Honeywell

SMV800 MultiVariable Transmitter
Modbus Communication
User's Guide

34-SM-25-09
Revision 1.0
August 2018

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Revision 1, August 2018

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About This Document

This guide provides the details of programming Honeywell SMV800 Multivariable Transmitters for applications involving Modbus protocol.

For installation, wiring, and maintenance information, refer to the *SMV800 Multivariable Transmitter User Manual, Document # 34-SM-25-03*.

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.

To digitally integrate a Transmitter with one of the following systems:

- For the Experion PKS through SCADA, Experion HS, you will need to supplement the information in this document with the data and procedures in the *Experion Knowledge Builder*.
- For 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

Document Name/ID SMV800 Modbus User's Guide - 34-SM-25-09	Release Number	Publication Date
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References

The following list identifies all documents that may be sources of reference for material discussed in this publication.

SMV800 Multivariable Transmitter User's Manual, # 34-SM-25-03

SmartLine Pressure Transmitter Quick Start Installation Guide, # 34-SM-25-04

SMV800 Configuration and Parameter Dependencies #34-SM-00-06

Patent Notice

The Honeywell SMV800 Multivariable 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

Honeywell Process Solutions https://www.honeywellprocess.com/smart-multivariable-transmitters.aspx

Training Classes 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 1-800-423-9883 Global Technical Support
Global Email Support	Honeywell Process Solutions	ask-ssc@honeywell.com

Symbol Definitions

The following table lists those symbols used in this document to denote certain conditions.

Symbol	Definition
	**ATTENTION:** Identifies information that requires special consideration.
	**TIP:** Identifies advice or hints for the user, often in terms of performing a task.
	**REFERENCE -EXTERNAL:** Identifies an additional source of information outside of the bookset.
	**REFERENCE - INTERNAL:** Identifies an additional source of information within the bookset.
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.
	**CAUTION**: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. **CAUTION** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	**WARNING**: Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or death. **WARNING** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	**WARNING, Risk of electrical shock**: Potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 VDC may be accessible.
	**ESD HAZARD:** Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices.
	**Protective Earth (PE) terminal**: Provided for connection of the protective earth (green or green/yellow) supply system conductor.
	**Functional earth terminal**: Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national local electrical code requirements.

Symbol	Definition
	**Earth Ground**: **Functional earth connection.** NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	**Chassis Ground**: Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	**The Canadian Standards mark means the equipment has been tested and meets applicable standards for safety and/or performance.**
	**The Ex mark means the equipment complies with the requirements of the European standards that are harmonized with the 94/9/EC Directive (ATEX Directive, named after the French "ATmosphere EXplosible").**

Terms and Acronyms

Term	Definition
Alarm	The detection of a block leaving a state and when it returns to that state.
Analog Input (function block)	One of the standard function blocks define by the Foundation Modbus
AP	Absolute Pressure
Application	A software program that interacts with blocks, events and objects. One application may interface with other applications or contain more than one application.
AWG	American Wire Gauge
Block	A logical software unit that makes up one named copy of a block and the associated parameters its block type specifies. It can be a resource block, transducer block or a function block.
Configuration (of a system or device)	A step-in system design: selecting functional units, assigning their locations and identifiers, and defining their interconnections.
Device	A physical entity capable of performing one or more specific functions. Examples include transmitters, actuators, controllers, operator interfaces.
Device Description	Description of FBAPs within a device. Files that describe the software objects in a device, such as function blocks and parameters. The DD binary are created by passing DD source files through a standard tool called a tokenizer.
Device Description Language	A standardized programming language (similar to C) used to write device description source files.
Device Tag	The Physical Device Tag of the device as specified in the Foundation Modbus specifications.
DP	Differential Pressure
EEPROM	Electrically Erasable Programmable Read Only Memory
EMI	Electromagnetic Interference
Event	An instantaneous occurrence that is significant to scheduling block execution and to the operational (event) view of the application.
Field Device	A Modbus-compatible device that contains and executes function blocks.
FTA	Field Termination Assembly
Function Block	An executable software object that performs a specific task, such as measurement or control, with inputs and outputs that connect to other function blocks in a standard way.
Function Block Application Process	The part of the device software that executes the blocks (function, transducer, or resource blocks).
GP	Gauge Pressure
HP	High Pressure (also, High Pressure side of a Differential Pressure Transmitter)
Hz	Hertz
inH2O	Inches of Water
LGP	In-Line Gauge Pressure
Link Active Scheduler	A device which is responsible for keeping a link operational. The LAS executes the link schedule, circulates tokens, distributes time messages and probes for new devices.
LP	Low Pressure (also, Low Pressure side of a Differential Pressure Transmitter)
LRL	Lower Range Limit
LRV	Lower Range Value

Macrocycle	The least common multiple of all the loop times on a given link.
mAdc	Milliamperes Direct Current
Manufacturer's Signal Processing	A term used to describe signal processing in a device that is not defined by Modbus specifications.
mmHg	Millimeters of Mercury
Modbus	Modbus is an industry standard protocol used in many SCADA packages for network control. The transmitters can be inserted into existing networks using Modbus or linked directly to a controller over an RS485 link. Modbus TCP/IP is available through the Ethernet interface.
mV	Millivolts
MBT	Meter Body Temperature
Network Management	A part of the software and configuration data in a Foundation Modbus device that handles the management of the network.
Network Management Agent	Part of the device software that operates on network management objects.
Network Management Information Base	A collection of objects and parameters comprising configuration, performance and fault-related information for the communication system of a device.
Nm	Newton. Meters
NPT	National Pipe Thread
NVM	Non-Volatile Memory
Object Dictionary	Definitions and descriptions of network visible objects of a device. There are various object dictionaries within a device. The dictionaries contain objects and their associated parameters which support the application in which they are contained.
Objects	Entities within the FBAP, such as blocks, alert objects, trend objects, parameters, display lists, etc.
P	Pressure
Pa	Measured static pressure in PV4 algorithm
Parameters	A value or variable which resides in block objects
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
PM	Process Manger
Pr	Reduced pressure
PID	Proportional Integral Derivative control. A standard control algorithm. Also, refers to a PID function block.
PSI	Pounds per Square Inch
PSIA	Pounds per Square Inch Absolute
Pu	Static pressure at upstream point
PV	Process Variable
PWA	Printed Wiring Assembly
PT	Process Temperature
RFI	Radio Frequency Interference
RTD	Resistance Temperature Detector
Stack	The software component that implement the Foundation Modbus communications protocol specifications, including FMS, FAS, DLL, SM and NM.

Status	A coded value that qualifies dynamic variables (parameters) in function blocks. This value is usually passed along with the value from block to block. Status is fully defined in the Modbus FBAP specifications.
STIM	Pressure Transmitter Interface Module
STIMV IOP	Pressure Transmitter Interface Multivariable Input / Output Processor
System Management	Provides services that coordinate the operation of various devices in a distributed Modbus system.
System Management Agent	Part of the device software that operates on system management objects.
System Management Information Base	A collection of objects and parameters comprising configuration and operational information used for control of system management operations.
SP	Static Pressure
TAC	Technical Assistance Center
Trim Point	A selected reference point at which a measurement is calibrated.
URL	Upper Range Limit
URV	Upper Range Value
US	Universal Station
Vac	Volts Alternating Current
Vdc	Volts Direct Current
Virtual Communication Reference	A defined communication endpoint. Modbus communications can primarily only take place along an active communications "path" that consists of two VCR endpoints.
Virtual Field Device	A logical grouping of "user layer" functions. Function blocks are grouped into a VFD, and system and network management are grouped into a VFD. For example, to establish communications between a transducer block and a function block, a VCR must be defined at the transducer block and a VCR must be defined at the function block.

Contents

Tables

Figures

1. Introduction

1.1 Overview

This section is an introduction to the physical and functional characteristics of Honeywell's family of SMV800 Modbus transmitters.

1.2 Features of the transmitter

The SMV800 SmartLine Multivariable transmitter type SMV800 Modbus supports standard Modbus RTU transmission mode with measurement capability of process variables: DP (Differential Pressure), SP (Static Pressure), PT (Process Temperature), Flow, Totalizer and MBT (Meter Body Temperature).

Table 1-1 lists the protocols, human interface (HMI), materials, approvals, and mounting bracket options for the SMV800 Modbus transmitter. The transmitter does support SmartLine advance diagnostics such as Process Variables monitoring, Tamper Alarm and Stress monitoring.

Table 1-1: Features and Options

Feature/Option	Standard/Available Options
Communication Protocols	Modbus standard RTU
Human-Machine Interface (HMI)	Advanced Digital Display: Advanced display languages: English, German, French, Italian, Spanish, Russian, Turkish, Chinese & Japanese
	Three-button programming (optional)
Calibration	Single, Dual and Triple Cal for PV1 (Differential Pressure) and PV2 (Static Pressure)
Integration Tools	Experion HS, Honeywell RTU2020
Mounting Brackets	Angle and Flat brackets in carbon Steel, 304SS and 316SS
Approvals (See SMV Transmitter Users manual, 34-SM-25-03 Appendix for details.)	FM, CSA, ATEX, IECEx, SAEx/CCoE, INMETRO, NEPSI, KOSHA, EAC and Explosion-proof options

1.2.1. Tamper Functionality

When the write protection is enabled, if any unauthorized person tries to change the device configuration, then "Tamper counter" gets incremented and if it crosses the "Maximum number of tamper attempts" then Tamper alarm warning is triggered

1.2.2. Advanced Diagnostics

1.2.2.1. Error Log

Error Log feature provides information related to relative time stamp of errors/faults detected by device. The device can store last 10 errors occurred when error log feature is enabled. There is also provision to reset error log to capture the new errors. We can read the error log information and the elapsed time since the error occurred from host application.

1.2.2.2. Configuration Change History

The feature provides history for parameters configuration change.
For example, if Differential Pressure damping is modified from 2.0 to 3.0 then using configuration history user can find that previous value of DP damping is 2.0.

Device can hold history for last 5 configured parameters data.

1.2.3. Physical Characteristics

As shown in Figure 1-1, the SMV800 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 1-1 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, all of which are described in the SMV Transmitter Users Manual, see *References*

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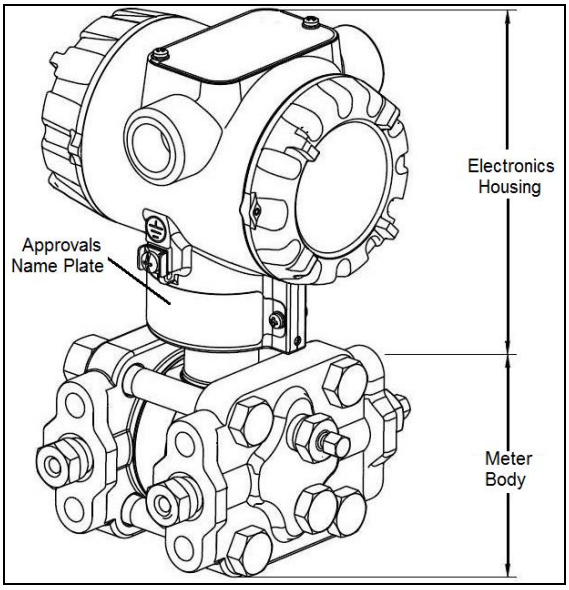


Figure 1-1: SMV800 Major Assemblies

1.2.4. Functional Characteristics

The SMV800 Modbus transmitter supports standard Modbus RTU transmission mode with configurable serial communication parameters such as baud rate and parity.

The SMV800 Modbus transmitter measures Differential Pressure, Static Pressure

(Absolute or Gauge), and Process Temperature. The SMV800 measures Process Temperature from an external RTD or Thermocouple.These measurements are used to calculate volumetric or mass flow rates and Totalizer. The measured values and calculated flow may be read by a connected Host. Support of temperature sensing using Thermocouple and computation of volumetric flow are separate software optional features.

An optional 3-button assembly is available to set up and configure the transmitter via the Advanced Digital Display. In addition, a Honeywell SMV Modbus PC based application is available for configuration of transmitter parameters.

1.3 SMV800 Transmitter Name Plate

The transmitter nameplate mounted on the bottom of the electronics housing (see Figure 1-1) lists certifications. The model number, physical configuration, electronic options, accessories are located on the Product I.D. nameplate (see Figure 1-2).

Figure 1-2 is an example of a SMV800 for the name plate information. The model number format consists of a Key Number with several table selections.

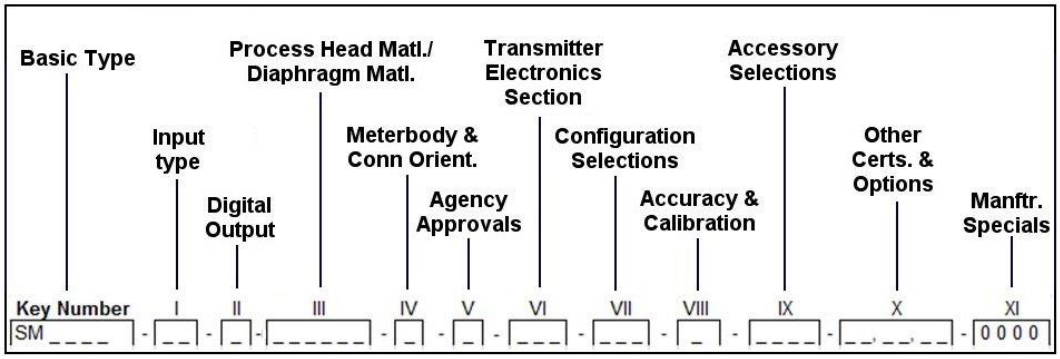


Figure 1-2: Typical SMV800 Name Plate

E.g. SMA810, SMA845 or SMG870

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 measurement types for the Static Pressure:

- A = Absolute Pressure
- G = Gauge Pressure

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

2. Configuration

2.1 Software installation and setup

2.1.1. System requirements

The purpose of this document is to describe the installation of the "SmartLine Modbus Manager", a PC based application used to configure SMV Modbus transmitter

The Following are the minimum system requirements to install the Modbus Host:

Microsoft® Windows™ Operating System (32- bit or 64-bit) as given below.

- Windows 7
- Windows 8.1
- Windows 10
- Windows server 2012
- Windows Server 2016
- Recommended to use Isolated USB-RS485 modem hardware and it's driver for USB modem option
- Proper Execution of host requires a standard PC with at least following resources:
  - 1 gigahertz (GHz) or faster 32-bit (x86) or 64-bit (x64) processor
  - 1 gigabyte (GB) RAM (32-bit) or 2 GB RAM (64-bit)
  - Screen Resolution at least 1280x1024, 1280x960, 1280x800 pixels

2.1.2. Hard Disk Space:

The Modbus Host requires minimum 250MB Hard Disk space.

2.1.3. Downloads

Download: Honeywell PC based Modbus Host application " SmartLine Modbus Manager" from HPS websites given below

https://www.honeywellprocess.com/all-downloads.aspx

and

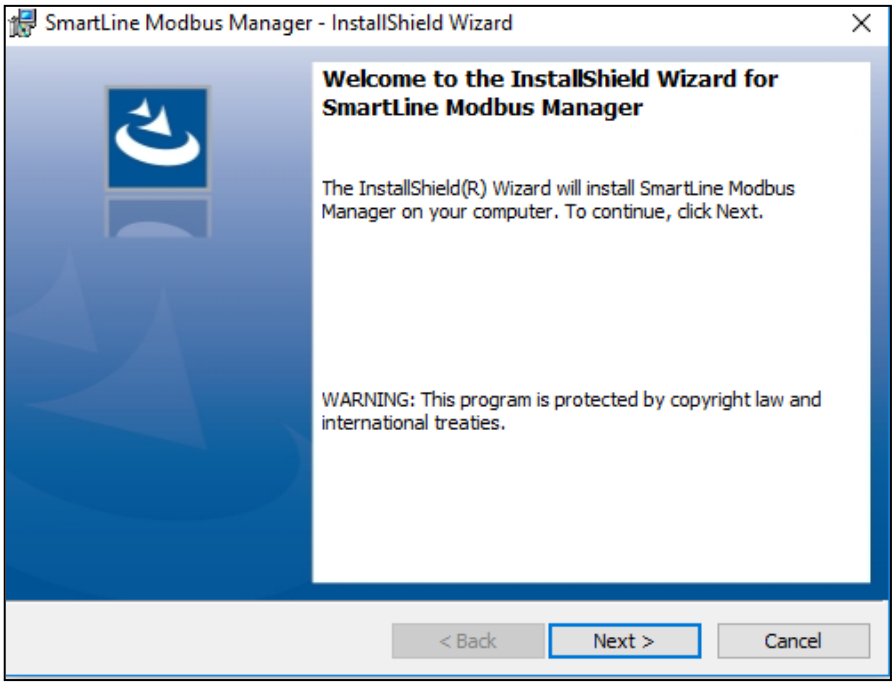
https://www.honeywellprocess.com/smartline-smv800-multivariable-transmitter.aspx

2.1.4. Installing

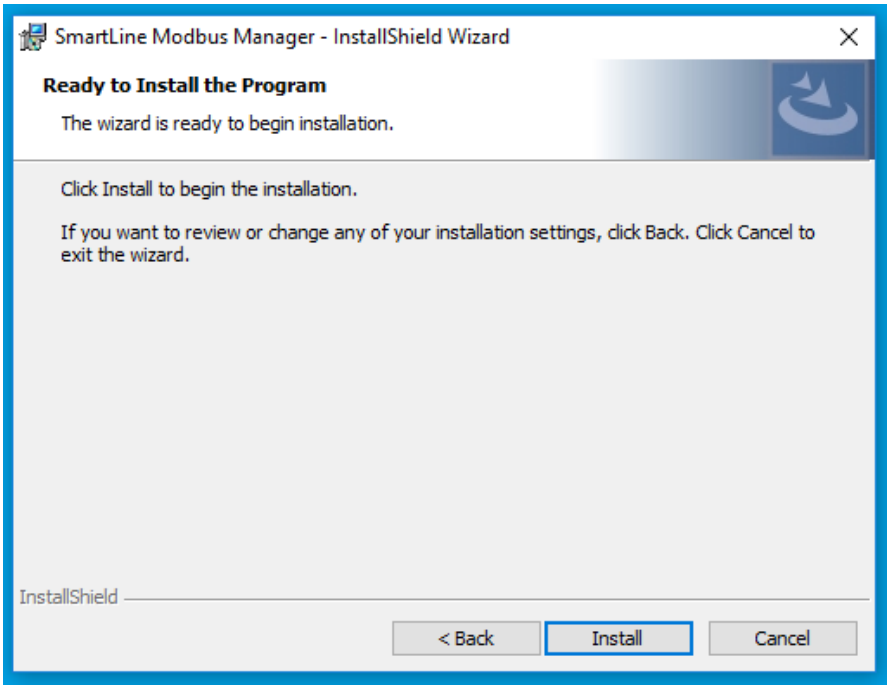
Extract the installation package to your local disk. Structure and Files are like the below image.

1. Double Click on the SmartLine Modbus Manager.exe file, follow the instruction to install the Host application.

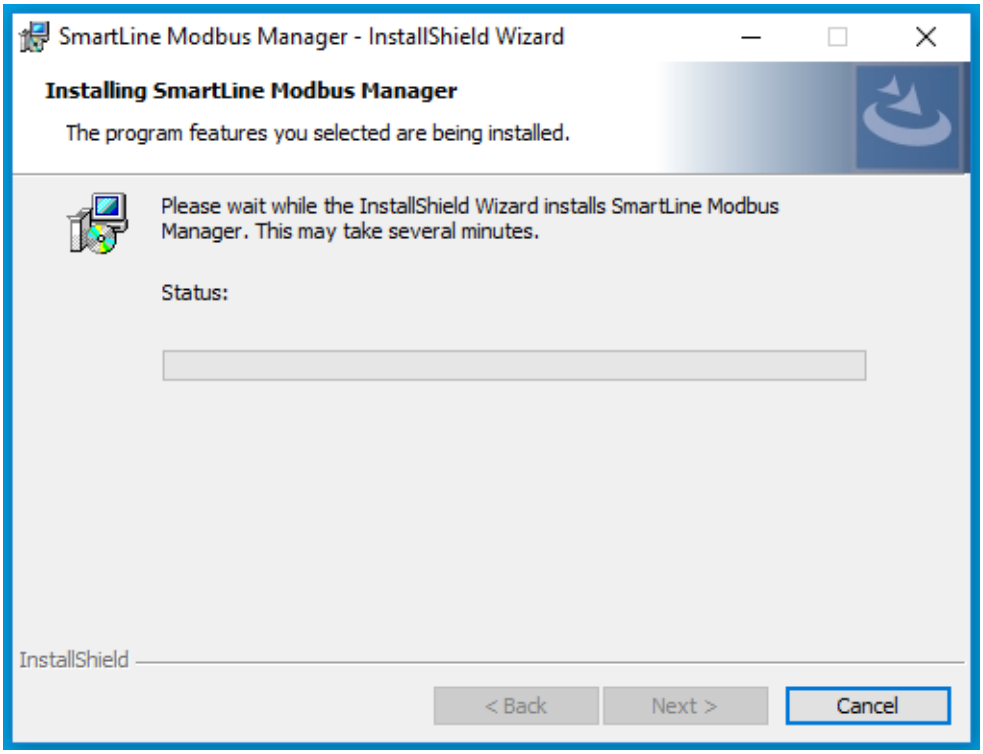
2. InstallShield Wizard will appear click on Next button.



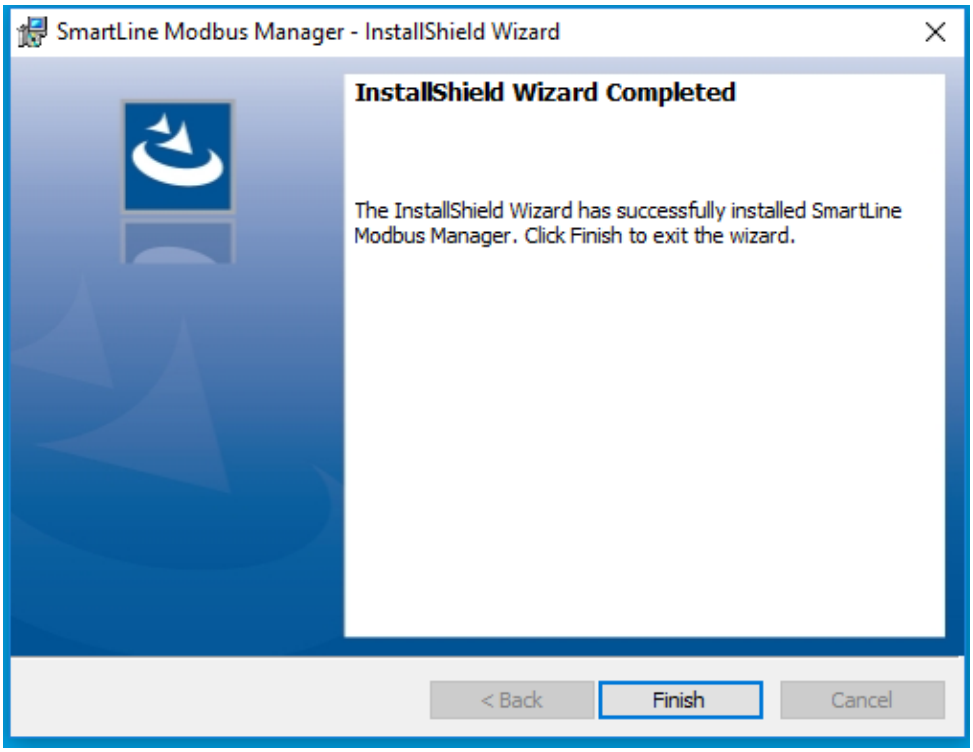
3. Ready to Install the program screen will appear, click on Install button.



4. Installing the Modbus SMV Host screen will appear.

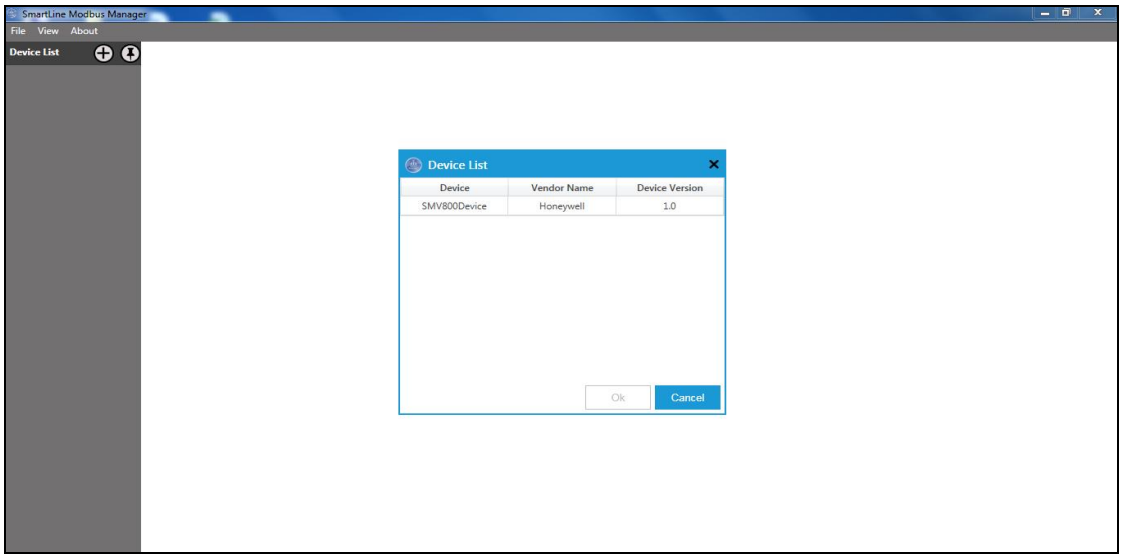


5. Installation finished screen will appear, click on Finish button.

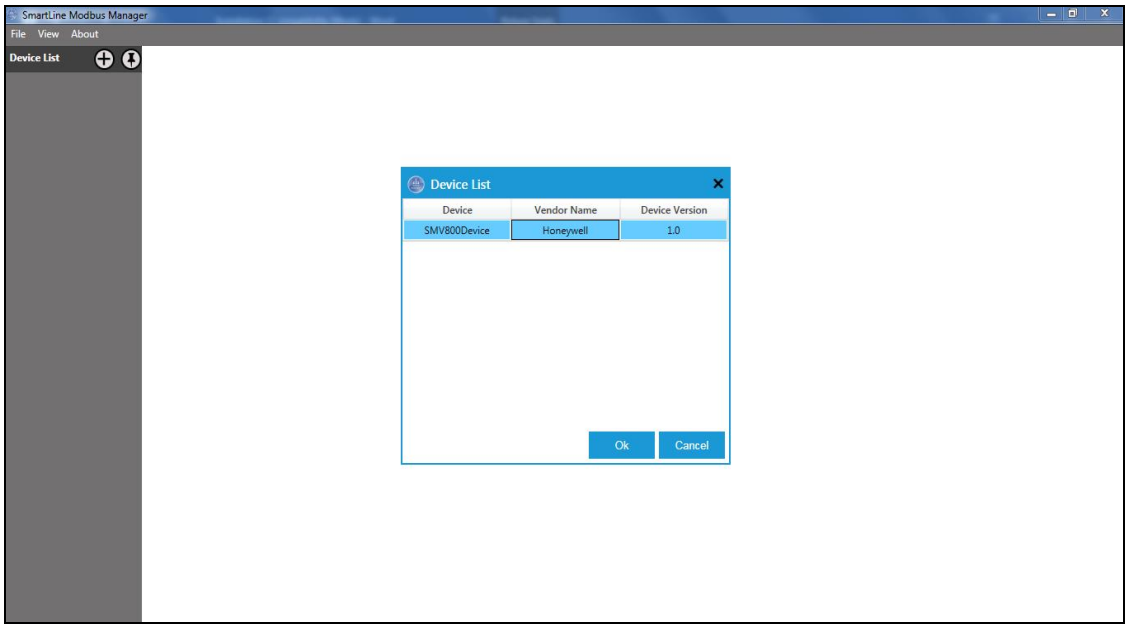


2.1.5. Getting started

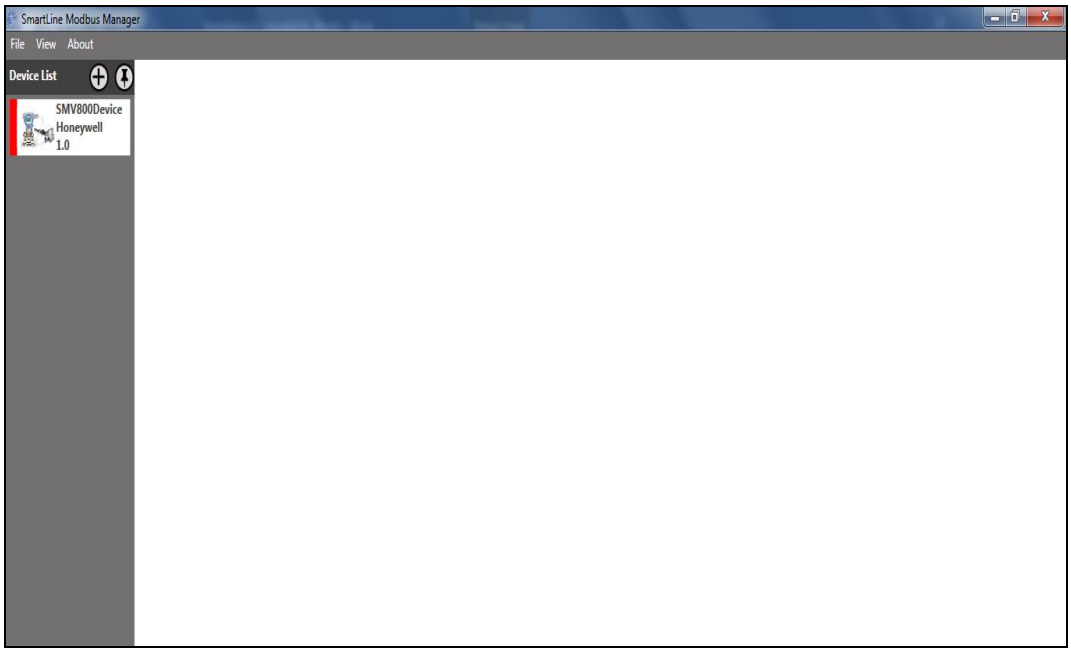
1. Connect the device to power supply,
2. Connect the RS485 modem to device RS485 terminals and other end to COM Port System on which Modbus Manager application is installed.
3. Run “SmartLine Modbus Manager” Host.
4. Now Add the Device by clicking on Add Device (plus) button.



5. Device List window will appear to add the device, click on the particular Device (Ex: SMV800 Device).



6. Click on Ok button, user can see the below offline screen, status will be in Red color, as the device is not connected.

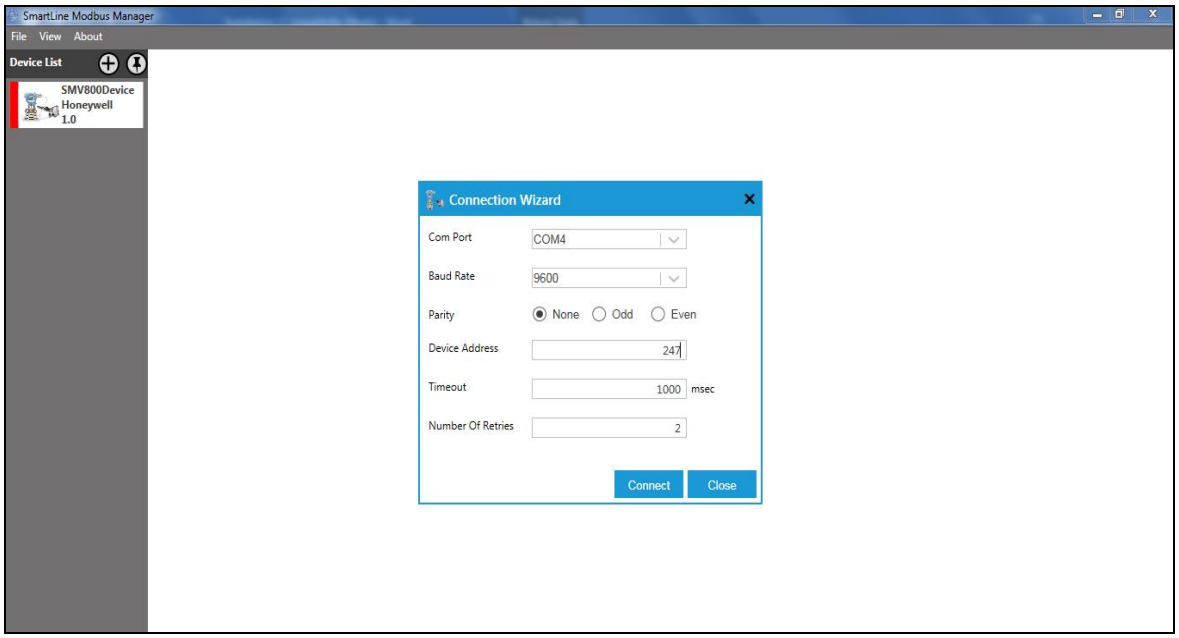


7. Right click on the device using which the user wants to connect and click on Connect manually.
8. Connection Wizard will appear.

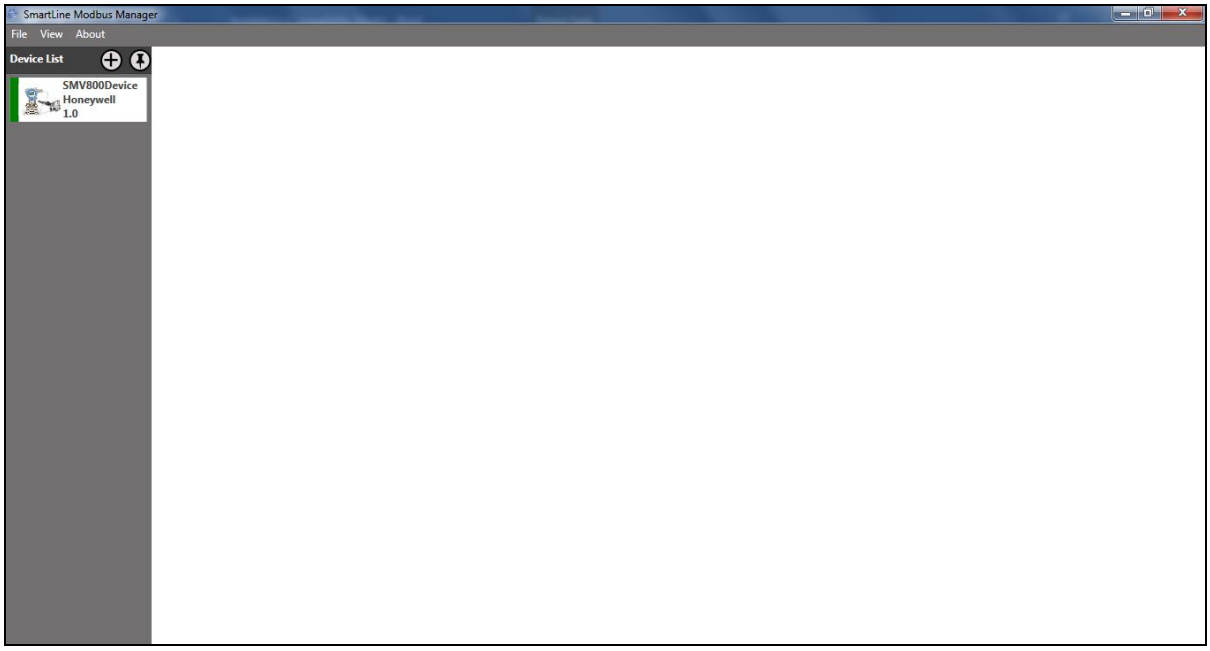
2.1.6. Launching the configuration process

This section outlines how to configure the transmitter using the Modbus Host.

1. Enter corresponding device COM Port, Baud Rate, Parity, Address, Timeouts, Number of Retries and click on **Connect**.

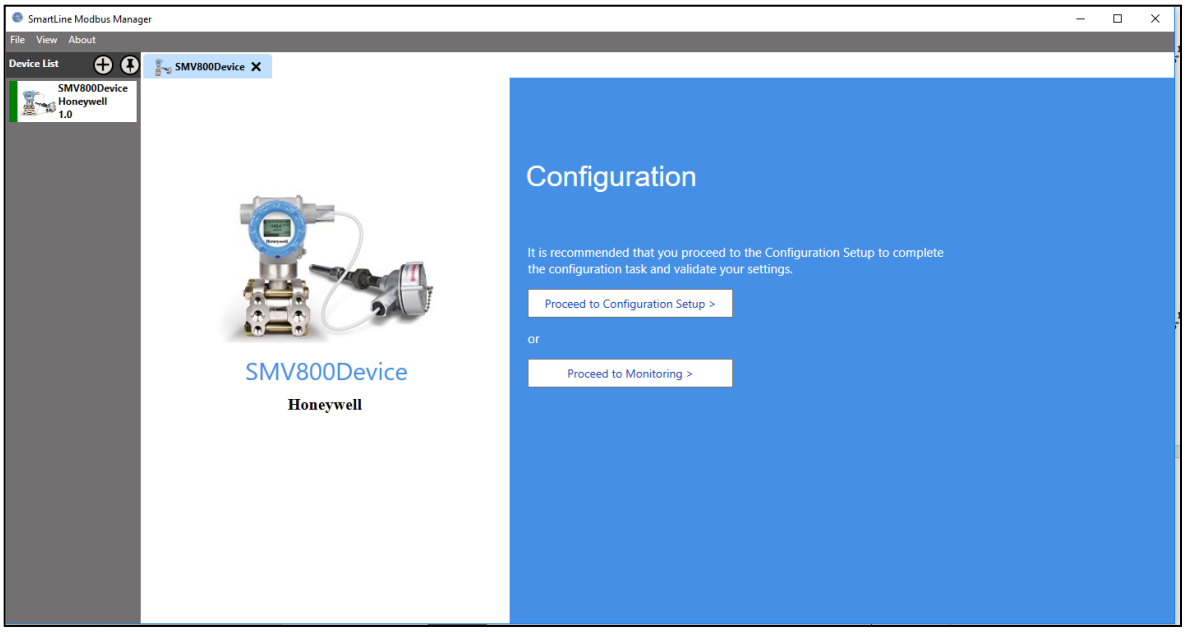


2. User can see the status in green color, after having the successful connection of the device.



3. Double click on the connected device.

4. User can see the Configuration page, click on Proceed to Monitoring for viewing the Process Values. For configuration changes and review of configuration click on “Proceed to Configuration Setup”.

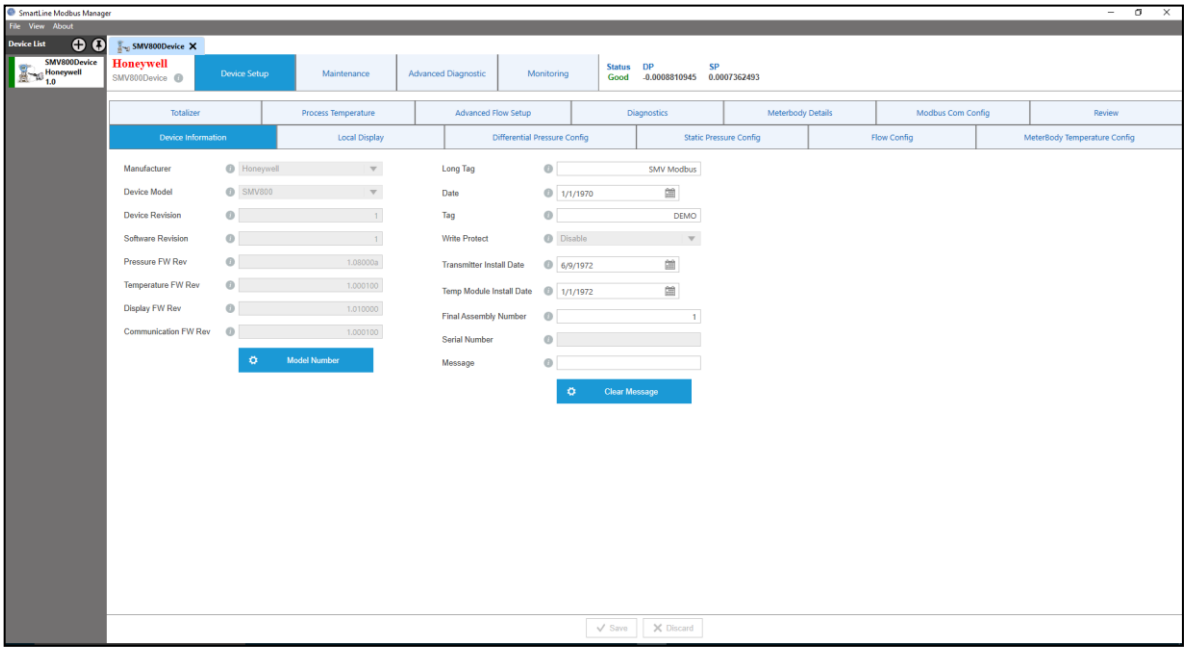


2.2

2.3 Device Setup

2.3.1. Device information

This tab provides the detail information about the device.

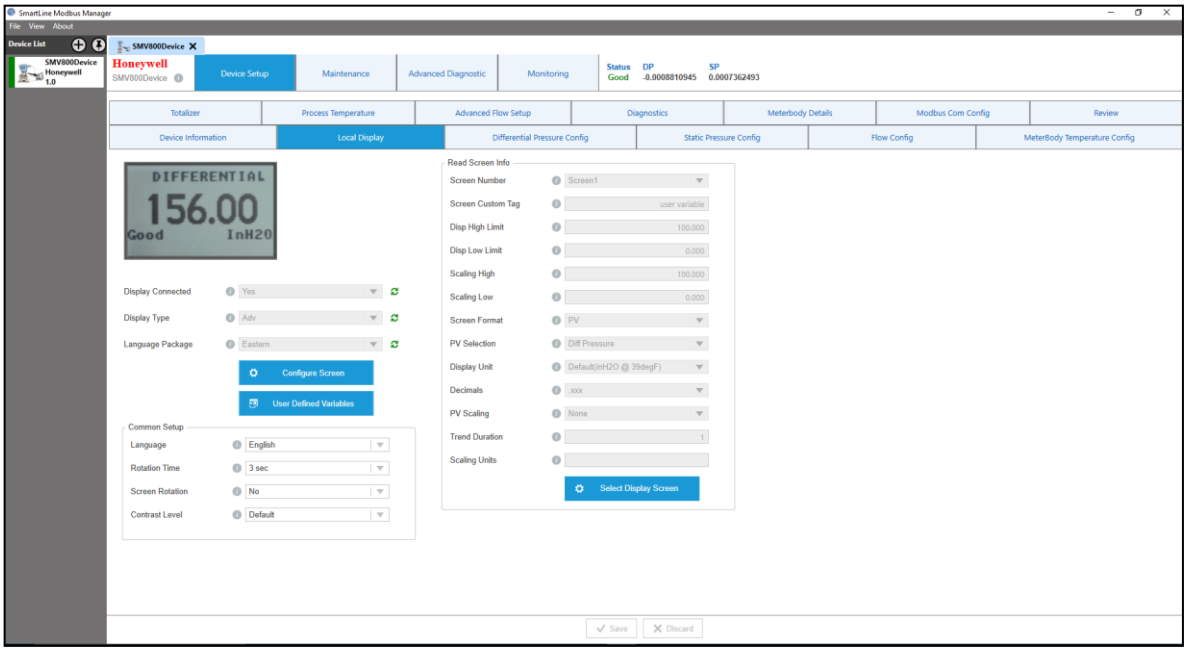


Refer to the below table for Device Information:

Key: Plain = Read only **Bold** = Configurable	**Bold underline** = Method ***Bold italic*** = Table or graph
Manufacturer	Honeywell
Device Model	Displays Model or Device Type of SMV800 Transmitter
Device Revision	Displays Field Device Revision of the SMV800 Transmitter
Software Rev	Software revision
Pressure FW Rev	Pressure Sensor Board Firmware Version
Temperature FW Rev	Temperature Sensor Board Firmware Version
Display FW Rev	Display Board Firmware Version
Communication FW Rev	Communication board Firmware Version
Model Number	Displays the model number of the device
Long Tag	Enter Tag ID name up to 32 characters
Date	Gregorian calendar date that is stored in the Field Device. This date can be used by the user in any way.
Tag	Enter Tag ID name up to 8 characters
Write Protect	Indicates the current state of the device write protect option as enabled (yes) or disabled (no)
Transmitter Install Date	(One time editable) Transmitter installation date in MM/DD/YYYY format. Note : If install date is not present then it will show default install date as 01/01/1978
Temp Module Install Date	(One time editable) Temperature Module installation date in MM/DD/YYYY format. Note: If install date is not present then it will show default install date as 01/01/1978
Final Assembly Number	Used for identifying electronic components. This number can be used by the user in any way.
Serial Number	Shows serial number of the device.
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.
Clear Message	Select to clear message from transmitter's local display.

2.3.2. Local Display:

This tab provides the detail information about the local display.



Refer the below table for Local Display Configuration:

Local display parameters

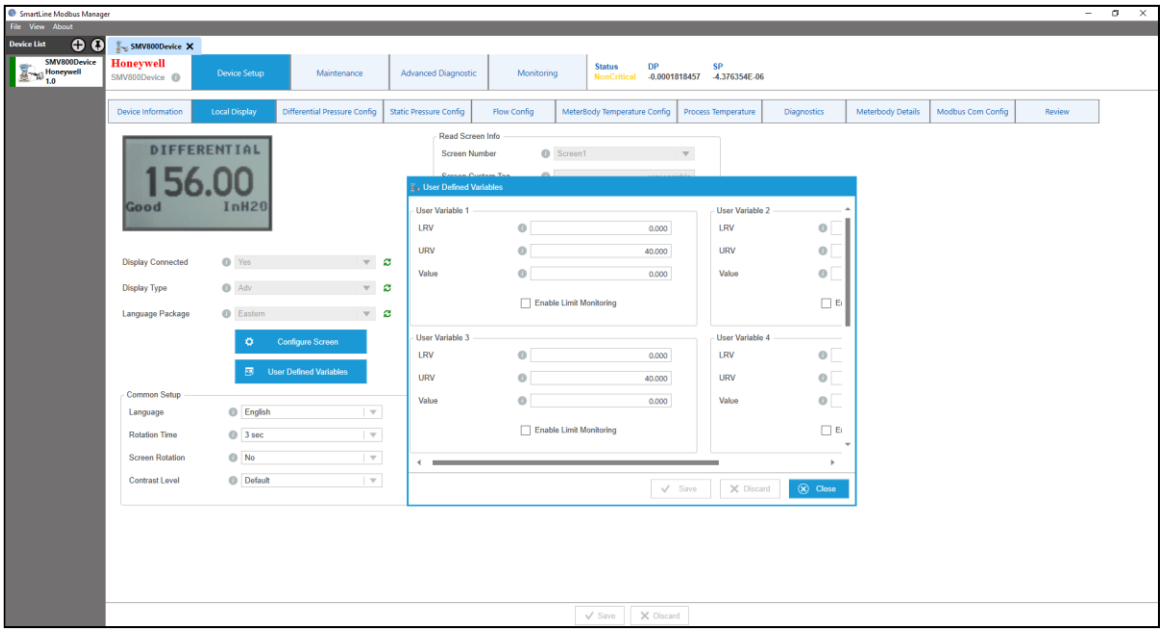
Display Setup Parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Display Connected		Identifies whether a Display is connected to the device
Display Type		Identifies the type of Display connected to the device (only Advanced Display is available for SMV devices)
Language Package		Identifies the language package selected as Eastern or Western
Common Setup	**Language**	Select the desired language to be used for the Display.
	Rotation Time	Select the desired time delay for switching between configured screens (3 to 30 seconds)
	Screen Rotation	Select to enable or disable screen rotation.
	Contrast Level	Select the level of contrast for the Display (default = 5, or select levels 1(low) to 9 (high))

Screen Configuration	**Configure Screen**	Select the screen to be configured: □ Screen 1 to 8 Select the screen format: □ None □ PV □ PV & bar graph □ PV & trend Enter high and low limits for trend or ba rgraph, if PV & trend or PV & bar graph were selected for screen format Enter trend duration from 1 to 24 hours if PV & trend was selected for screen format Enter the PV selected for this screen: □ Differential Pressure □ Static Pressure □ Process Temperature □ Flow □ Meter Body Temperature □ Sensor Resistance □ Totalizer □ User Variable 1 to 8 Enter the selection for PV scaling (note: available selections are dependent on PV selection): □ None □ Convert Units □ Linear (for custom units) Enter the high and low scaling values if Linear PV scaling was selected. Select the new engineering unit if Convert Units PV Scaling was selected. Select number of decimal places desired for the PV selected (1,2, or 3 decimal places) Enter a custom tag for the display screen up to 14 characters if desired. If no custom tag is entered, a default tag consistent with the PV selection will be used.

User Defined Variable (User Variable 1 to 8)	**LRV**	Configure the user defined variable 1 to 8
	URV	
	Value	
	Enable Limit Monitoring	
Read Screen Info	**Select Display Screen**	Select a Display screen from 1 to 8. The configuration information for the selected screen will then be updated in the menu.
	Screen Number	Screen Number selected in the method above. All other parameters shown in this menu pertain to the selected screen.
	Screen Custom Tag	The custom tag configured for this Screen Number
	Disp High Limit	The value configured as the Display High Limit for trending or bar graph
	Disp Low Limit	The value configured as the Display Low Limit for trending or bar graph
	Scaling High	The value configured as the Scaling High Limit for PV Scaling selections of linear.
	Scaling Low	The value configured as the Scaling Low Limit for PV Scaling selections of linear.
	Scaling Units	The text configured to be displayed for custom Units
	Screen Format	The configured selection for the PV Screen Format
	PV Selection	The PV Selection for this screen
	Display Units	The PV units selected for this screen
	Decimals	The selection for number of decimal places for the PV displayed by this screen
	PV Scaling	The PV Scaling selection for this screen
	Trend Duration	The trend duration selected for this screen if PV & trend was configured for screen format.

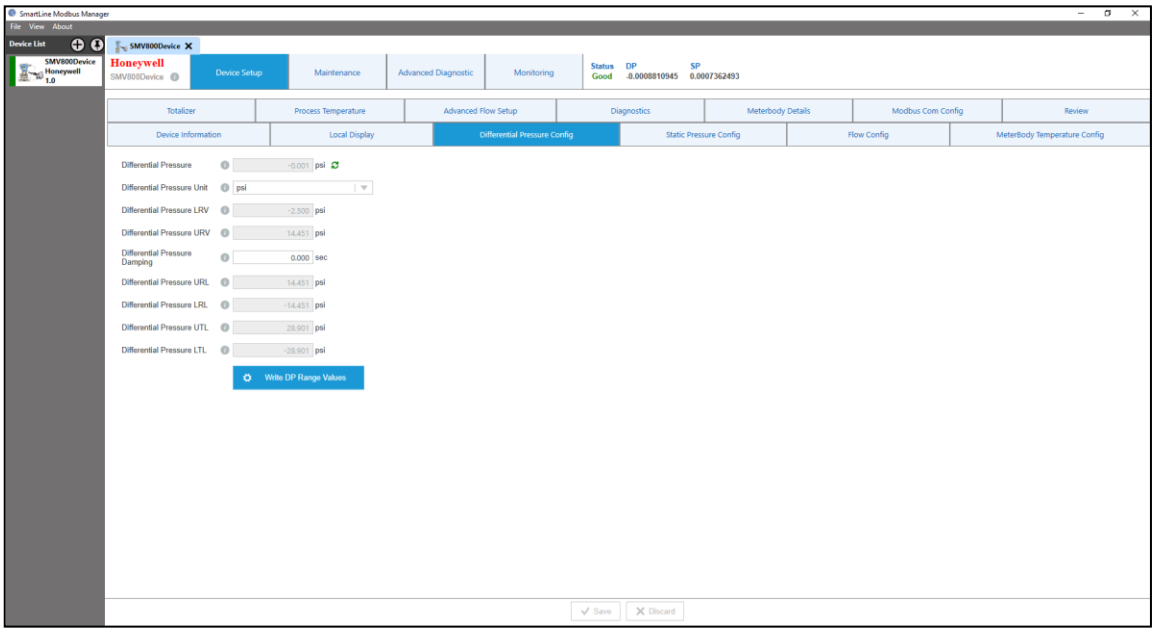
User defined Variables are provided for user, where the value written (either from flow computer or RTU) is displayed on local display based on screen configuration. Custom units configuration is available in screen configuration for user variables.

If the Enable Limit Monitoring is checked then the value written to device is compared against configured LRV,URV associated for each user variable and if value is out of limits then status is shown as bad in display screen.



2.3.3. Differential Pressure Configuration

This tab provides the detail information about the Diffrential Pressure parameters.



Refer the below table for Diffrentail Pressure Configuration:

Differential Pressure parameters

Display Setup Parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Diff. Pressure Config		
Differential Pressure		The current value of the Differential Pressure input
Diffrential Pressure Unit	• inH2O (68 ^{O}F) • inHg (0^{O}C) • ftH2O (68^{O}F) • mmH2O (68^{O}F) • mmHg (0^{O}C) • psi • bar • mbar • g/cm2 • kg/cm2 • Pa • kPa • Torr • Atm • inH2O@60^{O}F • MPa • inH2O@4^{O}C (39.2 ^{O}F mmH2O@4^{O}C	The user selected engineering unit for the Differential Pressure input
Differential Pressure LRV		The Lower Range Value for the Differential Pressure input (which represents 0% output) in user selected engineering units. This value may be configured to any value within the range DP LTL to DP UTL
Differential Pressure URV		The Upper Range Value for the Differential Pressure input (which represents 100% output) in user selected engineering units. This value may be configured to any value within the range DP LTL to DP UTL
Differential Pressure Damping		Damping value for the Differential Pressure output. Entries may be any value from 0.00 to 32.00
Differential Pressure URL		The Upper Range Limit for the Differential Pressure input
Differential Pressure LRL		The Lower Range Limit for the Differential Pressure input
Differential Pressure UTL		The Upper Transducer Limit for the Differential Pressure input
Differential Pressure LTL		The Lower Transducer Limit for the Differential Pressure input
Write DP Range Values	• **DP LRV** • **DP URV**	Write a new Lower Range Value and Upper Range Value for the Differential

Engineering Units

The Differential Pressure Config tab displays the Lower Range Value (LRV), Low Range Limit (LRL), Upper Range Value (URV) and Upper Range Limit (URL) for DP in the unit of measure selected in the Engineering Units field "**Diffrential Pressure Unit"**.

DP Engineering Units

Select one of the preprogrammed engineering units in Table 2-1 for display of the DP measurement.

Table 2-1: Pre-programmed Engineering Units for DP

Engineering Unit	Meaning
inH2O @ 39F d	Inches of Water at 39.2 °F (4 °C)
inH2O @ 68F	Inches of Water at 68 °F (20 °C)
mmHg @ 0C	Millimeters of Mercury at 0°C (32 °F)
psi	Pounds per Square Inch
kPa	Kilopascals
M Pa	Megapascals
mbar	Millibar
bar	Bar
g/cm^2	Grams per Square Centimeter
Kg/cm^2	Kilograms per Square Centimeter
inHg @ 32F	Inches of Mercury at 32 °F (0 °C)
mmH2O @ 4C	Millimeters of Water at 4°C (39.2 °F)
mH2O @ 4C	Meters of Water at 4 °C (39.2 °F)
ATM	Normal Atmospheres
inH2O @ 60F	Inches of Water at 60 °F (15.6 °C)

LRV and URV

The Lower Range Value and the Upper Range Value fields for DP are found on the Differential Pressure Config tab.

DP Range Values

Configure LRV and URV outputs for the differential pressure input.

- LRV = Enter the desired lower range value
- URV = Enter the desired upper range value

(default = 100 inH2O@39.2 °F for SMV models SMA845 and SMG870)

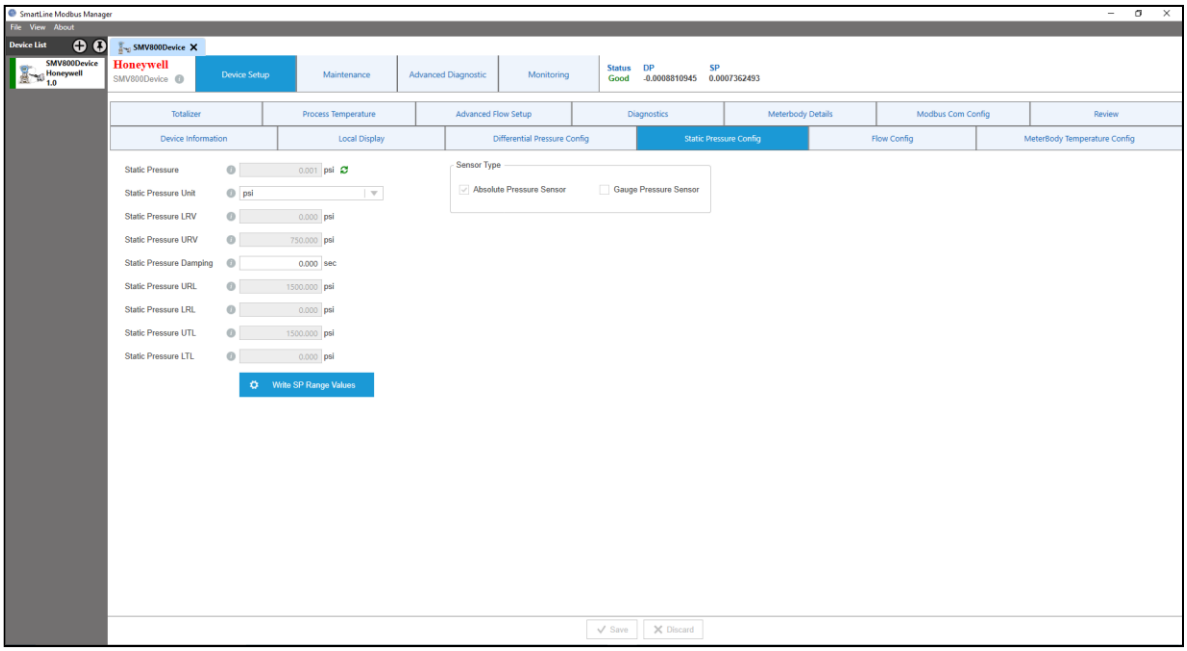
(default = 10 inH2O@39.2 °F for SMV models SMA810)

Damping

Adjust the damping time constant for Differential Pressure to reduce the output noise. Default value of damping is 0.5 seconds.

2.3.4. Static Pressure Configuration

This tab provides the detail information about the Static Pressure parameters.



Refer the below table for Static Pressure Configuration:

Static Pressure Configuration parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Static Pressure Config		
Static Pressure		The current value of the Static Pressure input
Static Pressure Unit	inH2O (68 ^{O}F) inHg (0^{O}C) ftH2O (68^{O}F) mmH2O (68^{O}F) mmHg (0^{O}C) psi bar mbar g/cm2 kg/cm2 Pa kPa Torr Atm inH2O@60^{O}F MPa inH2O@4^{O}C (39.2 ^{O}F mmH2O@4^{O}C (39.2^{O}F)	The user selected engineering unit for the Static Pressure input

Static Pressure LRV		The Lower Range Value for the Static Pressure input (which represents 0% output) in user selected engineering units. This value may be configured to any value within the range SP LTL to SP UTL.
Static Pressure URV		The Upper Range Value for the Static Pressure input (which represents 100% output) in user selected engineering units. This value may be configured to any value within the range SP LTL to SP UTL.
Static Pressure Damping		Damping value for the Static Pressure output. Entries may be any value from 0.00 to 32.00 seconds.
Static Pressure URL		The Upper Range Limit for the Static Pressure input
Static Pressure LRL		The Lower Range Limit for the Static Pressure input
Static Pressure UTL		The Upper Transducer Limit for the Static Pressure input
Static Pressure LTL		The Lower Transducer Limit for the Static Pressure input
Write SP Range Values	**SP LRV** **SP URV**	Write a new Lower Range Value and Upper Range Value for the Static Pressure
Sensor Type		Shows type of pressure sensor. Absolute Pressure Sensor and Gauge Pressure sensor

SP Engineering Units

The Static Pressure Config tab displays the Lower Range Value (LRV), Lower Range Limit (LRL), Upper Range Value (URV) and Upper Range Limit (URL) for SP in the unit of measure selected in the Engineering Units field.

Table 2-2: Pre-programmed Engineering Units for SP*

Engineering Unit	Meaning
inH2O @ 39F	Inches of Water at 39.2 °F (4 °C)
inH2O @ 68F	Inches of Water at 68 °F (20 °C)
mmHg @ 0C	Millimeters of Mercury at 0°C (32 °F)
psi d	Pounds per Square Inch
kPa	Kilopascals
M Pa	Megapascals
mbar	Millibar
Bar	Bar
g/cm^2	Grams per Square Centimeter
Kg/cm^2	Kilograms per Square Centimeter
inHg @ 32F	Inches of Mercury at 32 °F (0 °C)
mmH2O @ 4C	Millimeters of Water at 4°C (39.2 °F)
mH2O @ 4C	Meters of Water at 4 °C (39.2 °F)
ATM	Normal Atmospheres
inH2O @ 60F	Inches of Water at 60 °F (15.6 °C)

* Static pressure may be absolute or gauge pressure, depending on the SMV model type.

NOTE: Depending on the SMV transmitter model type, SP will measure static pressure in either absolute or gauge values.

SMV Models - SMA810 and SMA845 SP —Absolute Pressure

-SMG870 SP —Gauge Pressure

SP Engineering Units. Select one of the preprogrammed engineering units in Table 2-2 for display of the SP measurements.

Background

Internally, the SMV transmitter uses absolute pressure values for all flow calculations. The value entered in the Atmospheric Offset field is added to the gauge pressure input value to approximate the absolute pressure.

An inaccurate atmospheric pressure offset value will result in a small error of the flow calculation.

Use an absolute pressure gauge to measure the correct atmospheric pressure. A standard barometer may not give an accurate absolute pressure reading. **SP (AP/GP or SP) Range Values (LRV and URV)**

The Lower Range Value and the Upper Range Value fields for SP are found on the Static Pressure Config tab.

Set the LRV (which is the process input for 0% output) and URV (which is the process input for 100% output) for the static pressure input.

- LRV, Enter the lower range value (default value is 0.0)
- URV, Enter the upper range value

default values for URV based on model are:

50 psia for model SMA810750 psia for model SMA845,
3000 psig for model SMG870

NOTE: Static pressure may be absolute or gauge pressure, depending on the model SMV800 you have selected.

ATTENTION: The range for static pressure is (as measured at the high-pressure port of the meter body).

The range for static pressure is (as measured at the high-pressure port of the meter body).

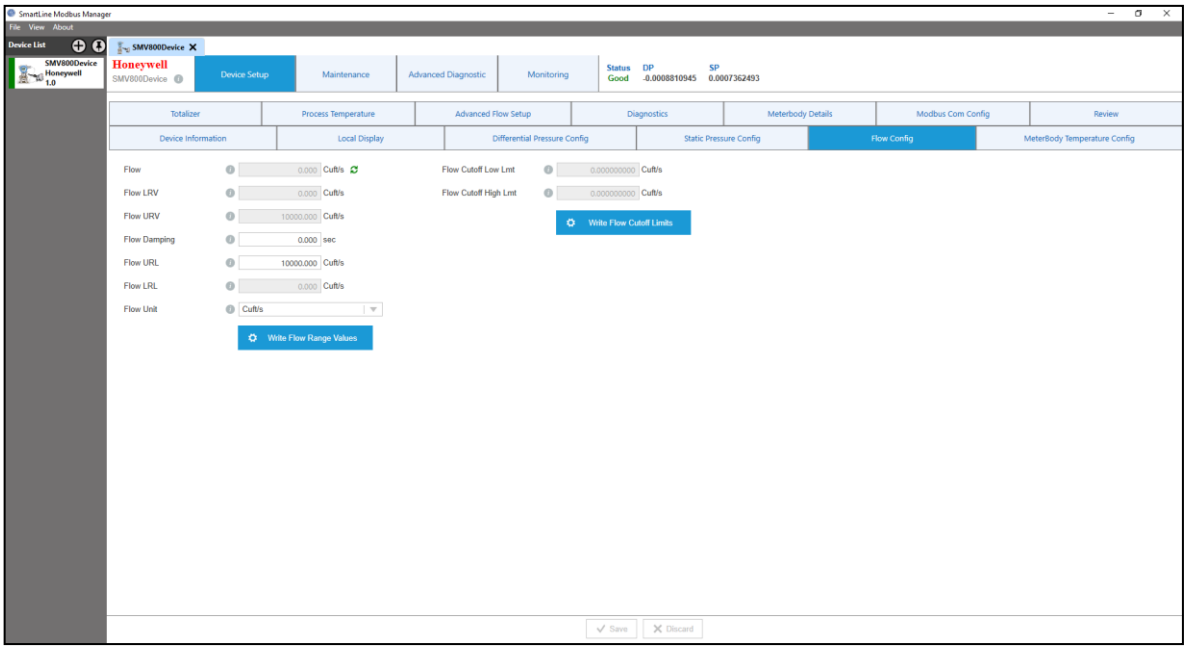
- The URV changes automatically to compensate for any changes in the LRV and maintain the present span (URV – LRV).
- If you must change both the LRV and URV, always change LRV first.

Damping

Adjust the damping time constant for Static Pressure to reduce the output noise. Default value of damping is 0.5 seconds.

2.3.5. Flow Configuration

This tab provides the detail information about the Flow parameters.



Refer the below table for Flow Configuration:

Flow Configuration parameters		
Key: Plain = Read only Bold = Configurable Bold underline = Method Bold italic = Table or graph		
Flow Config		
Flow		The current value of the calculated Flow
Flow LRV		The Lower Range Value for the Flow input (which represents 0% output) in user selected engineering units. This value may be configured to any value within the range Flow LTL to Flow UTL.
Flow URV		The Upper Range Value for the Flow input (which represents 100% output) in user selected engineering units. This value may be configured to any value within the range Flow LTL to Flow UTL.
Flow Damping		Damping value for the Flow output. Entries may be any value from 0.00 to 32.00 seconds. The upper limit for Flow damping is 100.
Flow URL		The Upper Range Limit for the Flow input (editable)
Flow LRL		The Lower Range Limit for the Flow input

Flow Unit	See Table 2-3 and Table 2-4 for Mass Flow and Volume Flow units	Allows configuring Flow unit. All the units are self-Explanatory. Custom Unit: When this unit is selected, Tools will populate Flow Custom Tag Flow Base Unit : Base unit is unit from which custom unit is derived Flow Conver. Factor: Enter a numeric value that represents the number of base units per one custom unit. Example: Flow Custom Tag: MyNewUnit Flow Base Unit: g/sec Flow Conver Factor: 0.5 (means 0.5 g/sec = 1 Custom Unit) Flow Rate = 50 g/sec Flow Rate in “MyNewUnit” will be = (50/0.5) MyNewUnit
Write Flow Range values	**Flow LRV** **Flow URV**	Write a new Lower Range Value and Upper Range Value for the Flow input. Flow can be ranged anywhere between –URL to +URL so that the span is <= URL (i.e.,URV – LRV should be <= URL)
Flow Cutoff Low Lmt		The lower value for Low Flow cutoff. When the flow drops below this value, the flow output will be forced to 0%.
Flow Cutoff High Lmt		The upper value for Low Flow cutoff. The flow will not exit the low flow cutoff state (0% flow) until the flow exceeds this value.
Write Flow CutoffLimits	**Flow Cutoff Lo Lmt** **Flow Cutoff Hi Lmt**	Allows the user to configure new values for the low and high cutoff limits for the Low Flow Cutoff option

Engineering Units

The Flow Config tab displays the Lower Range Value (LRV), Lower Range Limit (LRL), Upper Range Value (URV) and Upper Range Limit (URL) for Flow in the unit of measure selected in the Engineering Units field "**Flow Unit"**.

Flow Engineering Units

Select one of the preprogrammed engineering units for display of the flow measurements, depending upon type of flow measurement configuration. Table 2-3 lists the pre-programmed engineering units for volumetric flow and Table 2-4 lists the engineering units for mass flow.

Table 2-3: Pre-programmed Volumetric Flow Engineering Units for Flow

Engineering Unit	Meaning
M^3/h^d	Cubic Meters per Hour
gal/h	Gallons per Hour
l/h	Liters per Hour
cc/h	Cubic Centimeters per Hour
m^3/min	Cubic Meters per Minute
gal/min	Gallons per Minute
l/min	Liters per Minute
cc/min	Cubic Centimeters per Minute
m^3/day	Cubic Meters per Day
gal/day	Gallons per Day
Kgal/day	Kilogallons per Day
bbl/day	Barrels per Day
m^3/sec	Cubic Meters per Second
CFM	Cubic Feet per Minute
CFH	Cubic Feet per Hour

Table 2-4: Pre-programmed Mass Flow Engineering Units for Flow

Engineering Unit	Meaning
Kg/sec	Kilograms per Second
Kg/min	Kilograms per minute
Kg/h	Kilograms per Hour
lb/min	Pounds per Minute
lb/h	Pounds per Hour
lb/sec	Pounds per Second
t/h^d	Tonnes per Hour (Metric Tons)
t/min	Tonnes per Minute (Metric Tons)
t/sec	Tonnes per Second (Metric Tons)
g/h	Grams per Hour

g/min	Grams per Minute
g/sec	Grams per Second
ton/h	Tons per Hour (Short Tons)
ton/min	Tons per Minute (Short Tons)
ton/sec	Tons per Second (Short Tons)

Flow Upper Range Limit (URL) and Range Values (LRV and URV)

Set the URL, LRV, and URV for calculated flow rate output by typing in the desired values on the Flow Config tab.

- URL = Type in the maximum range limit that is applicable for your process conditions. (100,000 = default)
- LRV = Type in the desired value (default = 0.0)
- URV = Type in the desired value (default = URL)

ATTENTION: Be sure that you set the Flow Upper Range Limit (URL) to desired value before you set Flow range values. We suggest that you set the Flow URL to equal two times the maximum flow rate (2 x URV)

About URL and LRL

The Lower Range Limit (LRL) and Upper Range Limit (URL) identify the minimum and maximum flow rates for the given Flow calculation. The LRL is fixed at zero to represent a no flow condition. The URL, like the URV, depends on the calculated rate of flow that includes a scaling factor as well as pressure and/or temperature compensation. It is expressed as the maximum flow rate in the selected volumetric or mass flow engineering units.

About LRV and URV

The LRV and URV set the desired zero and span points for your calculated measurement range as shown in the example in Figure 2-1.

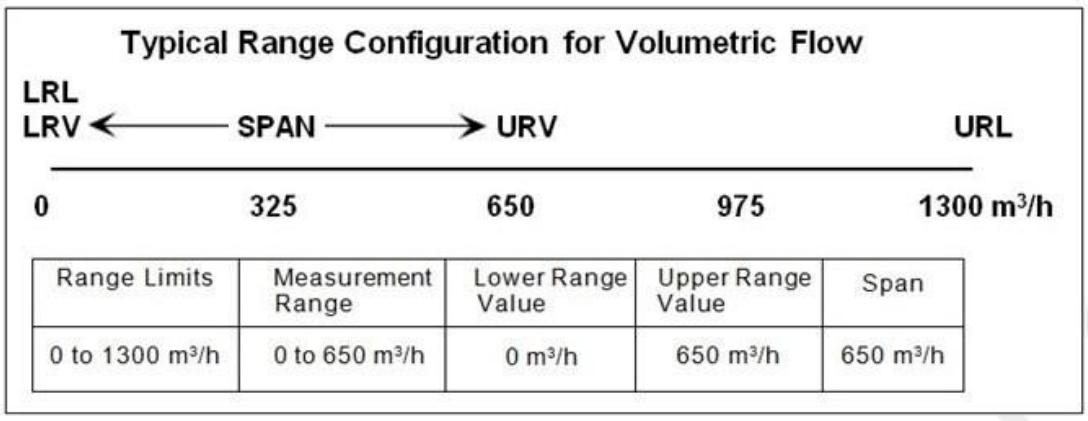


Figure 2-1: Typical Volumetric Flow Range Setting Values

ATTENTION:

- The default engineering units for volumetric flow rate is cubic feets per seconds and pound is the default engineering units for mass flow rate.
- The URV changes automatically to compensate for any changes in the LRV and maintain the present span (URV – LRV).
- If you must change both the LRV and URV, always change the LRV first.

Damping

Adjust the damping time constant for flow measurement to reduce the output noise. We suggest that you set the damping to the smallest value that is reasonable for the process.

The damping values (in seconds) for flow are:

0.00[d], 0.5, 1.0, 2.0, 3.0, 4.0, 5.0,

10.0, 50.0 and100.0

Adjust the damping time to reduce the output noise. We recommend that you set the damping to the largest value that the transmitter can accept.

Low Flow Cutoff

For calculated flow rate, set low and high cutoff limits between 0 and 30% of the upper range limit (URL) for flow.

- Low Flow Cutoff: Low (0.0 = default) High (0.0 = default)

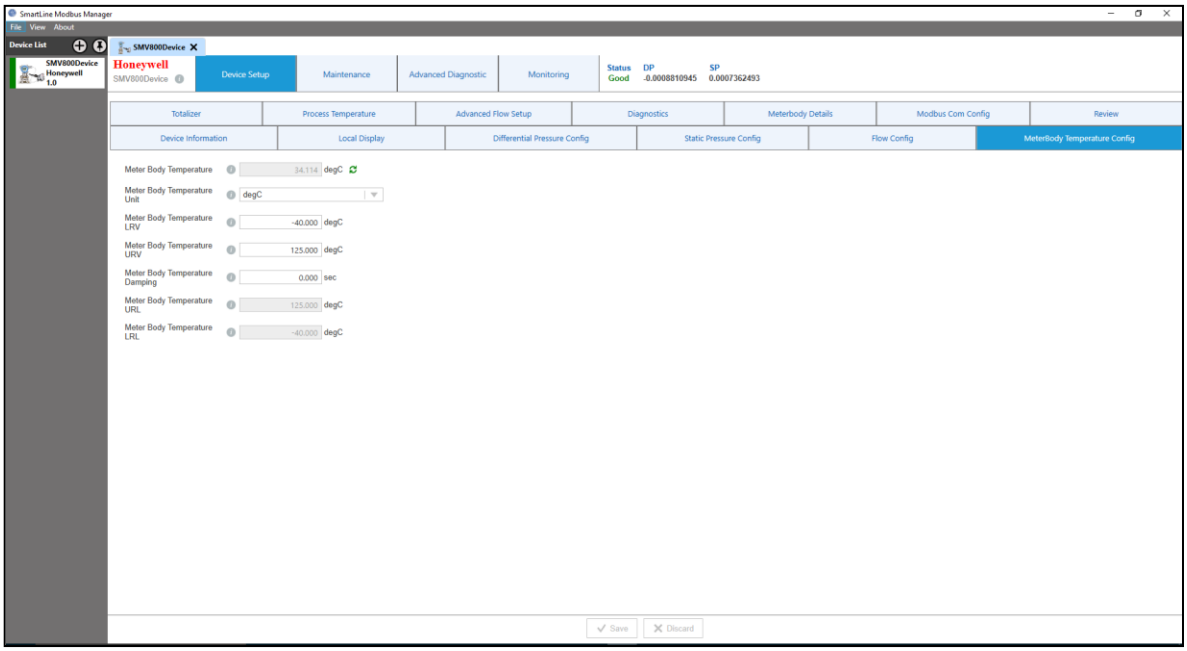
Change the High value before editing Low value.

Background

You can set low and high flow cutoff limits for the transmitter output based on the calculated variable Flow. The transmitter will clamp the flow output at zero flow when the flow rate reaches the configured low limit and will keep the flow output at zero until the flow rate rises to the configured high limit. This helps avoid errors caused by flow pulsations in range values close to zero. Note that you configure limit values in selected engineering units between 0 to 30% of the upper range limit for Flow. If either simulation of flow is enabled or reverse flow is enabled then low and high cut off values have no effect on flow output.

2.3.6. Meterbody Temperature Config:

This tab provides the detail information about the Meterbody Temperature parameters.

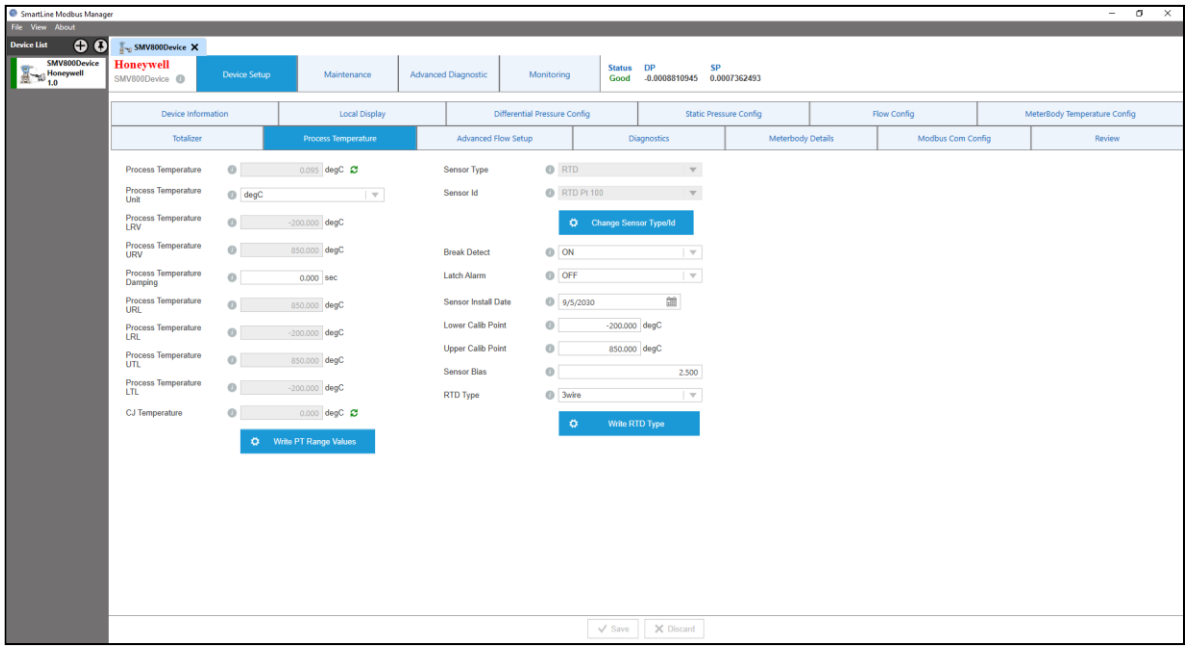


Refer the below table for Meterbody Temperature Configuration:

Meter Body Temperature Configuration parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Meter body Temp. Config		
Meter Body Temperature		The current value of the measured Meter body Temperature
Meter Body Temperature Unit	degC degF degR Kelvin	The engineering unit for the Meter body Temperature value
Meter Body Temperature LRV		The Lower Range Value for the Meter body Temperature input
Meter Body Temperature URV		The Upper Range Value for the Meter body Temperature input
Meter Body Temperature Damping		Damping value for the Meter body Temperature measurement. Entries may be any value from 0.00 to 32.00 seconds.
Meter Body Temperature URL		The Upper Range Limit for the Meter body Temperature value
Meter Body Temperature LRL		The Lower Range Limit for the Meter body Temperature value

2.3.7. Process Temperature Configuration

This tab provides the detail information about the ProcessTemperature parameters.



Refer the below table for Process Temperature Configuration:

Process Temperature Configuration parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Process Temp.Config		
Process Temperature		The current value of the Process Temperature input
Process Temperature Unit	degC degF degR Kelvin	The user selected engineering unit for the Process Temperature input.
Process Temperature LRV		The Lower Range Value for the Process Temperature input (which represents 0% output) in user selected engineering units. This value may be configured to any value within the range PT LTL to PT UTL.
Process Temperature URV		The Upper Range Value for the Process Temperature input (which represents 100% output) in user selected engineering units. This value may be configured to any value within the range PT LTL to PT UTL.
Process Temperature Damping		Damping value for the Process Temperature output. The upper limit for temp damping is 102. Entries may be any value from 0.00 to 32.00 seconds.
Process Temperature URL		The Upper Range Limit for the Process Temperature input
Process Temperature LRL		The Lower Range Limit for the Process Temperature input

Process Temperature UTL		The Upper Transducer Limit for the Process Temperature input
Process Temperature LTL		The Lower Transducer Limit for the Process Temperature input
CJ Temperature		The current value of the cold junction temperature.
Write PT Range Values	**PT LRV** **PT URV**	Write a new Lower Range Value and Upper Range Value for the Process Temperature input
Sensor Type		The type of sensor (RTD or TC) selected for measuring the Process Temperature.
Sensor Id		The specific type of RTD or TC selected for measuring the Process Temperature
Change Sensor Type/Id	**Enter Sensor Type** **Enter Sensor ID**	Enter a new selection for the temperature sensor
CJ Selection*		The selected value for Cold Junction compensation type.
Fixed CJ Compensation Value*		When fixed CJ compensation is selected, this value represents the fixed cold junction temperature to be used for the Process Temperature measurement. (This parameter is applicable when temp sensor is configured only as a thermocouple). Fixed CJ Value range is -50 to +90'C.
CJ Compensation*		Select fixed or internal cold junction compensation for the Process Temperature measurement.
Break Detect		Allows user to enable or disable sensor break detection capability for the Process Temperature input
Latch Alarm		Allows user to enable or disable critical status latching when a break is detected in the temperature sensor
Sensor Install Date		The customer-entered Temperature Sensor Install Date. Editable
Lower Calib Point		The Lower Calibration Point value to be used for calibrating the Process Temperature Lower Calibration range.
Upper Calib Point		The Upper Calibration Point value to be used for calibrating the Process Temperature Upper Calibration range.
Sensor Bias		The RTD sensor bias in ohms if required for Process Temperature measurement.
RTD Type**		The currently selected 2-wire, 3-wire or 4-wire RTD type
Write RTD Type**		Select 2-wire, 3-wire or 4-wire RTD sensor type to be used for measuring the Process Temperature

* for T/C sensor configurations only

** for RTD sensor configurations only

Engineering Units

The Process Temperature Config tab displays the Lower Range Value (LRV), Lower Range Limit (LRL), Upper Range Value (URV) and Upper Range Limit (URL) for Process temperature in the unit of measure selected in the Engineering Units field.

Selecting PT Engineering Units

Select one of the preprogrammed engineering units in Table 2-5 for display of the PT measurements, depending upon output characterization configuration.

Also select one of the preprogrammed engineering units for display of the cold junction temperature readings (CJT Units field). This selection is independent of the other sensor measurements. See Cold Junction Compensation below.

Table 2-5: Pre-programmed Engineering Units for PT

Engineering Unit	Meaning
C [d]	Degrees Celsius or Centigrade
F	Degrees Fahrenheit
K	Kelvin
R	Degrees Rankine

Cold Junction Compensation

If a thermocouple is used for process temperature input, you must select if the cold junction (CJ) compensation will be supplied internally by the transmitter or externally from a user-supplied isothermal block.

Specify source of cold junction temperature compensation.

- Internal
- Fixed - Must also key in value of cold junction temperature for reference.

Background

Every thermocouple requires a hot junction and a cold junction for operation. The hot junction is located at the point of process measurement and the cold junction is in the transmitter (internal) or at an external location selected by the user. The transmitter bases its range measurement on the difference of the two junctions. The internal or external temperature sensitive resistor compensates for changes in ambient temperature that would otherwise have the same effect as a change in process temperature.

If you configure CJ source as fixed, you must tell the transmitter what cold junction temperature to reference by typing in the temperature as a configuration value. For internal cold junction configuration, the transmitter measures the cold junction temperature internally.

You can have the transmitter provide a linear output which is linearized to temperature for PT input, or a nonlinear output which is proportional to resistance for an RTD input or volt input for T/C input. Also, if you do switch from linear to non-linearized or vice versa, be sure you verify the LRV and URV settings after you enter the configuration data.

Sensor Type

Identify and select the type of sensor that is connected to the transmitter as its input for process temperature. This will set the appropriate LRL and URL data in the transmitter automatically.

Table 2-6 shows the pre-programmed temperature sensor types and the rated measurement range limits for a given sensor selection.

Table 2-6: Sensor Types for Process Temperature Input

Input Type	Maximum Range Limits	
RTD (2,3,4 wire)	**° C**	**° F**
Pt254	-200 to 850	-328 to 1562
Pt100	-200 to 850	-328 to 1562
Pt2004	-200 to 850	-328 to 1562
Pt5004	-200 to 850	-328 to 1562
Pt10004	-200 to 500	-328 to 932

Thermocouples	**° C**	**° F**
B4	200 to 1820	392 to 3308
E	-200 to 1000	-328 to 1832
J	-200 to 1200	-328 to 2192
K	-200 to 1370	-328 to 2498
N4	-200 to 1300	-328 to 2372
R4	-50 to 1760	-58 to 3200
S4	-50 to 1760	-58 to 3200
T	-250 to 400	-418 to 752

ATTENTION: Whenever you connect a different sensor as the transmitter's input, you must also change the sensor type configuration to agree. Otherwise, range setting errors may result.

Input Open Fault Detect

WARNING: To accurately set the device status and device output, it is highly recommended to enable break detect in order to detect a input open fault.

The behavior of the device and process values is explained below when this setting is OFF vs ON to explain why it is recommended to configure this setting ON always.

If the Sensor input Fault detect is OFF:

The reported temperature value may or may not be reported as a fault condition depending upon how the open T/C connection drifts. For active temperature compensation during flow calculations an undetected open thermocouple may result in a condition where the reported flow value is inaccurate. For this reason, it highly recommended that open thermocouple detection is turned on so that the active temperature is used for flow compensation.

When the open input condition occurs, device will report non-critical status, but Flow calculation will use the reported Temperature value. Note that this case may result in inaccurate Flow value. If the sensor is repaired, the status is cleared without device reset.

If the Fault detect is ON:

On detecting open input, device will report critical status, Temperature value will be set to NaN and Flow value will also be set to NaN.

Background

You can turn the transmitter's temperature sensor fault detection (Break Detect) function ON or OFF through configuration.

- With the detection ON, the transmitter drives the PT output value to NaN in the event of an open RTD or T/C lead condition.
- When fault detection is set to OFF, these same fault conditions result in the transmitter not driving the output to failsafe and reporting a non-critical status for an open RTD sensing lead or any T/C lead. But when an open RTD compensation lead is detected, the transmitter automatically reconfigures itself to operate without the compensation lead. This means that a 4-wire RTD would be reconfigured as 3-wire RTD, if possible and thus avoiding a critical status condition in the transmitter when the transmitter is still capable of delivering a reasonably accurate temperature output.

Process Temperature Range Values (LRV and URV)

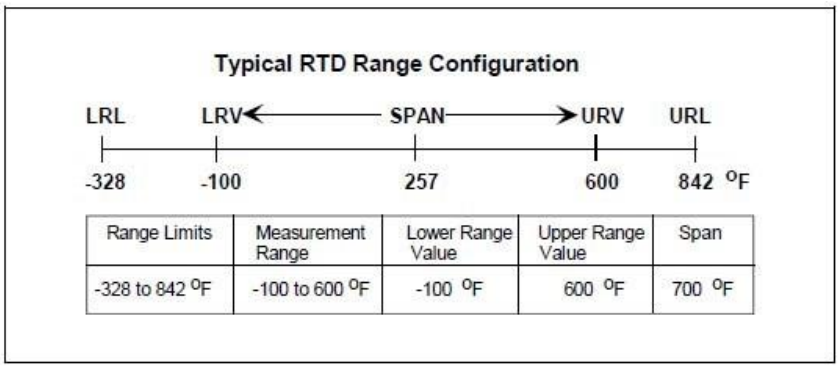
The Lower Range Value and the Upper Range Value fields for PT are found on the Process Temperature Config tab.

Configure the LRV and URV (which are desired zero and span points for your measurement range) for the process temperature input by typing in the desired values on the Process Temperature Config tab.

- LRV, enter the lower range value (default = 0.0)
- URV, enter the upper range value (default = URL)

Background

You can set the LRV and URV for PT by either typing in the desired values on the MODBUS-RTU host Process Temperature Config tab or applying the corresponding LRV and URV input signals directly to the transmitter. The LRV and URV set the desired zero and span points for your measurement range as shown the example in Figure 2-2.



Range Limits	Measurement Range	Lower Range Value	Upper Range Value	Span
-328 to 842 °F	-100 to 600 °F	-100 °F	600 °F	700 °F

Figure 2-2: RTD Range Configuration

- The URV changes automatically to compensate for any changes in the LRV and maintain the present span (URV – LRV). See Figure 2-3 for an example.
- If you must change both the LRV and URV, always change the LRV first. However, if the change in the LRV would cause the URV to exceed the URL, you would have to change the URV to narrow the span before you could change the LRV

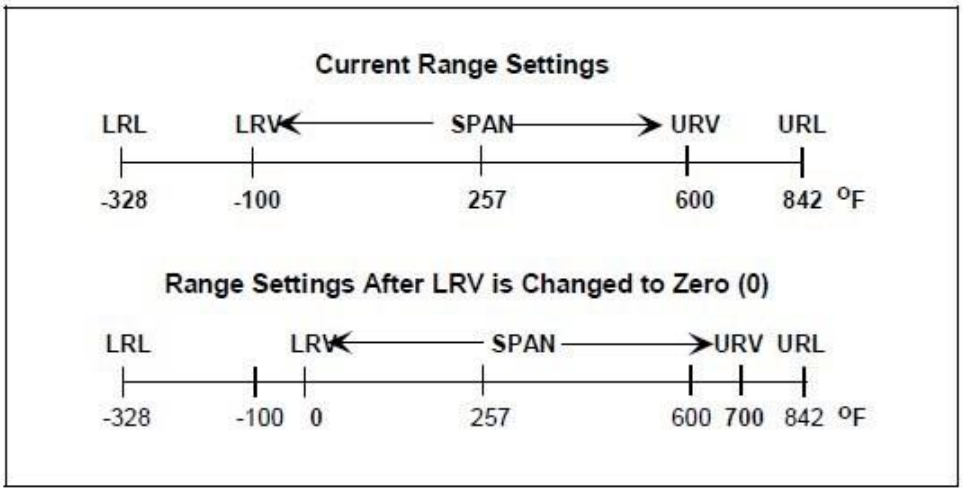


Figure 2-3: Current Range Settings

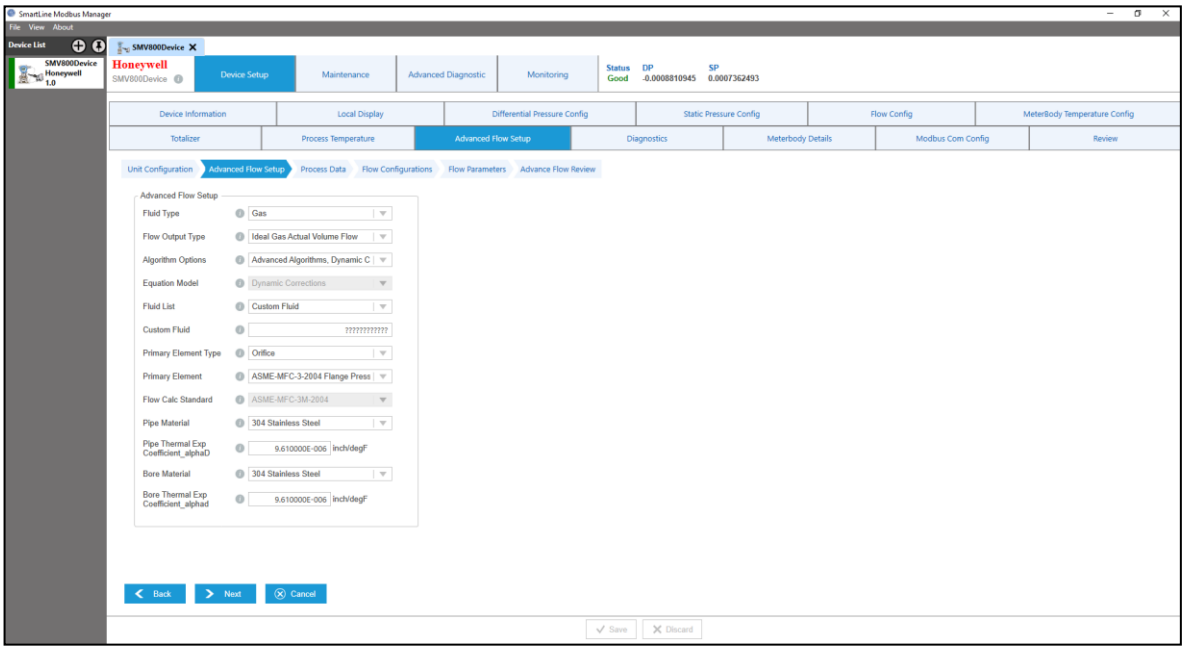
Damping

Adjust the damping time constant for Process Temperature to reduce the output noise. Default value of damping is 0.5 seconds. Damping can be configured from 0 to 102 seconds.

Unit Configuration Parameters			
Key: Plain = Read only Bold = Configurable Bold underline = Method Bold italic = Table or graph			
Parameters	**Units Selection**		
	U.S. Units	**S.I. Units**	**All Units**
Differential Pressure Unit	U.S. Units: Pounds per Square Inch (psi)	S.I. Units Kilopascals (kPa)	• inH2O (68oF) • inHg (0oC •)ftH2O (68oF) • mmH2O (68oF) • mmHg (0oC) • psi • bar • mbar • g/cm2 • kg/cm2 • Pa • kPa • Torr • Atm • inH2O@60oF • MPa • inH2O@4oC (39.2 oF • mmH2O@4oC (39.2oF)
Static Pressure Unit	Pounds per Square Inch (psi)	Kilopascals (kPa)	• Pound per Square Inch (psi) • inH2O (68oF) • inHg (0oC) • ftH2O (68oF) • mmH2O (68oF) • mmHg (0oC) • psi • bar • mbar • g/cm2 • kg/cm2 • Pa • kPa • Torr • Atm • inH2O@60oF • MPa • inH2O@4oC (39.2 oF • mmH2O@4oC (39.2oF)
Temperature Unit	Degrees Fahrenheit (°F)	Degrees Celsius (°C)	• Degrees Fahrenheit (°F) • Degrees Celsius (°C) • Kelvin • Degrees Rankine (°K)

Length Unit	Inches (in)	Millimeters (mm)	• Inches (in) • Millimeters (mm)
Density Unit	Pounds per Cubic Foot ($lb/ft^{3)}$	Kilograms per Cubic Meter ($kg/m^{3)}$	• Pounds per Cubic Foot ($lb/ft^{3)}$ • Kilograms per Cubic Meter ($kg/m^{3)}$
Viscosity Unit	Centipoise (cP)	Centipoise (cP)	• Centipoise (cP) • Pascal Seconds (Pa.s) • Pounds per Foot Seconds (lb/ft.s)
Flow	lb/sec when Flow output type is Mass Flow ft3/sec when Flow output type is Volume Flow	g/sec when Flow output type is Mass Flow m3/sec when Flow output type is Volume Flow	See Table 2-6 and Table 2-7 for mass and volume unit.
Flow Custom Unit			Custom Unit: Flow Custom Tag: Customized unit
Flow Base Unit			Flow Base Unit: Base unit is unit from which custom unit is derived
Flow Conver. Factor			Flow Conver. Factor: Enter a numeric value that represents the number of base units per one custom unit.

Configure Flow Setup parameters



Refer below table for more details regarding parameters.

Advanced Flow Setup Parameters		
Key: Plain = Read only Bold = Configurable Bold underline = Method Bold italic = Table or graph		
Fluid Type	Gas Liquid Superheated Steam Saturated Steam (DP, SP) Saturated Steam (DP, PT)	1,2,3 – applicable when: Algorithm Options = Advanced Algorithms or ASME 1989 Algorithms 4,5 – applicable when Algorithm Options = Advanced Algorithms
Flow Output Type	No Flow Output Ideal Gas Actual Volume Flow Ideal Gas Mass Flow Ideal Gas Volume Flow @ Std Condition	When Fluid type = Gas
	No Flow Output Liquid Mass Flow Liquid Actual Volume Flow Liquid Volume Flow @ Std Condition	When Fluid type = Liquid
	No Flow Output Steam Mass Flow	When Fluid type = Superheated Steam or Saturated Steam (DP, SP) or Saturated Steam (DP, PT)
Algorithm Options	Advanced Algorithms ASME 1989 Algorithms	Advanced Algorithms: Allows Flow calculation using newer Standards using predefined list of Primary Elements. ASME 1989 Algorithms: Allows selecting legacy SMV3000 algorithms and Primary Elements
Equation Model	Dynamic Standard	Dynamic option allowed on Advanced Algorithms or ASME 1989 Algorithms Algorithm. Select ASME 1989 Algorithm Option if you need to calculate Standard Flow

Fluid list	0,1,1,2,2-TETRAFLUOROETHANE, 1,1,1,2-TRICHLOROETHANE, 2,1,2,4-TRICHLOROBENZENE, 3,1,2-BUTADIENE, 4,1,3,5-TRICHLOROBENZENE, 5,1,4-DIOXANE, 6,1,4-HEXADIENE, 7,1-BUTANAL, 8,1-BUTANOL, 9,1-BUTENE, 10,1-DECANAL, 11,1-DECANOL, 12,1-DECENE, 13,1-DODECANOL, 14,1-DODECENE, 15,1-HEPTANOL, 16,1-HEPTENE, 17,1-HEXADECANOL, 18,1-HEXENE, 19,1-NONANAL, 20,1-NONANOL, 21,1-OCTANOL, 22,1-OCTENE, 23,1-PENTADECANOL, 24,1-PENTANOL, 25,1-PENTENE, 26,1-UNDECANOL, 27,2,2-DIMETHYLBUTANE, 28,2-METHYL-1-PENTENE, 29,ACETIC ACID, 30,ACETONE, 31,ACETONITRILE, 32,ACETYLENE, 33,ACRYLONITRILE, 34,AIR, 35,ALLYL ALCOHOL, 36,AMMONIA, 37,ARGON, 38,BENZALDEHYDE, 39,BENZENE, 40,BENZYL ALCOHOL, 41,BIPHENYL, 42,CARBON DIOXIDE, 43,CARBON MONOXIDE, 44,CARBON TETRACHLORIDE, 45,CHLORINE, 46,CHLOROPRENE, 47,CHLOROTRIFLUOROETHYLENE, 48,CYCLOHEPTANE, 49,CYCLOHEXANE, 50,CYCLOPENTENE, 51,CYCLOPROPANE, 52,ETHANE, 53,ETHANOL, 54,ETHYLAMINE, 55,ETHYLBENZENE, 56,ETHYLENE OXIDE, 57,ETHYLENE, 58,FLUORENE, 59,FURAN, 60,HELIUM-4, 61,HYDROGEN CHLORIDE, 62,HYDROGEN CYANIDE,	List of Fluids for which the Viscosity and Density coefficients will be calculated automatically.

Fluid list	63,HYDROGEN PEROXIDE, 64,HYDROGEN SULFIDE, 65,HYDROGEN, 66,ISOBUTANE, 67,ISOPRENE, 68,ISOPROPANOL, 69,m-CHLORONITROBENZENE, 70,m-DICHLOROBENZENE, 71,METHANE, 72,METHANOL, 73,METHYL ACRYLATE, 74,METHYL ETHYL KETONE, 75,METHYL VINYL ETHER, 76,n-BUTANE, 77,n-BUTYRONITRILE, 78,n-DECANE, 79,n-DODECANE, 80,n-HEPTADECANE, 81,n-HEPTANE, 82,n-HEXANE, 83,n-OCTANE, 84,n-PENTANE, 85,NATURAL GAS, 86,NEON, 87,NEOPENTANE, 88,NITRIC ACID, 89,NITRIC OXIDE, 90,NITROBENZENE, 91,NITROETHANE, 92,NITROGEN, 93,NITROMETHANE, 94,NITROUS OXIDE, 95,OXYGE}, 96,PENTAFLUOROETHANE, 97,PHENOL, 98,PROPADIENE, 99,PROPANE, 100,PROPYLENE, 101,PYRENE, 102,STYRENE, 103,SULFUR DIOXIDE, 104,TOLUENE, 105,TRICHLOROETHYLENE, 106,VINYL CHLORID, 107,WATER, 108,Custom Fluid	
Custom Fluid	Enter any custom fluid name if the one user wants to use is NOT in the Fluid List	Enter any name for Custom Fluid and then user can manually enter the Viscosity and Density coefficients on Process Data page
Primary Element Type	Orifice Nozzle Venturi Pitot Tube VCone Wedge	When Algorithm Options = Advanced Algorithms
	Orifice Nozzle Venturi Pitot Tube	When Algorithm Options = ASME 1989 Algorithms

Continued …

Primary Element Type	Orifice ASME-MFC-3-2004 Flange Pressure Taps Orifice ASME-MFC-3-2004 Corner Pressure Taps Orifice ASME-MFC-3-2004 D and D/2 Pressure Taps Orifice ISO5167-2003 Flange Pressure Taps Orifice ISO5167-2003 Corner Pressure Taps Orifice ISO5167-2003 D and D/2 Pressure Taps Orifice GOST 8.586-2005 Flange Pressure Taps Orifice GOST 8.586-2005 Corner Pressure Taps Orifice GOST 8.586-2005 Three-Radius Pressure Taps Orifice AGA3-2003 Flange Pressure Taps Orifice AGA3-2003 Corner Pressure Taps Nozzle ASME-MFC-3-2004 ASME Long Radius Nozzles Nozzle ASME-MFC-3-2004 Venturi Nozzles Nozzle ASME-MFC-3-2004 ISA 1932 Nozzles Nozzle ISO5167-2003 Long Radius Nozzles Nozzle ISO5167-2003 Venturi Nozzles Nozzle ISO5167-2003 ISA 1932 Nozzles Nozzle GOST 8.586-2005 Long Radius Nozzles Nozzle GOST 8.586-2005 Venturi Nozzles Nozzle GOST 8.586-2005 ISA 1932 Nozzles Venturi ASME-MFC-3-2004 “As-Cast” Convergent Section Venturi ASME-MFC-3-2004 Machined Convergent Section Venturi ASME-MFC-3-2004 Rough-Welded Convergent Section Venturi ISO5167-2003 “As-Cast” Convergent Section Venturi ISO5167-2003 Machined Convergent Section Venturi ISO5167-2003 Rough-Welded Sheet-Iron Convergent Section Venturi GOST 8.586-2005 Cast Upstream Cone Part Venturi GOST 8.586-2005 Machined Upstream Cone Part Venturi GOST 8.586-2005 Welded Upstream Cone Part made of Sheet Steel Averaging Pitot Tube Standard V-Cone with Macrometer method	When Algorithm Options = Advanced Algorithms

Primary Element	Standard V-Cone with ASME method Wafer Cone with Macrometer method Wafer Cone with ASME method Wedge Integral Orifice	When Algorithm Options = Advanced Algorithms
	Orifice Flange Taps D >/= 2.3 inches Orifice Flange Taps 2 </= D </= 2.3 Orifice Corner Taps Orifice D and D/2 Taps Orifice 2.5 and 8D Taps Venturi Machined Inlet Venturi Rough Cast Inlet Venturi Rough Welded Sheet-Iron Inlet Leopold Venturi Gerand Venturi Universal Venturi Tube Low-Loss Venturi Tube Nozzle Long radius Nozzle Venturi Preso Elipse Ave. Pitot Tube Other (Std compensation mode) Pitot Tube	When Algorithm Options = SMV3000 /ASME 1989 with Dynamic Corrections or Standard
Flow Calc Standard	ASME-MFC-3M ISO5167 GOST AGA3 VCONE/WAFER CONE ASME-MFC-14M WEDGE AVERAGE PITOT TUBE INTEGRAL ORIFICE CONDITIONAL ORIFICE CONDITIONAL ORIFICE	When Algorithm Options = Advanced Algorithms Automatically set based on Primary Element type and Primary Element
	ASME 1989	When Algorithm Options = SMV3000

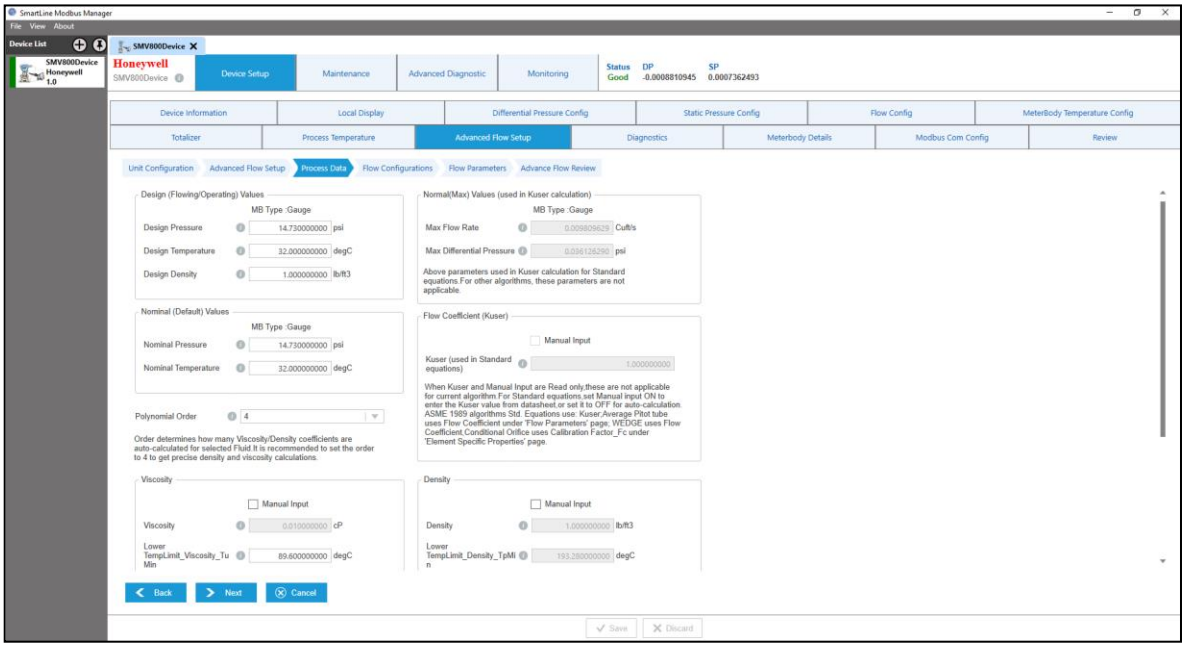
Pipe Material	304 Stainless Steel 316 Stainless Steel 304/316 Stainless Steel Carbon Steel Hastelloy Monel 400 Other	When Flow Calc Standard is other than GOST
	35П 45П 20ХМП 12Х18Н9ТП 15К,20К 22К 16ГС 09Г2С 10 15 20 30,35 40,45 10Г2 38ХА 40Х 15ХМ 30ХМ,30ХМА 12Х1МФ 25Х1МФ 25Х2МФ 15Х5М 18Х2Н4МА 38ХН3МФА 08Х13 12Х13 30Х13 10Х14Г14Н14Т 08Х18Н10 12Х18Н9Т 12Х18Н10Т 12Х18Н12Т 08Х18Н10Т 08Х22Н6Т 37Х12Н8Г8МФБ 31Х19Н9МВБТ 06ХН28МдТ 20П 25П	When Flow Calc Standard is GOST

	304 Stainless Steel 316 Stainless Steel 304/316 Stainless Steel Carbon Steel Hastelloy Monel 400 Other	When Flow Calc Standard is other than GOST
Bore Material	35П 45П 20ХМП 12Х18Н9ТП 15К,20К 22К 16ГС 09Г2С 10 15 20 30,35 40,45 10Г2 38ХА 40Х 15ХМ 30ХМ,30ХМА 12Х1МФ 25Х1МФ 25Х2МФ 15Х5М 18Х2Н4МА 38ХН3МФА 08Х13 12Х13 30Х13 10Х14Г14Н14Т 08Х18Н10 12Х18Н9Т 12Х18Н10Т 12Х18Н12Т 08Х18Н10Т 08Х22Н6Т 37Х12Н8Г8МФБ 31Х19Н9МВБТ 06ХН28МдТ 20П 25П	When Flow Calc Standard is GOST. RULE: When Algorithm = ASME 1989 Algorithms, for Pitot Tube Element, Bore Material = Pipe Material.
Bore Thermal Exp Coefficient_alpha_d		Value is set based on the Bore Material selected. RULE: When Algorithm = ASME 1989 Algorithms, for Pitot Tube Element, Bore Thermal Expansion Coefficient = Pipe Thermal Expansion Coefficient

Process Data Screen

Configure Viscosity and Density Coefficients, Design Temperature, Pressure, Nominal Temperature,

Pressure values, Max values, and KUser factor



Refer below tables for more details regarding parameters.

Process Data Parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Design(Flowing/Operating) Values		
Design Pressure		Enter the temperature value in the units selected in the Unit Configuration screen.
Design Temperature		
Design Density		
Nominal (Default) Values		
Nominal Absolute Pressure		Enter the temperature value in the units selected in the Unit Configuration screen.
Nominal Temperature		
Polynomial order		This is an internal parameter in the DD hosts. When using the DTM Tool, Viscosity and Density Coefficients will be automatically calculated for all the Fluids using the Polynomial of this order. For Custom Fluid user, can manually enter the coefficients. Set this to 4 to use the highest polynomial order resulting in 5 Viscosity and 5 Density Coefficients. Polynomial order 3 results in 4 Viscosity / Density coefficients, order 2 results in 3 Viscosity / Density coefficients and so forth. Relevant number of coefficients will be used in the Flow calculations. For Custom Fluid, Polynomial order is not used. User can manually enter up to 5 Viscosity and Density coefficients. All the 5 Coefficients are used in the calculations. Please make sure at least one coefficient value is > 0.0
Viscosity		
Manual Input Viscosity	ON OFF	Applicable When Algorithm Option = Advanced Algorithms
Viscosity Coefficient_V#	V1 to V5	Refer viscisity coefficient table to see when V1 to V5 are applicable based on Algorithm option, Equation Model and Fluid Type

Lower TempLimit Viscosity TuMin		Minimum Temperature to select the initial Temperature vs Viscosity value in the polynomial equation for auto calculation of Viscosity. Enter the temperature value in the units selected in the Unit Configuration screen.
Upper TempLimit Viscosity TuMax		Maximum Temperature to select the end point Temperature vs Viscosity value in the polynomial equation for auto calculation of Viscosity. Enter the temperature value in the units selected in the Unit Configuration screen.
Normal (Max) Volume		
Max Flow Rate		When Algorithm Option = ASME 1989 Algorithms, Equation Model = Standard. Enter the value in the units selected in the Unit Configuration screen. Value cannot be <= 0
Max Differential Pressure		When Algorithm Option = ASME 1989 Algorithms, Equation Model = Standard. Enter the value in the units selected in the Unit Configuration screen. Value must be greater than or less than 0, but not 0.
Flow Coefficient (KUser)		ASME 1989 Algorithms, Equation Model = Standard.
Manual Input	ON/OFF	Select this to ON to enter KUser value manually. Select this to OFF to have DTM auto calculate the KUser value using selected Fluid type, Flow output type, Max Flow Rate and Max Differential Pressure.
KUser Value	#.#	When Manual Input is ON, user enters the KUser value for ASME 1989 Algorithms. When Manual Input is OFF, KUser value is auto calculated. When Algorithm is Dynamic, Manual Input ON/OF is not applicable and this value is set to 1. If Flow value or KUser value calculates to NaN, make sure the Nominal Temperature Value is within the Lower TempLimit Density TpMin and Upper TempLimit Density TpMax

Density		
Manual Input Density	ON/OFF	When Algorithm Option = Advanced Algorithms Fluid Type = Liquid
Density Coefficient_d#	#.#	When Algorithm Option = SMV3000 /ASME 1989 with Dynamic Corrections or Standard Fluid Type = Liquid Equation Model = Dynamic or Standard
Lower TempLimit Density TpMin		Minimum Temperature to select the initial Temperature vs Density value in the polynomial equation for auto calculation of Density. Enter the temperature value in the selected unit in the Unit Configuration screen.
Upper TempLimit Density TpMax		Maximum Temperature to select the end point Temperature vs Density value in the polynomial equation for auto calculation of Density. Enter the temperature value in the selected unit in the Unit Configuration screen.

Viscosity Coefficients: Dependency to Algorithm option

Equation Model and Fluid Type

Algorithm Options		Viscosity					
		Manual input viscosity	Fluid Selection	Custom Fluid selection	Auto calculation V1 to V5 (Fluid != Custom Fluid)	Manual input V1 to V5 (Fluid = Custom)	Visc Temp Low/High limits
SMV3000 / ASME 1989 with Dynamic Corrections or Standard	Std / Gas	N/A	N/A	N/A	N/A	N/A	N/A
	Std / liquid	N/A	N/A	N/A	N/A	N/A	N/A
	Std/SHS	N/A	N/A	N/A	N/A	N/A	N/A
	Std / Sat S	N/A	N/A	N/A	N/A	N/A	N/A
SMV3000 / ASME 1989 with Dynamic Corrections or Standard	Dynamic / Gas	N/A	y	y	y	y	y
	Dynamic / liquid	N/A	y	y	y	y	y
	Dynamic/SHS	N/A	Water by default	n/a	y	n/a	y
	Dynamic / Sat S	N/A	N/A	N/A	N/A	N/A	N/A
SMV800 / Newer Algorithms with All Dynamic Corrections	Dynamic / Gas	y	y	y	y	y	y
	Dynamic / liquid	y	y	y	y	y	y
	Dynamic/SHS	y	Water by default	N/A	y	N/A	y
	Dynamic / Sat S	y	water by default	N/A	N/A	N/A	N/A

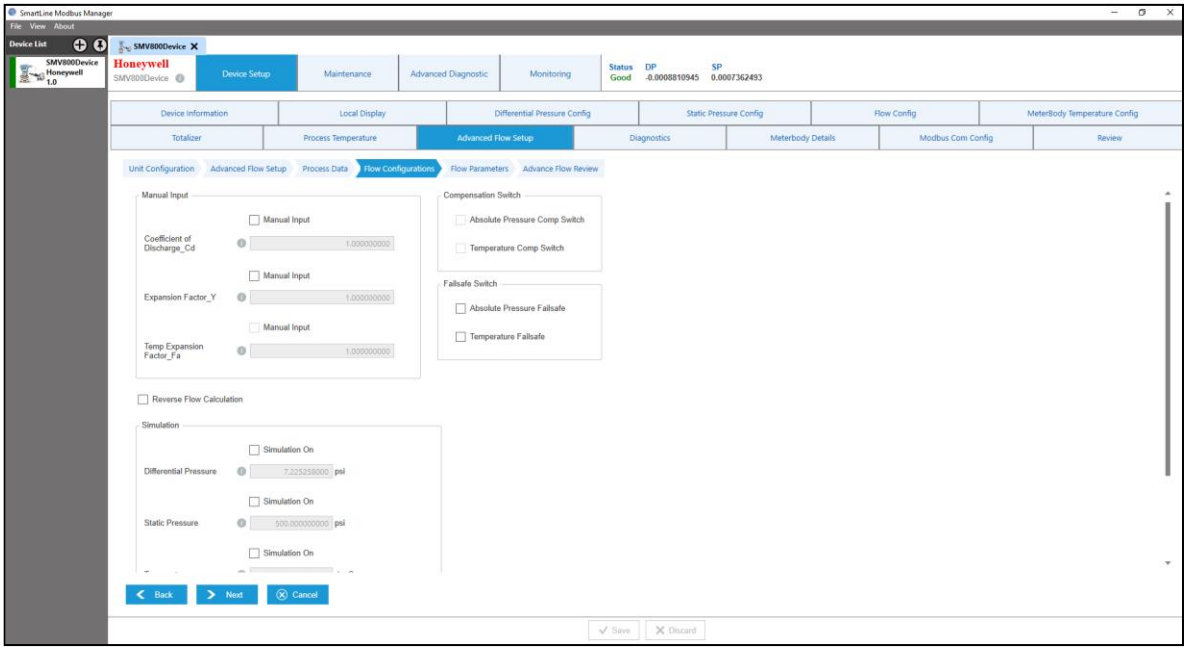
Table 2-7: Density Coefficients: Dependency to Algorithm option

Equation Model and Fluid Type

		Density					
Algorithm	**Output Type**	**Manual input density**	**Fluid Selection**	**Custom Fluid selection**	**Auto calculation d1 to d5 (Fluid! = Custom)**	**Manual entry d1 to d5 (Fluid = Custom)**	**Density Temp Low/High limits**
ASME 1989 Algorithms and Equation Model Dynamic	Std / Gas	N/A	N/A	N/A	N/A	N/A	N/A
	Std / liquid	N/A	y	y	y	y	y
	Std/SHS	N/A	N/A	N/A	N/A	N/A	N/A
	Std / Sat S	N/A	N/A	N/A	N/A	N/A	N/A
ASME 1989 Algorithms and Equation Model Dynamic	Dynamic / Gas	N/A	y	y	y	y	y
	Dynamic / liquid	N/A	y	y	y	y	y
	Dynamic/SHS	N/A	water	n/a	y	n/a	y
	Dynamic / Sat S	N/A	N/A	N/A	N/A	N/A	N/A
Advanced Algorithms	Dynamic / Gas	N/A	y	y	y	y	y
	Dynamic / liquid	N/A	y	y	y	y	y
	Dynamic/SHS	N/A	water	N/A	y	N/A	y
	Dynamic / Sat S	y	water by default	N/A	N/A	N/A	N/A

Flow Configuraiton Screens

Configure Discharge coefficients, compensation and failsafe settings and Simulation values.



Refer below tables for more details regarding parameters.

Flow Configuration Parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Manual Input		
Manual Input (for Coefficient of Discharge_Cd)	ON OFF	
Coefficient of Discharge_Cd		(entry field when Manual Input is ON)
Manual Input (for Expansion Factor_y)	ON OFF	
Expansion Factor_Y		(entry field When Manual Input is ON)
Manual Input (for Temp Expansion Factor_Fa)	ON OFF	
Temp Expansion Factor_Fa		(entry field When Manual Input is ON)

Continued ..

Reverse Flow	ON OFF	With Reverse flow OFF, flow value will be zero flow when Flow is negative (when Differential Pressure is < 0) for Algorithm Options = Advanced Algorithms or 1989 Algorithms With Reverse flow ON, flow value will be negative when Differential Pressure is < 0 for Algorithm Options = Advanced Algorithms With Reverse flow ON or OFF, flow value will be 0 when Differential Pressure is < 0 for Algorithm Options = ASME 1989 Algorithms So, if Reverse flow is expected, select Algorithm Options = Advanced Algorithms, set Reverse Flow Calculation parameter: ON Example: When Reverse flow is ON, PV4 is calculated considering the absolute value of DP (when Differential Pressure is < 0) and resulting Flwo value will be negative. *Example When Reverse Flow OFF:* DP = -100 inH20 SP = 14.45 psi. PV4 (Flow) = 0 *Example When Reverse Flow ON:* DP = -100 inH20 (-3.612 psi) SP = 14.45 psi. PV4 calculation will consider 100in H20 in calculation. SP value, SP=SP-DP. SP = 14.45-(-3.612)=18.062 psi will be

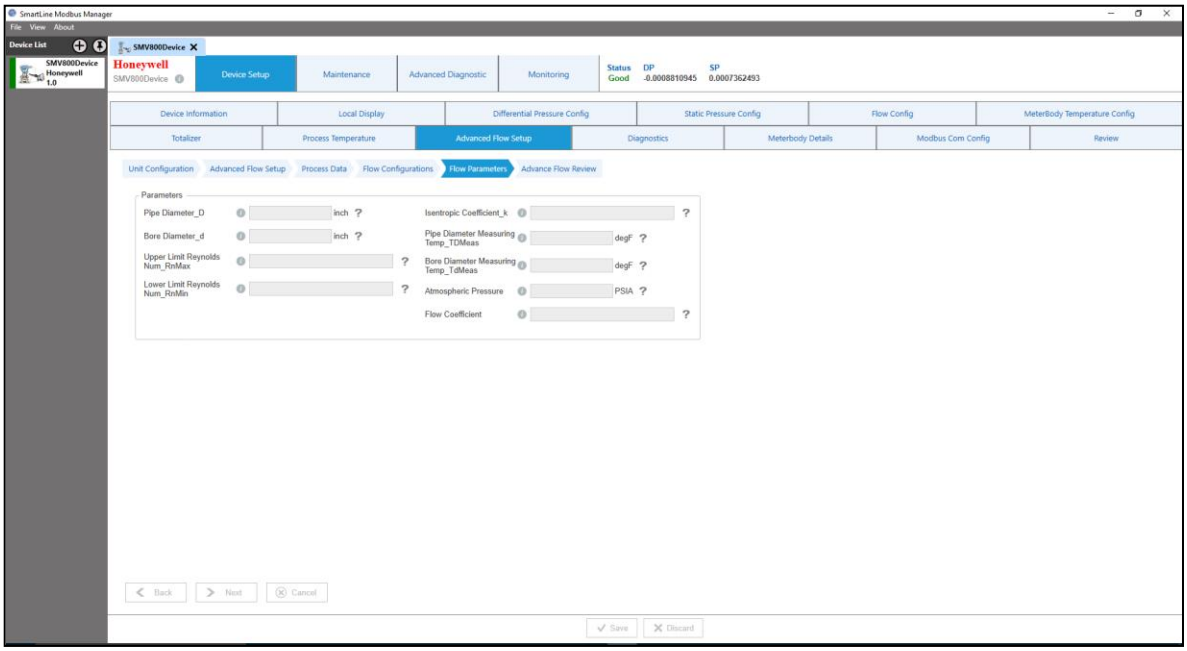
Reverse Flow *continued*	ON OFF	used in the flow algorithm calculation for Advanced Algorithms resulting in negative flow value. Note that, for some Primary Elements and Algorithm Standards, Reverse Flow may not be applicable. In this case, flow value will be zero regardless of the Reverse Flow Calculation option.
Compensation Switch		
Absolute Pressure Comp Switch	ON OFF	Applicable when Equation Model is Standard, Algorithm Option is ASME 1989 Algorithms When ON, use Design Pressure for Flow Calculation when PV2 (Static Pressure) goes bad and PV2 Failsafe is OFF. When OFF, PV2 has no effect on Flow Calculation When Equation model is Dynamic, Algorithm Option is Advanced Algorithms or ASME 1989 Algorithms, this switch is always ON
Temperature Comp Switch	ON OFF	Applicable when Equation Model is Standard, Algorithm Option is ASME 1989 Algorithms When ON, use Design Temperature for Flow Calculation when PV3 (Process Temperature) goes bad and PV3 Failsafe is OFF When OFF, PV3 has no effect on Flow Calculation When Equation model is Dynamic, Algorithm Option is Advanced Algorithm or ASME 1989 Algorithm, this switch is always ON

Failsafe Switch		
Absolute Pressure Failsafe (PV2)	ON OFF ON OFF	Case1: If flow output is required to go to failsafe when there is a pressure failure, selecting Absolute Pressure (PV2) failsafe will assure this. If failsafe for the flow output is not needed when a pressure sensor fails, the nominal or design values for pressure is used in the flow calculation and the flow rate continues to be reported. Some cases are listed below. PV2 Process Input: If the PV2 input becomes good, device needs a power cycle to return to normal. PV2 Sim Input: If the PV2 input becomes good, device returns to normal without a power cycle. Case 2: This Switch ON: When PV4 is mapped to output, bad PV2 (Process input or Sim value) makes PV4 bad, device goes to burnout. PV4 calculated: If the PV2 input becomes good (Process input or Sim value), device needs a power cycle to return to normal. PV4 Simulated: PV2 input good or bad (Process input or Sim value), PV4 is not dependent on PV2. If PV4 sim input is Bad, device goes to Burnout. If PV4 Sim input becomes good, device returns to normal without power cycle. Case3: This switch OFF: If PV4 is mapped to output, PV4 is still good on bad PV2. PV4 calculation uses Design Pressure or Nominal / Default Pressure as below: SMV3000, Standard: Fluid = Gas: Flow equation Uses Design Pressure. Fluid = Liquid: Flow equation Uses Default / Nominal Pressure. Fluid = Steam: Flow equation Uses Design Density. Design Pressure = 1 SMV3000 or SMV800 Dynamic: Fluid = Gas, Liquid Steam: Flow equation uses Nominal/Default Pressure

Temperature Failsafe (PV3)	ON OFF	If the flow output is required to go to failsafe when there is a temperature failure, selecting Temperature Failsafe (PV2 Failsafe) will assure this. If failsafe for the flow output is not needed when a temperature sensor fails, the nominal or design values for temperature are used in the flow calculation and the flow rate continues to be reported. Some use cases are listed below. Case1: This switch On or OFF: When PV3 is mapped to Output, and when PV3 goes bad, device always goes to burnout. PV3 Process Input: If the PV3 input becomes good, device needs a power cycle to return to normal if Critical Status Latching is ON.
	ON OFF	PV3 Process Input: If the PV3 input becomes good, device returns to normal without power cycle if Critical Status Latching is OFF. PV3 Sim Input: If the PV3 input becomes good, device returns to normal without a power cycle whether Latching is ON or OFF. Case 2: This Switch ON: When PV4 is mapped to output, bad PV3 makes PV4 bad and device goes to burnout. PV4 calculated: If the PV3 input becomes good (Process input or Sim value), device needs a power cycle to return to normal. PV4 Simulated: PV3 input good or bad (Process input or Sim value), PV4 is not dependent on PV3. If PV4 sim input is Bad, device goes to Burnout. If PV4 Sim input becomes good, device returns to normal without power cycle. Case3: This switch OFF: If PV4 is mapped to output, PV4 is still good on bad PV3. PV4 calculation uses Design Temperature or Nominal / Default Temperature as below: SMV3000, Standard: Fluid = Gas: Flow equation Uses Design Temperature. Fluid = Liquid: Flow equation Uses

Temperature Failsafe (PV3) *continued*		Default / Nominal Temperature. Fluid = Steam: Flow equation Uses Design Density. Design Temperature = 1. SMV3000 or SMV800 Dynamic: Fluid = Gas, Liquid, Steam: Flow equation uses Nominal/Default Temperature
Simulation		
Simulate Differential Pressure	ON OFF	User enters the values as selected in Unit Configuration screen
Simulate Static Pressure	ON OFF	User enters the values as selected in Unit Configuration screen
Simulate Temperature	ON OFF	User enters the values as selected in Unit Configuration screen
Simulate Mass Flow	ON OFF	User enters the values as selected in Unit Configuration screen

Flow Parameters



Refer below tables for more details regarding parameters.

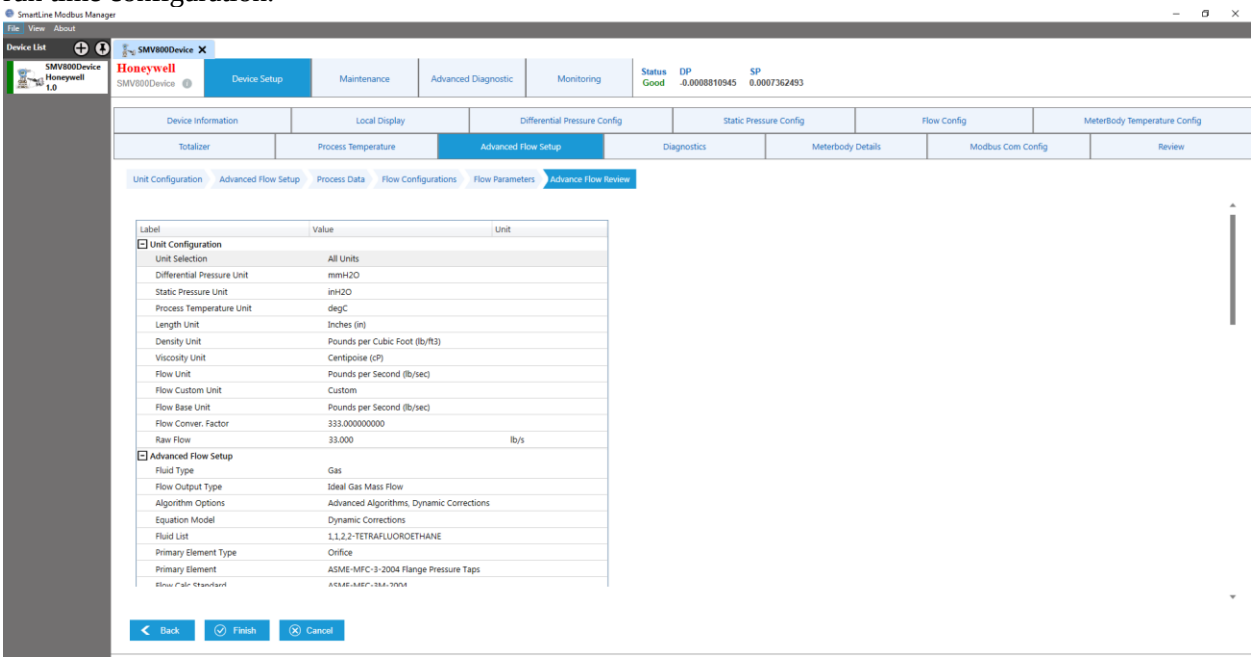
Flow Parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Pipe diameter_D	in	
Bore Diameter_d	in	
Upper Limit Reynolds Num_RnMin		Upper limit for Reynolds number. Applicable when Algorithm Options = SMV3000 Equation Model = Dynamic
Lower Limit Reynolds Num_RnMax		Lower limit for Reynolds number. Applicable when Algorithm Options = SMV3000 Equation Model = Dynamic
Isentropic Coefficient_k		Isentropic Coefficient of Expansion
Discharge Exponent	0.75 0.5	Applicable when Algorithm Options = SMV3000 Equation Model = Dynamic. Based on the selected Primary element, this is auto calculated. Coefficient of Discharge in the Flow equation is calculated using Discharge Exponent, Reynolds Coefficinet_r1 and Reynolds Coefficinet_r2.
Reynolds Coefficient_r1		Based on the selected Primary element, this is auto calculated. Applicable when Algorithm Options = SMV3000 Equation Model = Dynamic

Reynolds Coefficient_r2		Based on the selected Primary element, this is auto calculated. Applicable when Algorithm Options = SMV3000 Equation Model = Dynamic
Pipe Diameter Measuring Temp_TdMeas		Pipe diameter measuring Temperature Enter the value in the unit selected in the Unit Configuration screen. For SMV3000 algorithms, this value is fixed at 68degF. For SMV800 Algorithms, user entered Reference Temperature will be used to calculate the adjusted Diameter. **Note:** that other parameters like Pipe Thermal Expansion Coefficient, measured Pipe Diameter and Flowing Temperature values are also used in the equation)
Bore Diameter Measuring Temp_TdMeas		Bore diameter measuring Temperature Enter the value in the unit selected in the Unit Configuration screen. For SMV3000 algorithms, this value is fixed at 68degF. For SMV800 Algorithms, user entered Reference Temperature will be used to calculate the adjusted Diameter. Note that other parameters like Bote Thermal Expansion Coefficient, measured Bore Diameter and Flowing Temperature values are also used in the equation)
Atmospheric Pressure	PSIA	Local Atmospheric pressure in units as per Units configuration screen
Flow Coefficient		Flow Coefficient used when Algorithm options is Advanced Algorithms, and Primary Element is any of the types: Averaging Pitot Tube, Wedge or Integral Orifice

Advance Flow Review:

This screen provides an overview of all the Flow related parameters that are configured in above steps.

If the “Raw Flow” value given in review page is a valid number but the actual flow displayed in “Flow Config” screen is NAN, then provide soft/master reset to device. Flow can be set to NAN if any of the parameters like viscousity and density becomes invalid based on algorithm type during run time configuration.



2.3.8. Using Custom Units for Flow Measurement

The Modbus host contains a selection of preprogrammed engineering units that you can choose to represent your flow measurement. If you want the flow measurement to represent an engineering unit, you must select custom units and enter a tag that identifies the desired custom unit.

Using the Modbus config tool, selecting Custom Units allows you to choose a unit that is compatible with your application process. Additionally, a conversion factor must be calculated and entered when configuring the flow variable. This conversion factor is a value used to convert the standard units used by the SMV into the desired custom units. The standard units used by the SMV are:

- Tonnes/hour – for mass flow
- Meters^3/hour – for volumetric flow

For example, to calculate the conversion factor for a volumetric flow rate of Standard Cubic Feet per Day – SCFD

$$Flow\ in\ SCFD = \left(Flow\ in \frac{m^3}{hr} \right) \left[\left(\frac{ft}{0.3048m} \right)^3 \bullet \left(\frac{24\ hr}{1\ day} \right) \right] = Flow\ in \frac{m^3}{hr} \bullet 847.552$$

Conversion Factor = 847.552

For example, to calculate the conversion factor for a mass flow rate of Kilograms per day – kg/day

$$Flow\ in\ kg/d = \left(Flow\ in \frac{t}{hr} \right) \left[\left(\frac{kg}{.001} \right) \bullet \left(\frac{24\ hr}{1\ day} \right) \right] = Flow\ in \frac{t}{hr} \bullet 24000$$

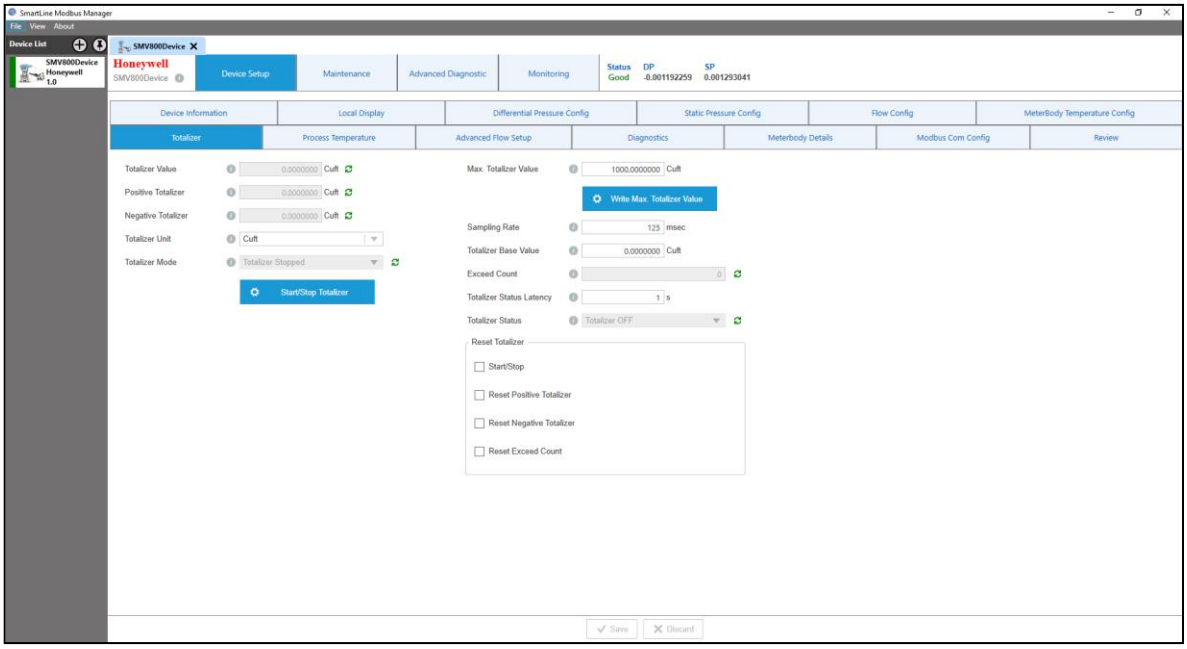
Conversion Factor = 24000

This factor is then entered as the Conversion Factor value in Flow Compensation Wizard of the Modbus config tool during configuration. Please note that when using the standard equation, the conversion factor, as well as other values, are used to calculate the Wizard Kuser factor. When using the dynamic corrections equation, the conversion factor is used as the Kuser factor.

Refer to the SCT on-line manual for additional information about using custom units

Totalizer

Allows configuration of Totalizer Ranges, Units and Modes.



Refer below tables for more details regarding parameters.

Totalizer Configuration parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Totalizer Config		
Totalizer Value		This is the Totalized Flow as calculated based on the flow rate during the time that the Totalizer is in Run mode. The Totalizer will increment during Forward (positive) flow and decrement during Reverse (negative) flow. Note: the Reverse Flow configuration setting must be enabled to calculate negative flow.
Positive Totalizer		This is the Totalized Flow for Forward flow only. The Positive Totalizer will increment when the Flow Rate is a forward flow (positive flow value).
Negative Totalizer		This is the Totalized Flow for Reverse flow only. The Negative Totalizer will decrement when the Flow Rate is a reverse flow (negative flow value). Note that the Reverse Flow configuration setting must be enabled to calculate negative flow.

Totalizer Unit	When Flow output type is Mass Flow, Totalizer Unit lists: • Kg • G • ShTons • LTons • Mton • Lb • Ounce • Custom Unit When Flow Output type is Volume Flow, Totalizer units lists: • M3 • Barrels • Ft3 • Nm3 • nLiters • Liters • scft • Scm • Gallons • Custom Unit When Custom Unit is selected, related parameters will be enabled: Custom Unit Tag Base Unit Base per Custom unit Conversion factor	This is the user-configured engineering unit for the Totalized Value. The user may select any of the standard engineering units, or custom units may be selected. For custom units, the user must provide a units tag name, a base unit, and a conversion factor for converting from the base unit to the custom unit. (value in Custom unit =value in base unit * conversion factor)
Totalizer Mode		This parameter indicates the current mode of the Totalizer as RUN or STOP.
Start/Stop Totalizer	• Start Totalizer • Stop Totalizer	This method will allow the user to Start the Totalizer or Stop the Totalizer.
Max. Totalizer Value		This is a user configurable value indicating the maximum Totalizer value. When the Totalizer Value reaches this maximum value, it automatically resets to zero and continues totalizing. It also increments the Exceed Counter. On a Negative Totalizer Max value, with a decreasing Total Flow value, Totalizer will reset only on crossing the negative max value. Ex: Totalizer Max = -1000lb On an emptying Tank, say Totalizer reaches -100, -200, -300 etc. Even though -100, -200 etc are greater than -1000, this does not cause Totalizer Reset until after the Totalizer goes below -1000. Here Exceed counter will be incremented every time Totalizer reaches below -1000 lb.

Sample Rate		This is the Totalizer sampling rate. The Totalizer value will be updated at the configured rate. The rate may be configured in increments of 125 ms. The shorter the sampling rate, the more frequently the Totalizer Value will be updated.
Totalizer Base Val		When the Totalizer is set to Run mode after a Reset, it will start incrementing/decrementing from this base value.
Exceed count		This value indicates the number of times the Totalizer Value has reached the user-configured Maximum Totalizer Value.
Totalizer Status Latency		Each time the Totalizer Value has reached the Maximum Totalizer Value, the Max Totalizer Status will be set. The user-configurable Totalizer Status Latency indicates the length of time this status will be active before it is reset.
Totalizer Status		This parameter indicates the current status of the Totalizer Value. Possible values are: - Good - Bad - Totalizer OFF - Simulation Mode Active
Reset Totalizer	• Start/Stop • Reset Positive Totalizer • Reset Negative Totalizer • Reset Totalizer Exceed Counter	This method will allow the user to: • Start or stop the totalizer • Reset the Positive Totalizer to zero or to the configured Totalizer base Value • Reset the Negative Totalizer to zero or to the configured Totalizer base Value • Reset the Totalizer Exceed Counter to zero

Note: Based on the host implementations, user entered values for Totalizer ranges and limits will be rounded off to 7 digits (this includes the digits before and after the decimal point) and rest will be filled with 0's (digits 8 and above) to represent the values in IEEE floating point format.

This will be the value that gets written to the device.

For example:

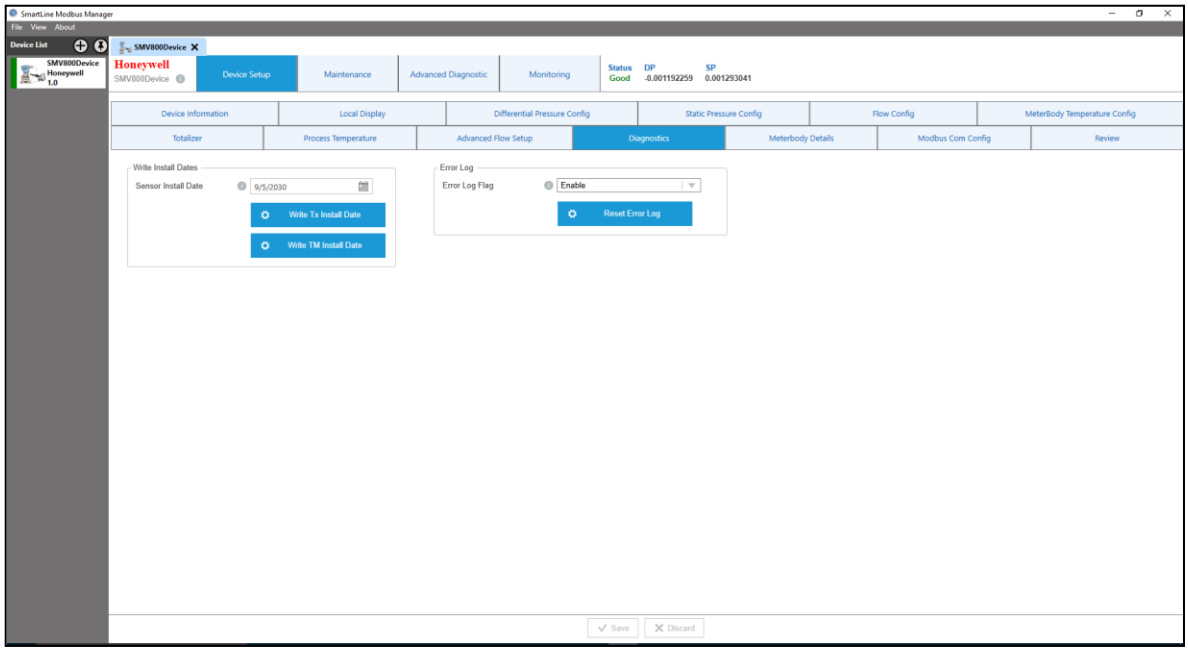
4567.12459 will be rounded to 4567.125

12345678 will be rounded to 12345680

123456789 will be rounded off to 123456800

2.3.9. Diagnostics:

This tab provides the information about the device diagnostic configuration selection for error log. User can read and write the transmitter install date using this tab which is used by device for advance diagnostics related to process values tracking

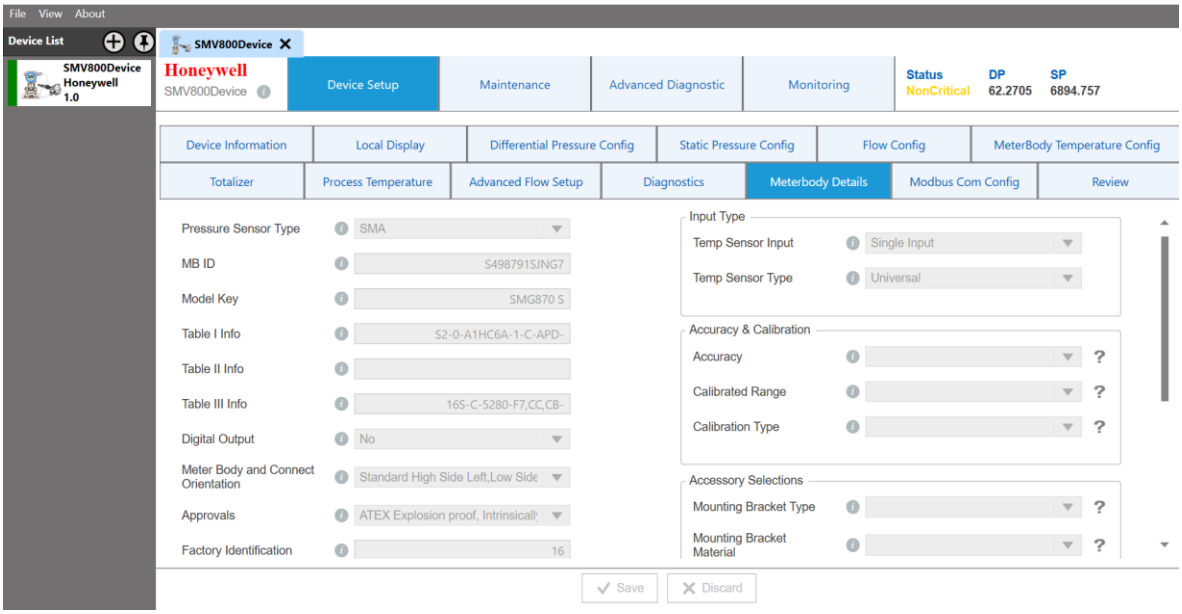


Diagnostics – Error Log		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Error Log	Error Log Flag	Allows selection to Enable or Disable the Error Log
	Reset Error Log	Allows resetting of the Error Log

Diagnostics – Advanced Diagnostics – Write Install Dates		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Sensor Install Date		One-time writable installation date for the thermocouple or RTD sensor for measuring the temperature input
Write Install Dates	**Tx Install Date**	One-time writable installation date for the Meter Body.
	TM Install Date	One-time writable installation date for the Temperature Module.

2.3.10. Meterbody Details:

This tab provides the detail information about the meterbody. User can read the meterbody ID and model key using this tab.



Refer below tables for meter body details.

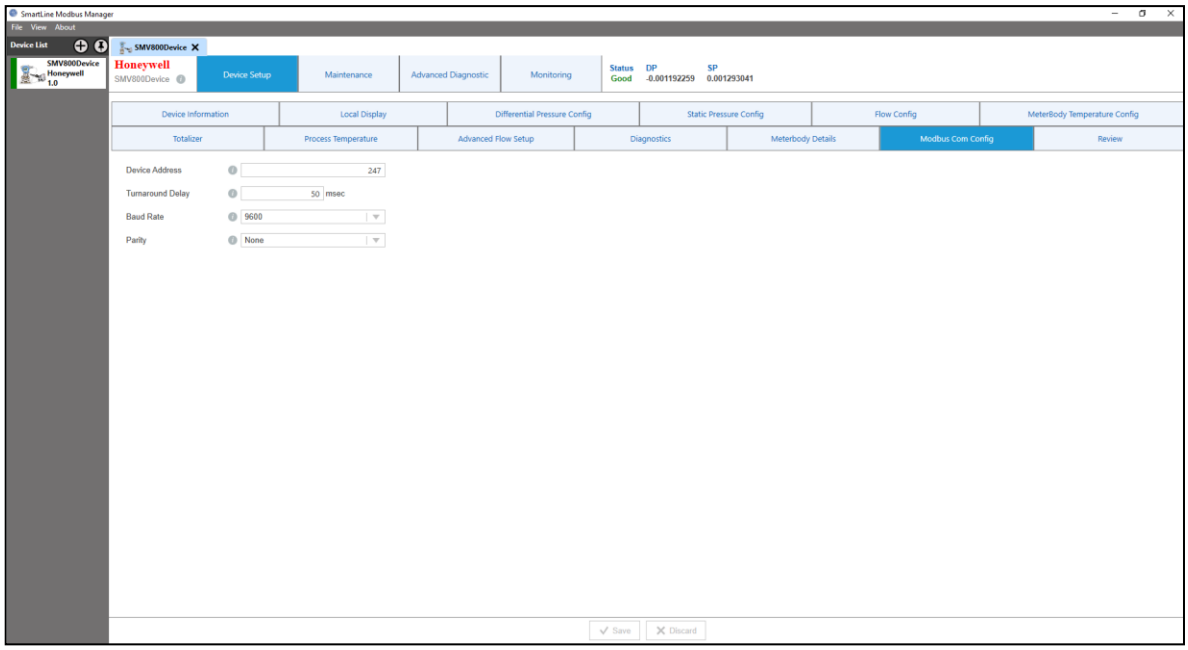
Meter Body Details Parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Pressure Sensor Type		Pressure Sensor Type
MB ID		The serial number of the Meter Body
Model Key		The Key Number portion of the device model number (representing the Differential and Static Pressure measurement ranges for this device)
Table I Info		The Table I portion of the device model number (represents the temperature sensor input type available for this device)
Table II Info		The Table II portion of the device model number (indicates availability of Digital Output for this device)
Table III Info		The Table III portion of the device model number (indicates various materials of construction for this device)
Input Type	Temp Sensor Input	Identifies the availability of single or dual temperature sensor input
	Temp Sensor Type	Identifies the availability of the type of sensor input (RTD-only input or Universal)
Digital Output		Identifies the availability of Digital Output
Material Details	Process Head Material	Material of construction for the Meter Body process heads
	Diaphragm Material	Material of construction for the Meter Body

		diaphragm
	Fill Fluid	Fill fluid used in the Meter Body
	Process Connection	Size and type of the Meter Body process piping connection ports
	Bolt/Nut Material	Material of construction for the nuts and bolts used in Meter Body
	Vent Head Type	Identifies the installation of single or dual vent connection ports for the Meter Body
	Vent/Drain Location	Location details of the vent/drain ports in the Meter Body
	Vent Material	Material of construction for the Meter Body vent ports
	Gasket Material	Material of construction for the Meter Body gaskets
Meter Body and Connect Orientation		The rotation orientation of the Meter Body process heads and piping connection ports
Approvals		A list of official agency approvals for the transmitter

Tx Electronics Selections	Electronic Housing Material	Material of construction for the electronics housing
	Connection Type	Size/type of wiring conduit ports on the housing
	Lightning Protection	Identifies if lightning protection is installed
	Analog Output	Identifies the availability of Analog Output
	Digital Protocol	Identifies the device Digital Communications Protocol (HART, DE, Modbus)
	Customer Interface Indicator	Identifies the type of Display available (None or Advanced)
	Ext Zero, Span & Config Buttons	Identifies the selection of external calibration buttons available
	Languages	Identifies the selection of languages available via the Display and communications hosts
Configuration Selections	Diagnostics	Standard Diagnostics is the only selection available
	Write Protect	Identifies the hardware write protect configuration ordered with the device (On or Off)
	Failsafe	Identifies the analog failsafe configuration ordered with the device (High or Low burnout)
	Hi & Lo Output Limits	Identifies the configured high and low analog output range (Standard or Namur)
	General Configuration	Identifies the configuration ordered with the device (standard configuration or custom)
Accuracy & Calibration	Accuracy	Only Standard Accuracy is available
	Calibrated Range	Identifies the factory calibration selection ordered for this device (Standard factory calibration or custom range) for the three process inputs (Differential Pressure, Static Pressure, Process Temperature)
	Calibration Type	Identifies the number of custom factory calibrations ordered for this device (single, dual, or triple custom calibrations are available for Differential and Static Pressure inputs)
Accessory Selections	Mounting Bracket Type	Identifies the shape (angle or flat) of the device mounting bracket ordered with the device
	Mounting Bracket Material	Identifies the material of construction of the device mounting bracket ordered with the device
	Customer Tag	Identifies the number of identification tags ordered for this device (none, one or two)
	Unassembled Conduit Plugs & Adapters	Identifies the size, quantity and material of any unassembled conduit plugs and adapters ordered with this device
Certifications & Warranty		Lists all special certifications and warranties ordered with this device
Factory Identification		Identifies the location of the factory for manufacturing this device

2.3.1. MODBUS COM Config

This tab provides the detail information about the Modbus communication parameters. User can read and write the Device Address, Turn Around Delay, Baud Rate, Parity using this tab.

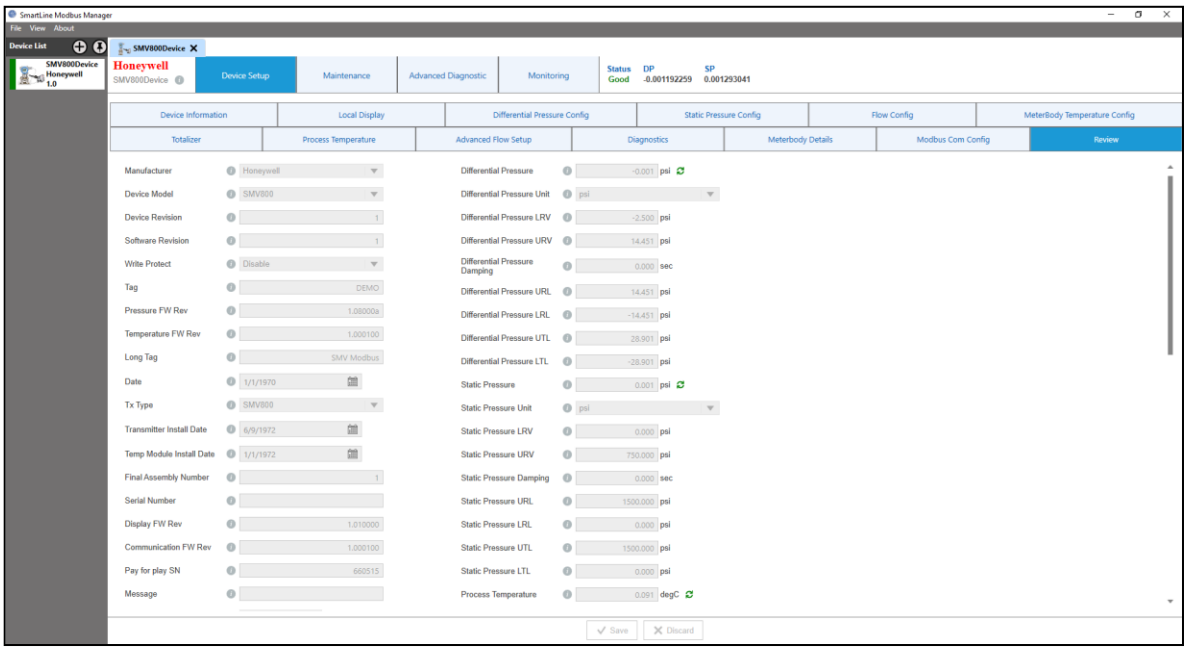


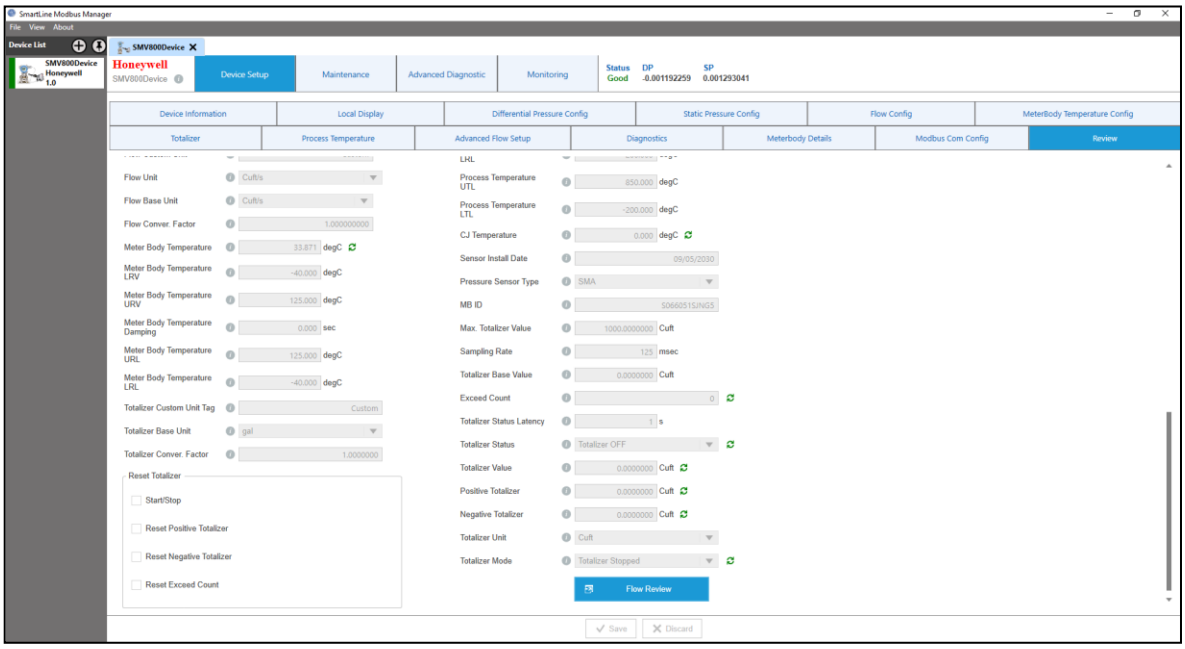
Refer the below table for modbus configuration parameter.

MODBUS Configuration Parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Device Address	Slave device address range is 1 to 247	The device address field can be used to configure the device address.
Turnaround Delay	Turn around delay range is 1 to 200 ms	The Turnaround Delay time (ms) field can be used to configure the device's turnaround delay time, it is the amount of time that the device takes to respond to a Modbus request
Baud Rate	Available baud rate: 1200, 2400, 4800, 9600, 19200	The baud rate is user selectable under Modbus com config tab. Default baud rate is 9600
Parity	Available Parity selection: even, odd, none	The parity field can be used to configure parity type.

Review:

This tab provides information about all the device parameters. User can not configure any of the parameters using this tab. All parameters are read only in this tab.

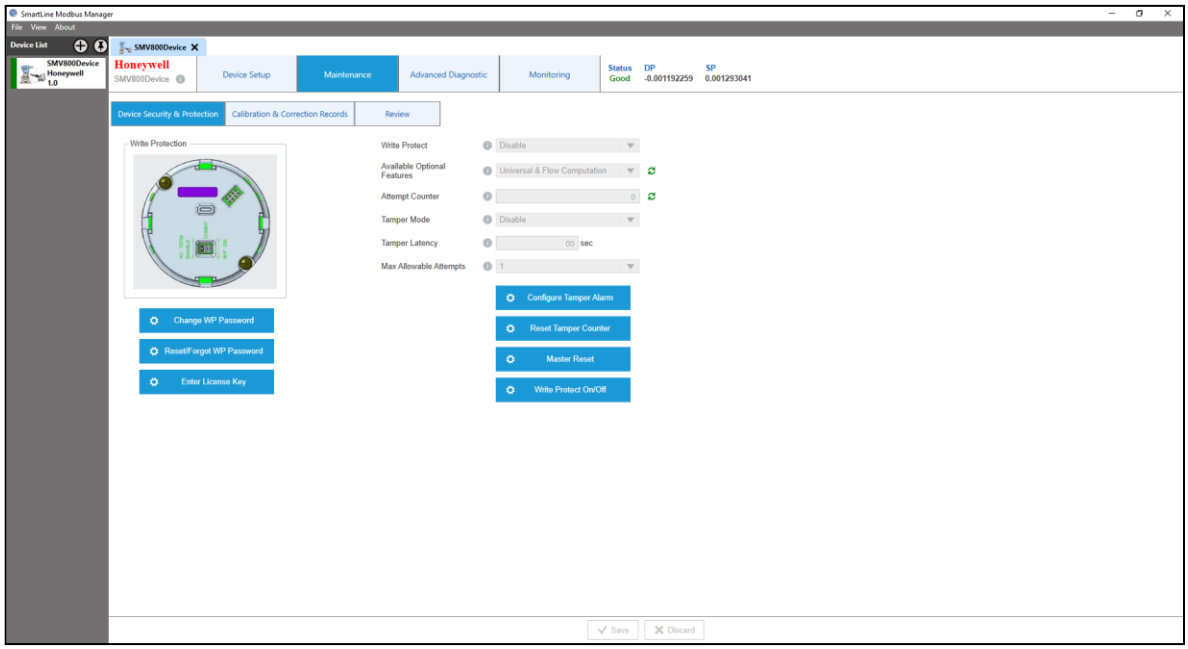




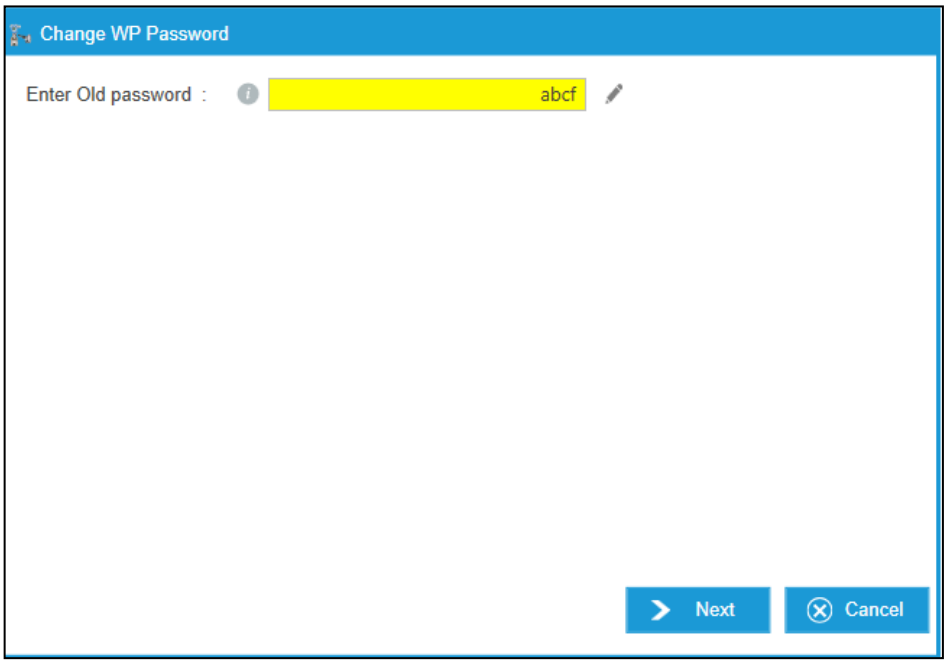
2.4 Maintenance:

2.4.1. Device security & protection:

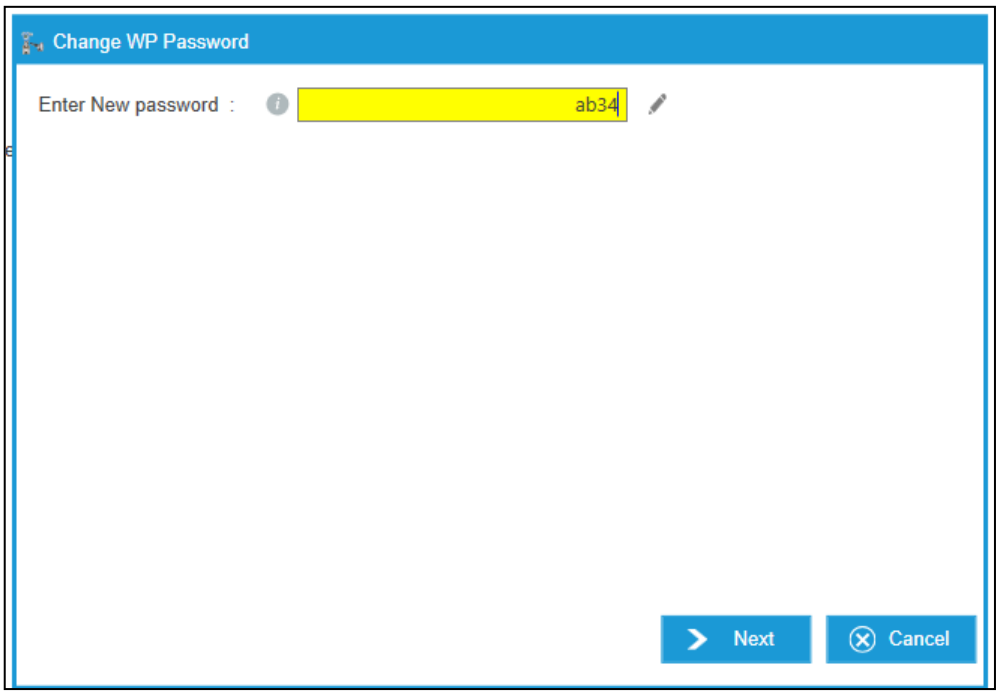
This menu provides interface to modify the software Write Protection, Tamper Alarm, Soft reset and License Entry option to upgrade optional features.

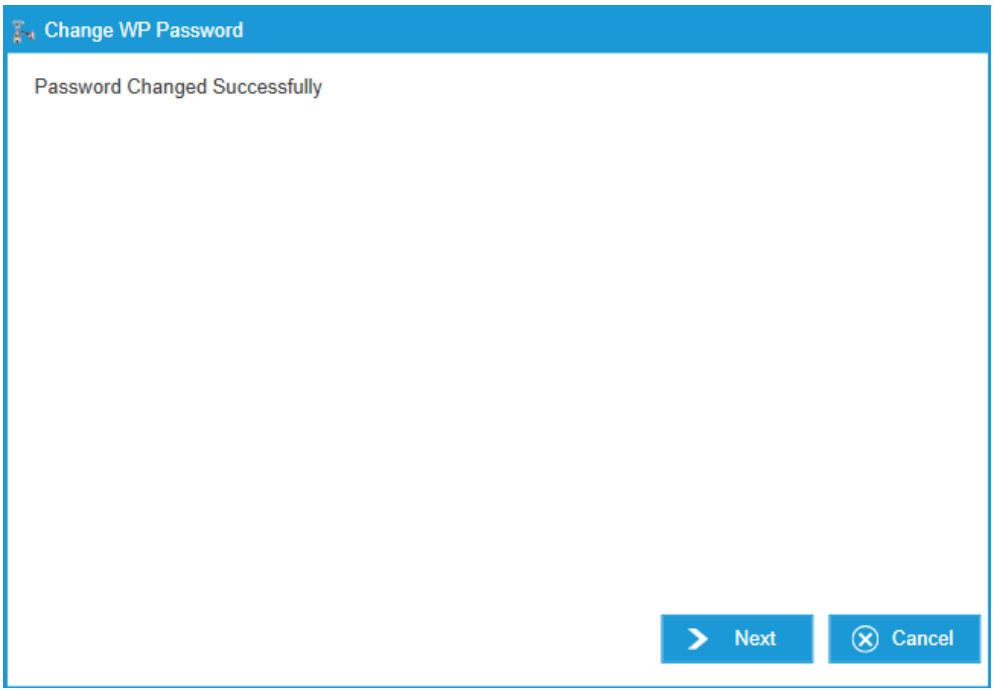


Change WP Password: This method is used to change the software write protect password. Enter the old or previous password that needs to be changed.



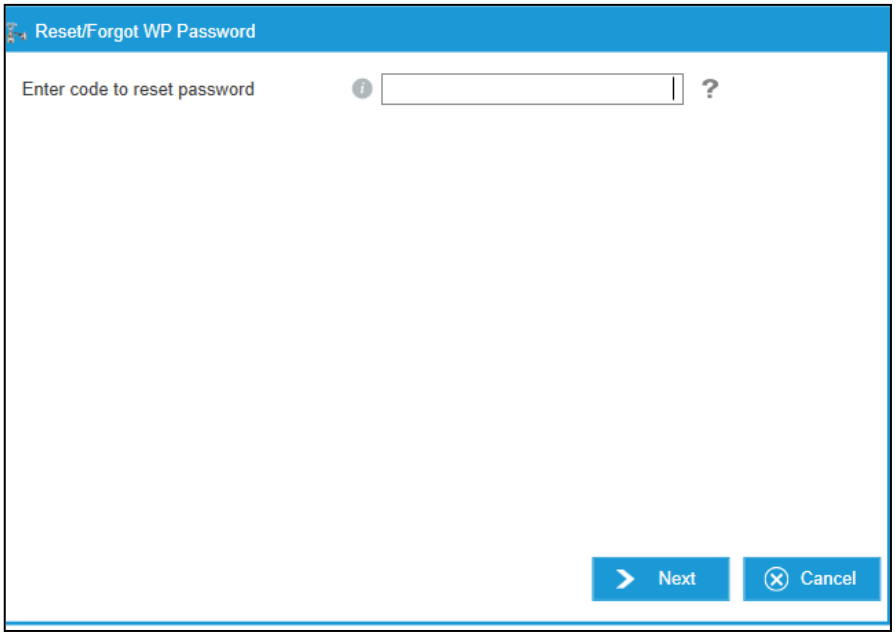
Enter New Password that is used for enabling or disabling software write protection.


Change WP Password
Enter New password :
ab34
Next
Cancel


Change WP Password
Password Changed Successfully
Next
Cancel

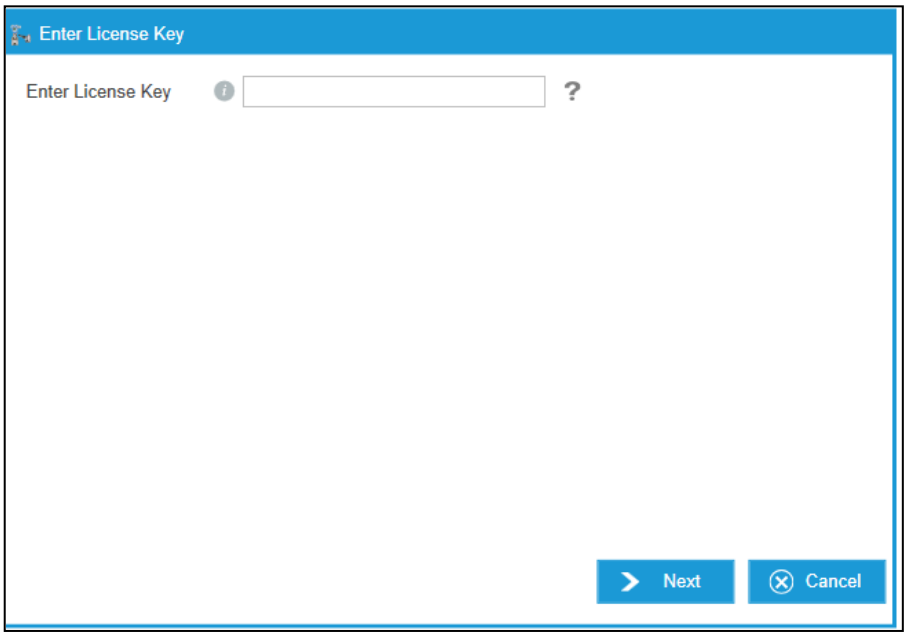
Reset WP Password: Incase if software write protect password is forgotten, please use this method to reset to a new password. Get the Reset code by providing serial number of device to TAC or Technical support.

Enter the Reset code shared by technical assistance in the screen shown below

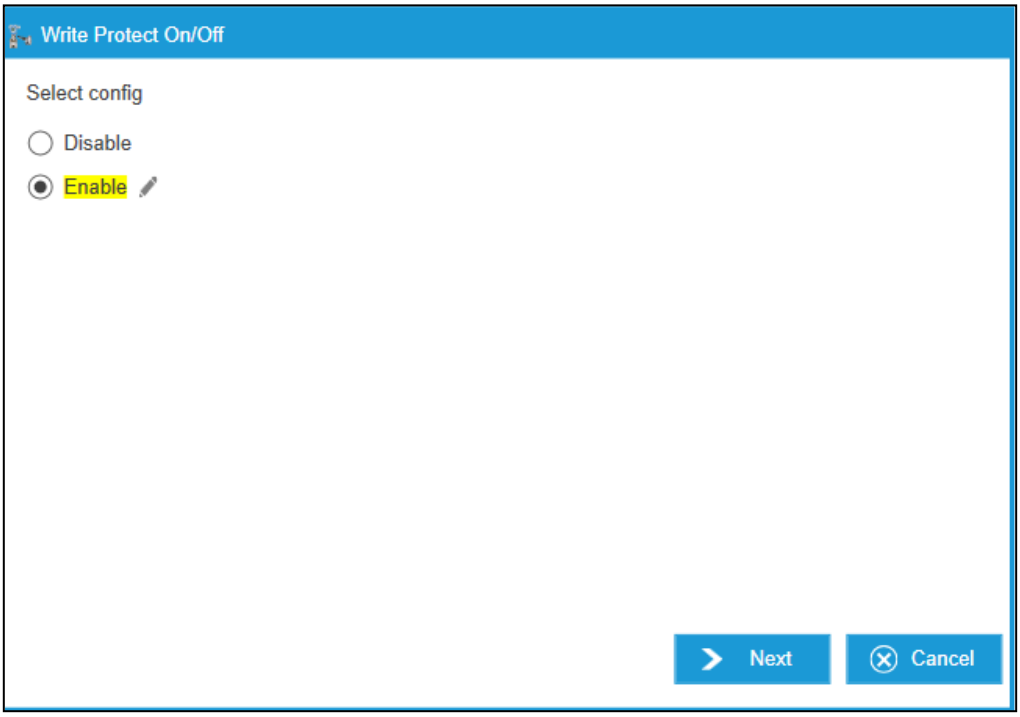


Enter License to enable features: This method provides means to enable optional features such as Universal input and Compensated Flow.

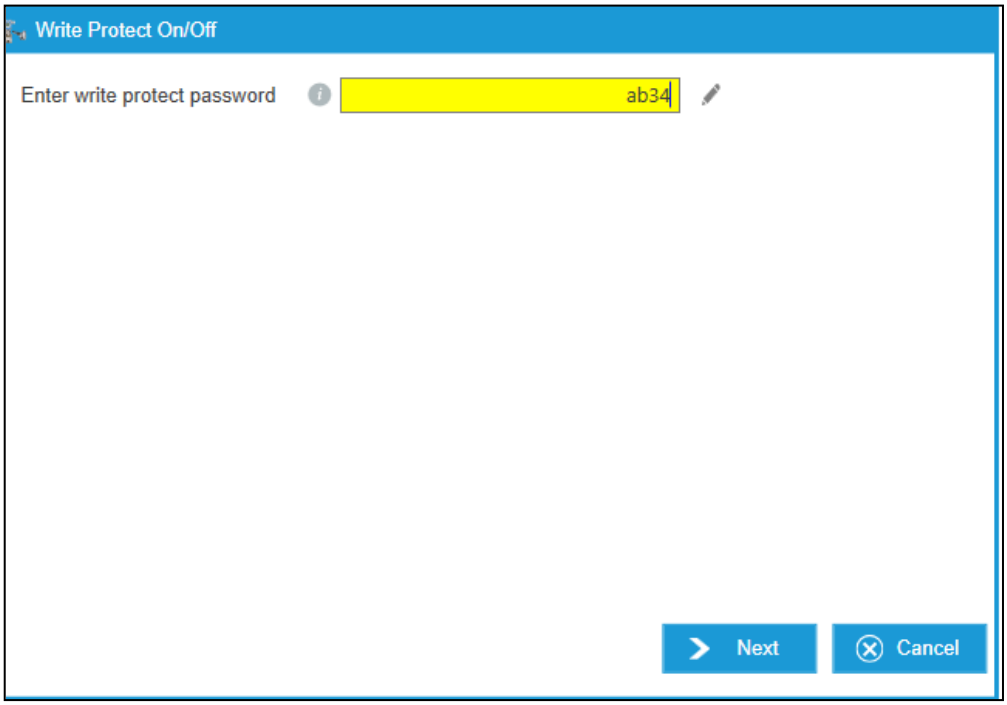
Enter the License key recevied through TAC or technical support to upgrade device functionality to handle Universal or Compensated Flow.

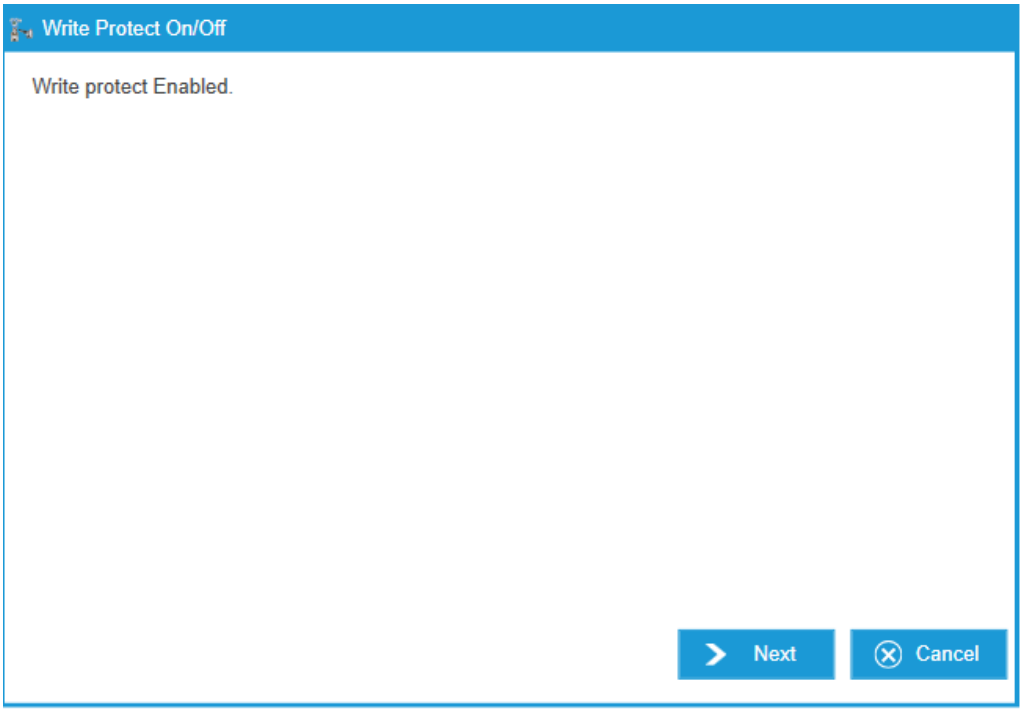


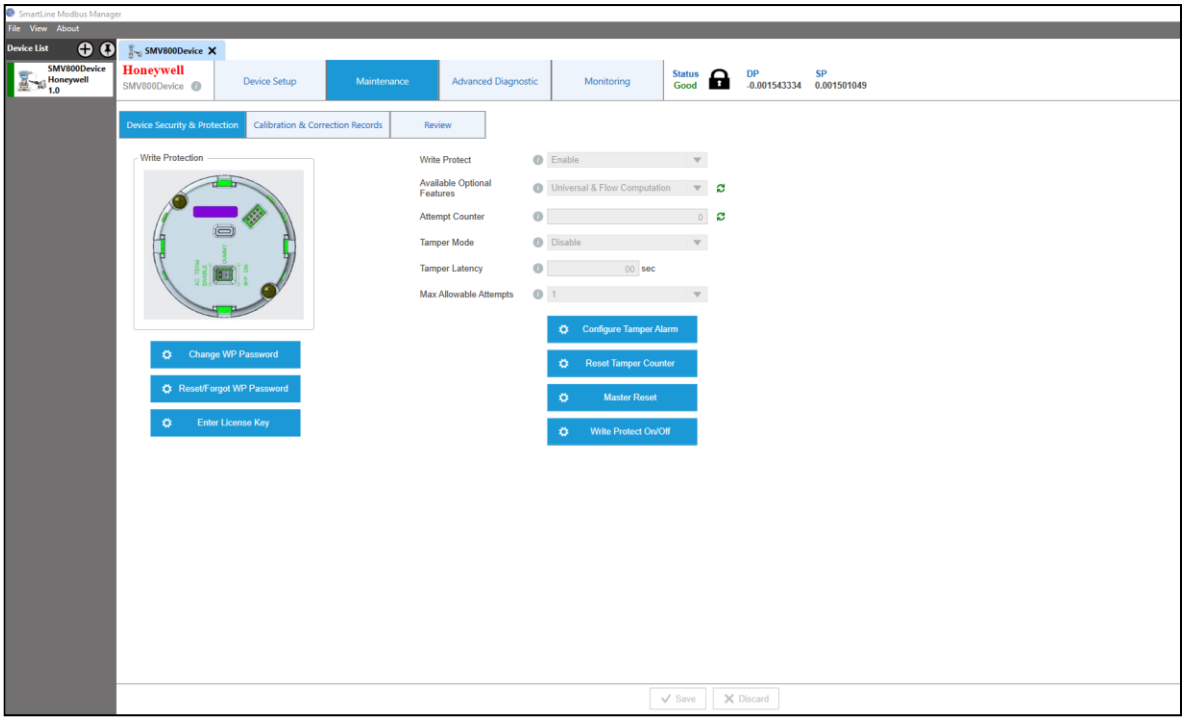
Enable/Disable WP :Software write protection can be enabled or disabled using this method by providing the user password.



Enter password to make write protection changes.



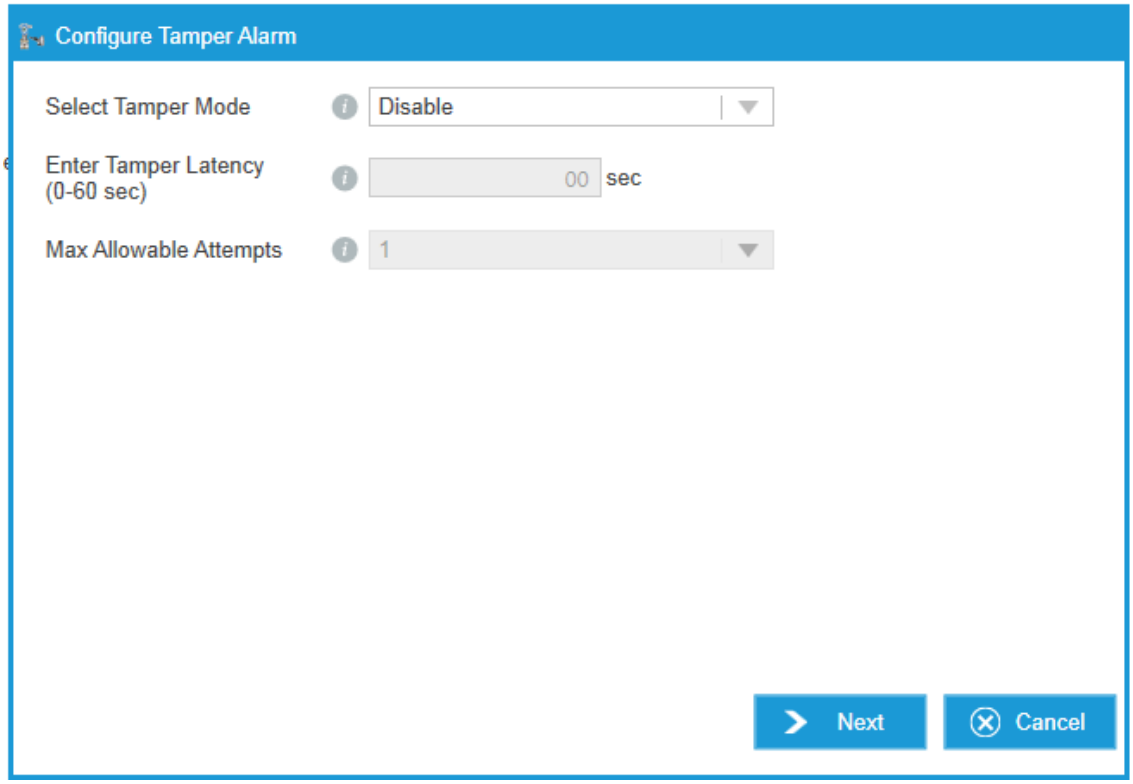




When write protection is enabled a lock symbol is shown in the header of tool next to process variables and status.

The menu also provides infomration about the Optional features available with device, Master reset provides soft reset to device.

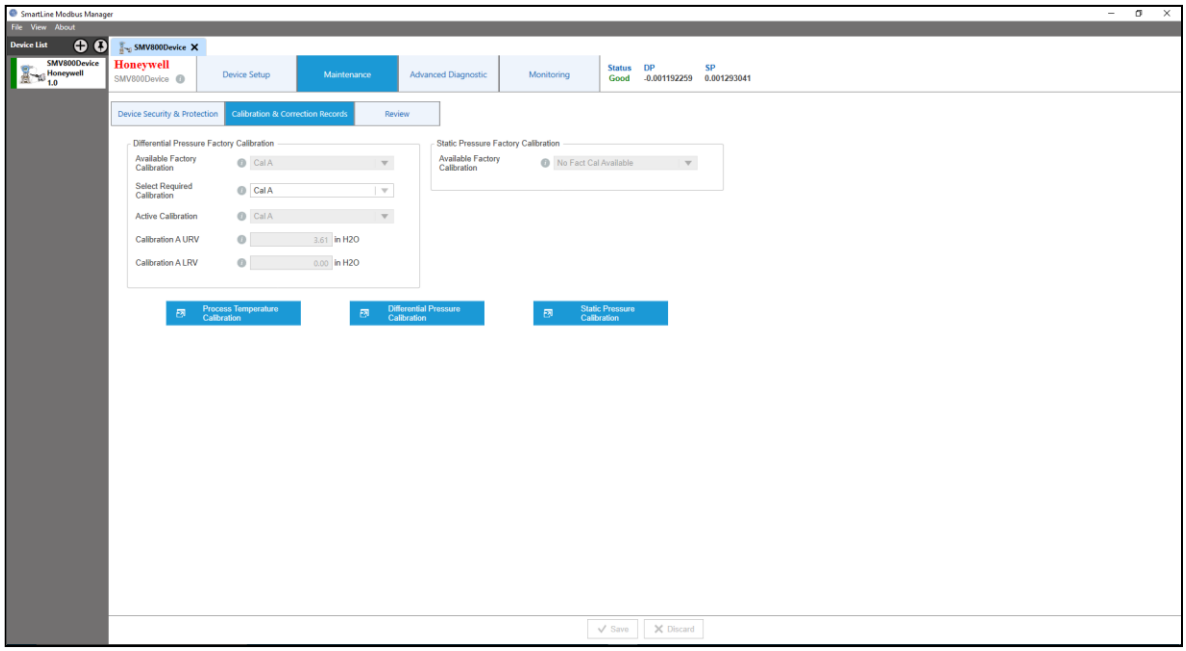
Configure Tamper Alarm : Use this method to configure Tamper feature parameters like Tamper Mode,Latency and Maximum allowable attempts that device monitors to raise tamper alarm.



Use method “Reset Tamper Counter” to reset the tamper attempts.

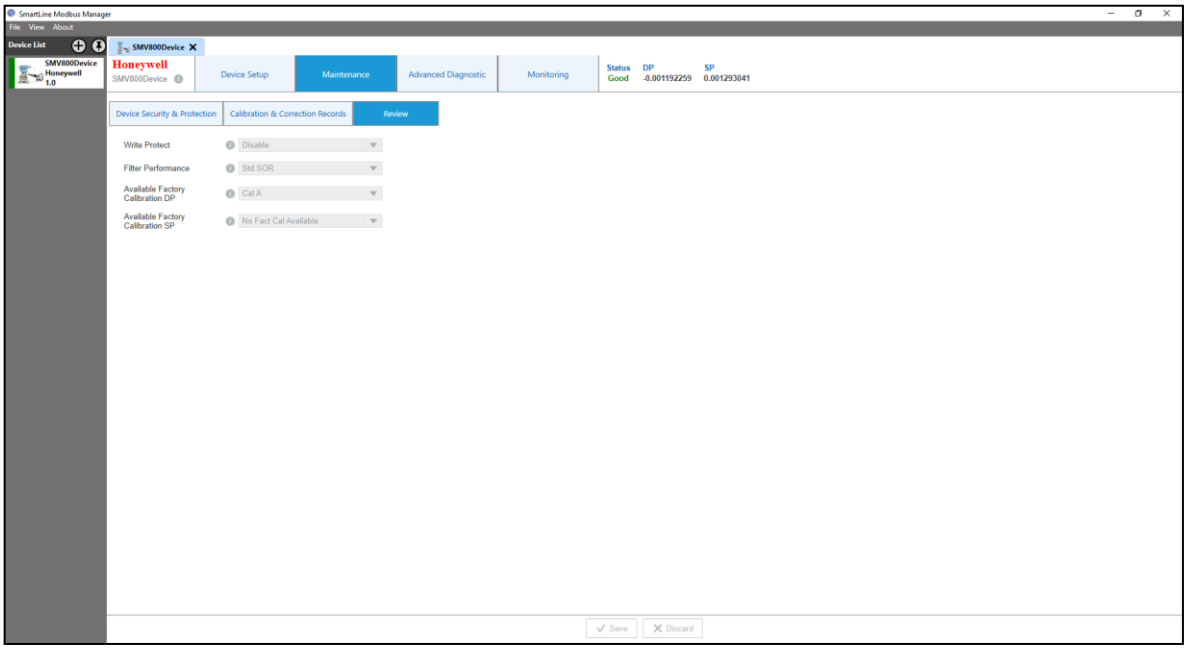
2.4.2. Calibration & Correction records:

This menu contains details of Factory Dual/Triple calibration and methods to perform calbration of DP, SP and PT.



2.4.3. Review [Maintenance]:

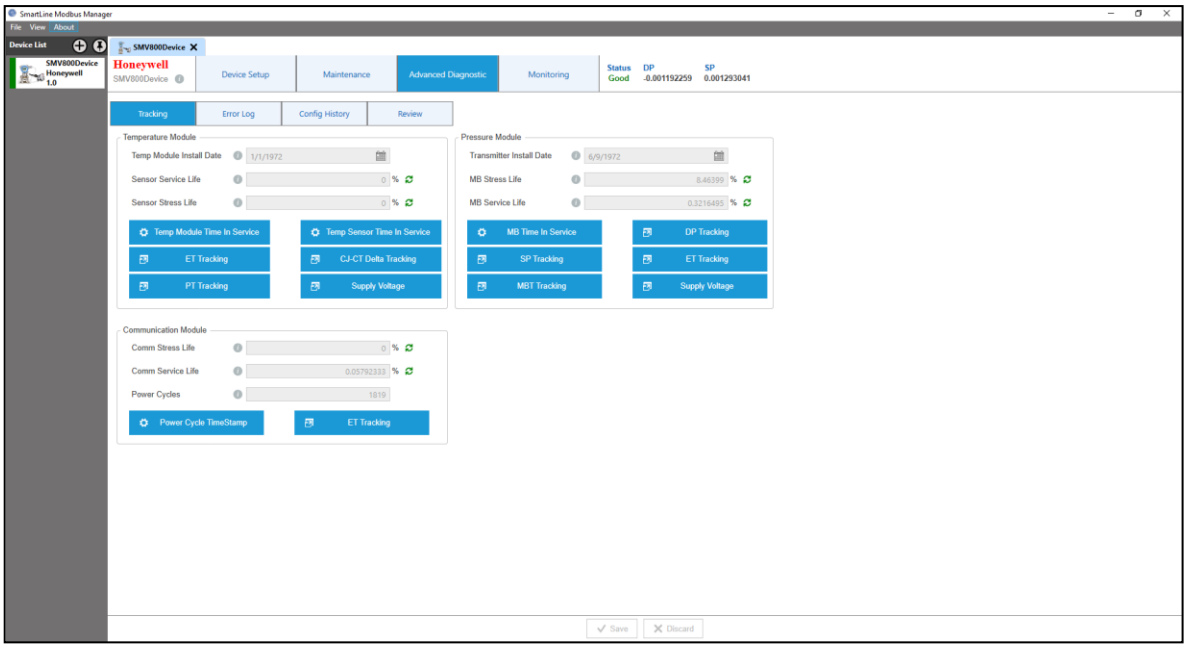
This tab provides review information regarding maintematnce details.



2.5 Advanced Diagnostic

This screen provides information regarding Advanced diagnostics. Including Tracking, Error Log, Configuration History and a Review tab.

2.5.1. Tracking:



Refer below tables Advanced Diagnostic details.

Comm Module

Diagnostics – Advanced Diagnostics – Modules – Comm Module		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Comm Stress Life		Percent of Communication Module service life spent in stressful conditions. Indicates the % of service life where one or more of processor core temperature, or electronics temperature are within 10% of respective range limits.
Comm Service Life		Percent of the expected Service Life that the Communications Module has been in service. Value is based on electronics temperature. Service life accumulates faster at higher temperatures with an exponential relationship.
Power Up Diagnostics	Power Cycles	The total number of times the device has been reset by power cycle
	Power Cycle TimeStamp	Displays time since last power cycle (in minutes)
ET Tracking	Maximum ET Limit	Communications board Electronics Temperature (ET) highest operating limit from specification.
	Maximum ET Value	Communications board Electronics Temperature (ET) highest measured value
	ET Up Cnt	The total number of minutes that the Communications board Electronics Temperature (ET) has exceeded the upper stress limit (ET Upper Limit)

ET Tracking	Minimum ET Limit	Communications board Electronics Temperature (ET) lowest operating limit from specification.
	Minimum ET Value	Communications board Electronics Temperature (ET) lowest measured value
	ET Dn Cnt	The total number of minutes that the Communications board Electronics Temperature (ET) has been below the lower stress limit (ET Lower Limit)
	ET Upper Limit	High Electronics Temperature stress limit – if the Communications board ET exceeds this limit, the ET Up Cnt and ET Up Time will be updated. Value is equal to “Max ET Limit” minus 10% of limits range.
	ET Up Time	Displays time since the Communications board Electronics Temperature was last measured as exceeding the ET Upper Limit (in minutes)
	ET Lower Limit	Low Electronics Temperature stress limit – if the Communications board ET exceeds this limit, the ET Dn Cnt and ET Dn Time will be updated. Value is equal to “Min ET Limit” plus 10% of limits range.
	ET Dn Time	Displays time since the Communications board Electronics Temperature was last measured below the ET Lower Limit (in minutes)

Temperature Module

Diagnostics – Advanced Diagnostics – Modules – Temperature Module		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Temp Module Install Date		The Temperature Module Installation Date
Sensor Service Life		Percent of the expected Service Life that the Temperature Module has been in service. Value is based on electronics temperature. Service life accumulates faster at higher temperatures with an exponential relationship.
Sensor Stress Life		Percent of Temperature Sensor service life spent in stressful conditions. Indicates the % of service life where one or more of Process Temperature, processor core temperature, or electronics temperature are within 10% of respective range limits.
Temp Module Time in Service		Total time that the Temperature Module has been in service. Time based on the Temperature Module Install Date.
Temp Sensor Time in Service		Total time that the Temperature Sensor has been in service Based on the Sensor Install Date
ET Tracking	Maximum ET Value	Temperature Module Electronics Temperature (ET) highest measured value
	ET Up Cnt	The total number of minutes that the Temperature Module Electronics Temperature (ET) has exceeded the upper stress limit
	Minimum ET Value	Temperature Module Electronics Temperature (ET) lowest measured value
	ET Dn Cnt	The total number of minutes that the Temperature Module Electronics Temperature (ET) has been below the lower stress limit

ET Tracking	**ET Dn Time**	Displays time elapsed since the Temperature Module Electronics Temperature was last measured below the ET lower stress limit (in minutes)
	ET Up Time	Displays time elapsed since the Temperature Module Electronics Temperature last measured as exceeding the ET upper stress limit (in minutes)
CJ-CT Delta Tracking	CT-CJ Delta Maximum Value	Maximum measured difference between the Temperature Processor Core temperature (CT) and the Cold Junction temperature (CJ)
	CT-CJ Delta Value	Currently measured difference between the Temperature Processor Core Temperature (CT) and the Cold Junction temperature (CJ)
	CT-CJ Delta Up Count	The total number of minutes that the Temperature Processor Core temperature (CT) has been higher than the Cold Junction temperature (CJ)
	CT-CJ Delta Minimum Value	The total number of minutes that the Temperature Processor Core temperature (CT) has been less than the Cold Junction temperature (CJ)
	CT-CJ Delta Down Count	The total number of minutes that the Temperature Processor Core temperature (CT) has been lower than the Cold Junction temperature (CJ)
	CT-CJ Down TimeStamp	Displays time elapsed since the Temperature Processor Core temperature (CT) was last measured as less than the Cold Junction temperature
	CT-CJ Up TimeStamp	Displays time elapsed since the Temperature Processor Core temperature (CT) was last measured as higher than the Cold Junction temperature
PT Tracking	PT Low Alarm Limit	The configured Low Alarm Limit for the Process Temperature input
	PT Low Alarm Counter	The total number of minutes that the Process Temperature input has been below the PT Low Alarm Limit
	PT High Alarm Limit	The configured High Alarm Limit for the Process Temperature input
	PT High Alarm Counter	The total number of minutes that the Process Temperature input has exceeded the PT High Alarm Limit
	PT Low Value & TimeStamp	Displays the lowest recorded value of Process Temperature and the time elapsed since the Process Temperature last dropped below the PT High Alarm Limit
	PT High Value & TimeStamp	Displays the highest recorded value of Process Temperature and the time elapsed since the Process Temperature last exceeded the PT High Alarm Limit
Supply Voltage	Maximum Supply Voltage Value	Displays the highest recorded value of the Temperature Sensor Supply Voltage
	Minimum Supply Voltage Value	Displays the lowest recorded value of the Temperature Sensor Supply Voltage
	Supply Voltage Up TimeStamp	Displays the time elapsed since the Temperature Sensor Supply Voltage last exceeded the Maximum Supply Voltage Value
	Supply Voltage Down TimeStamp	Displays the time elapsed since the Temperature Sensor Supply Voltage last dropped below the Minimum Supply Voltage Value

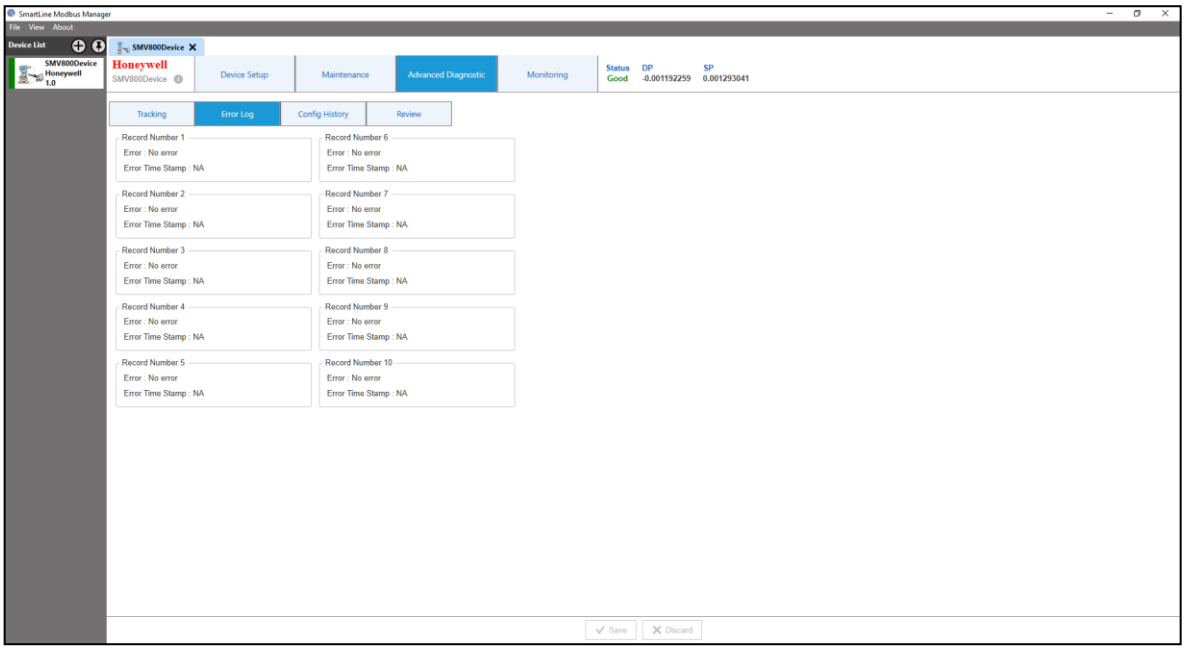
Pressure Module

Diagnostics – Advanced Diagnostics – Modules – Pressure Module		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Transmitter Install Date		The Pressure Module Installation Date
MB stress life		Percent of Pressure Sensor module service life spent in stressful conditions. Indicates the % of service life where one or more of Differential Pressure, Static Pressure, processor core temperature, or electronics temperature are within 10% of respective range limits.
MB service life		Percent of the expected Service Life that the Pressure Module has been in service. Value is based on electronics temperature. Service life accumulates faster at higher temperatures with an exponential relationship.
MBT Time in Service		Total time that the Pressure Module has been in service. Time based on the Tranmsitter Install Date.
DP Tracking	DP Maximum	The highest measured value of the Differential Pressure input
	DP Up Count	The total number of minutes that the Differential Pressure input has exceeded the upper stress limit
	DP Minimum	The lowest measured value of the Differential Pressure input
	DP Dn Count	The total number of minutes that the Differential Pressure input has been below the lower stress limit
	DP Up Limit	High Differential Pressure stress limit – if the Differential Pressure input exceeds this limit, the DP Up Count and DP Up Timestamp will be updated. Value is equal to “Max DP Limit” minus 10% of limits range.
	DP Up TimeStamp	Displays time elapsed since the Differential Pressure was last measured as exceeding the DP Up Limit
	DP Dn Limit	Low Differential Pressure stress limit – if the Differential Pressure input drops below this limit, the DP Down Count and DP Down Timestamp will be updated. Value is equal to “Min DP Limit” plus 10% of limits range.
	DP Dn TimeStamp	Displays time elapsed since the Differential Pressure was last measured as lower than the DP Down Limit
SP Tracking	Maximum SP Value	The highest measured value of the Static Pressure input
	SP Up Count	The total number of minutes that the Static Pressure input has exceeded the upper stress limit
	SP Up Limit	High Static Pressure stress limit – if the Static Pressure input exceeds this limit, the SP Up Count and SP Up Timestamp will be updated. Value is equal to “Max SP Limit” minus 10% of limits range.
	SP Up TimeStamp	Displays time elapsed since the Static Pressure was last measured as exceeding the SP Up Limit

ET Tracking	Maximum ET Value	Pressure Module Electronics Temperature (ET) highest measured value
	ET Up Count	The total number of minutes that the Pressure Module Electronics Temperature (ET) has exceeded the upper stress limit
	Minimum ET Value	Pressure Module Electronics Temperature (ET) lowest measured value
	ET Dn Count	The total number of minutes that the Pressure Module Electronics Temperature (ET) has been below the lower stress limit
	ET Dn TimeStamp	Displays time elapsed since the Pressure Module Electronics Temperature was last measured below the ET lower stress limit
	ET Up TimeStamp	Displays time elapsed since the Pressure Module Electronics Temperature last measured as exceeding the ET upper stress limit
MBT Tracking	Maximum MBT Value	Meter Body Temperature (MBT) highest measured value
	MBT Up Count	The total number of minutes that the Meter Body Temperature (MBT) has exceeded the upper stress limit
	Minimum MBT Value	Pressure Module Meter BodyTemperature (MBT) lowest measured value
	MBT Dn Count	The total number of minutes that the Meter Body Temperature (MBT) has been below the lower stress limit
	MBT Up Limit	High Meter Body Temperature stress limit – if the Meter Body Temperature exceeds this limit, the MBT Up Count and MBT Up Timestamp will be updated. Value is equal to “Max MBT Limit” minus 10% of limits range.
	MBT Up TimeStamp	Displays time elapsed since the Meter Body Temperature last measured as exceeding the MBT upper stress limit
	MBT Dn Limit	Low Meter Body Temperature stress limit – if the Meter Body Temperature drops below this limit, the MBT Down Count and MBT Down Timestamp will be updated. Value is equal to “Min MBT Limit” plus 10% of limits range.
	MBT Dn TimeStamp	Displays time elapsed since the Meter Body Temperature was last measured below the MBT lower stress limit
Supply Voltage	Maximum Supply Voltage Value	Displays the highest recorded value of the Pressure Sensor Supply Voltage (AVDD)
	Minimum Supply Voltage Value	Displays the lowest recorded value of the Pressure Sensor Supply Voltage (AVDD)
	Supply Voltage Dn TimeStamp	Displays the time elapsed since the Pressure Sensor Supply Voltage last exceeded the Max Supply Voltage Value
	Supply Voltage Up TimeStamp	Displays the time elapsed since the Pressure Sensor Supply Voltage last dropped below the Min Supply Voltage Value

2.5.2. Error Log

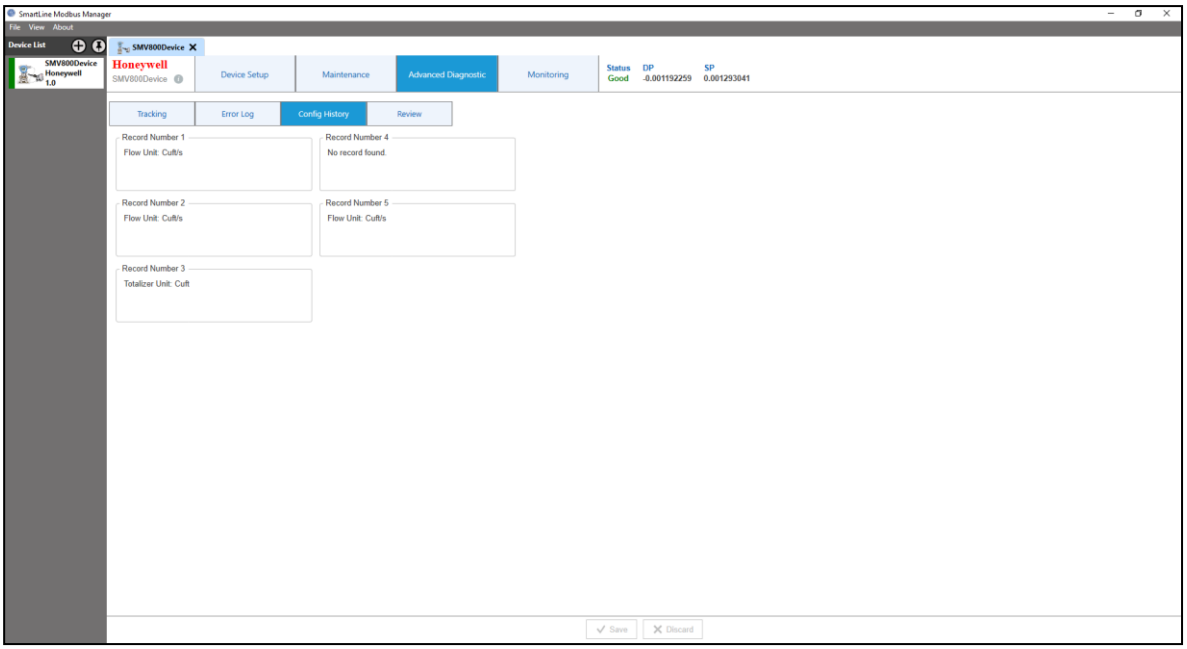
This tab provides review information regarding Error Log details.



Diagnostics – Error Log		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
	Show Error Log	Displays the last 10 error messages recorded and the elapsed time since the error occurred

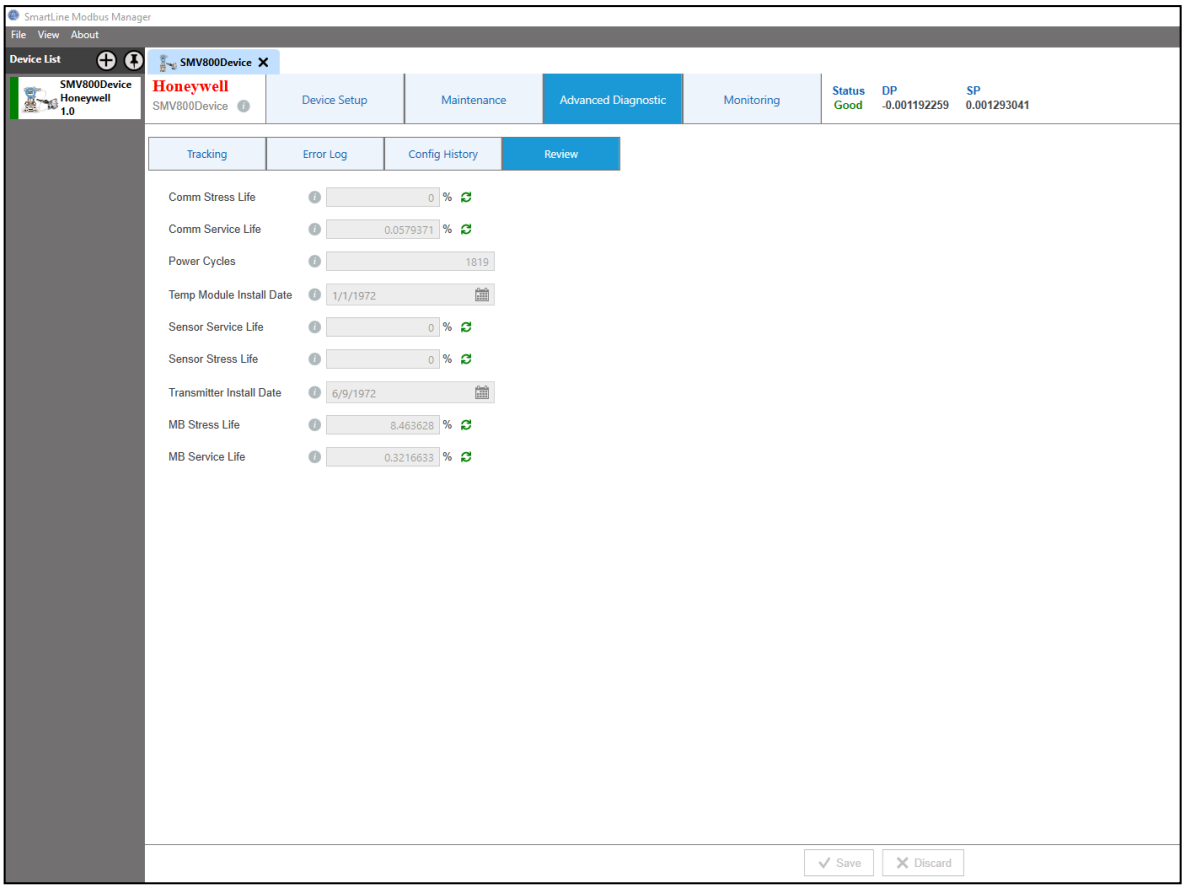
2.5.3. Config History:

This tab provides review information regarding Configuration History details.



Diagnostics – Config History		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Config History		Displays the parameters updated during the last five configuration changes

2.5.4. Review:

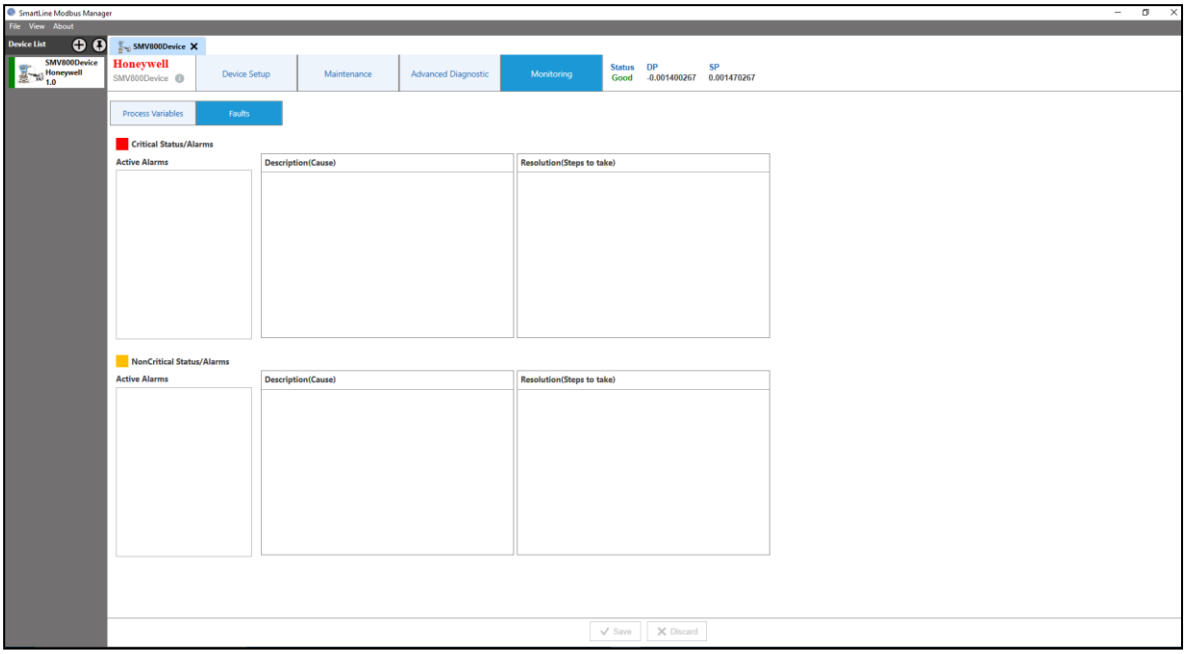

SmartLine Modbus Manager
File View About
Device List
SMV800Device
Honeywell
1.0
SMV800Device
Honeywell
SMV800Device
Device Setup
Maintenance
Advanced Diagnostic
Monitoring
Status
Good
DP
-0.001192259
SP
0.001293041
Tracking
Error Log
Config History
Review
Comm Stress Life
0
%
Comm Service Life
0.0579371
%
Power Cycles
1819
Temp Module Install Date
1/1/1972
Sensor Service Life
0
%
Sensor Stress Life
0
%
Transmitter Install Date
6/9/1972
MB Stress Life
8.463628
%
MB Service Life
0.3216633
%
Save
Discard

2.6 Monitoring:

2.6.1. Faults:

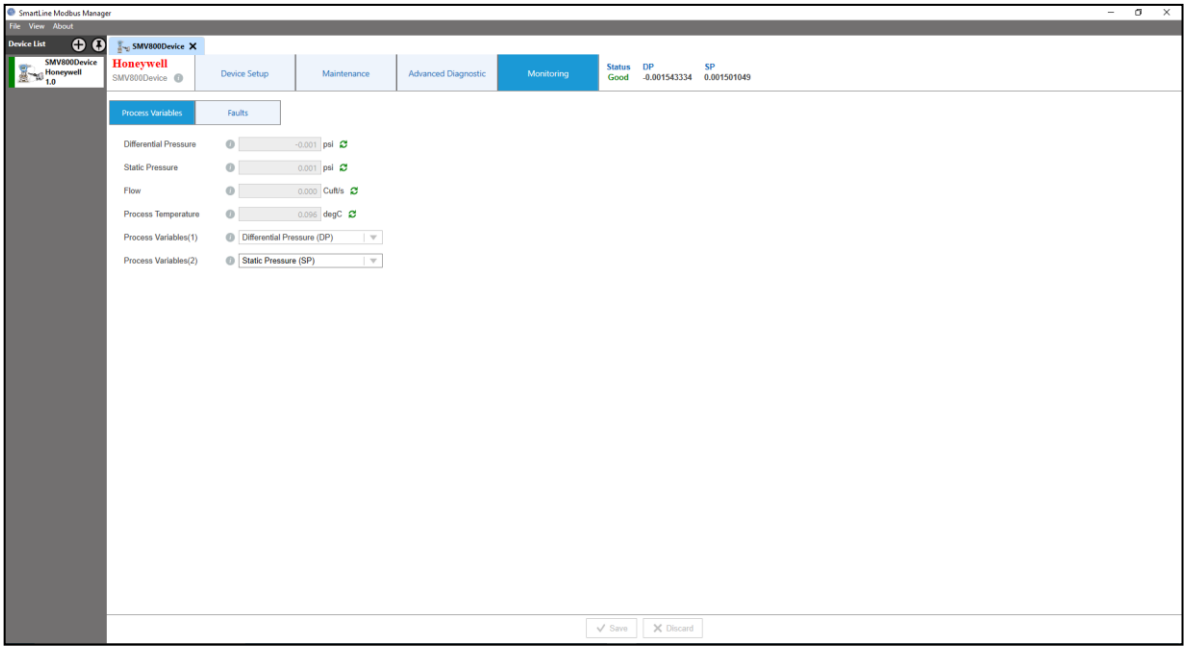
This screen provides Critical and Non-critical faults (Alarms) diagnosed by device.

when a fault is reported, click on the fault to get details of description and resolution needed to clear the fault.



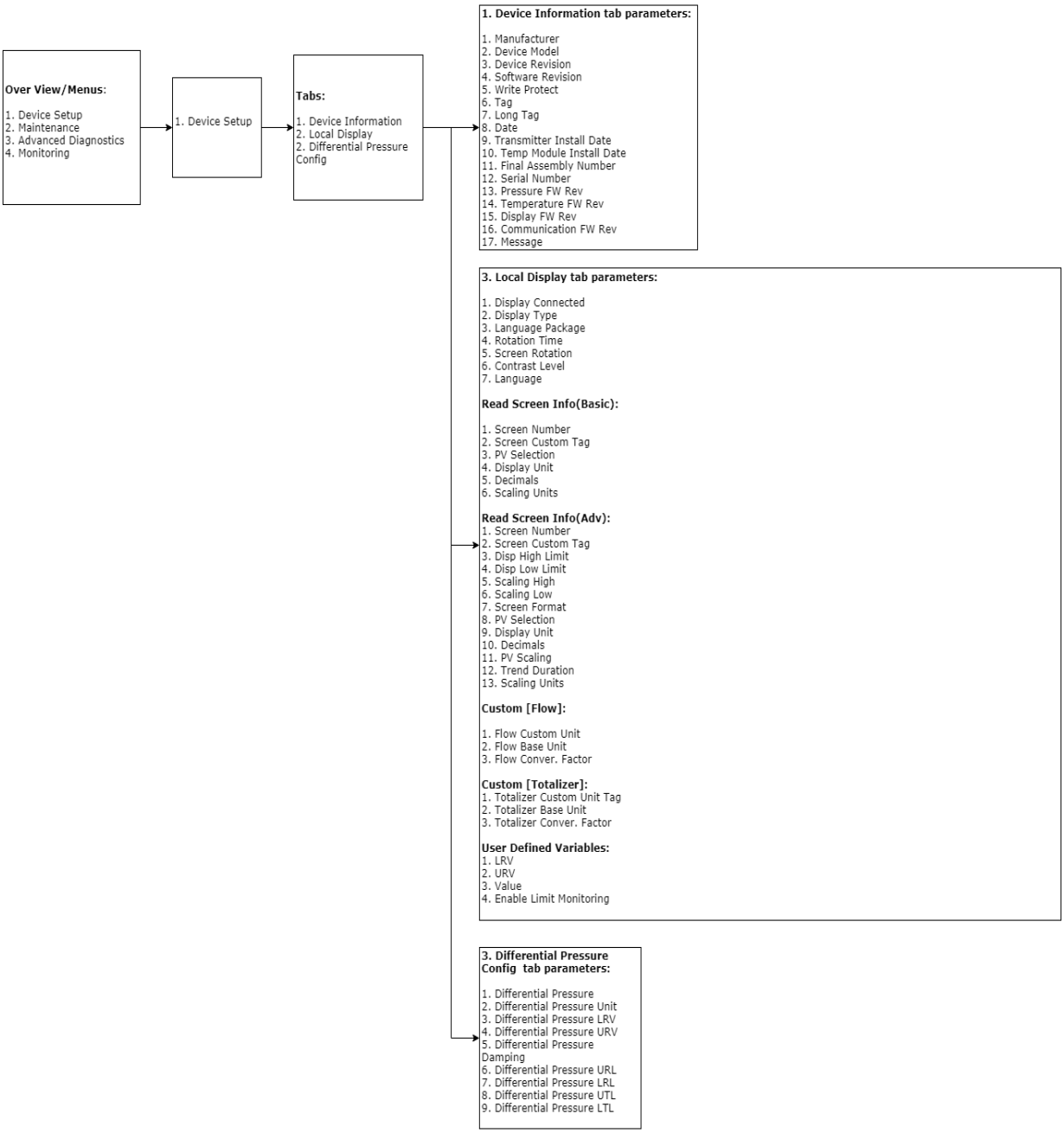
2.6.2. Process Variables:

This screen provides device variables value. Based on the selection of Process Variables (1) and (2) the header is updated to reflect the dynamic values.

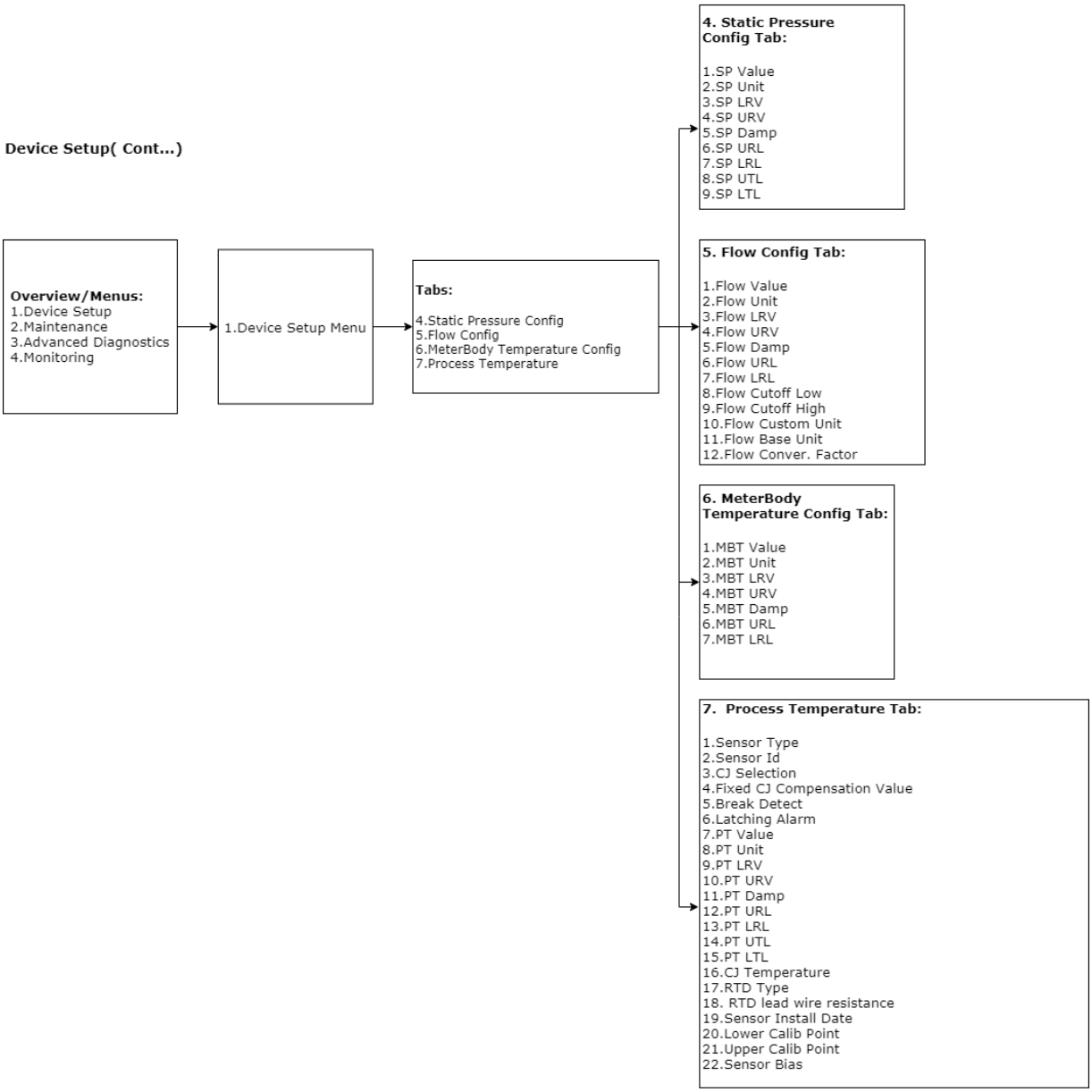


2.7 SMV 800 Modbus Host Menu tree

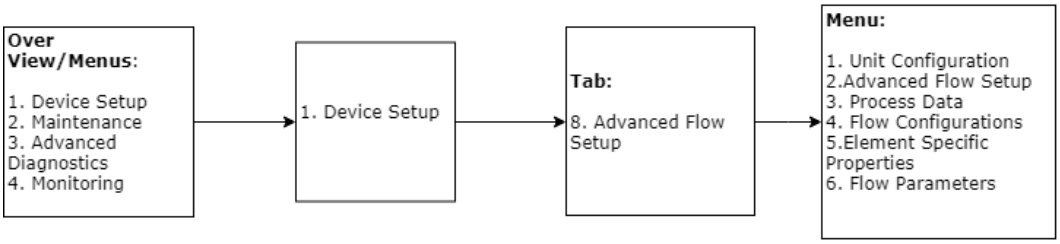
Device Setup Menu:



Device Setup(Cont...)



Device Setup(Cont...)



Menu:

1. Unit Configuration
2. Advanced Flow Setup
3. Process Data

Unit Configuration menu parameters:

1. Unit selection
2. Differential Pressure Unit
3. Static Pressure Unit
4. Temperature Unit
5. Length Unit
6. Density Unit
7. Viscosity Unit
8. Flow Unit
9. Flow Custom Unit
10. Flow Conver. Factor
11. Flow Base Unit

Advanced Flow Setup menu parameters:

1. Fluid Type
2. Flow Output Type
3. Algorithm Options
4. Equation Model
5. Fluid List
6. Custom Fluid
7. Base(Std) Density
8. Primary Element Type
9. Primary Element
10. Flow Calc Standard
11. Pipe Material
12. Pipe Thermal Exp Coefficient_alphaD
13. Bore Material
14. Bore Thermal Exp Coefficient_alphad

Process Data menu parameters:

Design (Flowing/Operating) Values:

- Design Pressure
- MB Type
- Design Temperature
- Design Density

Nominal (Default) Values:

- Nominal Pressure
- Nominal Temperature

Normal(Max) Values (used in Kuser calculation):

- Max Flow Rate
- Max Differential Pressure

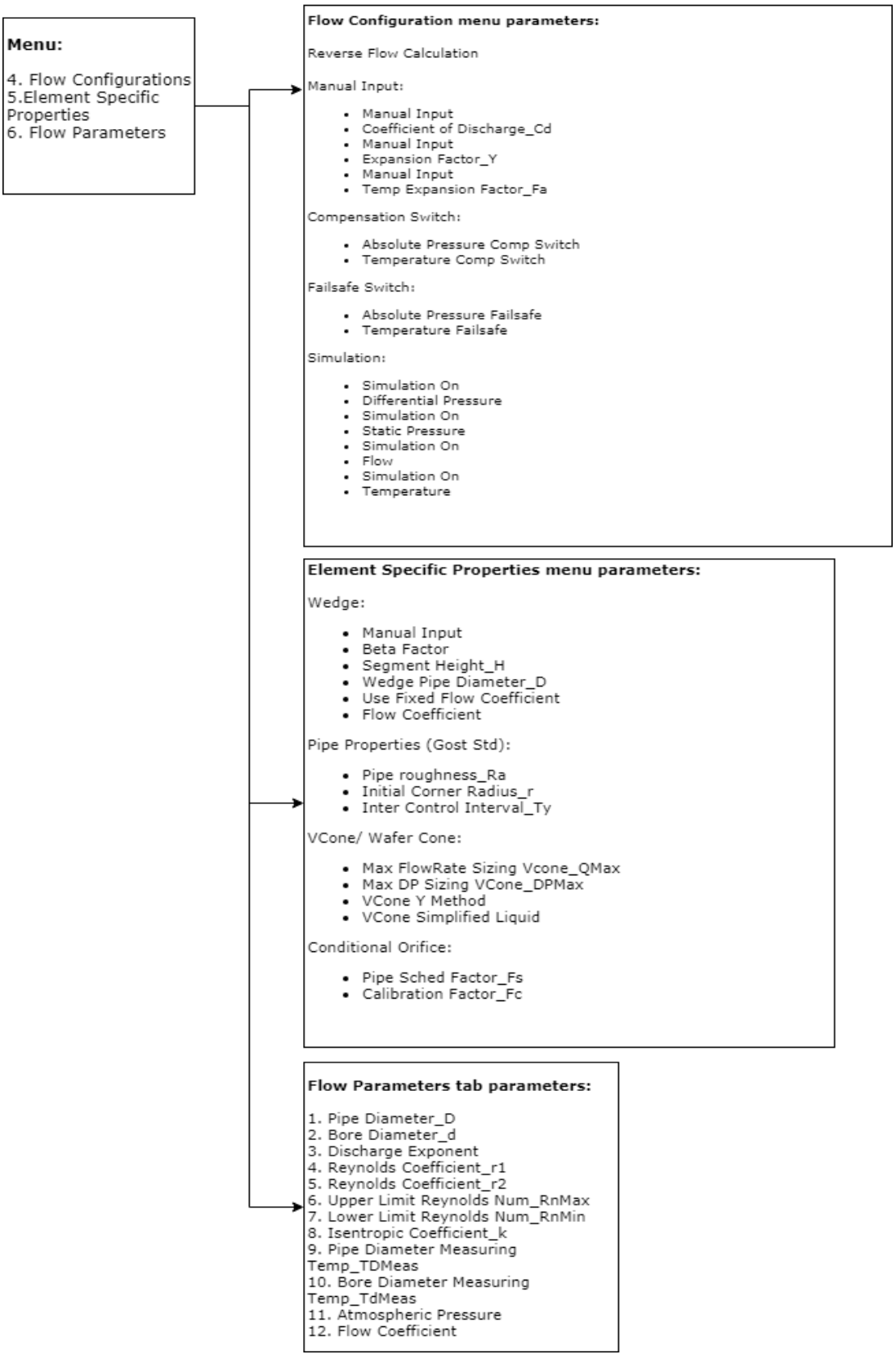
Viscosity:

- Manual Input
- Viscosity
- Lower TempLimit_Viscosity_TuMin
- Upper TempLimit_Viscosity_TuMax
- Viscosity Coefficient_V1
- Viscosity Coefficient_V2
- Viscosity Coefficient_V3
- Viscosity Coefficient_V4
- Viscosity Coefficient_V5

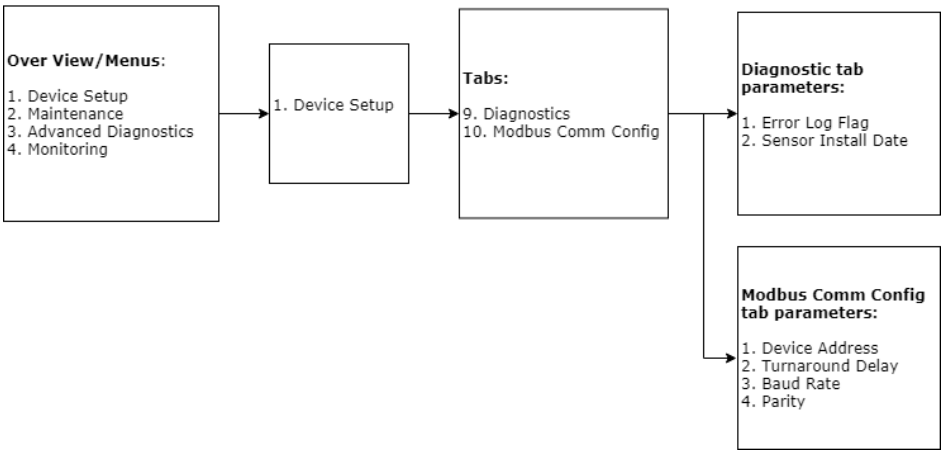
Density:

- Manual Input
- Density
- Lower TempLimit_Density_TpMin
- Upper TempLimit_Density_TpMax
- Density Coefficient_d1
- Density Coefficient_d2
- Density Coefficient_d3
- Density Coefficient_d4
- Density Coefficient_d5

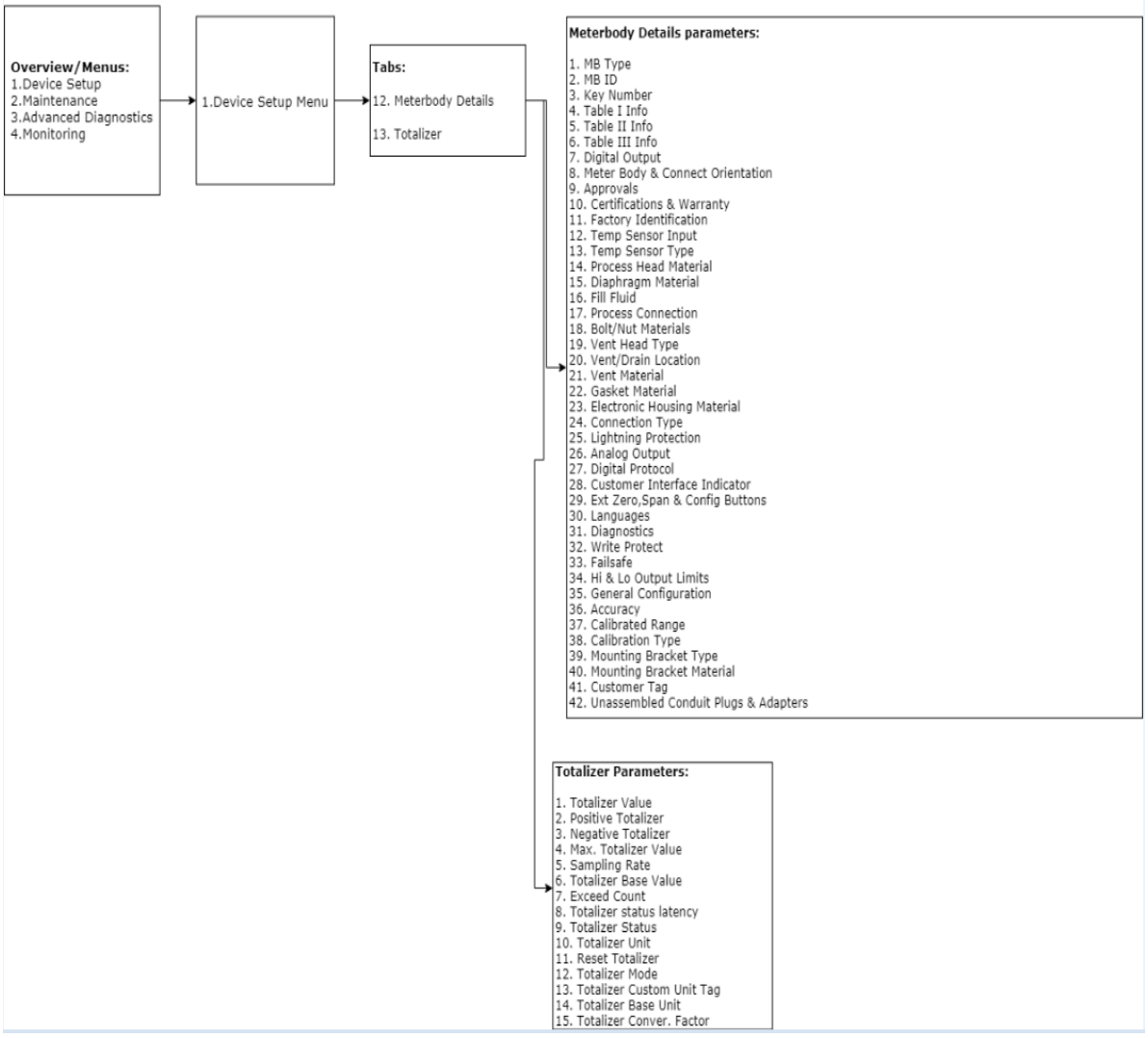
Advanced Flow Setup(Cont...)



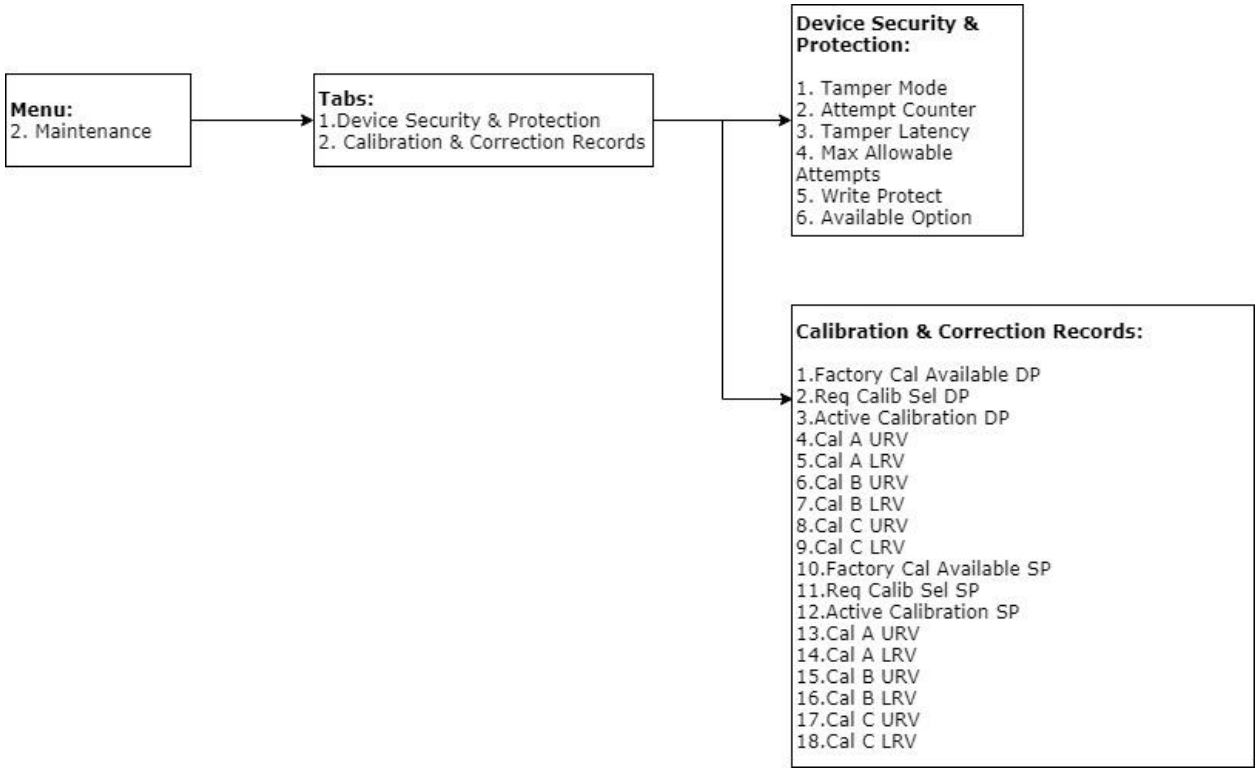
Device Setup(Cont...)



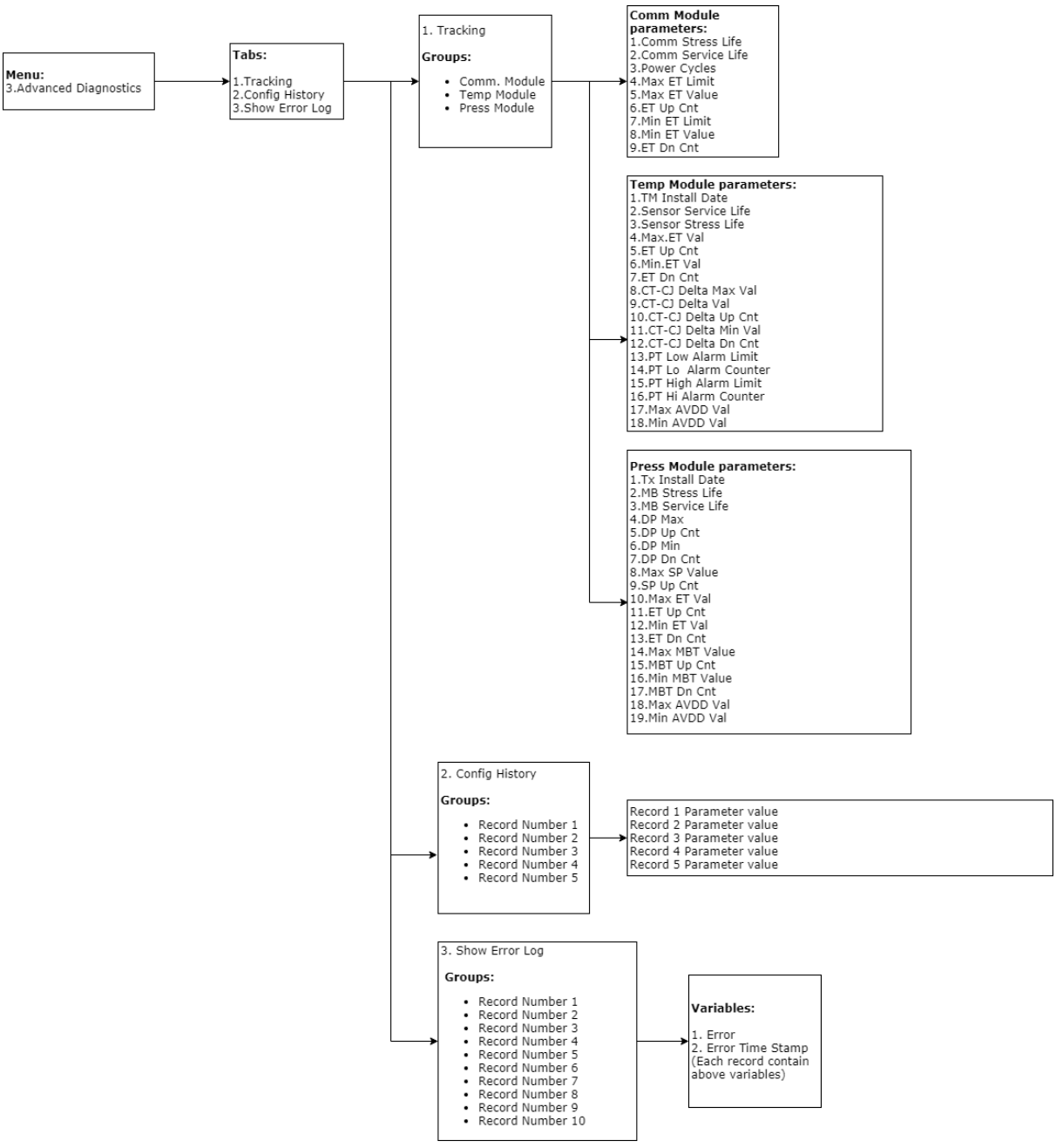
Device Setup(Cont...)



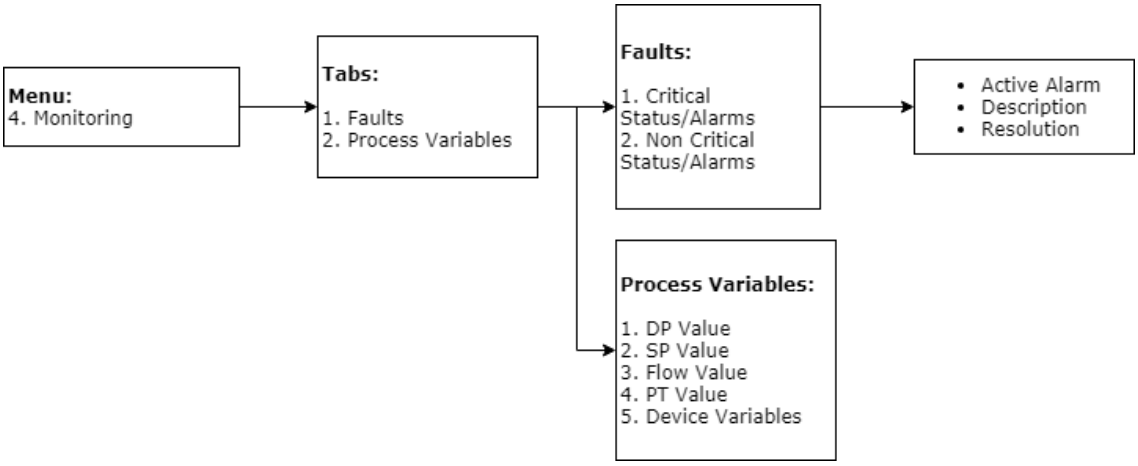
Maintenance Menu:



2.7.1. Advanced Diagnotics Menu:



2.7.2. Monitoring Menu:



2.8 Offline Configuration

Offline Configuration using Honeywell SmartLine Modbus Manager application

Overview

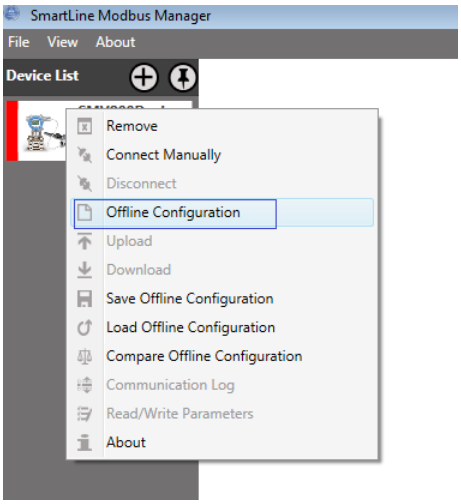
Offline Configuration refers to configuring a device when the device is not physically present or communicating with the application. This process enables you to create and save a configuration for a device, even when the device is not there physically. Later when the device becomes available with live 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.

The following are the tasks that you need to perform for importing offline configuration from SmartLIne Modbus Manager application software and then downloading it to the device.

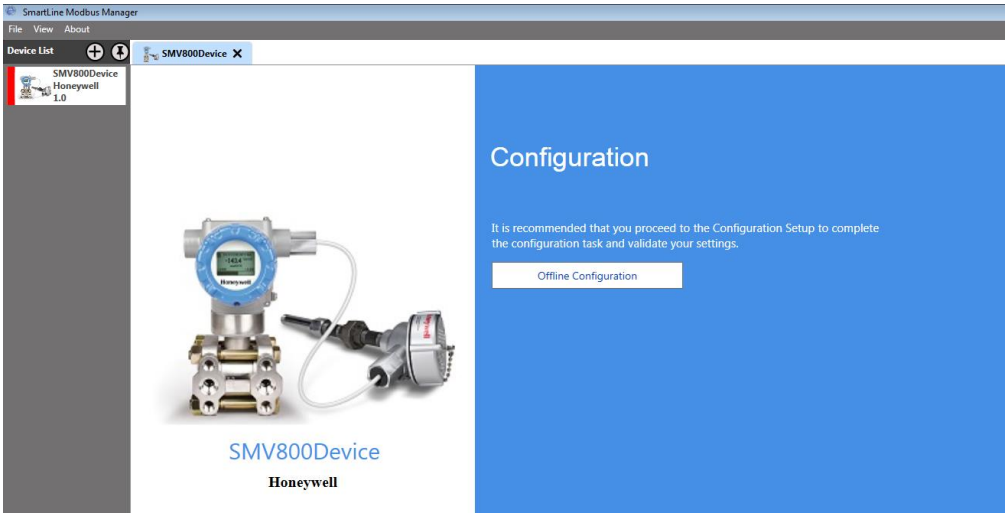
- Create offline configuration template
- Save the configuration in XML format.
- Load the offline configuration
- Download the offline configuration to the device

Note: Some of the parameters cannot be configured in offline mode as application needs information from device.Local Display Screen Configuration and Totalizer parameters are few such parameters.

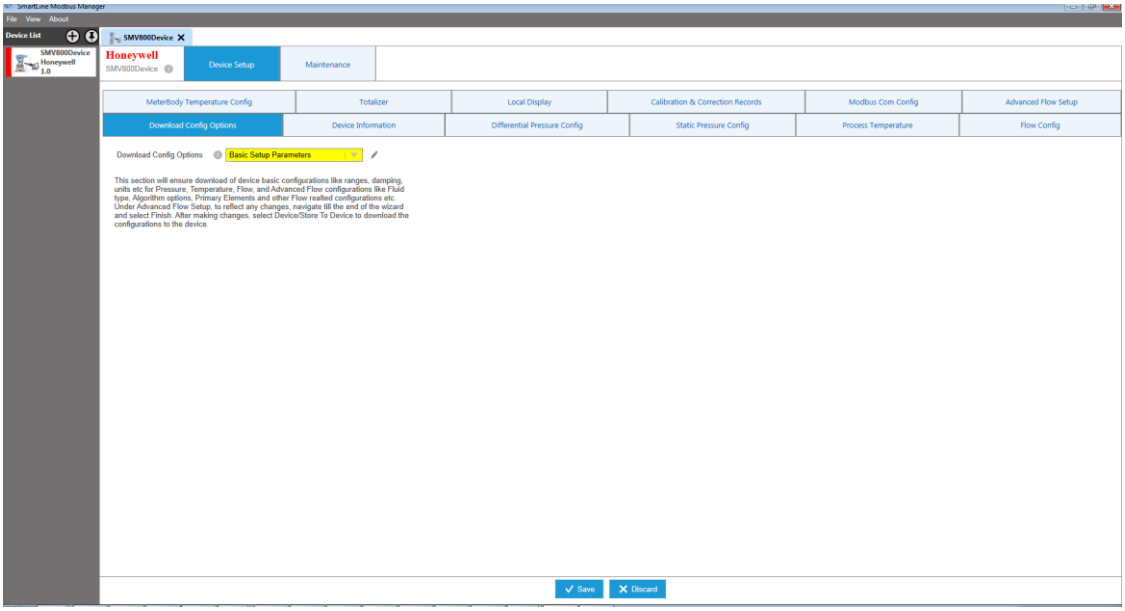
1. **Offline Configuration**
    1. Open the SmartLine Modbus Manager Host application. Right click on device and select “Offline Configuration” as shown in below figure



    2. The below window will appear and click on “Offline Configuration”

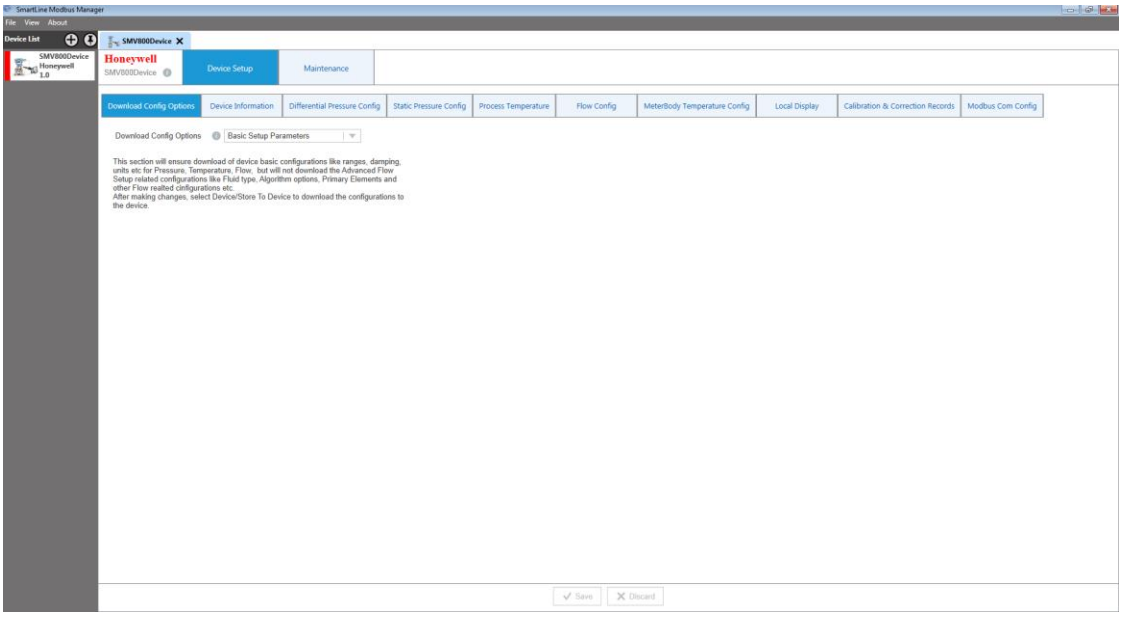


3. Select “Basic Setup Parameters” and click on save option

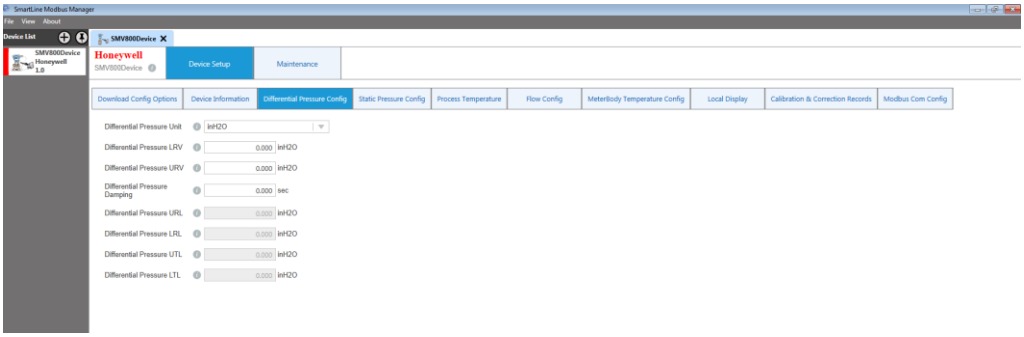


4. Only tabs which are applicable to Basic setup parameters will appear as shown below

Navigate to all tabs and configure the required parameters, ensure that the remaining parameters configured to default data



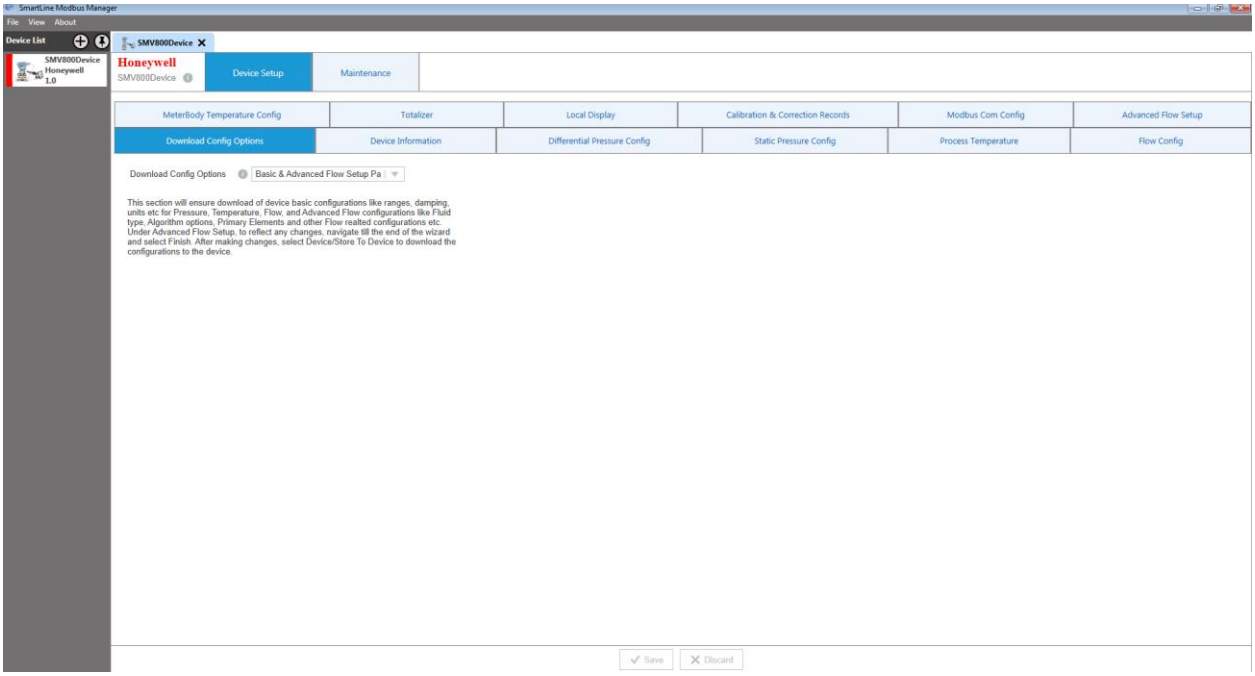
The fields appear in gray color are Read only



5. Select “Basic and Advanced Flow Setup Parameters” and click on Save option

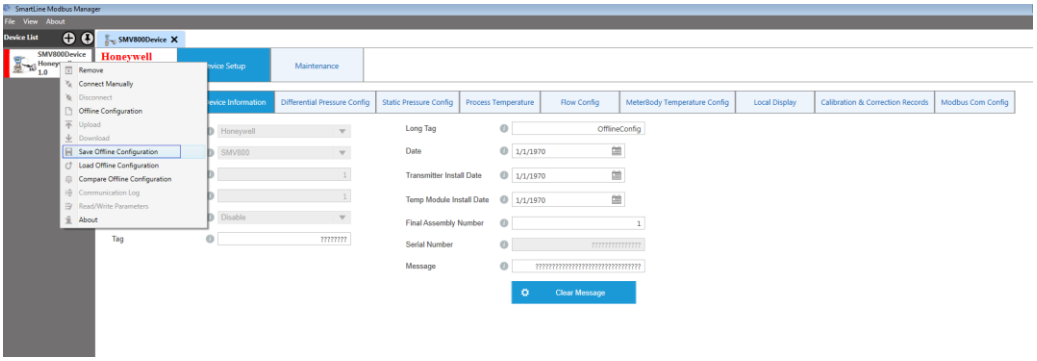
Only tabs which are applicable to Basic and Advanced flow setup parameters will appear as shown below

Navigate to all tabs and configure the required parameters, ensure that the remaining parameters configured to default data

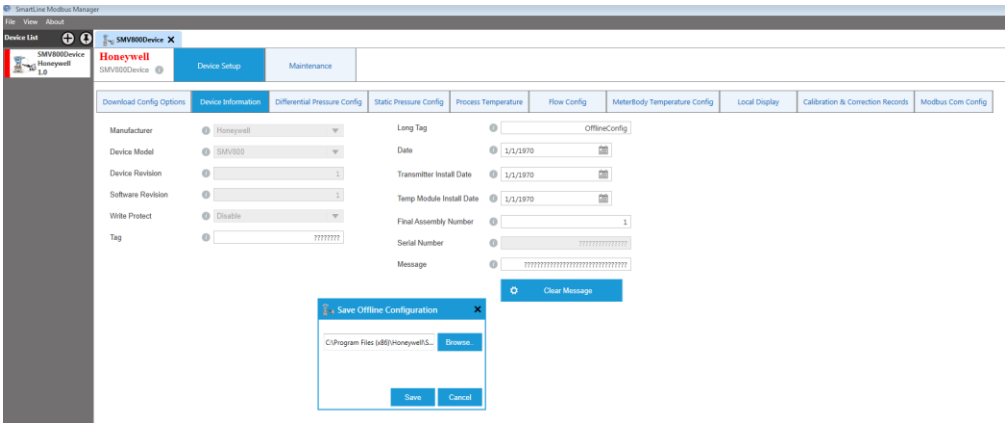


2. Save Offline Configuration

a) After Offline configuration done, Right click on device and select “Save Offline Configuration”. This option gets enable only when device disconnected



b) Browse the path to save offline configuration xml file. Save button will be enabled after the file name is selected



c) On click of save, device type information will be saved into the xml along with Offline configuration data.

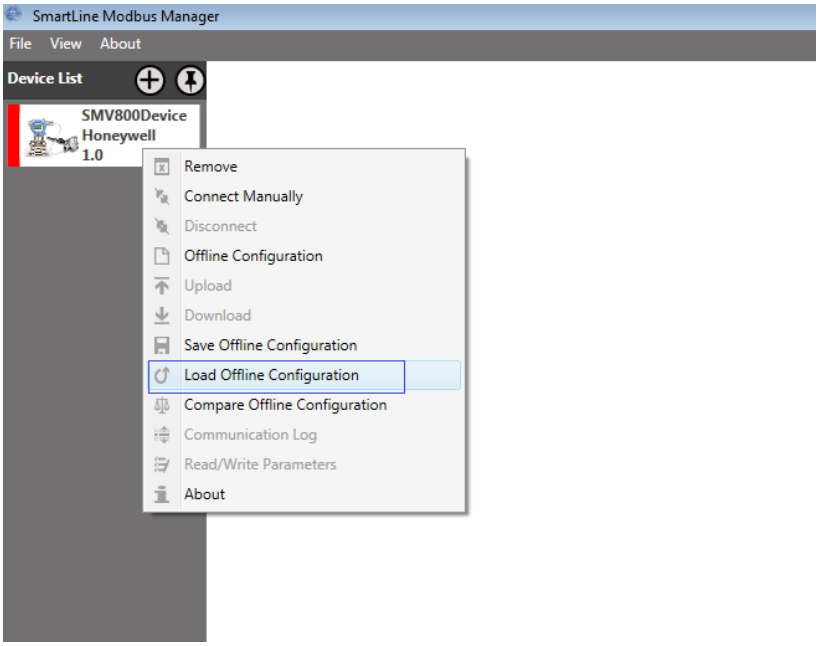
d) Message (Success/Failure) will be shown to the user on completion of save operation.

e) Xml holds the single instance data and which does not holds topology information

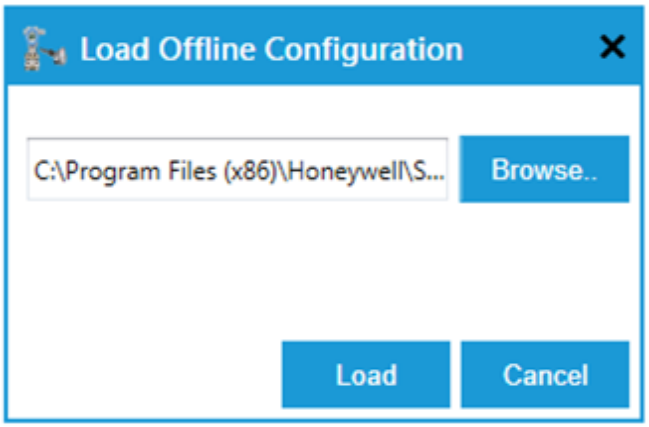
3. Load Offline Configuration

a) "Load Offline configuration" option used for loading the persisted xml data into the offline configuration of device package instance.

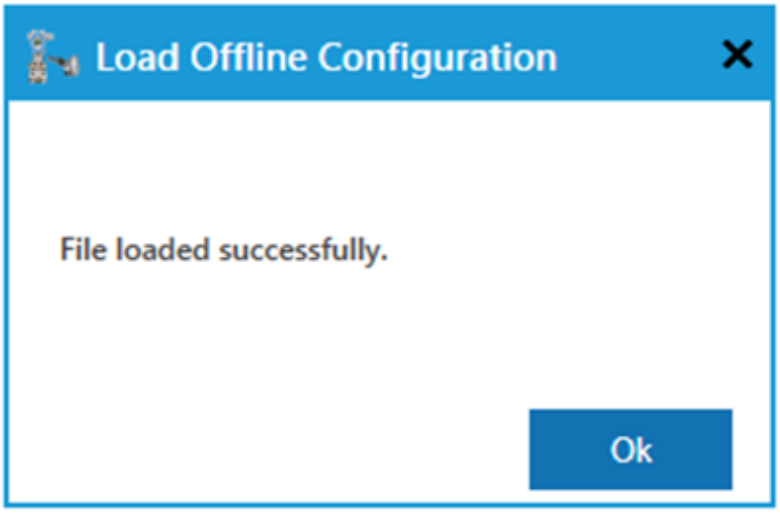
b) "Load Offline configuration" option is provided in the context menu of Device and it will be enabled only device is disconnected



c) Click "Browse" button and browse for the persisted offline configuration xml. "Load" button will be enabled after selecting the xml file

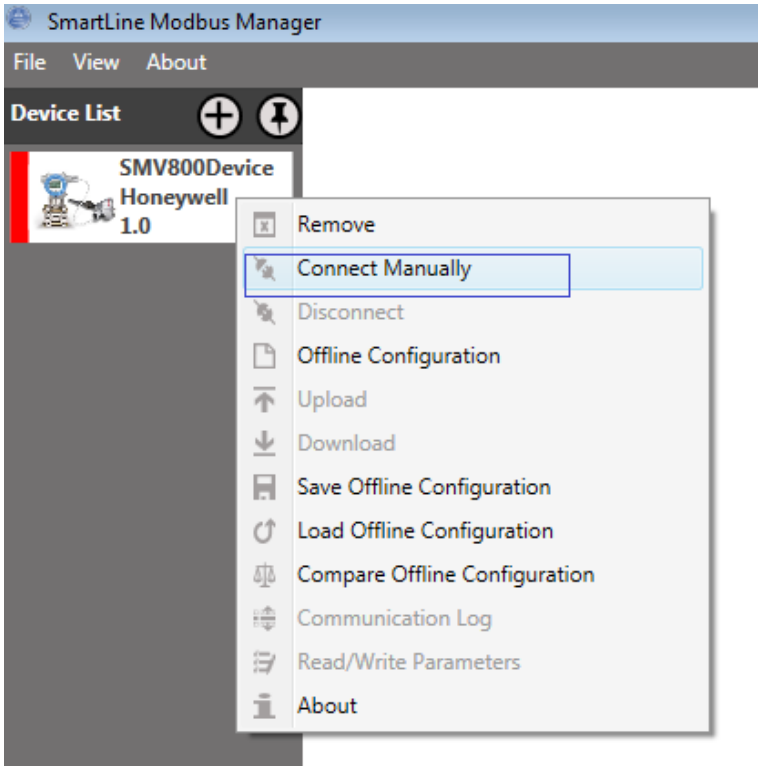


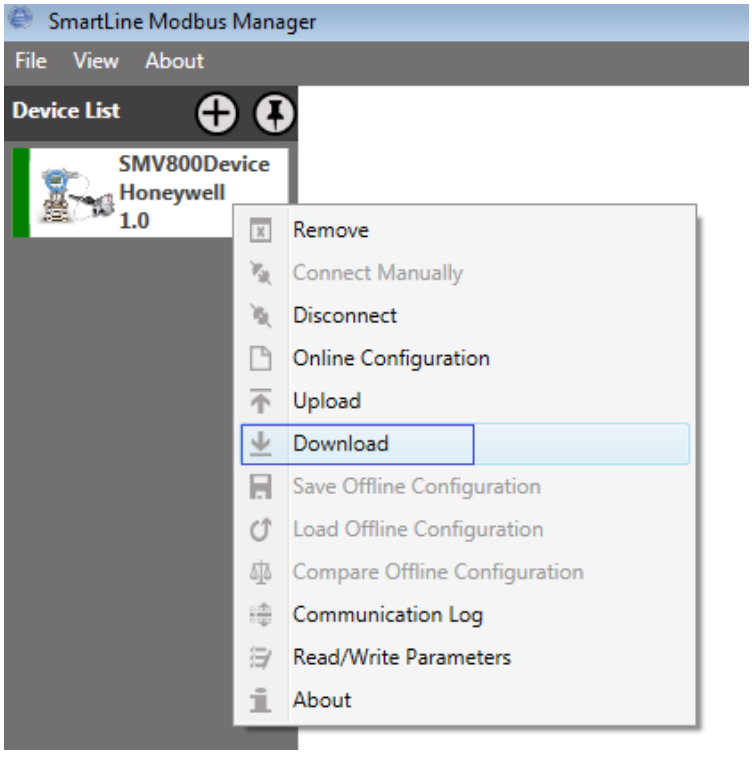
d) On click of Load, Manufacture ID, Device Type ID and Device revision of xml will be validated with the device package instance information. If validation succeeded, xml data will be loaded in to the offline data source of device



e) Error message will be prompted to the end user in case of validation failure.

f) Loaded data can be seen in the offline screens and it can be downloaded to the device by using “Download” option.

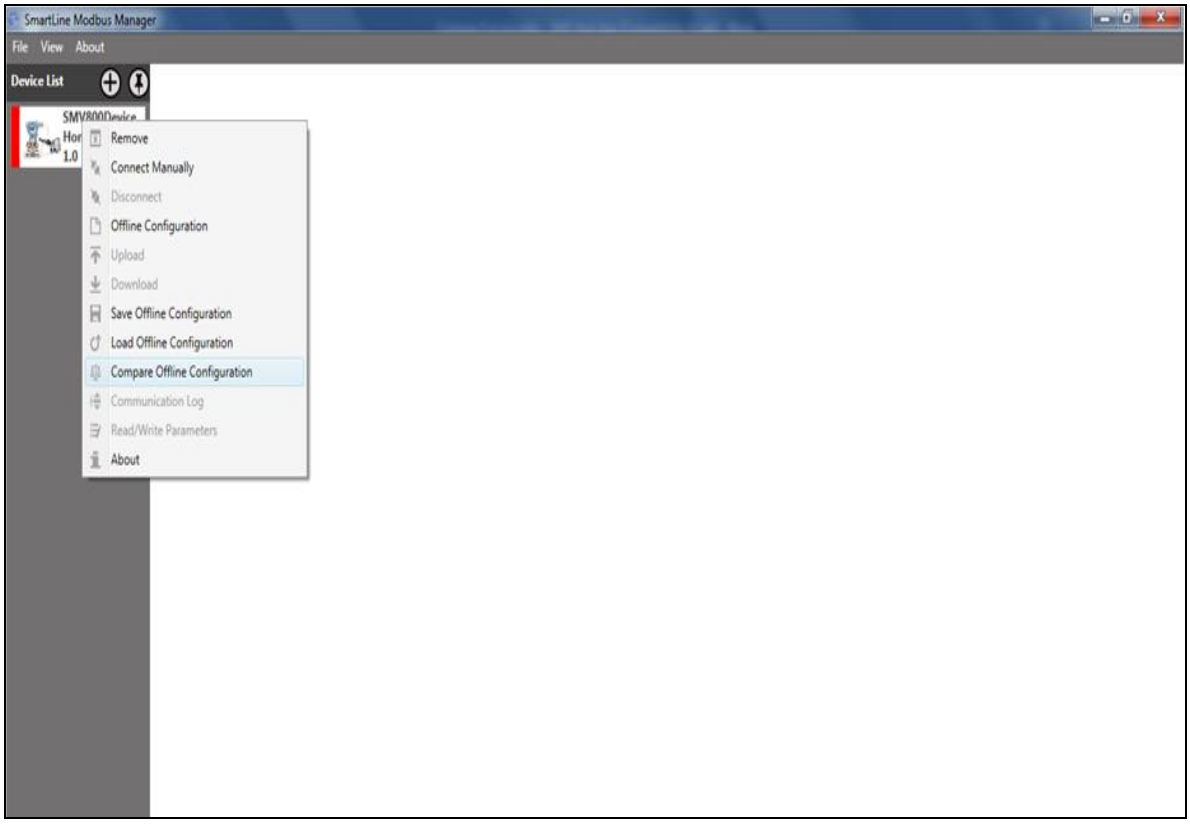

SmartLine Modbus Manager
File
View
About
Device List
SMV800Device
Honeywell
1.0
Remove
Connect Manually
Disconnect
Offline Configuration
Upload
Download
Save Offline Configuration
Load Offline Configuration
Compare Offline Configuration
Communication Log
Read/Write Parameters
About


SmartLine Modbus Manager
File
View
About
Device List
SMV800Device
Honeywell
1.0
Remove
Connect Manually
Disconnect
Online Configuration
Upload
Download
Save Offline Configuration
Load Offline Configuration
Compare Offline Configuration
Communication Log
Read/Write Parameters
About

2.9 Compare Configuration Files

Compare functionality consists of the following steps in the host application, which involves the comparison between two different files.

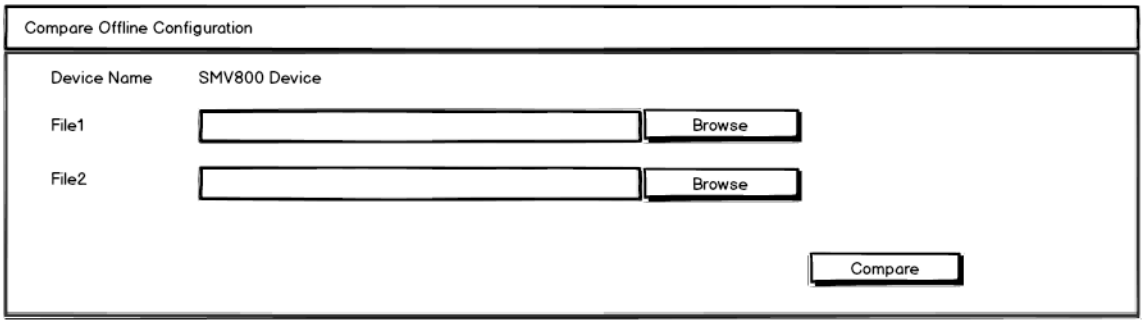
1. Select the device from Device List.
2. Right click on the device and click the **Compare Offline Configuration** from context menu**.**



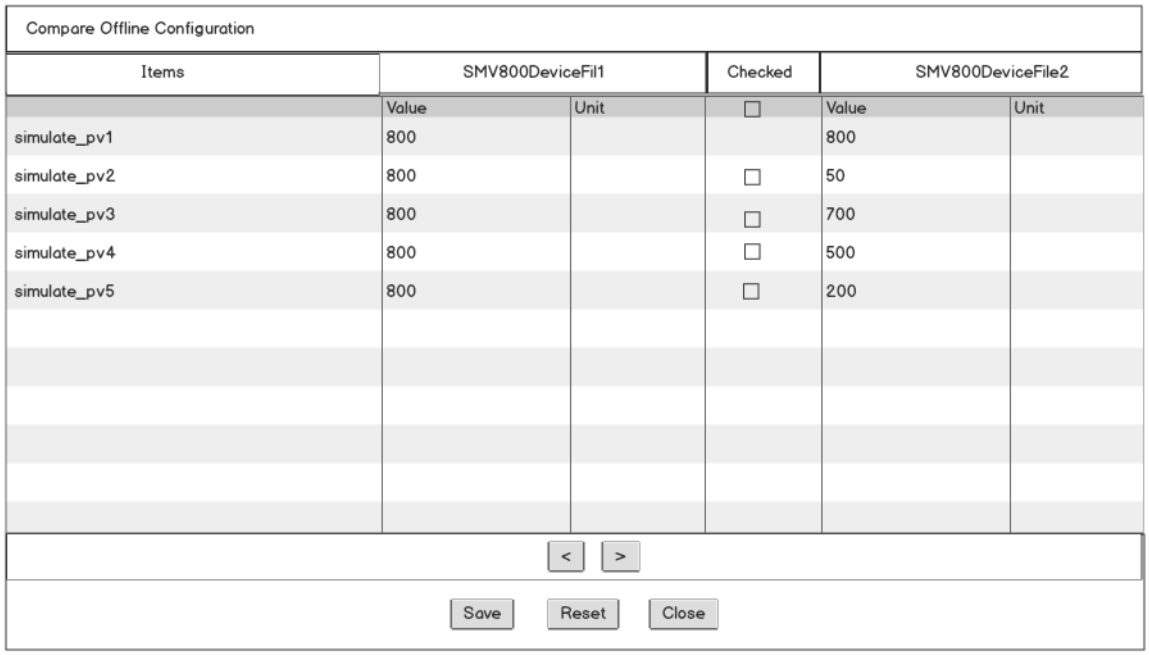
3. Select the configuration files (xml) that are alaredy saved.

```
<?xml version="1.0" encoding="utf-8"?>
<OfflineInstanceData xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <DeviceType name="SMV800Device">
    <Parameters>
      <Parameter name="tag" value="????????" />
      <Parameter name="longTag" value="????????????????????????????????" />
      <Parameter name="date" value="1/1/1990 12:00:00 AM" />
      <Parameter name="MBinstall_date" value="1/1/1970 12:00:00 AM" />
      <Parameter name="final_assembly_number" value="1" />
      <Parameter name="message" value="????????????????????????????????" />
      <Parameter name="input_density_value_manual" value="1" />
      <Parameter name="input_viscosity_value_manual" value="0.01" />
      <Parameter name="input_discharge_coeff_value_manual" value="1" />
      <Parameter name="input_expan_factor_manual" value="1" />
      <Parameter name="input_temp_expan_factor_manual" value="1" />
      <Parameter name="max_totalizer_val" value="0" />
      <Parameter name="flow_fluid_type" value="0" />
      <Parameter name="simulate_pv1" value="800" />
      <Parameter name="simulate_pv2" value="500" />
      <Parameter name="simulate_pv3" value="25" />
      <Parameter name="simulate_pv4" value="5000" />
      <Parameter name="flow_calc_type" value="0" />
      <Parameter name="dp_units" value="1" />
      <Parameter name="dp_lrv" value="0" />
      <Parameter name="dp_urv" value="0" />
      <Parameter name="dp_damping_value" value="0" />
      <Parameter name="sp_units" value="1" />
      <Parameter name="sp_lrv" value="0" />
      <Parameter name="sp_urv" value="0" />
      <Parameter name="sp_damping_value" value="0" />
      <Parameter name="pt_units" value="32" />
      <Parameter name="pt_lrv" value="0" />
      <Parameter name="pt_urv" value="0" />
      <Parameter name="pt_damping_value" value="0" />
      <Parameter name="flow_lrv" value="0" />
      <Parameter name="flow_urv" value="0" />
      <Parameter name="flow_damping_value" value="0" />
      <Parameter name="flow_upperlimit_value" value="0" />
      <Parameter name="flow_cutoff_lo" value="0" />
      <Parameter name="flow_cutoff_hi" value="0" />
      <Parameter name="flow_units" value="70" />
```

4. The compare configuration screen will be displayed as shown below.



- In the above screen, click **Browse** button to get the files to compare by browsing it from different location.
- Here the File1 and File2 are the last and currently saved configuration files respectively by the user.
- Before start comparing the files, the Compare button will be disabled and once the files are selected for comparison, the button will be enabled, to perform the comparison operation.
- The selected File1 and File2 should have the same structure of the files. If there is any invalid file is used for comparison, “Browse the appropriate file for comparison” message will be displayed from the application.
- Once the valid files are selected and compared, the results as part of the comparison will be shown as given in the below screen.



- When the parameter value is different between the File1 and File2, the respective cells will be differentiated in blue color. The check box ☐ will be enabled only when there is a change of the values in the **File 1** and **File 2**.
- The Grid header check box ☐ used to **Select/UnSelect** all the check boxes.
- When the values are different and user wants to configure the specific value, Select the desired check box, then click the **[<]** button, selected check box content from **File 2** values copied to **File 1** , the respective cells will be indicated in yellow for the modified values.
- If user clicks **[>]** button, selected check box content from **File 1** values will be copied to **File 2** , the respective cells will be highlighted in yellow for the modified values.
- Once the modified value is copied to another file, the enabled check box will be hidden, as the same values will be existing in both the files.
- **Reset** and **Save** buttons will be disabled by default and will be enabled only, when the user modify the value or update the values using **[<]** or **[>]** buttons.
- The **Reset** button is used to perform the reset operation, which will reset the values without saving the copied values.
- The **Save** button used to save the changes which are moved from **File 2** to **File 1** or **File1** to **File2**.
- Click **Close** will close the compare window.

3. Communication

3.1 SMV800 Modbus Communication

This section contains the Modbus interface and register map used in SMV800 Modbus transmitter. Use this section to locate the Modbus register for the process variable and status bits that will be retrieved from the SMV800 Modbus. The purpose of including this register map is to provide the information required to implement this register map within a host to achieve an effective exchange of data with the SMV800 Modbus. It is expected that anyone creating such an interface has thorough understanding of the Modbus protocol. Reference the “Modicon Modbus Protocol Reference Guide PI-MBUS-300 revision J”published by Modicon, Inc.,Industrial Automation System for further information.

3.2 Modbus Communication Overview

The SMV800 Modbus is a Modbus-compatible measurement device. The SMV800 Modbus supports standard Modbus RTU transmission mode.

3.2.1. Physical Layer Requirements

- RS-485
- 2-wire
- Half-duplex

3.2.2. Data Format

- Data bits: 8 (Not Configurable)
- Stop bits: 1 (Not Configurable)
- Parity: Even, Odd, None (Configurable, default is None)
- Bit Order: Least significant byte(LSB) (Not Configurable)

3.2.3. Baud Rate (Software Configurable)

- Default baud rate: 9600
- Available baud rate: 1200, 2400, 4800, 9600, 19200

Make sure the RS-485 network is only terminated twice on the entire bus. Best practice would suggest this be done once on each end. Termination at multiple point on the bus will hamper communication.

The format for both query and response frames is as follows:

For communication to specific SMV800 Modbus, the address field contains the slave's polling address. The function field contains a function code. Which indicates the read, write or diagnostic command to be performed as part of query. When the SMV800 modbus device responds to a query, the function field will either verify the device's response provide an exception that explains any errors encountered while processing the command. Table 3-1 provides an overview of these response codes. When transmitters receive a query, it will not respond until the command has been completed. No subsequent commands will be processed until the first command is finish.

Table 3-1: Exception Response Codes

Exception Response	Description	Explanation
01	Illegal function	The received message function is not an allowable action for the transmitter.
02	Illegal data address	The address referenced in the data field is not an allowable address for the memory location.
03	Illegal data value	The value referenced in the data field is not allowed in the addressed memory location.
04	Save device failure	An unrecoverable error occurred while the slave was attempting to perform the requested action.
06	Slave device is busy	The slave is engaged in processing a long duration command. The host should retransmit the message later when the slave is free.

The data field contains information that is specific to each individual function.

The error check field contains a 16-bit CRC checksum that is used to verify the integrity of the message frame.

3.2.4. Modbus data Types

Thetransmitter's mapped addresses store and use data types supported by many Modbus-compatible PLC's and host controllers.

Please refer the Modbus table Table 3-2 for lists of data types per their mapped addresses and corresponding function codes.

All registers in this document are referenced to zero. The register in Modbus messages are referenced to zero. Floating point values are stored as single precision IEE 754 floating point numbers. These numbers are stored as two 16-bit registers.

Read and Write request for a sinlge parameter is supported, reading and writing of multiple parameters is not suggested.

3.2.5. Modbus function codes

The SMV800 Modbus device supports the following function codes, which include read, write and diagnostics commands.

Table 3-2: Modbus Function Codes

Function code	Command type	Description	Explanation
01	Read	Read coil status	Read ON/OFF status of one coil or consecutive coils
02	Read	Read input status	Read ON/OFF status of one discrete input consecutive discrete input
03	Read	Read holding register	Read values of one or more holding registers
04	Read	Read input registers	Read values of one or more input registers
05	Write	Force single coil	Set coil to a specified ON or OFF state.
06	Write	Force single holding register	Write a value to holding register
16	Write	Force multiple holding register	Write values to consecutive holding registers.
65	Read	Read file records	Read file records

Once the transmitter has been configured, the configuration data can be protected by removing the write protect jumper. This write protect jumper located on the device. If write protect jumper is removed and host tries to write to a register location, the Modbus Exception Illegal Function Code Address (01) will be returned. Any exceptions to this are noted in the Modbus register maps.

Refer to SMV Transmitter User's manual or Quick Start guide listed in ***References***

for location of Write Protect Jumper.

3.2.6. User defined Function codes

Function code – 65 (Read file records)

Below are the details to read configuration change history data from device to demonistrate how to read file records

Each record has following data:

- 1 byte for Parameter identification
- 1 byte for Parameter size
- 32 bytes of data (based on size and parameter id, host has to decode value to be displayed).

Config history table with parameter size and order of parameters:

Table 3-3: Configuration History

Parameters Name/ Description	Parameter Size	Order of Parameters (for multiple parameters)
Slave Address	2	NA
Turn around delay	2	NA
Baud Rate and Parity	4	Baudrate, Parity
Process Temperature URV/LRV	8	URV, LRV
Damping for Process Variables	20	DP, SP, PT,Flow,MBT
Damping of DP	4	NA
Damping of SP	4	NA
Damping of PT	4	NA
Damping of Flow	4	NA
Damping of MBT	4	NA
Flow Cut Off Limits (Low/High)	8	Low Limit, High Limit
DP Unit Code	2	NA
SP Unit Code	2	NA
PT Unit Code	2	NA
Flow Unit Code	2	NA
MBT Unit Code	2	NA
Totalizer Unit Code	2	NA
Software Write Protect	2	NA
Tamper Parameters	6	Tamper Mode (2 bytes), Latency (2 bytes) and Max attempts (2 bytes)

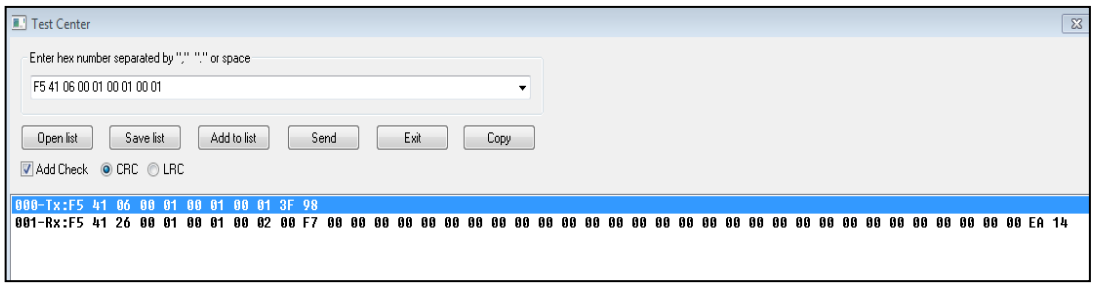
Request

Field Name	Bytes	Hex
Slave ID	1 Byte	0xF5
Function Code	1 Byte	0x41
Byte Count (file number + record number + record length)	1 Byte	0x06
File Number	2 Bytes	0x0001
Record Number	2 Bytes	0x0001
Record Length	2 Bytes	0x0001

Response

Field Name	Bytes	Hex
Slave ID	1 Byte	0xF5
Function Code	1 Byte	0x41
Byte Count (file number + record number + record data)	1 Byte	0x26
File Number	2 Bytes	0x0001
Record Number	2 Bytes	0x0001
Record Data Parameter id for Slave Address Parameter size Configuration history Data for Slave Address	27 Bytes 1 Byte 1 Bytes 32 Bytes	 0x00 0x02 0x00 F7 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

So the last parameters that was in history record 1 is slave address which was changed from 247 (00 F7). Current slave address from request and response is 245(0xF5). Which means slave address is changed from 247 to 245 and the value of 247 is recorded as history.



3.2.7. Registers for process variables

A complete register map, including coils, holding, floating point and diagnostics are found later in this section. The register map for the process variables has been designed such that all dynamic process information can be obtained with a single read. The registers that provide this capability are shown in Table 3-4. In the event of sensor malfunction, the transmitter will return “NAN” (Not A Number) for the numeric value.

Table 3-4: Modbus Register for Process Variables

Register number(16-bit)	Register number(32-bit)	Descriptiuon
400 - 401	N/A	Differential pressure
402 - 403	N/A	Static pressure
404 - 405	N/A	Process temperature
391 - 392	N/A	Flow
398 - 399	N/A	Meter body temperature
747 - 748	N/A	Totalizer
396	N/A	Meterbody temperature/ Differential pressure variable status
397	N/A	Static pressure variable status/ and Process temperature variable status
395	N/A	Flow/Totalizer variable status
406 - 409	N/A	Tranmitter status information

3.2.8. Floating point formats

The floating-point format byte order is shown in Table 3-5

Table 3-5: Floating Point Format

Byte Order				
	Byte A	Byte B	Byte C	Byte D
IEEE 754 Floating Point	SEEE EEEE	EMMM MMMM	MMMM MMMM	MMMM MMMM
Format 0	1	2	3	4

Note: “S” is the sign of floating point number, “E” is the exponent, and “M” is the mantissa

3.2.9. Communications

SMV800 modbus transmitter can be configured with a turnaround delay time (holding register 106), which defines how long the transmitter will wait to respond after receiving a query from the host. If the Turnaround Delay Time is set to one, the device will respond as fast as it can. The default Turnaround Delay is 50 miliseconds.

The registers shown in Table 3-6 provide statistics that may be used to gather diagonostics information about the communication between the device and the host. The communication statistics will reset when SMV800 Modbus device loses power or if a Master Reset performed. The registers will be reset to zero when the value in the registers exceeds maximum value of an unsigned 16-bit number.

Table 3-6: Communication Statistics

Address	Register Type	Attribute	Description
111	Holding	Read Only	Network Parity Overrun Error
110	Holding	Read Only	CRC Errors
109	Holding	Read Only	Good Message Count

3.2.10. Implementing calibration

Each process variable in the SMV800 Modbus device (diffrential Pressure [DP], static pressure[SP], and process temperature[PT]) can be calibrated through a trim process, either a zero trim or two-point trim. The lower trim value acts the same as zero trim. The upper trim serves to adjust the span (or slope) of the device. The trim value should be written to the appropriate Floating Point Registers in Table 3-5.

For accurate calibration, the user should be prompted to wait for the process variable to stabilize before attempting to trim the transmitter. For best result, a Lower Trim should be completed before attempting the Upper Trim.
Refer section 4.1 on Calibration for more information.

3.2.11. Diagnostics

The SMV800 Modbus device features several diagnostics status bits that gives information about the status of the transmitter. A complete listing of the diagnostics status bits is shown in Table 3-7. The status bits can be read as coils, or holding registers.

Table 3-7: Transmitter Status amd Diagnostic Registers

Category	Modbus Holding Register #	Bit details	Name of fault	Description	Resolution
Critical	115	Bit - 0	comm_section_failure	This is a roll-up status bit that is set when any of the following critical status conditions are present, RAM, ROM or program execution (flow) of communication module.	Power cycle the device. If the problem persists after power cycle then board might be damaged so need to replace Communication module.
		Bit -1	comm_section_ram_corrupt	Communication board RAM Corruption/ Failure.	Power cycle the device. If the problem persists after power cycle, then board might be damaged so need to replace Communication module.
		Bit - 2	comm_section_rom_corrupt	Communication board ROM Corruption/ Failure.	Power cycle the device. If the problem persists after power cycle, then board might be damaged so need to replace Communication module.
		Bit - 3	comm_section_flow_failure	Communication module firmware Program Flow Failure. This fault will get set if any of the critical part of the code is not executed after expected duration.	Check the connection between communication and meterbody (Housing). Power cycle the device and if problem persists replace the Communication module.
		Bit - 4	configuration_corrupt	This is a roll-up status bit that is set when any of the following status of register 122/123 are set. - Common DB Corrupt - Vital DB Corrupt - General Config DB Corrupt - Totalizer Config DB Corrupt - Totalizer Value DB Corrupt	Power cycle the device. If the problem is not seen, verify the parameters for configuration changes. If the problem persists then NVM might be damaged so need to replace Communication board.

Critical	115	Bit - 5	pres_sensor _comm _timeout	If there is no communication between Communication Board and Pressure Sensor Board (Meter-body) or invalid data on communication line due to noise	User can verify the cable/connector between communication and Pressure sensor board (Meter body) to ensure that it is not damaged. Check for bent pins.If cable/connector is not the problem, replace the Communication module.If problem still persists, replace the meter body.
		Bit - 6	temp_sensor _comm _timeout	If there is no communication between Communication Board and Temperature Sensor Board (Terminal) or invalid data on communication line due to noise	User can verify the cable/connector between communication and Temperature sensor board (Terminal Board) to ensure that it is not damaged. Check for bent pins.If cable/connector is not the problem, replace the Communication module.If problem still persists, replace the Terminal board.
		Bit - 7	comm_vcc _fault	Power Supply failure	Power cycle the device. If problem persist, Check the terminal voltage to be within limits. If still problem persists, replace the Terminal block assembly. If problem continues replace the Communication module
		Bit - 8	pres_sensing _failure	This is a roll-up status bit used for reporting a failure of the pressure sensing measurement by pressure module.	Refer register 116 status bits for more details and resolution.
		Bit - 9	temp_sensing_f ailure	This is a roll-up status bit used for reporting a failure of the temperature sensing measurement by Pressure module.	Refer register 116 status bits for more details and resolution.
		Bit 10 - 15	Unsued	NA	NA

Details of Critical Fault	116	Bit - 0	pres_meter _body_failure	Pressure module is reporting a critical failure of the pressure sensing measurement within the Meter Body, which may be caused by one of the following: • Meter body failure • Sensor firmware flow failure	Power cycle the device. If the problem persists, replace the Meter Body
		Bit -1	pres_sensor _characterizatio n_corrupt	Pressure module is reporting corruption in the Pressure Characterization data	Power cycle the device. If the problem persists, replace the Meter Body
		Bit - 2	pres_suspect _input	Differential Pressure, Meter Body Temperature and/orvStatic Pressure input are extremely out of range such that the value is suspect.	Verify that all inputs are within specifications. Power cycle the device. If the problem persists, replace the Meter Body.
		Bit - 3	pres_ram_DB _Fault	Pressure module is reporting corruption in the database in the Random-Access Memory (RAM)	Power cycle the device. If the problem persists, replace the Meter Body
		Bit - 4	pres_nvm _corrupt	Pressure module is reporting corruption of the Non-Volatile Memory data (NVM)	Power cycle the device and if fault is cleared ensure to configure sensor parameters. If the problem persists, replace the Meter Body
		Bit - 5	pres_ram _corrupt	Pressure module is reporting corruption in the Random-Access Memory (RAM)	Power cycle the device. If the problem persists, replace the Meter Body
		Bit - 6	pres_flash _CRC_Fault	Pressure module is reporting corruption in sensor firmware	Power cycle the device. If the problem persists, replace the Meter Body
		Bit - 7	pres_flow _failure	Pressure module firmware Program Flow Failure. This fault will get set if any of the critical part of the code is not executed after expected duration.	Power cycle the device. If the problem persists, replace the Meter Body
		Bit - 8	temp_input1 _fault	The temperature sensor (Thermocouple or RTD) has an open input. The sensor connections may be disconnected or broken.	Check the temperature sensor connections for disconnections or broken wires. Repair the sensor connections
		Bit - 9	unused	NA	NA

Details of Critical Fault	116	Bit - 10	temp_suspect _input	The fault is set for the following conditions. • If the measured CJ value is below -50 degC or above 90 degC • If the internal ADC	
		Bit - 11	temp_char_tbl _crc_fault	Temperature module is reporting corruption in the temperature Characterization data	Power cycle the device. If the problem persists, replace the Terminal Board.
		Bit - 12	temp_nvm_fault	Temperature module is reporting corruption of the Non-Volatile Memory data (NVM)	Power cycle the device and if fault is cleared ensure to configure sensor parameters. If the problem persists, replace the Terminal Board.
		Bit - 13	temp_ram_fault	Temperature module is reporting corruption in the Random-Access Memory (RAM)	Power cycle the device. If the problem persists, replace the Terminal Board.
		Bit - 14	temp_flash_crc_ fault	Temperature module is reporting corruption in sensor firmware	Power cycle the device. If the problem persists, replace the Terminal Board.
		Bit - 15	temp_flow _control_fault	Temperature module firmware Program Flow Failure. This fault will get set if any of the critical part of the code is not executed after expected duration.	Power cycle the device. If the problem persists, replace the Terminal Board.
Device Variables Status	117	Bit - 0	bad_DP	The Differential Pressure input measurement is far outside the specified range. The meter body may be damaged. The status is set if any of the critical faults is set.	Refer register 116 status bits for more details and resolution. Verify that all inputs are within specifications.
		Bit -1	bad_MBT	The Meterbody Temperature measurement is far outside the specified range. The meter body may be damaged. The status is set if any of the critical faults is set.	Reset the device. If the problem persists, replace the Meter body. Refer register 116 status bits for more details and resolution.
		Bit - 2	bad_PT	The Process Temperature input measurement is far outside the specified range. The Temperature module may be damaged.	Refer register 116 status bits for more details and resolution. Verify that all inputs are within specifications

Device Variables Status	117	Bit - 3	bad_SP	The Static Pressure input measurement is far outside the specified range. The meter body may be damaged. The status is set if any of the critical faults is set.	Refer register 116 status bits for more details and resolution. Verify that all inputs are within specifications
		Bit - 4	bad_Flow	The Flow calculation has failed. Possible causes are: • Bad DP/SP/MBT/PT input • Invalid flow algorithm configuration • Firmware flow control fault • Any one critical fault is set	If Bad DP/MBT/SP/PT status is set, follow the resolution suggested. If Bad Flow is a result of an invalid algorithm configuration other statuses will be set to clarify the issue. Correct the configuration parameters and recheck the calculated raw flow (register: 389-390) . A power cycle is recommended here to reset and get correct reading. If a Flow Control Fault is set, reset the device. If the problem persists, replace the Meter Body.
		Bit - 5	bad_Totalizer	The Totalizer calculation has failed. Possible causes is same as that of Bad Flow.	Refer the steps for Bad Flow
		Bit - 6	DP Above High Limit	Differential pressure measured is above URV	Verify that the DP input is within specifications and if so adjust URV as per need.
		Bit - 7	DP Below Low Limit	Differential pressure measured is below LRV	Verify that the DP input is within specifications and if so adjust LRV as per need.
		Bit - 8	SP Above High Limit	Static pressure measured is above URV	Verify that the SP input is within specifications and if so adjust URV as per need.
		Bit - 9	SP Below Low Limit	Static pressure measured is below LRV	Verify that the SP input is within specifications and if so adjust LRV as per need.
		Bit - 10	PT Above High Limit	Process Temperature measured is above URV	Verify that the temperature input is within specifications and if so adjust URV as per need.
		Bit - 11	PT Below Low Limit	Process Temperature measured is below LRV	Verify that the temperature input is within specifications and if so adjust LRV as per need.

Device Variables Status	117	Bit - 12	MBT Above Limit	Meter body Temperature measured is above URV	Verify that the meter body ambient is within specifications and if so adjust URV as per need.
		Bit - 13	MBT Below Limit	Meter body Temperature measured is below LRV	Verify that the meter body ambient is within specifications and if so adjust LRV as per need.
		Bit - 14	Flow Above High Limit	Flow measured is above URV	Verify that the Flow value expected is within URV if not adjust the Flow URV.
		Bit - 15	Flow Below Low Limit	Flow measured is below LRV	Verify that the Flow value expected is within specifications and if so adjust Flow LRV
Warning	118	Bit - 0	comm_section_ non_critical _failure	This is a roll-up status bit that is set when any of the communication module non-critical status is set such as • Display NVM Corrupt	Power cycle the device and if problem persists replace communication module
		Bit -1	sensing_section _non_critical _failure	This is a roll-up status bit that is set when any of the pressure and temperature sensing modules non critical status is set such as • Unreliable Communication • Sensor Input Out Of Range • CJ Out Of Limit • Excess Calibration Correction • CJ CT Delta Warning	Refer detailed status bits corresponding to pressure module in register 121 and temperature module in register 120.
		Bit - 2	cj_out_of_range	The Internal Cold Junction Temperature (CJ) measured in the Temperature module is outside of the specified range. Range limits are -40 to 85 degrees C.	Verify that the environmental temp is within spec. If it is, Temperature module may have been damaged. Replace the Temperature module
		Bit - 3	no_factory _calibration	This is roll up status bit set for the following: • Temperature sensor module factory calibration missing • Pressure sensor module factory calibration missing Factory Calibration for either Temperature module or Pressure module is missing. Accuracy is compromised if not calibrated.	Refer status bits corresponding to factory calibration status of pressure in register 121 and temperature module in register 120. Accordingly return the module for factory calibration.

Warning	118	Bit 4	Unreliable _sensor_comm	This is roll up status bit set for the following: • Temperature Module Unreliable Communication • Pressure Module Unreliable Communication	Refer status bits corresponding to unreliable communication status of pressure in register 121 and temperature module in register 120 for more details. Internal communication quality between Communication board and Temp Module or Communication board and Meter Body is degrading.
		Bit - 5	tamper_alm	Warning	More than a specified number of attempts or actual config changes are made, with Tamper Alarm enabled. Warning stays active until the specified Tamper latency period has elapsed. If needed, set the Tamper attempt to maximum value (10) or disable the Tamper alarm during setup stages of the device to avoid alarm being setup frequently. If configuration changes are required, contact a qualified individual to unlock the Write Protection Mode feature and make the required updates.
		Bit - 6	low_supply _voltage	The supply voltage to the transmitter power terminals is too low. Any or all of these status is set: Low supply voltage to: the transmitter or, Temp sensor module or Press. Sensor; or supply voltage to the transmitter has dropped low enough to cause a Device Warm Reset	Check that the power supply at terminals to be within specification. Try to increase the supply voltage level. If supply voltage is adequate and if the problem persists, replace the communication module followed by Temperature module followed by Meter Body.
		Bit - 7	brownout_reset	The supply voltage to the transmitter terminals has dropped low enough to cause a warm reset of device	Power cycle the device. If problem persist, Check the terminal voltage to be within limits. If still problem persists, replace the Terminal block assembly. If problem continues replace the Communication module

Warning	118	Bit - 8	meter_comm _timeout	Display communication failure	Secure Display connections and recheck. If problem persists, reset the device. If the problem still persists, replace the Display module.
		Bit - 9	meter_nvm _corrupt	Communication screen configuration module is reporting corruption of the Non-Volatile Memory data (NVM) related to display	Power cycle the device. If the problem is not seen, verify the parameters for configuration changes made. If the problem still persists then NVM might be damaged so need to replace Communication board.
		Bit - 10	Comm VCC Fault	The voltage supply to the Communication Module processor is outside the operational range of 2.8 to 3.2volts	Power cycle the device. If problem persist, Check the terminal voltage to be within limits. If problem continues replace the Communication module
		Bit - 11	Device VCC Fault	Power Supply failure	Power cycle the device. If problem persist, Check the terminal voltage to be within limits. If still problem persists, replace the Terminal block assembly. If problem continues replace the Communication module
		Bit 12-15	Unused	NA	NA

Warning	119	Bit - 0	max_totalizer _status	Totalizer Reached Maximum Value. This bit will be set every time the Totalizer value reaches user configured maximum Totalizer value.	Totalizer starts from zero when it reaches the max value. Warning stays active until the user acknowledges the status or Totalizer status latency expires whichever comes first
		Bit -1	sensor_over _temperature	The Process Temperature input exceeds the Temperature Upper Range Limit (URL) as determined by the configured Sensor Type.	Check the process temperature. If the process temperature exceeds the range of the current sensor type, either correct the process to an in-range temperature or switch to a different sensor type which is ranged for the expected process temperature range.
		Bit - 2	sensor_in1 _open	The temperature sensor (Thermocouple or RTD) has an open input. The sensor connections may be disconnected or broken.	Check the temperature sensor connections for disconnections or broken wires. Repair the sensor connections.
		Bit - 3	sensor_input1 _out_of_range	The temperature sensor is reading an out of range input value. The value is outside the limits of Temperature limits for the configured sensor type (LTL to UTL)	Check that the process temperature input is within the range limits for the configured temperature sensor (LTL to UTL). If a higher temperature range is required, configure and connect a different sensor type to meet the requirements of the process.
		Bit - 4	cj_ct_delta_tem p_warning	The difference between the Internal Cold Junction Temperature (CJ) and the Processor Core Temperature (CT) measured in the Temperature module is greater than 10 degrees C.	Verify that the environmental temperature is within specifications

Warning	119	Bit - 5	flow_cal_error	During setup and configuration of the flow algorithm parameters, insufficient configuration or invalid parameter values have been entered which are causing a division by zero math error in the flow calculation	Carefully review the flow algorithm parameter values that have been configured. Correct any errors. When the flow is showing a good value and this status is cleared, reset the device to clear any Critical Status that may have been generated due to the bad flow calculation. Parameters to check: For Primary Elements / Algorithms other than Pitot Tube (Algorithm Option = ASME 1989 Algorithms) and for any Elements (including Average Pitot Tube, Algorithm Option = Advanced Algorithms) Pipe Diameter D cannot be equal to Bore Diameter d d must be > 0 D must be > 0 d < D For primary element / algorithm = Pitot Tube (applicable to Algorithm Option = ASME 1989 Algorithms only) Pipe Diameter D must be equal to Bore Diameter d alpha_D must be equal to alpha_d D = d and alpha_D = alpha_d D and d must be > 0 alpha_D and alpha_d must be > 0 Primary Element = Wedge Segment Height H < D H and D > 0 Viscosity and Density Coefficeints (as applicable) Make sure at least one of the Viscosity coefficients > 0 Make sure at least one of the Density coefficients > 0

Warning	119	Bit - 6	No_Flow_Output	The Flow Algorithm has been configured for “No Flow Output”.	This bit will be set when flow output algorithm type configured as No flow output. Configure Flow Output algorithm type if required otherwise ignore this warning.
		Bit - 6	Simulation Mode	Process variables simulation enabled	This bit is set when any of the process variables like DP, SP, PT and Flow are configured for Simulation. Simulation mode(sim) is enabled for the Diff, Static Press, Process Temp or Flow. Sim mode simplifies testing of flow calc prior to online operation.\nWhile conducting testing, the status indicates that sim is being used. When testing is completed, clear the sim mode for the inputs to return to true process measurement
		Bit 7-15	Unused	NA	NA
Information	120	Bit - 0	adc_reference_fault	The reference voltage measurement in one of the two Analog to Digital Converter (ADC) parts in the Temperature module is not operating correctly. The process temperature measurement may be affected.	Reset the device. If the problem persists, replace the Temperature module.
		Bit -1	temp_unreliable_comm	If there is no proper communication between Communication Board and Temperature Sensor Board (Terminal) or invalid data on communication line due to noise	User can verify the cable/connector between communication and Temperature sensor board (Terminal Board) to ensure that it is not damaged. Check for bent pins.If cable/connector is not the problem, replace the Communication module.If problem still persists, replace the Terminal board.
		Bit - 2	ts_no_factory_calibration	Temperature sensor module factory calibration is missing	Return the device for Factory Calibration

Information	120	Bit - 3	ts_sensor_over_temperature	The Process Temperature input exceeds the Temperature Upper Range Limit (URL) as determined by the configured Sensor Type.	Check the process temperature. If the process temperature exceeds the range of the current sensor type, either correct the process to an in-range temperature or switch to a different sensor type which is ranged for the expected process temperature range.
		Bit - 4	excess_cal1_correction	The temperature calibration correcs on LRV, URV or both is in excess.	Perform Reset Corrects to reset the User calibration to factory default. If required, fllow the calibration procedure to repeat the temperature calibration.
		Bit - 5	user_corrects_activated	User Corrects Activated	This is acknowledgement status for reset corrects performed by user
		Bit - 6	bad TV	Temperature module input bad. Input out of range or may be open	Use matching sensor suitable for the process range. Reset the device, replace the Temp Module if issue persists
		Bit - 7	bad SV	Temperature Module CJ measurement is bad	Verify that the CJ sensor within the Temp sensor module is not outside of the operating temp limits (-40 to 85 degC). Reset the device, replace the Temp Module if issue persists
		Bit - 8	Input1_fault	Fault is set if Temperature module • input failue faulty sensor, • out of range • input open	Replace the faulty sensor if that is the reason. Select suitable sensor type for the process. Reset the device, replace the Temperature Module if issue persists
		Bit - 9	low_sensor_supply	Temperature module Supply is Low	Check supply voltage is within specification. If all are within specification, replace Temperature module
		Bit 10-11	Unused	NA	NA

Information	121	Bit - 0	excess_zero_correction	The DP and/or SP pressure Zero calibration or LRV correction performed by the user is excessive for the given inputs.	Perform a Reset Corrects on the DP and/or SP Pressure Calibration to reset the User calibration to factory default. If required, repeat the Pressure calibrations being careful to ensure that input during Zero calibration (Input Correct) is at zero pressure and input during LRV calibration (LRV Correct) matches the configured pressure LRV value
		Bit -1	excess_span_correction	The DP and/or SP pressure URV correction performed by the user is excessive for the given inputs	Perform a Reset Corrects on the DP and/or SP Pressure Calibration to reset the User calibration to factory default. If required, repeat the Pressure calibrations being careful to ensure that input during URV calibration (URV Correct) matches the configured pressure URV value.
		Bit - 2	char_calc_error	The redundant integrity check on the Pressure measurement calculation indicates a failure.	Power Cycle the device. If the problem persists,replace the Pressure module.
		Bit - 3	sensor_overload_or_fault	The Meter Body is sensing Differential or Static pressure greater than the specified limit of the Upper Range Limit (DP URL)	Check that the process inputs are within specification for the Differential and Static Pressure for this device input range. Correct the excessive pressure input. If higher pressures are required, a higher range device type may be required. Meter Body may have been damaged.
		Bit - 4	Sensor_RAM_DB_Fault	Pressure module is reporting corruption in the database in the Random-Access Memory (RAM)	Power cycle the device. If the problem persists, replace the Meter Body

Information	121	Bit - 5	ps_no_factory_calibration	Factory Calibration for the Pressure module is missing. Accuracy will be compromised.	Return the device for Factory Calibration
		Bit - 6	pres_unreliable_comm	Internal communication quality between the Communication Module and Pressure Sensor is degrading.	Either the transmitter is installed in a noisy environment or internal communication quality between the Communication Module and Pressure Sensor module is degrading. Verify the connector for bent pins.If cable/connector is not the problem, replace the Communication module.If problem still persists, replace the Terminal board.
		Bit - 7	ps_sensor_over_temperature	The Meter Body temperature is too high. Accuracy and life span may decrease if it remains high.	Verify the environmental temperature is within specification. Take steps to insulate the Temperature module from the temperature source.
		Bit 8 - 15	Unsed	NA	NA

Information	122	Bit - 0	common_db_corrupt	NVM copy of Common database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter
		Bit -1	vital_config_db_corrupt	NVM copy of Vital Configuration database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter
		Bit - 2	general_config_db_corrupt:1;	NVM copy of General Configuration database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter
		Bit - 3	config_change_db_corrupt	NVM copy of Configuration Change database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter
		Bit - 4	adv_diag_db_corrupt	NVM copy of Advanced Configuration database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter
		Bit - 5	meter_view_db_corrupt	NVM copy of Display View/Screens Configuration database block found corrupt.	Power cycle the device. If the problem persists reconfigure Display Screen parameters. If still problem is seen replace communication module.

Information	122	Bit - 6	meter_common_db_corrupt	NVM copy of Display Common Configuration database block found corrupt.	Power cycle the device. If the problem persists reconfigure Display Screen parameters. If still problem is seen replace communication module.
		Bit - 7	totalizer_config_corrupt	NVM copy of Totalizer Configuration database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter
		Bit 8-15	Unused		

Information	123	Bit - 0	miscellaneous_db_corrupt	NVM copy of Miscellaneous Configuration database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter
		Bit -1	totalizer_value_db_corrupt	NVM copy of totalizer value block is found corrupt	Power cycle the device. If the problem persists, replace the transmitter
		Bit - 2	unsigned flow_unit_db_corrupt	NVM copy of totalizer value block is found corrupt	Power cycle the device. If the problem persists, replace the transmitter

In addition, each dynamic variable has one byte of status accessible via holding register. The dynamic variables include differential pressure, static pressure, process temperature and flow. Each variable status reading consists of two parts: measurement quality and limit status. These variable statuses are found in the register map for register.

Possible responses for measurement quality status

Good- Displays during normal device operation.

Poor Accuracy – Indicates the accuracy of the variable measurement has been compromised

Manual/Fixed – Indicates the variable reading has been set to fixed, user specified value and may not represent the actual process. This status is set if a variable reading is being simulated or if tha Process Temperature is set to use fixed value.

Bad – Indicates the variable has failed. Example: The differential pressure sensor has failed.

Possible responses for measurement limit status

Not Limited - Displays during normal operation

High Limited – Indicates the current variable reading has gone above the transmitter's maximum possible reading and is no longer representatives of the actual measurement.

Low Limited – Indicates the current variable reading has gone below the transmitter's minimum possible reading and is no longer representatives of the actual measurement.

Constant – indicates the variable reading is set to fixed value -Example: The variable has been left in fixed simulation mode.

3.2.12. Transmitter register maps

This section contains three register maps for SMV800 Modbus Device. These maps include Coils, Holding register and Floating point register.

Table 3-8: SMV800 Modbus Coils

Name	Coil Address	Function Codes	Description	Access Type
Soft Reset	1	5	Perform device soft reset	W
Differential Pressure Calib HiPt	2	5	Perform differential pressure calibration at high point	W
Differential Pressure Calib LowPt	3	5	Perform differential pressure calibration at low point	W
Static Pressure Calib_HiPt	4	5	Perform static pressure calibration at high point	W
Static Pressure Calib LowPt	5	5	Perform static pressure calibration at low point	W
Differential Pressure Zero Correct	6	5	Perform differential pressure zero correct	W
Static Pressure Zero Correct	7	5	Perform static pressure zero correct	W
Differential Pressure Reset Correct	8	5	Perform differential pressure reset correct	W
Static Pressure Reset Correct	9	5	Perform static pressure reset correct	W
Process Temperature Reset Correct	10	5	Perform process temperature reset corrects	W
Process Temperature Calib HiPt	11	5	Perform process temperature calibration at high point	W
Process Temperature Calib LowPt	12	5	Perform process temperature calibration at low point	W
Critical Alarm	49	1	Device critical alarm status	R
Warning Alarm	50	1	Device non-critical alarm status	R
Differential Pressure Above Upper Limit	54	1	Status of differential pressure above upper limit	R
Differential Pressure Below Lower Limit	55	1	Status of differential pressure below lower limit	R
Static Pressure Above Upper Limit	60	1	Status of Static pressure above upper limit	R
Static Pressure Below Lower Limit	61	1	Status of Static pressure below lower limit	R
Process Temperature Above Upper Limit	68	1	Status of process temperature above upper limit	R
Process Temperature Below Lower Limit	69	1	Status of process temperature below lower limit	R
MBT Above Upper Limit	75	1	Status of meter body temperature above Upper limit	R
MBT Below Lower Limit	76	1	Status of meter body temperature below lower limit	R
Sensor Module Failure	79	1	Status of pressure or temperature sensor Module failure	R
Sensor Communication Failure	81	1	Status of pressure or temperature sensor communication failure	R
DP Simulation Enabled	88	1	Status of differential pressure simulation enabled	R
SP Simulation Enabled	89	1	Status of static pressure simulation enabled	R
PT Simulation Enabled	93	1	Status of process temperature simulation enabled	R
Flow Simulation Enabled	94	1	Status of flow simulation enabled	R
WP Enabled	95	1	Status of write protect enabled	R

Table 3-9: SMV800 Modbus Holding Registers

Name	Register Start Address	Description	Access Type	Data Type	Selections / Bitmap / Enumeration
Device Revision	1	Transmitter Device revision	RO	uint8	
Software revision	2	Transmitter Software revision	RO	uint8	
Date	3	Date in DDMMYY format. YY : Year with offset as 1900. Eg. 0x020376 corresponds to March 2, 2018	RW	uint8	
Tag	5	This field can hold numbers, symbols, upper-case letters (8 characters)	RW	ASCII	
Communication Module Firmware Version	9	Firmware revision of Comm. Module	RO		
Final assembly number	13	Assembly number of Transmitter	RW	uint32	
Device Address	15	Modbus Device Slave Address	RW	uint8	
Hardware revision	16	Transmitter Hardware revision	RO		
Message	17	This field can hold numbers, symbols, upper-case letters (16 characters)	RW	ASCII	
Long tag	33	This field can hold numbers, symbols, upper-case letters (16 characters)	RW	ASCII	
Pay For Play Serial Number	49	Unique Serial Number of Transmitter required for enabling optional features	RO	uint32	
Write Protect	51	Transmitter Write Protection Status	RO	uint8	1 - Write Protect Enabled 0 - Write Protect Disabled

Write Protect Config	52	Configuration of Device Software Write Protection. Always use this along with parameter "Write Protect Config".	W	uint8	0 - Disable Write Protect 1 - Enable Write Protect 3 - Change Write Protect Password Using Existing Password 4 - Enter New Write Protect Password 5 - Write Protect Password Reset using Key 6 - Set Write Protect Password
Write Protect Password	53	Password used along with "Write Protect Config" parameter. All Passwords are in ASCII except the Reset Key.	W	ASCII /uint32	
Transmitter Model/ type	55	Device Type, 0x24 (Multivariable Transmitter)	RO	uint8	
Transmitter Manufacturer	56	Manufacturer, 0x17 (Honeywell)	RO	uint8	
Flow Base Unit	57	Base unit is unit from which custom unit is derived	RW	uint8	Mass Flow Base Unit 70 - g/sec 71 - g/min 72 - g/h 73 - kg/sec 74 - kg/min 75 - kg/h 76 - Kg/d 77 - t/min [Metric tons] 78 - t/h [Metric tons] 79 - MetTon/d 80 - lb/sec 81 - lb/min 82 - lb/h 83 - lb/d 84 - STon/min 85 - STon/h 86 - STon/d 87 - LTon/h 88 - LTon/d 89 - Custom Volume Flow Base Unit: 19 - m3/h 131 - m3/min 28 - m3/sec 29 - m3/day 16 - gal/min 136 - gal/h 235 - gal/day 17 - l/min 138 - l/h 15 - ft3/min 26 - ft3/sec

					130 - ft3/h 135 - bbl/day 22 - gal/s 24 - L/S 27 - Cuft/d 121 - NmlCum/h 122 - NmlL/h 123 - StdCuft/min 132 - Bbl/s 133 - Bbl/min 134 - Bbl/h 181 - Nml m3/d 182 - Nml m3/min 184 - Std ft3/d 185 - Bbl/h 186 - Nml m3/s 187 - Nml m3/d 188 - Nml m3/min 189 - Std ft3/d

Flow Unit	58	Allows configuring Flow unit. All the units are self-Explanatory. Custom Unit: When this unit is selected, Tools will populate Flow Custom Tag Flow Base Unit : Base unit is unit from which custom unit is derived Flow Conver. Factor: Enter a numeric value that represents the number of base units per one custom unit. Example: Flow Custom Tag: MyNewUnit Flow Base Unit: g/sec Flow Conver Factor: 0.5 (means 0.5 g/sec = 1 Custom Unit) Flow Rate = 50 g/sec Flow Rate in “MyNewUnit” will be = (50/0.5) MyNewUnit	RW	uint8	Mass Flow Base Unit 70 - g/sec 71 - g/min 72 - g/h 73 - kg/sec 74 - kg/min 75 - kg/h 76 - Kg/d 77 - t/min [Metric tons] 78 - t/h [Metric tons] 79 - MetTon/d 80 - lb/sec 81 - lb/min 82 - lb/h 83 - lb/d 84 - STon/min 85 - STon/h 86 - STon/d 87 - LTon/h 88 - LTon/d 89 - Custom Volume Flow Base Unit: 19 - m3/h 131 - m3/min 28 - m3/sec 29 - m3/day 16 - gal/min 136 - gal/h 235 - gal/day 17 - l/min 138 - l/h 15 - ft3/min 26 - ft3/sec 130 - ft3/h 135 - bbl/day 22 - gal/s 24 - L/S 27 - Cuft/d 121 - NmlCum/h 122 - NmlL/h 123 - StdCuft/min 132 - Bbl/s 133 - Bbl/min 134 - Bbl/h 181 - Nml m3/d 182 - Nml m3/min 184 - Std ft3/d 185 - Bbl/h 186 - Nml m3/s 187 - Nml m3/d 188 - Nml m3/min 189 - Std ft3/d

Differential Pressure Unit	59	Differential Pressure Units	RW	uint8	1 - InH2O@68 deg F 2 - InHg @ 0 deg C 3 - FtH2O @68 deg F 4 - mmH2O @68 deg F 5 - mmHg @ 0 deg C 6 - psi 7 - bar 8 - mbar 9 - g/SqCm 10 - kg/SqCm 11 - Pa 12 - kPa 13 - Torr 14 - Atm 145 - InH2O@60 deg F 237 - MPa 238 - InH2O@4 deg C 239 - mmH2O@4 deg C
Static Pressure Unit	60	Static Pressure Units	RW	uint8	1 - InH2O@68 deg F 2 - InHg @ 0 deg C 3 - FtH2O @68 deg F 4 - mmH2O @68 deg F 5 - mmHg @ 0 deg C 6 - psi 7 - bar 8 - mbar 9 - g/SqCm 10 - kg/SqCm 11 - Pa 12 - kPa 13 - Torr 14 - Atm 145 - InH2O@60 deg F 237 - MPa 238 - InH2O@4 deg C 239 - mmH2O@4 deg C
Process Temperature Unit	61	Process Temperature Unit	RW	uint8	32 - degC 33 - degF 34 - degR 35 - Kelvin
Meter body Temperature Unit	62	Meter body Temperature Unit	RW	uint8	32 - degC 33 - degF 34 - degR 35 - Kelvin

Totalizer Engineering Unit	63	Unit of Totalizer. Depends on configured flow output type . When Custom Unit is selected, related parameters will be enabled: • Custom Unit Tag • Base Unit • Base per Custom unit Conversion factor	RW	uint8	When Flow output type is Mass Flow, Totalizer Unit lists: 60 – g 61 - Kg 62 - Mton 63 - Lb 64 - ShTons 65 - LTons 125 - Ounce 253 - Custom Unit When Flow Output type is Volume Flow, Totalizer units lists: 43 - M3 46 - Barrels+J19 112 - Ft3 166 - Nm3 167 - nLiters 41 - Liters 168 - scft 172 - Scm 40 - Gallons 253 - Custom Unit
Flow Custom Unit Tag	64	User defined Tag for custom unit selection. This field can hold numbers, symbols, upper-case letters (8 characters)	RW	ASCII	
Totalizer Base Unit	68	Base unit is unit from which custom unit is derived for totalizer.	RW	uint8	When Flow output type is Mass Flow, Totalizer Unit lists: 60 - g 61 - Kg 62 - Mton 63 - Lb 64 - ShTons 65 - LTons 125 - Ounce When Flow Output type is Volume Flow, Totalizer units lists: 43 - M3 46 - Barrels+J19 112 - Ft3 166 - Nm3 167 - nLiters 41 - Liters 168 - scft 172 - Scm 40 - Gallons

Reserve	69	Reserve Address	NA	NA	
Transmitter Meter body Type	86	Meter body Type	RO	uint8	01- Absolute Pressure 02- Gauge Pressure
Comm Module Min. Temp Time Stamp	87	Communication Module minimum temperature time stamp in minutes.	RO	uint32	
Comm Module Max. Temp Time Stamp	89	Communication Module maximum temperature time stamp in minutes.	RO	uint32	
License Key/Feature Upgrade Key	91	Upgrade Code/Key to enable pay for play features such as Flow Computation or TC measurement	W	uint32	
Reserve	93	Reserve Address	NA	NA	
Power Cycle Count	94	The total number of times the device has been reset by power cycle	RO	uint16	
Power Cycle Time Stamp	95	Last power cycle time in minutes	RO	uint32	
Time In Service	97	Total time that the Transmitter is in service in minutes	RO	uint32	
Tamper Mode	99	Tamper detection (parameters configuration change) mode	RW	uint8	00 - Disble 01 - Enable
Tamper Latency	100	Time in seconds for clearing Tamper alarm status after reading alarm status once.	RW	uint8	
Max. Tamper Allowable Attempts	101	Maximum tamper attempts to set Tamper Alarm	RW	uint8	
Tamper Attempt Counter	102	Number tamper attempts made	RO	uint8	
Error Log Mode	103	Error Log Mode configuration to enable or disable logging of error time stamp	RW	uint8	00 - Disble 01 - Enable
Reserve	104	Reserve Address	NA	NA	
Device Address	105	Modbus Device Slave Address	RW	uint8	
Turnaround delay	106	Minimum time to respond to a modbus request.	RW	uint8	
Baud rate select	107	Modbus Serial Communication Baud rate selection	RW	uint8	00 - 1200 01 - 2400 02 - 4800 03 - 9600 04 - 19200
Parity Select	108	Modbus Serial Communication Parity Selection	RW	uint8	00 - None 01 - Odd 03 – Even

Message Count	109	Diagnostics information of messages received	RO		
CRC Error count	110	Modbus communication CRC Error Count	RO		
Parity Error count	111	Modbus communication Parity Error Count	RO		
Reserve	112	Reserve Address	NA	NA	
Reserve	114	Device Variable Status	NA	NA	
Critical Faults	115	Critical Fault Status	RO	uint8	Bit - 0 Diagnostic Failure Bit -1 Communication RAM Failure Bit - 2 Communication ROM Failure Bit - 3 Communication Program Flow Failure Bit - 4 Communication Config Data Corrupt Bit - 5 Pressure Sensor Comm Timeout Bit - 6 Temp Sensor Comm Timeout Bit - 7 Supply(Vcc) Failure Bit - 8 Pressure Sensing Failure Bit - 9 Temperature Sensing Failure
Critical Faults Details	116	More Details of Crtical Faults	RO	uint8	Bit - 0 Meterbody Failure Bit -1 Pressure Sensor Charactarization corrupt Bit - 2 Pressure Suspect Input Bit - 3 Sensor RAM DB Fault Bit - 4 Pressure NVM Corrupt Bit - 5 Pressure Sensor RAM Corrupt Bit - 6 Pressure Sensor Code Corrupt Bit - 7 Pressure Sensor Flow Failure Bit - 8 Temperature Sensor Input Failure Bit - 9 NA Bit - 10 Temperature Suspect Input Bit - 11 Temperature Sensor Char CRC Failure Bit - 12 Temperature Sensor NVM Corrupt Bit - 13 Temperature Sensor RAM Failure Bit - 14 Temperature Sensor Code Corrupt Bit - 15 Temperature Sensor Flow Failure

Process Variables Status	117	Process Variables limits status	RO	uint8	Bit - 0 Bad DP Bit - 1 Bad MBT Bit - 2 Bad SP Bit - 3 Bad PT Bit - 4 Bad Flow Bit - 5 Bad Totalizer Bit - 6 Differential pressure measured is above URV Bit - 7 Differential pressure measured is below LRV Bit - 8 Static pressure measured is above URV Bit - 9 Static pressure measured is below LRV Bit - 10 Process Temperature measured is above URV Bit - 11 Process Temperature measured is below LRV Bit - 12 Meter body Temperature measured is above URV Bit - 13 Field Meter body Temperature measured is below LRV Bit - 14 Field Flow measured is above URV Bit - 15 Field Flow measured is below LRV
Warnings Status 1	118	Warnings Status 1	RO	uint8	Bit - 0 Communication Section Non-Critical Failure Bit - 1 Sensing Section NC Failure Bit - 2 CJ Out Of Limit Bit - 3 No Factory Calibration Bit - 4 Sensor Unreliable Communication Bit - 5 Tamper Alarm Bit - 6 Low Supply Voltage of Temp/MBT Bit - 7 Device Warm Reset Bit - 8 Display Communication Failure Bit - 9 Display NVM Corrupt Bit - 10 Communication Module VCC Failure Bit - 11 Communication Supply Failure

Warnings Status 2	119	Warnings Status 2	RO	uint8	Bit - 0 Totalizer Reached Maximum Value Bit - 1 PT Sensor Over Temperature Bit - 2 PT Sensor Input Open Bit - 3 PT Sensor Input Out Of Range Bit - 4 CJ CT Delta Warning Bit - 5 Flow Calculation Fault Bit - 6 No Flow Output Bit - 6 DP/SP/PT/FLOW Simulation Mode Enabled
Temp. Mod Debug Information 1	120	Temperature Module Faults debug Information 2	RO	uint8	Bit - 0 Temperature module ADC Reference Failure Bit - 1 Temperature Module Unreliable Communication Bit - 2 Temperature module Factory Calibration missing Bit - 3 Temperature Sensor Over Temperature Bit - 4 Excess Calibration Correction Bit - 5 User Corrects Activated Bit - 6 Sensor input bad Bit - 7 Sensor/CJ Bad Bit - 8 Sensor Input Failure Bit - 9 Temperature Module Low Supply
Press. Mod.Debug Information 1	121	Pressure Module Faults debug Information 2	RO	uint8	Bit - 0 Pressure Sensor Excess Zero Correction Bit -1 Pressure Sensor Excess Span Correction Bit - 2 Pressure Sensor Characterization Calc Error Bit - 3 Pressure Sensor Overload Bit - 4 Pressure Sensor RAM DB Failure Bit - 5 Pressure Sensor No Fact Calib Bit - 6 Pressure Sensor Module Unreliable Communication Bit - 7 Pressure Sensor Over Temperature Bit - 8 Pressure Module Low Supply Bit - 9 Reverse Flow is enabled Bit - 10 Flow bad for Negative Square root Bit - 11 Flow bad for Divided By Zero

Database Fault Information 1	122	Database Fault Information 1	RO	uint8	Bit - 0 NVM copy of Common database block found corrupt. Bit - 1 NVM copy of Vital Configuration database block found corrupt. Bit - 2 NVM copy of General Configuration database block found corrupt. Bit - 3 NVM copy of Configuration Change database block found corrupt. Bit - 4 NVM copy of Advanced Configuration database block found corrupt. Bit - 5 NVM copy of Display View/Screens Configuration database block found corrupt. Bit - 6 NVM copy of Display Common Configuration database block found corrupt. Bit - 7 NVM copy of Totalizer Configuration database block found corrupt.
Database Fault Information 2	123	Database Fault Information 2	RO	uint8	Bit - 0 NVM copy of Miscellaneous Configuration database block found corrupt. Bit -1 NVM copy of totalizer value block is found corrupt Bit - 2 NVM copy of totalizer value block is found corrupt Bit - 3 NVM copy of advance flow value block is found corrupt Bit - 4 NVM copy of totalizer value back up block is found corrupt Bit - 5 NVM copy of user variables block is found corrupt
Reserve	124	Reserve Address	NA	NA	

Calibration Date	125	DP, SP, PT Calibration Date in DDMMYY format. YY : Year with offset as 1900. Eg. 0x020376 corresponds to March 2, 2018. When read, this will always give Jan 01 2011 as date. To read Calibration date configured for DP, SP and PT refer respective registers.	RW	uint8	
Reserve	128	Reserve Address	NA	NA	
Model Key	131	Model Key of transmitter representing the Differential and Static Pressure measurement ranges.	RO	ASCII	
Model Selection Guide Part 1	135	Model Selection Guide (MSG) Part 1	RO	ASCII	
Model Selection Guide Part 2	145	Model Selection Guide (MSG) Part 2	RO	ASCII	
Model Selection Guide Part 3	155	Model Selection Guide (MSG) Part 3	RO	ASCII	
Model Selection Guide Part 4	165	Model Selection Guide (MSG) Part 4	RO	ASCII	
Comm Module Temp Up Count	175	The total number of minutes that the Communications Module/board Electronics Temperature (ET) has exceeded the upper stress limit (ET Upper Limit)	RO	uint32	
Comm Module Temp Down Count	177	The total number of minutes that the Communications Modlue/board Electronics Temperature (ET) has been below the lower stress limit (ET Lower Limit)	RO	uint32	
Reserve	179	Reserve Address	NA	NA	
User Defined Variables Monitoring	188	User defined variables limit check configuration for each variable.	RW	uint8	Bit - 0 Enable Monitoring of User Variable 1 Bit - 1 Enable Monitoring of User Variable 2 Bit - 2 Enable Monitoring of User Variable 3 Bit - 3 Enable Monitoring of User Variable 4 Bit - 4 Enable Monitoring of User Variable 5 Bit - 5 Enable Monitoring of User Variable 6 Bit - 6 Enable Monitoring of User Variable 7 Bit - 7 Enable Monitoring of User Variable 8

Reserve	189	Reserve Address	NA	NA	
Totalizer Status	190	Totalizer Process Variable Status			0x30 TOTALIZER OFF 0x00 TOTALIZER BAD 0x40 TOTALIZER POOR ACCURACY 0x80 TOTALIZER FLOW SIMULATION ON 0xC0 TOTALIZER GOOD 0xB0 TOTALIZER STOP
Sampling Rate	191	The Totalizer value will be updated at the configured rate. The rate may be configured in increments of 125 ms.	RW	uint16	
Totalizer Status Latency	192	The userconfigurable Totalizer Status Latency indicates the length of time this status will be active before it is reset.	RW	uint16	
Totalizer Custom Unit Tag	193	User defined Tag for Totalizer custom unit selection. This field can hold numbers, symbols, upper-case letters (8 characters)	RW	ASCII	
Reserve	197	Reserve Address	NA	NA	
Totalizer Exceed Count	198	This value indicates the number of times the Totalizer Value has reached the userconfigured Maximum Totalizer Value	RO	uint16	
Start/Stop Totalizer [M]Reset Totalizer	199	Reset Totalizer Mode and Values	RW	uint16	Bit 0 : Start/Stop . Set to 1 for Start Bit 1 : Reset Positive Totalizer. Set to 1 for Reset Bit 2 : Reset Negative Totalizer. Set to 1 for Reset Bit 3 : Reset Totalizer Exceed Counter. Set to 1 for Reset
DP Current URV Correction Time and Date	204	Current time record for DP URV Correction	RO	uint32	N/A
DP Current LRV Correction Time and Date	206	Current time record for DP LRV Correction	RO	uint32	N/A
DP Current Zero Correction Time and Date	208	Current time record for DP Zero Correction	RO	uint32	N/A

DP Last URV Correction Time and Date	210	Last time record for DP URV Correction	RO	uint32	N/A
DP Last LRV Correction Time and Date	212	Last time record for DP LRV Correction	RO	uint32	N/A
DP Last Zero Correction Time and Date	214	Last time record for DP Zero Correction	RO	uint32	N/A
DP Previous URV Correction Time and Date	216	Previous time record for DP URV Correction	RO	uint32	N/A
DP Previous LRV Correction Time and Date	218	Previous time record for DP LRV Correction	RO	uint32	N/A
DP Previous Zero Correction Time and Date	220	Previous time record for DP Zero Correction	RO	uint32	N/A
Reserve For Device Specific	222	NA			N/A
DP Current Reset Corrects Time and Date	223	Current time record for DP Reset Correction	RO	uint32	N/A
DP Last Reset Corrects Time and Date	225	Last time record for DP Reset Correction	RO	uint32	N/A
DP Previous Reset Corrects Time and Date	227	Previous time record for DP Reset Correction	RO	uint32	N/A
SP Current URV Correction Time and Date	229	Current time record for SP URV Correction	RO	uint32	N/A
SP Last URV Correction Time and Date	231	Last time record for SP URV Correction	RO	uint32	N/A
SP Previous URV Correction Time and Date	233	Previous time record for SP URV Correction	RO	uint32	N/A
SP Current LRV Correction Time and Date	235	Current time record for SP LRV Correction	RO	uint32	N/A
SP Last LRV Correction Time and Date	237	Last time record for SP LRV Correction	RO	uint32	N/A
SP Previous LRV	239	Last time record for SP Zero Correction	RO	uint32	N/A

Correction Time and Date					
SP Current Zero Correction Time and Date	241	Previous time record for SP URV Correction	RO	uint32	N/A
SP Last Zero Corrects Time and Date	243	Previous time record for SP LRV Correction	RO	uint32	N/A
SP Previous Zero Correction Time and Date	245	Previous time record for SP Zero Correction	RO	uint32	N/A
SP Reset Corrects Time and Date	247	Current time record for Reset Correction	RO	uint32	N/A
SP Last Reset Corrects Time and Date	249	Last time record for Reset Correction	RO	uint32	N/A
SP Previous Reset Corrects Time and Date	251	Previous time record for Reset Correction	RO	uint32	N/A
DP Up Count	256	The total number of minutes that the Differential Pressure input has exceeded the upper stress limit.	RO	uint32	N/A
DP Down Count (not used in AP or GP)	258	The total number of minutes that the Differential Pressure input has been below the lower stress limit.	RO	uint32	N/A
DP Up time stamp	260	Displays time elapsed since the Differential Pressure was last measured as exceeding the DP Up Limit .	RO	uint32	N/A
DP down time stamp (not used in AP or GP)	262	Displays time elapsed since the Differential Pressure was last measured as lower than the DP Down Limit.	RO	uint32	N/A
SP Up Count (not used in AP or GP)	264	The total number of minutes that the Static Pressure input has exceeded the upper stress limit.	RO	uint32	N/A
SP Up Time Stamp (not used in AP or GP)	266	Displays time elapsed since the Static Pressure was last measured as exceeding the SP Up Limit.	RO	uint32	N/A
MBT Up Count	268	The total number of minutes that the Meter Body Temperature (MBT) has exceeded the upper stress limit.	RO	uint32	N/A
MBT Down Count	270	The total number of minutes that the Meter Body Temperature (MBT) has	RO	uint32	N/A

		been below the lower stress limit.			
MBT Up Time Stamp	272	Displays time elapsed since the Meter Body Temperature last measured as exceeding the MBT upper stress limit.	RO	uint32	N/A
MBT Down Time Stamp	274	Displays time elapsed since the Meter Body Temperature was last measured below the MBT lower stress limit.	RO	uint32	N/A
Reserve	276	NA			
Transmitter Install Date	278	One time writable installation date for the SMV Modbus Transmitter.	R/W	uint32	N/A
MBT Time in Service	280	Percent of the expected Service Life that the Pressure Module has been in service. Value is based on electronics temperature. Service life accumulates faster at higher temperatures with an exponential relationship.	RO	uint32	N/A
Flow Type	285	Shows the current Flow Output type. When it is No Flow Output type, Flow Rate output will be 0. Flow Calculation details status will be active until the device is power cycled.	R/W	uint8	(Byte 0 :-> Bit 0 to 3) 0 = No Flow Output 1 = Ideal Gas Actual Volume Flow 2 = Ideal Gas Mass Flow 3 = Superheated Steam Mass Flow 4 = Liquid Mass Flow 5 = Ideal Gas Volume Flow @ Std Condition 6 = Liquid Actual Volume Flow 7 = Liquid Volume Flow @ Std Condition 8 = Laminar Mass Flow 9 = Laminar Actual Volume Flow 10 = Laminar Volume Flow @ Std Condition 11-15 = Reserved
Legacy Control:		Shows currently selected legacy Control. This is user configurable parameter.			(Byte 0 :-> Bit 4 to 5) 0 = SMV800 Method 1 = SMV300 Method 2-3 = Reserved

Compensation Mode		Shows currently selected Compensation Mode.This is user configurable parameter. Dynamic option allowed on Advanced Algorithms or ASME 1989 Algorithms.If you need to calculate Standard Flow, Select ASME 1989 Algorithms Algorithm Option			(Byte 0 :-> Bit 6 to 7) 0 = Dynamic Compensation 1 = Standard Compensation 2-3 = Reserved
Flow Calculation Standard	286	Shows the Flow Calculation Standard. When Algorithm Option = Advanced Algorithms, all the Flow Calc Types except for ASME 1989 applicable. When Algorithm Option = ASME 1989	R/W	uint8	(Byte 0 :-> Bit 0 to 4) 0 = ASME-MFC-3 1 = ISO5167 2 = GOST 3 = AGA3 4 = VCONE/WAFER CONE 5 = ASME-MFC-14M 6 = WEDGE 7 = AVERAGE PITOT TUBE 8 = INTEGRAL ORIFICE 9 = CONDITIONAL ORIFICE 10 = LEGACY SMV 3000 11 = LEGACY LAMINAR FLOW 12-31 = Reserved
					(Byte 0 :-> Bit 5 to 6) Reserved
Discharge Exponent:		Shows Discharge Exponent setting. This is user configurable parameter. When the Reynolds Exponent is Off, the value is 0.75. When ON, the value is 0.5.			(Byte 0 :-> Bit 7) 0 = 0.75 1 = 0.5
Manual Input Switch	287	Shows currently selected Manual Input Switch. This is user configurable parameter. Configures Manual Input On/OFF for Density, Viscosity, Fa, Y, Cd, Note that only when Algorithm Option = ASME 1989 Algorithms and Equation Model = Standard, AP and TEMP Compensations can be set to ON or OFF. This setting determines the usage of alternate values for AP and/or TEMP for Standard Gas Flow calculations when Failsafe setting is OFF.	R/W	uint8	(Byte 0 :-> Bit 0 to 4) Bit 0 :-> 0 = Off, 1 = Manually Input Density On Bit 1 :-> 0 = Off, 1 = Manually Input Viscosity On Bit 3 :-> 0 = Off, 1 = Manually Input Cd On Bit 4 :-> 0 = Off, 1 = Manually Input Fa On Bit 5 :-> Reserved

Compensation Switch		Shows currently selected Compensation settings for Static Pressure and Temperature..This is user configurable parameter.			(Byte 0 :-> Bit 6 to 7) Bit 6 :-> 0 = Off, 1 = AP Compensation On Bit 7 :-> 0 = Off, 1 = Temp compensation On
Primary Element Type	288	Shows currently selected Primary Element Type.This is user configurable parameter. Available Primary Element options are dependent upon the selected Algorithm Option; Advanced Algorithms or ASME 1989 Algorithms.	R/W	uint8	Primary Element Type For Legacy Control = SMV3000 Method: 0x00 = O-FTaps(ASME-ISO)D >/= 2.3 0x01 = FTaps(ASME-ISO)2</= D </= 2.3 0x02 = O-CTaps(ASME-ISO) 0x03 = O-D&D/2Taps(ASME-ISO) 0x04 = O-2.5D&8DTaps(ASME-ISO) 0x05 = V-MI(ASME-ISO) 0x06 = V-RCI(ASME-ISO) 0x07 = V-RW Sheet-Iron Inlet(ASME-ISO) 0x08 = N-(ASME LR) 0x09 = V-nozzle(ISA Inlet) 0x0A = V-Leopold 0x0B = V-Gerand 0x0C = Uni V-Tube 0x0D = Lo-Loss V-Tube 0x0E = PE-0.875inch for 2inch Pipe 0x0F = PE-0.875inch for 2.5inch Pipe 0x10 = PE-0.875inch for 3inch Pipe 0x11 = PE-0.875inch for 4inch Pipe 0x12 = PE-0.875inch for 5inch Pipe 0x13 = PE-0.875inch for 6inch Pipe 0x14 = PE-0.875inch for 8inch Pipe 0x15 = PE-0.875inch for 10inch Pipe 0x16 = PE-0.875inch for 12inch Pipe 0x17 = PE-0.875inch for 14inch Pipe 0x18 = PE-1.25inch for 12inch Pipe 0x19 = PE-1.25inch for 14inch Pipe 0x1A = PE-1.25inch for 16inch Pipe 0x1B = PE-1.25inch for 18inch Pipe 0x1C = PE-1.25inch for 20inch Pipe 0x1D = PE-1.25inch for 22inch Pipe 0x1E = PE-1.25inch for

					24inch Pipe 0x1F = PE-1.25inch for 26inch Pipe 0x20 = PE-1.25inch for 28inch Pipe 0x21 = PE-1.25inch for 30inch Pipe 0x22 = PE-1.25inch for 32inch Pipe 0x23n = PE-1.25inch for 34inch Pipe 0x24 = PE-1.25inch for 36inch Pipe 0x25 = E-1.25inch for 42inch Pipe 0x26 = PE-1.25inch for gt42inch Pipe 0x27 = PE-2.25inch for 16inch Pipe 0x28 = PE-2.25inch for 18inch Pipe 0x29 = PE-2.25inch for 20inch Pipe 0x2A = PE-2.25inch for 22inch Pipe 0x2B = PE-2.25inch for 24inch Pipe 0x2C = PE-2.25inch for 26inch Pipe 0x2D = PE-2.25inch for 28inch Pipe 0x2E = PE-2.25inch for 30inch Pipe 0x2F = PE-2.25inch for 32inch Pipe 0x30 = PE-2.25inch for 34inch Pipe 0x31 = PE-2.25inch for 36inch Pipe 0x32 = PE-2.25inch for 42inch Pipe 0x33 = PE-2.25inch for gt42inch Pipe 0x34 = Other Pitot Tube"} For Legacy Control = SMV800 Method: 0x00 = ASME-MFC-3 O-FTaps 0x01 =ASME-MFC-3 O-CTaps 0x02 = ASME-MFC-3 O-D&D/2Taps 0x03 = IS05167 O-FTaps 0x04 = IS05167 O-CTaps 0x05 = IS05167 O-D&D/2Taps 0x06 = Gost 8.586 O-FTaps 0x07 = Gost 8.586 O-CTaps 0x08 = Gost 8.586 O-3-

					RadiusTaps 0x09 = AGA3 O-FTaps 0x0A = AGA3 O-CTaps 0x10 = ASME-MFC-3 ASME LR Nozzles 0x11 = ASME-MFC-3 V-Nozzles 0x12 = ASME-MFC-3 ISA1932 Nozzles 0x13 = IS05167 LRNozzles 0x14 = IS05167 V-Nozzles 0x15 = S05167 ISA1932 Nozzles 0x16 = Gost 8.586 LRNozzles 0x17 = Gost 8.586 V-Nozzles 0x18 = Gost 8.586 ISA 1932 Nozzles 0x20 = ASME-MFC-3 V-As-Cast CSec 0x21 = ASME-MFC-3 V-Machined CSec 0x22 = ASME-MFC-3 V-RW CSec 0x23 = IS05167 V-As-Cast CSec 0x24 = IS05167 V-M CSec 0x25 = IS05167 V-RW Sheet-Iron CSec 0x26 = Gost 8.586 V-CU Cone Part 0x27 = Gost 8.586 V-MUCone Part 0x28 = Gost 8.586 V-WU ConePart made of Sheet Steel 0x30 = APT 0x40 = Std Vcone 0x41 = Wafer Cone 0x50 = Wedge 0x60 = Integral Orifice 0x70 = Small Bore O-FTaps 0x71 = Small Bore O-CTaps 0x80 = Cond O-405 0x81 = Cond O-1595 FTaps 0x82 = Cond O-1595 CTaps 0x83 = Cond O-1595 D&D/2Taps

Fluid Type	289	Shows currently selected fluid Type.This is user configurable parameter Note: Saturated Steam-SP : use Static Pressure to calculate the Density for Saturated steam). Saturated Steam-PT : use Process Temperature to calculate the Density for Saturated steam)	R/W	uint8	(Byte 0 :-> Bit 0 to 3) 0 = Gas 1 = Liquid 2 = Steam 3 = Saturated Steam-SP 4 = Saturated Steam-PT 5-15 = Reserved
VCone Y Method		Shows currently selected VCone Y Method.This is user configurable parameter.			(Byte 0 :-> Bit 4) 0 = Use McCrometer Method 1 = Use ASME Method
VCone Simplified Liquid		Shows currently selected VCone Simplified Liquid.This is user configurable parameter.			(Byte 0 :-> Bit 5) 0 = Off 1 = ON
Use Wedge Fixed Flow Coefficient		Shows currently selected Use Wedge Fixed Flow Coefficient.This is user configurable parameter.			(Byte 0 :-> Bit 6) 0 = Off 1 = ON (Byte 0 :-> Bit 7) Reserved
Algorithm Type	290	Shows if the Algorithm is Advanced Algorithms type or ASME 1989 Algorithms. When Algorithm Options is ON, Algorithm is ASME 1989 Algorithms type. When OFF, it is Advanced Algorithms type.	R/W	uint8	0 = Advanced Algorithms 1 = ASME1989 Algorithms

Pipe Material	291	Shows currently selected Pipe Material. This is user configurable parameter.Available Pipe Material is dependent upon the Flow Calculation Standard and Algorithm Options. Note that only Advanced Algorithms Options Supports GOST material/Standard.	R/W	uint8	When Flow Calc Standard is other than GOST : 0 = 304 Stainless Steel 1 = 316 Stainless Steel 2 = 304/316 Stainless Steel 3 = Corbon Steel 4 = Hastelloy 5 = Monel 400 6 = Other When Flow Calc Standard is GOST: 0 = 35П 1 = 45П 2 = 20ХМП 3 = 12Х18Н9ТП 4 = 15К,20К 5 = 22К 6 = 16ГС 7 = 09Г2С 8 = 10 9 = 15 10 = 20 11 = 30,35 12 = 40,45 13 = 10Г2 14 = 38ХА 15 = 40Х 16 = 15ХМ 17 = 30ХМ,30ХМА 18 = 12Х1МФ 19 = 25Х1МФ 20 = 25Х2МФ 21 = 15Х5М 22 = 18Х2Н4МА 23 = 38ХН3МФА 24 = 08Х13 25 = 12Х13 26 = 30Х13

Bore Material	292	Shows currently selected Bore Material. This is user configurable parameter. Available Bore Material is dependent upon the Flow Calculation Standard and Algorithm Options. Note that only Advanced Algorithms Options Supports GOST material/Standard.	R/W	uint8	When Flow Calc Standard is other than GOST : 0 = 304 Stainless Steel 1 = 316 Stainless Steel 2 = 304/316 Stainless Steel 3 = Corbon Steel 4 = Hastelloy 5 = Monel 400 6 = Other When Flow Calc Standard is GOST: 0 = 35П 1 = 45П 2 = 20ХМП 3 = 12Х18Н9ТП 4 = 15К,20К 5 = 22К 6 = 16ГС 7 = 09Г2С 8 = 10 9 = 15 10 = 20 11 = 30,35 12 = 40,45 13 = 10Г2 14 = 38ХА 15 = 40Х 16 = 15ХМ 17 = 30ХМ,30ХМА 18 = 12Х1МФ 19 = 25Х1МФ 20 = 25Х2МФ 21 = 15Х5М 22 = 18Х2Н4МА 23 = 38ХН3МФА 24 = 08Х13 25 = 12Х13 26 = 30Х13
PV Simulation Fail Safe	293	Configures Temperature and Static Pressure failsafe ON/Off conditions, Reverse Flow ON/OFF condition and Simulation ON / OFF conditions for Process Variables DP, SP, PT, Flow	R/W	uint8	Bit 0 :-> 0 = Off, 1 = pv2 failsafe Bit 1 :-> 0 = Off, 1 = pv3 failsafe Bit 2 :-> 0 = Off, 1 = reverse flow on Bit 3 :-> 0 = Off, 1 = simulate DP Bit 4 :-> 0 = Off, 1 = simulate SP Bit 5 :-> 0 = Off, 1 = simulate PT Bit 6 :-> 0 = Off, 1 = simulate Flow Bit 7 :-> reserved
Simulated DP	294	Simulated DP value when Simulation setting is ON	RO	float	N/A
Simulated SP	296	Simulated SP value when Simulation setting is ON	RO	float	N/A
Simulated PT	298	Simulated PT value when Simulation setting is ON	RO	float	N/A

Simulated Flow	300	Simulated Flow value when Simulation setting is ON	RO	float	N/A
Options Present	302	Pay for play option. This parameter gives information that what are options present in transmitter.	RO	uint32	Bit 0 = Reserved Bit 1:-> 0 = Universal Input Option not present ;1 = Universal Input option present Bit 2:-> 0 = Flow Output Option not present ;1 = Flow Output Option present Bit 3 to 15 = Reserved
Reserve For Device Specific	304	NA			
Reserve For Device Specific	306	NA			
Reserve For Device Specific	313	NA			
Selected calibration set for DP	315	The currently selected custom factory calibration (A,B, C) for Differential Pressure	RO	uint8	0 = CAL A 1 = CAL B 2 = CAL C 3 = Best Fit
Available calibration set for DP	316	The available custom factory calibration (A,B, C) for Diffrential Pressure	RO	uint8	0 = CAL A 1 = CAL B 2 = CAL C 3= Best Fit
Selected calibration set for SP	317	The currently selected custom factory calibration (A,B, C) for Static Pressure	RO	uint8	0 = CAL A 1 = CAL B 2 = CAL C 3 = Best Fit
Available calibration set for SP	318	The available custom factory calibration (A,B, C) for Static Pressure	RO	uint8	0 = CAL A 1 = CAL B 2 = CAL C 3= Best Fit
Req Calib Sel DP	319	Allows selection of one of the available custom factory calibrations for Differential Pressure	R/W	uint8	0 = CAL A 1 = CAL B 2 = CAL C 3 = Best Fit
Req Calib Sel SP	320	Allows selection of one of the available custom factory calibrations for Static Pressure	R/W	uint8	0 = CAL A 1 = CAL B 2 = CAL C 3 = Best Fit
Sensor firmware revision	321	Sensor Firmware Version	RO	string	N/A
Meterbody Bar Code	325	Bar Code number of Meter Body	RO	string	N/A
adc Filter selection	331	Configuration option for Standard or Fast Speed of Response	R/W	uint8	0 = Std SOR 1 = Fast SOR

AVDD up time stamp	332	Displays the time elapsed since the Pressure Sensor Supply Voltage last dropped below the Min AVDD Value.	RO	uint32	N/A
AVDD Down time stamp	334	Displays the time elapsed since the Pressure Sensor Supply Voltage last exceeded the Max AVDD Value.	RO	uint32	N/A
ET up cnt (presure)	336	The total number of minutes that the Pressure Module Electronics Temperature (ET) has exceeded the upper stress limit	RO	uint32	N/A
ET down cnt	338	The total number of minutes that the Pressure Module Electronics Temperature (ET) has been below the lower stress limit.	RO	uint32	N/A
ET up time stamp	340	Displays time elapsed since the Pressure Module Electronics Temperature last measured as exceeding the ET upper stress limit.	RO	uint32	N/A
ET down time stamp	342	Displays time elapsed since the Pressure Module Electronics Temperature was last measured below the ET lower stress limit.	RO	uint32	N/A
Reserve For Device Specific	376	NA	RO	uint32	N/A
Reserve For Device Specific	378		RO	uint8	N/A
Temperature Sensor Firmware Revision	382	Temperature Sensor Firmware Revision	RO	uint8	N/A
Reserve For Device Specific	386		RO		
Raw Flow Value	389	Raw Flow Value	RO	float	N/A
Flow Value	391	The current value of the calculated Flow	RO	float	N/A
Totalizer Value	393	Totalizer Value	RO	float	N/A
Flow, Totalizer Status	395	Flow, Totalizer Status	RO	uint8	N/A
MBT, DP status	396	MBT, DP status	RO	uint8	N/A
MBT, SP, PT status	397	MBT, SP, PT status	RO	uint16	N/A

MBT Value	398	Meter body temperature value	RO	float	N/A
DP value	400	Diffrential pressure value	RO	float	N/A
SP Value	402	Static pressure value	RO	float	N/A
PT Value	404	Process temperature value	RO	float	N/A
Transmitter status1	406	First byte of transmitter status	RO	uint8	Bit0: reserved Bit1: reserved Bit2: reserved Bit3: 0 = Off; 1= sp below lowerlimit Bit4: 0 = Off; 1= sp above upper limit Bit5: reserved Bit6: reserved Bit7: reserved Bit8: reserved Bit9: 0 = Off; 1= dp below lower limit Bit10: 0 = Off; 1= dp above upper limit Bit11: reserved Bit12: reserved Bit13: 0 = Off; 1 = warning alarm Bit14: 0 = Off; 1 = critical alarm Bit15: reserved
Transmitter status2	407	Second byte of transmitter status	RO	uint8	Bit0: reserved Bit1: reserved Bit2: 0 = Off; 1= lcd display communicationfailure Bit3: reserved Bit4: 0 = Off; 1 = mbt below lower limit Bit5: 0 = Off; 1 = mbt above upper limit Bit6: reserved Bit7: reserved Bit8: 0 = Off; 1 = pt sensor input failure Bit9: reserved Bit10: reserved Bit11: 0 = Off; 1 = pt below lower limit Bit12: 0 = Off; 1 = pt above upper limit Bit13: reserved Bit14: reserved Bit15: reserved

Transmitter status3	408	Third byte of transmitter status	RO	uint8	Bit0: reserved Bit1: 0 = Off; 1 = Write Protect enabled Bit2: 0 = Off; 1 = flow pv4 simulation enabled Bit3: 0 = Off; 1= pt pv3 simulation enabled Bit4: reserved Bit5: reserved Bit6: reserved Bit7: 0 = Off; 1 = sp pv2 simulation enabled Bit8: 0 = Off; 1 = dp pv1 simulation enabled Bit9: reserved Bit10: reserved Bit11: reserved Bit12: reserved Bit13: reserved Bit14: 0 = Off; 1 = brownout reset Bit15: 0 = Off; 1 = sensor communication failure
Transmitter status4	409	Fourth byte of transmitter status		uint8	Reserved
PT Hi Alarm Counter	411	The total number of minutes that the Process Temperature input has exceeded the PT High Alarm Limit.	RO	uint32	N/A
PT Lo Alarm Counter	413	The total number of minutes that the Process Temperature input has been below the PT Low Alarm Limit.	RO	uint32	N/A
PT High Val & TimeStamp	415	Displays the highest recorded value of Process Temperature and the time elapsed since the Process Temperature last exceeded the PT High Alarm Limit.	RO	uint32	N/A
PT Low Val & TimeStamp	417	Displays the lowest recorded value of Process Temperature and the time elapsed since the Process Temperature last dropped below the PT High Alarm Limit.	RO	uint32	N/A
Temp Sensor Install Date	419	One time temperature sensor installation date.	R/W	uint32	N/A
Temp Sensor Time In Service	421	Percent of the expected Service Life that the Temperature Module has been in service. Value is based on electronics temperature. Service life accumulates faster at higher temperatures with an exponential relationship.	RO	uint32	N/A

Temperature Module ET up accumulator	423	The total number of minutes that the Temperature Module Electronics Temperature (ET) has exceeded the upper stress limit.	RO	uint32	N/A
Temperature Module ET down accumulator	425	The total number of minutes that the Temperature Module Electronics Temperature (ET) has been below the lower stress limit.	RO	uint32	N/A
Temperature Module ET up time stamp	427	Displays time elapsed since the Temperature Module Electronics Temperature last measured as exceeding the ET upper stress limit.	RO	uint32	N/A
Temperature Module ET down time stamp	429	Displays time elapsed since the Temperature Module Electronics Temperature was last measured below the ET lower stress limit.	RO	uint32	N/A
CJ Temp up accumulator	431	The total number of minutes that the Temperature Module cold junction temperature (CJ) has exceeded the upper stress limit	RO	uint32	N/A
CJ Temp down accumulator	433	The total number of minutes that the Temperature Module cold junction temperature (CJ) has been below the lower stress limit.	RO	uint32	N/A
CJ Temp up time stamp	435	Displays time elapsed since the Temperature Module cold junction temperature (CJ) last measured as exceeding the ET upper stress limit.	RO	uint32	N/A
CJ Temp down time stamp	437	Displays time elapsed since the Temperature Modulecold junction temperature (CJ) was last measured below the ET lower stress limit.	RO	uint32	N/A
CJ M360 Core Temp up accumulator	439	The total number of minutes that the Temperature Processor Core temperature (CT) has been higher than the Cold Junction temperature (CJ).	RO	uint32	N/A
CJ M360 Core Temp down accumulator	441	The total number of minutes that the Temperature Processor Core temperature (CT) has been lower than the Cold Junction temperature (CJ).	RO	uint32	N/A

CJ M360 Core Temp up time stamp	443	Displays time elapsed since the Temperature Processor Core temperature (CT) was last measured as higher than the Cold Junction temperature.	RO	uint32	N/A
CJ M360 Core Temp down time stamp	445	Displays time elapsed since the Temperature Processor Core temperature (CT) was last measured as less than the Cold Junction temperature.	RO	uint32	N/A
AVDD max time stamp	447	Displays the time elapsed since the Temperature Sensor Supply Voltage last exceeded the Max AVDD Value.	RO	uint32	N/A
AVDD min time stamp	449	Displays the time elapsed since the Temperature Sensor Supply Voltage last dropped below the Min AVDD Value	RO	uint32	N/A
Temp Module Time In Service	451	Percent of the expected Service Life that the Temperature Module has been in service. Value is based on electronics temperature. Service life accumulates faster at higher temperatures with an exponential relationship.	RO	uint32	N/A
Power ups since transmitter installed	453	Total number of power cycle count since transmitter installed.	RO	N/A	0x0000000
TM Install Date	455	Temperature Module installed date	R/W	uint32	N/A
Sensor Type, Sensor Id, Change Sensor Type/Id(M)	458	The type of sensor (RTD or TC) selected for measuring the Process Temperature. The specific type of RTD or TC selected for measuring the Process Temperature	R/W	uint8	1 = TC 2 = RTD
RTD1 Type	459	The currently selected 2-wire, 3-wire or 4-wire RTD type.	R/W	uint8	0 = 2 wire 1 = 3 wire 2 = 3 wire
Reserve For Device Specific	460				
Break detect	461	Allows user to enable or disable sensor break detection capability for the Process Temperature input.	R/W	uint8	0x0000 = Disabled 0x0001 = Enabled
CJ Compensation Type	462	Select fixed or internal cold junction compensation for the Process Temperature measurement.	R/W	uint8	0 = Internal 1 = External 2 = Fixed

Latching	463	Allows user to enable or disable critical status latching when a break is detected in the temperature sensor.	R/W	uint8	0x0000 = Disabled 0x0001 = Enabled
Reserve For Device Specific	464				
PT Curr URV Correct Records	466	Current time record for PT URV Correction	RO	uint32	N/A
PT Curr LRV Correct Records	468	Current time record for PT LRV Correction	RO	uint16	N/A
PT Last URV Correct Records	470	Last time record for PT URV Correction	RO	uint16	N/A
PT Last LRV Correct Records	472	Last time record for PT LRV Correction	RO	uint16	N/A
PT Prev URV Correct Records	474	Previous time record for PT URV Correction	RO	uint16	N/A
PT Prev LRV Correct Records	476	Previous time record for PT LRV Correction	RO	uint16	N/A
PT Curr Reset Records	478	Current time record for PT reset Correction	RO	uint16	N/A
PT Last Reset Records	480	Last time record for PT reset Correction	RO	uint16	N/A
PT Prev Reset Records	482	Previous time record for PT reset Correction	RO	uint16	N/A
Language	501	Western languages and Eastern languages supported by display	R/W	uint8	For Wester Language Display 0 = English 1 = Francais(French) 2 = Deutsch(German) 3 = Espanol(Spanish) 4 = Russian 7 = Turkish 8 = Italian For Eastern Language Display 0 = English 1 = Chinese 2 = Japanese
Rotation Time	502	Screen Rotation Time.	R/W	uint8	N/A
Screen Rotation	503	Screen Rotation Enable/ Disable option	R/W	uint8	0 = Disable 1 = Enable
Password	504	Password (ASCII – 4 Byte data)	R/W	ASCII	N/A
Contrast Level	506	Display Contrast level	R/W	uint8	N/A

Display SW Rev	507	Advanced Dissplay Software Revision	RO	uint8	N/A
Display Type	511	Identifies the type of Display connected to the device (only Advanced Display is available for SMV Modbus devices)	RO	uint8	0 = No Display Connected 1 = Advanced Display connected
Screen Number	512	Display screens from 1 to 8	R/W	uint8	N/A
Screen Format	513	View display format:	R/W	uint8	0 = None 1 = PV 2 = BAR Graph 3 = Horizontal Trend
PV Selection	514	process variable	R/W	uint8	0 = PV Unused 1 = Diff. Pressure 2 = Absolute Press 3 = Temperature 4 = Mass Flow 5 = MB Temperature 6 = Sensor 1 Resis 7 = Totalizer 8 = User Variable1 9 = User Variable2 10 = User Variable3 11 = User Variable4 12 = User Variable5 13 = User Variable6 14 = User Variable7 15 = User Variable8
Display Unit	515	Engineering units code.	R/W	uint8	
Decimals	516	Number of digits to display after the decimal point	R/W	uint8	0 = x 1 = x.x 2 = x.xx 3 = x.xxx
PV Scaling	517	When Convert Units is selected, the selected PV Selection parameter will show the values in converted Engineering Unit. Else the values will be shown in default Engineering Unit None, Convert Units, Linear Not Applicable to Sensor Resis. None, Linear, Convert Units applicable to Diff Press, Gauge/Absolute Press, Temp, Meter Body Temp, Mass/Volume Flow, Sensor, Totalizer	R/W	uint8	0 = None 1 = Convert EU 2 = Linear
Trend Duration	518	Duration of the trend screen in hours.	R/W	uint8	N/A

Scaling Units	519	The text configured to be displayed for custom units	R/W	uint8	N/A
Screen Custom Tag	528	Character string to identify the displayed value (14 characters + null) - sized to support Unicode characters	R/W	ASCII	N/A
Reserve For Device Specific	543	Incremented each time a value in this table is changed.	R/W	uint8	N/A
Scaling High	544	The value configured as the Scaling High Limit for PV Scaling selections of linear.	R/W	float	N/A
Scaling Low	546	The value configured as the Scaling Low Limit for PV Scaling selections of linear.	R/W	float	N/A
Disp Low Limit	548	Display Low Limit (Trend, Bar Graph - usually equal to LRV)	R/W	float	N/A
Disp Hi Limit	550	Display High Limit (Trend, Bar Graph - usually equal to URV)	R/W	float	N/A
Display Connected	552	Identifies whether a Display is connected to the device.	RO	uint8	0 = Not connected 1 = connected
Language Package	553	shows type of language package loaded in advanced display.	RO	uint8	0 = None 1 = Western Language Pack 2 = Easter Language Pack
User Variable 1	601	User defined varaible 1	R/W	float	N/A
User Variable 2	603	User defined varaible 2	R/W	float	N/A
User Variable 3	605	User defined varaible 3	R/W	float	N/A
User Variable 4	607	User defined varaible 4	R/W	float	N/A
User Variable 5	609	User defined varaible 5	R/W	float	N/A
User Variable 6	611	User defined varaible 6	R/W	float	N/A
User Variable 7	613	User defined varaible 7	R/W	float	N/A
User Variable 8	615	User defined varaible 8	R/W	float	N/A
User Var1_LRV	617	User defined variable 1 lower range value.	R/W	float	N/A
User Var1_URV	619	User defined variable 1 upper range value.	R/W	float	N/A
User Var2_LRV	621	User defined variable 2 lower range value.	R/W	float	N/A
User Var2_URV	623	User defined variable 2 upper range value.	R/W	float	N/A
User Var3_LRV	625	User defined variable 3 lower range value.	R/W	float	N/A
User Var3_URV	627	User defined variable 3 upper range value.	R/W	float	N/A

User Var4_LRV	629	User defined variable 4 lower range value.	R/W	float	N/A
User Var4_URV	631	User defined variable 4 upper range value.	R/W	float	N/A
User Var5_LRV	633	User defined variable 5 lower range value.	R/W	float	N/A
User Var5_URV	635	User defined variable 5 upper range value.	R/W	float	N/A
User Var6_LRV	637	User defined variable 6 lower range value.	R/W	float	N/A
User Var6_URV	639	User defined variable 6 upper range value.	R/W	float	N/A
User Var7_LRV	641	User defined variable 7 lower range value.	R/W	float	N/A
User Var7_URV	643	User defined variable 7 upper range value.	R/W	float	N/A
User Var8_LRV	645	User defined variable 8 lower range value.	R/W	float	N/A
User Var8_URV	647	User defined variable 8 upper range value.	R/W	float	N/A
Reserve For Device Specific	649	NA	NA	NA	
DP URV	667	Diffrential pressure upper range value	RW	float	
DP LRV	669	Diffrential pressure lower range value	RW	float	
DP URL	671	The Upper Range Limit for the Differential Pressure input	RO	float	
DP LRL	673	The Lower Range Limit for the Differential Pressure input	RO	float	
SP URV	675	Static Pressure upper range value	RW	float	
SP LRV	677	Static Pressure lower range value	RW	float	
SP URL	679	The Upper Range Limit for the Static Pressure input	RO	float	
SP LRL	681	The Lower Range Limit for the Static Pressure input	RO	float	
Process Temperature URV	683	Process Temperature Upper Range Value	R/W	Float	N/A
Process Temperature LRV	685	Process Temperature Lower Range Value	R/W	Float	N/A
Process Temperature URL	687	Process Temperature Upper Range Limit	RO	Float	N/A

Process Temperature LRL	689	Process Temperature Lower Range Limit	RO	Float	N/A
Flow URV	691	Flow upper range value	RW	float	
Flow LRV	693	Flow lower range value	RW	float	
Flow URL	695	Flow upper range limit	RW	float	
Flow LRL	697	Flow lower range limit	RO	float	
DP Damp	699	Damping value for the Differential Pressure Process	RW	float	
SP Damp	701	Damping value for the Static Pressure Process	RW	float	
PT Damp	703	Damping value for the Process Temperature	RW	float	
Flow Damp	705	Damping value for the Flow output	RW	float	
MBT Damp	707	Damping value for the Meter-body Temperature output	RW	float	
Flow Cutoff Low	709	The lower value for Low Flow cutoff. When the flow drops below this value, the flow output will be forced to 0.	RW	float	
Flow Cutoff High	711	The upper value for Low Flow cutoff. The flow will not exit the low flow cutoff state (0 flow) until the flow exceeds this value.	RW	float	
Comm. stress life	713	Percent of Communication Module service life spent in stressful conditions. Indicates the % of service life where one or more of processor core temperature, or electronics temperature are within 10% of respective range limits.	RO	float	
Comm. service life	715	Percent of the expected Service Life that the Communications Module has been in service. Value is based on electronics temperature. Service life accumulates faster at higher temperatures with an exponential relationship.	RO	float	
Communicaito n Module ET Min. limit	717	Communications board Electronics Temperature (ET) lowest operating limit from specification.	RO	Float	

Communicaito n Module ET Max. limit	719	Communications board Electronics Temperature (ET) highest operating limit from specification.	RO	Float	
Communicaito n Module ET Min. Value	721	Communications board Electronics Temperature (ET) lowest measured value	RO	Float	
Communicaito n Module ET Max. Value	723	Communications board Electronics Temperature (ET) highest measured value	RO	Float	
Communicaito n Module ET Value	725	Communications board Electronics Temperature (ET) highest measured value	RO	Float	
Maximum Totalizer Value.	745	This is a user configurable value indicating the maximum Totalizer value. When the Totalizer Value reaches this maximum value, it automatically resets to zero and continues totalizing. It also increments the Exceed Counter. On a Negative Totalizer Max value, with a decreasing Total Flow value, Totalizer will reset only on crossing the negative max value. Ex: Totalizer Max = -1000lb On an emptying Tank, say Totalizer reaches -100, -200, -300 etc. Even though -100, -200 etc are greaterthan -1000, this does not cause Totalizer Reset until after the Totalizer goes below -1000. Here Exceed counter will be incremented every time Totalizer reaches below -1000 lb.	R/W	float	N/A
Totalizer Value	747	This is the Totalized Flow as calculated based on the flow rate during the time that the Totalizer is in Run mode. The Totalizer will increment during Forward (positive) flow and decrement during Reverse (negative) flow. Note: the Reverse Flow configuration setting must be enabled to calculate negative flow.	RO	float	N/A

Totalizer base unit conversion factor	749	The user may select any of the standard engineering units, or custom units. For custom units, the user must provide a units tag name, a base unit, and a conversion factor for converting from the base unit to the custom unit. (value in Custom unit =value in base unit * conversion factor)	R/W	float	N/A
Totalizer Base Value	751	When the Totalizer is set to Run mode after a Reset, it will start incrementing / decrementing from this base value.	R/W	float	N/A
Negative totalizer Value	753	This is the Totalized Flow for Reverse flow only. The Negative Totalizer will decrement when the Flow Rate is a reverse flow (negative flow value). Note that the Reverse Flow configuration setting must be enabled to calculate negative flow.	RO	float	N/A
Positive Totalizer value	755	This is the Totalized Flow for Forward flow only. The Positive Totalizer will increment when the Flow Rate is a forward flow (positive flow value).	RO	float	N/A
Reserved for device specific	757		RO		
Reserved for device specific	759		RO		
Differential Pressure UTL	765	Differential Pressure Upper Transducer Limit	RO	Float	N/A
Differential pressure LTL	767	Differential Pressure Lower Transducer Limit	RO	Float	N/A
meterbody Temperature UTL	769	Meterbody temperature Upper Transducer Limit	RO	Float	N/A
meterbody Temperature LTL	771	Meterbody temperature lower Transducer Limit	RO	Float	N/A
Static Pressure UTL	773	Static Prssure Upper Transducer Limit	RO	Float	N/A
Static Pressure LTL	775	Static Pressure Lower transducer limit	RO	Float	N/A
Reserve For Device Specific	777	NOT USED	RO	Float	NOT USED

Reserve For Device Specific	779	NOT USED	RO	Float	NOT USED
Reserve For Device Specific	781	NOT USED	RO	Float	NOT USED
Reserve For Device Specific	783	NOT USED	RO	Float	NOT USED
Reserve For Device Specific	785	NOT USED	RO	Float	NOT USED
Reserve For Device Specific	787	NOT USED			NOT USED
Reserve For Device Specific	789	NOT USED	RO	Float	NOT USED
Reserve For Device Specific	791	NOT USED	RO	Float	NOT USED
Factory Calibration A DP URV Trim Point	793	The DP URV trim point at which factory A calibration was performed.	RO	Float	N/A
Factory Calibration A DP LRV Trim Point	795	The DP LRV trim point at which factory A calibration was performed.	RO	Float	N/A
Factory Calibration B DP URV Trim Point	797	The DP URV trim point at which factory B calibration was performed.	RO	Float	N/A
Factory Calibration B DP LRV Trim Point	799	The DP LRV trim point at which factory B calibration was performed.	RO	Float	N/A
Factory Calibration C DP URV Trim Point	801	The DP URV trim point at which factory C calibration was performed.	RO	Float	N/A
Factory Calibration C DP LRV Trim Point	803	The DP LRV trim point at which factory C calibration was performed.	RO	Float	N/A
Static Pressure URV during factory A calibration	805	The SP URV trim point at which factory A calibration was performed.	RO	Float	N/A
Static Pressure LRV during factory A calibration	807	The SP LRV trim point at which factory A calibration was performed.	RO	Float	N/A

Static Pressure URV during factory B calibration	809	The SP URV trim point at which factory B calibration was performed.	RO	Float	N/A
Static Pressure LRV during factory B calibration	811	The SP LRV trim point at which factory B calibration was performed.	RO	Float	N/A
Static Pressure URV during factory C calibration	813	The SP URV trim point at which factory C calibration was performed.	RO	Float	N/A
Static Pressure LRV during factory C calibration	815	The SP LRV trim point at which factory C calibration was performed.	RO	Float	N/A
RESERVE_FOR_OID_CHANGE_2HR	817	NOT USED	RO		
DP max	819	Maximum value of DP recorded with a time and date stamp with units of seconds since the event	RO	Float	N/A
DP min (not used in AP or GP devices)	821	Minimum value of DP recorded with a time and date stamp with units of seconds since the event	RO	Float	N/A
SP max (not used in AP or GP)	823	maximum value of SP recorded with a time and date stamp with units of seconds since the event	RO	Float	N/A
MB Temp max	825	Maximum value of meter body temperature recorded with a time and date stamp with units of seconds since the event	RO	Float	
MB Temp min	827	Minimum value of meter body temperature recorded with a time and date stamp with units of seconds since the event	RO	Float	
Pressure Sensor Controller Core Temp max	829	Maximum value of temperature recorded for the controller on pressure meter body with a time and date stamp with units of seconds since the event	RO	Float	
Pressure sensor controller Core Temp min	831	Minimum value of temperature recorded for the controller on pressure meter body with a time and date stamp with units of seconds since the event	RO	Float	

AVDD max	833	Maximum value of supply voltage recorded for pressure meter body with a time and date stamp with units of seconds since the event	RO	Float	N/A
AVDD min	835	Minimum value of supply voltage recorded for pressure meter body with a time and date stamp with units of seconds since the event	RO	Float	N/A
MB Stress Monitor	837	Stress value for meter body	RO	Float	N/A
MB Service Life	839	Service life value for the meter body	RO	Float	N/A
Reserve For Device Specific	841	NOT USED	RO	Float	
Reserve For Device Specific	843	NOT USED	RO	Float	
Reserve For Device Specific	845	NOT USED	RO	Float	
Reserve For Device Specific	847	NOT USED	RO	Float	
Reserve For Device Specific	849	NOT USED	RO	Float	
Reserve For Device Specific	851	NOT USED			
Reserve For Device Specific	853	NOT USED	R/W	Float	
Reserve For Device Specific	855	NOT USED	RO	Float	
Reserve For Device Specific	857	NOT USED	RO	Float	
Reserve For Device Specific	859	NOT USED	RO	Float	
Reserve For Device Specific	861	NOT USED	RO	Float	
K_user	863	Kuser	R/W	Float	N/A
D	865	Pipe Diameter	R/W	Float	N/A
d	867	Bore Diameter	R/W	Float	N/A
TD_meas	869	Pipe Diameter Measure Temperature	R/W	Float	N/A

Td_meas	871	Bore Diameter Measure Temperature	R/W	Float	N/A
Alpha_D	873	Pipe thermal expansion coefficient	R/W	Float	N/A
alpha_d	875	Bore thermal expansion coefficient	R/W	Float	N/A
r1	877	Reynolds Coefficients r1 (Discharge Coefficients)	R/W	Float	N/A
r2	879	Reynolds Coefficients r2 (Discharge Coefficients)	R/W	Float	N/A
Rn_min	881	Low limit for Reynolds Number	R/W	Float	N/A
Rn_max	883	High limit for Reynolds Number	R/W	Float	N/A
V1	885	Viscosity polynomial coefficients 1	R/W	Float	N/A
V2	887	Viscosity polynomial coefficients 2	R/W	Float	N/A
V3	889	Viscosity polynomial coefficients 3	R/W	Float	N/A
V4	891	Viscosity polynomial coefficients 4	R/W	Float	N/A
V5	893	Viscosity polynomial coefficients 5	R/W	Float	N/A
Tu_min	895	Lower Temperature Limit Viscosity	R/W	Float	N/A
Tu_max	897	Upper Temperature Limit Viscosity	R/W	Float	N/A
k	899	Isentropic coefficient	R/W	Float	N/A
atmosphere	901	Local Atmosphere Pressure	R/W	Float	N/A
MnInDensity	903	Manually Input Density Value	R/W	Float	N/A
MnInViscos	905	Manually Input Viscosity Value	R/W	Float	N/A
manInputCd	907	Manually Input Discharge Coefficients	R/W	Float	N/A
manInputY	909	Manually Input Expansion Factor	R/W	Float	N/A
manInputFa	911	Manually Input Temperature Expansion Factor	R/W	Float	N/A
d1	913	Density polynomial coefficients 1	R/W	Float	N/A
d2	915	Density polynomial coefficients 2	R/W	Float	N/A
d3	917	Density polynomial coefficients 3	R/W	Float	N/A
d4	919	Density polynomial coefficients 4	R/W	Float	N/A
d5	921	Density polynomial coefficients 5	R/W	Float	N/A

Tp_min	923	Lower Limit Density polynomial	R/W	Float	N/A
Tp_max	925	Upper Limit Density polynomial	R/W	Float	N/A
Tnom	927	Nominal Temperature	R/W	Float	N/A
Pnom	929	Nominal Absolute Pressure	R/W	Float	N/A
Dnom	931	Nominal Differential Pressure	R/W	Float	N/A
pbase	933	Base Density	R/W	Float	N/A
Pdes	935	Design Pressure	R/W	Float	N/A
Tdes	937	Design Temperature	R/W	Float	N/A
pdes	939	Design Density	R/W	Float	N/A
FPV	941	Super Compres Factor /Super Compressity Factor	R/W	Float	N/A
GasComprs	943	Gas compressibility	R/W	Float	N/A
Gi	945	Specific Gravity of Ideal Gas	R/W	Float	N/A
Qmax	947	Max Flowrate on Sizing of Vcone	R/W	Float	N/A
DPmax	949	Maximum DP on Sizing for VCone	R/W	Float	N/A
gostRaWB	951	Pipe Roughness for Gost or Beta	R/W	Float	N/A
gostrH	953	Initial Radius	R/W	Float	N/A
gostTy	955	Inter Control Interval	R/W	Float	N/A
Reserve For Device Specific	956-1000	N/A			N/A
Reserve For Device Specific	1001	N/A			N/A
CJ Temperature Deg C	1003	CJ Temperature	RO	Float	N/A
PV4 (Process Variable = Resistance) in Ohms	1005	Sensor Resistance	RO	Float	N/A
Reserve For Device Specific	1007	N/A			N/A
PV1 UTL	1009	Process Temperature Upper Limit Value	RO	Float	N/A
PV1 LTL	1011	Process Temperature Lower Limit Value	RO	Float	N/A
Reserve For Device Specific	1013	N/A			N/A

Reserve For Device Specific	1015	N/A			N/A
Reserve For Device Specific	1017	N/A			N/A
Reserve For Device Specific	1019	N/A			N/A
Reserve For Device Specific	1021	N/A			N/A
Upper Cal Point1 Value (customer entry) CALPT_HI1 in sensor units (In DegC) .	1023	Upper Calibration point value for Process Temperature	R/W	Float	N/A
Lower Cal Point1 Value (customer entry) CALPT_LO1 in sensor units (In DegC) .	1025	Lower Calibration point value for Process Temperature	R/W	Float	N/A
Reserve For Device Specific	1027	N/A			N/A
PV1 max	1029	Process Temperature maximum Value	RO	Float	N/A
PV1 min	1031	Process Temperature minimum Value	RO	Float	N/A
ET max	1033	Temperature sensor module Electronic Temperature Maximum Value	RO	Float	N/A
ET min	1035	Temperature sensor module Electronic Temperature Minimum Value	RO	Float	N/A
CJ Temp max	1037	CJ Temperature Maximum Value	RO	Float	N/A
CJ Temp min	1039	CJ Temperature Minimum Value	RO	Float	N/A
CJ_M360 Core Temp Delta	1041	Temperature sensor processor Core Temp Delta Value	RO	Float	N/A
CJ_M360 Core Temp delta max	1043	Temperature sensor processor Core Temp Delta Maximum Value	RO	Float	N/A

CJ_M360 Core Temp delta min	1045	Temperature sensor processor Core Temp Delta Minimum Value	RO	Float	N/A
AVDD max	1047	Maximum Value of Analog Voltage of Temperature module	RO	Float	N/A
AVDD min	1049	Minimum Value of Analog Voltage of Temperature module	RO	Float	N/A
Sensor Board Stress Monitor	1051	Temperature Sensor Board Stress Monitor	RO	Float	N/A
Sensor Board Service Life	1053	Temperature Sensor Board Service Life	RO	Float	N/A
Reserve For Device Specific	1055	N/A			
RTD1 lead wire resistance	1057	RTD1 lead wire resistance	R/W	Float	N/A
Bias1 Value	1059	Bias1 Value	R/W	Float	N/A
Fixed CJ Compensation Value	1061	Fixed CJ Compensation Value	R/W	Float	N/A
CVD coefficient R0	1063	CVD coefficient R0	R/W	Float	N/A
CVD coefficient α	1065	CVD coefficient α	R/W	Float	N/A
CVD coefficient δ	1067	CVD coefficient δ	R/W	Float	N/A
CVD coefficient β	1069	CVD coefficient β	R/W	Float	N/A
Reserve For Device Specific	1071	N/A			
Reserve For Device Specific	1125	Parameter Used by Host Application	NA		
Reserve For Device Specific	1145	Parameter Used by Host Application	NA		
Reserve For Device Specific	1129	Parameter Used by Host Application	NA		
Reserve For Device Specific	1131	Parameter Used by Host Application	NA		
Reserve For Device Specific	1132	Parameter Used by Host Application	NA		
Reserve For Device Specific	1133	Parameter Used by Host Application	NA		

Reserve For Device Specific	1134	Parameter Used by Host Application	NA		
Reserve For Device Specific	1142	Parameter Used by Host Application	NA		
Reserve For Device Specific	1143	Parameter Used by Host Application	NA		
Reserve For Device Specific	1144	Parameter Used by Host Application	NA		
Reserve For Device Specific	1145	Parameter Used by Host Application	NA		
Totalizer Value	1366	This is the Totalized Flow (In double) as calculated based on the flow rate during the time that the Totalizer is in Run mode. The Totalizer will increment during Forward (positive) flow and decrement during Reverse (negative) flow. Note: the Reverse Flow configuration setting must be enabled to calculate negative flow.	RO	double	N/A
Positive Totalizer value	1350	This is the Totalized Flow (In double) for Forward flow only. The Positive Totalizer will increment when the Flow Rate is a forward flow (positive flow value).	RO	double	N/A
Negative totalizer Value	1358	This is the Totalized Flow (In double) for Reverse flow only. The Negative Totalizer will decrement when the Flow Rate is a reverse flow (negative flow value). Note that the Reverse Flow configuration setting must be enabled to calculate negative flow.	RO	double	N/A

4. Operation and Maintenance

4.1 Calibration

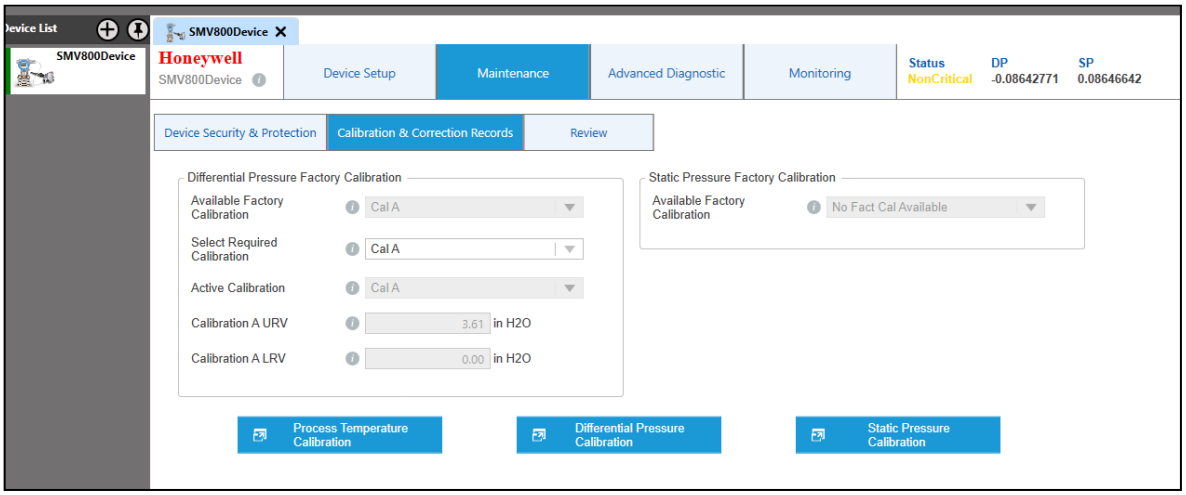
This section provides information about calibrating transmitter's pressure and temperature measurement range. It also covers the procedure to reset calibration to the default values as a quick alternative to measurement range calibration.

The SMV800 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.

The following sections describe for pressure and temperatue measurement range:

- 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

It is suggested to use SMV Modbus PC based application tool for quicker calibration of transmitter instead of manually writng each Modbus register defined for respective calibration. The Calibration menu in SMV Modbus Manager application tool is available at Maintenance->Calibration and Correction Records screen, refer below screen.

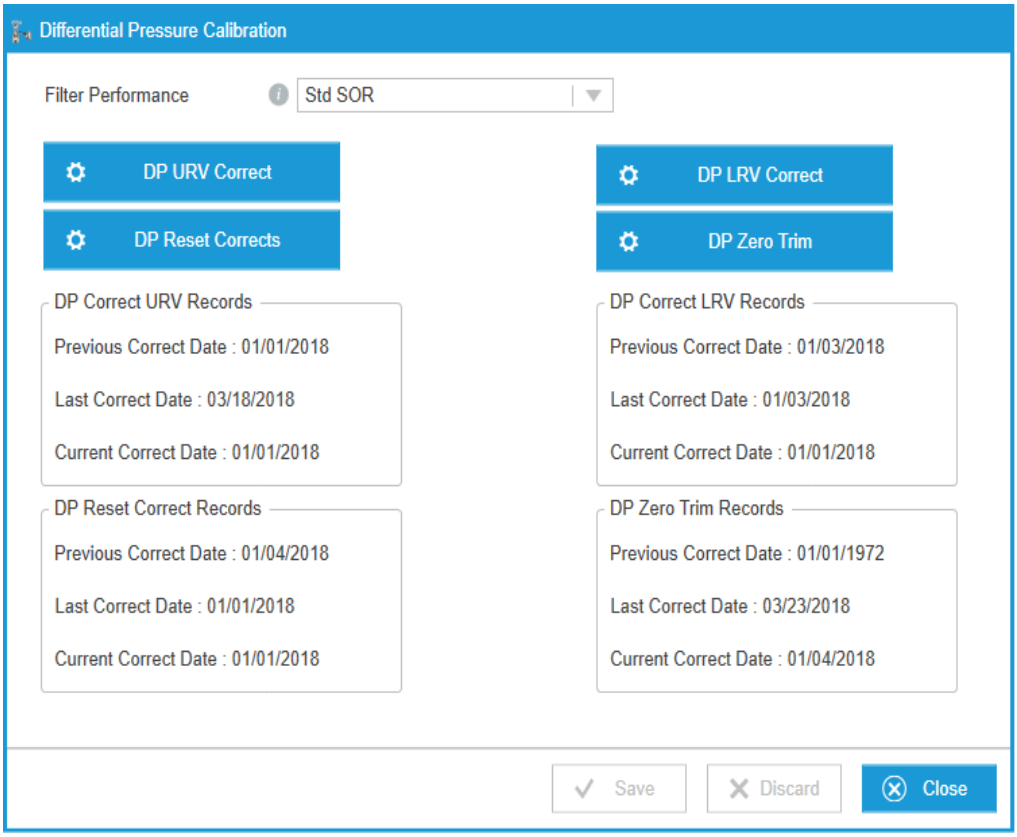


The SMV800 transmitter supports two-point calibration. This means that when two points in a range are calibrated, all points in that range adjust to the calibration.

This procedure assumes that the transmitter has been removed from the process and is in a controlled environment.

4.1.1. Differential Pressure sensor calibration

Navigate to Maintenance > Calibration and Correction Records->Differential Pressure Calibration to perform DP Calibration using SMV Modbus Manager application tool.



The Differential Pressure Calibration screen has following options.

1. DP URV Correct
2. DP LRV Corrrect
3. DP Reset Corrects
4. DP Zero Trim
5. Records that include Current, Last and Previous Calibration/Corrects dates.

By default, Records show the date as Jan 01 1972.

Filter Performace option is provided for process where Noise has to be considered during calibration.

Correcting the Lower Range Value (LRV) for Differential Pressure:

Calibrate using SMV Modbus application:

1. Connect power supply and RS485 connectors 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. Launch SMV Modbus application, connect to the device and go to the DP Calibration screen as show below. DP Calibration is available at Maintenance->Calibration and Correction Records->Differential Pressure Calibration.
5. Adjust the pressure source to apply pressure equal to the LRV (0%), and
6. Click on "DP LRV Correct" button. follow the on-screen prompts.

Calibrate manually by writing to Modbus registers:

1. Write the LRV value for which the correction is required to the registers 669-770.
2. Write the date in the DDMMYY-- format in the calibration time and date register. (Register address 125-126)
    - The date to be written as month and day followed by the year.
    - Year to be entered as year -1900.

For example, to enter calibration date as June 10th 2018 write to register 125-126 as 0x0A067600

3. Adjust the PV input Pressure to the exact value of the LRV.
4. Write to single coil address 3 as ON

Correcting the Upper Range Value (URV) for Differential Pressure:

Calibrate using SMV Modbus application:

1. Connect power supply and RS485 connectors 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. Launch SMV Modbus application, connect to the device and go to the DP Calibration screen as show below. DP Calibration is available at Maintenance->Calibration and Correction Records->Differential Pressure Calibration.
5. Adjust the pressure source to apply pressure equal to the URV (100%), and
6. Click on "DP URV Correct" button. follow the on-screen prompts.

Calibrate manually by writing to Modbus registers:

1. Write the URV value for which the correction is required to the registers 667-668.
2. Write the date in the DDMMYY-- format in the calibration time and date register. (Register address 125-126)
    - The date to be written as month and day followed by the year.
    - Year to be entered as year -1900.

      For example, to enter calibration date as June 10th 2018 write to register 125-126 as 0x0A067600
3. Adjust the PV input Pressure to the exact value of the URV.
4. Write to single coil address 2 as ON

Resetting Calibration for Differential Pressure:

Reset Calibration using SMV Modbus application:

1. Connect power supply and RS485 connectors 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. Launch SMV Modbus application, connect to the device and go to the DP Calibration screen as show below. DP Calibration is available at Maintenance->Calibration and Correction Records->Differential Pressure Calibration.
5. Click on "DP Reset Corrects" button. follow the on-screen prompts.

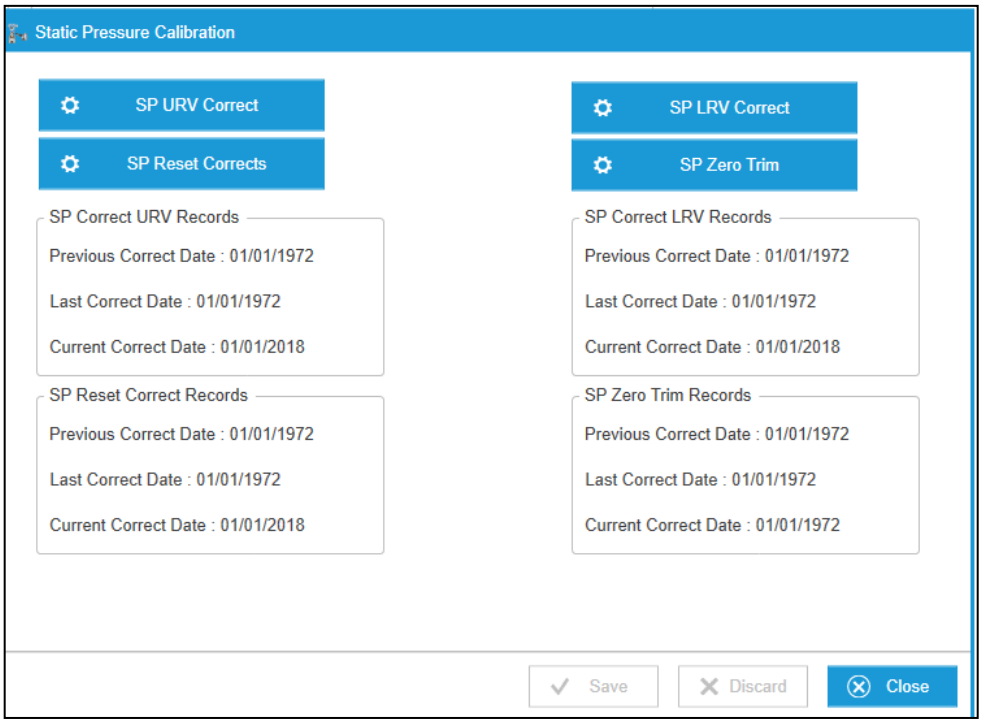
Reset Corrects for Differential Pressure manually by writing to Modbus registers:

1. Write the date in the DDMMYY-- format in the calibration date register. (Register address 125-126)
    - The date to be written as month and day followed by the year.
    - Year to be entered as year -1900.

      For example, to enter calibration date as June 10th 2018 write to register 125-126 as 0x0A067600
2. Write to single coil address 8 as ON

4.1.2. Static Pressure Calibration

Navigate to Maintenance->Calibration and Correction Records->Static Pressure Calibration to perform SP Calibration using SMV Modbus Manager application tool.



The Static Pressure Calibration screen has following options.

1. SP URV Correct
2. SP LRV Corrrect
3. SP Reset Corrects
4. SP Zero Trim
5. Records that include Current, Last and Previous Calibration/Corrects dates.

By default, Records show the date as Jan 01 1972.

Correcting the Lower Range Value (LRV) for Static Pressure:

Calibrate using SMV Modbus application:

1. Connect power supply and RS485 connectors to the signal terminals of the Transmitter's terminal block.
2. Connect the precision pressure source to the high-pressure side of the SP-type Transmitter.
3. Turn on the power supply, and allow the Transmitter to become stable.
4. Launch SMV Modbus application, connect to the device and go to the SP Calibration screen as show below. SP Calibration is available at Maintenance->Calibration and Correction Records->Static Pressure Calibration.
5. Adjust the pressure source to apply pressure equal to the LRV (0%), and
6. Click on "SP LRV Correct" button. follow the on-screen prompts.

Calibrate manually by writing to Modbus registers:

1. Write the LRV value for which the correction is required to the registers 677-678.
2. Write the date in the DDMMYY-- format in the calibration time and date register. (Register address 125-126)
    - The date to be written as month and day followed by the year.
    - Year to be entered as year -1900.

For example, to enter calibration date as June 10th 2018 write to register 125-126 as 0x0A067600

3. Adjust the SV input Pressure to the exact value of the LRV.
4. Write to single coil address 5 as ON

Correcting the Upper Range Value (URV) for Static Pressure:

Calibrate using SMV Modbus application:

1. Connect power supply and RS485 connectors 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. Launch SMV Modbus application, connect to the device and go to the SP Calibration screen as show below. SP Calibration is available at Maintenance->Calibration and Correction Records->Static Pressure Calibration.
5. Adjust the pressure source to apply pressure equal to the URV (100%), and
6. Click on "SP URV Correct" button. follow the on-screen prompts.

Calibrate manually by writing to Modbus registers:

1. Write the URV value for which the correction is required to the registers 675-676.
2. Write the date in the DDMMYY-- format in the calibration time and date register. (Register address 125-126)
   - The date to be written as month and day followed by the year.
   - Year to be entered as year -1900.

     For example, to enter calibration date as June 10th 2018 write to register 125-126 as 0x0A067600
3. Adjust the SV input Pressure to the exact value of the URV.
4. Write to single coil address 4 as ON

Resetting Calibration for Static Pressure:

Reset Calibration using SMV Modbus application:

1. Connect power supply and RS485 connectors 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. Launch SMV Modbus application, connect to the device and go to the SP Calibration screen as show below. SP Calibration is available at Maintenance->Calibration and Correction Records->Static Pressure Calibration.
5. Click on "SP Reset Corrects" button. follow the on-screen prompts.

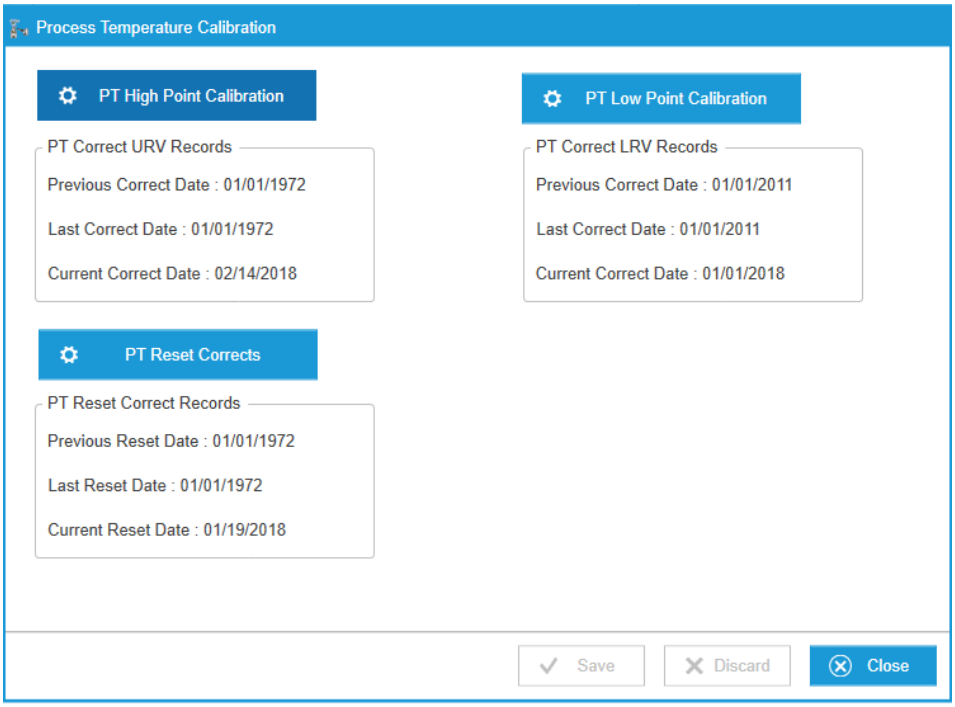
Reset Corrects for Differential Pressure manually by writing to Modbus registers:

1. Write the date in the DDMMYY-- format in the calibration date register. (Register address 125-126)
   - The date to be written as month and day followed by the year.
   - Year to be entered as year -1900.

     For example, to enter calibration date as June 10th 2018 write to register 125-126 as 0x0A067600
2. Write to single coil address 9 as ON

4.1.3. Process temperature sensor calibration

Navigate to Maintenance->Calibration and Correction Records->Process Temperature Calibration to perform PT Calibration using SMV Modbus Manager application tool.



The Process Temperature Calibration screen has following options.

1. PT High Point Calibration
2. PT Low Point Calibration
3. PT Reset Corrects
4. Records that include Current, Last and Previous Calibration/Corrects dates.

By default, Records show the date as Jan 01 1972.

Correcting the Low Point or Lower Range Value (LRV) for Process Temperature:

Calibrate using SMV Modbus application:

1. Connect power supply and RS485 connectors to the signal terminals of the Transmitter's terminal block.
2. Turn on the power supply, and allow the Transmitter to become stable.
3. Ensure that the Damping value for Process Temperature is set to 0 seconds while performing calibration.
4. Launch SMV Modbus application, connect to the device and go to the PT Calibration screen as show below. PT Calibration is available at Maintenance->Calibration and Correction Records->Process Temperature Calibration.
5. Adjust the temperature source to apply value equal to the Lower Calibration Point, and when the temperature stabilizes, wait for 5 seconds and press ok
6. Click on "PT Low Point Calibration" button and follow the on-screen prompts

Calibrate manually by writing to Modbus registers:

1. Write the low point calibration value for which the correction is required to the registers 1025-1026.
2. Write the date in the DDMMYY-- format in the calibration time and date register. (Register address 125-126)
    - The date to be written as month and day followed by the year.
    - Year to be entered as year -1900.

For example, to enter calibration date as June 10th 2018 write to register 125-126 as 0x0A067600

3. Adjust the temperature source to apply value equal to the Lower Calibration Point,
4. Write to single coil address 12 as ON

Correcting the High Point or Upper Range Value (URV) for Process Temperature:

Calibrate using SMV Modbus application:

1. Connect power supply and RS485 connectors to the signal terminals of the Transmitter's terminal block.
2. Turn on the power supply, and allow the Transmitter to become stable.
3. Ensure that the Damping value for Process Temperature is set to 0 seconds while performing calibration.
4. Launch SMV Modbus application, connect to the device and go to the PT Calibration screen as show below. PT Calibration is available at Maintenance->Calibration and Correction Records->Process Temperature Calibration.
5. Adjust the temperature source to apply value equal to the High Calibration Point, and when the temperature stabilizes, wait for 5 seconds and press ok
6. Click on "PT High Point Calibration" button and follow the on-screen prompts

Calibrate manually by writing to Modbus registers:

1. Write the high point calibration value for which the correction is required to the registers 1023-1024.
2. Write the date in the DDMMYY-- format in the calibration time and date register. (Register address 125-126)
    - The date to be written as month and day followed by the year.
    - Year to be entered as year -1900.

For example, to enter calibration date as June 10th 2018 write to register 125-126 as 0x0A067600

3. Adjust the temperature source to apply value equal to the High Calibration Point,
4. Write to single coil address 11 as ON

Resetting Calibration for Process Temperature:

Reset Calibration using SMV Modbus application:

1. Connect power supply and RS485 connectors to the signal terminals of the Transmitter's terminal block.
2. Turn on the power supply, and allow the Transmitter to become stable.
3. Launch SMV Modbus application, connect to the device and go to the PT Calibration screen as show below. PT Calibration is available at Maintenance->Calibration and Correction Records->Process Temperature Calibration.
4. Click on "PT Reset Corrects" button. follow the on-screen prompts.

Reset Corrects for Process Temperature manually by writing to Modbus registers:

1. Write the date in the DDMMYY-- format in the calibration date register. (Register address 125-126)
   - The date to be written as month and day followed by the year.
   - Year to be entered as year -1900.

     For example, to enter calibration date as June 10th 2018 write to register 125-126 as 0x0A067600
2. Write to single coil address 10 as ON

4.1.4. Dual / Triple Calibration

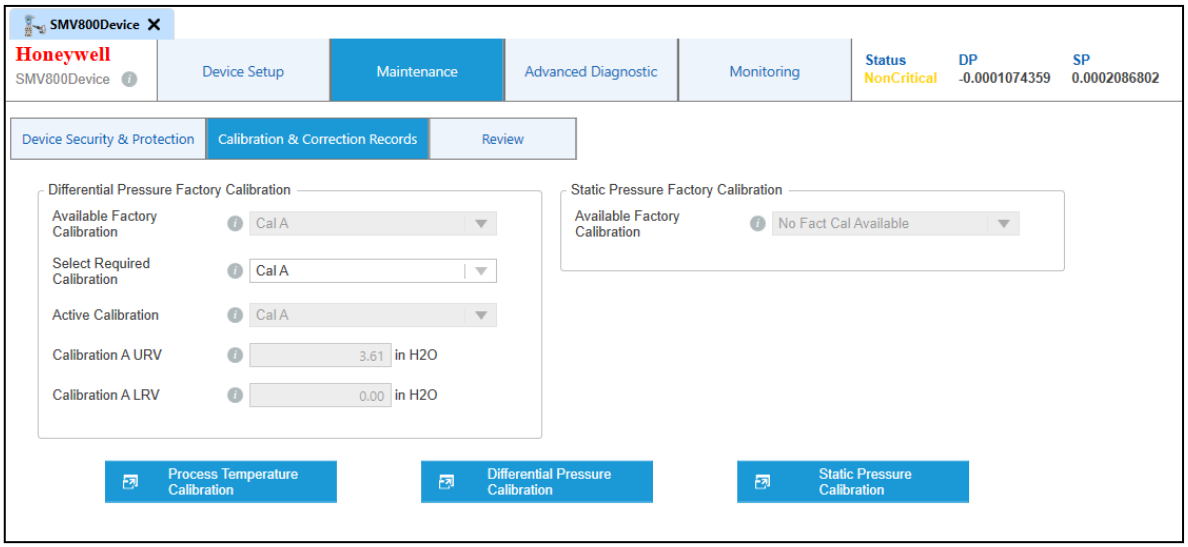
The transmitter will have the required calibration set as selected by the user when the transmitter is purchased; either single, dual or triple calibration for Differential Pressure and Static Pressure.

- 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 Process Values.

Navigate to Maintenance->Calibration and Correction Records and select the Required Calibration option in the drop-down box “Differential Pressure Factory Calibration” for Differential pressure selection and “Static Pressure Factory Calibration” for static pressure required calibration respectively.



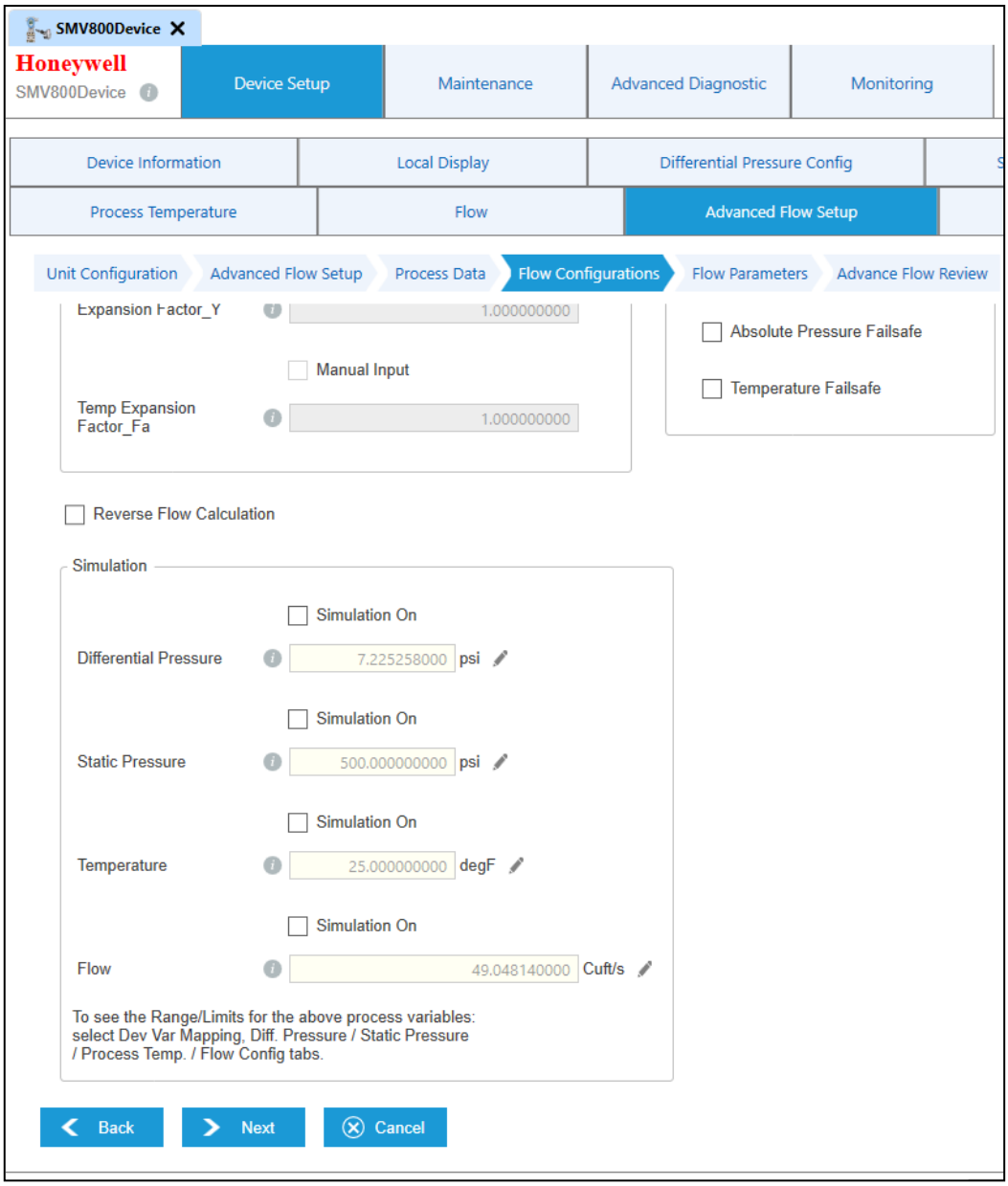
The tabs “Differential Pressure Factory Calibration” and “Differential Pressure Factory Calibration” as shown in above screen provides details of available calibrations, selected calibrations,active calibration and its range.Incase if no factory calibration is available then it screen will not have more details.

The above selections can be made manually using the registers defined for Factory calibration configuration selection. Refer Communication Table for registers in the range 315-320.

4.1.5. Simulate Device Variables

Process Values such as Differential Pressure, Static Pressure, Process Temperature and Flow output can be temporarily simulated by user. An option is provided for user to write defined simulated values to device. When the device is power cycled, the configuration is lost, device reports the actual values as measured.

To enable simulation of device variables, navigate to Device Setup->Advanced Flow Setup->Flow Configurations screen as given below. Check the box “Simulation On” for individual device variable and enter the value and continue the Flow configuration screen completion.



5. Troubleshooting

5.1 Overview

Using the Honeywell Modbus Host in the on-line mode you can check the transmitter status by navigating into Monitoring tab, identify diagnostic messages and access troubleshooting information so you can clear fault conditions.

Refer section 6.3 to understand alarams and its resolution

The SMV Modbus diagnostic messages fall into any one of the following general categories:

- Critical
- Details of Critical Fault
- Device Variables Status
- Warning
- Information

5.2 Communications troubleshooting

5.2.1. Device not visible on the network

The table below identifies the causes of the communication problem with the SMV800 Modbus Transmitter.

Symtom	Corrective action
No communication between Honeywell SMV800 Modbus transmitter interface software and the transmitter.	1. Check proper voltage across the power terminal of the transmitter (9.5V– 30 Vdc). 2. Check Com port selected correctly.
No communication between transmitter and host	1. Check proper voltage across the power terminal of the transmitter (9.5V– 30 Vdc). 2. Verify the RS485 bus terminated with 120 Ohm resistor or via AC termination, at each end of the bus. 3. Verify the RS485 bus is not terminated at point other than at each end of the bus. 4. Check for intermittent shorts, open circuits and multiple grounds. 5. Verify the power wiring and RS-485 bus wiring are not interchanged. 6. Verify the RS-485 wires are connected to correct communication terminals (A,B and RS485 common) Verify the grounding scheme is followed as

	recommended in the Transmitter Manual. 7. Verify the identical baud rate for host and transmitter. 8. Verify the transmitter Address. 9. The turn around delay time for the transmitter may be too fast for host. Try using longer time. 10. The RTU may be polling too fast and cutting off the transmitter response message. Try adjusting polling time on RTU. 11. Verify the software for the host is functioning properly.

5.3 Alarms and conditions

5.3.1. Below table shows all alarms and condition for SMV800 Modbus device.

Category	Alarm Name	Description	Resolution	Bit details	Modbus Holding Register #
Critical	Diagnostic Failure	This is a roll-up status bit that is set when any of the following critical status conditions are present, RAM, ROM or program execution (flow) of communication module.	Power cycle the device. If the problem persists after power cycle then board might be damaged so need to replace Communication module.	Bit - 0	115
	RAM Failure	Communication board RAM Corruption/Failure.	Power cycle the device. If the problem persists after power cycle then board might be damaged so need to replace Communication module.	Bit -1	
	ROM Failure	Communication board ROM Corruption/Failure.	Power cycle the device. If the problem persists after power cycle then board might be damaged so need to replace Communication module.	Bit - 2	
	Program Flow Failure	Communication module firmware Program Flow Failure. This fault will get set if any of the critical part of the code is not executed after expected duration.	Check the connection between communication and meterbody (Housing). Power cycle the device and if problem persists replace the Communication module.	Bit - 3	
	Config Data Corrupt	This is a roll-up status bit that is set when any of the following status of register 122/123 are set. - Common Database Corrupt - Vital Database Corrupt - General Config Database Corrupt - Totalizer Config Database Corrupt - Totalizer Value Database Corrupt	Power cycle the device. If the problem is not seen, verify the parameters for configuration changes. If the problem still persists then NVM might be damaged so need to replace Communication board.	Bit - 4	

Critical	Pressure Sensor Comm Timeout	If there is no communication between Communication Board and Pressure Sensor Board (Meter-body) or invalid data on communication line due to noise	User can verify the cable/connector between communication and Pressure sensor board (Meter body) to ensure that it is not damaged.Check for bent pins.If cable/connector is not the problem, replace the Communication module.If problem still persists, replace the meter body.	Bit - 5	115
	Temp Sensor Comm Timeout	If there is no communication between Communication Board and Temperature Sensor Board (Terminal) or invalid data on communication line due to noise	User can verify the cable/connector between communication and Temperature sensor board (Terminal Board) to ensure that it is not damaged.Check for bent pins.If cable/connector is not the problem, replace the Communication module.If problem still persists, replace the Terminal board.	Bit - 6	
	Comm Vcc Failure	Power Supply failure	Power cycle the device. If problem persist, Check the terminal voltage to be within limits. If still problem persists replace the Terminal block assembly. If problem continues replace the Communication module	Bit - 7	
	Pressure Sensing Failure	This is a roll-up status bit used for reporting a failure of the pressure sensing measurement by pressure module.	Refer register 116 status bits for more details and resolution.	Bit - 8	
	Temp Sensing Failure	This is a roll-up status bit used for reporting a failure of the temperature sensing measurement by Pressure module.	Refer register 116 status bits for more details and resolution.	Bit - 9	

Details of Critical Fault	Meterbody Failure	Pressure module is reporting a critical failure of the pressure sensing measurement within the Meter Body, which may be caused by one of the following: • Meter body failure • Sensor firmware flow failure	Power cycle the device. If the problem persists, replace the Meter Body	Bit - 0	116
	Sensor Charactarization corrupt	Pressure module is reporting corruption in the Pressure Characterization data	Power cycle the device. If the problem persists, replace the Meter Body	Bit -1	
	Pressure Suspect Input	Differential Pressure, Meter Body Temperature and/or Static Pressure input are extremely out of range such that the value is suspect.	Verify that all inputs are within specifications. Power cycle the device. If the problem persists, replace the Meter Body.	Bit - 2	
	Sensor RAM DB Fault	Pressure module is reporting corruption in the database in the Random Access Memory (RAM)	Power cycle the device. If the problem persists, replace the Meter Body	Bit - 3	
	Pressure NVM Corrupt	Pressure module is reporting corruption of the Non-Volatile Memory data (NVM)	Power cycle the device and if fault is cleared ensure to configure sensor parameters. If the problem persists, replace the Meter Body	Bit - 4	
	Sensor RAM Corrupt	Pressure module is reporting corruption in the Random Access Memory (RAM)	Power cycle the device. If the problem persists, replace the Meter Body	Bit - 5	
	Sensor Code Corrupt	Pressure module is reporting corruption in sensor firmware	Power cycle the device. If the problem persists, replace the Meter Body	Bit - 6	
	Sensor Flow Failure	Pressure module firmware Program Flow Failure. This fault will get set if any of the critical part of the code is not executed after expected duration.	Power cycle the device. If the problem persists, replace the Meter Body	Bit - 7	
	Sensor Input Failure	The temperature sensor (Thermocouple or RTD) has an open input. The sensor connections may be disconnected or broken.	Check the temperature sensor connections for disconnections or broken wires. Repair the sensor connections	Bit - 8	

Details of Critical Fault	NA	NA	NA	Bit - 9	116
	Temp Suspect Input	The fault is set for the following conditions. • If the measured CJ value is below -50 degC or above 90 degC • If the internal ADC		Bit - 10	
	Sensor Char CRC Failure	Temperature module is reporting corruption in the temperature Characterization data	Power cycle the device. If the problem persists, replace the Terminal Board.	Bit - 11	
	Sensor NVM Corrupt	Temperature module is reporting corruption of the Non-Volatile Memory data (NVM)	Power cycle the device and if fault is cleared ensure to configure sensor parameters. If the problem persists, replace the Terminal Board.	Bit - 12	
	Sensor RAM Failure	Temperature module is reporting corruption in the Random Access Memory (RAM)	Power cycle the device. If the problem persists, replace the Terminal Board.	Bit - 13	
	Sensor Code Corrupt	Temperature module is reporting corruption in sensor firmware	Power cycle the device. If the problem persists, replace the Terminal Board.	Bit - 14	
	Sensor Flow Failure	Temperature module firmware Program Flow Failure. This fault will get set if any of the critical part of the code is not executed after expected duration.	Power cycle the device. If the problem persists, replace the Terminal Board.	Bit - 15	

Device Variables Status	Bad DP	The Differential Pressure input measurement is far outside the specified range. The meter body may be damaged. The status is set if any of the critical faults is set.	Refer register 116 status bits for more details and resolution.Verify that all inputs are within specifications.	Bit - 0	117
	Bad MBT	The Meter body Temperature measurement is far outside the specified range. The meter body may be damaged. The status is set if any of the critical faults is set.	Reset the device. If the problem persists,replace the Meter body. Refer register 116 status bits for more details and resolution.	Bit -1	
	Bad PT	The Process Temperature input measurement is far outside the specified range. The Temperature module may be damaged.	Refer register 116 status bits for more details and resolution. Verify that all inputs are within specifications	Bit - 2	
	Bad SP	The Static Pressure input measurement is far outside the specified range. The meter body may be damaged. The status is set if any of the critical faults is set.	Refer register 116 status bits for more details and resolution. Verify that all inputs are within specifications	Bit - 3	
	Bad Flow	The Flow calculation has failed. Possible causes are: • Bad DP/SP/MBT/PT input • Invalid flow algorithm configuration • Firmware flow control fault • Any one critical fault is set	If Bad DP/MBT/SP/PT status is set, follow the resolution suggested. If Bad Flow is a result of an invalid algorithm configuration other statuses will be set to clarify the issue. Correct the configuration parameters and recheck the calculated raw flow (register : 389-390) . A power cycle is recommended here to reset and get correct reading. If a Flow Control Fault is set, reset the device. If the problem persists, replace the Meter Body.	Bit - 4	

Device Variables Status	Bad Totalizer	The Totalizer calculation has failed. Possible causes is same as that of Bad Flow.	Refer the steps for Bad Flow	Bit - 5	117
	New Field		Verify that the DP input is within specifications and if so adjust URV as per need.	Bit - 6	
	New Field	Differential pressure measured is below LRV	Verify that the DP nput is within specifications and if so adjust LRV as per need.	Bit - 7	
	New Field	Static pressure measured is above URV	Verify that the SP input is within specifications and if so adjust URV as per need.	Bit - 8	
	New Field	Static pressure measured is below LRV	Verify that the SP input is within specifications and if so adjust LRV as per need.	Bit - 9	
	New Field	Process Temperature measured is above URV	Verify that the temperature input is within specifications and if so adjust URV as per need.	Bit - 10	
	New Field	Process Temperature measured is below LRV	Verify that the temperature input is within specifications and if so adjust LRV as per need.	Bit - 11	
	New Field	Meter body Temperature measured is above URV	Verify that the meter body ambient is within specifications and if so adjust URV as per need.	Bit - 12	
	New Field	Meter body Temperature measured is below LRV	Verify that the meter body ambient is within specifications and if so adjust LRV as per need.	Bit - 13	
	New Field	Flow measured is above URV	Verify that the Flow value expected is with in URV if not adjust the Flow URV.	Bit - 14	
	New Field	Flow measured is below LRV	Verify that the Flow value expected is within specifications and if so adjust Flow LRV	Bit - 15	

Warning	Comm Sec NC Failure	This is a roll-up status bit that is set when any of the communication module non critical status is set such as • Display NVM Corrupt	Power cycle the device and if problem persists replace communication module	Bit - 0	118
	Sensing Sec NC Failure	This is a roll-up status bit that is set when any of the pressure and temperature sensing modules non critical status is set such as • Unreliable Communication • Sensor Input Out Of Range • CJ Out Of Limit • Excess Calibration Correction • CJ CT Delta Warning	Refer detailed status bits corresponding to pressure module in register 121 and temperature module in register 120.	Bit -1	
	CJ Out Of Limit	The Internal Cold Junction Temperature (CJ) measured in the Temperature module is outside of the specified range. Range limits are -40 to 85 degrees C.	Verify that the environmental temp is within spec. If it is, Temperature module may have been damaged. Replace the Temperature module	Bit - 2	
	No Factory Calibration	This is roll up status bit set for the following: • Temperature sensor module factory calibration missing • Pressure sensor module factory calibration missing Factory Calibration for either Temperature module or Pressure module is missing. Accuracy is compromised if not calibrated.	Refer status bits corresponding to factory calibration status of pressure in register 121 and temperature module in register 120. Accordingly return the module for factory calibration.	Bit - 3	

Warning	Sensor Unreliable Communication	This is roll up status bit set for the following: • Temperature Module Unreliable Communication • Pressure Module Unreliable Communication	Refer status bits corresponding to unreliable communication status of pressure in register 121 and temperature module in register 120 for more details. Internal communication quality between Communication board and Temp Module or Communication board and Meter Body is degrading.	Bit - 4	118
	Tamper Alarm	Device is in Write Protect Mode and the user tried to change one or more of the parameters. The write attempts exceeded the Tamper attempt limit.	More than a specified num of attempts or actual config changes are made, with Tamper Alarm enabled. Warning stays active until the specified Tamper latency period has elapsed. If needed, set the Tamper attempt to maximum value (10) or disable the Tamper alarm during setup stages of the device to avoid alarm being setup frequently. If configuration changes are required, contact a qualified individual to unlock the Write Protection Mode feature and make the required updates.	Bit - 5	
	Low Supply Voltage	The supply voltage to the transmitter power terminals is too low. Any or all of these status is set : Low supply voltage to: the transmitter or, Temp sensor module or Press. Sensor; or supply voltage to the transmitter has dropped low enough to cause a Device Warm Reset	Check that the power supply at terminals to be within specification. Try to increase the supply voltage level. If supply voltage is adequate and if the problem still persists replace the communication module followed by Temperature module followed by Meter Body.	Bit - 6	

Warning	Device Warm Reset	The supply voltage to the transmitter terminals has dropped low enough to cause a warm reset of device	Power cycle the device. If problem persist, Check the terminal voltage to be within limits. If still problem persists replace the Terminal block assembly. If problem continues replace the Communication module	Bit - 7	118
	Display Communication Failure	Display communication failure	Secure Display connections and recheck. If problem persists, reset the device. If the problem still persists, replace the Display module.	Bit - 8	
	Display NVM Corrupt	Communication module is reporting corruption of the Non-Volatile Memory data (NVM) related to display screen configuration.	Power cycle the device. If the problem is not seen, verify the parameters for configuration changes made. If the problem still persists then NVM might be damaged so need to replace Comms board.	Bit - 9	
	Communication Module VCC Failure	The voltage supply to the Communication Module processor is outside the operational range of 2.8 to 3.2volts	Power cycle the device. If problem persist, Check the terminal voltage to be within limits. If problem continues replace the Comms module	Bit - 10	
	Transmitter Supply Failure	Power Supply failure	Power cycle the device. If problem persist, Check the terminal voltage to be within limits. If still problem persists replace the Terminal block assembly. If problem continues replace the Comms module	Bit - 11	

Warning	Totalizer Reached Max. Value	Totalizer Reached Maximum Value. This bit will be set every time the Totalizer value reaches user configured maximum Totalizer value.	Totalizer starts from zero when it reaches the max value. Warning stays active until the user acknowledges the status or Totalizer status latency expires whichever comes first	Bit - 0	119
	Sensor Over Temperature	The Process Temperature input exceeds the Temperature Upper Range Limit (URL) as determined by the configured Sensor Type.	Check the process temperature. If the process temperature exceeds the range of the current sensor type, either correct the process to an in-range temperature or switch to a different sensor type which is ranged for the expected process temperature range.	Bit -1	
	Sensor Input Open	The temperature sensor (Thermo-couple or RTD) has an open input. The sensor connections may be disconnected or broken.	Check the temperature sensor connections for disconnections or broken wires. Repair the sensor connections.	Bit - 2	
	Sensor Input Out of Range	The temperature sensor is reading an out of range input value. The value is outside the limits of Temperature limits for the configured sensor type (LTL to UTL)	Check that the process temperature input is within the range limits for the configured temperature sensor (LTL to UTL). If a higher temperature range is required, configure and connect a different sensor type to meet the requirements of the process.	Bit - 3	
	CJ CT Delta Warning	The difference between the Internal Cold Junction Temperature (CJ) and the Processor Core Temperature (CT) measured in the Temperature module is greater than 10 degrees C.	Verify that the environmental temperature is within specifications	Bit - 4	

Warning	Flow Calculation Fault	During setup and configuration of the flow algorithm parameters, insufficient configuration or invalid parameter values have been entered which are causing a division by zero math error in the flow calculation	Carefully review the flow algorithm parameter values that have been configured. Correct any errors. When the flow is showing a good value and this status is cleared, reset the device to clear any Critical Status that may have been generated due to the bad flow calculation. Parameters to check: For Primary Elements / Algorithms other than Pitot Tube (Algorithm Option = ASME 1989 Algorithms) and for any Elements (including Average Pitot Tube, Algorithm Option = Advanced Algorithms) Pipe Diameter D cannot be equal to Bore Diameter d d must be > 0 D must be > 0 d < D For primary element / algorithm = Pitot Tube (applicable to Algorithm Option = ASME 1989 Algorithms only) Pipe Diameter D must be equal to Bore Diameter d alpha_D must be equal to alpha_d D = d and alpha_D = alpha_d D and d must be > 0 alpha_D and alpha_d must be > 0 Primary Element = Wedge Segment Height H < D H and D > 0 Viscosity and Density Coefficeints (as applicable) Make sure at least one of the Viscosity coefficients > 0 Make sure at least one of the Density coefficients > 0	Bit - 5	119

Warning	No Flow Output	The Flow Algorithm has been configured for “No Flow Output”.	This bit will be set when flow output algorithm type configured as No flow output. Configure Flow Output algorithm type if required otherwise ignore this warning.	Bit - 6	119
	DP/SP/PT/FLOW Simulation Mode	Process variables simulation enabled	This bit is set when any of the process variables like DP,SP,PT and Flow are configured for Simulation. Simulation mode(sim) is enabled for the Diff, Static Press, Process Temp or Flow. Sim mode simplifies testing of flow calc prior to online operation.\nWhile conducting testing, the status indicates that sim is being used. When testing is completed, clear the sim mode for the inputs to return to true process measurement	Bit - 7	

Information	Temperature module ADC Reference Failure	The reference voltage measurement in one of the two Analog to Digital Converter (ADC) parts in the Temperature module is not operating correctly. The process temperature measurement may be affected.	Reset the device. If the problem persists, replace the Temperature module.	Bit - 0	120
	Temperature Module Unreliable Communication	If there is no proper communication between Communication Board and Temperature Sensor Board (Terminal) or invalid data on communication line due to noise	User can verify the cable/connector between communication and Temperature sensor board (Terminal Board) to ensure that it is not damaged. Check for bent pins.If cable/connector is not the problem, replace the Communication module.If problem still persists, replace the Terminal board.	Bit -1	
	Temperature module Factory Calibration missing	Temperature sensor module factory calibration is missing	Return the device for Factory Calibration	Bit - 2	
	Temperature Sensor Over Temperature	The Process Temperature input exceeds the Temperature Upper Range Limit (URL) as determined by the configured Sensor Type.	Check the process temperature. If the process temperature exceeds the range of the current sensor type, either correct the process to an in-range temperature or switch to a different sensor type which is ranged for the expected process temperature range.	Bit - 3	
	Excess Calibration Correction	The temperature calibration correcs on LRV, URV or both is in excess.	Perform Reset Corrects to reset the User calibration to factory default. If required, fllow the calibration procedure to repeat the temperature calibration.	Bit - 4	
	User Corrects Activated	User Corrects Activated	This is acknowledgement status for reset corrects performed by user	Bit - 5	

Information	Sensor input bad	Temperature module input bad. Input out of range or may be open	Use matching sensor suitable for the process range. Reset the device, replace the Temp Module if issue persists	Bit - 6	120
	Sensor/CJ Bad	Temperature Module CJ measurement is bad	Verify that the CJ sensor within the Temp sensor module is not outside of the operating temp limits (-40 to 85 degC). Reset the device, replace the Temp Module if issue persists	Bit - 7	
	Sensor Input Failure	Fault is set if Temperature module • input failue faulty sensor, • out of range • input open	Replace the faulty sensor if that is the reason. Select suitable sensor type for the process. Reset the device, replace the Temperature Module if issue persists	Bit - 8	
	Low Supply	Temperature module Supply is Low	Check supply voltage is within specification. If all are within specification, replace Temperature module	Bit - 9	

Information	Excess Zero Correction	The DP and/or SP pressure Zero calibration or LRV correction performed by the user is excessive for the given inputs.	Perform a Reset Corrects on the DP and/or SP Pressure Calibration to reset the User calibration to factory default. If required, repeat the Pressure calibrations being careful to ensure that input during Zero calibration (Input Correct) is at zero pressure and input during LRV calibration (LRV Correct) matches the configured pressure LRV value	Bit - 0	121
	Excess Span Correction	The DP and/or SP pressure URV correction performed by the user is excessive for the given inputs	Perform a Reset Corrects on the DP and/or SP Pressure Calibration to reset the User calibration to factory default. If required, repeat the Pressure calibrations being careful to ensure that input during URV calibration (URV Correct) matches the configured pressure URV value.	Bit -1	
	Char Calc Error	The redundant integrity check on the Pressure measurement calculation indicates a failure.	Power Cycle the device. If the problem persists,replace the Pressure module.	Bit - 2	
	Sensor Overload	The Meter Body is sensing Differential or Static pressure greater than the specified limit of the Upper Range Limit (DP URL)	Check that the process inputs are within specification for the Differential and Static Pressure for this device input range. Correct the excessive pressure input. If higher pressures are required, a higher range device type may be required. Meter Body may have been damaged.	Bit - 3	

Information	Sensor RAM DB Failure	Pressure module is reporting corruption in the database in the Random Access Memory (RAM)	Power cycle the device. If the problem persists, replace the Meter Body	Bit - 4	121
	Press No Fact Calib	Factory Calibration for the Pressure module is missing. Accuracy will be compromised.	Return the device for Factory Calibration	Bit - 5	
	Pressure Module Unreliable Communication	Internal communication quality between the Communication Module and Pressure Sensor is degrading.	Either the transmitter is installed in a noisy environment or internal communication quality between the Communication Module and Pressure Sensor module is degrading. Verify the connector for bent pins.If cable/connector is not the problem, replace the Communication module.If problem still persists, replace the Terminal board.	Bit - 6	
	Press Sensor Over Temperature	The Meter Body temperature is too high. Accuracy and life span may decrease if it remains high.	Verify the environmental temperature is within specification. Take steps to insulate the Temperature module from the temperature source.	Bit - 7	

Information	Common DB Corrupt	NVM copy of Common database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter	Bit - 0	122
	Vital Config DB Corrupt	NVM copy of Vital Configuration database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter	Bit -1	
	General Config DB Corrupt	NVM copy of General Configuration database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter	Bit - 2	
	Config Change DB Corrupt	NVM copy of Configuration Change database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter	Bit - 3	
	Advance Diagnostics DB Corrupt	NVM copy of Advanced Configuration database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter	Bit - 4	
	Display View Config DB Corrupt	NVM copy of Display View/Screens Configuration database block found corrupt.	Power cycle the device. If the problem persists reconfigure Display Screen parameters. If still problem is seen replace communication module.	Bit - 5	
	Display Common Config DB Corrupt	NVM copy of Display Common Configuration database block found corrupt.	Power cycle the device. If the problem persists reconfigure Display Screen parameters. If still problem is seen replace communication module.	Bit - 6	
	Totalizer Config DB Corrupt	NVM copy of Totalizer Configuration database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter	Bit - 7	

Information	Miscellaneous DB Corrupt	NVM copy of Miscellaneous Configuration database block found corrupt.	Power cycle the device. If the problem persists, replace the transmitter	Bit - 0	123
	Totalizer Value DB Corrupt	NVM copy of totalizer value block is found corrupt	Power cycle the device. If the problem persists, replace the transmitter	Bit -1	
	Flow Unit DB Corrupt	NVM copy of totalizer value block is found corrupt	Power cycle the device. If the problem persists, replace the transmitter	Bit - 2	
	Flow Parameter DB Corrupt	NVM copy of advance flow value block is found corrupt	Power cycle the device. If the problem persists, replace the transmitter	Bit - 3	
	Backup Totalizer Value DB Corrupt	NVM copy of totalizer value back up block is found corrupt	Power cycle the device.	Bit - 4	
	User Variable DB Corrupt	NVM copy of user variables block is found corrupt	Power cycle the device. If the problem persists reconfigure user defined variables LRV,URV if required.If still problem persists replace transmitter.	Bit - 5	

6. Security

6.1 Security Guidelines

The SMV800 provides several features designed to prevent accidental changes to the device configuration or calibration data. These features include a Hardware Write Protect Jumper and a Software Write Protect configuration parameter. These features can be used in combination to provide multiple layers of configuration change protection. The default software PIN is “0000” and this needs to be changed by user during installation and commissioning.

A hardware write-protect locks out changes regardless of the entry of a PIN. The hardware jumper requires physical access to the device as well as partial disassembly and should not be modified where the electronics are exposed to harsh conditions or where unsafe conditions exist. For configuration or calibration changes without changing the hardware jumper position the user may choose to rely on the PIN and software lockout features.

Ensure that the device has Software write protect enabled and hardware write protect jumper in appropriate position on the device to prevent any unauthorized configuration changes. Change the software PIN peridically and securely maintain the PIN.Reset / Forgot PIN option is supported where user can send the serial number of the device to Honeywell Technical Assistance Center and get the license code to reset PIN.

A tamper detection feature (see section 5 of this document for more details) is available that can indicate that an attempt was made to change either the configuration or calibration of the device (whether a change was made or not). These security features are designed to avoid accidental changes and to provide a means to detect if an attempt was made to change the configuration and calibration.

Physical access to device: MODBUS host and the devices on the control network shall have physical access controll. Otherwise a malicious operation on the transmitters will result in process Shutdown or impact process control. For maximum security, the transmitter device must be protected against unauthorized physical access.

6.2 How to report a security vulnerability

For the purpose of submission, a security vulnerability is defined as a software defect or weakness that can be exploited to reduce the operational or security capabilities of the software or device. Honeywell investigates all reports of security vulnerabilities affecting Honeywell products and services.

To report potential security vulnerability against any Honeywell product, please follow the instructions at:

https://honeywell.com/pages/vulnerabilityreporting.aspx

Submit the requested information to Honeywell using one of the following methods:

- Send an email to security@honeywell.com or
- Contact your local Honeywell Process Solutions Customer Contact Centre (CCC) or Honeywell Technical Assistance Centre (TAC) listed in the “Support and Contact information” section of this document.

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Sales and Service

Sales and Service

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

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