**		
	Line 1	Measurement, Temperature, Absolute, Analog Out	**Measurement**		
	Line 2		**Temperature**		
	Line 3		**Absolute**		
A-10	AO Failsafe	- - -	- - -		
	AO Failsafe	Off, Fail Low, Fail High	**Off**		
A-11	HART Digital	- - -	- - -		
	Poll Address	0 - 63	**0**		
	mA Loop Mode	Active, Multi-Drop	**Active**		
	Preambles		**7**		

Figure	Prompt/Parameter	Parameter Limits	Factory Configuration	User Configuration	Remarks and Notes
A-12	Diagnostics	- - -	- - -		
	Leakage	On, Off	**Off**		
	ATC Short	On, Off	**Off**		
	ATC Open	On, Off	**Off**		
	Comp Rng	On, Off	**Off**		
	Meas Rng	On, Off	**Off**		
	Low Slope	On, Off	**Off**		
	Reference Coating	On, Off	**Off**		
	Broken Glass	On, Off	**Off**		
	Aging	On, Off	**Off**		
	Sensor Service Prediction	On, Off	**On**		
	Slope Limit	0 through 100%	**80.0**		If Low Slope is enabled.
	Predicted Slope Limit	50 to 90%	**80%**		If Sensor Service Prediction is enabled.
	Advance Notice	0 to 30 days	**10 days**		
	Coat Limit	0 through 200 kΩ	**40**		If Coated Ref enabled
	Glass Lo Limit	0.10 and 1.10 M Ω	**1.0**		If Broken Glass enabled.
	Glass Cutoff	-30 through +200°C	**50°C**		If Broken Glass enabled.
A-13	Auto Hold	- - -	- - -		
	Auto Hold	Off, On Present, On Manual	**On Manual**		See end of this table
	If Auto Hold is set to On Manual, the transmitter hold output value limits and factory configuration is as follows:				
	AO Hold	3.6 to 22 mA	**3.6 mA**		
	PV Hold	(per source)	**7 pH**		
	SV Hold	(per source)	**25°C**		
	TV Hold	(per source)	**0 mV**		
	QV Hold	(per source)	**1097.3 Ω**		
A-14	Config Timeout	Never Timeout Online Only Always Timeout	**Always Timeout**		
	Front Panel	30 to 999	**600**		
	HART Communications	30 to 999	**999**		
A-15	Transmitter Tags	- - -	- - -		
	HART Message	32 characters	(blank)		
	HART Tag	8 characters	(blank)		
	HART Long Tag	32 characters	(blank)		
	HART Descriptor	16 characters	(blank)		
	Verbose Tag	14 characters	**(blank)**		
	Location	14 characters	**(blank)**		
	Device Name	6 characters	**(blank)**		

Figure	Prompt/Parameter	Parameter Limits	Factory Configuration	User Configuration	Remarks and Notes
A-16	Passcode Access	- - -	- - -		
	Admin Code	0000 to 9999	**0800**		
	User Code	0000 to 9999	**0800**		
	User Change	- - -	- - -		
	Calibrate	On, Off	**On**		
	Cal Buffers	On, Off	**Off**		
	Hold	On, Off	**On**		
	Suspend Alert	On, Off	**Off**		
	Resume Alert	On, Off	**Off**		
	Clear History	On, Off	**Off**		
	Temp Comp	On, Off	**On**		
	PV Cfg	On, Off	**On**		
	Meas Cfg	On, Off	**On**		
	Display Cfg	On, Off	**On**		
	Diag Cfg	On, Off	**Off**		
	HART Cfg	On, Off	**Off**		
	Auto Hold	On, Off	**Off**		
	Tags Cfg	On, Off	**Off**		
	Timeouts	On, Off	**Off**		
	Default Cfg	On, Off	**Off**		
	User View	- - -	- - -		
	Cal Buffers	On, Off	**On**		
	Temp Comp	On, Off	**On**		
	Temp Table	On, Off	**On**		
	Display	On, Off	**On**		
	Diags	On, Off	**On**		
	HART	On, Off	**On**		
	Auto Hold	On, Off	**On**		
	Xmtr Tags	On, Off	**On**		
	Timeouts	On, Off	**On**		
	Default	On, Off	**On**		
	Time Set	Year range: 2000 to 2100 Month range: 1 to 12 Day range: 1 to 31	1/1/2000 0:0 hours		876PH-S only This is set for the U.S. Eastern Time Zone.
A-17	Enter Date Time	Year (2000 to 2100) Month (1 to 12) Date of Month (1 to 32) Hour (1 to 23) Minute (1 50 59)			

Figure	Prompt/Parameter	Parameter Limits	Factory Configuration	User Configuration	Remarks and Notes
A-18	Cal Parameters	- - -	- - -		
	Buffer Set	American, NIST, European, DIN, MERCK, JIS 8802, User Select	**American**		
	Stability	25% through 1000%	**100**		pH
	User Select	Standard 1, 2, 3, 4, 5, 6, 7	- - -		
	# Standard	1.68, 4.01, 4.61, 6.87, 7.00, 9.18, 10:00, 10.01, 12.45, Custom, not used	**American buffer set**		
	# Nominal				
	# Num Points	1 through 21			
	# Point n		- - -		
	# Temp Value n				
	# Value n				
A-19	Auto Scroll	On, Off	**On**		
A-20	Language	English French German Italian Spanish Portuguese Russian	**English**		
A-21	Restore Config	- - -	- - -		
	Restore User 1	Yes, No	No		
	Restore User 2	Yes, No	No		
	Restore Factory	Yes, No	No		

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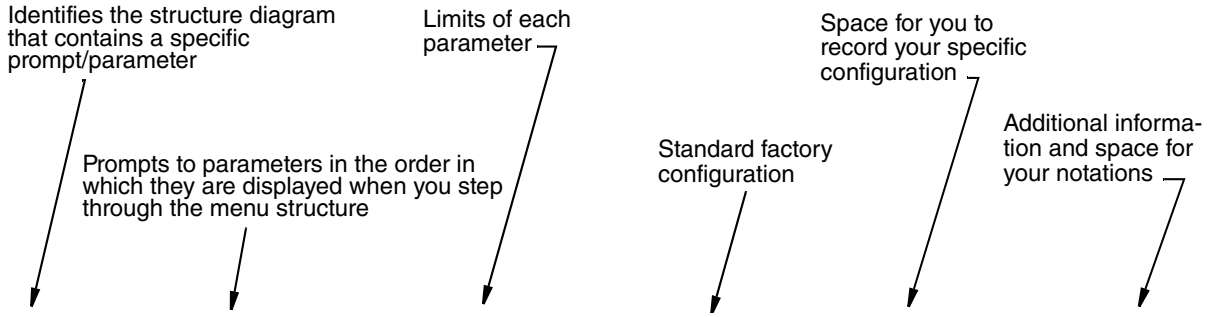

Figure	Prompt/Parameter	Parameter Limits	Factory Configuration	User Configuration	Remarks and Notes
A-1	Config	Sensor Meas Config Temp Config Temp Comp Analog Out (PV) Meas Display AO Failsafe HART Digital Diagnostics Auto Hold Config Timeout Transmitter Tags Passcode Access Cal Parameters Restore Config			

Figure	Prompt/Parameter	Parameter Limits	Factory Configuration	User Configuration	Remarks and Notes
A-2	Sensor	- - -	- - -		It is available only with 876PH-T. A2 is pre-configured in each -S sensor. It is not available to the user.
	Measurement	pH, pH and ORP, ISE Concentration, ORP	pH		
	If Measurement = pH or pH and ORP				
	Electrode	Glass, Antimony, Other	Glass		
	Slope	-100 to +100 mV/pH	-59.16		If Electrode = Other
	Isopotential	pH: -2 through +16 pH ISE: 1.0 through 999.00	7		If Electrode = Other
	Temp Type	2-Wire Pt 100 Ω, 2-Wire Pt 1000 Ω 3-Wire Pt 100 Ω 3-Wire Pt 1000 Ω 3 kΩ Balco	3-Wire Pt 1000 Ω		
	If Measurement = ISE Concentration				
	Electrode	Positive, Negative	Glass		
	Isopotential	-2000 to +2000 ppm	100		
	Valence	Monovalent, Divalent	Monovalent		
	Temp Type	2-Wire Pt 100 Ω, 2-Wire Pt 1000 Ω 3-Wire Pt 100 Ω 3-Wire Pt 1000 Ω 3 kΩ Balco	3-Wire Pt 1000 Ω		
	If Measurement = mV (ORP)				
	Temp Type	2-Wire Pt 100 Ω, 2-Wire Pt 1000 Ω 3-Wire Pt 100 Ω 3-Wire Pt 1000 Ω 3 kΩ Balco	3-Wire Pt 1000 Ω		
A-3	Meas Config	- - -	- - -		
	If Measurement = pH or pH and ORP				
	pH Resolution	0.1 pH, 0.01 pH	0.01 pH		
	Damping	0 to 300 seconds	0		In seconds
	If Measurement = ISE Concentration				
	ISE Units	ppb, ppm, %, Custom	ppm		
	ISE Scale	0.9999. 9.999, 99.99, 999.9, 9999	99.99		
	Custom Units		(blank)		If ISE Units = Custom
	Damping	0 to 300 seconds	0		In minutes and seconds
	If Measurement = mV (ORP)				
	Damping	0 to 300 seconds	0		In minutes and seconds
A-4	Temp Config	- - -	- - -		
	Temp Units	Celsius, Fahrenheit	Celsius		
	Temp Mode	Auto, Manual	Auto		
	Manual Temp		25°C		If Temp Mode = Manual
	Alert Temp		25°C		If Temp Mode = Auto

Figure	Prompt/Parameter	Parameter Limits	Factory Configuration	User Configuration	Remarks and Notes
A-5	Temp Comp	- - -	- - -		
	Temp Comp	Standard, Ammonia, Custom	Standard		Not if Measurement = mV(ORP
	Ref Temp	-30 through +200 by 0.1°C -4 through +392 by 0.1°F	25°C		If Temp Comp = Custom
	Temp Table	- - -	- - -		
	Num of Points	2 through 21	2		
	Point n				
	Temperature		-30°C, +200°C		
	Value		7.1, 7.0		
A-6	Analog Out (PV)	- - -	- - -		
	AO Source Meas	Measurement, Temperature, ORP, Absolute, Glass Resistance, Reference Res, ATC Resistance	Measurement		
	Lower Value		0 pH		At 4 mA
	Upper Value		14 pH		At 20 mA
	HART SV	Measurement, Temperature, ORP, Absolute, Glass Resistance, Reference Res, ATC Resistance	Temperature		
	HART TV		Absolute		
	HART QV		ATC Resistance		
A-7	Meas Display	- - -	- - -		
	Display Format	Single Line, Double Line, Triple Line	Double		
	Line 1	Measurement, ORP, Temperature, Absolute, Analog Out	Measurement		ORP only if Measurement = pH and ORP
	Line 2		Temperature		
	Line 3		Absolute		
A-8	AO Failsafe	- - -	- - -		
	AO Failsafe	Off, Fail Low, Fail High	Off		
A-9	HART Digital	- - -	- - -		
	Poll Address	0 - 63 (HART Version 7)	0		
	mA Loop Mode	Active, Multi-Drop			HART Version 7
	Preambles		7		
	HART Version	5, 6, 7	7		
A-10	Diagnostics	- - -	- - -		
	Leakage	On, Off	Off		
	ATC Short	On, Off	Off		
	ATC Open	On, Off	Off		
	Comp Rng	On, Off	Off		
	Meas Rng	On, Off	Off		
	Low Slope	On, Off	Off		
	Preamp	On, Off	Off		
	Reference Coating	On, Off	Off		
	Broken Glass	On, Off	Off		
	Aging	On, Off	Off		
	Slope Limit	0 through 100%	80.0		
	Coat Limit	0 through 200 kΩ	40		If Coated Ref enabled
	Glass Lo Limit	0.10 and 1.10 M Ω	1.0		If Broken Glass enabled.
	Glass Cutoff	-30 through +200°C	50°C		If Broken Glass enabled.

Figure	Prompt/Parameter	Parameter Limits	Factory Configuration	User Configuration	Remarks and Notes
A-11	Auto Hold	- - -	- - -		
	Auto Hold	Off, On Present, On Manual	On Manual		See end of this table
	If Auto Hold is set to On Manual, the transmitter hold output value limits and factory configuration is as follows:				
	AO Hold	3.6 to 22 mA	3.6 mA		
	PV Hold	(per source)	7 pH		
	SV Hold	(per source)	25°C		
	TV Hold	(per source)	0 mV		
	QV Hold	(per source)	1097.3 Ω		
A-12	Config Timeout	Never Timeout Online Only Always Timeout	Always Timeout		
	Front Panel	30 to 999	600		
	HART Communications	30 to 999	999		
A-13	Transmitter Tags	- - -	- - -		
	HART Message	32 characters	(blank)		
	HART Tag	8 characters	(blank)		To restore factory settings (blank fields), set Config/ Restore Cfg = Factory.
	HART Long Tag	32 characters	(blank)		To restore factory settings (blank fields), set Config/ Restore Cfg = Factory.
	HART Descriptor	16 characters	(blank)		
	Tag Name	14 characters	(blank)		
	Location	14 characters	(blank)		
	Device Name	6 characters	(blank)		

Figure	Prompt/Parameter	Parameter Limits	Factory Configuration	User Configuration	Remarks and Notes
A-14	Passcode Access	- - -	- - -		
	Admin Code	0000 to 9999	0800		
	User Code	0000 to 9999	0800		
	User Change	- - -	- - -		
	Calibrate	On, Off	On		
	Cal Buffers	On, Off	Off		
	Hold	On, Off	On		
	Suspend Fault	On, Off	Off		
	Resume Fault	On, Off	Off		
	Clear History	On, Off	Off		
	Temp Comp	On, Off	On		
	Sensor Cfg	On, Off	On		876PH-T only
	PV Cfg	On, Off	On		
	Meas Cfg	On, Off	On		
	Display Cfg	On, Off	On		
	Diag Cfg	On, Off	Off		
	HART Cfg	On, Off	Off		
	Auto Hold	On, Off	Off		
	Tags Cfg	On, Off	Off		
	Timeouts	On, Off	Off		
	Default Cfg	On, Off	Off		
	User View	- - -	- - -		
	Cal Buffers	On, Off	On		
	Temp Comp	On, Off	On		
	Temp Table	On, Off	On		
	Display	On, Off	On		
	Diags	On, Off	On		
	HART	On, Off	On		
	Auto Hold	On, Off	On		
	Xmtr Tags	On, Off	On		
	Timeouts	On, Off	On		
	Default	On, Off	On		
	Time Set	Year range: 2000 to 2100 Month range: 1 to 12 Day range: 1 to 31	1/1/2000 0:0 hours		876PH-S only This is set for the U.S. Eastern Time Zone.
A-15	Cal Parameters	- - -	- - -		
	Buffer Set	American, NIST, European, DIN, MERCK, JIS 8802, User Select	American		
	Stability	25% through 1000%	100		pH
	User Select	Standard 1, 2, 3, 4, 5, 6, 7	- - -		
	# Standard	1.68, 4.01, 4.61, 6.87, 7.00, 9.18, 10:00, 10.01, 12.45, Custom, not used	American buffer set		
	# Nominal				
	# Num Points	1 through 21			
	# Point n		- - -		
	# Temp Value n				
	# Value n				

Figure	Prompt/Parameter	Parameter Limits	Factory Configuration	User Configuration	Remarks and Notes
A-16	Restore Config	- - -	- - -		
	Restore User 1	Yes, No	No		
	Restore User 2	Yes, No	No		
	Restore Factory	Yes, No	No		

ISSUE DATES

MAY 2010	JUN 2016	MAY 2018
AUG 2010	DEC 2016	AUG 2018
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MAR 2015	FEB 2018	

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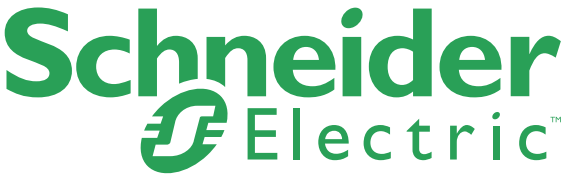

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