

## **ST 800 Series HART/DE Option User's Manual**

**34-ST-25-38**

**Revision 5.0**

**July, 2014**

# Copyrights, Notices and Trademarks

---

© Copyright 2014 by Honeywell, Inc.

Revision 5, July 2014

While the information in this document is presented in good faith and believed to be accurate, Honeywell disclaims any implied warranties of merchantability and fitness for a particular purpose and makes no express warranties except as may be stated in the written agreement with and for its customers. In no event is Honeywell liable to anyone for any indirect, special, or consequential damages. The information and specifications in this document are subject to change without notice.

Honeywell, TDC 3000, SFC, SmartLine, PlantScape, Experion PKS, and TotalPlant are registered trademarks of Honeywell International Inc. Other brand or product names and service marks are the property of their respective owners.

**Honeywell Process Solutions  
1860 Rose Garden Lane  
Phoenix, AZ 85027**

# About This Manual

This manual provides the details of programming Honeywell ST 800 SmartLine Pressure Transmitters for applications involving HART versions 5, 6, and 7 and Honeywell's Digitally Enhanced (DE) communication protocols. For installation, wiring, and maintenance information refer to the *ST 800 SmartLine Pressure Transmitter User Manual*, document number 34-ST-25-35.

The configuration of your Transmitter depends on the mode of operation and the options selected for it with respect to operating controls, displays and mechanical installation. Details for operations involving the Honeywell Multi-Communication (MC) Toolkit (MCT202) are provided only to the extent necessary to accomplish the tasks-at-hand. Refer to the associated MCT202 User Manual for complete details. The "Reference" section in the front matter of this manual lists document titles and numbers.

The ST 800 SmartLine Pressure transmitter can be digitally integrated with one of two systems:

- Experion PKS: you will need to supplement the information in this document with the data and procedures in the *Experion Knowledge Builder*.
- Honeywell's TotalPlant Solutions (TPS): you will need to supplement the information in this document with the data in the *PM/APM SmartLine Transmitter Integration Manual*, which is supplied with the TDC 3000 book set. (TPS is the evolution of the TDC 3000).

---

## Release Information

*ST 800 Series HART/DE Option User Manual*, Document # 34-ST-25-38 (this document)  
Rev. 1.0, October, 2012 – First Release  
Rev. 2.0, January 2013 – Calibration updates  
Rev. 3.0, February 2014 – Dual/Triple Cal and PILD added  
Rev.4.0, May 2014 – Factory Cal and PILD Upgrade Options  
Rev.5.0, July 2014 – PILD License/firmware updates

---

## References

The following list identifies publications that may contain information relevant to the information in this document.

*ST 800 SmartLine Pressure Transmitter Quick Start Installation Guide*, # 34-ST-25-36  
*ST 800 & ST 700 SmartLine Pressure Transmitter w/ HART Comms Safety Manual*, 34-ST-25-37  
*ST 800 SmartLine Pressure Transmitter User Manual*, # 34-ST-25-35  
*ST 800 Transmitter with FOUNDATION Fieldbus Option & Function Blocks Installation & Device Reference*, # 34-ST-25-39  
*MC Toolkit User Manual*, Document # 34-ST-25-20  
*PM/APM SmartLine Transmitter Integration Manual*, # PM 12-410  
*ST 800 Series Pressure, Analog, HART and DE Communications form*, Drawing #50049892  
*Smart Field Communicator Model STS 103 Operating Guide*, Document # 34-ST-11-14  
*Technical Bulletin, Communicating with Honeywell™ ST3000/STT3000 Smart Transmitters*, #TB-960704B  
*MC Toolkit Modem Code Download Instruction Manual*, Document # 34-ST-25-33

## Patent Notice

The Honeywell ST 800 SmartLine Pressure Transmitter family is covered by one or more of the following U. S. Patents: 5,485,753; 5,811,690; 6,041,659; 6,055,633; 7,786,878; 8,073,098; and other patents pending.

---

## Support and Contact Information

For Europe, Asia Pacific, North and South America contact details, see back page or refer to the appropriate Honeywell Solution Support web site:

Honeywell Corporate [www.honeywellprocess.com](http://www.honeywellprocess.com)

Honeywell Process Solutions [www.honeywellprocess.com/pressure-transmitters/](http://www.honeywellprocess.com/pressure-transmitters/)

Training Classes <http://www.honeywellprocess.com/en-US/training>

---

## Telephone and Email Contacts

| Area                     | Organization                | Phone Number   |
|--------------------------|-----------------------------|--|
| United States and Canada | Honeywell Inc.              | 1-800-343-0228 Customer Service<br>1-800-423-9883 Global Technical Support |
| Global Email Support     | Honeywell Process Solutions | <a href="mailto:ask-ssc@honeywell.com">ask-ssc@honeywell.com</a>           |

# Contents

|     |   |    |
|-----|---|----|
| 1   | ST 800 Physical and Functional Characteristics .....          | 1  |
| 1.1 | Overview .....  | 1  |
| 1.2 | Features and Options .....                                    | 1  |
|     | Physical Characteristics.....                                 | 2  |
|     | Functional Characteristics .....                              | 3  |
| 1.3 | Series, Model and Number .....                                | 3  |
| 1.4 | Safety Certification Information.....                         | 3  |
| 1.5 | Transmitter Adjustments .....                                 | 4  |
| 1.6 | Local Display Options .....                                   | 4  |
| 1.7 | Optional 3-Button Assembly .....                              | 5  |
| 2   | Communication Modes .....                                     | 6  |
| 2.1 | Overview .....  | 6  |
| 2.2 | Digitally Enhanced (DE) Mode Communication .....              | 6  |
| 2.3 | HART Mode Communication .....                                 | 7  |
| 3   | Configuration Tools and Interfaces .....                      | 8  |
| 3.1 | Overview .....  | 8  |
| 3.2 | Pre-requisites .....  | 8  |
| 3.3 | Application Design, Installation, Startup, and Operation..... | 8  |
|     | Organization .....  | 8  |
| 3.4 | MC Toolkit Participation.....                                 | 9  |
|     | MC Toolkit Software Applications .....                        | 9  |
|     | Configuration Databases .....                                 | 9  |
|     | Configuration.....  | 9  |
|     | MC Toolkit–Transmitter Electrical/Signal Connections .....    | 9  |
| 4   | DE Transmitter Configuration.....                             | 11 |
| 4.1 | Configuration Personnel Requirements.....                     | 11 |
| 4.2 | MC Toolkit Software Application Overview .....                | 11 |
| 4.3 | DE Transmitter Online Configuration.....                      | 12 |
|     | Uploading a Transmitter Configuration .....                   | 12 |
|     | Device Information Configuration .....                        | 14 |
|     | General Configuration Parameters .....                        | 15 |
|     | DE-Specific Configuration Parameters .....                    | 16 |
|     | Transmitter Display Configuration.....                        | 18 |
|     | Monitor Status Configuration.....                             | 19 |
|     | Saving the Configuration to File .....                        | 20 |
|     | DE Online Configuration Summary .....                         | 21 |
| 4.4 | DE Transmitter Offline Configuration .....                    | 21 |
|     | Overview .....  | 21 |
|     | DE Offline File Management .....                              | 21 |
|     | Save to a File .....  | 22 |
|     | Downloading in DE Offline Mode .....                          | 22 |
|     | DE Offline Parameterization. ....                             | 22 |
| 5   | HART Transmitter Configuration.....                           | 23 |
| 5.1 | Overview .....  | 23 |
|     | Personnel Requirements .....                                  | 23 |
| 5.2 | Overview of FDC Homepage .....                                | 24 |
|     | Settings .....  | 25 |
|     | Manage DDs.....   | 26 |
|     | Online configuration.....                                     | 27 |

|   |    |
|---|----|
| Offline configuration .....   | 28 |
| Online Configuration Overview.....                                    | 28 |
| Overview of Device Homepage.....                                      | 28 |
| Tabs on the Device Home page .....                                    | 29 |
| Using FDC for various device operations.....                          | 31 |
| Device Configuration and Parameter Descriptions.....                  | 33 |
| Procedure to Enter the Transmitter Tag.....                           | 47 |
| Selecting the Process Variable (PV) Unit of Pressure Measurement..... | 47 |
| Setting PV URV, and LRV Range Values.....                             | 48 |
| Setting Range Values for Applied Pressure .....                       | 48 |
| Saving device history .....   | 49 |
| Exporting device history records to FDM.....                          | 50 |
| Exporting device history records to Documint .....                    | 51 |
| Custom Views.....   | 51 |
| Offline Configuration.....  | 53 |
| 6 DE Calibration .....  | 56 |
| 6.1 Overview.....   | 56 |
| 6.2 Calibration Recommendations .....                                 | 56 |
| 6.3 Test Equipment Required for Calibration.....                      | 56 |
| 6.4 Analog Output Signal Calibration.....                             | 56 |
| 6.5 Calibrating Range Using the MC Toolkit.....                       | 58 |
| 6.6 Conditions for Input Calibration .....                            | 58 |
| 6.7 Input Calibration Procedures Description.....                     | 58 |
| 6.8 Input Calibration Procedure .....                                 | 59 |
| Correct the Input at Zero.....  | 59 |
| Correct Input at the Lower Range Value (LRV).....                     | 61 |
| Correct Input at URV.....   | 62 |
| 6.9 DE Output Calibration .....                                       | 63 |
| Output Calibration Preparation .....                                  | 63 |
| 6.10 Manually Setting the Process Variable Range .....                | 65 |
| 6.11 Procedure to Reset Calibration .....                             | 68 |
| 7 HART Calibration.....   | 70 |
| 7.1 About This Section .....  | 70 |
| About Calibration.....  | 70 |
| Equipment Required .....  | 70 |
| 7.2 Analog Output Signal Calibration.....                             | 71 |
| 7.3 Calibrating Range .....   | 72 |
| Correcting the Lower Range Value (LRV).....                           | 72 |
| Correcting the Upper Range Value (URV).....                           | 72 |
| Resetting Calibration .....   | 73 |
| Calibration Records .....   | 73 |
| 7.4 Dual / Triple Calibration.....                                    | 75 |
| 8 HART Advanced Diagnostics.....                                      | 76 |
| 8.1 About This Section .....  | 76 |
| 8.2 Advanced Diagnostics.....   | 76 |
| Plugged Impulse Line Detection (PILD) .....                           | 76 |
| Install Date .....  | 76 |
| PV Tracking Diagnostics .....   | 77 |
| SV Tracking .....   | 79 |
| TV Tracking Diagnostics.....  | 80 |
| ET Tracking Diagnostics .....   | 80 |
| % Stress Life .....   | 82 |

|   |     |
|---|-----|
| % Service Life .....  | 82  |
| Operating Voltage Diagnostics.....                                      | 82  |
| AVDD Tracking Diagnostics .....   | 83  |
| Sensor CPU Temperature Tracking Diagnostics.....                        | 83  |
| Power Up Diagnostics .....  | 84  |
| PILD Status .....   | 84  |
| 9 Troubleshooting and Maintenance .....                                 | 87  |
| 9.1 HART Diagnostic Messages .....                                      | 87  |
| 9.2 HART Diagnostic Details.....  | 88  |
| 9.3 DE Diagnostic Messages .....  | 92  |
| 9.4 Software Upgrade for PILD .....                                     | 95  |
| Procedure for upgrading the software from HART host application .....   | 95  |
| Procedure for upgrading the software from Device Integral display ..... | 96  |
| 10 Using DTMs .....   | 97  |
| 10.1 Introduction .....   | 97  |
| 10.2 Components.....  | 97  |
| 10.3 Downloads.....   | 97  |
| 10.4 Procedure to Install and Run the DTM.....                          | 97  |
| 10.5 ST 800 Online Parameterization.....                                | 98  |
| Device Health: .....  | 99  |
| Device Icon / Honeywell Logo: .....                                     | 99  |
| Process Variables: .....  | 99  |
| Shortcuts:.....   | 99  |
| 10.6 Basic Setup Page .....   | 100 |
| Pressure Transfer Fn:.....  | 100 |
| Low Flow Cutoff Mode:.....  | 100 |
| Device Information.....   | 100 |
| Model Number: .....   | 101 |
| Device Assembly:.....   | 101 |
| System Setup: .....   | 101 |
| 10.7 Calibration Page .....   | 101 |
| Calibration Methods .....   | 102 |
| Calibration Records.....  | 102 |
| 10.8 Process Variables.....   | 103 |
| 10.9 Trend Charts .....   | 104 |
| 10.10 Device Status .....   | 105 |
| 10.11 Critical and Non-Critical Help Display .....                      | 106 |
| 10.12 Diagnostics: .....  | 107 |
| 10.13 Services .....  | 108 |
| 10.14 Detailed Setup .....  | 109 |
| 10.15 Meterbody Selection.....  | 110 |
| 10.16 Display Setup.....  | 110 |
| 10.17 Read Screen Info: .....   | 111 |
| 10.18 Screen Configuration:.....  | 111 |
| 10.19 Common setup:.....  | 111 |
| 10.20 Review .....  | 111 |
| 10.21 ST 800 Offline Parameterization.....                              | 112 |
| 11 . HART DD binary file format compatibility matrix.....               | 113 |
| Glossary.....   | 115 |

## List of Figures

|   |    |
|---|----|
| Figure 1 – ST 800 Major Assemblies .....  | 2  |
| Figure 2 – Electronics Housing Components .....   | 2  |
| Figure 3 – Typical Atmospheric or Gauge Pressure Transmitter Name Plate Information ..... | 3  |
| Figure 4 – DE Mode Value Scaling .....  | 6  |
| Figure 5 – HART Point-to-Point and Multi-drop Value Scaling .....                         | 7  |
| Figure 6 – MC Toolkit-Transmitter Electrical/Signal Connections .....                     | 10 |
| Figure 7 – Differential Pressure Square Root Conformity Curve .....                       | 17 |
| Figure 8 – FDC Homepage .....   | 24 |
| Figure 9 – Device Homepage .....  | 29 |
| Figure 10 – Analog Output Calibration Test Setup .....                                    | 57 |
| Figure 11 – Input Calibration Connections .....   | 59 |
| Figure 12 – Output Calibration Test Connections .....                                     | 63 |
| Figure 13 – DE Analog Mode Scaling and Test Connections .....                             | 63 |
| Figure 14 – Setup to Manually Set the PV LRV and URV .....                                | 65 |

## List of Tables

|   |    |
|---|----|
| Table 1 – Features and Options .....                                      | 1  |
| Table 2 – Available Display Characteristics .....                         | 4  |
| Table 3 – User Manual Related Topics .....                                | 8  |
| Table 4 – Device Information Parameters .....                             | 14 |
| Table 5 – General Configuration Parameters .....                          | 15 |
| Table 6 – DE Configuration Parameters .....                               | 16 |
| Table 7 – Local Display Configuration Parameters .....                    | 18 |
| Table 8 – Monitor Parameters .....  | 19 |
| Table 9 - FDC homepage elements .....                                     | 24 |
| Table 10 - Device health status .....                                     | 29 |
| Table 11 – HART Transmitter Parameters .....                              | 33 |
| Table 12 – Tamper Reporting Logic Implementation with Write Protect ..... | 46 |
| Table 13 – Calibration Records .....                                      | 74 |
| Table 14 – Viewing Advanced Diagnostics .....                             | 76 |
| Table 15 – Maximum PV Tracking .....                                      | 77 |
| Table 16 – Minimum PV Tracking .....                                      | 78 |
| Table 17 – Maximum SV Tracking .....                                      | 79 |
| Table 18 – Minimum SV Tracking .....                                      | 79 |
| Table 19 – TV Tracking Diagnostics .....                                  | 80 |
| Table 20 – Maximum ET Diagnostics .....                                   | 80 |
| Table 21 – Minimum ET Diagnostics .....                                   | 81 |
| Table 22 – Operating Voltage Diagnostics .....                            | 82 |
| Table 23 – Maximum and Minimum AVDD Tracking .....                        | 83 |
| Table 24 – Maximum Sensor CPU Temperature Tracking .....                  | 83 |
| Table 25 – Minimum Sensor CPU Temperature Tracking .....                  | 83 |
| Table 26 – Power Up Diagnostics .....                                     | 84 |
| Table 27 – HART Diagnostic Messages .....                                 | 87 |
| Table 28 – HART Critical and Non-Critical Diagnostic Details .....        | 88 |
| Table 29 – DE Diagnostics .....   | 92 |



# 1 ST 800 Physical and Functional Characteristics

## 1.1 Overview

This section is an introduction to the physical and functional characteristics of Honeywell's family of ST 800 SmartLine Pressure Transmitters.

## 1.2 Features and Options

The ST 800 SmartLine Pressure Transmitter is available in a variety of models for measuring Differential Pressure (DP), Gauge Pressure (GP), and Absolute Pressure (AP). Table 1 lists the protocols, human interface (HMI), materials, approvals, and mounting bracket options for the ST 800.

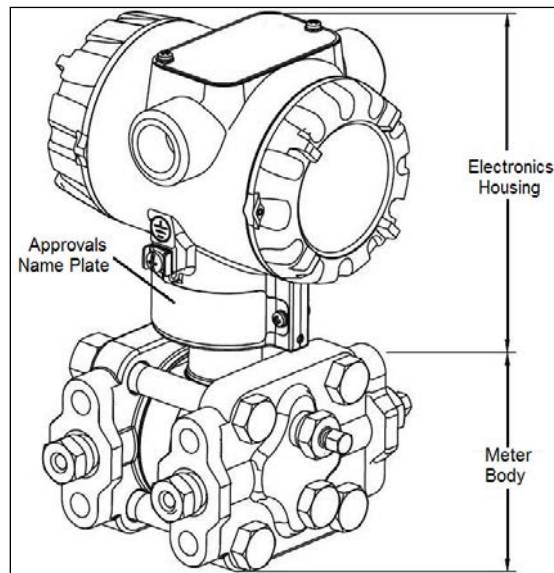
**Table 1 – Features and Options**

| Feature/Option  | Standard/Available Options  |
|---|---|
| Communication Protocols   | HART, Digitally Enhanced (DE), Fieldbus                                   |
| Human-Machine Interface (HMI) Options<br>(Basic and Advanced Display) | Basic and Advanced Digital Display  |
|   | Three-button programming (optional)                                       |
|   | Basic display language: English only                                      |
|   | Advanced display languages: English, German, French, Spanish, and Russian |
| Calibration   | Single, Dual and Triple Cal   |
| Approvals (See Appendix C for details.)                               | ATEX, CSA, FM, IECx, NEPSI  |
| Mounting Brackets   | Angle/flat carbon steel/304 stainless steel, Marine 304 stainless steel   |
| Integration Tools   | Experion  |
| Configuration   | Plugged Impulse Line Detection (PILD)                                     |

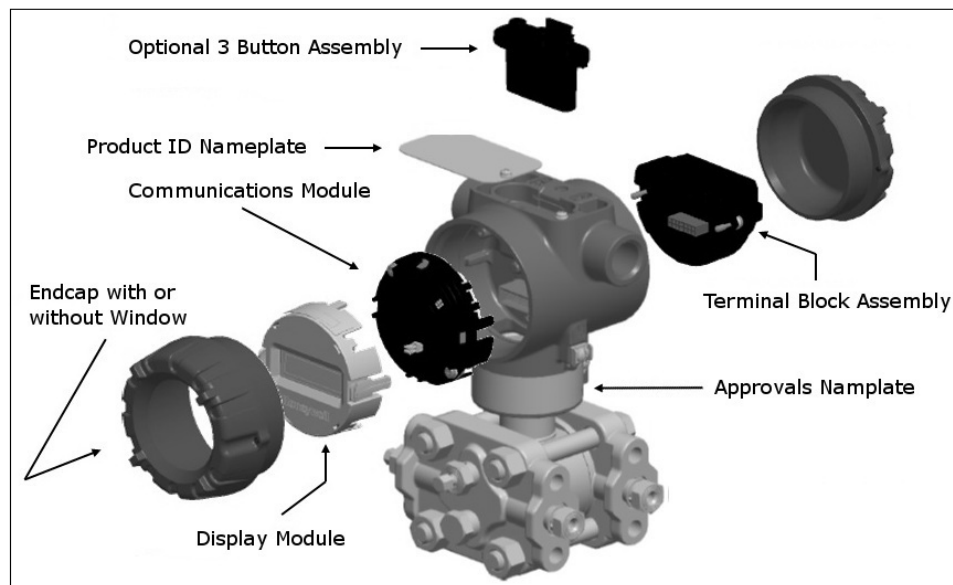
## Physical Characteristics

As shown in Figure 1, the ST 800 is packaged in two major assemblies: the Electronics Housing and the Meter Body. The elements in the Electronic Housing respond to setup commands and execute the software and protocol for the different pressure measurement types. Figure 2 shows the assemblies in the Electronics Housing with available options.

The Meter Body provides connection to a process system. Several physical interface configurations are available, as determined by the mounting and mechanical connections. Refer to the *ST 800 SmartLine User's Manual*, document number 34-ST-25-35 for installation and wiring details.



**Figure 1 – ST 800 Major Assemblies**



**Figure 2 – Electronics Housing Components**

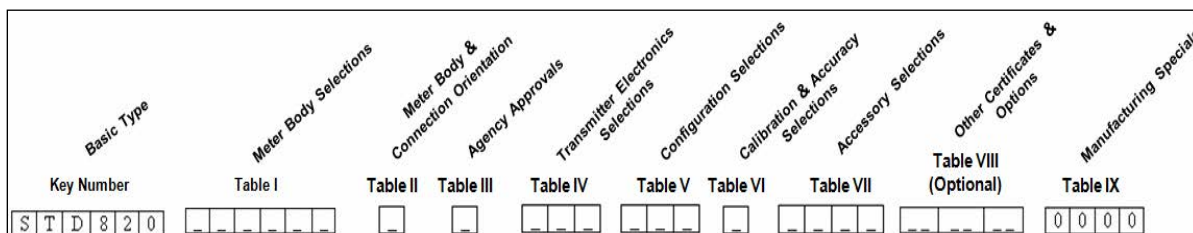
## Functional Characteristics

Functionally, the Transmitter measures process pressure and outputs a signal proportional to the measured process variable (PV). Available output communication protocols include analog 4 to 20 mA, Honeywell Digitally Enhanced (DE) protocol, HART, and FOUNDATION Fieldbus.

An optional 3-button assembly is available to set up and make adjustments to the Transmitter. In addition, a Honeywell Multi-Communication (MC) Toolkit (not supplied with the Transmitter) can facilitate setup and adjustment procedures. Certain adjustments can be made through an Experion Station or a Universal Station if the Transmitter is digitally integrated with Honeywell's Experion or TPS/TDC 3000 control system.

### 1.3 Series, Model and Number

The Transmitter nameplate mounted on the top of the Electronics Housing (see Figure 2) lists the model number, physical configuration, electronics options, accessories, certifications, and manufacturing specialties. Figure 3 is an example of a typical Differential Pressure (DP) or Gauge Pressure (GP) or Atmospheric Pressure (AP) Transmitter name plate. The model number format consists of a Key Number with several table selections. The Differential Pressure (DP), Absolute Pressure (AP), and Gauge Pressure (GP) name plates are essentially the same. However, the DP provides one additional entry (7 vs. 6 characters) in the Meter Body Selections (Table I) to accommodate the static pressure rating.



**Figure 3 –Typical Atmospheric or Gauge Pressure Transmitter Name Plate Information**

You can readily identify the series and basic Transmitter type from the third and fourth digits in the key number. The letter in the third digit represents one of these basic transmitter types:

- A = Absolute Pressure
- D = Differential Pressure
- F = Flange Mounted
- G = Gauge Pressure
- R = Remote Seals

For a complete selection breakdown, refer to the appropriate Specification and Model Selection Guide provided as a separate document.

### 1.4 Safety Certification Information

An “approvals” name plate is located on the bottom of the Electronics Assembly; see Figure 1 for exact location. The approvals name plate contains information and service marks that disclose the Transmitter compliance information. Refer to Appendix C of the *ST 800 SmartLine Transmitters User's Manual*, document number 34-ST-25-35 for details.

## 1.5 Transmitter Adjustments

Zero and Span adjustments are possible in new generation ST 800 SmartLine Pressure Transmitters by using the optional three-button assembly located at the top of the Electronic Housing (see Figure 2). However, certain capabilities are limited in the following configurations:

- Without a display – Zero and Span setting only for HART and DE devices.
- With a display – Complete Transmitter configuration is possible for HART & DE devices.

You can also use the Honeywell MCT202 Configuration Tool to make any adjustments to an ST 800 Transmitter. The MCT202 tool has two applications; MC Toolkit and FDC. Using the MC Toolkit application you can adjust the ST 800 DE model configuration. Using the Field Device Configurator (FDC) application, you can adjust the ST 800 HART model configuration. Alternately, you can use the Honeywell SmartLine Configuration Tool, SCT 3000, for configuring DE models. Certain adjustments can also be made through the Experion or Universal Station if the Transmitter is digitally integrated with a Honeywell Experion or TPS system.

ST 800 HART models can be configured using Honeywell tools such as Experion in conjunction with FDM, using DTMs running in FDM or Pactware, or Emerson 375 or 475.

## 1.6 Local Display Options

The ST 800 Pressure Transmitter offers two display options: Basic and Advanced; see Table 2.

**Table 2 – Available Display Characteristics**

|                  |  |
|------------------|--|
| Basic Display    | <ul style="list-style-type: none"><li>• Suitable for basic process needs</li><li>• 360° rotation in 90° Increments</li><li>• 2 lines, 16 characters</li><li>• Standard units-of-measurement: Pa, KPa, MPa, KGcm2, TORR, ATM, inH2O, mH2O, bar, mbar, inHg, FTH2O, mmH2O, MMHG, &amp; PSI</li><li>• Diagnostic messaging</li><li>• Square root output indication</li><li>• Supports optional 3-Button configuration and calibration</li></ul>   |
| Advanced Display | <ul style="list-style-type: none"><li>• 360° rotation in 90° increments</li><li>• Three (3) configurable screen formats:<ul style="list-style-type: none"><li>○ Large process variable (PV)</li><li>○ PV with bar graph</li><li>○ PV with trend (1-24 hours, configurable)</li></ul></li><li>• Eight (8) screens 3-30 seconds configurable rotation timing</li><li>• Standard and custom engineering units</li><li>• Diagnostic alerts and diagnostic messaging</li><li>• Multiple language support:<ul style="list-style-type: none"><li>○ EN, FR, GE, SP, RU, IT &amp; TK</li><li>○ EN, CH (Kanji), JP</li></ul></li><li>• Square root output indication</li><li>• Supports optional 3-Button configuration and calibration</li><li>• Supports transmitter messaging and maintenance mode indication</li></ul> |

## 1.7 Optional 3-Button Assembly

The optional 3-button assembly provides the following features:

- Opportunity for immediate reaction with minimal disruptions
- Improved maintenance time
- Potential savings on hand-held units
- Suitable for all environments: hermetically sealed for long life in harsh environments
- Suitable for use in all electrical classifications (flameproof, dustproof, and intrinsically safe)

The 3-button assembly is externally accessible and provides the following capabilities:

- Menu-driven configuration with optional display:
  - Using increment, decrement & enter keys
  - A comprehensive on screen menu guides the way
  - Configure the transmitter
  - Configure the display
  - Set zero and span
- Zero and span settings without optional display

## 2 Communication Modes

### 2.1 Overview

The ST 800 SmartLine Pressure Transmitter can be configured for operation with Honeywell's Digitally Enhanced (DE) communication protocol, HART version 7, and Fieldbus communication. This manual addresses the processes to configure and calibrate a Transmitter for DE and HART communication. Refer to the *ST 800 FF Transmitter with FOUNDATION Fieldbus Option Installation & Device Reference Guide*, document number 34-ST-25-39 for Fieldbus details.

### 2.2 Digitally Enhanced (DE) Mode Communication



Although it is unnecessary to put a control loop in manual mode before communicating with a Transmitter operating in DE mode, caution is required if there is potential for error in identifying the operating mode.

In DE mode, the PV is available for monitoring and control purposes; and the meter body temperature (secondary variable) is available for monitoring purposes only.

Much of the operation in the Digitally Enhanced (DE) mode is similar to that of analog operation. The essential characteristics of DE mode operation are shown in Figure 4.

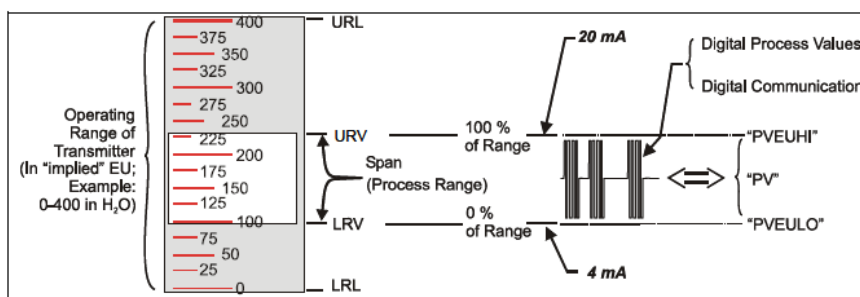


Figure 4 – DE Mode Value Scaling

As indicated at the right of Figure 4, output values of process variables, as well as communications are transferred to a receiving device digitally. The digital coding is Honeywell proprietary, which requires the use of DE-capable Honeywell control equipment.

The use of DE mode offers several advantages:

- **Process Safety.** Unlike analog mode, communications devices do not *bump* the PV value.
- **Accuracy:** requires less maintenance.
- **Digital communication:** Relatively immune to small variations in circuit resistance or supply voltage.
- **Facilitates Maintenance Tasks:** Honeywell control systems include operating displays that enable direct communication with transmitters operating in DE mode.

## 2.3 HART Mode Communication



When using MCT202, before connecting to a HART transmitter, verify that the FDC application is used and not the MC Toolkit application. When you use the MC Toolkit application, the MCT202 is set for DE communications, where the current amplitude can *bump* process variables in either point-to-point or in the multi-drop mode in HART.

- Transmitters with HART capability have features that vary among manufacturers and with the characteristics of specific devices. The FDC software application executing on the MCT202 supports the HART Universal, Common Practice and Device Specific Commands which are implemented in the Honeywell Transmitters.

As indicated in Figure 5, the output of a Transmitter configured for HART protocol includes two primary modes:

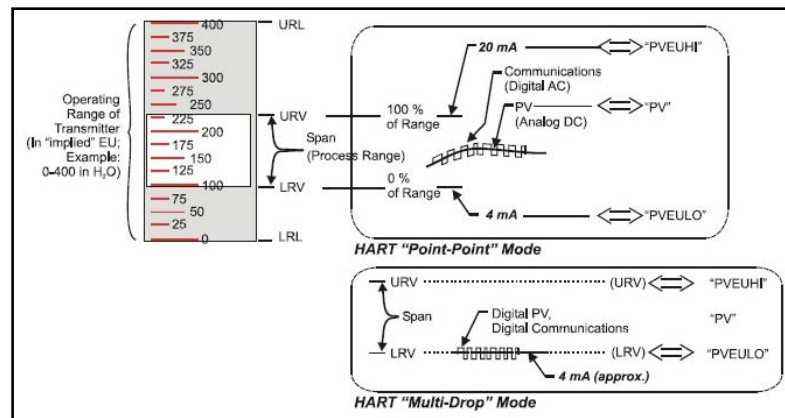


Figure 5 – HART Point-to-Point and Multi-drop Value Scaling

- Point-to-Point Mode, in which one Transmitter is connected via a two-conductor, 4-20 mA current loop to one receiver.
- Multi-Drop Mode, in which several Transmitters are connected through a two-conductor network to a multiplexed receiver device.

In point-to-point mode, the value of the primary Process Variable (PV) is represented by a 4-20 mA current loop, almost identical to that of a Transmitter operating in analog mode. In this case, however, the analog signal is modulated by Frequency Shift Keying (FSK), using frequencies and current amplitude that do not affect analog sensing at the receiver. The accuracy of the analog level must be precisely controlled for accurate sensing. HART communication will not *bump* process variables.

In multi-drop mode, up to 16 transmitters in HART 5 (addresses 0-15) and up to 64 transmitters in HART6/7 (addresses 0-63) can exist on the two-conductor network.

## 3 Configuration Tools and Interfaces

### 3.1 Overview

This section describes the tools and interfaces involved in configuring a new ST 800 SmartLine Pressure Transmitter for HART or DE communication operation. The information in this section also applies to adjusting the configuration of a Transmitter that has been in operation and updating one that is currently in operation.

### 3.2 Pre-requisites

The information and procedures in this manual are based on the assumption that personnel performing configuration and calibration tasks are fully qualified and knowledgeable in the use of the Honeywell MC Toolkit or MCT202. The name MC Toolkit or Toolkit and MCT202 are used interchangeably as MCT202 is the model name for the Honeywell MC Toolkit product. Furthermore, we assume that the reader is intimately familiar with the ST 800 family of SmartLine Pressure Transmitters and thoroughly experienced in the type of process application targeted for Transmitter deployment. Therefore, detailed procedures are supplied only in so far as necessary to ensure satisfactory completion of configuration tasks.

### 3.3 Application Design, Installation, Startup, and Operation

The *ST 800 SmartLine Pressure Transmitters User's Manual*, document number 34-ST-25-35, provides the details for application design, installation, and startup; see Table 3 for topics.

**Table 3 – User Manual Related Topics**

| ST 800 SmartLine Pressure Transmitters Users Manual                 |   |  |
|---|---|--|
| Section 2. Application Design                                       | Section 3. Installation and Startup   | Section 4. Operation   |
| Safety and accuracy<br>Diagnostics messages<br>Design consideration | Site evaluation<br>Toolkit issues<br>Display installation concerns<br>Transmitter mounting & zero-correction<br>Piping & wiring<br>Startup tasks and procedures | Three-button option<br>Failsafe direction setup<br>Monitoring displays |

### Organization

This information in this section is arranged in the following sequence:

- MC Toolkit participation in ST 800 Transmitter Setup and Configuration:
  - Physical circuit connections
  - Application components
  - Configuration for Analog, DE, and HART operation
- ST 800 Transmitter
  - Basic and advanced displays
  - Health indications
  - Ability to be configured and operate in a process system



### 3.4 MC Toolkit Participation



Before using the MC Toolkit, be sure that you are aware of the potential consequences of each procedure, and that you use appropriate safeguards to avoid possible problems. For example, if the Transmitter is an element in a control loop, the loop needs to be put in manual mode, and alarms and interlocks (i.e., trips) need to be disabled, as appropriate, before starting a procedure.

#### MC Toolkit Software Applications

The MC Toolkit has two software applications to work with ST 800 SmartLine Pressure Transmitters:

- **Field Device Configurator (FDC).** This application is used for configuring, calibrating, monitoring, and diagnosing HART devices. FDC conforms to the IEC 61804-3 EDDL (Electronic Data Description Language) standard specification. The FDC application is an open solution that supports devices with a registered device description (DD) file compatible with HART Communication Foundation (HCF) requirements.
- **MC Toolkit.** This application is used for configuring, calibrating, monitoring, and diagnosing Honeywell Digitally Enhanced (DE) devices.

Details for working with the MC Toolkit are provided in the *MC Toolkit User Manual*, document # 34-ST-25-20. In subsequent sections of this manual, explicit operating instructions are provided only in so far as necessary to complete required tasks and procedures.

#### Configuration Databases

The MC Toolkit is used to establish and/or change selected operating parameters in a Transmitter database.

#### Configuration

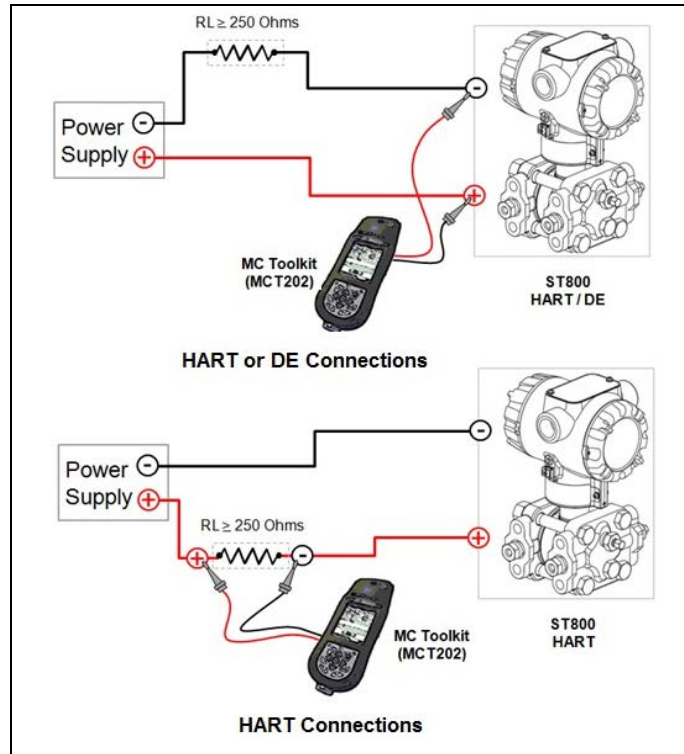
Configuration can be accomplished both online and offline with the Transmitter powered up and connected to the MC Toolkit. Online configuration immediately changes the Transmitter operating parameters. For offline configuration, Transmitter operating characteristics are entered into Toolkit memory for subsequent downloading to a Transmitter.



When you set up or configure a Transmitter, it can take up to 30 seconds for the value to be stored in it. If you change a value and Transmitter power is interrupted before the change is copied to nonvolatile memory, the changed value will not be moved to nonvolatile memory.

#### MC Toolkit–Transmitter Electrical/Signal Connections

Figure 6 displays how to connect the MC Toolkit directly to the terminals of a HART or DE Transmitter (top), and a HART-only Transmitter (bottom).



**Figure 6 – MC Toolkit-Transmitter Electrical/Signal Connections**

## 4 DE Transmitter Configuration

### 4.1 Configuration Personnel Requirements

The configuration processes in this section reflect the assumption that you will use the Honeywell MC Toolkit Configuration Tool to configure an ST 800 SmartLine Pressure Transmitter. The **MC Toolkit** application is used to configure Honeywell ST 3000 Pressure Transmitter, STT 3000 Smart Temperature Transmitters, as well as the ST 800 SmartLine Pressure Transmitter. Throughout, the term Transmitter means the ST 800 SmartLine Pressure Transmitter.

The other tools that support DE Transmitter configuration are the SmartLine Configuration Toolkit (SCT 3000), Experion PKS, and Smart Field Communicator (SFC).

### 4.2 MC Toolkit Software Application Overview

Each new ST 800 SmartLine Pressure Transmitter is shipped from the factory with a basic configuration installed. This basic configuration must be edited or revised to meet the requirements of your process system.

The **MC Toolkit** application supports both online and offline configuration.

- **Online** operation allows you to establish communication with a DE Transmitter for the following tasks:
  - Upload a Transmitter database.
  - Configure Transmitter parameters.
  - Calibrate a Transmitter.
  - Execute diagnostics.
  - Save a configuration to a file.
- **Offline** operation allows you to select a basic template, edit the parameters and download to a Transmitter after establishing communication with it. Parameter updates can also be saved in a file without actually downloading them to a Transmitter.

Specific operating details for the MC Toolkit displays are provided in Section 3.5, “MC Toolkit Application Software Display Conventions,” of the *MC Toolkit User Manual*, (document number 34-ST-25-20) for the following:

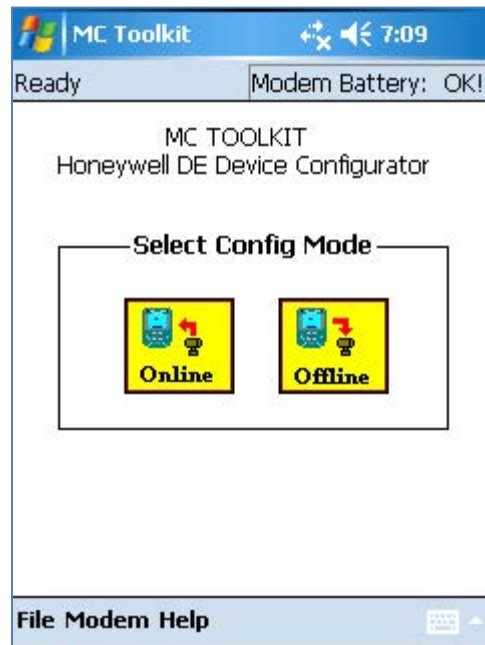
- Navigation
- The MC Toolkit Menu Bar
- File Menu
- Modem Menu
- Help Menu
- Data Entry and Display

## 4.3 DE Transmitter Online Configuration

Online configuration consists of establishing communication between the MC Toolkit and a Transmitter configured for DE communication. Each Transmitter has a configured database, whether new from the factory, a spare, or one to be reconfigured. In any case, the **MC Toolkit** application is used to upload the existing configuration from the Transmitter for review and editing.

### Uploading a Transmitter Configuration

1. Connect a DE Transmitter to the MC Toolkit. Be sure that both devices have power applied.
2. Start the **MC Toolkit** application by selecting Start / MC Toolkit on the MC Toolkit / MCT202. The MC TOOLKIT Home page will be displayed.



3. Select the **Online** button, and establish communication between the Toolkit and the Transmitter.
4. When the warning message for connecting to a DE device appears, select **OK**.
5. Process the three warning pop-ups as appropriate, and then select **OK** in the **Put loop in Manual...** pop-up. The QUICK MONITOR box will be displayed.

MC Toolkit 7:10

DE QUICK MONITOR

Tag B 123

Type ST 800

Output (%) 1.2219 LRV 0.0 URV 400.0

LRL -1.0 URL 400.0

Input 4.8865 PV Units inH2O @ 39F

Gross Status Comm. Status OK

< Back Upload >

File Modem Device Help

6. Select **Upload**. A progress bar will be displayed on the QUICK MONITOR box, and when the upload is complete, the DE MAIN MENU will be displayed.

MC Toolkit 7:10 Online

DE MAIN MENU

Device Info Calibration

General Local Display

Configure Monitor

< Back Save to File

File Modem Device Help



A confirmation request message will be displayed if you select **<Back** for a Transmitter that was previously set to Output Mode during calibration, and was not subsequently cleared. If you confirm the message (**Yes** answer), the display will exit the DE MAIN MENU.

## Device Information Configuration

In this and subsequent procedures, the notations **R** for read only and **R/W** for read/write are used to indicate if a parameter can be edited.

1. On the DE MAIN MENU, select **Device Info**. The DEVICE INFO box will be displayed.

The screenshot shows a software interface titled "MC Toolkit" with a status bar at the top right showing "7:11". The main window is titled "DE DEVICE INFO". It contains several input fields: "Tag" with the value "B 123", "Type" with the value "ST 800", "Firmware Version" with the value "1.E", and "PROM ID Number" with the value "B1150B0900". There is also a "Scratch Pad" field which is empty. At the bottom of the form are two buttons: "< Back" and "Send". The very bottom of the window has a menu bar with "File", "Modem", "Device", and "Help".

2. Configure device information according to Table 4.

**Table 4 – Device Information Parameters**

| Parameter        | Read (R) or Read/Write (R/W) | Configuration Details                      |
|------------------|------------------------------|--|
| Tag ID           | R/W                          | User ID up to 8 alphanumeric characters.   |
| Type             | R                            | Manufacturer's device type identifier      |
| Firmware Version | R                            | Manufacturer's firmware version identifier |
| PROM ID Number   | R                            | PROM ID Number                             |
| Scratch Pad      | R/W                          | Up to 32 alphanumeric characters           |

3. Select the Back button to go back to the DE MAIN MENU.

## General Configuration Parameters

Select the **General** button on the **DEVICE MAIN MENU** page, and configure parameters according to

Table 5.

The screenshot shows a configuration window titled "GENERAL". It contains three settings:

- PV Type:** A dropdown menu with "Single Range" selected.
- Communication Mode:** A dropdown menu with "DE 6 Byte" selected.
- Failsafe Direction:** A text box with "Upscale" entered.

At the bottom of the window are two buttons: "Send" and "Back".

**Table 5 – General Configuration Parameters**

| Parameter          | Read (R) or Read/Write (R/W) | Configuration Details  |
|--------------------|------------------------------|--|
| PV Type            | <b>R/W</b>                   | Dual Range Smart Transmitter Digital Communications (STDC) or Single Range or Single Range with secondary variable (SV).   |
| Communication Mode | <b>R/W</b>                   | Analog, DE 4-byte, or DE 6-byte  |
| FS Direction       | <b>R</b>                     | Failsafe (FS) direction: upscale or downscale, switch selectable on the electronics module. See the <i>ST 800 SmartLine Transmitter User Manual</i> for details. |

Select the **Back** button to go back to the **DE MAIN MENU**.

## DE-Specific Configuration Parameters

Select the **Configure** button, and configure parameters according to Table 6.

DE CONFIGURE

LRL

URL

LRV

URV

PV Units

SV Units

Sensor Type

Damping

Span

Conformity

**Table 6 – DE Configuration Parameters**

| Parameter   | Read (R) or Read/Write (R/W) | Configuration Details   |
|-------------|------------------------------|---|
| LRL         | R                            | Lower Range Limit, Floating Point   |
| URL         | R                            | Upper Range Limit, Floating Point   |
| LRV         | R/W                          | Lower Range Value, Floating Point   |
| URV         | R/W                          | Upper Range Value, Floating Point   |
| PV Units    | R/W                          | Process Variable Units: scaling value selection; default = inches H <sub>2</sub> O@39°F           |
| SV Units    | R/W                          | Secondary Variable scaling units: °C or °F  |
| Sensor Type | R                            | Sensor type used in the Transmitter   |
| Damping     | R/W                          | Select digital noise reduction; (see note below)  |
| Span        | R                            | Process Range: URV – LRV, Floating Point  |
| Conformity  | R/W                          | Conformity: for the output calculation. Linear (pressure) or Square Root (flow); (see note below) |

Select the Back button to go back to the DE MAIN MENU.

### Notes on Damping (Digital Noise Reduction)

You can adjust the damping time to reduce output noise. By way of suggestion, set damping to the smallest value reasonable for your process.

The electrical noise effect on the output signal is partially related to the turndown ratio of the Transmitter. As the turndown ratio increases, the peak-to-peak noise on the output signal increases. You can use the following formula to find the turndown ratio using the range information for your Transmitter.

$$\text{Turndown Ratio} = \frac{\text{Upper Range Limit}}{(\text{Upper Range Value} - \text{Lower Range Value})}$$

Note that ST 800 Transmitters are specified with a minimum of 100:1 turndown capability.



### Notes on Conformity

You can select the Transmitter output to represent a straight linear or a square root calculation for flow measurement applications with a differential pressure (DP) unit.

For a differential pressure (DP) Transmitter, measuring the pressure drop across a primary element, the flow rate is directly proportional to the square root of the pressure drop. The Transmitter output automatically converts to percent-of-flow when its output conformity is configured as square root.

You can use the following formulas to manually calculate the percent of flow for comparison purposes:

$$\frac{\Delta P}{\text{Span}} \times 100 = \%P$$

Where  $\Delta P$  = Differential pressure input in engineering units  
Span = Transmitter measurement span (URV- LRV)  
 $\%P$  = Pressure in percent of span

Therefore:  $\sqrt{\frac{\%P}{100}} \times 100 = \% \text{ Flow}$

Also, you can use the following formula to determine the corresponding current output in Milliampers DC.

$$(\% \text{ Flow} \times 16) + 4 = \text{mA DC Output}$$

To avoid unstable output at readings near zero, the ST 800 Transmitter automatically drops square root conformity and changes to linear conformity for low differential pressure readings. As shown in Figure 7, the dropout point is between 0.4% and 0.5% of differential pressure, depending on direction

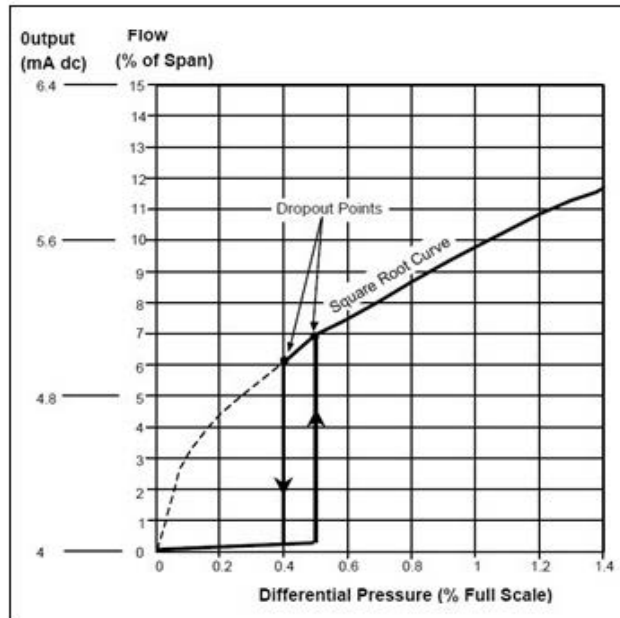


Figure 7 – Differential Pressure Square Root Conformity Curve

## Transmitter Display Configuration

From the DE MAIN MENU, select the **Local Display** button. The LOCAL DISPLAY box will be displayed.

Select display parameters from the options listed in Table 7

**Table 7 – Local Display Configuration Parameters**

| Parameter           | Read (R) or Read/Write (R/W) | Configuration Details  |
|---------------------|------------------------------|--|
| Display Hardware    | R                            | Type of Transmitter Display: <ul style="list-style-type: none"> <li>Full Functional Display</li> <li>No Display installed</li> </ul>   |
| Display Units       | R/W                          | Engineering Units for this Display: <div> %, inH2O@39°F, mmHg@0°C<br/> psi, KPa, MPa, mBar,<br/> Bar, g/cm2, kg/cm2, mmH2O@4°C<br/> mHg@0°C, mH2O@4°C, GPM<br/> GPH, Custom </div> |
| Custom Units Tag    | R/W                          | 8 Characters<br>Note that the Custom Units Tag is not sent to the Display. It will be displayed in the Tool.   |
| Flow EU Upper Value | 4.3.1 R/W                    | 4.3.2 Floating point (for square root configurations)  |
| Flow EU Lower Value | R/W                          | Floating point (for square root configurations)  |

Select the Back button to go back to the DE MAIN MENU.

## Monitor Status Configuration

With the DE MAIN MENU displayed, select the **Monitor** button. The MONITOR box will be displayed.

**MONITOR**

|   |   |
|---|---|
| Input<br><div style="border: 1px solid black; padding: 2px;">0.2104</div>                       | Output<br><div style="border: 1px solid black; padding: 2px;">53.0</div> %                            |
| inH2O @ 39F   | SV<br><div style="border: 1px solid black; padding: 2px;">0.0</div> °C                                |
| Gross Status<br>  | <div style="border: 1px solid black; padding: 2px; display: inline-block;"><b>Device Status</b></div> |
| Communication Status<br><div style="border: 1px solid black; padding: 2px;">OK</div>            |   |
| <div style="border: 1px solid black; padding: 5px; width: 100px; margin: 10px auto;">Back</div> |   |

MONITOR status parameters are **R** (read only); **Error! Reference source not found.** lists the status parameters.

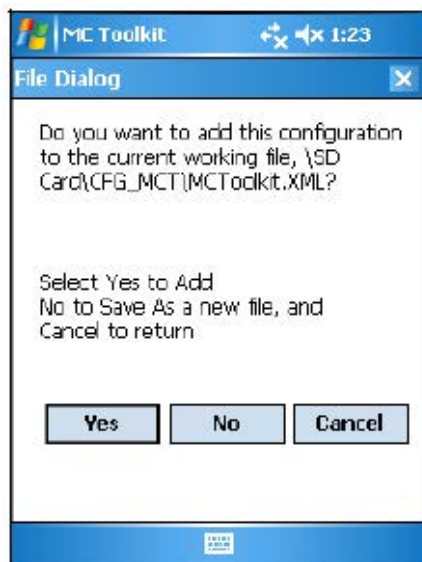
**Table 8 – Monitor Parameters**

| Parameter            | Read (R) or Read/Write (R/W) | Configuration Details   |
|----------------------|------------------------------|---|
| Input                | R                            | Sensor input in EU  |
| Output               | R                            | Loop output as a percent of Span  |
| SV                   | R                            | Secondary Variable in SV EU   |
| Gross Status         | R                            | Gross Transmitter Status. Select the Monitor menu <b>Device Status</b> button to display device status. |
| Communication Status | R                            | Refer to the “Messages and Diagnostic Codes” section of the <i>MCT202 Toolkit</i> manual.               |

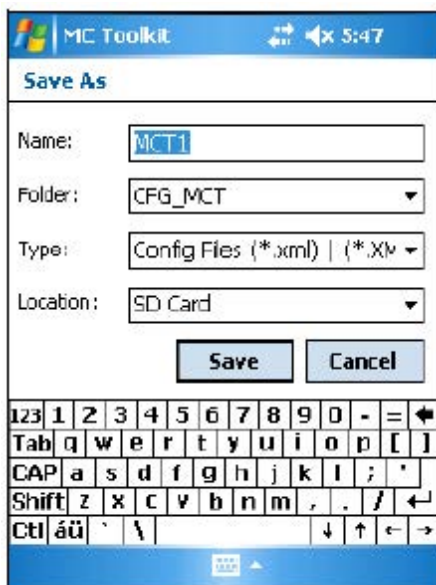
Select the Back button to go back to the DE MAIN MENU.

## Saving the Configuration to File

1. Display the DE MAIN MENU, and select the **Save to File** button. The File Dialog will be displayed.



2. Save the configuration as follows:
  - a. Select **Cancel** to return to the DE MAIN MENU, and abort saving the configuration.
  - b. Select **Yes** to add the configuration to the current working file, and return the display to the DE MAIN MENU.
  - c. Select **No** to save to a different file; the Save As screen will be displayed.



- d. The default location and folder are set to **SD Card** and **CFG\_MCT**. However, you can type in a new name for the file; the default name is **New1**.
- e. After entering the file name, select the **Save** button to display the DE MAIN MENU.

## DE Online Configuration Summary

This concludes the process of configuring an ST 800 DE transmitter online. For best operational results, calibrate the Transmitter according to Section 6, “Calibration” in this document.

## 4.4 DE Transmitter Offline Configuration

### Overview

This section summarizes the features, capabilities, and processes for configuring an ST 800 SmartLine Pressure Transmitter set for DE operation offline. Refer to the *MC Toolkit User Manual*, 34-ST-25-20, section 5.6, “Offline Configuration” for complete procedural details.

After starting the **MC Toolkit** application, selecting the **Offline** button provides access to the following configuration features:

- **DE Offline File Management** – Open an XML file, select a saved configuration for the selected device and edit the parameters.
- **Save to File** – Save the parameters back to the file.
- **Download** – Download the current offline configuration to a device after establishing connection.

The MC Toolkit can process more than one device type or model. For the purposes of this section, the term *device* refers to the ST 800 SmartLine Pressure Transmitter, and/or one of its model variants.

### DE Offline File Management

Offline configuration allows you to select a basic template, edit its parameter content, and download it to a Transmitter after establishing communication. Parameter updates can also be saved in a file without actually downloading to a Transmitter.

The MCT202 Toolkit is shipped with the two files: **MCToolkit.xml** and **TEMPLMCT.xml**:

- The **MCToolkit.xml** file consists of default configurations for all the supported DE devices. The available configurations can be updated and saved back to this file.
- The **TEMPLMCT.XML** is a template file. The contents of this template file cannot be edited; however, the template can be saved under a different file name. The contents of the newly named file can be edited.

DE offline file management provides general, configuration, and parameter options. General options provide for communication serial port selection of COM1 through COM8. However, the current configuration of the Toolkit Pocket PC (PPC) provides only COM1; the other seven serial port designations are reserved for future expansion.

Offline configuration options provide for confirmation before saving a changed configuration file. Denying confirmation results in having the changes discarded.

In addition to file saving confirmation, DE offline file management provides access to three parameter sets for review and editing:

- **Parameter Set 1** consists of the description of Transmitter according to bus type, device type, serial and model number, and the manufacturer.

- **Parameter Set 2** permits entering/editing the values for the LRL, URL, LRV, URV, PV Units, Damping, SV Units, Line Filter frequency, Sensor Type, and the Conformity selection.
- **Parameter Set 3** is oriented primarily to the Honeywell SmartLine Temperature Transmitter models for monitoring purposes.

### Save to a File

Saving to a file in offline mode will let you add an edited configuration to a working file. Alternately, if you decide not to save an edited configuration to the current file, you can select a new location and file name for it. The default location and folder for saving configurations are **SD Card** and **CFG MCT**. The default name of a new configuration is **New1**, which you can change for your needs.

### Downloading in DE Offline Mode

Downloading a file to a Transmitter from the Toolkit requires a communicating connection between the two units. Serial communication is established when you select **DOWNLOAD to Device** from the Toolkit **Select Device** menu. When the download completes, confirmation will be required to affirm that the configuration for the Transmitter is to be saved.

### DE Offline Parameterization.

A table in Section 6, “Offline Configuration,” of the *MC Toolkit User Manual*, 34-ST-25-80 contains a list of the basic ST 800 SmartLine Pressure Transmitter parameters for DE operation.

# 5 HART Transmitter Configuration

## 5.1 Overview

Each new ST 800 Pressure Transmitter configured for HART protocol is shipped from the factory with a basic configuration database installed. This basic configuration database must be edited or revised to meet the requirements of your process system. The process in this section assumes that you will use the **Field Device Communicator (FDC)** application for HART configuration tasks. The **FDC** application provides the facilities for the online and offline configuration of Transmitters operating with HART protocol

Online configuration requires that the Transmitter and MC Toolkit are connected and communication between the two has been established. Online configuration provides a set of functions with which to perform various operations on a HART communication network through an active communication link. These operations primarily include configuration, calibration, monitoring, and diagnostics. Typically, these operations could be realized through various constructs exposed by the Device Description (DD) file. In addition, the **FDC** application provides some functions for convenient execution of these functions.

Offline Configuration refers to configuring a device when the device is not physically present or communicating with the application. This process enables you to create and save a configuration for a device, even when the device is not there physically. Later when the device becomes available with live communication, the same configuration can be downloaded to the device. This feature enables you to save on device commissioning time and even helps you to replicate the configuration in multiplicity of devices with lesser efforts. Currently, FDC does not support creating offline configuration. However, it supports importing of offline configuration from FDM R310 or later versions. The configurations thus imported can be downloaded to the device from FDC. The following are the tasks that you need to perform for importing offline configuration in FDC application software and then downloading it to the device.

- Create offline configuration template in FDM
- Save the configuration in FDM in FDM format.
- Import the offline configuration in FDC
- Download the offline configuration to the device

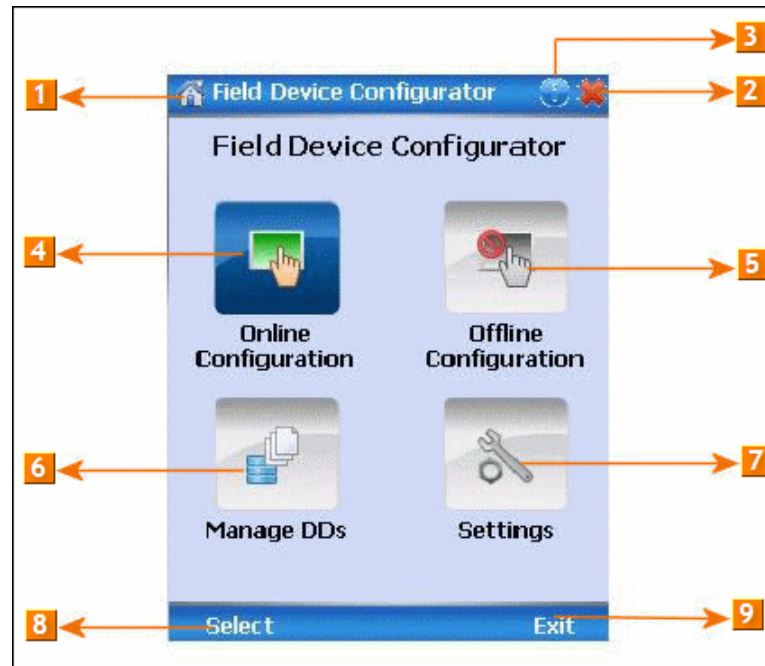
**Note:** For details on creating and using offline configuration, refer to section Offline configuration in FDM User's Guide.

## Personnel Requirements

The information and procedures in this section are based on the assumption that the person accomplishing configuration tasks is fully qualified and knowledgeable on the use of the MC Toolkit and is intimately familiar with the ST 800 family of SmartLine Pressure Transmitters. Therefore, detailed procedures are supplied only in so far as necessary to ensure satisfactory configuration. The other HART configuration Tools are Honeywell Experion in conjunction with FDM, iDTMs running on FDM or Pactware, and Emerson 375/475. The organization of Device Configuration and Parameter Descriptions on page 33 is given in Table 11.

## 5.2 Overview of FDC Homepage

The FDC homepage consists of links for Online Configuration, Offline Configuration, Manage DDs, and Settings. See below.



**Figure 8 – FDC Homepage**

**Error! Reference source not found.** lists the items that appear on the FDC homepage and its descriptions.

**Table 9 - FDC homepage elements**

| Items    | Description                                      |
|----------|--|
| <b>1</b> | Screen title.                                    |
| <b>2</b> | Tap to quit FDC.                                 |
| <b>3</b> | Tap to view the application information.         |
| <b>4</b> | Tap to navigate to Online Configuration screen.  |
| <b>5</b> | Tap to navigate to Offline configuration screen. |
| <b>6</b> | Tap to navigate to Manage DDs screen.            |
| <b>7</b> | Tap to navigate to Settings screen.              |
| <b>8</b> | Tap to select the highlighted menu option.       |
| <b>9</b> | Tap to quit FDC.                                 |



**Note:** To select a particular option in FDC you can either select the option and then tap **Select** or you can directly double-tap the option.

## Settings

Use this feature to customize FDC. You can customize FDC for device detection, DD selection, and other application settings.

### Device Identification

Use the following options to configure FDC to identify a device.

- **Using Poll Address**
  - **Use poll address 0 only:** Use this to detect a device with the poll address as zero.
  - **Find first poll address and use:** Use this to detect a device with the first available poll address in the range of poll addresses that are available.
  - **Use selected poll address:** Use this to detect a device with a specific poll address in the range of zero to 63.
  - **Use From:** Use this to detect a device based on a range of poll addresses.
- **Using Device TAG:** Use this to detect a device with a known HART tag.
- **Using Device LONG TAG:** Use this to detect a device with a known HART long tag (applicable for devices with HART 6 or later Universal revisions).

**Note:** If you choose the option Using Device TAG or Using Device LONG TAG, FDC prompts you to enter a device tag/long tag name during device detection.

### DD selection

Use the following options to configure FDC to select DD files when a DD with matching device revision is not available.

- **Use DD file of previous device revision:** Use this option to automatically communicate using a DD file having device revision lower than that of the device.
- **Use generic DD file:** Use this option to automatically communicate to the device using an appropriate generic DD file.
- **Always ask user:** Use this option to always prompt you with a choice for communicating to the device either using the previous device revision or using a generic DD file.
- **Always Use Generic:** Use this option to always communicate to the device using generic DD files even if a DD file with matching device revision as the device is present.

**Note:** A generic DD file is a DD file that provides access and interface to the universal data and features of a HART device.

### Other settings

**Low storage notification:** Use this option to set a percentage value and to notify you with a warning message when the available storage card space is less than the percentage set.

**Application diagnostics:** Use this option to enable or disable the logging infrastructure for application diagnostics. With this option enabled, FDC creates necessary log files for troubleshooting and diagnostics. These files are stored in SD Card\FDC folder.

**Note:** You must not enable this option unless suggested by Honeywell TAC because this may impact the application performance.

## Manage DDs

Using this feature, you can manage the DD files installed with FDC. A DD file contains descriptive information about the functionality of a device. By default, a set of DD files are installed with FDC. However, if you do not have a DD for a given device, you can install it using the “Add DD” feature. Similarly, you can uninstall a DD file or a set of DD files using “Delete DD” feature. You can also directly copy the DD files in appropriate hierarchy using a card reader or “Active Sync/Mobile Device Center” mechanisms. In such a case, you should validate the library view using the “Refresh” feature.

### Overview

Using Manage DDs, you can view, add, or delete DD files for devices. A list of already available DD files is maintained in the DD Library. FDC lists the installed DD files in a hierarchy as below:

Manufacturer  
Device Type  
DevRev xx, DDRev yy  
DevRev pp, DDRev qq

### Add a DD file

To add a DD file for a device, perform the following steps.

1. From the FDC homepage, tap Manage DDs > Select.

The **Manage DDs** dialog box appears.

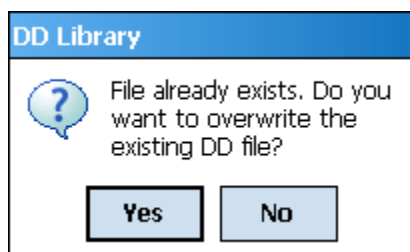
2. Tap **Options** > **Add DD**.

Or

Tap .

The **ADD DD files** dialog box appears.

3. Browse to the location in which the DD file (.fm8) is located and tap **OK**.
4. If the DD file already exists, then the following message appears.



5. Tap **Yes** to overwrite the existing DD files.
6. If the DD file is added successfully, a success message appears.

## Delete a DD file

Using this option, you can delete a particular version of a DD file. To delete a DD file for a device, perform the following steps.

1. From the FDC homepage, tap **Manage DDs > Select**.

The **Manage DDs** dialog box appears.

2. You can choose to delete DD(s) in one of the following ways:
  - a) By device manufacturer – Select a device manufacturer to delete all device types and DDs associated with the manufacturer's devices.
  - b) By device type – Select a device type to delete all DDs associated with the device.
  - c) By device revision and DD revision – Select the specific entry of device revision, DD revision to delete the specific DD
3. Tap **Options > Delete DD**.

Or



A confirmation message appears.

4. Tap **Yes**.

If the DD file is deleted successfully, a success message appears.

5. Tap **OK** to return to **DD Library** page.

## Validating a manually edited library

Besides using the Add/Delete DD features, advanced users may also manipulate a DD library by directly editing the contents of the FDC\Library folder. DD files can also be transferred directly to this location by accessing the SD Card on MCT101 through a card reader and/or by connecting the MCT101 or MCT202 to a PC. In such cases, you must perform the following steps to validate a DD Library, thus edited manually:

1. From the **FDC homepage**, tap **Manage DDs > Select**
- The **Manage DDs** dialog box appears
2. Tap **Options**.
  3. Tap **Refresh Library**.

Or



A confirmation message appears.

4. Tap **Yes**. The DD library is now validated and refreshed.

## Online configuration

Using online configuration, you can configure, calibrate, monitor and diagnose a HART device which is connected to MC Toolkit. FDC provides the features to perform these functions through the various constructs offered through the DD file of the device. Besides there are certain other features available under this link for you to conveniently work with a HART device with live communication. After making changes to the device you can also save a snapshot of the device data as history to later transfer it to FDM for record and audit purposes.

## Offline configuration

Offline configuration refers to configuring a device offline (without physically connecting to the device) using a template and then downloading the configuration to the device. Presently, FDC application software does not support creating offline configuration. However, it supports importing of offline configuration from FDM (R310 and above).

## Online Configuration Overview

Online Configuration option provides you a set of functions with which you can perform various operations on a device with an active communication link. These operations primarily include configuration, calibration, monitoring, and diagnostics of a HART device. Typically, these operations could be realized through various constructs exposed by the DD file of the device. In addition, FDC also provides some additional application functions for you to perform these functions more conveniently.

Online configuration includes a set of functions to perform various operations on a Transmitter with active communication link. These operations primarily include:

- Identifying a Transmitter
- Reading and reviewing Transmitter variable values
- Editing Transmitter variable values
- Downloading the selected/edited variable set to the Transmitter

## Detecting and loading a device

Tap the **Online Configuration** button on the **Application Home** page.

The device detection and loading process automatically gets started. Depending upon the Device Detection and DD Selection settings you may have chosen, you may be prompted for certain inputs as described in the **Settings** section.

## Overview of Device Homepage

Once the device is detected and loaded successfully, you can view the device homepage for the identified device.




The workspace area on the device homepage consists of 4 tabs on the left hand side. Selecting a tab displays functions/information associated with that tab on the right hand side.



### Figure 9 – Device Homepage

Table 10 Lists the device health status and their indications.

**Table 10 - Device health status**

| Device health icons   | Indications   |
|---|---|
|  | Indicates there's no health or status indicators reported by the device   |
|  | Indicates that the device is potentially reporting a status which needs attention and further investigation. It is advised that you use Device Status under Functions tab to further investigate the details. |
|  | Indicates that the device has lost communication with MC Toolkit  |

### Tabs on the Device Home page

The following are the options that are available on the device homepage

- **Information tab:** Use this option to view the device identity related information. You can view the manufacturer name, device type, device revision, DD revision, and universal revision of the HART device.



- **Functions tab:** This tab provides various options which you may use for navigating through the device specific user interface and some standard features offered by FDC across all devices. For the sake of explanations, the right side options under this tab shall be referred as “Entry points” throughout the rest of the document.



- My Views tab:** Quite often, you may be interested only in a set of variables of a device. But navigating through the menu tree of a device may not be helpful because of time and further all variables that you want may not be in the same location. Using this unique feature of FDC, you can now choose what you want to view in a device in your own views. FDC allows you to create two such views per device revision of a specific device type. You can always modify them as per your needs.



- Tools tab:** This tab is a placeholder for FDC specific tools for providing certain functionality. Currently the only option it provides is called as Save History. Using this option you can save the snapshot of the device variables. This snapshot is saved in a format which can be later imported as a history record in FDM.



## Using FDC for various device operations

Typical operations with a smart field device involve configuration, calibration, monitoring, and diagnostics. FDC enables you to achieve these operations with a HART device via the various interfaces/constructs exposed through the DD file of the device.

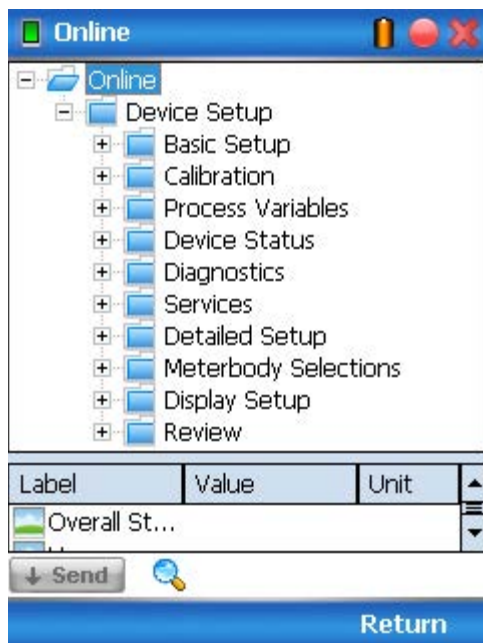
The “Functions” tab under the device home page provides the entry points for navigating through the device specific user interface to perform the above mentioned operations. A device may define up to four entry points in the DD file. All devices shall have at least one entry point, generally referred to as “Online”. Besides the device specific entry points, FDC provides custom entry points for navigational aids to specific types of information/features. One such entry point is called Device Status, which is used for reviewing device health. Another is called Methods List, which is used to navigate to all the methods available in a device.

All of the device specific entry points represent the device interface, as explained using the Online entry point as an example. All the other device specific entry points have a similar interface except for the fact that the variables and other DD constructs provided under each may vary as indicated by the title of each entry point.

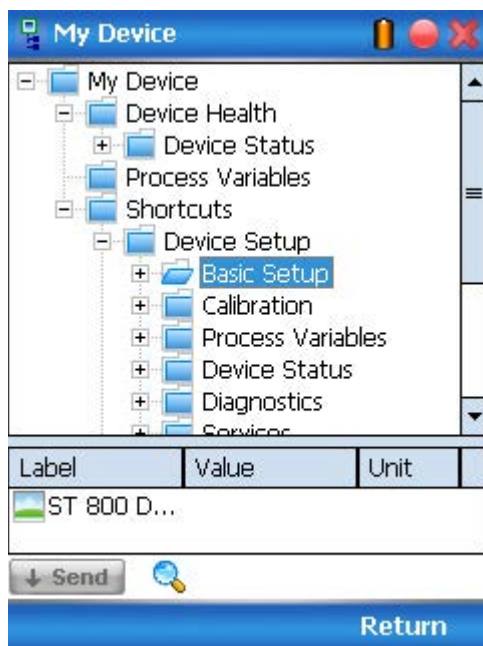


For the sake of explanation, the pages that appear on navigating through the device specific entry points are referred to as “Device Configuration” pages in this document. However it must be noted that this does not prohibit you from performing other device operations as explained above.

**Online Device Entry Point:** When you tap on to open the Online tab, the device configuration screen appears as shown below.



Alternately you can access the full EDDL features by selecting the “My Device” Tab



Navigate through the Menus to access various functions. See Table 11 for lists all the parameters in the ST 800.



## Device Configuration and Parameter Descriptions

Table 11 lists descriptions of all parameters for a HART Transmitter with the Online tab menu path. The same parameters may be accessed via the Shortcuts menu under the My Device tab.

**Table 11 – HART Transmitter Parameters**

| Online Menu Flow      | Parameter menu/ name | Description/Valid values  |
|-----------------------|----------------------|---|
| Online/Overall Status |                      | Displays a pictorial representation of the current device status  |
| Online/Honeywell Logo |                      | Photograph of an ST 800 Pressure Transmitter along with the official “Honeywell” logo   |
| Online/PV Meter       |                      | Displays a gauge meter representation of the current value of the Primary Variable (pressure input)   |
| Online/PV             |                      | Displays the current value of the Primary Variable (pressure input) in user selected engineering units  |
| Online/SV Meter       |                      | Displays a gauge meter representation of the current value of the Secondary Variable (meter body temperature)   |
| Online/SV             |                      | Displays the current value of the Secondary Variable (meter body temperature) in user selected engineering units  |
| Online/AO Meter       |                      | Displays a gauge meter representation of the current value of the Analog Output   |
| Online/PV AO          |                      | Displays the current value of Analog Output in mA   |
| Online/TV             |                      | Displays the current value of the Tertiary Variable (static pressure) in psi  |
| Online/PV % rnge      |                      | Displays the current value of transmitter Output in %   |
| Online/PV LRV         |                      | Displays the current value of the Lower Range Value (input which represents 0% output) in user selected engineering units.. This value may be configured to any value within the range LTL to UTL.  |
| Online/PV URV         |                      | Displays the current value of the Upper Range Value (input which represents 100% output) in user selected engineering units. This value may be configured to any value within the range LTL to UTL. |
| Online/ PV LRL        |                      | Displays the Lower Range Limit of the transmitter in user selected engineering units.   |
| Online/ PV URL        |                      | Displays the Upper Range Limit of the transmitter in user selected engineering units.   |
| Online/ PV LTL        |                      | Displays the Lower Transducer Limit of the transmitter in user selected engineering units.  |
| Online/ PV UTL        |                      | Displays the Upper Transducer Limit of the transmitter in user selected engineering units.  |

|   |                            |  |
|---|----------------------------|--|
| Online/Device Setup/Basic Setup/Pressure Xfer Fn          | PV Xfer fnctn              | Pressure Transfer function:<br>Select the pressure transfer function for calculated output:<br>Linear: (output scaled linearly per configured range)<br>Square Root : (output scaled as square root conversion per configured range - for flow measurements) |
|   | Transfer Function Image    | Diagram of a flow application (square root transfer function) to exemplify dual-slope low-flow cutoff behavior with uni-directional flow   |
| Online/Device Setup/Basic Setup/Low flow Cutoff (Sq Root) | Low Flow Cutoff Mode       | For Square Root (Transfer function) configurations only, choose the operating mode to determine the low flow cutoff breakpoint:<br>Dual slope: (breakpoint determined by dual slope calculation)<br>User configuration: (breakpoint defined by user)         |
|   | Low Flow Cutoff Breakpoint | When "User Configuration" is selected for Low Flow Cutoff Mode, enter the desired breakpoint value.  |
| Online/Device Setup/Basic Setup/ST 800 Device             |                            | Photograph of an ST 800 Pressure Transmitter   |
| Online/Device Setup/Basic Setup/System Connections        |                            | Diagram representing typical connections for power and communications for the ST 800 Pressure Transmitter  |
| Online/Device Setup/Basic Setup/ST 800 Assembly           |                            | Parts assembly diagram of an ST 800 Pressure Transmitter   |
| Online/Device Setup/Basic Setup/Device Information        | Honeywell Logo             | Photograph of an ST 800 Pressure Transmitter along with the official "Honeywell" logo  |
|   | Manufacturer               | Displays Manufacturer of the ST 800 Pressure Transmitter: Honeywell International  |
|   | Model                      | Displays Model number of the ST 800 Pressure Transmitter: ST 800   |
|   | Install Date               | Enter the date of site installation. This is a one-time only configuration.  |
|   | MB Type                    | Displays Meter Body Type of the ST 800 Pressure Transmitter. Possible types are:<br>DP: Differential Pressure<br>AP: Absolute Pressure<br>GP: Gauge Pressure   |
|   | MB ID                      | Displays the Meter Body ID number of the ST 800 Pressure Transmitter   |
|   | Tag                        | Enter tag identification up to eight alphanumeric characters.  |
|   | Long Tag                   | Enter a long tag name up to 32 alphanumeric characters.  |
|   | Cfg chng count             | Configuration Change Counter – this counter keeps track of the number of times any configuration parameter has been changed  |

|   |               |  |
|---|---------------|--|
| Online/Device Setup/Basic Setup/Device Information<br>(Continued ...) | Date          | Enter a date for user information only.  |
|   | Descriptor    | Enter a descriptor for user information only (up to 16 alphanumeric characters)  |
|   | Message       | Enter a message up to 32 alphanumeric characters) that will be sent to the Display. The message will be shown on the Display interspersed with the configured screens. To stop displaying the message, select "Clear Display" in the Device Information menu.  |
|   | Clear Message | Selecting this option clears the "Message" and it will no longer be sent to the Display.   |
|   | Range values  | <p>Displays all of the range information for the device. The following limits are read only:</p> <p>LRL: Lower range limit<br/>URL: Upper range limit<br/>LTL: Lower transducer limit<br/>UTL: Upper Transducer limit</p> <p>The following may be configured to desired zero and span ranging for the application:</p> <p>LRV: Lower Range Value (input which represents 0% output)<br/>URV: Upper Range Value(input which represents 100% output)</p> <p>Valid configurations for LRV and URV range from LTL to UTL.</p>  |
|   | Model Number  | Displays the full order model number of the ST 800 Pressure Transmitter  |
|   | Maint Mode    | <p>Displays the Maintenance mode set by Experion PKS.</p> <p>When a HART device requires maintenance, the engineer or the operator changes the <b>PV Source</b> value of the corresponding AI channel to <b>MAN</b>. As soon as the <b>PV Source</b> value is changed for the channels connected to the ST 800 transmitters, Experion communicates the channel mode status to the corresponding ST 800 transmitters. Upon receiving this status, if the value is <b>MAN</b>, the transmitter displays an <b>M</b> and <b>Available for Maintenance</b> on the local display of the transmitter. The status display on the transmitter ensures that the field technician can locate and perform the maintenance work on the correct transmitter without impacting the integrated devices in the process loop. The transmitter continues to display the <b>Available for Maintenance</b> status on its local display until the <b>PV Source</b> status of the corresponding AI channel is changed to <b>AUTO</b> / <b>SUB</b> or the transmitter is power cycled.</p> <p>For more information, refer to the Experion Knowledge Builder</p> |

|  |                  |   |
|--|------------------|---|
| Online/Device<br>Setup/Basic Setup/<br>Device Information<br>(Continued ...) | Device ID        | Displays the HART unique long address of the ST 800 Pressure Transmitter  |
|  | Final Asmbly num | Displays the final assembly number of the ST 800 Pressure Transmitter   |
|  | Universal rev    | Displays the HART Universal Revision of the ST 800 Pressure Transmitter   |
|  | Fld dev rev      | Displays Field Device Revision of the ST 800 Pressure Transmitter   |
|  | Software rev     | Displays the Electronics Board Software Revision of the ST 800 Pressure Transmitter   |
|  | Loop mA          | Select the Loop Current Mode configuration:<br>“Enable”: enables loop current mode (analog output will operate as a 4 to 20 mA signal consistent with the transmitter output)<br>“Disable”: disables loop current mode (analog output will be fixed at 4 mA)  |
|  | PV Units         | Select one of the pre-programmed engineering units. ST 800 Transmitters with inches of water ranges are factory calibrated using pressure referenced to 39.2°F (4°C). Pressure readings can be displayed in the following engineering units:<br><br><div style="display: flex; justify-content: space-between;"> <div> inH<sub>2</sub>O<br/>mmH<sub>2</sub>O<br/>bar<br/>kg/cm<sup>2</sup><br/>torr<br/>inH<sub>2</sub>O @ 4°C </div> <div> inHg<br/>ftH<sub>2</sub>O<br/>mmHg<br/>mbar<br/>g/cm<sup>2</sup><br/>Pa<br/>kPa<br/>atm<br/>MPa<br/>mmH<sub>2</sub>O@4°C<br/>inH<sub>2</sub>O @ 60°F </div> <div>psi</div> </div> |
|  | PV Damping       | Enter a value for damping of the device output. Entries may be any value from 0.00 to 32.00 seconds.  |
|  | SV Units         | Select the desired unit for measurement of the Secondary Variable (Meter Body Temperature). Selections available are: °C, °F, °R, Kelvin.   |
|  | Write Protect    | Displays the current configuration of the write protect function. Write Protect is “Enabled” if either the write protect jumper on the electronics board is in the “ON” position or the firmware write protect has been enabled.  |

|                                    |  |   |
|------------------------------------|--|---|
| Online/Device<br>Setup/Calibration | PV Levels                                | Displays a graphic representation of all PV ranges and limits for the ST 800 Pressure Transmitter   |
|                                    | Calibration Methods<br>(See Section 7.4) | <p>The following calibration methods are available:</p> <p>Apply Values: performs a Set LRV and/or Set URV to configure the LRV/URV to applied inputs.</p> <p>Enter Values: enter desired LRV and URV value to configure the desired operating range. Valid entries are from LTL to UTL (lower/upper transducer limits).</p> <p>D/A Trim: perform an analog output calibration at 4.00 and 20.00 mA (0% and 100% output).</p> <p>Zero Trim: perform an input calibration correction by applying process input at zero.</p> <p>LRV Correct: perform an input calibration correction by applying process input at the configured LRV level.</p> <p>URV Correct: perform an input calibration correction by applying process input at the configured URV level.</p> <p>Reset Corrects: clear all user calibration adjustments.</p> |
|                                    | Filter Performance Selection             | <p>Configure the desired performance for the Output Speed of Response Filter. Select from:</p> <p>Standard SOR : excellent speed of response to input changes with optimal noise performance</p> <p>Fast SOR: fastest speed of response to input changes</p>  |
|                                    | Correct URV Records                      | Displays the time and date history records for the last three URV Correct calibrations.   |
|                                    | Correct LRV Records                      | Displays the time and date history records for the last three LRV Correct calibrations.   |
|                                    | Zero Trim Records                        | Displays the time and date history records for the last three Zero Trim calibrations.   |
|                                    | Reset Correct Records                    | Displays the time and date history records for the last three times Reset Corrects was issued.  |

|                                       |                                 |   |
|---------------------------------------|---------------------------------|---|
| Online/Device Setup/Process Variables | PV Meter                        | Displays a gauge meter representation of the current value of the Primary Variable (pressure input)                           |
|                                       | PV                              | Displays the current value of the Primary Variable (pressure input) in user selected engineering units                        |
|                                       | Trend of PV                     | Displays a trending chart of the current value of the Primary Variable (pressure input)                                       |
|                                       | SV Meter                        | Displays a gauge meter representation of the current value of the Secondary Variable (meter body temperature)                 |
|                                       | SV                              | Displays the current value of the Secondary Variable (meter body temperature) in user selected engineering units              |
|                                       | Trend of SV                     | Displays a trending chart of the current value of the Secondary Variable (meter body temperature)                             |
|                                       | TV Meter                        | Displays a gauge meter representation of the current value of the Tertiary Variable (static pressure)                         |
|                                       | TV                              | Displays the current value of the Tertiary Variable (static pressure) in psi  |
|                                       | Trend of TV                     | Displays a trending chart of the current value of the Tertiary Variable (static pressure)                                     |
|                                       | ET Meter                        | Displays a gauge meter representation of the current value of the Electronics Temperature                                     |
|                                       | ET                              | Displays the current value of Electronics Temperature in degrees C  |
|                                       | Trend of ET                     | Displays a trending chart of the current value of the Electronics Temperature   |
|                                       | AO Meter                        | Displays a gauge meter representation of the current value of the Analog Output   |
|                                       | Trend of AO                     | Displays a trending chart of the current value of the Analog Output   |
|                                       | PV AO %                         | Displays a bar graph of the current value of the Analog Output  |
|                                       | PV % range                      | Displays the current value of transmitter Output in %   |
| Online/Device Setup/Device Status     | Overall Status                  | Displays a pictorial representation of the current device status  |
|                                       | Critical                        | Displays all possible Critical Status faults and indicates OFF for inactive faults or ON for active faults.                   |
|                                       | Help – Critical Diagnostics     | Provides a more detailed description of each Critical Status fault  |
|                                       | Non-Critical                    | Displays the first set of possible Non-Critical Status faults and indicates OFF for inactive faults or ON for active faults.  |
|                                       | Help – Non-Critical Diagnostics | Provides a more detailed description of each of the first set of Non-Critical Status faults                                   |
|                                       | Non-Critical                    | Displays the second set of possible Non-Critical Status faults and indicates OFF for inactive faults or ON for active faults. |
|                                       | Help – Non-Critical Diagnostics | Provides a more detailed description of each of the second set of Non-Critical Status faults                                  |
|                                       | Ext dev status                  | Displays all possible Extended Device Status faults and indicates OFF for inactive faults or ON for active faults.            |
|                                       | Additional Status               | Displays an advanced diagnostic detailed breakdown of all Critical and Non-Critical faults                                    |

|                                 |                      |   |
|---------------------------------|----------------------|---|
| Online/Device Setup/Diagnostics | Adv Diagnostics      | Displays Advanced Diagnostics details for tracking basic device operation. For more detailed information on Advanced Diagnostics, refer to HART Advanced Diagnostics section in this Manual. Diagnostic information includes:<br>Installation and Device Life details<br>PV Tracking details<br>SV Tracking details<br>TV Tracking details<br>ET Tracking details<br>Operating Voltage details<br>AVDD Tracking details<br>Sensor CPU Temp. Tracking details<br>Power Up Diagnostics details  |
|                                 | Config History       | Displays a history of the last five configuration parameters that have been changed.  |
| Online/Device Setup/Services    | Write Protection     | Displays a picture of the Electronics module to demonstrate how to connect the hardware write protect jumper.   |
|                                 | Write Protect        | Displays the current configuration of the write protect function. Write Protect is “Yes”(enabled) if either the write protect jumper on the electronics board is in the “ON” position or the firmware write protect has been enabled.   |
|                                 | Write Protect On/Off | Configure the firmware write protect option. Write Protect selections are:<br>“Enable”: enables the firmware write protect option (changes in configuration parameters will not be permitted).<br>“Disable”: disables the firmware write protect option (requires a password).<br>A 4-digit password is required to change the Write Protect option from “Enabled” to “Disabled” to allow configuration changes. The default password is “0000”, and can be re-configured by the user.  |
|                                 | Change Password      | Change the write protect password to a new 4-digit code.  |
|                                 | Tamper Mode          | Displays the current configuration of the Tamper detection feature (outside attempts to change device configuration when Write Protect is enabled and Tamper Mode is Enabled or Tamper Mode alone is Enabled). Refer to the “Tamper Reporting Logic and Write Protect Logic” in Table 12  |
|                                 | Attempt Counter      | Displays the number of times a tamper attempt (configuration write) has occurred. This parameter works as below:<br><b>1)</b> The attempt counter will get reset on following instances:<br>- When tamper is reset using the “Reset Tamper Counter” Method.<br>- When Tamper Mode is configured. During the configuration, if the Tamper Mode is Enabled and the other Tamper parameters are configured, then that is also considered as a Tamper Attempt.<br><b>2)</b> When tamper attempts are already incremented, if tamper is reconfigured then following happens,<br>- If the reconfigured value is greater than tamper attempts, then the tamper attempts value is retained.<br>If the reconfigured value is smaller than tamper attempts, then the tamper attempts value is clamped to the reconfigured attempts. |

|   |                       |   |
|---|-----------------------|---|
| Online/Device Setup/Services<br>(Continued ...) | Tamper Latency        | Displays the current setting of the Tamper Latency (0-60 seconds). <b>Tamper latency is the time period for which the tamper alarm remains set in response of command 48 and reflected as “Tamper Alarm” Device Status condition.</b>   |
|   | Max Attempts          | Displays the current setting for the Tamper Maximum Attempts configuration. This is the maximum number of tamper attempts to be permitted during one Latency period before setting the Tamper Alarm status.   |
|   | Configure Tamper Mode | Configure all of the settings controlling the Tamper Detection option. Selections include:<br><br>Select Tamper Mode: enable or disable tampering detection. When enabled, the “Tamper Counter” will keep track of the number of times an attempt is made. After the configured “Max Attempts”, an alarm status is generated.<br>Tamper Latency:<br>Configure the desired latency (in seconds) for the Tamper detection.<br>Maximum Attempts:<br>Configure the maximum number of tamper attempts allowed before the device sets the Tamper Alarm status |
|   | Reset Tamper Counter  | Reset the Attempt Counter to zero.  |
|   | Master Reset          | Selecting this option will cause a Master Reset of the transmitter, which is the equivalent to power cycling the device.  |
|   | Loop Test             | This function enables the user to test the Analog Output measurement at any value over the full operational range. Select a current value to apply to the output and verify the measured current on the loop with a calibrated meter. Note that this function is only available when “Loop mA” (Loop Current mode) is Enabled.  |
|   | Lock/Unlock Device    | Select the Lock state for access by HART configuration tools.<br>If “Yes” is selected to lock the device, also select “Yes” or “No” to choose whether or not the lock is “permanent.” If the lock is not permanent, it will be cleared on power cycle or Master Reset of the device.<br>If “Yes” is selected to unlock the device, the lock state will be cleared.  |



|                                    |                  |  |
|------------------------------------|------------------|--|
| Online/Device Setup/Detailed Setup | Namur Option     | <p>Select from the following:</p> <p>Namur Selection: select to enable or disable the Namur option for the output. (Refer to the PV Ranges/Limits chart) for effect on output signal.</p> <p>Namur Level: Displays a diagram of the operating range and failsafe range of the Analog output for Normal and Namur configurations</p>  |
|                                    | Sensors          | <p>Displays range information for the Sensor.<br/>The following limits are read only:<br/>LRL: Lower range limit<br/>URL: Upper range limit<br/>LTL: Lower transducer limit<br/>UTL: Upper Transducer limit</p> <p>Displays the following process variable values:<br/>PV: the current value of the PV (primary variable: pressure input)in user selected engineering units<br/>SV: the current value of the SV (secondary variable: meter body temperature)in user selected engineering units</p> <p>Allows configuration of the process variable units. See “Device Information” menu for details.<br/>PV Units: Select one of the pre-programmed engineering units for the primary variable(pressure input).<br/>SV Units: Select one of the pre-programmed engineering units for the secondary variable(meter body temperature).</p> |
|                                    | Signal Condition | <p>The following signal control parameters may be configured in this menu:</p> <p>PV Damping: Enter a value for damping of the device output. Entries may be any floating point value from 0.00 to 32.00 seconds.</p> <p>PV URV: Upper Range Value or span (input which represents 100% output). Range of entries is from LTL to UTL.</p> <p>PV LRV: Lower Range Value or zero (input which represents 0% output). Range of entries is from LTL to UTL.</p> <p>PV Xfer fnctn: Pressure Transfer function:<br/>Select pressure transfer function for calculated output:<br/>Linear (output scaled linearly per configured range)<br/>Square Root (output scaled as square root conversion per configured range - for flow measurements)</p> <p>PV % range: Displays the current value of AO (analog output) in %</p>                      |

|   |                         |   |
|---|-------------------------|---|
| <p>Online/Device Setup/Detailed Setup<br/>(Continued ...)</p> | <p>Output Condition</p> | <p>The following output-related values and operations are available in this menu:</p> <p>Poll Address: Select HART short address 0 to 63.</p> <p>Num req preams: displays the number of required request preambles for the ST 800 HART communications</p> <p>PV AO: displays the current value of AO (analog output) in milliamps</p> <p>PV AO Alm Type: displays the current position of the failsafe jumper on the electronics board (upscale/ lowscales burnout)</p> <p>Loop mA: Select the Loop Current Mode configuration:<br/> “Enable”: enables loop current mode (analog output will operate as a 4 to 20 mA signal consistent with the transmitter output)<br/> “Disable”: disables loop current mode (analog output will be fixed at 4 mA)</p> <p>Loop test: This function enables the user to test the Analog Output measurement at any value over the full operational range. Select a current value to apply and verify the current output on the loop with a calibrated meter.<br/> Note that this function is only available when “Loop mA” (Loop Current mode) is Enabled.</p> <p>D/A trim: perform an analog output calibration at 4.00 and 20.00 mA (0% and 100% output).</p> |
|---|-------------------------|---|

|   |                             |  |
|---|-----------------------------|--|
| Online/Device Setup/Detailed Setup<br>(Continued ...) | PILD/PILD                   | Select the PILD configuration:<br>“Enable”: enables PILD feature/functionality<br>“Disable”: disables PILD feature/functionality   |
|   | PILD/Application (App)      | Provides option for user to select application type so that default PILD Configuration parameters for selected Application Type(SWIN....) are auto selected by Transmitter.<br><br>Possible Application Types are: <ul style="list-style-type: none"> <li>• DP flow application (Not applicable for Absolute and Gauge Transmitter.</li> <li>• Marine Level</li> <li>• Bubbler Level</li> <li>• Other (Default Factory Configuration)</li> </ul> |
|   | PILD/Sampling Window (SWIN) | The sampling window of PILD in minutes, which determines a cycle of PILD runs for both training and monitoring mode.<br>Enumeration: 3, 6, 9, 12, 15 minutes   |
|   | PILD/Up Limit (UL)*         | The up limit of PILD factor for normal status.<br>Valid range is from 0.50 to 1.00.  |
|   | PILD/Down Limit (DL)*       | The down limit of PILD factor for normal status.<br>Valid range is from BL to 0.50.  |
|   | PILD/Blockage Limit (BL)*   | The both sides blockage Limit of PILD factor.<br>For AP/GP transmitter, BL is not available/applicable, because there is only one side.<br>Valid range is from 0.00 to DL.   |
| Online/Device Setup/Meterbody Selections              | PILD/Cut Off Frequency      | Cut Off Frequency (HPF f0) configures the cut off frequency of a high pass filter for dynamic process.<br><br>This is used to take noise fluctuation of PV is kept after filtering.<br>Valid range is from 0.0 to 5.0..  |
|   |                             | Displays detailed information pertaining to the Meterbody, including construction configuration, materials of construction, fill fluids, and process connection details.   |

\*This parameter can be changed when PILD is disabled. When PILD is enabled user can still change the parameter if PILD is in Monitoring mode and not in Training mode

|  |                      |   |
|--|----------------------|---|
| Online/Device Setup/Display Setup<br><br>(for Advanced Display Only) | Display Connected    | Indicates the type of display installed on the transmitter (Advanced or Basic).   |
|  | Display Format       | Displays a photographic image of the installed display  |
|  | Screen Configuration | <p>Each of eight display screens may be customized with the following settings:</p> <p>Screen Format: select the screen format as:<br/> PV only<br/> PV &amp; bar graph<br/> PV &amp; trend.</p> <p>PV Selection: select the displayed process variable as:<br/> Differential Pressure<br/> Meterbody Temperature<br/> Loop Output<br/> Percent Output<br/> Static Pressure</p> <p>PV Scaling: select the desired scaling as:<br/> None<br/> Convert Units (direct conversion to other standard units)<br/> Linear (scale linearly to a custom range)<br/> Square Root (scale to a custom flow range)<br/> Engineering Units: for “Convert Units” scaling option, select desired standard unit based on selected PV.</p> <p>Scaling low/high limits: For Linear and Square Root scaling options, select the low and high scaling values.</p> <p>Custom Units: for Linear and Square Root scaling options, enter a custom units tag up to eight alphanumeric characters.</p> <p>Number of Decimals: select the number of decimal places for the PV display from none to 3.</p> <p>Custom Tag: enter a custom tag name for the screen title up to 14 alphanumeric characters.</p> <p>Bar Graph Chart low/high limits: for “PV and bar graph” display option, enter a custom range for the bar graph display.</p> <p>Trend Chart low/high limits: for “PV and trend” display option, enter a custom range for the trend display.</p> <p>Trend duration: for “PV and trend” display option, enter a trend duration time from 1 to 24 hours.</p> |
|  | Common Setup         | <p>The following screen options are available:</p> <p>Language: Select from:<br/> English<br/> French<br/> German<br/> Spanish<br/> Russian</p> <p>Rotation Time: Set the length of time each screen is visible before rotating to the next available screen. Select from 3 to 30 seconds.</p> <p>Contrast Level: Select a display contrast level from 1(low) to 9 (high) or choose the “default” (5).</p>  |

|  |                      |  |
|--|----------------------|--|
| Online/Device Setup/Display Setup<br>(Continued ...)<br><br>(for Basic Display Only) | Read Screen Info     | Displays configured information for each of the eight display screens. Select a screen number to view details of the configurations selected in the “Screen Configuration” menu.   |
|  | Screen Configuration | The display screen may be customized with the following settings:<br>PV Selection: select the displayed process variable as:<br>Differential Pressure<br>Loop Output<br>Percent Output<br>Pressure Units: select desired standard pressure unit.<br>Number of Decimals: select the number of decimal places for the PV display from none to 3.<br>Custom Tag: enter a custom tag name for the screen title up to 14 alphanumeric characters. |
|  | Common Setup         | The following screen options are available:<br><br>Rotation Time: Set the length of time the PV display is visible before rotating to another screen (such as a diagnostic display). Select from 3 to 30 seconds.<br><br>Contrast Level: Select a display contrast level from 1(low) to 9 (high) or choose the “default” (5).  |
| Online/Device Setup/Upgrade Options  | PILD Functionality   | Provides information to user to if PILD functionality which is an optional feature is Available or Not-Available.  |
|  | Dev Id               | This is the Device identification which user needs to provide to get valid License Key for upgrading new features like PILD.   |
|  | Enter License Key    | License Key used to enable specific feature or function  |
| Online/Device Setup/Review   |                      | Displays the current values for all of the pertinent operating parameters listed in this table, plus revision information. Parameters are not configurable in this menu.   |

**Table 12 – Tamper Reporting Logic Implementation with Write Protect**

| <b>Write Protect Jumper Status</b> | <b>Write Protect Software Status</b> | <b>Tamper Reporting Status</b> | <b>Tamper Alerted Posted?</b> | <b>Configuration Change Allowed?</b> |
|------------------------------------|--------------------------------------|--------------------------------|-------------------------------|--------------------------------------|
| ON                                 | ON                                   | ON                             | YES                           | NO                                   |
| ON                                 | OFF                                  | ON                             | YES                           | NO                                   |
| OFF                                | ON                                   | ON                             | YES                           | NO                                   |
| OFF                                | OFF                                  | ON                             | YES                           | YES                                  |
| ON                                 | ON                                   | OFF                            | NO                            | NO                                   |
| ON                                 | OFF                                  | OFF                            | NO                            | NO                                   |
| OFF                                | ON                                   | OFF                            | NO                            | NO                                   |
| OFF                                | OFF                                  | OFF                            | NO                            | YES                                  |
| Jumper missing                     | ON                                   | ON                             | YES                           | NO                                   |
| Jumper missing                     | ON                                   | OFF                            | NO                            | NO                                   |
| Jumper missing                     | OFF                                  | ON                             | YES                           | YES                                  |
| Jumper missing                     | OFF                                  | OFF                            | NO                            | YES                                  |

The sections below give some examples as to how to edit the configuration parameters and execute Methods.

## Procedure to Enter the Transmitter Tag

1. From the **My Device** menu, make the following menu selections:  
**Shortcuts > Device Setup > Basic Setup > Device Information > Tag.**
2. Click **Edit**. The **Tag** screen will be displayed.
3. Key in the tag name (for example: ST 800) which can be a maximum of eight characters.
4. Click **OK**. The **Send to Device** screen will be displayed.
5. Select the **Tag** check box.
6. Click **Send** to download the change to the Transmitter, or Click **Return** to continue making changes.

## Selecting the Process Variable (PV) Unit of Pressure Measurement



Engineering units affect the values of the LRV and URV. After changing the PV engineering units to the Transmitter, verify changes to the units parameter, the LRV, and the URV.


The pressure measurement can be displayed in one of the pre-programmed engineering units.

1. From **My Device** menu, make the following menu selections:  
**Shortcuts > Device Setup > Basic Setup > PV Units**
2. Click **Edit**. You will be warned that if you change the value of the variable it will change the loop current, which may upset the control process.
3. Click **Yes** to continue. The PV Unit screen will be displayed with a list of measurement units, as follows:

|                    |                    |      |                        |
|--------------------|--------------------|------|------------------------|
| inH <sub>2</sub> O | psi                | Pa   | inH <sub>2</sub> O@4°C |
| inHg               | bar                | kPa  | mmH <sub>2</sub> O@4°C |
| ftH <sub>2</sub> O | mbar               | Torr | —                      |
| mmH <sub>2</sub> O | g/cm <sup>2</sup>  | Atm  | —                      |
| mmHg               | kg/cm <sup>2</sup> | MPa  |                        |

4. Select the desired **PV Unit**, and click **OK**. A Post Edit action message will be displayed, indicating if you select this value, the variables that use it as the units code will start in the previous units until this value is sent to the Transmitter.
5. Click **OK** to continue or **Abort** to discard the change.
6. Click **Send**. The Send to Device screen will be displayed.
7. Select the **PV Unit** check box.
8. Click **Send** to download the change to the Transmitter or **Return** to continue making changes.

## Setting PV URV, and LRV Range Values


 ST 800 Transmitters are calibrated at the factory with ranges using inH<sub>2</sub>O at 39.2°F (4°C). For a reverse range, enter the upper range value as the LRV and the lower range value as the URV.

When setting the range using applied pressure, the URV changes automatically to compensate for any changes in the LRV. When using the Toolkit keyboard, the URV does not change automatically. To use the applied pressure method and change both the LRV and URV, change the LRV first.

The LRV and URV values can be entered with the Toolkit keypad or by applying the corresponding pressure values directly to the Transmitter. Use the following procedure to key in the range values. The procedure uses an example of 5 to 45 referenced to inH<sub>2</sub>O.

1. Starting at the My Device menu, make the following menu selections:  
**Shortcuts > Device Setup > Basic Setup > Device Information > Range values**
2. Click **Edit**. The “Range value” screen will be displayed.
3. Select **PV LRV** and click **Edit**. You will be warned that if you change the value of the variable it will change the loop current, which may upset the control process.
4. Click **Yes** to continue.
5. Enter the desired PV LRV value. (for example: 5).
6. Click **OK**. The Range Values menu will be displayed
7. Choose **Pressure URV**.
8. Add the desired URV setting value (for example: 45).
9. Press **ENTER**.
10. Select the **PV URV**, and click **Edit**. You will be warned that if you change the value of the variable, it will change the loop current, which may upset the control process.
11. Click **Yes** to continue.
12. Click **Return** to go back to the **Basic Setup** menu.
13. Click **Send**. The Send to Device screen will be displayed.
14. Select the **Range values** check box,
15. Click **Send** to download the change to Transmitter, or Click **Return** to continue making changes.

## Setting Range Values for Applied Pressure

 When setting the range values using applied pressure, the URV changes automatically to compensate for any changes in the LRV and to maintain the present span (URV – LRV). When entering the LRV using the Toolkit keypad, the URV does not change automatically. If you use the applied pressure method, and need to change the LRV and URV, change the LRV first. You can also use the local zero and span adjustments on the Transmitter to set the LRV and URV values.

1. Starting at the **My Device** menu, make the following menu selections:  
**Shortcuts > Device setup > Calibration > Calibration Methods > Apply values.**



2. Click **Execute**. You will be warned to remove the loop from automatic control. After doing so, press **OK** to continue.
3. Select **4mA** from the list, and then click **OK**. A message will prompt you to apply a new 4 mA input.
4. Click **OK**; otherwise, click **Abort**.
5. When the **Current applied process value:** is displayed, choose **Select as 4mA value**, and click **OK**.
6. Repeat steps 2 through 4 to set the URV to the applied input pressure for 20 mA output.
7. Click **Return** to go back to the Calibration menu.
8. Click **Send**. The Send to Device screen will be displayed.
9. Select the **Apply Values** check-box.
10. Click **Send** to download the change to the Transmitter, or click **Return** to continue making changes.

## Saving device history

FDC provides you a feature wherein you can save the device configuration snapshot as history. This history record may then be transferred to a central asset management database such as FDM. Using this feature you can save the device configuration snapshot as device history of a connected device at any given time in a predefined location. The following are the features of save device history option.

- Two formats of history are supported: FDM and DocuMint.
- Only one snapshot per device instance is allowed to be saved and you can save the snapshot of a device any number of times overwriting the existing one.

To save device history, perform the following steps.

1. On Device Home page, tap Tools.
2. Select **Save History** and tap **Select**

The **Save History** page appears.



**Save History**

History Record Name:  
NewDeviceRecord

Device Tag:  
DevTag

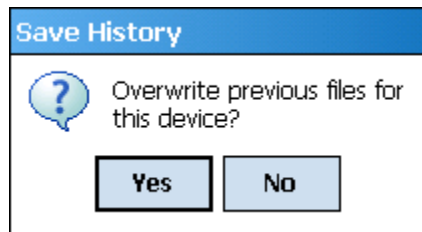
Format:  
☒ FDM  
☐ Documint

Save Return

3. Enter the **History Record Name** using the keypad and tap **OK**. History Name field accepts alphanumeric characters, underscore, and no other special characters.
4. Enter the **Device Tag** using the keypad and tap **OK**. Device Tag field accepts alphanumeric characters, underscore, and no other special characters.

**Note:** The device can be identified with **History Record Name** and **Device Tag** in FDM, once the record is imported in FDM, provided the device is not already present in the FDM network.

5. Select the **Format**. The following are the available formats:
  - FDM
  - DocuMint
6. Tap **Save** to save device history record.
7. If a history record for this device already exists, the following warning message appears.



8. Tap **Yes** to overwrite the existing name. A overwrite success message appears.
9. Tap **OK** to return to **Device Home** page.

## Exporting device history records to FDM

The history snapshot saved in FDC can be imported into FDM for record and audit purposes. This is enabled by the standard Import/Export wizard in FDM. This way FDM allows synchronizing the device configuration data through the MC Toolkit handheld.

To export device history from FDC and import it in FDM, perform the following steps.

1. Connect your MC Toolkit handheld to your computer as described earlier.
2. Browse to the folder on your computer, **SD Card > FDC > Resources > History**.
3. The FDC history records are named as per the following convention for the primary name:  
**DeviceTag\_ManufacturerIDDeviceTypeDeviceRevisionDDRRevision\_DeviceID**
4. Copy the desired Device History Record files (with .fdm extension) from the above mentioned location to a temporary location on FDM Client computer.
5. Use FDM Import/Export wizard to import the history records into FDM. After you import successfully:
  - The snapshot would get imported into FDM database and appear as a history record for the corresponding device in FDM.
  - The Audit Trail entry for such a record identifies it as being imported through the MC Toolkit handheld.
  - If the device is not part of any of the FDM configured networks, it would appear under '**Disconnected Devices**' in FDM network view.
  - All operations allowed on Device History Record in FDM will be allowed for the record imported through the MC Toolkit handheld.

**Note:** For more details on using FDM Import/Export feature, refer to section Importing and Exporting Device History in FDM User's Guide.

## Exporting device history records to DocuMint

To export device history from FDC and import it in FDM, perform the following steps.

1. Connect your MC Toolkit handheld to your computer as described earlier.
2. Browse to the folder on your computer, **SD Card > FDC > Resources > History**.
3. The FDC history records are named as per the following convention for the primary name:  
**DeviceTag\_ManufacturerIDDeviceTypeDeviceRevisionDDRevision\_DeviceID**
4. Copy the desired Device History Record files (with .xml extension) from the above mentioned location to a temporary location on the DocuMint system.
5. For Importing in DocuMint: Select Procedures > Import or the Import option in the tool bar.

**Note:** For more details on using DocuMint Import feature, refer to section Importing from XML File in Document Help.



## Custom Views

FDC provides you a unique feature wherein you can choose what you want to view in a device and thus creating your own custom views. This is a very convenient utility when you are interested in select few variables in a device and saves you the time for navigating through the menus. You can create two views per device type with maximum of 10 variables selected for each custom view.

To create/modify the custom views, perform the following.

1. On **Device Home** page, tap **My Views**.
2. Tap **Configure** and tap **Select**.

The **Configure My Views** dialog box appears.

3. To customize **View1** and **View2**, select the variables by checking the box against desired variables.
4. Tap  or  to navigate to previous and next set of variables.
5. Once done, tap **Options** to select **Save My Views**.

Two custom views are ready with selected variables.

**Note:** Since a custom view can contain only up to 10 variables each, a warning is displayed if you have selected more than 10 variables.

To rename the views, perform the following.

6. Tap **Options > Rename View1**.

A dialog box appears informing you to enter the name.

7. Tap **Ok**.
8. Tap **Option>Save** to persist the change
9. Tap **Return** to return to My Views page. You would see two options with the names you gave to the newly created views.

**Note:** To view the custom views, tap **My View 1 > Select**.  
The My View 1 page appears.



The screenshot shows a mobile application window titled "My View1". It contains a table with three columns: "Label", "Value", and "Unit". The table lists several parameters, each with a circular icon to its left. The parameters are: "Config Cha..." (value 32), "Manufactu..." (value Honeywell), "Model" (value ST3000), "PV" (value 0.00, unit s), "PV AO" (value 0.000, unit mA), "PV LRV" (value 5.5000, unit inH2O), "PV unit" (value inH2O), "SV unit" (value degC), "Tag" (value STT3K), and "Write prot..." (value No). Below the table is a "Send" button with a downward arrow icon. At the bottom of the screen is a blue bar with the word "Return" in white text.

| Label         | Value     | Unit  |
|---------------|-----------|-------|
| Config Cha... | 32        |       |
| Manufactu...  | Honeywell |       |
| Model         | ST3000    |       |
| PV            | 0.00      | s     |
| PV AO         | 0.000     | mA    |
| PV LRV        | 5.5000    | inH2O |
| PV unit       | inH2O     |       |
| SV unit       | degC      |       |
| Tag           | STT3K     |       |
| Write prot... | No        |       |

↓ Send

Return

Edit the parameters that are Read / Write and select Send.

For more details on any of the FDC features, refer the “*MC Toolkit User Manual*, document # 34-ST-25-20.”

## Offline Configuration

### Overview

Offline Configuration refers to configuring a device when the device is not physically present or communicating with the application. This process enables you to create and save a configuration for a device, even when the device is not there physically. Later when the device becomes available with live communication, the same configuration can be downloaded to the device. This feature enables you to save on device commissioning time and even helps you to replicate the configuration in multiplicity of devices with lesser efforts. Currently, FDC does not support creating offline configuration. However, it supports importing of offline configuration from FDM R310 or later versions. The configurations thus imported can be downloaded to the device from FDC.

The following are the tasks that you need to perform for importing offline configuration in FDC application software and then downloading it to the device.

- Create offline configuration template in FDM
- Save the configuration in FDM in FDM format.
- Import the offline configuration in FDC
- Download the offline configuration to the device

**Note:** For details on creating and using offline configuration, refer to section Offline configuration in FDM User's Guide.

### Importing offline configuration

Using this feature you can import offline configuration template. The offline configuration template has to be created in FDM and saved in FDM format. Copy the .fdm files into the storage location of the FDC.

To import an offline configuration, perform the following steps.

6. On the FDC homepage, tap Offline Configuration > Select.

The **Offline Configurations** page appears.

7. Tap **Options** > **Import**.

The **Select a File** dialog box appears.

8. Navigate to the location where the offline configuration template is stored.
9. Select the required offline configuration template from the list.
10. Double-tap and the offline configuration template is imported.

A success message appears.

**Note:** In case if the offline configuration template is already imported, an overwrite message appears.

11. Tap **OK** to return to the **Offline Configurations** page. The device details appear on the bottom of the page.

### ***Deleting offline configuration***

Using this feature you can delete an offline configuration template.  
To delete an offline configuration, perform the following steps.

12. On the FDC homepage, tap Offline Configuration > Select.

The **Offline Configurations** page appears.

13. Select the required offline configuration template from the list.
14. Tap **Options** > **Delete**. A warning message appears.
15. Tap **Yes** to delete the offline configuration template.

### ***Downloading an offline configuration***

Using this feature, you can download the offline configuration when the device is online.

To download an offline configuration, perform the following steps.

16. On the FDC homepage, tap **Offline Configuration** > **Select**.

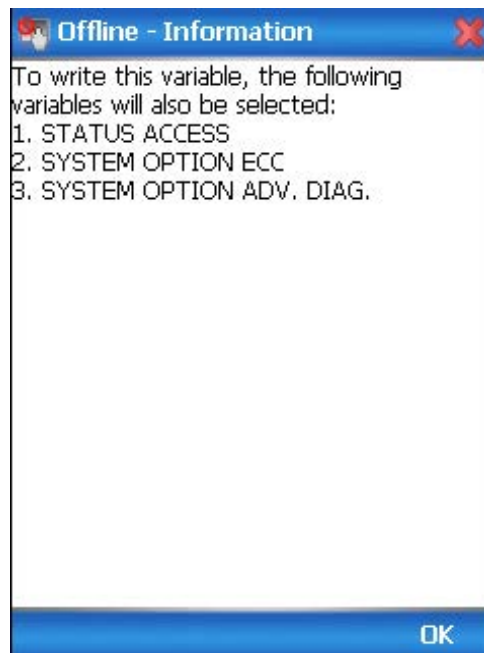
The **Offline Configurations** page appears.

17. Select the required offline configuration template from the list.
18. Tap **Options** > **Download**.

The **Offline – Select Variables** page appears with the all the variables.

**Note:** By default, all the variables selected in FDM will appear as selected and non-editable variables appear in grey color.

19. Select the required variable. In case you select a dependent variable, then variables on which it is dependent on will also be selected and the following warning appears.



20. Tap **OK** to return to the offline wizard.
21. Tap **Next**.

The **Offline – Review and Send** page appears with the list of selected variables.

22. Tap **Send** and the process to send the variables to the device starts. Once the downloading is complete, the following page appears.

| Offline - Status  |              |         |
|-------------------|--------------|---------|
| Label             | Value        | Status  |
| SV unit           | degC         | SUCC... |
| Transfer function | Linear       | SUCC... |
| PV LRV            | 0            | FAILED  |
| PV unit           | inH2O        | SUCC... |
| Units             | %            | SUCC... |
| Date              | 1/1/80 12... | SUCC... |
| Descriptor        | ?????????    | SUCC... |
| Poll addr         | 0            | SUCC... |
| PV URV            | 0            | SUCC... |
|                   |              |         |
| Send              |              | Finish  |

**Note:** If the variables are downloaded successfully, status appears as **SUCCESS** in green color; and if failed, status appears as **FAILED** in red color.

23. Tap **Finish** to return to **FDC Homepage**.

## 6 DE Calibration

### 6.1 Overview

The ST800 SmartLine Pressure Transmitter does not require periodic calibration to maintain accuracy. Typically, calibration of a process-connected Transmitter may degrade, rather than augment its capability. For this reason, it is recommended that a Transmitter be removed from service before calibration. Moreover, calibration will be accomplished in a controlled, laboratory-type environment, using certified precision equipment.

### 6.2 Calibration Recommendations

If the Transmitter is digitally integrated with a Honeywell Total Plant Solution (TPS) system, you can initiate range calibration and associated reset functions through displays at the Universal Station, Global User Station (GUS), and Allen-Bradley Programmable Logic Controllers (PLCs). However, a range calibration using the MC Toolkit with the Transmitter removed from service is recommended.

Calibration with the Transmitter removed from service needs to be accomplished in a controlled environment. Details for performing a calibration reset through the Universal Station are provided in the *PM/APM SmartLine Transmitter Integration Manual*, PM12-410, which is part of the TDC 3000<sup>x</sup> system book set.

### 6.3 Test Equipment Required for Calibration

Depending upon the type of calibration you choose, you may need any of the following test equipment to accurately calibrate the transmitter:

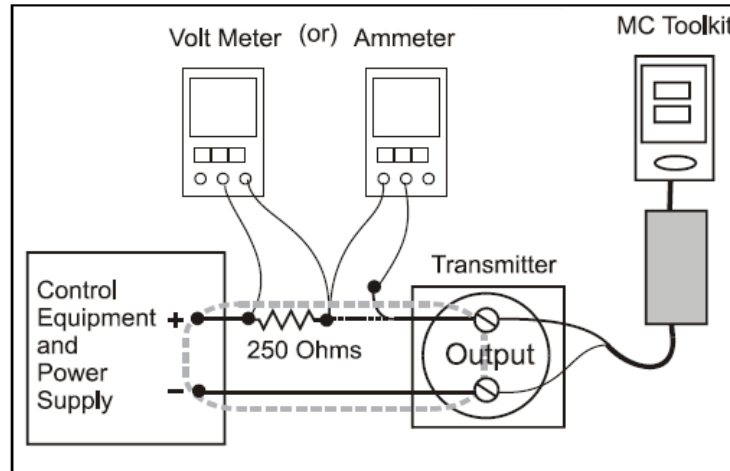
- Digital Voltmeter or millimeter with 0.01% accuracy or better
- Honeywell MC Toolkit: Use the **MC Toolkit** application to calibrate the ST 800 DE model and the **FDC** application to calibrate the ST 800 HART model.
- Calibration-standard input source with a 0.01% accuracy
- 250 ohm resistor with 0.01% tolerance or better.

### 6.4 Analog Output Signal Calibration

The Transmitter analog output can be calibrated at its zero (0) and 100% levels using a constant-current source mode. The Transmitter does not have to be removed from service for the analog output signal calibration procedure.



The following procedure provides the steps for calibrating the output signal for a Transmitter in the analog mode. The procedure is similar for a Transmitter in the DE mode, but the MC Toolkit is required to read the output in percent in place of current or voltage. Figure 10 **Error! Reference source not found.** illustrates the test setup for the analog output calibration process.



**Figure 10 – Analog Output Calibration Test Setup**

1. Verify the integrity of the electrical components in the output current loop.
2. Connect the MC Toolkit as indicated, and establish communication with the Transmitter. For these procedures, values of components in the current loop are not critical, if they support reliable communication between the Transmitter and the MC Toolkit.
3. Start the MC Toolkit application, and establish communication with the Transmitter.
4. In the Output Calibration box, select the **Loop Test** button to display the LOOP TEST box.
5. Select the desired constant-level Output: **0 %**, **100 %**, or **Other** (any of **0 % - 100 %**).

**LOOP TEST**

Mode: Normal

**Set Output To**

☒ 0 %

☐ 100 %

☐ Other  %

Set

Clear Output

Back

6. Select the **Set** button. You will be prompted to confirm that you want to put the Transmitter in output mode.

7. Select **Yes**, and note the output current at 0%, 100% or the other value established in the previous step. With the Transmitter in analog mode, you can observe the output on an externally connected meter or on a display. In DE mode, the output can be observed on the display or on the monitor display of the MC Toolkit.
8. To view the Monitor display, navigate back from the LOOP TEST display, and select the MONITOR display. A confirmation prompt will be displayed for you to verify that you want to change pages. Select **Yes**.

## 6.5 Calibrating Range Using the MC Toolkit

The range calibration involves two procedures, one to calibrate the input, the other to calibrate the output. This section provides both procedures.

## 6.6 Conditions for Input Calibration

Calibrate Transmitter input only when necessary, and under conditions that will ensure accuracy:

- Take Transmitter out of service, and move it to an area with favorable environmental conditions, for example, clean, dry, and temperature-controlled
- The source for the input pressure must be precise, and certified for correct operation.
- Qualified personnel are required for the input calibration procedure.

To optimize accuracy, the PROM includes storage for calibration constants: Correct Input Zero, Correct LRV, and Correct URV. These constants provide for optimum accuracy in that they enable fine-tuning of the input calculations by first correcting at zero input, then by bounding the input calculations at the selected operating range. Corrections are applied at the Lower Range Value (LRV) and the Upper Range Value (URV).

Factory calibration can be specified when you order your Transmitter. Also, if precision equipment, suitable environment, and required skill are available at your site, input calibration can be done locally.

The input calibration procedure in this section comprises the steps for calibrating a differential pressure (DP) Transmitter to a range of 0 to 200 in H<sub>2</sub>O for example purposes. This procedure assumes that the Transmitter is removed from the process and located in a controlled environment.

The procedure needs a precision pressure source with an accuracy of 0.04% or better to do a range calibration. Factory calibration of the ST 800 Pressure Transmitter is accomplished with inches-of-water ranges referenced to a temperature of 39.2 °F (4°C).

## 6.7 Input Calibration Procedures Description

The input calibration process consists of the following three parts:

- Correcting the input at zero pressure.
- Correcting the input LRV.
- Correcting the input URV.



For the input calibration procedure, current loop component tolerances and values are not critical if they support reliable communication between the Transmitter and the MC Toolkit. However, the **Transmitter must be level**, because the meter body contains fluids that can affect zero sensing. For leveling procedures. Refer to the ST 800 SmartLine Transmitter User's Manual, 34-ST-25-35, "Mounting Transmitters with Small Absolute or Differential Pressure Spans" for information on Transmitter leveling.

For the input calibration procedures, connect the test setup illustrated in. Either voltage mode (Voltmeter across the resistor) or current mode (Ammeter in series with the resistor) is satisfactory.

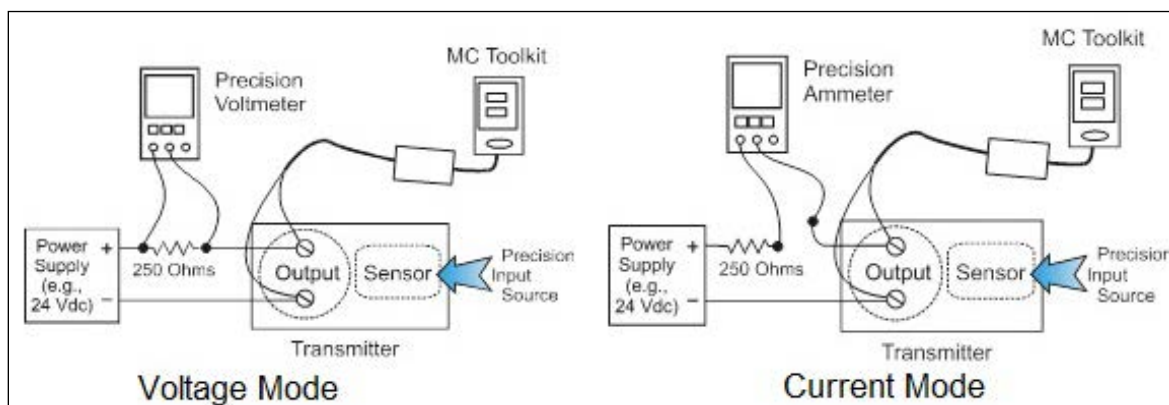


Figure 11 – Input Calibration Connections

## 6.8 Input Calibration Procedure

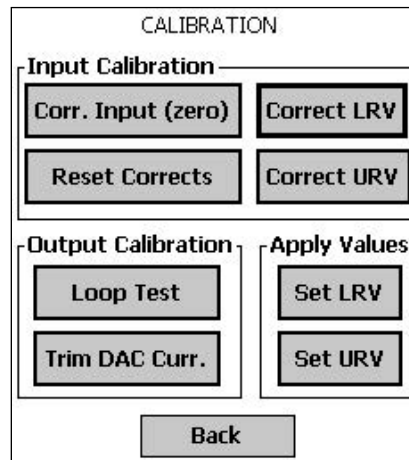
### Correct the Input at Zero

1. Start the **MC Toolkit** application. Establish communication between the Transmitter and the MC Toolkit.
2. From the DE MAIN MENU, select **Configure** to call up the DE CONFIGURE display.

| DE CONFIGURE   |   |
|--|---|
| LRL <input type="text" value="-10.0"/>               | URL <input type="text" value="10.0"/>             |
| LRV <input type="text" value="0.19371"/>             | URV <input type="text" value="10.194"/>           |
| PV Units<br><input type="text" value="inH2O @ 39F"/> | SV Units<br><input type="text" value="°C"/>       |
| Sensor Type<br><input type="text" value="DP"/>       | Damping<br><input type="text" value="32.00"/>     |
| Span<br><input type="text" value="10.0"/>            | Conformity<br><input type="text" value="Linear"/> |
| <input type="button" value="Send"/>                  | <input type="button" value="Back"/>               |

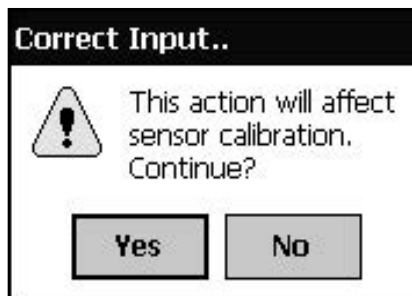
3. From the DE CONFIGURE display:

- a. Use the **PV Units** drop-down list to select the appropriate engineering units.
  - b. Use the keyboard to enter the desired **LRV** and **URV** values.
  - c. Select the **Send** button to copy the newly entered values to the Transmitter. When the copy operation is complete, **Send** will be displayed in half-intensity.
4. Select the **Back** button to go to the DE MAIN MENU; then select the **Calibration** button. The CALIBRATION box will be displayed.
5. Select the **Back** button to go to the DE MAIN MENU; then select the **Calibration** button. The CALIBRATION box will be displayed.



The CALIBRATION menu screen is titled "CALIBRATION" at the top. It contains two main sections: "Input Calibration" and "Output Calibration". The "Input Calibration" section has four buttons: "Corr. Input (zero)", "Correct LRV", "Reset Corrects", and "Correct URV". The "Output Calibration" section has two buttons: "Loop Test" and "Trim DAC Curr.". To the right of the "Output Calibration" section is an "Apply Values" section with two buttons: "Set LRV" and "Set URV". At the bottom center of the screen is a "Back" button.

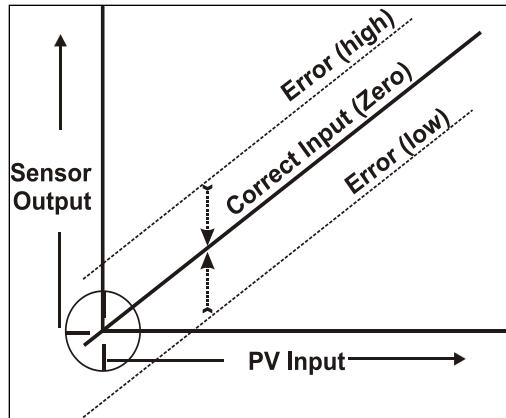
6. Select **Corr. Input (zero)**. The following advisory message will be displayed:



The advisory message is titled "Correct Input..". It features a warning icon (a triangle with an exclamation mark) on the left. To the right of the icon, the text reads: "This action will affect sensor calibration. Continue?". At the bottom of the message box are two buttons: "Yes" and "No".



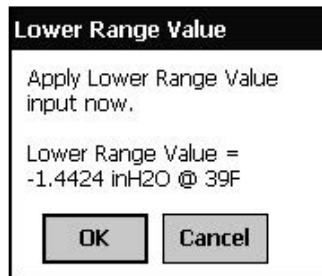
The PV Input (Zero) refers to a known standard such as zero pressure (e.g.: vent both sides of a DP transmitter). As indicated below, this procedure will shift the slope up or down to eliminate the error at the zero reference. The slope (angle) of the response is unchanged.



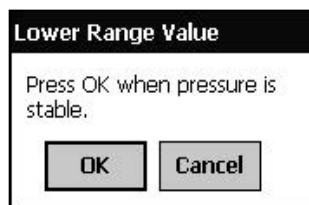
7. Select **Yes** in the **Correct Input..** message box, and you will be prompted to **Apply the PV Input (Zero) now**.
8. Verify that the *value* of the PV applied at the input is *exactly Zero*. Then select **OK** to send the Correct Input (Zero) command to the Transmitter, which adjusts the input calibration.
9. Wait for the message **Sensor input has stabilized**, then select **OK**.
10. When the zero correction is complete, the message **Sensor zero succeeded!** is displayed; select the **OK** button.

### Correct Input at the Lower Range Value (LRV)

1. After the LRV and URV have been entered, as described in the “Correct Input at Zero” procedure, above, select the **Correct LRV** button on the CALIBRATION display. (See Step 4 in the previous procedure to bring the CALIBRATION screen to the display.)
2. Select the **Correct LRV** button. This message appears:

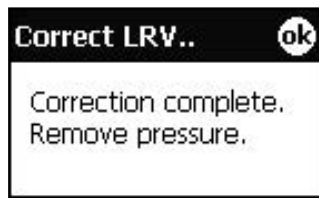


3. Adjust the PV input pressure to the *exact value of the LRV* entered in the DE CONFIGURE display.
4. Select the **OK** button; this message appears:



5. Observe the input pressure at the applied value; when it is stable, select the **OK** button.

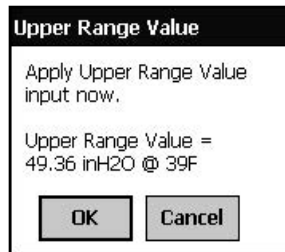
- When the Transmitter has completed the LRV correction, this message appears:



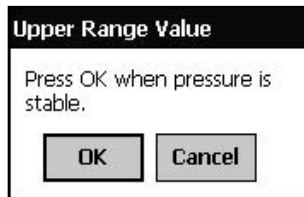
- Select **OK** to acknowledge.

## Correct Input at URV

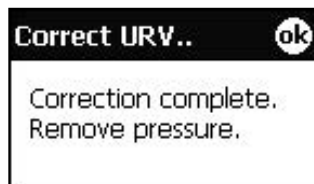
- Select the **Correct URV** button. This message appears.



- Adjust the PV input pressure to **the exact value of the URV** entered in the DE CONFIGURE display.



- Select the **OK** button.
- When the transmitter has completed the URV correction, this message appears.



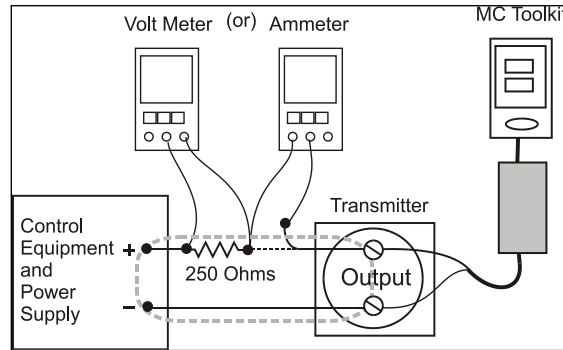
- Select **OK** to acknowledge.

## 6.9 DE Output Calibration

### Output Calibration Preparation

This procedure applies to DE Transmitters operating in analog (current) mode only. First, verify the integrity of the electrical components in the output current loop. Make the connections shown in Figure 12, and establish communication with the Transmitter.

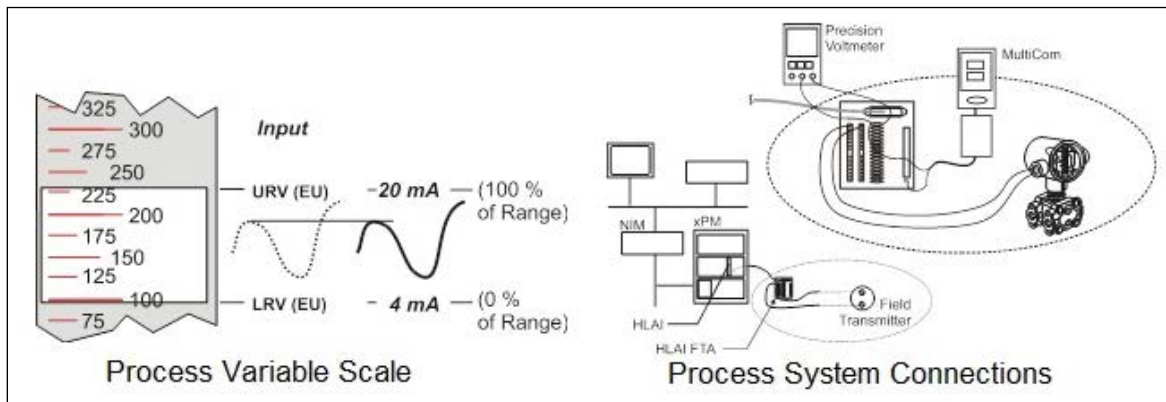
Connect the MC Toolkit as indicated, and establish communication with the transmitter.



**Figure 12 – Output Calibration Test Connections**

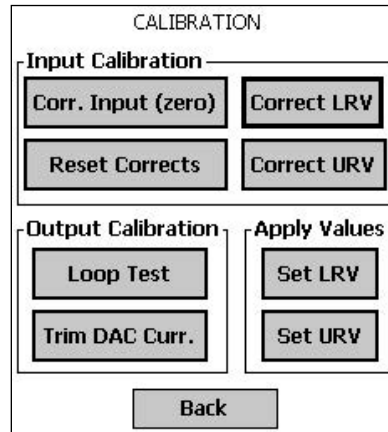
The purpose of Analog output calibration is to verify the integrity of electrical components in the output current loop. For Output calibration, establish the test set up shown in Figure 12. Values of components in the current loop are not critical if they support reliable communication between the Transmitter and the Toolkit.

For a DE Transmitter operating in analog mode, calibrate the analog output current to the Process Variable (PV) input range such that 4 mA corresponds to the LRV of 0% and 20 mA corresponds to the URV of 100%. Figure 13 shows the PV scale and representative process system connections.



**Figure 13 – DE Analog Mode Scaling and Test Connections**

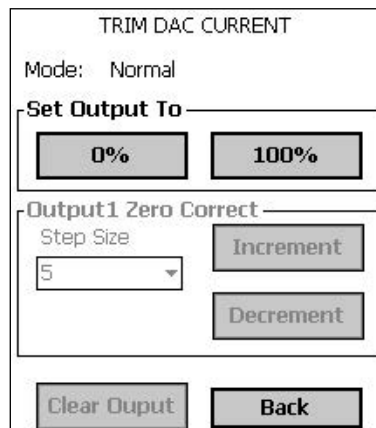
1. Start the MC Toolkit application such that the DE MAIN MENU is displayed.
2. Select the **Calibration** button to display the CALIBRATION menu.



The CALIBRATION menu is displayed with the following options:

- Input Calibration**
  - Corr. Input (zero)
  - Reset Corrects
  - Correct LRV
  - Correct URV
- Output Calibration**
  - Loop Test
  - Trim DAC Curr.
- Apply Values**
  - Set LRV
  - Set URV
- Back**

3. Select **Trim DAC Curr.** To display the TRIM DAC CURRENT box.



The TRIM DAC CURRENT screen displays the following information and controls:

- Mode:** Normal
- Set Output To**
  - 0%
  - 100%
- Output1 Zero Correct**
  - Step Size: 5 (dropdown menu)
  - Increment
  - Decrement
- Clear Output**
- Back**

4. Trim output current as follows:
  - a. Select **Set Output To 0%** or **100%**. You will be prompted to confirm that you want to place the Transmitter in output mode.
  - b. Verify that the loop is in manual control. In output mode, output current is fixed at the 0% or 100% level as selected in the TRIM DAC CURRENT box in the previous step.
  - c. Select **Yes**, and observe the loop current level. A meter reading of 4 mA corresponds to 1 volt.
  - d. Use the Toolkit to adjust the loop current to the Zero Percent level (4mA). If the current is low, tap the **Increment** button; if the current is high, tap the **Decrement** button. Note that the value on the meter changes accordingly. If the error is large, accelerate the adjustment rate by changing the Step Size to 10 or 100.
  - e. After establishing the zero current level (4 mA), select **Set Output To 100%**. A meter reading of 20 mA corresponds to 5 volts.



- f. Use the **Increment** or **Decrement** button, as necessary to adjust the output current to 20 mA. When the current reaches the 20 mA level, select **Clear Output**; the button will change to half-intensity.
5. Change the display in output mode as follows:
  - a. Selecting the **Back** button before selecting the **Clear Output** button, you will be prompted to confirm that you want to clear the output.
  - b. If you want to stay in output mode while viewing other displays, select **Yes**; otherwise, select **No** and the **Clear Output** button.
  - c.

## 6.10 Manually Setting the Process Variable Range

This procedure applies to DE Transmitters operating in both DE mode and analog (current) mode. During this procedure, the PV input will be set to 0%, which will be applied as the LRV. Further, the PV input will be set to 100% and applied as the URV.

1. Establish the test connections shown below. Then start the MC Toolkit application to display the DE MAIN MENU.

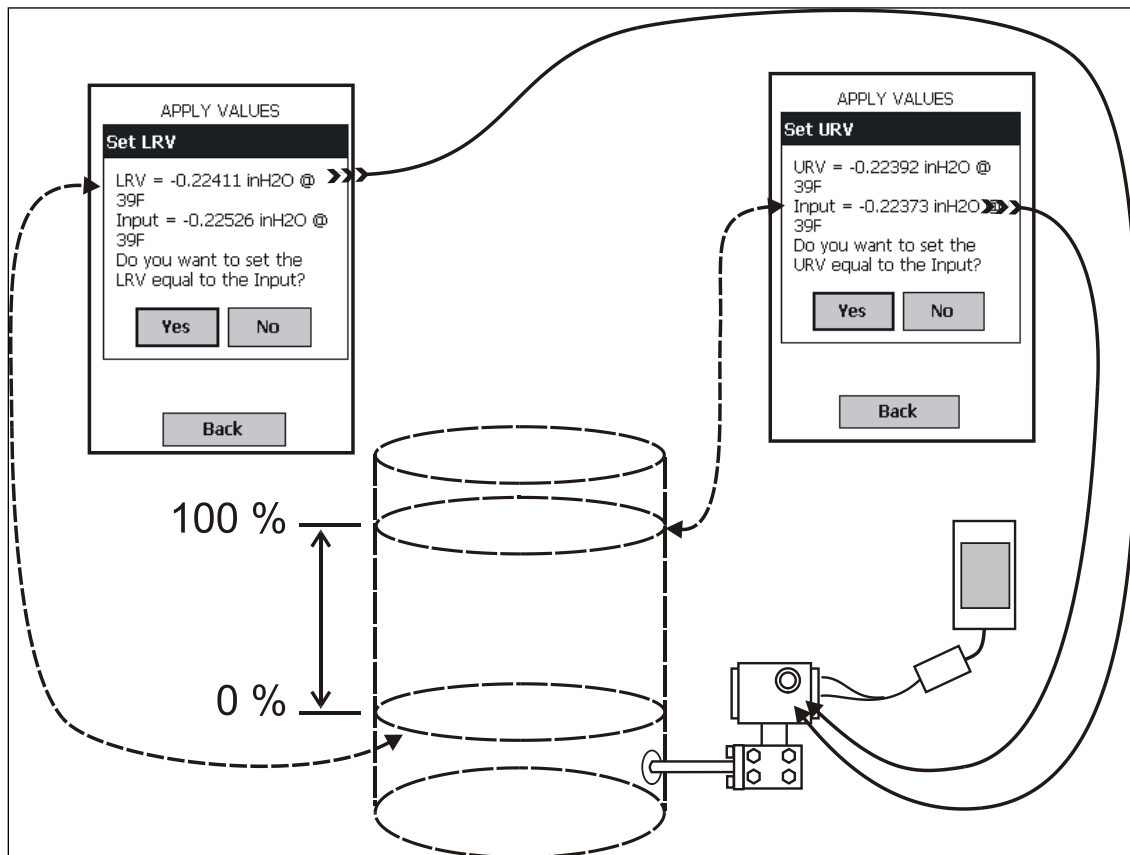
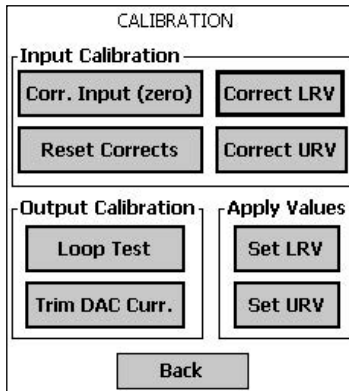


Figure 14 – Setup to Manually Set the PV LRV and URV

2. Select the **Calibration** button to display the CALIBRATION menu.



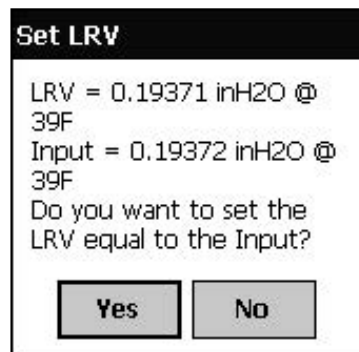
The CALIBRATION menu is displayed with the following options:

| Input Calibration  |             |
|--------------------|-------------|
| Corr. Input (zero) | Correct LRV |
| Reset Corrects     | Correct URV |

| Output Calibration | Apply Values |
|--------------------|--------------|
| Loop Test          | Set LRV      |
| Trim DAC Curr.     | Set URV      |

Back

3. In the **Apply Values** group, select **Set LRV**. The following message will be displayed;

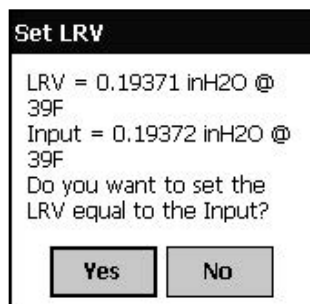


**Set LRV**

LRV = 0.19371 inH2O @ 39F  
Input = 0.19372 inH2O @ 39F  
Do you want to set the LRV equal to the Input?

Yes No

- a. The value of the input shown in the Set LRV box above updates only when the popup is called up.
- b. To update the input value, select **No**, and then select the **Set LRV** button in the CALIBRATION display.
4. Set the LRV as follows:
  - a. While observing the PV value at the physical process element (using a sight glass, for example), adjust it to the desired minimum (0 %) level, then select **Set LRV**.
  - b. If the displayed value is satisfactory, select **Yes** to copy the Input Value to the LRV in the Transmitter. If not, select **NO** and repeat this step.

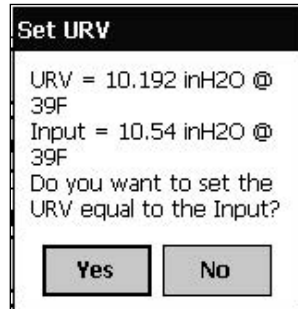


**Set LRV**

LRV = 0.19371 inH2O @ 39F  
Input = 0.19372 inH2O @ 39F  
Do you want to set the LRV equal to the Input?

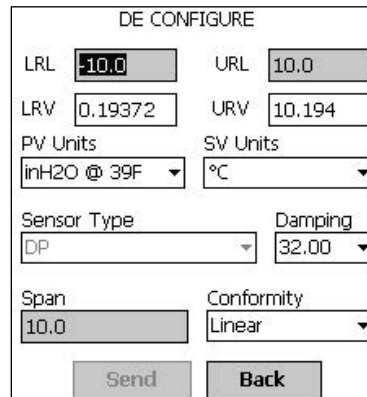
Yes No

5. Set the URV as follows:
- While observing the PV value at the physical process element (using a sight glass, for example), adjust the process variable to the desired maximum level, and then select **Set URV**.
  - If the displayed value is satisfactory, select **Yes** to copy the Input Value to the URV in the Transmitter. If not, select **NO** and repeat this step.



A dialog box titled "Set URV" with a black header. The text inside reads: "URV = 10.192 inH2O @ 39F", "Input = 10.54 inH2O @ 39F", and "Do you want to set the URV equal to the Input?". At the bottom are two buttons: "Yes" and "No".

6. Verify the LRV and URV settings as follows:
- Call up the DE CONFIGURE display, and observe that the settings are established in Steps 4 and 5.
  - This concludes the procedure to manually set the operating range.



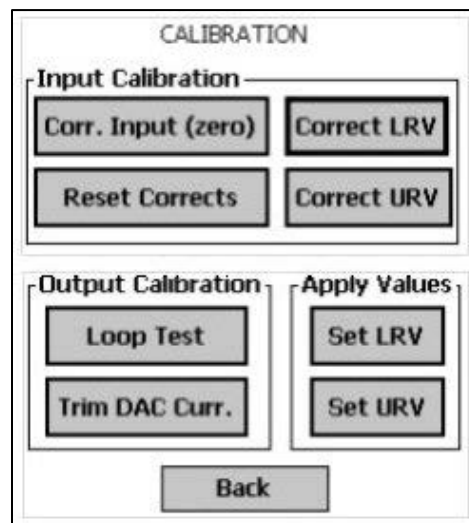
A configuration screen titled "DE CONFIGURE". It contains several input fields and dropdown menus. LRL is set to -10.0, URL to 10.0, LRV to 0.19372, and URV to 10.194. PV Units is set to inH2O @ 39F and SV Units to °C. Sensor Type is set to DP and Damping to 32.00. Span is set to 10.0 and Conformity to Linear. At the bottom are "Send" and "Back" buttons.

## 6.11 Procedure to Reset Calibration

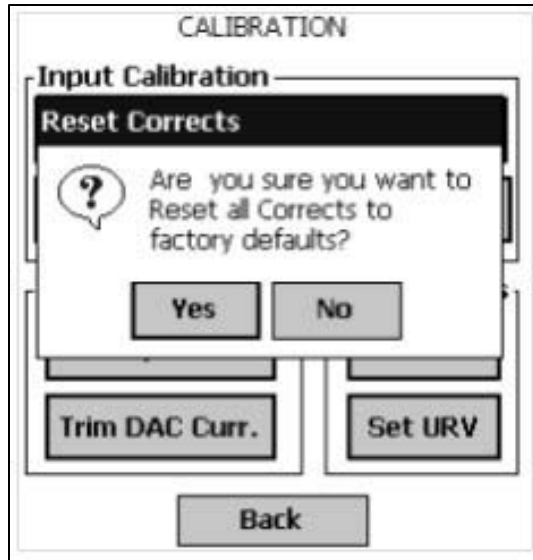
SmartLine DE Pressure Transmitter can erase incorrect calibration data by resetting the device back to *final factory calibration*, which is performed per the ordered range. The Corrects Reset command returns the zero and span calibration factors to the original precise factory calibration.

The following procedure is used to reset calibration data to factory calibrated range using the MC Toolkit.

1. Connect the MC Toolkit per figure 6. Start the MC Toolkit application into operation such that the DE MAIN MENU is displayed, and establish communication with the Transmitter.
2. From the DE MAIN MENU, select **Calibration**. The CALIBRATION menu will be displayed.



3. Select **Reset Corrects**. The following prompt will be displayed.



4. If corrects should not be overwritten with factory values, select **No**. If corrects need to be overwritten, select **Yes**. The timer will appear briefly, indicating the operation is performed



This function commands the transmitter to overwrite all user input corrections with factory default ("characterization") values. It is intended for use only when excessive corrections render the transmitter inaccurate. It is highly recommended that input calibration procedure be performed after calibration reset.

# 7 HART Calibration

## 7.1 About This Section

This section provides information about calibrating a Transmitter's analog output and measurement range. It also covers the procedure to reset calibration to the default values as a quick alternative to measurement range calibration.

This section includes the following topics:

- How to calibrate a Transmitter's analog output circuit using the Communicator
- How to perform a two-point calibration of a Transmitter
- How to perform a correct reset to return a Transmitter calibration to its default values.

### About Calibration

The ST 800 SmartLine Transmitter does not require calibration at periodic intervals to maintain accuracy. If a recalibration is required, we recommend that perform a bench calibration with the Transmitter removed from the process and located in a controlled environment to get the best accuracy.

For Dual / Triple Calibration see page 75

Before you recalibrate a Transmitter's measurement range, you must calibrate its analog output signal. See section 6.10 for the procedure.

You can also use the FDC application to reset the calibration data to default values, if they are corrupted, until the Transmitter can be recalibrated. See Section 6.8 for details.



All procedures in this manual assume the Transmitter is configured for Loop Current Mode enabled).

### Equipment Required

Depending on the selected calibration, you may need any of the following test equipment items to accurately calibrate the Transmitter:

- Digital Voltmeter or millimeter with 0.02% accuracy or better
- MC Toolkit Calibration standard pressure source with a 0.02% accuracy
- 250 ohm resistor with 0.01% tolerance or better.

## 7.2 Analog Output Signal Calibration

With a Transmitter in its constant current source mode, its analog output circuit can be calibrated at its 0 (zero)% and 100% levels. It is not necessary to remove the Transmitter from service.

The following procedure is used for analog output signal calibration.

You can calculate milliamperes of current from a voltage measurement as follows:

Dc milliamps = 1000 X voltage/resistance



**IMPORTANT:** Be sure that the accuracy of the resistor is 0.01% or better for current measurements made by voltage drop.

1. Connect the MC Toolkit across loop wiring, and turn it on. See **Error! Reference source not found.** for a sample test equipment hookup.
2. Launch the FDC application.
3. On the Home page, select Online and establish a connection with the device as follows;
4. Select the My Device menu, and choose from the following menus:
  - a. Device setup \ Calibration \ Calibration Methods \ D/A trim
5. You will be prompted to remove the loop from automatic control; after removing the loop from automatic control, press OK.
6. When a prompt appears, connect a precision milliammeter or voltmeter (0.03% accuracy or better) in the loop to check readings, and press OK. The following prompts will be displayed:
  - Setting field device to output to 4mA. Press OK
  - Enter meter value. Key in the meter value, and press ENTER.
  - Field device output 4.000 mA equal to reference meter?
    - 1 Yes
    - 2 No

If the reference meter is not equal to the field device output then select No and press Enter

Key in the new meter value

Return back to the "Enter Meter Value" prompt until the field device output equals the reference meter

Select Yes and press Enter
7. The following display prompts will appear:
  - Setting field device output to 20mA. Press OK
  - Enter meter value. Key in the meter value, and press ENTER.
  - Field device output 20.000 mA equal to reference meter?
    - 1 Yes
    - 2 No
      - If the reference meter is not equal to the field device output then select No and press Enter
      - Key in the new meter value
      - Return back to the "Enter Meter Value" prompt until the field device output equals the reference meter
      - Select Yes and press Enter
8. The prompt notifies you that the field device will be returned to its original output

## 7.3 Calibrating Range

The ST 800 SmartLine Pressure Transmitter supports two-point calibration. This means that when two points in a range are calibrated, all points in that range adjust to the calibration.

The procedures in this section are used to calibrate a differential pressure (DP) Transmitter to a range of 0 to 200 inH<sub>2</sub>O for example purposes. This procedure assumes that the Transmitter has been removed from the process and is located in a controlled environment.



**IMPORTANT!** You must have a precision pressure source with an accuracy of 0.02% or better to do a range calibration. Note that the factory calibrates ST 800 SmartLine Pressure Transmitters using inches of water pressure reference to a temperature of 39.2°F (4°C).

### Correcting the Lower Range Value (LRV)

1. Connect a power supply and the MC Toolkit to the signal terminals of the Transmitter's terminal block.
2. Connect the precision pressure source to the high pressure side of the DP-type Transmitter.
3. Turn on the power supply, and allow the Transmitter to become stable.
4. Turn the MC Toolkit on, start the FDC application.
5. On the FDC Home page, select Online, and establish communication with the Transmitter.
6. Select the My Device menu, and choose from the following selections:
  - a. Device Setup \ Calibration \ Calibration Methods \ LRV Correct
7. You will be prompted to remove the loop from automatic control. After removing the loop from automatic control, press OK.
8. When prompted, adjust the pressure source to apply pressure equal to the LRV (0%), and press OK.
9. When the pressure stabilizes, press OK.
10. When prompted, remove pressure.
11. On the next prompt – “Please enter current Calibration Time in 24 Hr Clock format (Hour field)”, enter the hour portion of the calibration time in the 24 Hr format HH, for example “12,” and press Enter.
12. On the next prompt – “Please enter current Calibration Time (Minute field),” enter the Minutes field MM (example 23), and press ENTER..
13. When prompted to return the loop to automatic control, press ENTER

### Correcting the Upper Range Value (URV)

1. See Figure 14 for typical test connections. Connect the power supply and communicator to the signal terminals of the Transmitter terminal block.
2. Connect the precision pressure source to the high pressure side of the DP-type Transmitter.
3. Turn on the power supply, and allow the Transmitter to become stable.
4. Turn on the MC Toolkit, and start the FDC application into operation.
5. On the FDC Home page, select Online, and establish communication with the Transmitter.
6. Select the My Device menu, and choose one of the following options:
  1. Device Setup \ Calibration \ Calibration Methods \ URV Correct
7. You will be prompted to remove the loop from automatic control. Press OK
8. When prompted, adjust the pressure source to apply pressure equal to the URV (100%), and press OK.
9. When pressure stabilizes, press OK.



10. When prompted, remove the pressure.
11. On the next prompt – “Please enter Calibration Date in MM/DD/YYYY format, for example “05/27/2009,” and press Enter.
12. On the next prompt – “Please enter current Calibration Time in 24 Hr Clock format (Hour field)”, enter the hour portion of the calibration time in the 24 Hr format HH, for example “12,” and press Enter.
13. On the next prompt – “Please enter current Calibration Time (Minute field),” enter the Minutes field MM (example 23), and press Enter.
14. When prompted, return the loop to automatic control, and press Enter.

## Resetting Calibration

SmartLine HART Pressure Transmitter can erase incorrect calibration data by resetting the device back to *final factory calibration*, which is performed per the ordered range. The Corrects Reset command returns the zero and span calibration factors to the original precise factory calibration. See Dual / Triple Calibration on page 75.

The following procedure is used to reset calibration data to factory calibrated range using the communicator.

1. Connect the MC Toolkit per figure 6 across the loop wiring and turn on.
2. Turn the MC Toolkit on, start the FDC application.
3. On the FDC Home page, select Online, and establish communication with the Transmitter.
4. Select the My Device menu, and choose from the following selections:
  - a. Device Setup \ Calibration \ Calibration Methods \ Reset Corrects
5. You will be prompted to remove the loop from automatic control. After removing the loop from automatic control, press OK.
6. You will be notified that a Reset Corrects is about to occur. Press OK
7. When the message “Reset Corrects OK” appears, press OK. The previous calibration “Corrects” are removed and calibration is reset to the factory values.
8. When prompted to return the loop to automatic control, press OK

## Calibration Records

A history of the date and time of the last three Calibration procedures is available for the HART device. Run the Methods and follow the screen prompts to read the Calibration Records.

Select “My Device\Device Setup\Calibration” to select the following calibration records

- Correct URV Records
- Correct LRV Records
- Zero Trim Records
- Reset Corrects Records

**Table 13 – Calibration Records**

| <b>Calibration Record</b>    | <b>Description</b>   |
|------------------------------|--|
| <b>Trim Records</b>          |  |
| Curr Zero Trim               | Date and Time of current zero trim field calibration displayed in mm/dd/yyyy format  |
| Last Zero Trim               | Date and Time of last zero trim field calibration displayed in mm/dd/yyyy format     |
| Prev Zero Trim               | Date and Time of previous zero trim field calibration displayed in mm/dd/yyyy format |
| <b>Correct LRV Records</b>   |  |
| Curr LRV Correct             | Date and Time of current LRV correct done displayed in mm/dd/yyyy format             |
| Last LRV Correct             | Date and Time of last LRV correct done displayed in mm/dd/yyyy format                |
| Prev LRV Correct             | Date and Time of previous LRV correct done displayed in mm/dd/yyyy format            |
| <b>Correct URV Records</b>   |  |
| Curr URV Correct             | Date and Time of current URV correct done displayed in mm/dd/yyyy format             |
| Last URV Correct             | Date and Time of last UTV correct done displayed in mm/dd/yyyy format                |
| Prev URV Correct             | Date and Time of previous URV correct done displayed in mm/dd/yyyy format            |
| <b>Reset Correct Records</b> |  |
| Curr Corrects Rec            | Date and Time of current Reset corrects done displayed in mm/dd/yyyy format          |
| Last Corrects Rec            | Date and Time of last Reset corrects done displayed in mm/dd/yyyy format             |
| Prev Corrects Rec2           | Date and Time of current Reset corrects done displayed in mm/dd/yyyy format          |

## 7.4 Dual / Triple Calibration

The transmitter will have the required calibration set as selected by the user when the transmitter is purchased; either single, dual or triple calibration.

Calibration A (Cal A) standard

Calibration B (Cal B)

Calibration C (Cal C)

Each factory calibration set (A, B or C) includes a calibration performed at LRV pressure and one performed at URV pressure.

Once the transmitter is in the field the user will be able to select one of the 3 factory calibration sets. The user can select one of the calibrations directly or select automatic mode which will pick the set that most closely matches the currently programmed URV and LRV values. The calibration selection is re-evaluated whenever a new range is written (new URV and LRV values) or the selection is changed.

If all three calibrations have not been performed at the factory then set A is selected and the default values have no effect on the PV value.

If we load ST800 DD file in MCTOOL KIT, we will be able to see under below path

1. Select the My Device menu, and choose from the following selections:
  - a. Device Setup \ Calibration \ Factory Calibration Selection->

```
:-> Factory Cal Available: A or A&B or A&B&C
:-> Cal A URV
:-> Cal A LRV
:-> Cal B URV
:-> Cal B LRV
:-> Cal C URV
:-> Cal C LRV
:-> Calibration Selection: A or B or C, AUTO Select
:->Active Calibration: Cal A, Cal B, Cal C
```

## 8 HART Advanced Diagnostics

### 8.1 About This Section

This section provides information about the Advanced Diagnostic features in the ST 800 SmartLine Pressure Transmitter.

### 8.2 Advanced Diagnostics

Table 14 – Viewing Advanced Diagnostics

| What you want to view  | What to do   |
|--|--|
| <ul style="list-style-type: none"><li>• Install date</li><li>• PV (Process Variable) Tracking Diagnostics</li><li>• SV (Meter Body Temperature )Tracking Diagnostics</li><li>• TV (Static Pressure) Tracking Diagnostics (DP transmitters only)</li><li>• ET (Electronics Temperature) Tracking Diagnostics</li><li>• Stress Life</li><li>• Service Life</li><li>• Operating Voltage Tracking Diagnostics</li><li>• AVDD (Sensor Supply Voltage) Tracking Diagnostics</li><li>• Sensor CPU Temp. Tracking</li><li>• Power Up Diagnostics</li><li>• Plugged Impulse Line Detection (PILD)</li></ul> | <p>Select Start/FDC to Launch the FDC application on the MC Toolkit.</p> <p>On the Home page, select Online and establish connection with the device.</p> <p>Select My Device\Diagnostics\Adv Diagnostics.</p> |

#### Plugged Impulse Line Detection (PILD)

An advanced diagnostic function Plugged Impulse Line Detection (PILD) becomes available in ST800 SmartLine Pressure Transmitters (R300.3) in Differential Pressure (DP) transmitters, Absolution Pressure (AP) transmitters and Gauge Pressure (GP) transmitters.

PILD is a powerful tool to detect when the impulse lines are blocked by solids or frozen fluid in process. Alarms on impulse line blockage will allow users to take proper measures at an early point of time so that effect of false readings from transmitters on process control can be minimized. See HART transmitter parameters, Table 11 on page 33 .

#### Install Date

| Install Date | Parameter | Description | Date of device installation. Date displayed in mm/dd/yyyy format where mm=month, dd=day, yyyy=year   |
|--------------|-----------|-------------|--|
|              |           | Set-up      | User enters a date once during device lifetime. Once date is entered no further updates are possible and value becomes read only and is permanently saved. |

## PV Tracking Diagnostics

**Table 15 – Maximum PV Tracking**

|                                    |           |                             |  |
|------------------------------------|-----------|-----------------------------|--|
| UTL (Max PV Limit)                 | Parameter | Description                 | Upper Transducer Limit: PV(pressure) specified upper operating limit in user-selected units  |
|                                    |           | Set-up                      | None.  |
| PV Upper Limit for Stress tracking | Method    | Description for DP type     | Actual limit value used to note “Time Above Limit” and “Time Since Last Event”. “PV Upper Stress Limit” value is equal to Upper Transducer Limit less 10% of Transducer limits range.  |
|                                    |           | Example for DP Type         | For STD120 span is 0 to 400 inH <sub>2</sub> O. Range is 400 inH <sub>2</sub> O settable within LTL = -800 inH <sub>2</sub> O to UTL = 800 inH <sub>2</sub> O limits.<br>“PV Upper Stress Limit” = 800 inH <sub>2</sub> O - 160 inH <sub>2</sub> O = 640 inH <sub>2</sub> O. |
|                                    |           | Example for AP and GP Types | For STA140 allowable working pressure is 0 to 500 psia. Withstand Pressure from LTL = 0 to UTL = 750 psia.<br>“PV Upper Stress Limit” = 750 psia – 75 psia = 675 psia.   |
|                                    |           | Set-up                      | None – calculation is automatic.   |
| Max PV                             | Parameter | Description                 | Maximum PV that the device has experienced in user selected units.   |
|                                    |           | Set-up                      | None. Value initialized to Min PV Limit value prior to leaving the factory. Updates to current PV automatically when powered at user site after one minute.  |
|                                    |           | NVM                         | Update after every 8 hours.  |
| Time Above Upper Stress Limit      | Parameter | Description                 | Accumulation of minutes that pressure measured by the device has been above “PV Upper Stress Limit”.   |
|                                    |           | Set-up                      | None – initialized to zero prior to leaving the factory.   |
|                                    |           | NVM                         | Backup once each 8 hour period   |
| Time Since Last PV Up              | Method    | Description                 | Time that has passed since the last time device’s PV passed above “PV Upper Stress Limit” (in days, hours and minutes).  |
|                                    |           | Set-up                      | None – initialized to zero prior to leaving the factory.   |
|                                    |           | NVM                         | Backup once each 8 hour period   |

**Table 16 – Minimum PV Tracking**

|                                     |           |                             |   |
|-------------------------------------|-----------|-----------------------------|---|
| LTL<br>(Min PV Limit)               | Parameter | Description                 | Lower Transducer Limit: PV(pressure) specified lower operating limit in user-selected units   |
|                                     |           | Set-up                      | None.   |
| PV Lower Limit for Stress Condition | Method    | Description                 | Actual limit value used in “Time Below Limit” and “Time Since Last Event”. Value is equal to “Min PV Limit” plus 10% of limits range for DP type devices and zero for GP and AP type devices.   |
|                                     |           | Example for DP Type         | For STD120 span is 0 to 400 inH <sub>2</sub> O. Range is 400 inH <sub>2</sub> O settable within LTL = -800 inH <sub>2</sub> O to UTL = 800 inH <sub>2</sub> O limits.<br>“PV Lower Stress Limit” =<br>-800 inH <sub>2</sub> O + 160 inH <sub>2</sub> O = -640 inH <sub>2</sub> O. |
|                                     |           | Example for AP and GP Types | For STA140 allowable working pressure is 0 to 500 psia. Withstand Pressure from LTL = 0 to UTL = 750 psia.<br>“PV Lower Stress Limit” = 0 psia.   |
|                                     |           | Set-up                      | None – calculation is automatic.  |
| Min PV                              | Parameter | Description                 | Minimum PV that the device has experienced in user selected units.  |
|                                     |           | Set-up                      | None. Value initialized to Max PV Limit value prior to leaving the factory. Updates to current PV automatically when powered at user site after one minute.   |
|                                     |           | NVM                         | Update after every 8 hours  |
| Time Below Lower Stress Limit       | Parameter | Description                 | Accumulation of minutes that pressure measured by the device has been below the value of “PV Lower Stress Limit”.   |
|                                     |           | Set-up                      | None.   |
|                                     |           | NVM                         | Backup once each 8 hour period  |
| Time Since Last PV Down             | Method    | Description                 | Time that has passed since the last time device’s PV passed below the value of “PV Lower Stress Limit” (in days, hours and minutes).  |
|                                     |           | Set-up                      | None – initialized to zero prior to leaving the factory.  |
|                                     |           | NVM                         | Backup once each 8 hour period  |

## SV Tracking

**Table 17 – Maximum SV Tracking**

|                               |           |             |   |
|-------------------------------|-----------|-------------|---|
| Max SV Limit                  | Parameter | Description | Meterbody Temperature (SV) upper operating limit from specification.  |
|                               |           | Set-up      | None.   |
| Max SV Value                  | Parameter | Description | Highest Meterbody Temperature ever experienced by the device.   |
|                               |           | Set-up      | None - value initialized to Min SV Limit value prior to leaving the factory. Updates to current Meterbody Temperature automatically when powered at user site after one minute. |
|                               |           | NVM         | Update after every 8 hours.   |
| Time Above Upper Stress Limit | Parameter | Description | Accumulation of minutes that device's Meterbody Temperature has been above the value of "SV Upper Stress Limit".  |
|                               |           | Set-up      | None.   |
|                               |           | NVM         | Backup once each 8 hour period  |
| Time Since Last SV Up         | Method    | Description | Time that has passed since the last time device's Meterbody Temperature has passed above the value of "SV Upper Stress Limit" (in days, hours and minutes).                     |
|                               |           | Set-up      | None.   |
|                               |           | NVM         | Backup once each 8 hour period  |

**Table 18 – Minimum SV Tracking**

|                               |           |             |   |
|-------------------------------|-----------|-------------|---|
| Min SV Limit                  | Parameter | Description | Meterbody Temperature (SV) lower operating limit from specification.  |
|                               |           | Set-up      | None.   |
| Min SV Value                  | Parameter | Description | Lowest Meterbody Temperature ever experienced by the device.  |
|                               |           | Set-up      | None - value initialized to Max SV Limit value prior to leaving the factory. Updates to current Meterbody Temperature automatically when powered at user site after one minute. |
|                               |           | NVM         | Update after every 8 hours.   |
| Time Below Lower Stress Limit | Parameter | Description | Accumulation of minutes that device's Meterbody Temperature has been below the value of "SV Lower Stress Limit".  |
|                               |           | Set-up      | None.   |
|                               |           | NVM         | Backup once each 8 hour period  |
| Time Since Last SV Down       | Method    | Description | Time that has passed since the last time device's Meterbody Temperature has passed below the value of "SV Lower Stress Limit" (in days, hours, and minutes).                    |
|                               |           | Set-up      | None.   |
|                               |           | NVM         | Backup once each 8 hour period  |

## TV Tracking Diagnostics

**Table 19 – TV Tracking Diagnostics**

|                               |           |             |   |
|-------------------------------|-----------|-------------|---|
| Max TV Limit                  | Parameter | Description | Static Pressure upper operating limit specification.<br>Units are always PSI (pounds per square inch).                                    |
|                               |           | Set-up      | None.   |
| Max TV Value                  | Parameter | Description | Highest SP ever experienced by the device.<br>Units are always PSI (pounds per square inch).  |
|                               |           | Set-up      | None.   |
|                               |           | NVM         | Backup once each 8 hour period  |
| Time Above Upper Stress Limit | Parameter | Description | Accumulation of minutes that device's SP has been above the value of "SP Upper Stress Limit".   |
|                               |           | Set-up      | None.   |
|                               |           | NVM         | Backup once each 8 hour period  |
| Time Since Last TV Up         | Method    | Description | Time that has passed since the last time device's SP has passed above the value of "SP Upper Stress Limit" (in days, hours, and minutes). |
|                               |           | Set-up      | None.   |
|                               |           | NVM         | Backup once each 8 hour period  |

## ET Tracking Diagnostics

**Table 20 – Maximum ET Diagnostics**

|                                     |           |             |   |
|-------------------------------------|-----------|-------------|---|
| Max ET Limit                        | Parameter | Description | Electronics Temperature (ET) upper operating limit from specification.<br>Units are same degree units as has been selected for SV (Secondary Variable). |
|                                     |           | Set-up      | None.   |
| ET Upper Limit for Stress Condition |           | Description | Actual limit used in "Time Above Limit" and "Time Since Last Event". Value is equal to "Max ET Limit" less 10% of limits range.                         |
|                                     |           | Example     | Electronics Temperature range is -40°F to 185°F for a total of 225°F.<br>"ET Upper Stress Limit" = 185°F - 10% of 225°F = 162.5°F.                      |
|                                     |           | Set-up      | None – calculation is automatic.  |
| Max ET Value                        | Parameter | Description | Highest Electronics Temperature ever experienced by the device.<br>Units are same degree units as has been selected for SV (Secondary Variable).        |
|                                     |           | Set-up      | None.   |
|                                     |           | NVM         | Update every 8 hour.  |
| Time Above Upper Stress Limit       | Parameter | Description | Accumulation of minutes that device's Electronics Temperature has been above the value of "ET Upper Stress Limit".                                      |
|                                     |           | Set-up      | None.   |
|                                     |           | NVM         | Backup once each 8 hour period  |



|                       |        |             |   |
|-----------------------|--------|-------------|---|
| Time Since Last ET Up | Method | Description | Time that has passed since the last time device's Electronics Temperature has passed above the value of "ET Upper Stress Limit" (in days, hours and minutes). |
|                       |        | Set-up      | None.   |
|                       |        | NVM         | Backup once each 8 hour period  |

**Table 21 – Minimum ET Diagnostics**

|                                     |           |             |  |
|-------------------------------------|-----------|-------------|--|
| Min ET Limit                        | Parameter | Description | Electronics Temperature (ET) lower operating limit from specification. Units are same degree units as has been selected for SV (Secondary Variable).                         |
|                                     |           | Set-up      | None.  |
| ET Lower Limit for Stress Condition |           | Description | Actual limit used in "Time Below Limit" and "Time Since Last Event". Value is equal to "Min ET Limit" plus 10% of limits range.  |
|                                     |           | Example     | Electronics Temperature range is -40°C to 85°C for a total of 125°C. "ET Lower Stress Limit" $-40^{\circ}\text{C} + 10\%$ of $125^{\circ}\text{C} = -27.5^{\circ}\text{C}$ . |
|                                     |           | Set-up      | None – calculation is automatic.   |
| Min ET Value                        | Parameter | Description | Lowest Electronics Temperature ever experienced by the device. Units are same degree units as has been selected for SV (Secondary Variable).                                 |
|                                     |           | Set-up      | None.  |
|                                     |           | NVM         | Update every 8 hour.   |
| Time Below Lower Stress Limit       | Parameter | Description | Accumulation of minutes that device's Electronics Temperature has been below the value of "ET Lower Stress Limit".   |
|                                     |           | Set-up      | None.  |
|                                     |           | NVM         | Backup once each 8 hour period   |
| Time Since Last ET Down             | Method    | Description | Time that has passed since the last time device's Electronics Temperature has passed below the value of "ET Lower Stress Limit" (in days, hours, and minutes).               |
|                                     |           | Set-up      | None.  |
|                                     |           | NVM         | Backup once each 8 hour period   |

## % Stress Life

|               |           |             |   |
|---------------|-----------|-------------|---|
| % Stress Life | Parameter | Description | Percent of service life spent in stressful conditions. Indicates the % of service life where one or more of PV, static pressure, meter body temperature or electronics temperature are within 10% of respective range limits. |
|               |           | Set-up      | None.   |
|               |           | NVM         | Backup once each 8 hour period  |

## % Service Life

|                |           |             |   |
|----------------|-----------|-------------|---|
| % Service Life | Parameter | Description | Percent of expected Service Life that device has been in service. Value is based on electronics temperature. Service life accumulates faster at higher temperatures with an exponential relationship. |
|                |           | Set-up      | None.   |
|                |           | NVM         | Backup once each 8 hour period  |

## Operating Voltage Diagnostics

**Table 22 – Operating Voltage Diagnostics**

|                                    |           |             |  |
|------------------------------------|-----------|-------------|--|
| Current Op Voltage                 | Parameter | Description | Operating voltage available at device terminals.   |
|                                    |           | Set-up      | None – units always in volts.  |
|                                    |           | NVM         | none   |
|                                    |           | Note        | <b>No accuracy is specified for this measurement!</b><br><b>This value is intended to be used for informational purposes only and should not be used for control.</b>              |
| Min Op Voltage                     | Parameter | Description | Minimum operating voltage experienced by device at terminals since last reset of operating voltage parameters.   |
|                                    |           | Set-up      | User can reset as desired using method described in item below.  |
|                                    |           | NVM         | Backup once each 8 hour period   |
| Time Since Last Voltage Low        | Method    | Description | Displays time since last minimum operating voltage event in minutes.   |
|                                    |           | Set-up      | User can reset as desired using method described in item below.  |
|                                    |           | NVM         | Update every 8 hour.   |
| Reset Operating Voltage Parameters | Method    | Description | Causes “Min Op Voltage” to be set to 32 volts and “Time Since Last Event” to be reset to zero. Within a short period of time “Min Op Voltage” will assume operating voltage value. |
|                                    |           | Set-up      | User actuates as desired.  |

## AVDD Tracking Diagnostics

**Table 23 – Maximum and Minimum AVDD Tracking**

|                           |           |             |   |
|---------------------------|-----------|-------------|---|
| Max AVDD                  | Parameter | Description | Maximum Sensor Supply Voltage experienced by device since last reset of voltage parameters. |
| Time since last AVDD Up   | Method    | Description | Displays time since last Sensor Supply Voltage was above last Max AVDD                      |
| Min AVDD                  | Method    | Description | Minimum Sensor Supply voltage experienced by device since last reset of voltage parameters. |
| Time since Last AVDD Down | Method    | Description | Displays time since last Sensor Supply Voltage was below last Min AVDD                      |

## Sensor CPU Temperature Tracking Diagnostics

**Table 24 – Maximum Sensor CPU Temperature Tracking**

|                                     |           |             |   |
|-------------------------------------|-----------|-------------|---|
| Max Sensor CPU Temp.                | Parameter | Description | Maximum Sensor CPU Temperature experienced by device  |
|                                     |           | Set-up      | none  |
| Time Above Upper Stress Limit       | Parameter | Description | Accumulation of minutes that Sensor CPU Temperature has been above the value of Max Sensor CPU Temp.  |
|                                     |           | Set-up      | None.   |
|                                     |           | NVM         | Backup once each 8 hour period  |
| Time Since Last Sensor CPU Temp. Up | Method    | Description | Time that has passed since the last time Sensor CPU Temp. has passed above the value of “Max Sensor CPU Temp” (in days, hours and minutes). |
|                                     |           | Set-up      | none  |
|                                     |           | NVM         | Backup once each 8 hour period  |

**Table 25 – Minimum Sensor CPU Temperature Tracking**

|                                       |           |             |   |
|---------------------------------------|-----------|-------------|---|
| Min Sensor CPU Temp.                  | Parameter | Description | Minimum Sensor CPU Temperature experienced by device  |
|                                       |           | Set-up      | none  |
| Time Below Upper Stress Limit         | Parameter | Description | Accumulation of minutes that Sensor CPU Temperature has been below the value or Min Sensor CPU Temp.  |
|                                       |           | Set-up      | none  |
|                                       |           | NVM         | Backup once each 8 hour period  |
| Time Since Last Sensor CPU Temp. Down | Method    | Description | Time that has passed since the last time Sensor CPU Temperature has passed below the value of “Min Sensor CPU Temp” (in days, hours and minutes). |
|                                       |           | Set-up      | none  |
|                                       |           | NVM         | Backup once each 8 hour period  |

## Power Up Diagnostics

**Table 26 – Power Up Diagnostics**

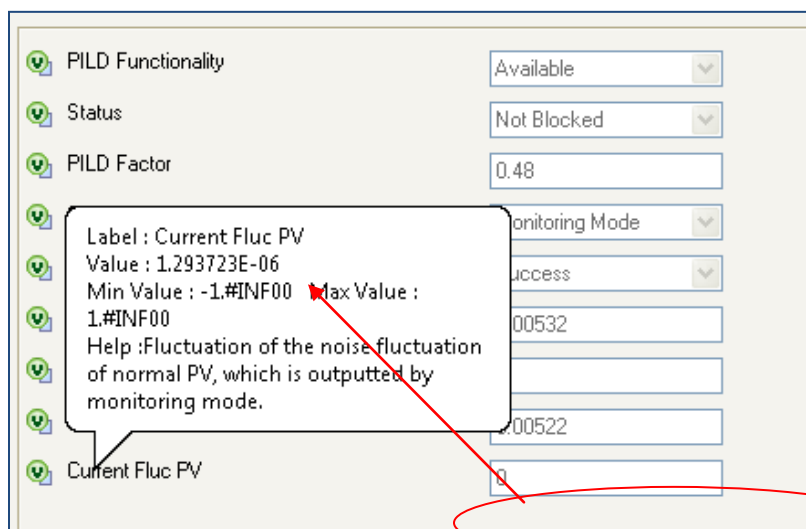
|                            |           |             |  |
|----------------------------|-----------|-------------|--|
| Pwr fail counter           | Parameter | Description | Total number of power-ups experienced by the unit.       |
|                            |           | Set-up      | None – initialized to zero prior to leaving factory.     |
|                            |           | NVM         | Backup once each 8 hour period                           |
|                            |           | Note        | Only one power failure in each 8 hour period is counted. |
| Time since last power fail | Method    | Description | Displays time since last power-up in minutes.            |
|                            |           | Set-up      | None.  |
|                            |           | NVM         | Backup once each 8 hour period–                          |

## PILD Status

| Name               | Description   |
|--------------------|---|
| PILD Functionality |   |
| Status             | <p>PILD Status</p> <p>For DP transmitters possible statuses are:</p> <ul style="list-style-type: none"> <li>• both sides blocked</li> <li>• one side blocked.</li> <li>• Not Blocked</li> </ul> <p>For AP/GP transmitters possible statuses are:</p> <ul style="list-style-type: none"> <li>• Blocked</li> <li>• Not blocked</li> </ul> |
| PILD factor        | <p>PILD factor for prediction.</p> <p>Possible values are 0.0 to 1.00 to the second decimal places.</p>   |
| Current Mode       | <p>Current Work Mode</p> <p>If PILD is enabled, modes are:</p> <ul style="list-style-type: none"> <li>• Training</li> <li>• Monitoring</li> </ul> <p>If PILD is disabled,<br/>no output.</p>  |

|                   |  |
|-------------------|--|
| Training Result   | <p>Training result</p> <p>If PILD is enabled:</p> <ul style="list-style-type: none"> <li>• Success</li> <li>• Failure</li> </ul> <p>If PILD is disabled,</p> <ul style="list-style-type: none"> <li>• no output.</li> </ul> <p>When PILD is Enabled from Disabled mode, Current Mode goes to Training Mode. Training Result will show 'Failure' until Sampling Window (SWIN) duration has passed. After the SWIN time, Training Result will show 'Success'.</p> <p>Note that, the Training Result showing 'Failure' means the mode switch is still In progress and not yet switched to the Monitor Mode. Once the mode is in Monitor mode, Training Result will show 'Success'</p> |
| Normal PV Ref     | Reference of normal PV, which is the median of PV/URL, and is output from the training mode.   |
| Fluc. PV Ref      | Reference of the noise fluctuation of normal PV, which is output by training mode.   |
| Current Normal PV | Current normal PV, which is the median of PV/URL and is output by monitoring mode.   |
| Current Fluc. PV  | Fluctuation of the noise fluctuation of normal PV, which is outputted by monitoring mode.  |

In Field Device Manager (FDM), the value in the actual field will be displayed as 0. But users can hover the mouse over the parameters to see the values using Tooltips. It is a known FDM limitation and future FDM releases will address this issue.



Value of 1.293723E-06 shows up as 0 in the Edit field

The PILD related non-critical status is show in the table below

| Alarm Message  | Possible Causes  | Recommended Resolution   |
|--|--|--|
| PILD Block OS<br>(Optional for DP Transmitter only when PILD is enabled)                       | One of the impulse lines is blocked.   | Check and clear the impulse lines. Then disable and enable PILD when the process and transmitter is in normal operation.   |
| PILD Block BS<br>(Optional for DP Transmitter only when PILD is enabled)                       | The transmitter is not installed to a process or the process is not in operation.                              | Ignore the alarm. It's suggested that PILD be enabled only after the transmitter is installed and the process is running.  |
|  | One of the impulse lines of DP is blocked and the other side is open to atmosphere or has a constant pressure. | Check and clear the impulse line(s). Then disable and enable PILD when the process and transmitter is in normal operation. |
|  | Both sides of the impulse lines are blocked.   |  |
|  | Noise in process is too low.   | PILD is not applicable to this specific situation. It's suggested to disable PILD.   |
| PILD Blockage<br>(Optional and applicable for AP and GP Transmitter only when PILD is enabled) | The transmitter is not installed to a process or the process is not in operation.                              | Ignore the alarm. It's suggested that PILD be enabled only after the transmitter is installed and the process is running.  |
|  | The impulse line is blocked.   | Check and clear the impulse line. Then disable and enable PILD when the process and transmitter is in normal operation.    |
|  | Noise in process is too low.   | PILD is not applicable to this specific situation. It's suggested to disable PILD.   |

## 9 Troubleshooting and Maintenance

Table 27 lists both critical and non-critical (warning conditions) diagnostics.

### 9.1 HART Diagnostic Messages

Table 27 critical and non-critical HART diagnostic messages.

**Table 27 – HART Diagnostic Messages**

| <b>Critical Diagnostics (Failure Conditions)</b> | <b>Non-Critical Diagnostics (Warning Conditions)</b> |
|--|--|
| Electronic Module DAC Failure                    | No DAC Compensation                                  |
| Meter Body NVM Corrupt                           | No Factory Calibration                               |
| Config Data Corrupt                              | PV Out of Range                                      |
| Electronic Module Diag Failure                   | Fixed Current Mode                                   |
| Meter Body Critical Failure                      | Sensor Over Temperature                              |
| Sensor Comm Timeout                              | Meter Body Excess Correct                            |
|  | Local Display  |
|  | Low Supply Voltage                                   |
|  | No DAC Calibration                                   |
|  | Tamper Alarm   |
|  | Meter Body Unreliable Comm                           |
|  | Loop Current Noise                                   |
|  | AO Out of Range                                      |
|  | URV Set Err. Span Config Button                      |
|  | LRV Set Err. Zero Config Button                      |
|  | PILD Blockage Detected                               |

## 9.2 HART Diagnostic Details

Table 28 lists and describes the HART critical and non-critical HART diagnostic details.

**Table 28 – HART Critical and Non-Critical Diagnostic Details**

| Status Type   | Device Status (HART Command 48)  | Details/Resolutions  |
|---|--|--|
| <b>Critical Status (Failure)</b><br>(continued)     | Meter Body Critical Failure<br><br>Meter Body NVM Corrupt                                      | Possible causes: <ul style="list-style-type: none"> <li>• Critical failure reported at the Sensor level</li> <li>• Meter Body NVM Corrupt</li> </ul> Resolution:<br>Reset the device. If the problem persists, replace the Meter Body.   |
|   | Electronic Module DAC Failure<br><br>Config Data Corrupt<br><br>Electronic Module Diag Failure | Possible causes: <ul style="list-style-type: none"> <li>• Critical failure reported for the Electronics Module</li> <li>• Database Corruption</li> <li>• Communication section has failed</li> </ul> Resolution:<br>Reset the device. If the problem persists, replace the Electronics Module.   |
|   | Sensor Comm Timeout  | Possible causes: <ul style="list-style-type: none"> <li>• No response from the Sensor</li> </ul> Resolution:<br>Try replacing the Electronics module. If this does not fix the problem, replace the Meter Body.  |
| <b>Non critical status (Warning)</b><br>(continued) | No DAC Compensation  | Possible causes:<br>No temperature compensation data exists for analog output calculations.<br>Loop accuracy may be slightly compromised.<br><br>The effect will be a minor degradation of ambient temperature influence specifications.<br><br>Resolution:<br>Replace Electronics Module (PWA) to achieve the maximum current loop accuracy or return the device to factory for DAC compensation. |
|   | No Factory Calibration   | Possible causes:<br>Factory Calibration is missing. Accuracy will be compromised.<br><br>Resolution:<br>Replace the Meter Body or return the device for Factory Calibration.   |



| Status Type                                     | Device Status<br>(HART Command 48) | Details/Resolutions  |
|---|------------------------------------|--|
| (continued)<br>Non-critical status<br>(Warning) | PV Out of Range                    | <p>Possible causes:</p> <ul style="list-style-type: none"> <li>• Sensor Overload/Sensor Fault</li> <li>• Redundant Characterization Calculation Error</li> <li>• Calculated pressure is above Upper Transducer Limit (UTL).</li> </ul> <p>Resolution:<br/>Check range and, if required, replace transmitter with one that has a wider range. Meter Body may have been damaged. Check the transmitter for accuracy and linearity. Replace Meter Body and recalibrate if needed.</p> |
|   | Fixed Current Mode                 | <p>Possible causes:<br/>Output current is fixed and not varying with applied input. Loop current mode is disabled or Loop Test is active.</p> <p>Resolution:<br/>Enable Loop Current Mode if it is disabled or exit the Loop Test mode if active.</p>  |
|   | Sensor Over Temperature            | <p>Possible causes:<br/>Meter Body temperature is too high. Accuracy and life span may decrease if it remains high.</p> <p>Resolution:<br/>Verify the environment temperature is within specification. Take steps to insulate Meter Body from temperature source.</p>  |
|   | Meter Body Excess Correct          | <p>Possible Causes:<br/>ZERO or SPAN correction factor is outside acceptable limits. INPUT may have been incorrect during calibration or transmitter was in output mode during a CORRECT procedure.</p> <p>Resolution:<br/>Check input pressure and be sure that it matches calibrated range values (LRV and URV). Check Meter Body. Perform an LRV or ZERO CORRECT procedure followed by a URV CORRECT procedure.</p>   |
|   | Display Failure                    | <p>Possible causes:<br/>The Display has been disconnected or configuration data has been corrupted.</p> <p>Resolution:<br/>Secure Display connections and recheck. If problem persists, reset the device. If the problem still persists, replace the Display</p>   |

| Status Type   | Device Status<br>(HART Command 48) | Details/Resolutions   |
|---|------------------------------------|---|
| (continued)<br><b>Non critical status<br/>(Warning)</b> | Low Supply Voltage                 | <p>Possible causes:<br/>The supply voltage to the transmitter terminals is too low or the supply voltage to the Sensor board is too low.</p> <p>Resolution:<br/>Check that the power supply and loop resistance are within specification. If possible, try to increase the voltage level of the supply. If supply voltage and loop resistance are adequate and the problem persists, replace the Electronics Module. If the problem still persists, replace the Meter Body.</p> |
|   | No DAC Calibration                 | <p>Possible causes:<br/>No DAC calibration has been performed on the device.</p> <p>Resolution:<br/>Perform DAC calibration for precise analog output measurement.</p>  |
|   | Tamper Alarm                       | <p>Possible causes:<br/>Device is in Write Protect Mode and Tamper Mode is enabled, or Tamper Alarm alone is enabled, and outside attempts to change device configuration exceeded the set Tamper limit</p> <p>Resolution:<br/>Identify source of tampering. If configuration changes are required, contact a qualified individual to unlock the Write Protection Mode feature and disable the Tamper Mode and make the required updates.</p>                                   |
|   | Meter Body<br>Unreliable Comm      | <p>Possible causes:<br/>Either the transmitter is installed in a noisy environment or internal communication quality between the Electronics Module and Sensor is degrading.</p> <p>Resolution:<br/>Call service person.</p>  |
|   | Loop Current Noise                 | <p>Possible causes:<br/>If this is observed frequently, it is an early indication of critical under/over-current failure.</p> <p>Resolution:<br/>Closely monitor the device status for indications of other failures, or proactively replace the Electronics module.</p>  |
|   | AO Out of Range                    | <p>Possible causes:<br/>Calculated Analog output is either above or below the specified Loop Current Limits. The transmitter input is not in specified range.</p> <p>Resolution:<br/>Check the transmitter input and verify the configured operating range.</p>   |

| Status Type                                     | Device Status<br>(HART Command 48) | Details/Resolutions   |
|---|------------------------------------|---|
| (continued)<br>Non critical status<br>(Warning) | URV Set Err. Span Config Button    | <p>Possible causes:<br/>SET URV operation using external Span button was rejected.</p> <p>Resolution:<br/>Verify the inputs are valid for the intended operation.</p>   |
|   | LRV Set Err. Zero Config Button    | <p>Possible causes:<br/>SET LRV operation using external Zero button was rejected.</p> <p>Resolution:<br/>Verify the inputs are valid for the intended operation.</p>   |
|   | PILD Blockage Detected             | <p>Possible causes:<br/>One of the impulse lines is blocked.</p> <p>Resolution:<br/>Check and clear the impulse lines. Then disable and enable PILD when the process and transmitter is in normal operation.</p>  |
|   |                                    | <p>Case 1. The transmitter is not installed to a process or the process is not in operation.<br/>Case 2. One of the impulse lines of DP is blocked and the other side is open to atmosphere or has a constant pressure.<br/>Case 3. Both sides of the impulse lines are blocked.<br/>Case 4. Noise in process is too low.</p> <p>Resolution:<br/>For case 1, just ignore the alarm. It's suggested that PILD be enabled only after the transmitter is installed and the process is running.<br/>For case 2 &amp; 3, check and clear the impulse line(s). Then disable and enable PILD when the process and transmitter is in normal operation.<br/>For case 4, PILD is not applicable to this specific situation. It's suggested to disable PILD.</p> |
|   |                                    | <p>Possible causes:<br/>Case 1. The transmitter is not installed to a process or the process is not in operation.<br/>Case 2. The impulse lines is blocked.<br/>Case 3. Noise in process is too low.</p> <p>Resolution:<br/>For case 1, just ignore the alarm. It's suggested that PILD be enabled only after the transmitter is installed and the process is running.<br/>For case 2, check and clear the impulse line. Then disable and enable PILD when the process and transmitter is in normal operation.<br/>For case 3, PILD is not applicable to this specific situation. It's suggested to disable PILD.</p>   |

## 9.3 DE Diagnostic Messages

Table 29 lists and describe DE diagnostics.

**Table 29 – DE Diagnostics**

| <b>Diagnostics Type</b>               | <b>Diagnostics</b>                          | <b>Details/Resolution</b>  |
|---------------------------------------|---|--|
| <b>Critical</b><br><i>(continued)</i> | NVM fault                                   | <p>Possible causes:<br/>The NVM in the Sensor board is corrupt<br/>The NVM in the Electronics module is corrupt</p> <p>Resolution:<br/>Reset the device. If the problem persists, replace the Meter Body.</p>  |
|                                       | RAM fault                                   | <p>Possible causes:<br/>The RAM in the Sensor board is corrupt<br/>The RAM database in the Sensor board is compromised</p> <p>Resolution:<br/>Reset the device. If the problem persists, replace the Meter Body.</p>   |
|                                       | MDU/DAC compensation fault                  | <p>Possible causes:<br/>This status is caused by one of the following problems:</p> <ul style="list-style-type: none"> <li>• DAC SPI fault</li> <li>• DAC PEC fault</li> <li>• DAC Temperature above 140C</li> <li>• DAC VLOOP (loop voltage)low</li> <li>• DAC control word write fault</li> </ul> <p>Resolution:<br/>Verify the environment temperature is within specification. Take steps to insulate Meter Body from temperature source.<br/>If problem persists, replace Electronics Module.</p> |
|                                       | Suspect input                               | <p>Possible causes:<br/>Pressure, Meter Body Temperature and/or Static Pressure input are extremely out of range such that the value is suspect.</p> <p>Resolution:<br/>Verify that all inputs are within specifications.<br/>Reset the device. If the problem persists, replace the Meter Body.</p>   |
| <i>(continued)</i><br><b>Critical</b> | Characterization prom fault or bad checksum | <p>Possible causes:<br/>Sensor characterization is corrupt or there is a Sensor firmware failure</p> <p>Resolution:<br/>Reset the device. If the problem persists, replace the Meter Body.</p>   |

|                                    |                     |  |
|------------------------------------|---------------------|--|
| <b>Non-Critical</b><br>(continued) | Meter body failure  | <p>Possible causes:</p> <ul style="list-style-type: none"> <li>• Meter body failure</li> <li>• Sensor communication timeout</li> <li>• Sensor firmware flow failure</li> </ul> <p>Resolution:<br/>Reset the device. If the problem persists, replace the Meter Body.</p>   |
|                                    | No DAC Compensation | <p>Possible causes:</p> <p>No temperature compensation data exists for analog output calculations. Loop accuracy may be slightly compromised. Effect will be minor degradation of ambient temperature influence specifications.</p> <p>Resolution:<br/>Replace Electronics Module (PWA) to achieve the maximum current loop accuracy or return the device to factory for DAC compensation.</p>   |
|                                    | Reset Corrects Flag | <p>Successful "Reset Corrects" operation will set this flag and display message as "Calibration Correction values are reset to factory default". When 'LRV Correct' and 'URV Correct' operations are performed, the flag will be reset.</p>  |
|                                    | Sensor Fault        | <p>Possible causes:</p> <ul style="list-style-type: none"> <li>• There is a failure on the Sensor Board</li> <li>• Redundant Characterization Calculation Error</li> <li>• Calculated pressure is above Upper Transducer Limit (UTL).</li> </ul> <p>Resolution:<br/>Check range and, if required, replace transmitter with one that has a wider range. Meter Body may have been damaged. Check the transmitter for accuracy and linearity. Replace Meter Body and recalibrate if needed.</p> |
|                                    | Sensor overload     | <p>Possible causes:</p> <p>The calculated pressure is above the Upper Transducer Limit (UTL).</p> <p>Resolution:<br/>Check range and, if required, replace transmitter with one that has a wider range. Meter Body may have been damaged. Check the transmitter for accuracy and linearity. Replace Meter Body and recalibrate if needed.</p>  |
|                                    | Current Fixed       | <p>Possible causes:</p> <p>Output current is fixed and not varying with applied input. Output Mode is active.</p> <p>Resolution:<br/>Exit Output mode if active.</p>   |

|                                    |                         |  |
|------------------------------------|-------------------------|--|
| (continued)<br><b>Non-Critical</b> | Excess Span Correction  | <p>The SPAN correction factor is outside acceptable limits. INPUT may have been incorrect during calibration or transmitter was in output mode during a URV CORRECT procedure.</p> <p>Resolution:<br/>Check input pressure and be sure that it matches calibrated range values (LRV and URV). Check Meter Body. Perform an LRV or ZERO CORRECT procedure followed by a URV CORRECT procedure.</p>          |
|                                    | Excess Zero Correction  | <p>The ZERO correction factor is outside acceptable limits. INPUT may have been incorrect during calibration or transmitter was in output mode during an LRV or ZERO CORRECT procedure.</p> <p>Resolution:<br/>Check input pressure and be sure that it matches calibrated range values (LRV and URV). Check Meter Body. Perform an LRV or ZERO CORRECT procedure followed by a URV CORRECT procedure.</p> |
|                                    | Sensor Over Temperature | <p>Possible causes:<br/>Meter Body temperature is too high. Accuracy and life span may decrease if it remains high.</p> <p>Resolution:<br/>Verify the environment temperature is within specification. Take steps to insulate Meter Body from temperature source.</p>  |

## 9.4 Software Upgrade for PILD

This procedure enables the PILD option in an ST 800 device that was not ordered from the factory. This requires the user to obtain and install a License Key. This procedure can be performed from both host application and integral display of the device to activate this option.

### Procedure for upgrading the software from HART host application

- Retrieve the Dev Id parameter shown on the Device Setup->Upgrade Options menu.
- Reference document PILD Upgrade Option, ST 800 Instruction Sheet (34-ST-33-73) for firmware revision level requirements.
- Verify firmware revisions in device meet the following required minimum revision levels for PILD Option Licensing support:
  - Basic Display: 1.08
  - Advanced Display (Euro): 1.12
  - Advanced Display (Asia): 1.13
  - HART Comm Firmware: 1.10
  - Sensor Firmware: 1.03

Please reference your User Manual on how to obtain firmware revision numbers from a device. If you need technical support contact Honeywell GTS at 1-800-423-9883.

- Place an order for the ST 800 PILD Field Upgrade kit, part number 50097038-501. Include the following information with the order:
  - The Dev Id of the device
  - Feature requires license: PILD Field upgrade for ST 800 (Part Number - 50097038-501)
- The factory or Honeywell factory] generates and sends a License Key to customer.
- The customer installs the license by selecting the “Enter License Key” method on the Device Setup->Upgrade Options menu.
- On confirmation of the license activation,
  - The transmitter’s integral display, if present, will restart.
  - The PILD Functionality parameter on the Device Setup->Upgrade Options menu will show the value “Available”

## Procedure for upgrading the software from Device Integral display

- Power up the device and retrieve the device **Serial Number** by navigating to **Information->Options** menu using reedswitch buttons.
- Reference document PILD Upgrade Option, ST 800 Instruction Sheet (34-ST-33-73) for firmware revision level requirements.
- Verify firmware revisions in device meet the following required minimum revision levels for PILD Option Licensing support:
  - Basic Display: 1.08
  - Advanced Display (Euro): 1.12
  - Advanced Display (Asia): 1.13
  - HART Comm Firmware: 1.10
  - Fieldbus Comm. Firmware: 1.04
  - Sensor Firmware: 1.03

Please reference your User Manual on how to obtain firmware revision numbers from a device. If you need technical support contact Honeywell GTS at 1-800-423-9883.

- Place an order for the ST800 PILD Field Upgrade kit, part number 50097038-501. Include the following information with the order:
  - Serial number of the device
  - Feature requires license: PILD Field upgrade for St 800 (Part Number - 50097038-501)
- The Honeywell factory generates and sends a License Key to customer.
- Customer activates the license by writing 'License Key' parameter provided
  - Navigate to **Information->Options** menu and select **License Key** parameter.
  - Press  $\downarrow$  to begin the edit process.
  - Press the  $\uparrow$  or  $\downarrow$  buttons to select the desired digit, and then press  $\downarrow$  to advance to the next digit to the right.
  - After the last digit has been entered, press  $\downarrow$  one more time to write the new value to ST800 Transmitter.
- On confirmation of the license activation, **PILD** parameter will be present in **Information->Options** menu indicates the enabled status.



# 10 Using DTMs

## 10.1 Introduction

ST 800 HART and Fieldbus models support DTMs running on Pactware or FDM / Experion. To set up the DTM network on the FDM/Experion, refer to the *FDM/Experion User Guide*. In this manual, the procedure is given to run the ST 800 HART DTM on Pactware (Version 4.1 or above).

## 10.2 Components

In order to be able to use the HART DTM you need the following:

- PACTware or some other Container application.
- Microsoft .NET Framework
- Latest HART Communication DTM: Free version of HART Communication DTM available for download from CodeWrights website.
- Honeywell HART DTM Library
- Viator modem from MacTek: RS-232 interface for HART Networks

## 10.3 Downloads

- **Download 1:** Pactware 4.x and .NET 2.0  
Download from [www.pactware.com](http://www.pactware.com)
- **Download 2:** HART Communication DTM\  
Download from <http://www.codewrights.biz/>
- **Download 3:** Honeywell HART DTM Library  
Download from HPS web site

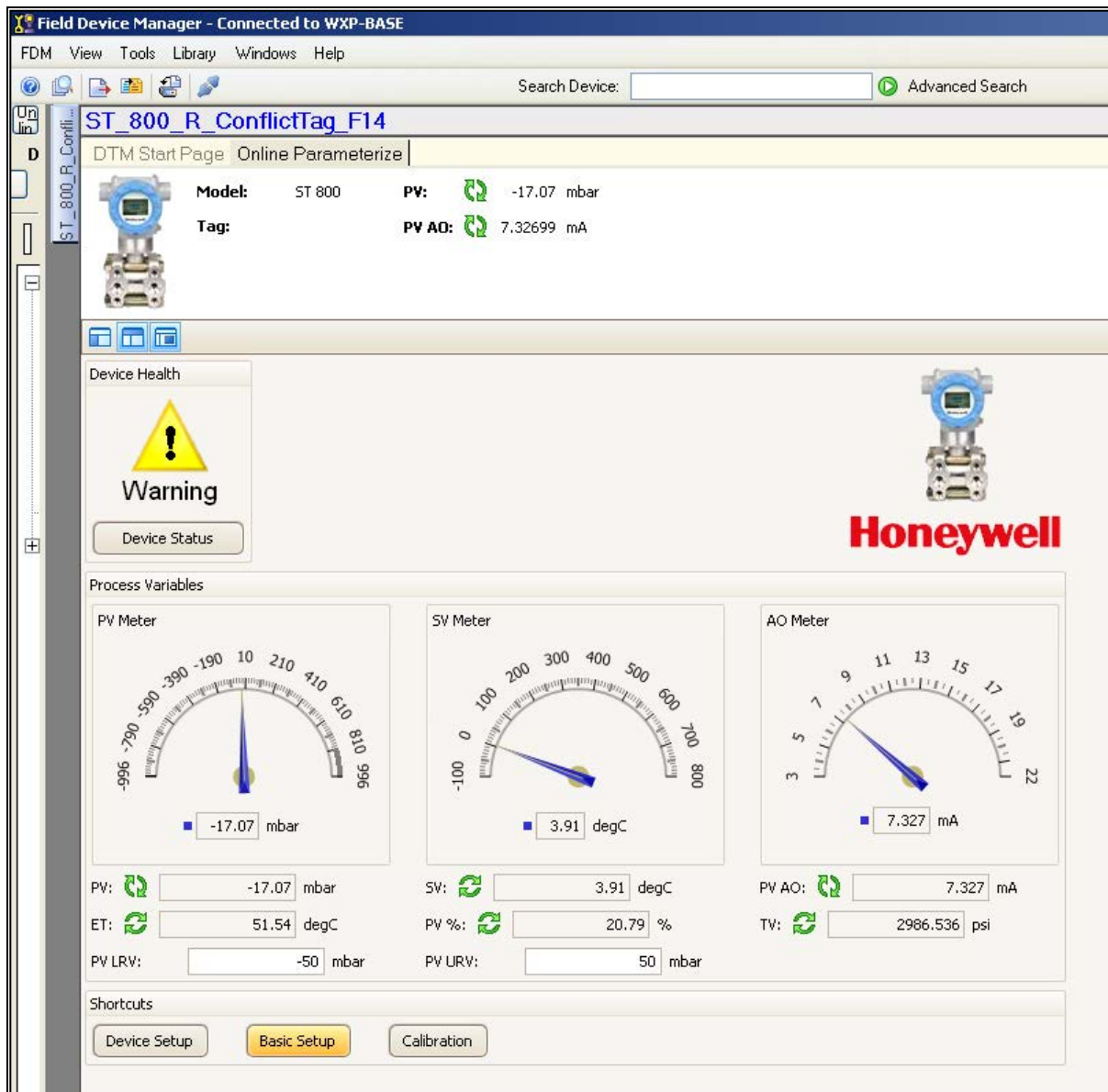
## 10.4 Procedure to Install and Run the DTM

1. Install the Download 1, 2, or 3 above.
2. Connect the Transmitter to the 30 V DC power supply with a 250 ohm loop resistor.
3. Connect the Viator modem terminals to the Transmitter power terminals.
4. Connect the Viator modem DB9 connector to the PC COM port.
5. Run Pactware. Select Update Device Catalog before adding Device (before adding HART Comm DTM).
6. Add Device – Add HART Comm DTM.
7. Right click on HART DTM, select Connect.
8. Right Click on HART Comm DTM and select Add device.
9. Add the Device DTM from for your device from the list (for example: ST 800 DevRev 1).
10. Right Click on Device DTM, and select Connect.
11. Right click on Device DTM, and select Parameter/online parameterization. You should see Status “Connected” to be able to do configuration, calibration etc.
12. Browse through the menus to access various parameters/functions

The following sections provide a high level overview of ST 800 DTM screens. The Menu structure is similar to the MC Toolkit FDC application and behavior of the parameters / methods is the same as the MC Toolkit FDC application. Refer to Table 11 for a complete listing of all the parameters and details. In the following sections, emphasis is given to show the various DTM screens.

## 10.5 ST 800 Online Parameterization

On selecting Parameter/Online Parameterization, the DTM home page is displayed as shown below.



### Device Health:

Shows Overall Device Status Image and “Device Status” Button/Link that takes you to the Device Status screen.

Overall Device Status will be either Normal, Warning or Failure depending upon the health of the device:



Overall Device Status will be shown on each of the DTM pages so that the user can get the current status of the device from any screen

### Device Icon / Honeywell Logo:

Shows the Honeywell Logo, Transmitter icon.

### Process Variables:

Shows Primary variables Gauges and their values, LRV, URV.

### Shortcuts:

Device Setup:

- Provides Tabs to access any of the functions : Basic Setup, Calibration, Process Variables, Device Status, Diagnostics, Services, Detailed Setup, Meter Body Selections, Display Setup and Review

Basic Setup:

- Provides Device Setup information (Tag, Device Type, MB Type etc.)

Calibration:

- Provides access to all the Calibration functions



Refer to the Table 11 for more details

## 10.6 Basic Setup Page

SDC625 - [Device Setup]

Device View Window Help

Basic Setup | Calibration | Process Variables | Device Status | Diagnostics | Services | Detailed Setup | Meterbody Selections | Display Setup | Review

Device Health

Normal

Transfer Fn and cutoff mode (sq root)

PV Xfer fnctn: Linear

Linear

Output %

Input (% of Span)

Low Flow Cutoff Mode: User Config

Low Flow Cutoff Brkpt(User Config): 0 %

Device Information

Range values

PV Units: inH2O

Tag: ??????

Long tag: ?????????

Date: 01/01/1900

Descriptor: ?????????

PV Damping: 0.00 s

SV Units: degC

Loop mA: Disabled

Install Date: 01/01/1900

Message: ?????????

Clear Message

Model Number

Maint Mode: Chk with oper

Manufacturer: Honeywell

Model: ST 800

MB Type: DP

MB ID: ?????????

Dev id: 1

Final asmbly num: 1

Universal rev: 7

Fld dev rev: 4

Software rev: 1

Cfg chng count: 1

Write Protect: No

Device Assembly

“Transmitter Messaging” and “Maintenance Mode”

### Pressure Transfer Fn:

Allows selecting Transfer function; Linear or Square Root.

### Low Flow Cutoff Mode:

Allows selecting the User Config Mode and entering the Low Flow Cutoff breakpoint from 0-25% to get the needed signal conditioning. Refer to Table 11 for more details

### Device Information

Allows access to both read only parameters and read/write parameters.  
Provides access to Message, Clear Message and Maint Mode.



Refer to Table 11 for more details

### Model Number:

Shows the Model number.

### Device Assembly:

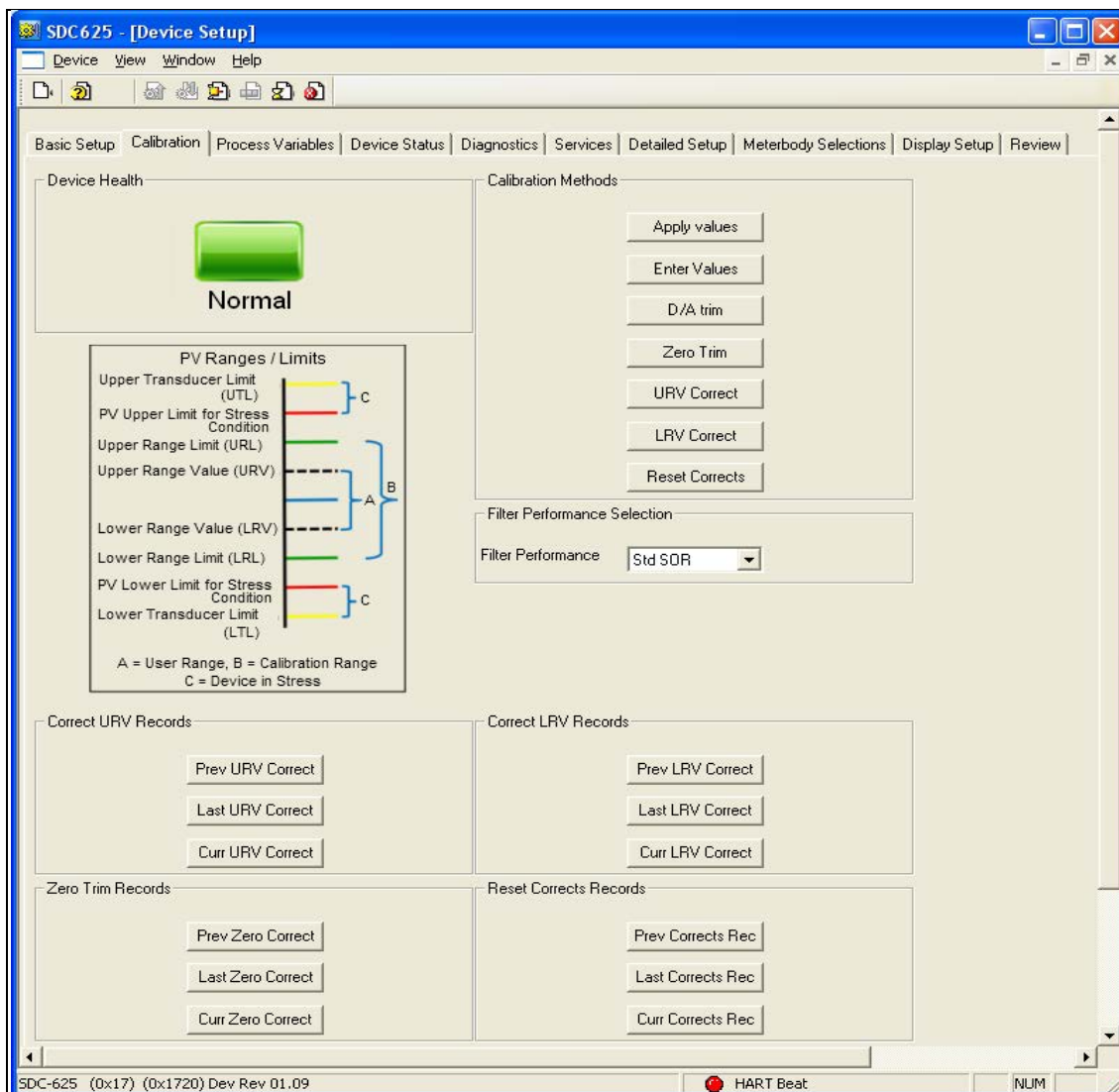
Shows the Blow out Image of ST 800

### System Setup:

Shows the Image how to connect the Transmitter

## 10.7 Calibration Page

The Calibration Page provides access to all of the calibration methods and records.



## Calibration Methods

Apply Values  
Enter Values  
D/A Trim  
Zero Trim  
URV Correct  
LRV Correct  
Reset Corrects



Refer to Table 11 for more details

## Calibration Records

Correct URV Records

- Prev URV Correct
- Last URV Correct
- Curr URV Correct



Refer to the Calibration Records in for more details

Correct LRV Records

- Prev LRV Correct
- Last LRV Correct
- Curr LRV Correct



Refer to the Calibration Records in for more details

Zero Trim Records

- Prev Zero Trim
- Last Zero Trim
- Curr Zero Trim



Refer to the Calibration Records in for more details

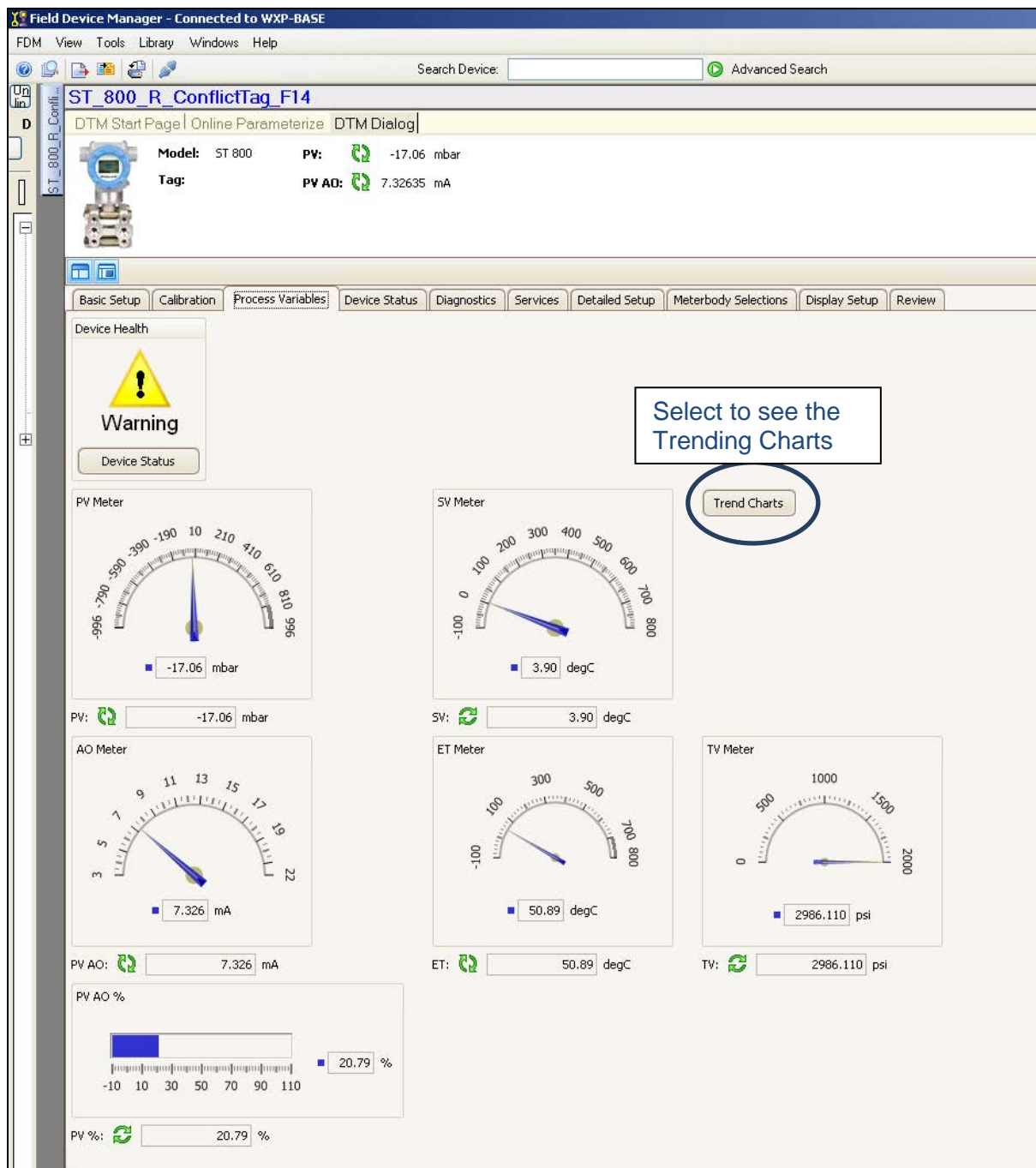
Reset Corrects Records

- Prev Corrects Resets
- Last Corrects Resets
- Curr Corrects Resets



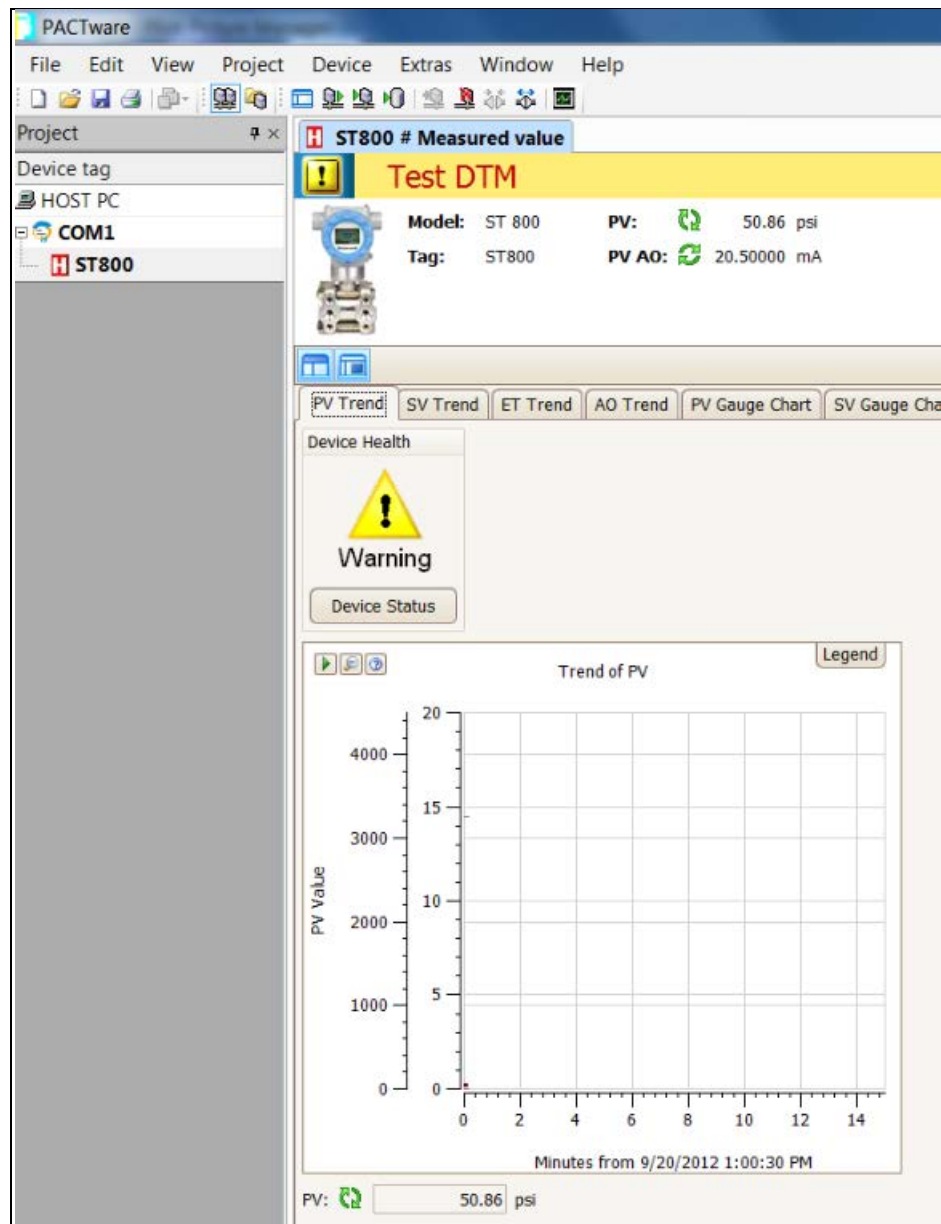
Refer to the Calibration Records in for more details

## 10.8 Process Variables



All the Process Variables are graphically represented in this screen. Select Trend Charts to see the Trending Charts

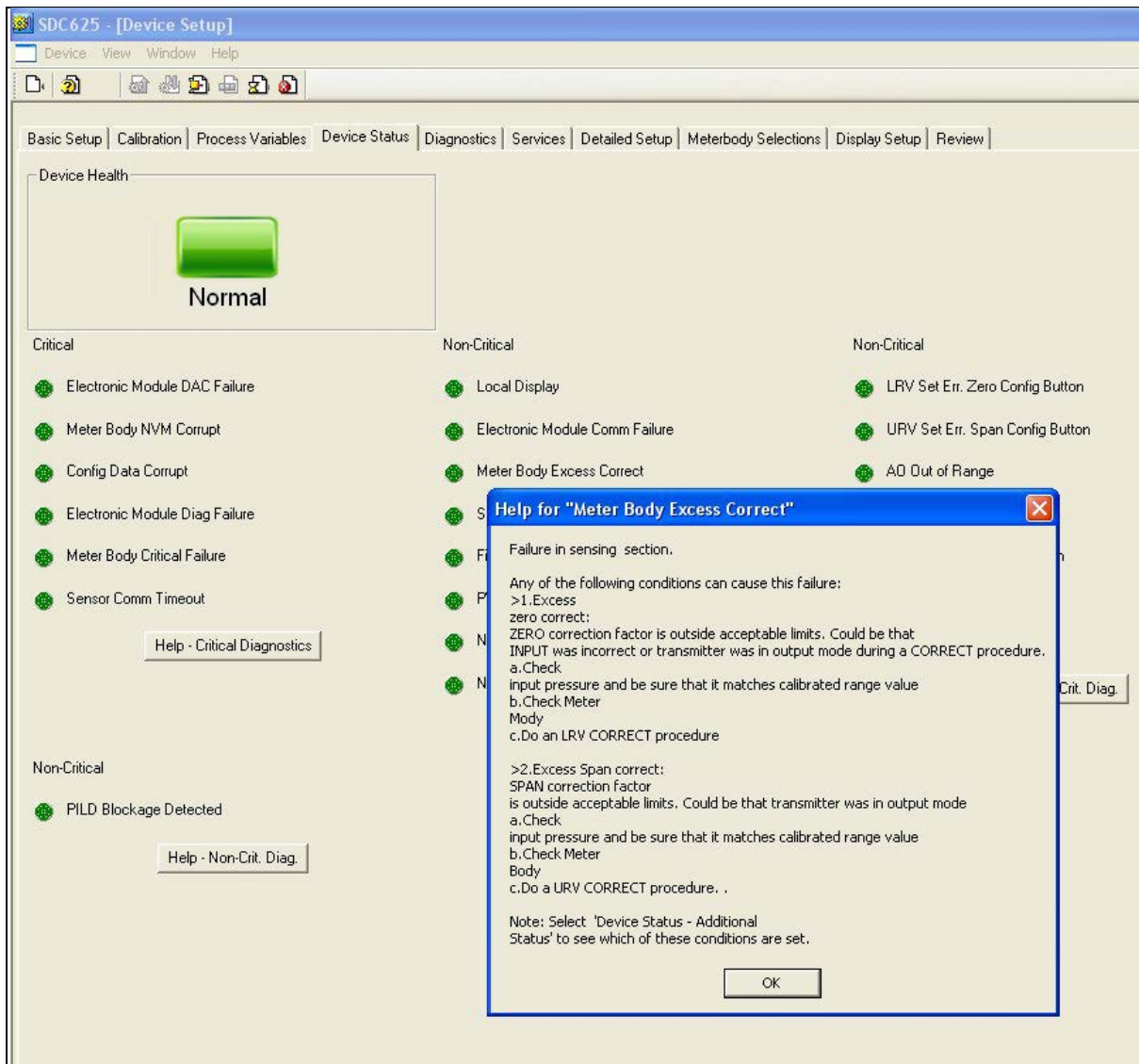
## 10.9 Trend Charts





## 10.10 Device Status

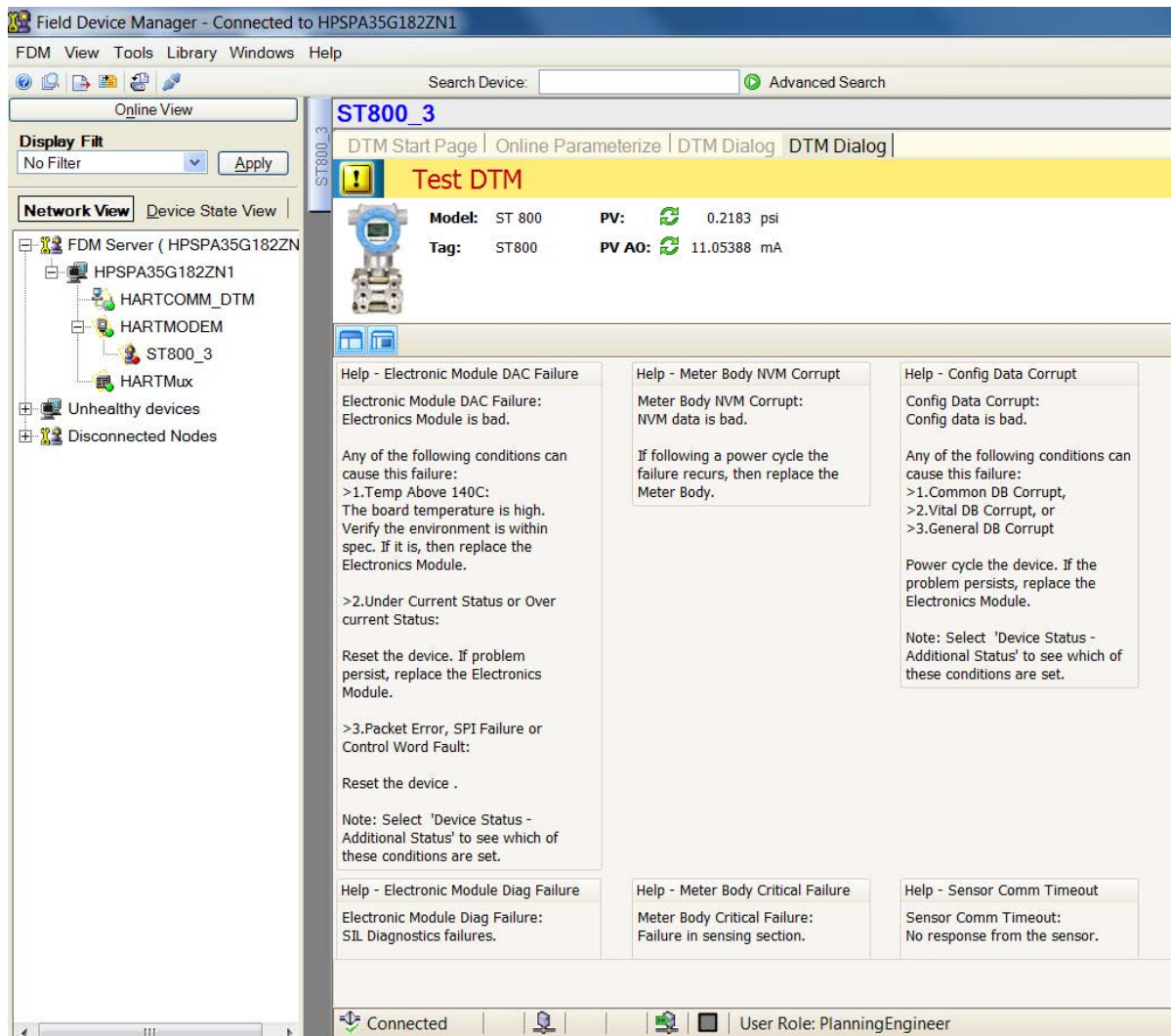
Shows Critical and Non-Critical status and context-sensitive help when gliding the mouse over an individual status.



Refer "Troubleshooting and Maintenance" for more details on individual status details

## 10.11 Critical and Non-Critical Help Display

Shows Help on Critical, Non-Critical when you click on “Help – Critical Diag” or “Help – Non-Critical Diag” buttons. Also, extended status can be seen by clicking the “Additional Status” button.



## 10.12 Diagnostics:

Provides access to the Advanced Diagnostics and Config History functions:

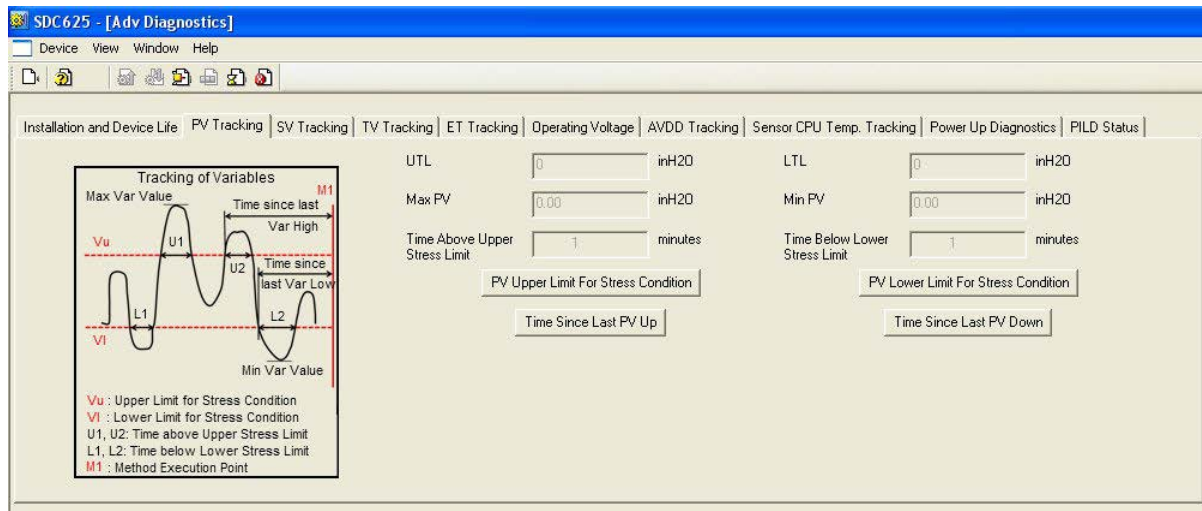
Various Advanced Diagnostics:

- Installation and Device Life
- PV Tracking
- SV Tracking
- ET Tracking
- Operating Voltage
- AVDD Tracking
- Sensor CPU Temp. Tracking
- Power Up Diagnostics
- PILD Status

Access the relevant tab to read the Diagnostic parameters or run the Diagnostics Methods



Refer "HART Advanced Diagnostics" section for more details.

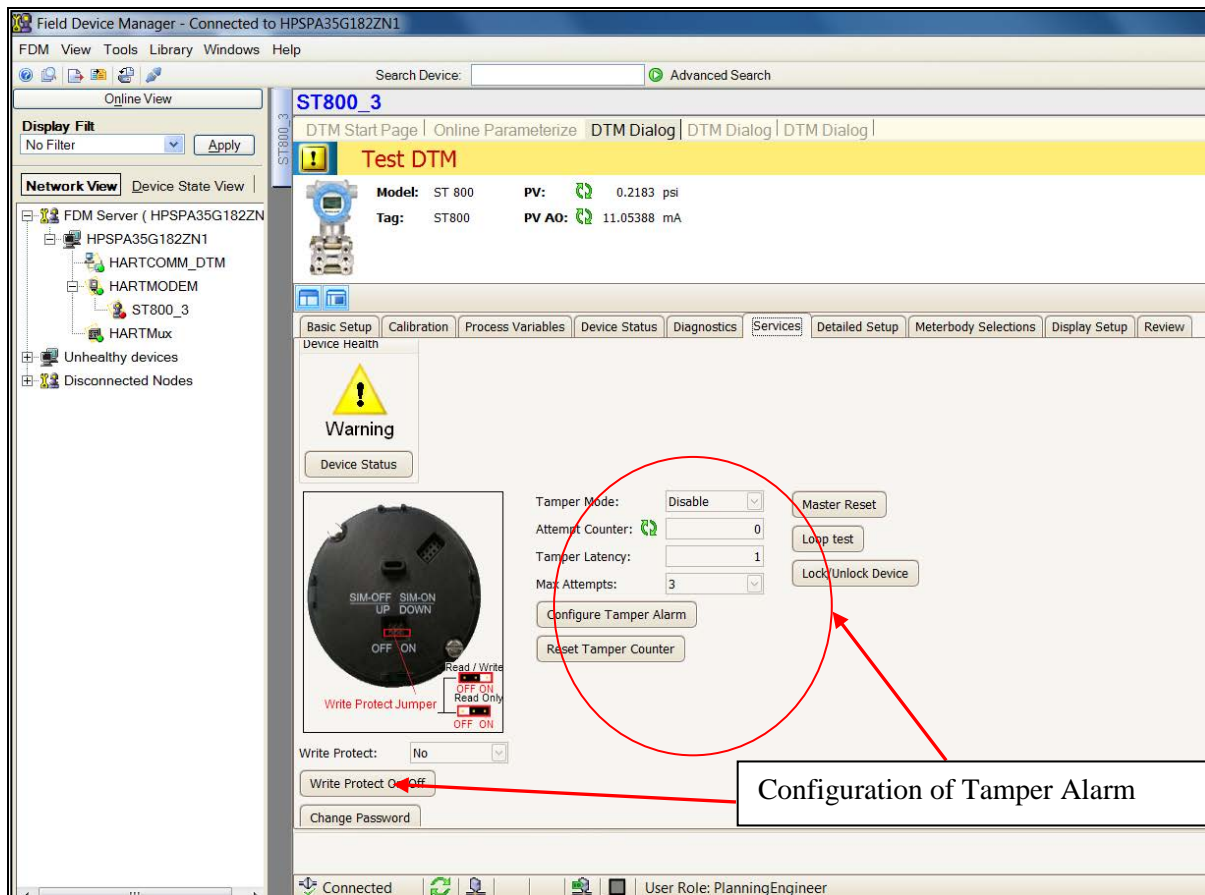


## 10.13 Services

This allows configuration of Tamper Alarm and Write Protect mode.



Refer “Device Configuration and Parameter Descriptions” for more details.



## 10.14 Detailed Setup

Shows Sensor Limits, Output Condition, Signal Condition and Burnout level selections.

**SDC625 - [Device Setup]**

Device View Window Help

Basic Setup | Calibration | Process Variables | Device Status | Diagnostics | Services | **Detailed Setup** | Meterbody Selections | Display Setup | Review

**Device Health**

Normal

**NAMUR Option**

NAMUR Selection: Disabled

4-20 mA dc Output & Failsafe Option Selections

Namur 21.0 mA HBO or Honeywell 21.0 mA HBO

20.5 mA Normal 20.8 mA Normal

100% 20 mA

0% 4 mA

3.8 mA Normal 3.8 mA

3.6 mA LBO 3.6 mA LBO

**Sensors**

UTL: 0 inH2O

LTL: 0 inH2O

PV URL: 0.00 inH2O

PV LRL: 0.00 inH2O

PV: 0 inH2O

PV Units: inH2O

SV: 0.00 degC

SV Units: degC

**Signal Condition**

PV Damping: 0.00 s

PV URV: 0 inH2O

PV LRV: 0 inH2O

PV Xfer frctn: Linear

PV % mge: 0.00 %

**Output Condition**

Poll addr: 0

Num req preams: 1

PV AO: 0.000 mA

PV AO Alm Type: Hi

Loop mA: Disabled

Loop test

D/A trim

**PILD**

PILD: Enable

Application (App): Other

Sampling Window (SwIN): 3 Minutes

Up Limit(UL): 0.60

Down Limit(DL): 0.40

Blockage Limit(BL): 0.10

Cut Off Frequency: 0.000 Hz

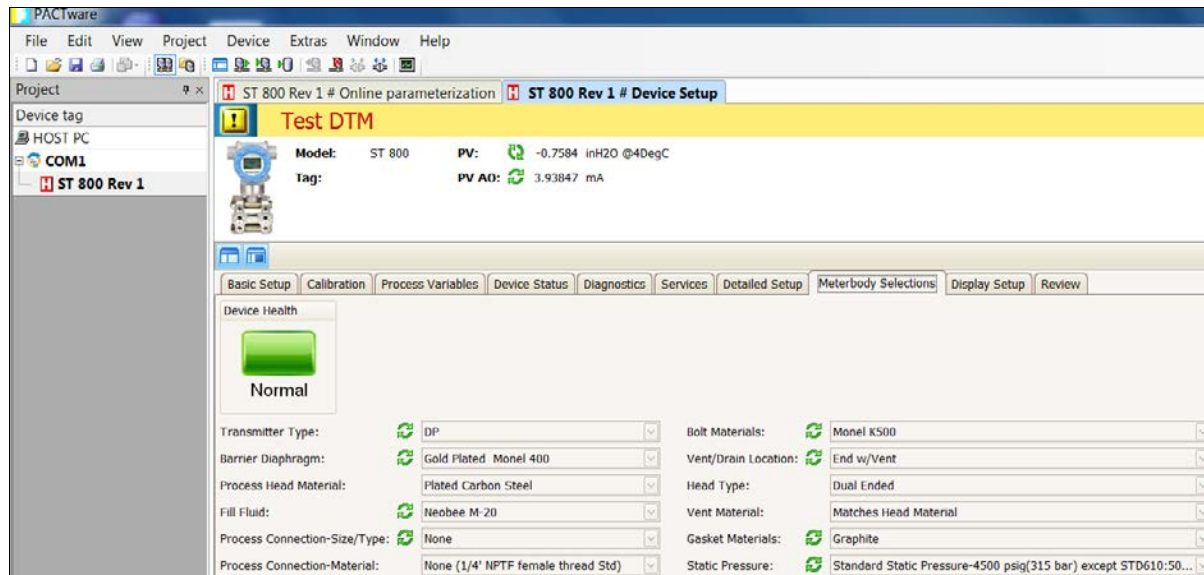


Refer Device Configuration and Parameter Descriptions for more details.



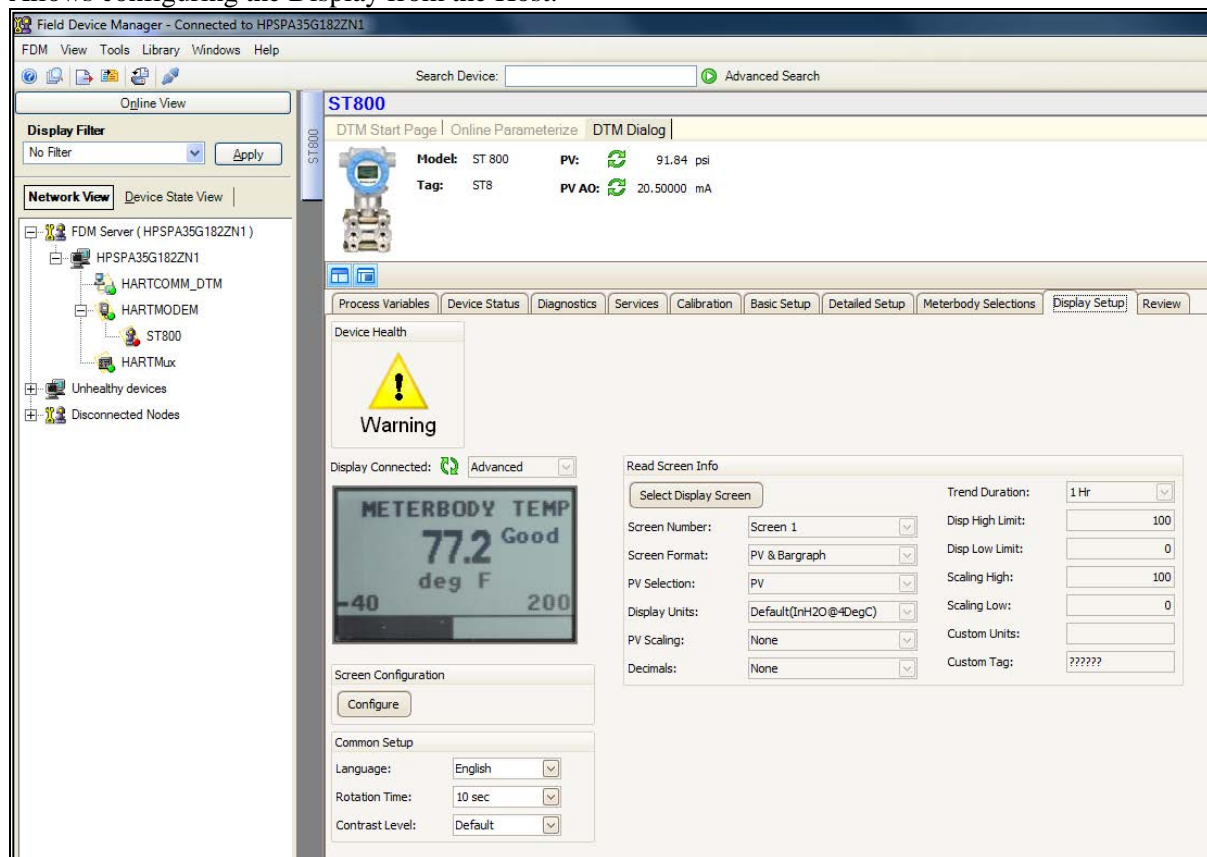
## 10.15 Meterbody Selection

Select the Meter Body Selections to see the Material of Construction details



## 10.16 Display Setup

Allows configuring the Display from the Host.



## 10.17 Read Screen Info:

Select the Screen number to get the relevant screen settings information

## 10.18 Screen Configuration:

To configure any of the Display screens run the “Configure” Method and set to the appropriate settings. Refer to the “ST 800 SmartLine Pressure Transmitter User’s Manual” 34-ST-25-35, Advanced Display Menu and Basic Display Menu sections for help configuring the Display Parameters

## 10.19 Common setup:

This lists the Common setup for all the screens



Refer “ST 800 SmartLine Pressure Transmitter User’s Manual: 34-ST-25-35 , Advanced Display Menu and Basic Display Menu sections” for more details.

## 10.20 Review

Summary screen showing all the parameters.

**Test DTM**

Model: ST 800 PV: 50.78 psi  
Tag: ST800 PV AO: 20.50000 mA

Basic Setup Calibration Process Variables Device Status Diagnostics Services Detailed Setup Meterbody Selections Display Setup Review

**Device Health**

Warning

Device Status

|               |             |                  |              |                          |            |
|---------------|-------------|------------------|--------------|--------------------------|------------|
| Manufacturer: | Honeywell   | Loop mA:         | Enabled      | Universal rev:           | 7          |
| Model:        | ST 800      | PV AO:           | 20.500 mA    | Fld dev rev:             | 1          |
| MB Type:      | GP          | PV AO Alm Type:  | Hi           | Software rev:            | 107        |
| PV unit:      | psi         | SV unit:         | degC         | Display SW Version:      | 1.01000w   |
| PV LRL:       | 0.00 psi    | MB ID:           | S397948SN6G1 | MB SW Version:           | 1.0000i5   |
| PV URL:       | 2999.98 psi | Tag:             | ST800        | Dev SW Version:          | 1.0100ag   |
| LTL:          | 0 psi       | Long tag:        | longtag      | Poll addr:               | 0          |
| UTL:          | 4500 psi    | Date:            | 1/1/1900     | Cfg chng count:          | 154        |
| PV Damp:      | 0.00 s      | Descriptor:      | DESCR1       | Num req preams:          | 7          |
| PV %:         | 187.51 %    | Message:         | HI THERE     | Inst Dt:                 | 1/1/1972   |
| Xfer Fn:      | Sq root     | Write Protect:   | No           | Pwr Fail:                | 168        |
| PV URV:       | 14.45 psi   | Final asbly num: | 1            | Filter Performance:      | Std SOR    |
| PV LRV:       | 0 psi       | Dev id:          | 3979481      | Comm Board Stress Life:  | 0.000000 % |
|               |             |                  |              | Comm Board Service Life: | 0.069156 % |



Refer “Device Configuration and Parameter Descriptions “ for more details.

## 10.21 ST 800 Offline Parameterization

On selecting Parameter/ Parameterization, the Offline parameter configuration page will be displayed.

**PACTware**

File Edit View Project Device Extras Window Help

Project

Device tag

HOST PC

COM1

ST800

**ST800 # Parameterization**

**Test DTM**

**Device Name:** ST 800 Rev 1

**Device Vendor:** Honeywell

**Tag:** ? ???????

Loop mA: ? Disabled

PV URV: ? 0 inH2O

PV LRV: ? 0 inH2O

PV unit: ? inH2O

PV Damp: ? 0.00 s

Xfer Fn: ? Linear

SV unit: ? degC

Tag: ? ???????

Long tag: ? ?????????????????????????????????

Date: ? 1/1/1900

Descriptor: ? ???????????????

Message: ? ?????????????????????????????????

Final assembly num: ? 1

Poll addr: 0

Filter Performance: Std SOR

Namur Selection: ? Disabled

Low Flow Cutoff Mode: ? User Config

Low Flow Cutoff Brkpt(User Config Mode only): ? 0.000000 %

Select Device / Load to Device to download the Offline Configuration to the connected device.



## 11. HART DD binary file format compatibility matrix

| "Host - ST 800 - HART DD binary file format" compatibility matrix |                           |
|---|---------------------------|
| Host  | DD file format to be used |
| Experion R410   | Fm8                       |
| Experion R400 to R300   | Fm6                       |
| Experion below R300   | fms                       |
| FDM R430  | Fm8                       |
| FDM R410 – R302   | Fm6                       |
| FDM Below R302  | fms                       |



Refer the respective Tools' User Manual for details on loading the DD file on these Tools.



# Glossary

|                    |   |
|--------------------|---|
| AP                 | Absolute Pressure   |
| AWG                | American Wire Gauge   |
| DE                 | Digital Enhanced Communications Mode  |
| DP                 | Differential Pressure   |
| d1                 | Inside diameter of pipe   |
| d2                 | Orifice plate bore diameter at flowing temperature                              |
| do                 | Inside diameter of orifice  |
| EMI                | Electromagnetic Interference  |
| FTA                | Field Termination Assembly  |
| GP                 | Gauge Pressure  |
| HP                 | High Pressure (also, High Pressure side of a Differential Pressure Transmitter) |
| Hz                 | Hertz   |
| inH <sub>2</sub> O | Inches of Water   |
| LGP                | In-Line Gauge Pressure  |
| LP                 | Low Pressure (also, Low Pressure side of a Differential Pressure Transmitter)   |
| LRL                | Lower Range Limit   |
| LRV                | Lower Range Value   |
| mAdc               | Milliamperes Direct Current   |
| mmHg               | Millimeters of Mercury  |
| mV                 | Millivolts  |
| Nm                 | Newton meters   |
| NPT                | National Pipe Thread  |
| NVM                | Non-Volatile Memory   |
| P                  | Pressure  |
| Pa                 | Measured static pressure in PV4 algorithm                                       |
| Pc                 | Absolute critical pressure of the gas   |
| Pd                 | Static pressure at downstream point   |
| Pdp                | Measured differential pressure in Pascals in PV4 algorithm                      |
| Pf                 | Absolute pressure of flowing gas  |
| Pr                 | Reduced pressure  |
| Pu                 | Static pressure at upstream point   |
| PM                 | Process Manger  |
| PSI                | Pounds per Square Inch  |
| PSIA               | Pounds per Square Inch Absolute   |

|           |   |
|-----------|---|
| PV        | Process Variable  |
| PWA       | Printed Wiring Assembly   |
| RFI       | Radio Frequency Interference  |
| RTD       | Resistance Temperature Detector                                     |
| SFC       | Smart Field Communicator  |
| STIM      | Pressure Transmitter Interface Module                               |
| STIMV IOP | Pressure Transmitter Interface Multivariable Input/Output Processor |
| URL       | Upper Range Limit   |
| URV       | Upper Range Value   |
| US        | Universal Station   |
| Vac       | Volts Alternating Current   |
| Vdc       | Volts Direct Current  |
| HART      | Highway Addressable Remote Transmitter                              |
| HCF       | HART Communication Foundation                                       |
| EEPROM    | Electrically Erasable Programmable Read Only Memory                 |

# INDEX

## A

About This Manual..... iii

## C

Communication Modes.....6  
    Digitally Enhanced (DE) Mode Communication .....6  
    HART Mode Communication.....7  
Configuration Tools and Interfaces.....8  
    Application Design, Installation, Startup, and  
        Operation .....8  
    MC Toolkit Participation .....8, 9  
Copyrights, Notices and Trademarks ..... ii

## D

DE Calibration .....56  
    Analog Output Signal Calibration .....56  
    Calibrating Range Using the MC Toolkit.....58  
    Calibration Recommendations.....56  
    Conditions for Input Calibration.....58  
    DE Output Calibration .....63  
    Input Calibration Procedure.....59  
    Input Calibration Procedures Description.....58  
    Manually Setting the Process Variable Range .....65  
    Procedure to Reset Calibration .....68  
    Test Equipment Required for Calibration.....56  
DE Transmitter Configuration .....11  
    Configuration Personnel Requirements.....11  
    DE Transmitter Offline Configuration.....21  
    DE Transmitter Online Configuration .....12  
    MC Toolkit Software Application Overview .....11  
DE Transmitter Offline Configuration .....21  
DE Transmitter Online Configuration.....12  
DE-Specific Configuration Parameters .....16  
Digitally Enhanced (DE) Mode Communication .....6

## F

Field Device Configurator.....24  
    aving device history .....49  
    Custom Views.....51  
    Device Configuration and Parameter Descriptions ..33  
    Exporting device history records to Documint.....51  
    Exporting device history records to FDM .....50  
    Manage DDs .....26  
    Offline configuration .....28  
    Offline Configuration .....53  
    Online configuration .....27  
    Overview of Device Homepage.....28  
    Procedure to Enter the Transmitter Tag ..... See

Selecting the Process Variable (PV) Unit of Pressure  
    Measurement ..... 47  
Setting PV URV, and LRV Range Values ..... 48  
Setting Range Values for Applied Pressure..... 48  
Settings ..... 25  
Using FDC for various device operations..... 31

## G

Glossary..... 115

## H

HART Advanced Diagnostics..... 76  
HART Calibration ..... 70  
    Analog Output Signal Calibration ..... 71  
    Calibrating Range ..... 72  
HART DD binary file format compatibility matrix..... 113  
HART Mode Communication ..... 7  
HART Transmitter Configuration ..... 23  
    Overview of FDC Homepage..... 24

## L

Local Display Options ..... 4

## O

Optional 3-Button Assembly ..... 5

## R

References..... iii  
Release Information ..... iii

## S

Safety Certification Information..... 3  
Series, Model and Number..... 3  
Software Upgrade for PILD..... 95  
ST 800 Physical and Functional Characteristics ..... 1  
    Features and Options ..... 1  
    Local Display Options ..... 4  
    Optional 3-Button Assembly ..... 5  
    Overview ..... 1  
Safety Certification Information..... 3  
Series, Model and Number..... 3  
Transmitter Adjustments..... 4

## T

|                                      |    |
|--------------------------------------|----|
| Transmitter Adjustments .....        | 4  |
| Troubleshooting and Maintenance..... | 87 |

## U

|   |     |
|---|-----|
| Uploading a Transmitter Configuration ..... | 12  |
| Using DTMs .....                            | 97  |
| Basic Setup Page .....                      | 100 |
| Calibration Page .....                      | 101 |
| Critical and Non-Critical Help Display..... | 106 |
| Detailed Setup.....                         | 109 |
| Device Status.....                          | 105 |
| Diagnostics .....                           | 107 |
| Display Setup .....                         | 110 |
| Downloads .....                             | 97  |
| Meterbody Selection .....                   | 110 |
| Procedure to Install and Run the DTM.....   | 97  |
| Process Variables .....                     | 103 |
| Screen Configuration .....                  | 111 |
| Services .....                              | 108 |
| ST 800 Offline Parameterization .....       | 112 |
| ST 800 Online Parameterization .....        | 98  |
| Trend Charts .....                          | 104 |

# Sales and Service

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

## ASIA PACIFIC

Honeywell Process Solutions,  
(TAC) [hfs-tac-support@honeywell.com](mailto:hfs-tac-support@honeywell.com)

### Australia

Honeywell Limited  
Phone: +(61) 7-3846 1255  
FAX: +(61) 7-3840 6481  
Toll Free 1300-36-39-36  
Toll Free Fax:  
1300-36-04-70

### China – PRC - Shanghai

Honeywell China Inc.  
Phone: (86-21) 5257-4568  
Fax: (86-21) 6237-2826

### Singapore

Honeywell Pte Ltd.  
Phone: +(65) 6580 3278  
Fax: +(65) 6445-3033

### South Korea

Honeywell Korea Co Ltd  
Phone: +(822) 799 6114  
Fax: +(822) 792 9015

## EMEA

Honeywell Process Solutions,  
Phone: + 80012026455 or  
+44 (0)1344 656000

Email: (Sales)

[FP-Sales-Apps@Honeywell.com](mailto:FP-Sales-Apps@Honeywell.com)

or

(TAC)

[hfs-tac-support@honeywell.com](mailto:hfs-tac-support@honeywell.com)

## AMERICA'S

Honeywell Process Solutions,  
Phone: (TAC) 1-800-423-9883 or  
215/641-3610  
(Sales) 1-800-343-0228

Email: (Sales)

[FP-Sales-Apps@Honeywell.com](mailto:FP-Sales-Apps@Honeywell.com)

or

(TAC)

[hfs-tac-support@honeywell.com](mailto:hfs-tac-support@honeywell.com)

**For more information**

To learn more about SmartLine Transmitters,  
visit [www.honeywellprocess.com](http://www.honeywellprocess.com)  
Or contact your Honeywell Account Manager

**Process Solutions**

Honeywell  
1250 W Sam Houston Pkwy S  
Houston, TX 77042

Honeywell Control Systems Ltd  
Honeywell House, Skimped Hill Lane  
Bracknell, England, RG12 1EB

Shanghai City Centre, 100 Jungi Road  
Shanghai, China 20061

[www.honeywellprocess.com](http://www.honeywellprocess.com)

34-ST-25-38 Rev.5  
July 2014

©2014 Honeywell International Inc.

The Honeywell logo, consisting of the word "Honeywell" in a bold, red, sans-serif typeface.