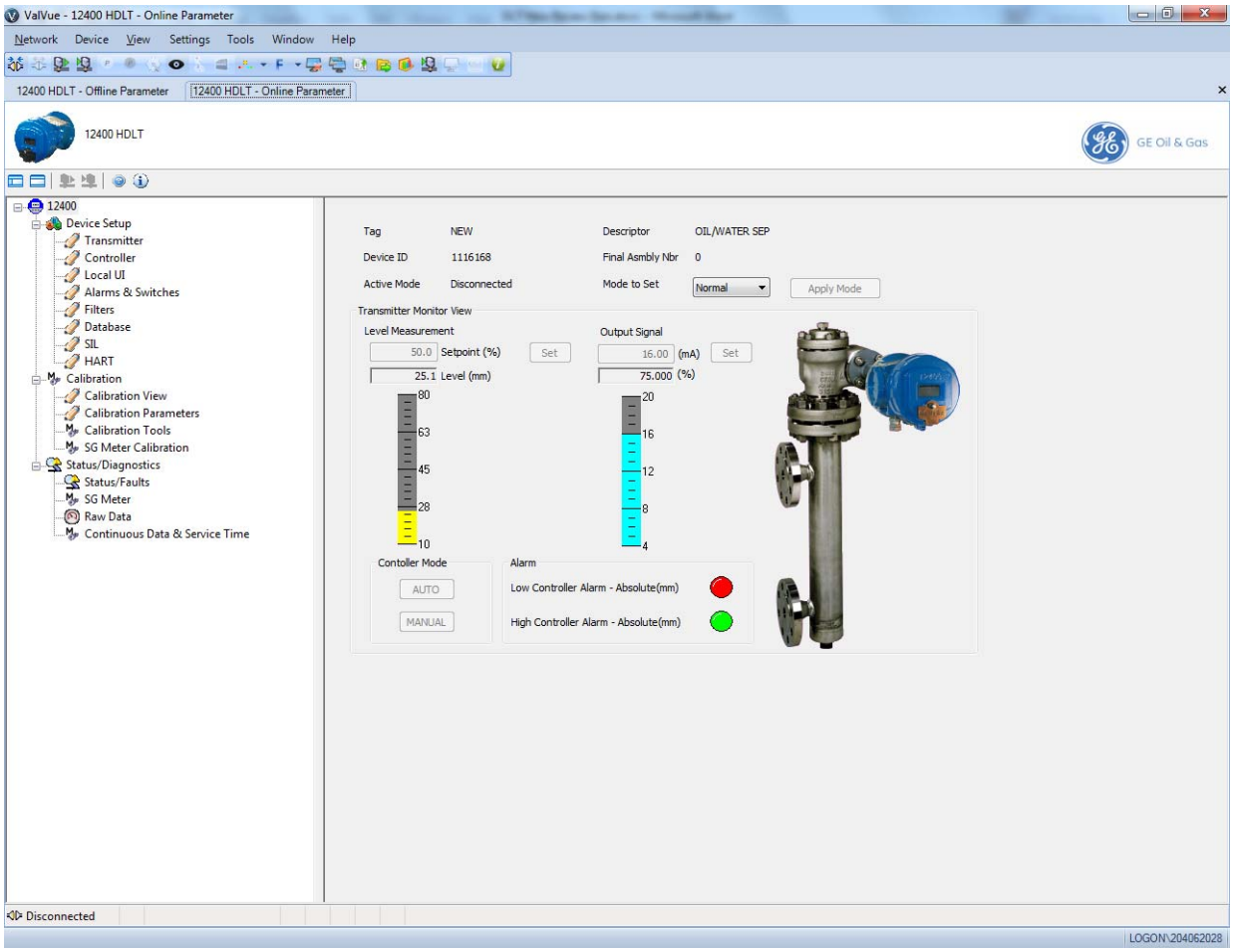
Masoneilan*
12400 HART® Digital Level Transmitter (HDLT) DTM

Online Help Manual (Rev. C)



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Document Changes

Version/Date	Changes
B/08-2017	Updated ValVue 3 chapter. Updated troubleshooting. Added section on BHGE Documentation Resources for Masoneilan Products. Added section on Failure to Communicate. Added section on how to interface with ValVue3.
C/06-2018	Updated ValVue 3 chapter. Updated section on how to interface with ValVue3. Updated download and install. Removed unregister functionality from licensing. Added note on Nameplate information.

Contents

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1. Introduction

12400 DTM Introduction

The 12400 DTM (Figure 1) is a user-friendly interface to Masoneilan's Digital Level Transmitter, Model 12400 that uses HART® communication protocol. The 12400 DTM is used to configure, calibrate and perform transmitter / controller diagnostics with the Model 12400 (Digital Level Transmitter) utilizing HART® communications protocol.

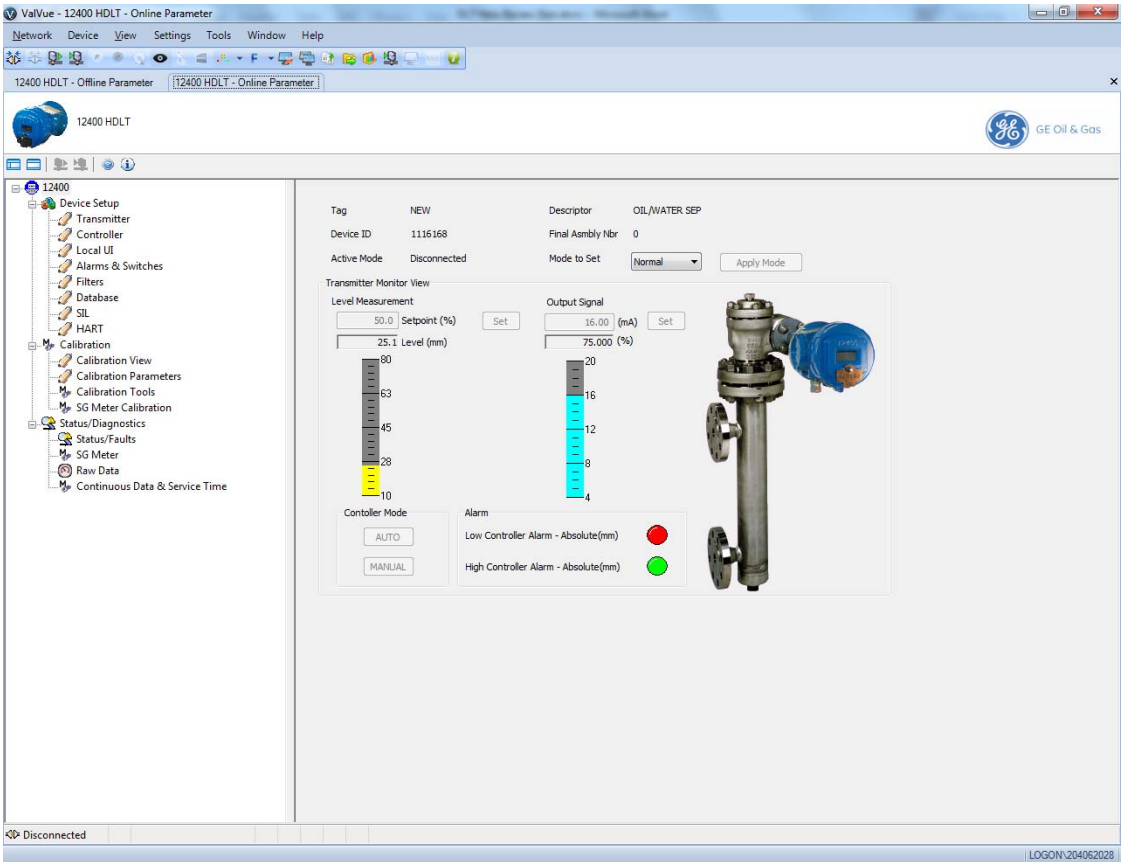

Figure 1 12400 Main Tab

About This Manual

These instructions are intended to help a field engineer use the 12400 DTM interface to install, configure, calibrate and diagnose 12400 transmitter/controller operations. If you experience problems that are not documented, contact BHGE or your local representative.

This is a tab-driven manual. Additionally, *Getting Started Tasks* gives a task-driven list for initial use.

Conventions Used in This Manual

Conventions used in this manual are as follows:

- *Italicized* letters are used when referencing a term used in the display window, for emphasis on important items and for fields where data appears or for user-entered data.
- Actions performed on buttons, checkboxes, etc. appear **bolded**.

Indicates important facts and conditions.

Indicates a potentially hazardous situation, which if not avoided could result in property damage or data loss.

Indicates a potentially hazardous situation, which if not avoided could result in death or serious injury.

BHGE Documentation Resources for Masoneilan Products

BHGE publishes several different resources for documentation on Masoneilan products:

- Bench quick starts contain information related to configuration and testing in a bench top environment.
- Hardware quick starts contain installation information and other basic information related to getting a device installed and very generally configured.
- Hardware instruction manuals contain more complete information for configuration of a device. This manual also includes information on background functionality and special circumstances useful in installation, configuration and operation/ troubleshooting.
- Software manuals contain more complete information for the software configuration of a device. This manual also includes information on background functionality and special circumstances useful in configuration and operation (including diagnostics and their interpretation). These manuals represent the same source material as the online help.
- Handheld documents: Give the DD mappings for the product.

Check the website: *https://www.geoilandgas.com/file-download-search*.

Related Documentation for the 12400 DTM

- ValVue documentation: The 12400 DTM works inside various software (such as PACTware), however it is designed to work best with out ValVue 3 software. See the ValVue 3 help or GEA31426 Masoneilan Products ValVue 3 Software Manual.
- Masoneilan 12400 Series Level Transmitter/Controller Instruction Manual & Safety Guide (GEA19367)
- 124000 online help.

Masoneilan Help Contacts

- Email: svisupport@bhge.com
- Phone: 888-SVI-LINE (888-784-5463)

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2. Installation and Logon

Installation

Requirements

Using the 12400 DTM installation procedures discussed requires basic knowledge of Microsoft® Windows® operating systems.

Hardware and Operating System Requirements

To successfully install and run the DTM software, your computer system must meet or exceed the following minimum hardware and software requirements.

- Windows® XP SP3, Windows® Server 2003, Windows® Server 2008, or Windows® 7
- Windows® Pentium® or compatible microprocessor
- 1 G of free hard disk space

Failure to Communicate

If the PC (using a modem) fails to communicate with the HART® or 12400 DTM the PC displays then either the message *No Devices Found* in the DTM main screen, or a COM port communication error occurs, or the message *HART I/O Failed* appears if the device communications fails during the session. Communication failure prevents the PC from establishing a link. Possible causes of communications failure related to installation include:

- Insufficient loop current and voltage
- Poor wiring contacts
- Improper connection of the HART® modem to the computer or a busy port (wait for COM port to clear or use another port)
- Incorrect serial port
- Using the DTM with another HART® master terminal in service
- Insufficient loop impedance (a minimum of 250 Ohms is required)
- Field device has a non-zero polling address (Set to multidrop)

If HART® compliance problems are suspect prepare a detailed description of the loop, including all devices on the loop, type of wiring used, loop length, and presence of any possible interference sources before contacting the factory for assistance.

Installing the ValVue3 and DTM Software

This installs not only the ValVue software but the SQL Express® software, the BHGE NI-FBUS-H1 Comm. DTM, Microsoft® VC++ Redistributable package and the .Net framework.

If you have a previous installation of the BHGE NI-FBUS-H1 Comm. DTM, you need to use Control Panel to uninstall before proceeding.

During the install, SQL is installed. It is highly recommended that you check for ValVue updates on the BHGE website (https://www.geoilandgas.com/file-download-search) every six months to keep this program current for security issues.

During the initial installation, if you do not have SQL installed, you are prompted to reboot your system. Follow the prompts to do so and the ValVue install automatically commences after reboot.

For ValVue 3 or DTM registration, you must run the frame application (i.e. ValVue 3, PACTware etc) as Administrator. For instance, for ValVue3, select the icon or ValVue3 in the Start menu, right-click and select ***Run as Administrator****.*

This also applies when using Masoneilan DTMs inside of PACTware® or other vendor and updating licensing

If you are performing these functions on a Masoneilan DTM using ValVue3 and ValVue3 is run as an Administrator, then the DTMs inherit the Windows Administrator properties from ValVue3.

To install the ValVue3 software:

1. Go to the *Resource Library* (https://www.geoilandgas.com/file-download-search) and enter *ValVue* in the search field (arrow in Figure 2).

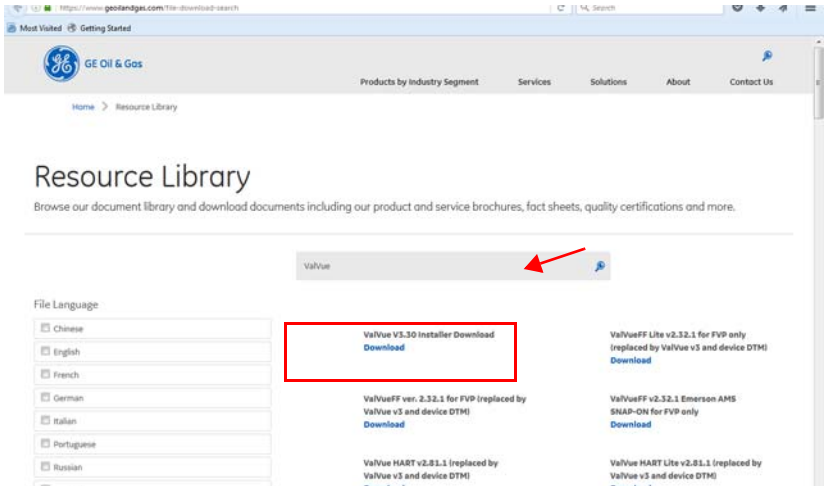

Figure 2 Download Center: Search for Valve3

The results appear (red box in Figure 2).

2. Use the arrows to move through the selections. Select **Download** below *ValVue V3.30 Installer Download* and Figure 3 appears.

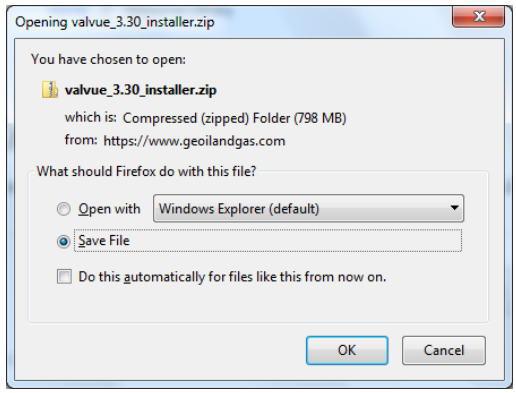

Figure 3 Opening Dialog

NOTE

The dialog that appears for download varies by the program used.

3. Click **Save File**, click **OK** and it saves to the *Windows Downloads* folder.

NOTE

For fastest installation, save the download file to your laptop/PC. *Don't install from the website.*

4. Open *Windows Explorer* and click the **Windows Downloads** folder.

NOTE

If you have a previous install of ValVue3 you are prompted to uninstall first and then you must run the installer again to finish the upgrade.

5. Unzip the files to a folder on your local drive.
6. Right-click the installer, and select **Run as Administrator** (Figure 4), and follow the instructions to install.

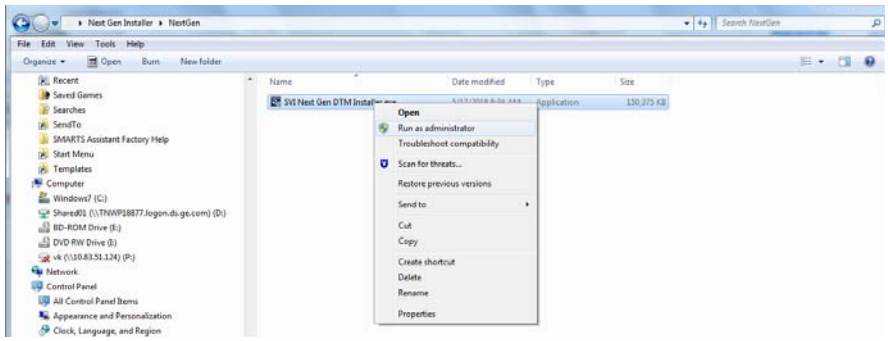

Figure 4 Run As Administrator

NOTE

The last dialog contains useful information on where to find help resources (Figure 5).

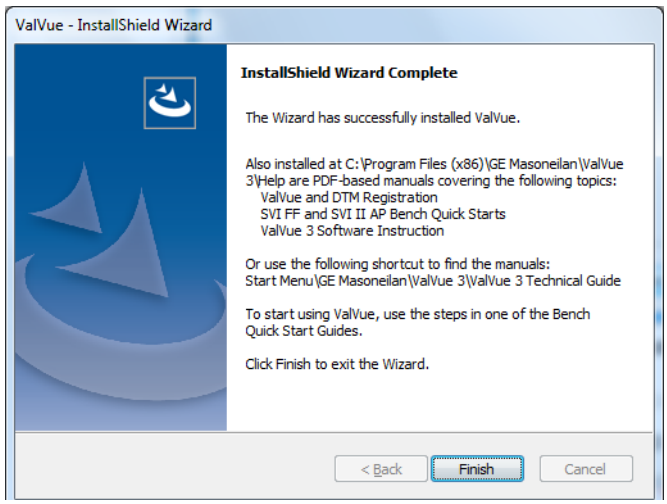

Figure 5 InstallShield Wizard Complete

To install the DTM software;

1. Go to the *Resource Library* (https://www.geoilandgas.com/file-download-search) and enter *12400 Level* in the search field (arrow in Figure 2).

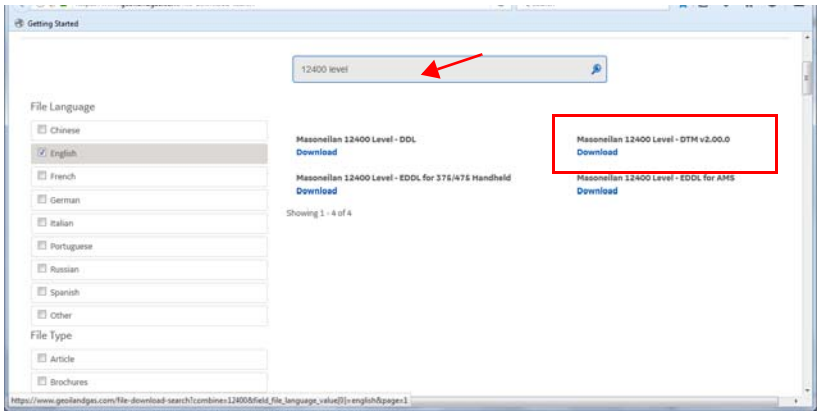

Figure 6 Download Center: Search for 12400 DTM

The results appear (red box in Figure 2).

2. Use the arrows to move through the selections. Select **Download** below *Masoneilan 12400 Level - DTM V2.20* and Figure 3 appears.

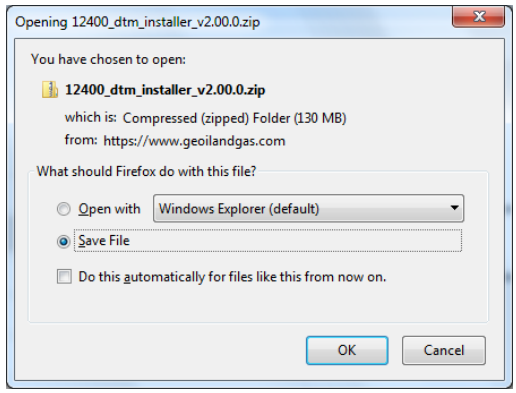

Figure 7 Opening Dialog

NOTE

The dialog that appears for download varies by the program used.

3. Click **Save File**, click **OK** and it saves to the *Windows Downloads* folder.

NOTE

For fastest installation, save the download file to your laptop/PC. *Don't install from the website.*

4. Open *Windows Explorer* and click the **Windows Downloads** folder.
5. Unzip the files to a folder on your local drive.
6. Right-click the installer, and select **Run as Administrator** (Figure 4), and follow the instructions to install.

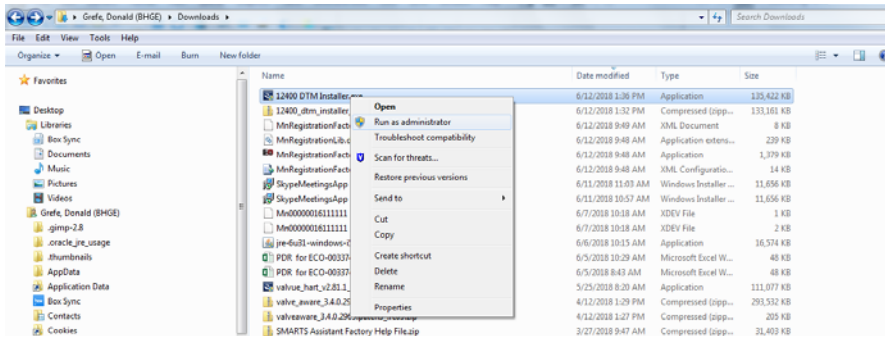

Figure 8 Run As Administrator

NOTE

If you have a previous install of ValVue3 you are prompted to uninstall first and then you must run the installer again to finish the upgrade.

Log On

1. Select **Start > All Programs > GE Masoneilan > ValVue 3 > ValVue**. Figure 9 appears.

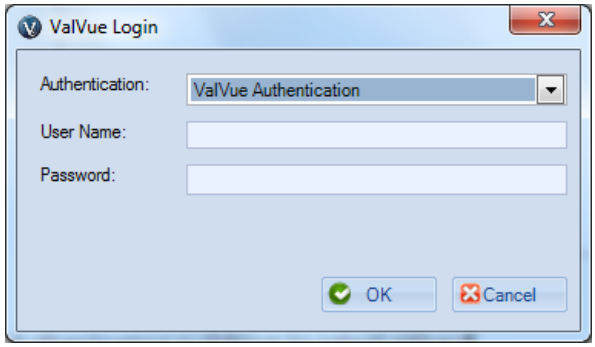

Figure 9 ValVue Login

2. Use the *Authentication* pulldown to select either:

   - *Windows Authentication:* Any user in the list of the ValVue user group can logon. This user group is created by the system administrator.
   - *ValVue Authentication*: This is the default username and password for first login. Username *Admin* and Password: *ValVue3*. These must be changed after the first login.

   During your initial login Figure 10 appears.

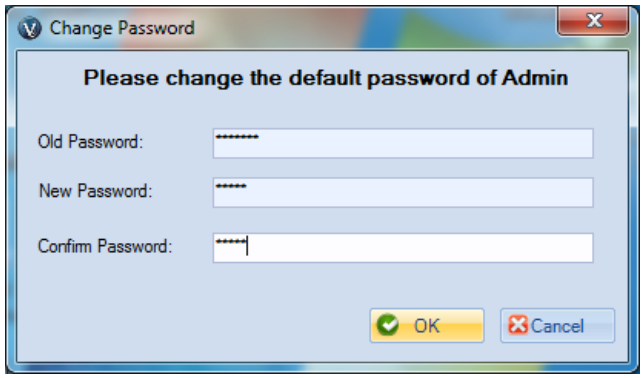

Figure 10 Change Password

You must change your password according to the constraints shown in Figure 11.

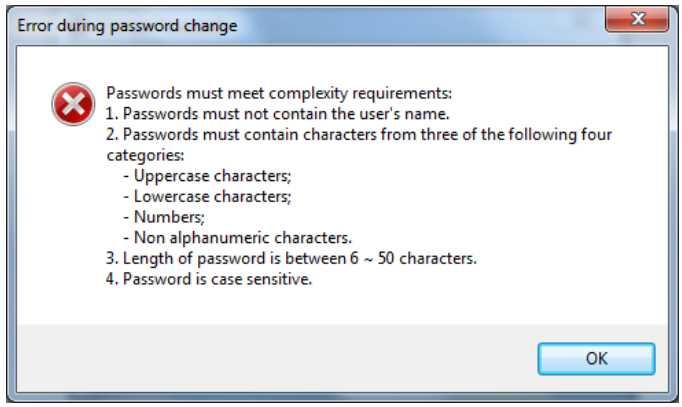

Figure 11 Passwords Constraints

- *Login as Current Windows User*: Your *Domain\Username* appear in *User Name*.

For:

- *Windows Authentication:* Enter a *Username*, *Password* and use the *Domain* pulldown to select the domain.
- *ValVue Authentication*: Enter a *User Name* and *Password*.
- *Login as Current Windows User*

3. Click **OK** and the main tab appears.

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3. ValVue Work Environment

ValVue Work Environment

This section describes the ValVue main screen and how to accomplish general ValVue tasks. After you have successfully launched and logged into the ValVue, *ValVue Main Screen* appears. The main screen includes four main components:

- "Command Area", which includes the title bar, main menu and the toolbar.
- DTM "UI Panel" on page 23, which displays the UI interface for the specific device DTM.
- Various "Docked Panes" on page 24, which include the topology pane, device library, help, and error log tracking.
- "Status Bar" on page 28.

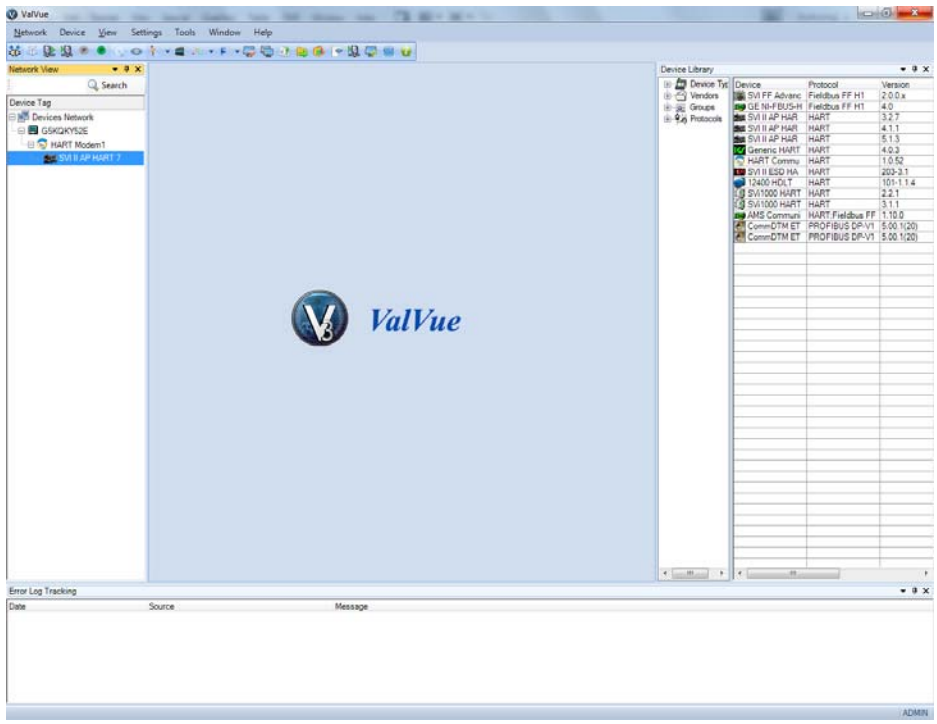


Figure 12 ValVue Main Screen

Command Area

Command area is composed of three components:

- Title bar: lists the application name and information about current project and current opened DTM UI and has buttons to minimize/maximize and close.

Figure 13 Title Bar

- Main menu: Provides items for all functions of the DTM software. See the individual menu discussions.

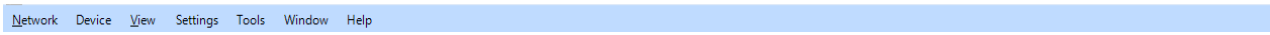


Figure 14 Main Menu

- Toolbar: An icon-driven representation of the main menu. The number of items and those that are active depend on the item selected in the topology.

Figure 15 Toolbar

UI Panel

The UI panel depends on the device installed and selected. For Masoneilan products see the individual DTM help. See vendor documentation for non-Masoneilan products.

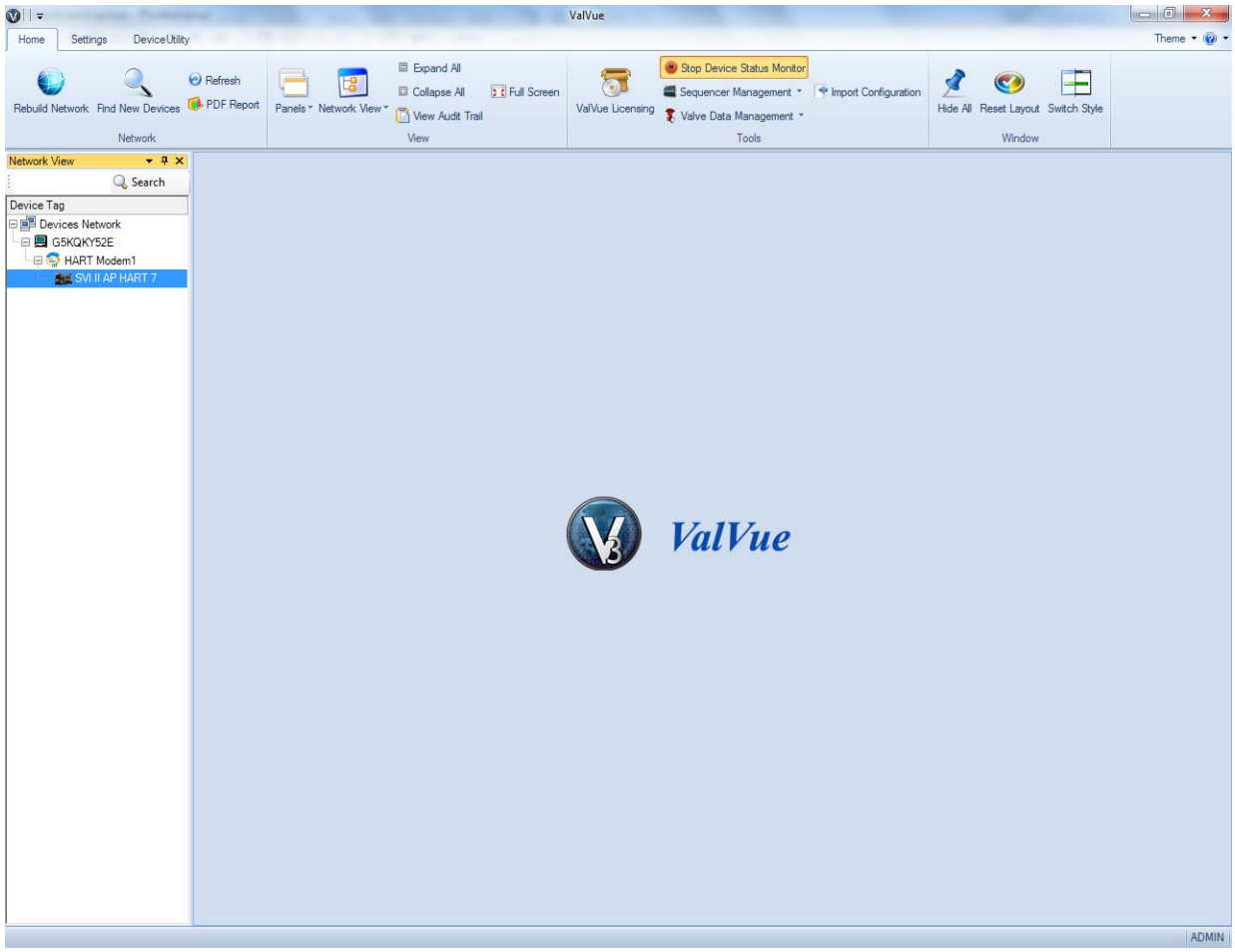


Figure 16 UI Panel

Docked Panes

ValVue Topology Pane

The topology pane (*ValVue Topology Pane: Network View*) is used to navigate the various areas and devices in each area and open a device's proprietary DTM. This navigation tree can be changed to one of four different views:

- *Topology View*
- *Area View*
- *Protocol View*
- *Manufacturer View*

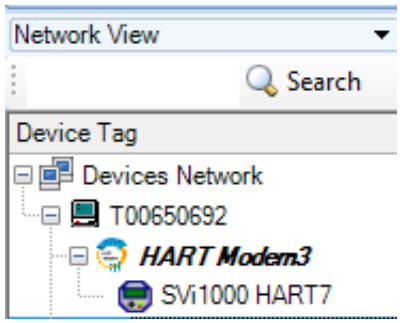


Figure 17 ValVue Topology Pane: Network View

The tree is broken down into the following functional areas:

- *View:* Listed just below the yellow bar is the view in use.
- *Field Network* or *Area*: One level below is either the protocol in use or a listing of the user-defined areas.
- *Protocol*: Next is the protocol in use.
- *Device*: Next is a list of the devices added.

Column Settings

You can add and remove columns appearing in the topology pane. The default is to display a minimal amount of columns and the columns available depend on the active *Network View*. These items are useful in identify particular valve/positioners. It may be necessary to pull th e topology pane to display the fields. Columns available for display include:

- *Device Tag*
- *Address*
- *Channel*
- *Device Type (DTM)*
- *Changed*: Indicates an unsaved parameter change using the pencil icon.

To configure columns:

1. Right-click at the device tag level.

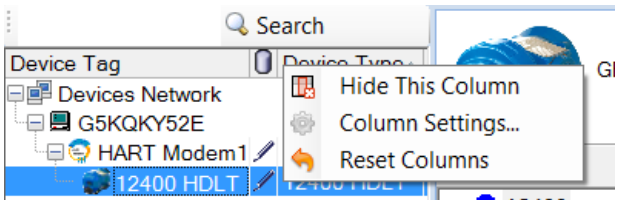
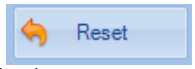


Figure 18 Column Settings Right Click Menu

The image shows the menu when more than the default columns are shown. Only *Column Settings* appears then.

Use the *Reset Columns* menu item or 

on the *Column Settings* dialog to reset the column configuration to default.
Use the *Hide This Column* menu item to hide a selected column.

2. Click **Column Settings** and the dialog appears.

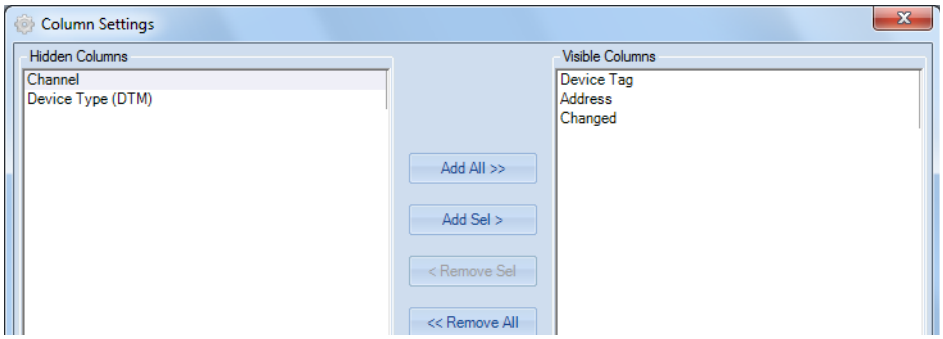


Figure 19 Column Settings

3. Use the add and remove buttons to add/remove items from the *Hidden Columns* or *Visible Columns* lists.
4. Use the move buttons to arrange the order and click **OK**. The topology pane appears with the columns appearing and arranged as dictated.

Device Library

Use the *Device Library* to view lists of protocols and devices in the *DTM Library*. In the *DTM Library* means that they are installed and ready for use by ValVue. Other protocols and DTM may be on the system, but not ready.

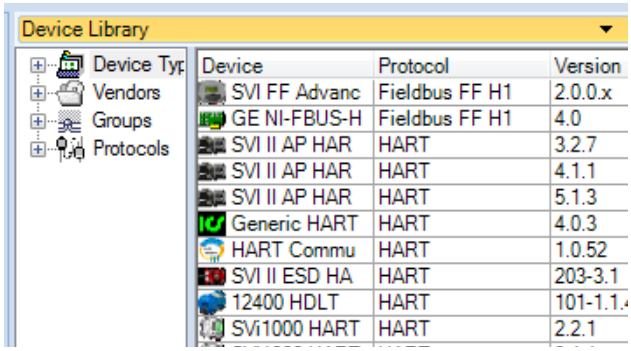


Figure 20 Device Library

NOTE

To see the correct version of ValVue3 or an individual DTM, click Help > About for ValVue3 or the About icon for a DTM ( ). Do not reference the Version field in DTM Library Management.

If you right-click on and item in the *Device* list you can access a dialog with display only *DTM Info*.

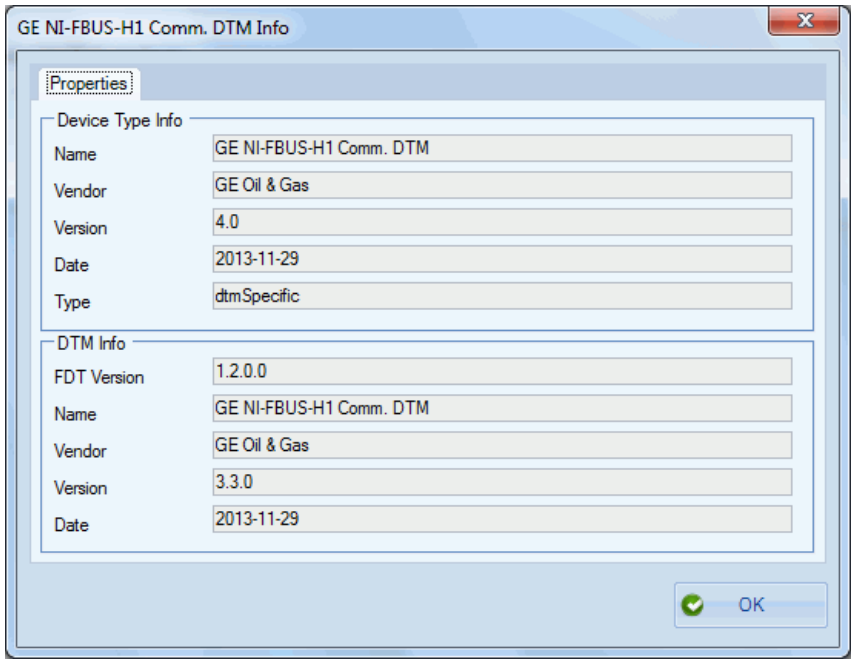


Figure 21 DTM Info

Error Log Tracking

Accessed from the *View* menu and clicking  in the status bar, use this, via a right-click menu, to view errors, clear errors and view details (*Error Info*).

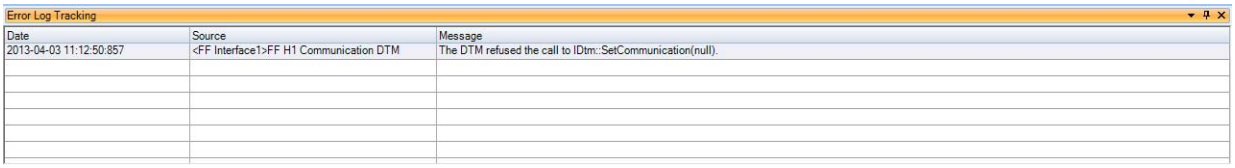


Figure 22 Error Log Tracking Pane

Information in the *Error Info* dialog can be copied and pasted for troubleshooting purposes.

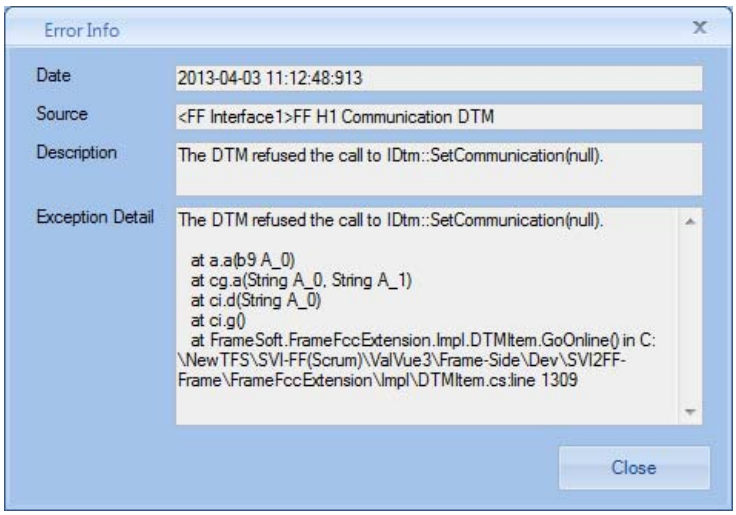


Figure 23 Error Info

Help

Use this function to access context-sensitive help. The information displayed is dictated by the selection made from the main menu.

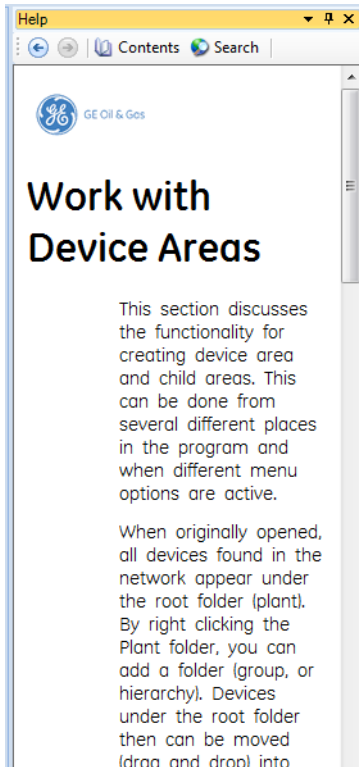


Figure 24 Intelligent Help

Status Bar

This displays the current user and an icon to indicate errors exist. When you mouse over the user label, the tooltip shows the role information. If you click the error icon  , the *Error Log Tracking* appears.

Figure 25 Status Bar

Ribbon View

ValVue has an alternate view for the main screen that is completely icon-driven. This section maps this view to its corresponding functionality in this manual.

The ribbon view is comprised of three tabs:

- *Home*: Contains icons related to *Network* issues, *View* issues for how the interface is presented, *Tools* for licensing and *Window* layout.
- *Settings*: Contains icons related to *Project Settings*, *Security Settings* and *General Settings*.
- *Device Utility*: Contains a *Function* area with icons related to connecting and assigning device areas.

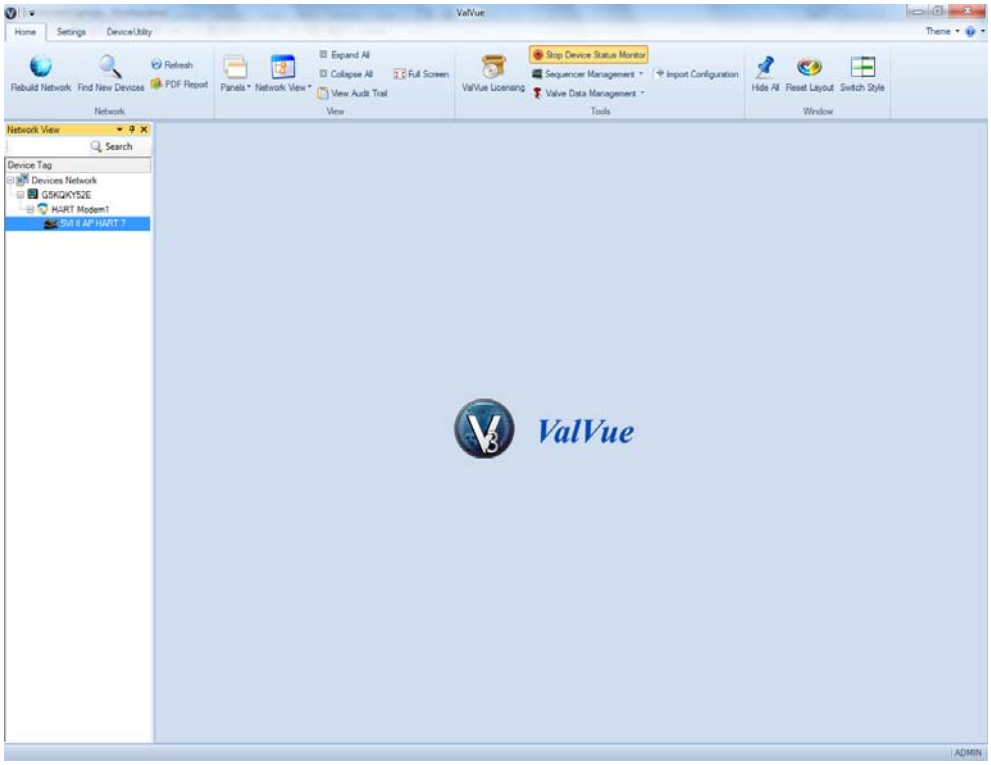


Figure 26 ValVue Ribbon View

Table 1 Ribbon View Icons Cross-referenced to Functionality

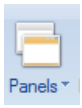
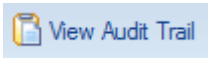
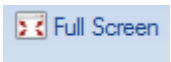
Icon	Cross-reference
Home	
Network	
	See *Network Menu*.
	
	
	
View	
	This includes: ☐ *Network View* ☐ *Device Library* ☐ *Error Log Tacking* ☐ *Intelligent Help* See *View Menu*.
	This includes: ☐ *Topology View* ☐ *Area View* ☐ *Protocol View* ☐ *Manufacturer View* See *View Menu*.
	See *View Menu*.
	See *View Menu*.
	See *View Menu*.

Table 1 Ribbon View Icons Cross-referenced to Functionality (Continued)

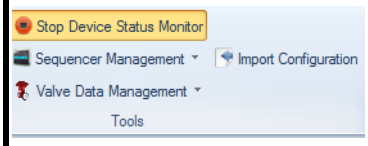
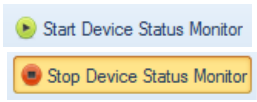
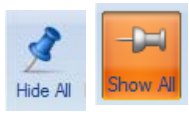
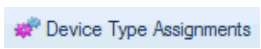
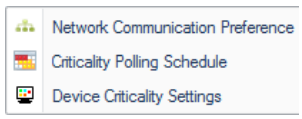
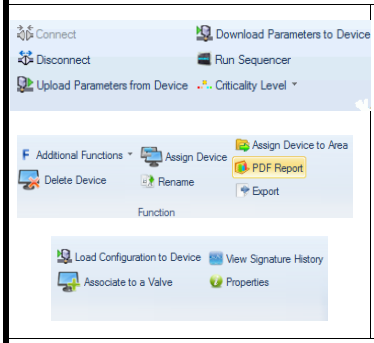
Tools	
	See Tools Menu.
	
	
Window	
	See *Windows Menu*.
	
	
Settings	
Project Settings	
	See *Settings Menu*.
	See *Settings Menu*
	See *Settings Menu*.
	See *Settings Menu*.

Table 1 Ribbon View Icons Cross-referenced to Functionality (Continued)

Security Settings	
	See *Settings Menu*.
Device Utility	
Function	
	See *Device Menu*.
Standard Function	
	See *Settings Menu*.

Quick Access Toolbar

The ribbon view has a quick access bar to which you can add favorite tasks in icon form. To add an item:

- Right-click on any icon and select **Add to Quick Access Toolbar**.

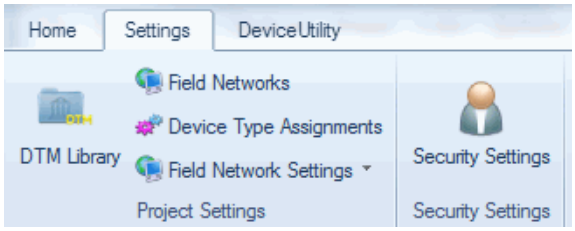


Figure 27 Quick Access Toolbar

This toolbar has a pulldown menu indicated by a down arrow.

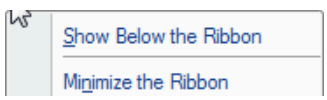


Figure 28 Quick Access Toolbar Pulldown Menu

Use the pulldown menu to minimize the ribbon so you can use the Quick Access toolbar only and to place the toolbar below the ribbon.

The icons have a right click menu.

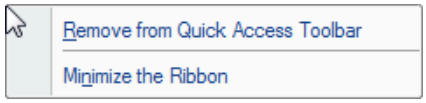


Figure 29 Quick Access Toolbar Icon Right Click Menu

Use the pulldown menu to minimize the ribbon so you can use the Quick Access toolbar only and to delete icons.

Assign Device Type

If the scan detects a device that is unknown or has unknown device properties, the *Assign Device Type* dialog appears. Use this dialog to review the information gathered during the network scan and to add or edit to that data. You can then save the assigned data for use with that device type.

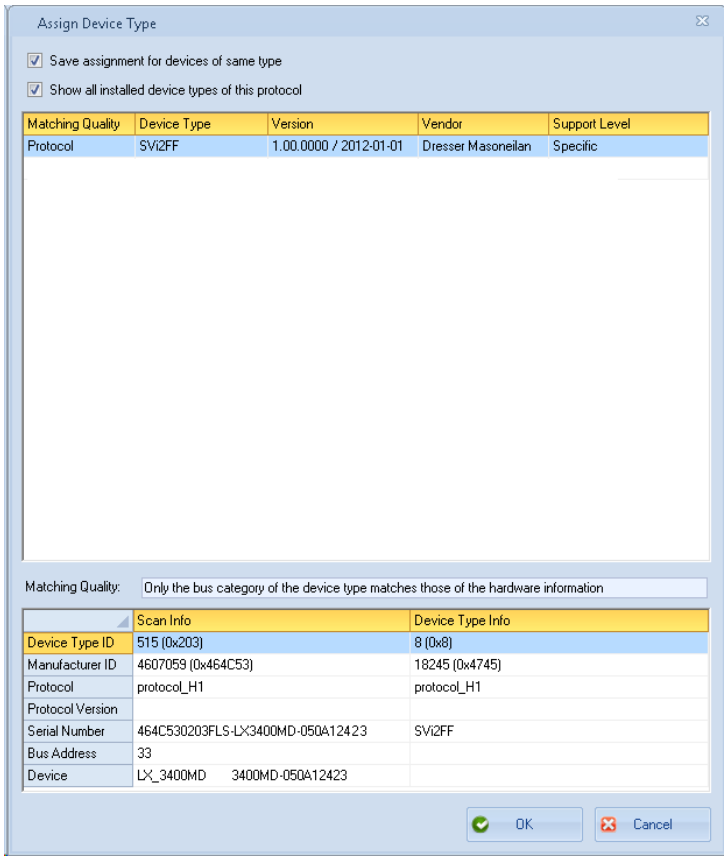


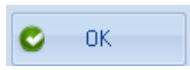
Figure 30 Assign Device Type

Fields and Buttons

Save assignment for devices of same type	Click this checkbox to save configuration changes made using this dialog for devices of the same type once  is clicked.
Show all installed device types of this protocol	Click this checkbox to display all devices scanned that are for the detected protocol. This is useful to see related information as reference.
Matching Quality	Detects the common quality detected. In this case, this is the protocol.
Device Type	Displays the device type detected.
Version	Displays the version detected.
Vendor	Displays the vendor detected.
Support Level	Displays the support level detected.
Matching Quality	Displays text associated with the detected *Matching Quality* as an explanation.
Scan Info	Displays the scanned data for: ☐ *Device Type ID* ☐ *Manufacturer ID* ☐ *Protocol* ☐ *Protocol Version* ☐ *Serial Number* ☐ *Bus Address* ☐ *Device*
Device Type Info	Enter amended data for the scanned data for: ☐ *Device Type ID* ☐ *Manufacturer ID* ☐ *Protocol* ☐ *Protocol Version* ☐ *Serial Number* ☐ *Bus Address* ☐ *Device*

Configure Assign Device Type

If the *Assign Device Type* dialog appears:

1. Review the Scan Info fields and ensure that all information is accurate.
2. Click **Show all installed device types of this protocol** to see information for reference, if required.
3. Click **Save assignment for devices of same type** and click  .

Topology Right-Click Menu

Use the topology view right-click menu to access functions some of which are ValVue 3 related and some SVI II AP DTM related. Figure 31 shows which items are related to positioner DTM operations and which to ValVue 3 (Black boxes are SVI II AP operations and red are ValVue 3).

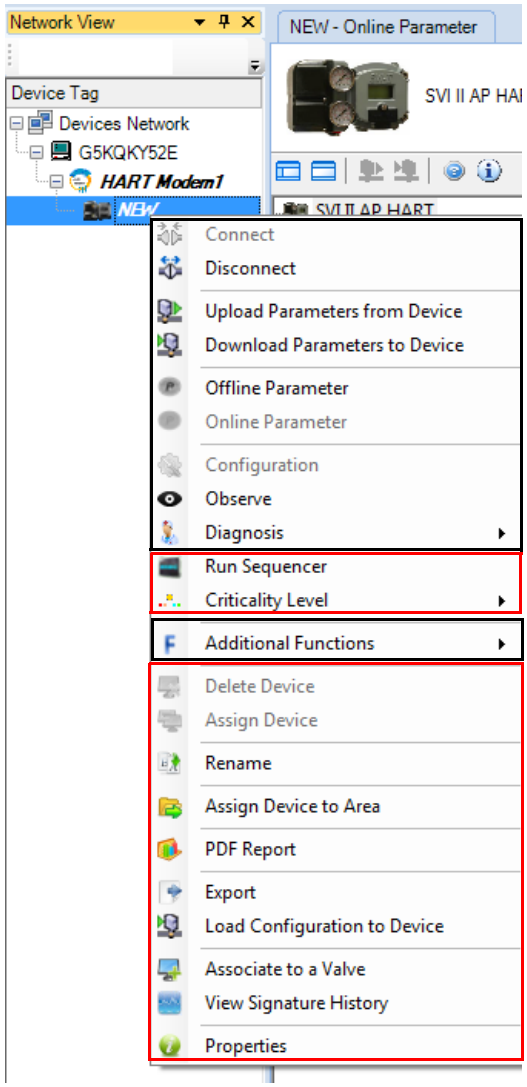


Figure 31 Topology Right-Click Menu

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4. 12400 Work Environment

12400 DTM Work Environment

Masoneilan's 12400 DTM software provides a powerful interface to Masoneilan's Digital Level Transmitter, Model 12400 that uses HART® communication protocol. The 12400 DTM is used to configure, calibrate and perform transmitter diagnostics for the Model 12400 (Digital Level Transmitter). The 12400 DTM launches and displays the device in the first *Transmitter Monitor View* tab (Figure 32).

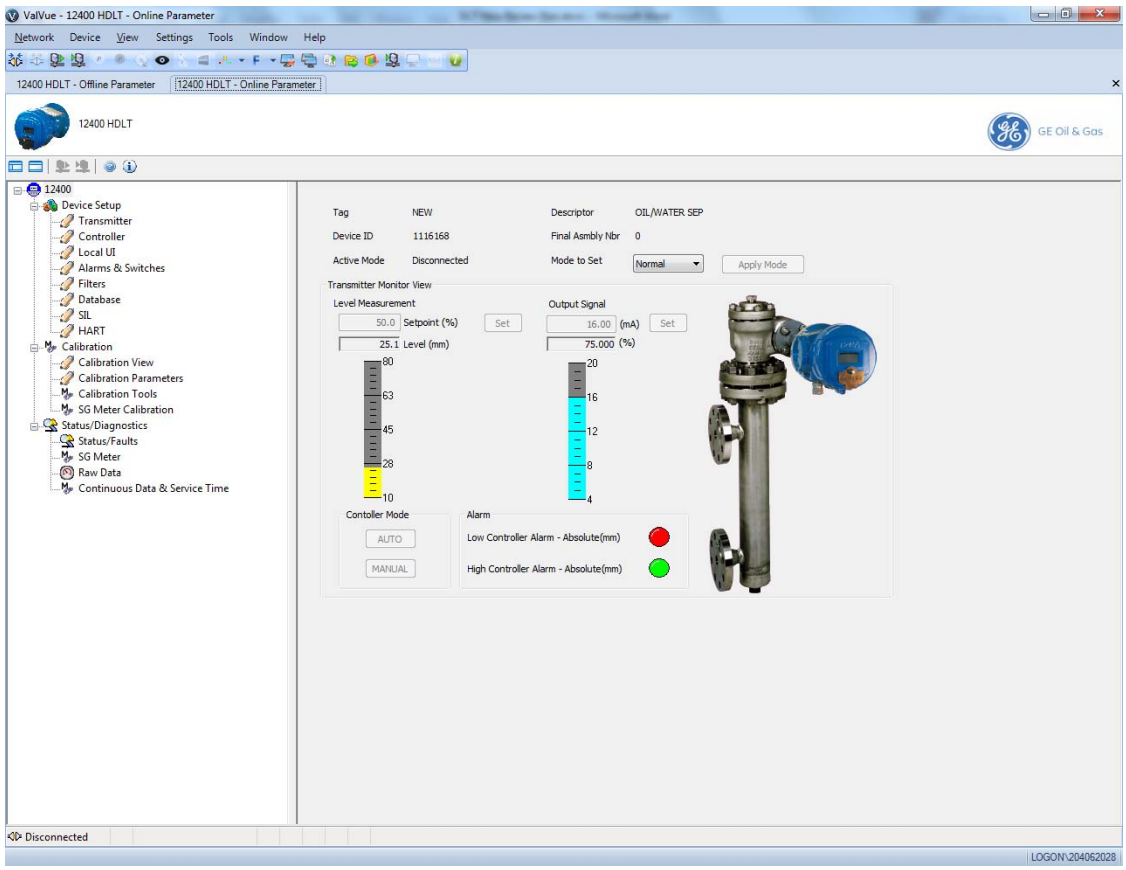


Figure 32 Transmitter Monitor View

Working in the 12400 DTM

The 12400 DTM is a typical Windows® program, with tabs, menus, dialogs, windows and toolbars. After you have successfully connected and opened the 12400 DTM the currently selected device appears in 12400's *Transmitter Monitor View* tab. You can either perform operations on the *Transmitter Monitor View* tab or select another tab to display another DTM tab. Each of the tabs and related functions are described within this Help system.

The Controller, DO switches and AO switches are options, which if not purchased will not appear on the various tabs or are grayed out.

Icon Bar

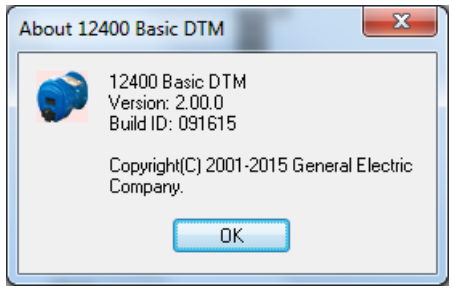
The icon bar at the top of every 12400 DTM tab has six items (Figure 33).

Figure 33 Icon Bar

Table 2 Icon Bar

Item	Description
	Toggles the 12400 DTM navigation pane off/on.
	Toggles the 12400 DTM area above the icon bar and below the *Online Parameter* and *Offline Parameter* tab labels off/on.
	Loads the data related to the active tab from the 12400 to the DTM software.
	Stores the data related to the active tab to the 12400 from the DTM software.

Table 2 Icon Bar (Continued)

Item	Description
	Opens the 12400 DTM help.
	Opens the 12400 DTM About dialog.  **Figure 34 About**

Right-Click Menu

The 12400 device level right-click menu available in the topology pane of the ValVue (Figure 35) or other FDT frames in which the 24000 DTM operates have the following 12400-specific items listed in Table 3.

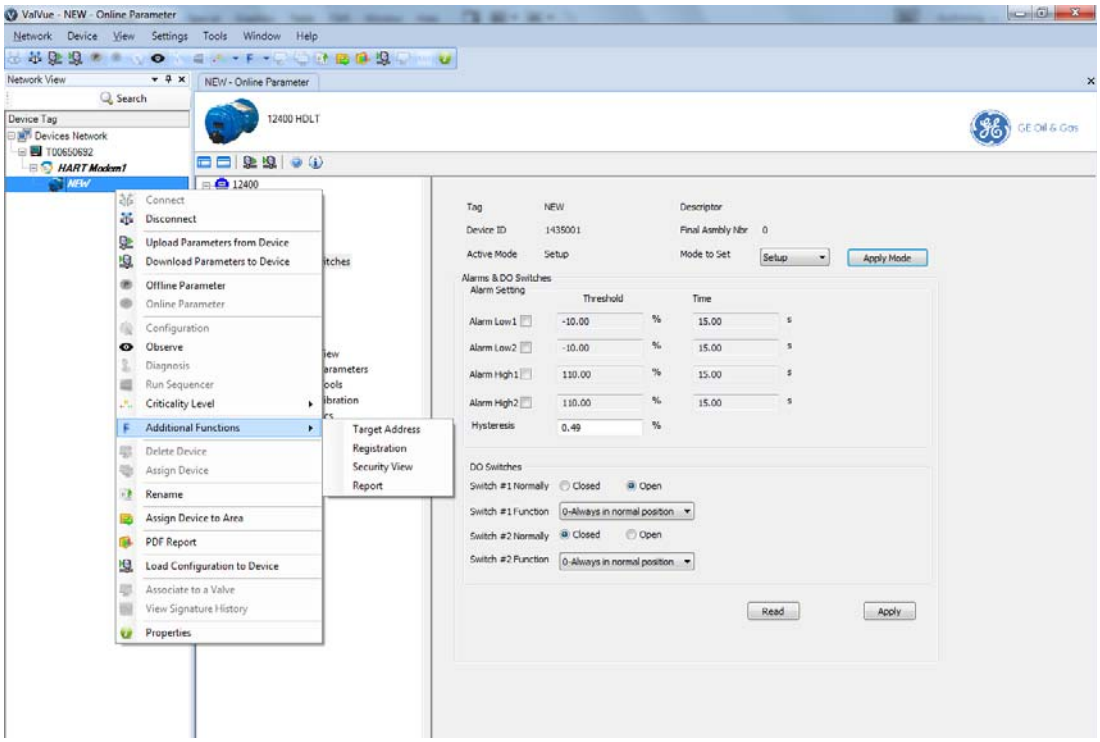


Figure 35 ValVue 3 with Topology Pane Right Click Menu

Table 3 12400 Right Click Menu Additional Items

Item	Description
Target Address	Opens the *Target Address* tab to change the 12400 polling address.
Registration	See *ValVue Licensing*.
Security View	Opens the Security View tab. See *Security View*.
Report	Opens the *HDLT 12400 Report*. See *HDLT 12400 Report*.

Security View

Use this tab to change the access levels for the various roles in the DTM. The roles are industry standard, but you can change the role's privileges. To access this tab, you must have a *Administrator* level privileges. Additionally, you can load security settings that were previously created for another 12400 ("Load Security Settings from File" on page 42) and saved into a security file (*.sec* format) and save the present settings to the default file for later use ("Save Security Settings to File" on page 42). The default file settings are represented in Figure 36. You are allowed to overwrite the default settings file. The default folder for this file is: *Windows/ProgramData/Dresser/12400 DTM/Data*.

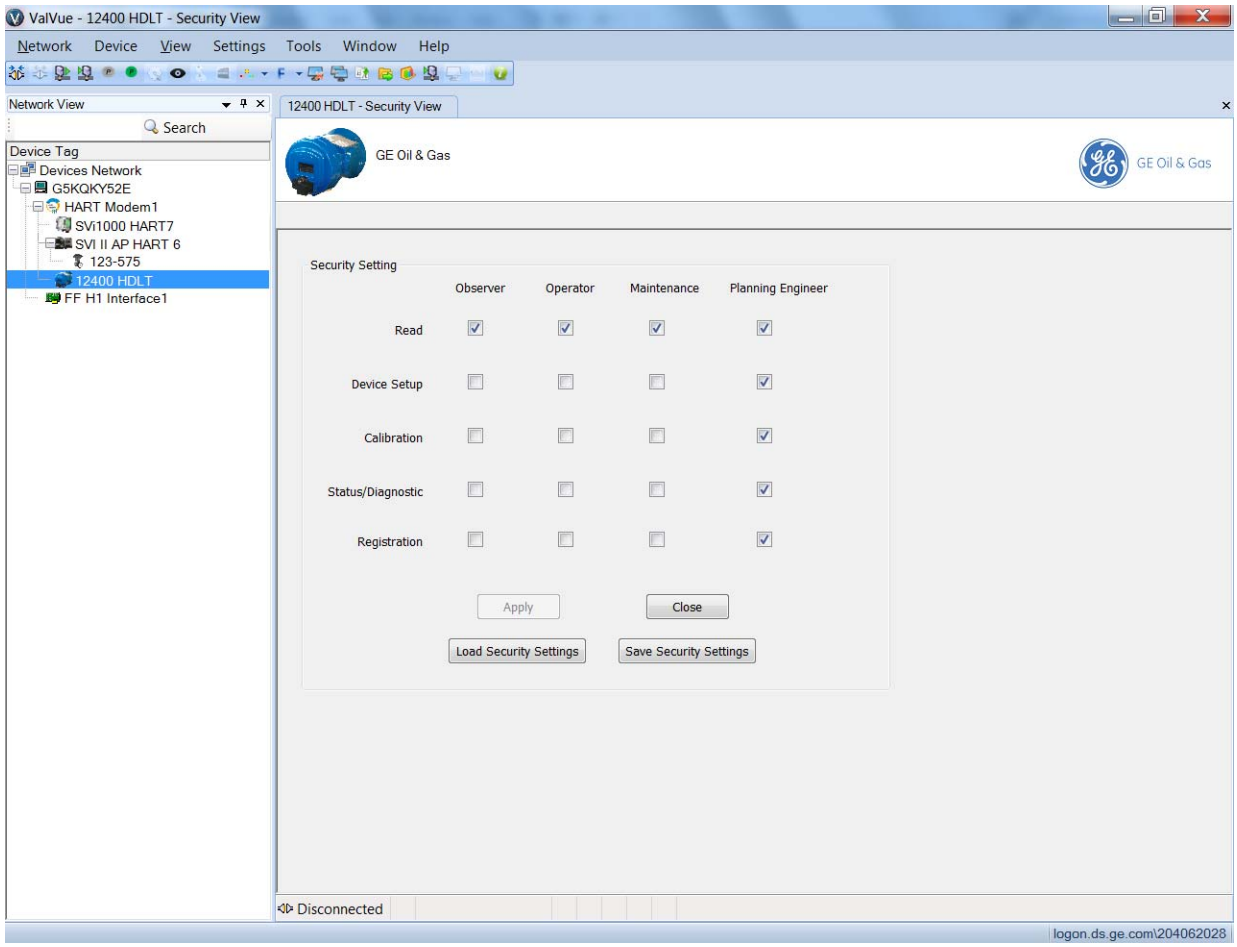


Figure 36 Security View

Change Privileges

To change privileges:

1. Change the user role's checkboxes as required.
2. Click Apply and then click Close.

Load Security Settings from File

1. Click Load Security Settings and the settings from the default file populate into the tab.
2. Change the user role's checkboxes as required.
3. Click Apply and then click Close. You must click Apply to save the settings to the transmitter even if the only changes are the ones from loading the default settings.

Save Security Settings to File

1. Click Save Security Settings and a confirmation dialog appears (Figure 37).

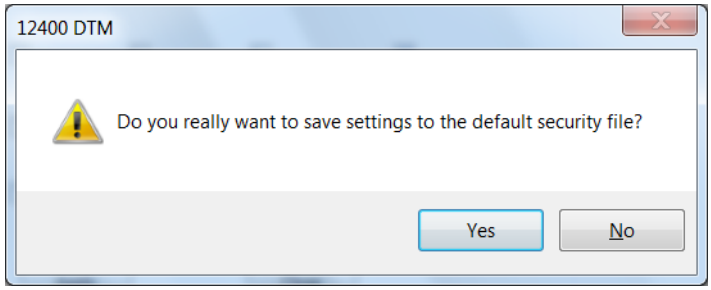
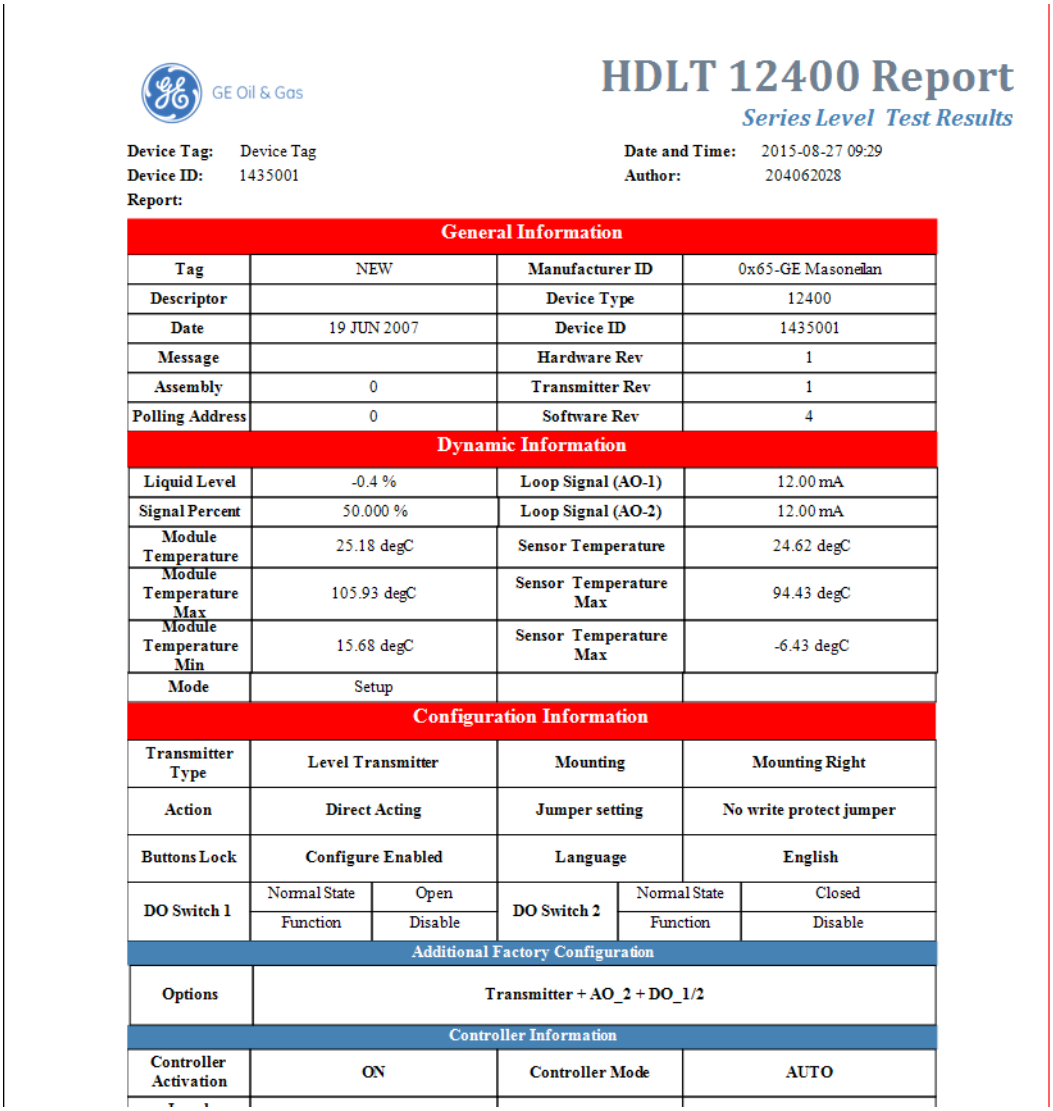


Figure 37 Save Security Settings to Default File Confirmation

2. Click Yes and the settings are saved.

HDLT 12400 Report

Use this to view a report containing *General Information* and specific configuration information. You can perform a set of tasks on this report that are described below.



GE Oil & Gas

HDLT 12400 Report

Series Level Test Results

Device Tag: Device Tag
Device ID: 1435001
Report:

Date and Time: 2015-08-27 09:29
Author: 204062028

General Information			
Tag	NEW	**Manufacturer ID**	0x65-GE Masoneilan
Descriptor		**Device Type**	12400
Date	19 JUN 2007	**Device ID**	1435001
Message		**Hardware Rev**	1
Assembly	0	**Transmitter Rev**	1
Polling Address	0	**Software Rev**	4

Dynamic Information			
Liquid Level	-0.4 %	**Loop Signal (AO-1)**	12.00 mA
Signal Percent	50.000 %	**Loop Signal (AO-2)**	12.00 mA
Module Temperature	25.18 degC	**Sensor Temperature**	24.62 degC
Module Temperature Max	105.93 degC	**Sensor Temperature Max**	94.43 degC
Module Temperature Min	15.68 degC	**Sensor Temperature Max**	-6.43 degC
Mode	Setup		

Configuration Information					
Transmitter Type	**Level Transmitter**		**Mounting**	**Mounting Right**	
Action	**Direct Acting**		**Jumper setting**	**No write protect jumper**	
Buttons Lock	**Configure Enabled**		**Language**	**English**	
DO Switch 1	Normal State	Open	**DO Switch 2**	Normal State	Closed
	Function	Disable		Function	Disable

Additional Factory Configuration	
Options	**Transmitter + AO_2 + DO_1/2**

Controller Information			
Controller Activation	**ON**	**Controller Mode**	**AUTO**

Figure 38 HDLT 12400 Report

This is in HTML format but can be exported to a pdf. This report is several pages long and contains a full snapshot of configured settings and any test results attached to the device.

The icon bar at the top contains the following functionality:

Toggle Sidebar

Opens the sidebar where you view thumbnails of each page.

Print

Prints the report to the default printer

Copy

Disabled.

Find

Opens a *Find* dialog to search the report.

Zoom

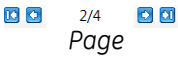
Use the left icon to zoom in, the right icon to zoom out or the presets in the pulldown list.

Fit Width /Fit Page

Use the left icon to fit to the width of the screen or the right icon to fit page to the screen size.

Page View

Use the left icon to view a single page, the center to view continuously and the right to see a grid to select a number of pages to view.



Page Navigation

Use the arrows to wither skip one page at a time or to the first or last page of the report.

Backward/ Forward

Disabled.

Refresh

Refreshes the report content. The device must be connected to refresh content.

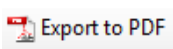
Selection Mode

Right-click to a get a menu of copy functions that include:

- *Pan Mode*: Click and drag to move the report physically around.
- *Selection Mode*: Click and drag an area to copy as text.
- *Snapshot Mode*: Click and drag an area to catch a graphic image.

Snapshot

Use to take a snapshot of a selected area.



Export to PDF

Exports the report to a selected directory.

Nameplate Area

This area (Figure 39) occurs at the top of every tab and represents the data and functions commonly required.

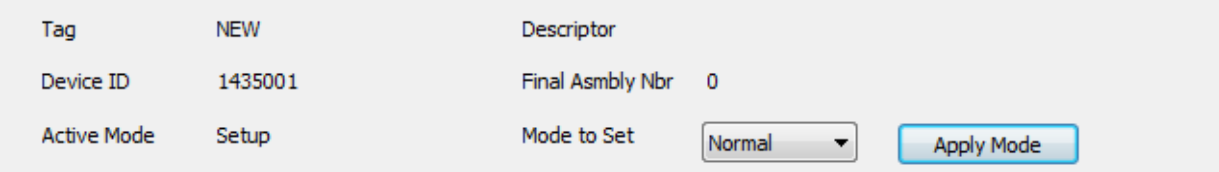


Figure 39 Nameplate Area

Items in this area include:

Table 4 Nameplate Area

Item	Description
Tag	Displays the *Tag* name. See *Transmitter General* tab for a description of the field and its modification.
Device ID	Displays the *Device ID* read from the 12400.
Active Mode	Displays the current 12400 mode. See *Modes of Operation* for a description of modes and *Apply Mode* for how to change modes.
Descriptor	Displays the *Descriptor*. See *Transmitter General* tab for a description of the field and its modification.
Final Asmbly Nbr	Displays this number that is usually factory entered. See *Transmitter General* tab for a description of the field and its modification.
Mode to Set	Use the pulldown to select the desired mode and click Apply Mode .

Modes of Operation

There are two modes of operation available for the 12400 DTM: Normal and Setup.

Normal	In Normal mode the 12400 measures the Process Variable (*PV*) and transmits the *PV* as a 4 to 20 mA signal.
Setup	In the Setup mode you can set configuration and calibration parameters, including PID parameters.

Apply Mode

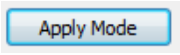
Use the *Apply Mode* button located at the bottom left of all the 12400 DTM tabs to change the 12400 operating mode. When selected, you can change the 12400 mode to either of two operating modes:

- *Normal* - In this mode the 12400 DTM measures the Process Variable (PV) and transmits the PV as a 4 to 20 mA signal. The monitor displays level detection accordingly (indicator green).
- *Setup* - In this mode you can set calibration and configuration parameters.

In addition to the two user selectable modes, there is an additional mode that is the result of internal diagnostics:

- *Failsafe* - When the 12400 cannot operate correctly the device goes into failsafe mode and remains in the failsafe mode until you intervene. In failsafe mode the output signal is either below 3.6 mA or above 20.5 mA as configured in *Calibration Tools 4 - 20 mA Calibration* fields.

To change 12400 mode:

1. Use the *Mode to Set* pulldown to select either:
   - **Setup**
   - **Normal**
2. Click 

.

5. Registration

ValVue Licensing

This section is meant to be a generic discussion of the licensing process for ValVue and Masoneilan software DTMs. In this discussion we use ValVue as an example. Dialogs that appear will differ based on the Masoneilan software is use. For example, the SVi* 1000 and 12400 DTMs have only 30 day trial periods.

Registration Process

To open the registration dialog:

- Select **Tools** > **ValVue Licensing** for ValVue.
- Select a device and then select **Additional Functions > Registration** for DTMs.

The Masoneilan ValVue Serial Number is obtained by contacting one of our channel partners or by contacting BHGE directly (software.reg@bhge.com).

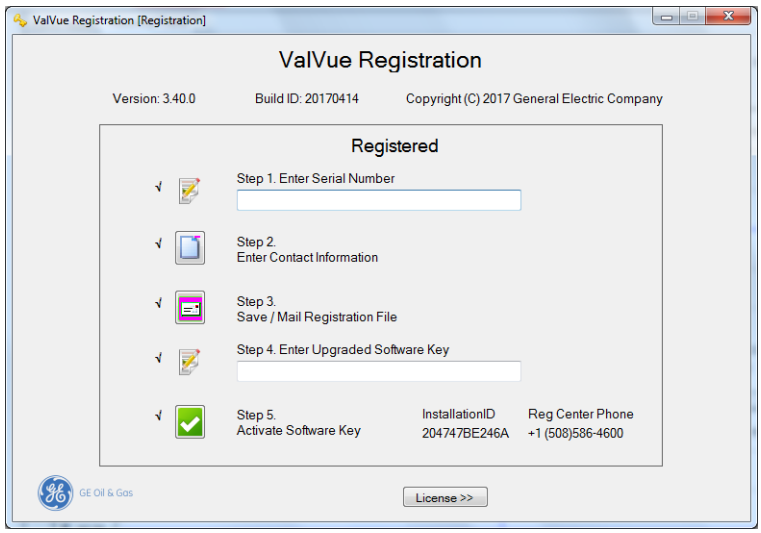


Figure 40 ValVue Registration

Use the registration dialog (Figure 40) to:

- "Register the Product" on page 48 - Required before use or at the end of the 30 day trial period.
- "Activate License" on page 50 - Required before use or at the end of the 30 day trial period.
- "Upgrade the Product" on page 51 - Upgrade the product. Contact Masoneilan to discuss upgrade features options.

Register the Product

To register the product:

1. Enter the serial number in *Step 1*. The *Serial Number* auto-fills for the *Basic Edition*.
2. Click  or click **Next** and Figure 41 appears.

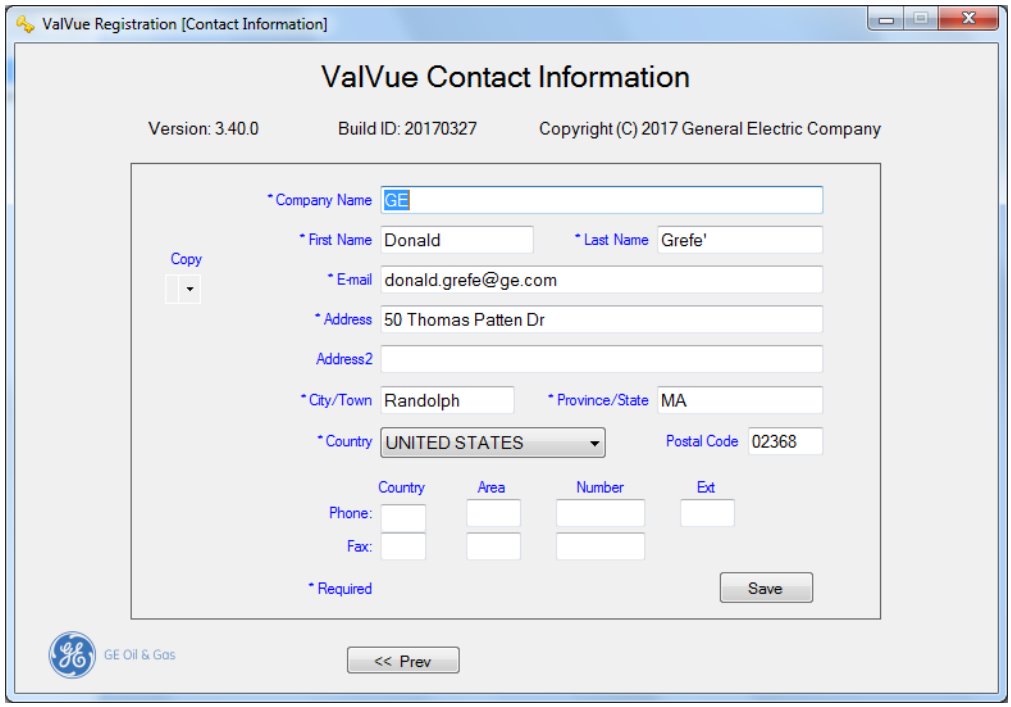


Figure 41 Contact Information

NOTE

Use the copy pulldown to import information that has been previously entered for another Masoneilan software.

3. Enter all required information, as marked by *, click Save then << Prev and click  and Figure 42 appears.

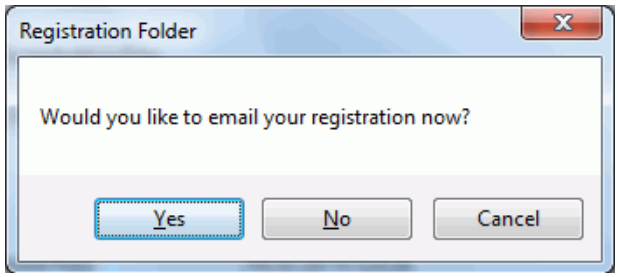


Figure 42 Email Registration

4. Ensure you have email access, click **Yes** and the registration email appears using your default email setup. The email has an *.xml* attachment containing licensing information. If sending the email fails or you wish to send from a different laptop/PC, click **No.** A dialog appears which you can use to save the file to a location for use.

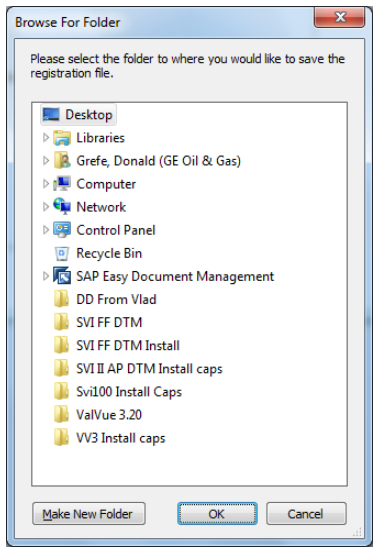


Figure 43 Browse for Folder

5. Send the email (software.reg@ge.com). A return email is sent containing the activation code. Proceed to "Activate License" on page 50.

Activate License

To activate the license:

1. Enter the emailed or channel partner acquired software key.
2. Click  and Figure 44 appears.

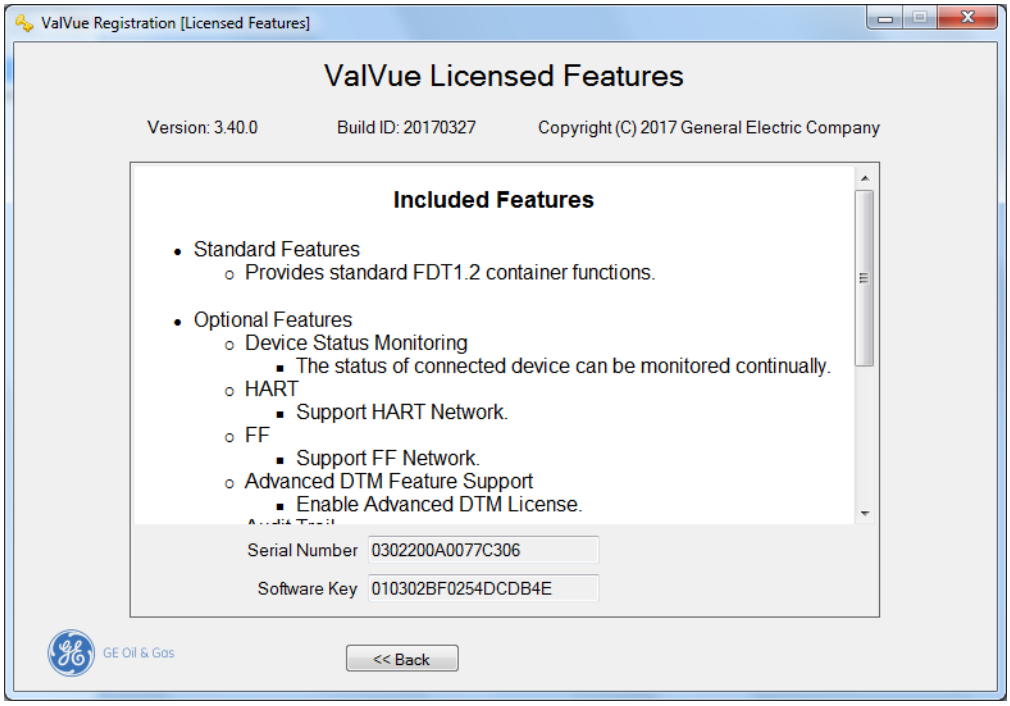


Figure 44 Included Features

3. Click **Close**.

Upgrade the Product

To upgrade:

1. Select **Tools > ValVue Licensing** and Figure 45 appears.

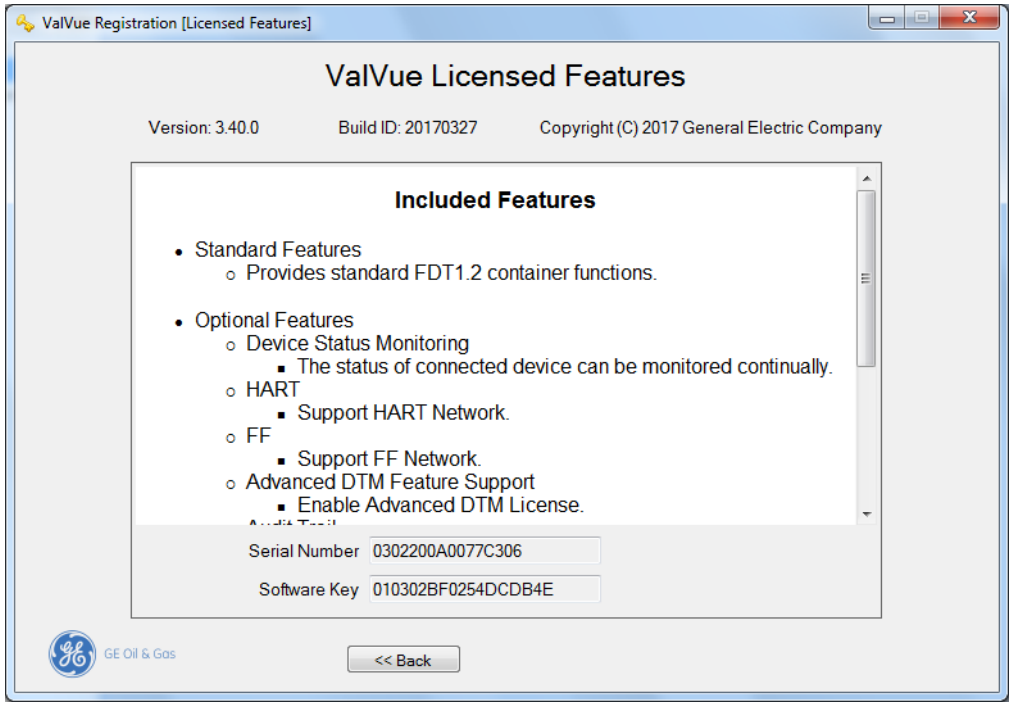


Figure 45 Included Features

2. Click 

.
3. Enter the new *License Code* provided by BHGE and click 
.

Registration During the Trial Period

The license trial period works as follows:

1. Once you download and install the ValVue software, you are granted a 30 day trial period. We strongly encourages you to register your license with us as soon as possible. During the 30 days, you have access to all the advanced features of ValVue.
2. Once the first 30 days expires, you lose the advanced features. You then have an additional 30 day period, after which you must register to continue using the product. Contact BHGE at software.reg@bhge.com.

NOTE

For DTMs (not ValVue) click:

- Register Now and follow the prompts to register, before the trial completely expires (see "Register the Product" on page 48).
- Register Later to continue use until the 30 days expires (see "Register the Product" on page 48).

The first time you open ValVue, if the product is on trial, a dialog appears.

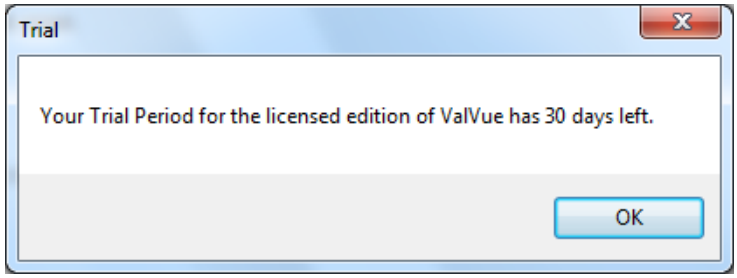


Figure 46 Trial Registration Dialog: Newly Installed

After 30 days without purchase or registration, the first time you open the DTM, Figure 47 appears.

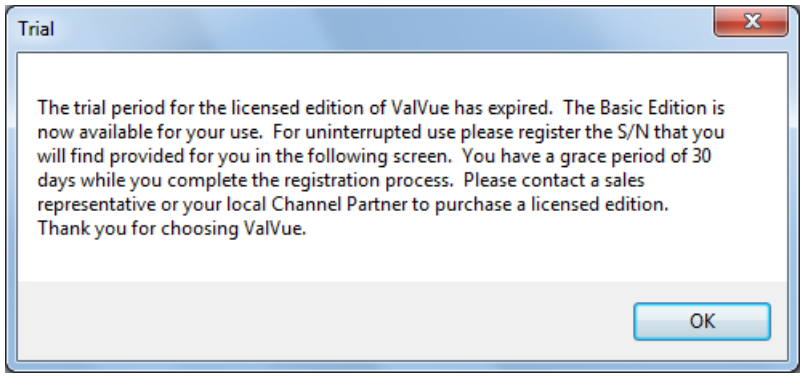


Figure 47 Advanced Features Expired

After the first time you open an expired license, and you select **Additional Functions > Registration**, Figure 48 appears. When you click **OK** the registration process starts (see “Register the Product” on page 48).

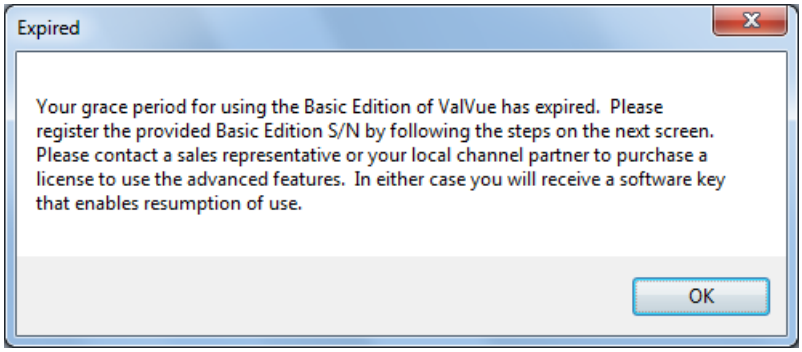


Figure 48 Ongoing Expiration

If you click anywhere in the DTM after the trial period expires, Figure 49 appears. When you click **OK**, the registration process starts (see “Register the Product” on page 48).

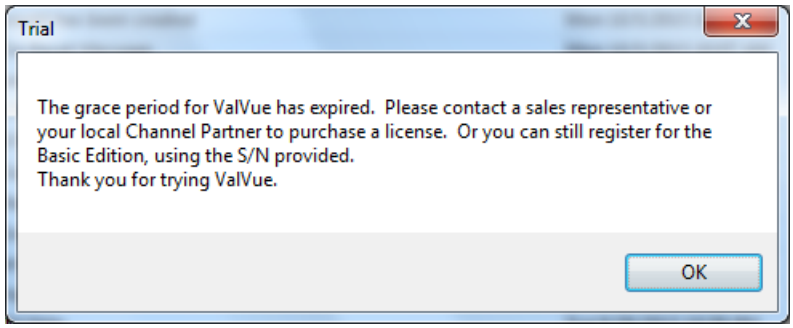


Figure 49 Trial Expired

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6. Online Parameterization

Online Parameterization

Use the online DTM UI when the device is connected to the 12400 interface. Online configuration, configuring the Transmitter/Controller while connected to the HART® loop, can include:

- Transmitter Monitor: Configuring level, output and changing the controller from Auto to Manual.
- *Device Setup*: Configuring a broad range of operational issues, including: transmitter, controller, user interface, alarms and DO switches, filters, database settings, SIL 2 status and settings, and HART® loop settings.
- *Calibration*: Configuring the 12400 calibration is the following areas: transmitter, level, loop amperage calibration and specific gravity meter.
- *Diagnostics*: Viewing characterized historical and current faults (with reset available), setting the specific gravity meter as a diagnostic tool, viewing raw data, viewing continuous and service time data (with reset available).

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7. Offline Parameterization

Offline Parameterization

Use the offline DTM UI when the device is not connected to the 12400 interface or when you don't want immediately work with an online device, such as:

- Device Setup: Configuring a broad range of operational issues, including: transmitter, user interface, alarms and DO switches, filters, database settings, SIL 2 status and settings, and HART® loop settings.
- Calibration: Configuring the 12400 calibration is the following areas: transmitter, level, loop amperage calibration and specific gravity meter.

Once complete, the changed settings must be downloaded to the 12400 for use.

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8. Transmitter Monitor View

Transmitter Monitor View

Use the *Transmitter Monitor View* tab to:

- Manipulate and study the effects of changes to the *Level Measurement* setpoint.
- Manipulate and study the effect of changes to the current *Output*.
- Change the Controller Mode between *Auto* and *Manual* and view the status of the *Low* and *High Controller Alarm* configured using the *Alarm* fields on the *Controller Setup* tab.

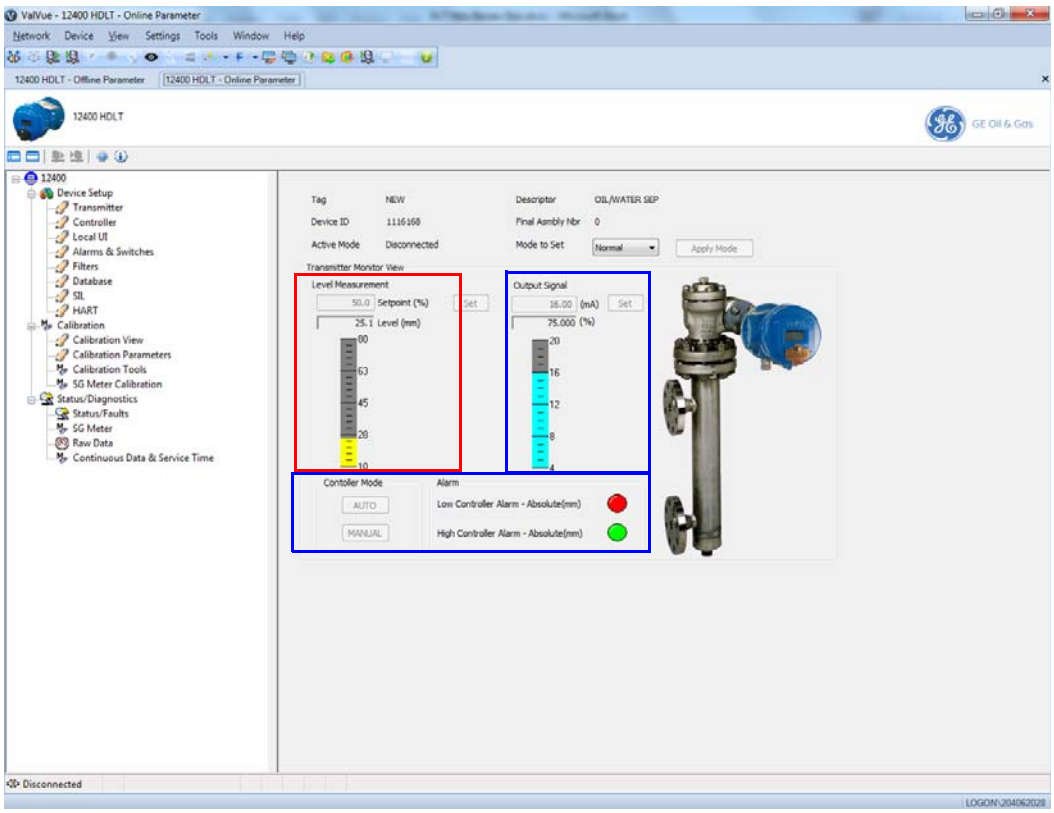

Figure 50 Transmitter Monitor View

The items visible on this tab vary in accordance with the items that you have purchased:

- *Transmitter* mode: These items (red box in Figure 50) are standard.
- *Controller* mode: This item is purchasable as on option (blue box). If the option is not purchased it does not appear on this tab or on the *Transmitter General* tab. The 12410 model Level Controller is a Level measurement instrument which includes a built-in PID controller function to directly and locally control a level control loop. It has been specifically designed to retrofit pneumatic level control loops or enable an easy and cost-effective solution to perform a local and independent level control loop.

Buttons and Fields

Level Measurement	Use this section of the *Transmitter Monitor View* tab to manipulate the level of the setpoint.
Setpoint	Use this field while in *Setup* mode to enter a new setpoint and implement by clicking Set. See *Change Level Measurement*.
Level	Displays the level in the selected engineering units.
Level Measurement Bargraph	Displays the level graphically in the bargraph. The units for the fields are set on the *Calibration Parameters* tab.
Output	
	Use this field when the controller is in *Manual* and the 12400 in *Setup* mode to enter a new current output and implement by clicking Set. See *Change Controller Output*. Clicking **Manual** automatically move the 12400 into *Setup* mode. Displays the current level in the selected engineering units.
Output Signal Bargraph	Displays the level graphically in the bargraph.
Controller Mode	
AUTO *Auto*	Click this button to change the controller mode to automatic. This is the same as Normal mode as determined when using *Apply Mode*.
MANUAL *Manual*	Click this button to change the controller mode to manual. While in *Manual* the *Level Measurement* fields are inactive. This is the same as *Setup* mode as determined when using *Apply Mode*.
Alarm	
Low Controller Alarm/ High Controller Alarm	The LED can be: - Green to indicate that the controller current is within range. - Red to indicate the controller current is out of range and needs adjustment.

Change Controller Output

1. Click MANUAL and the field below **Output Signal** activates and the 12400 moves to *Setup* mode.
2. Enter a value in the field and click Set.
3. Complete your work and click AUTO to return to automatic operation.

Change Level Measurement

1. Click AUTO and the field below **Setpoint** activates and the 12400 moves to *Normal* mode.
2. Enter a value in the field or use the pointer and drag to a new position and click Set.

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9. Device Setup

Device Setup

Use this series of tabs to:

- Setup the 12400 transmitter configuration (See *Transmitter General*).
- Setup the controller characteristics for setpoint, alarms and tuning values (See *Controller Setup*).
- Enable/disable the local user interface (See *Local User Interface*).
- Configure alarm and digital output switch settings (See *Alarms & Switches*).
- Perform Autotune and configure a smart filter for sensor noise and set a damping on the output current (See *Filters*).
- Configure displacer and torque tube physical characteristics (See *Configuration Database*).
- Enable SIL2 for the 12400 (See *SIL2*).
- Configure HART® settings and enable/disable the burst mode and set the burst mode type (*HART® Information*).

Transmitter General

Use this tab to setup:

- Nameplate data: *Tag*, *Descriptor*, *Message*, *Date*, etc.
- Configure *Transmitter Mode, Action* and *Mounting*.
- Activate the *Controller* feature and set the *Torque Tube Compensation* characteristic.

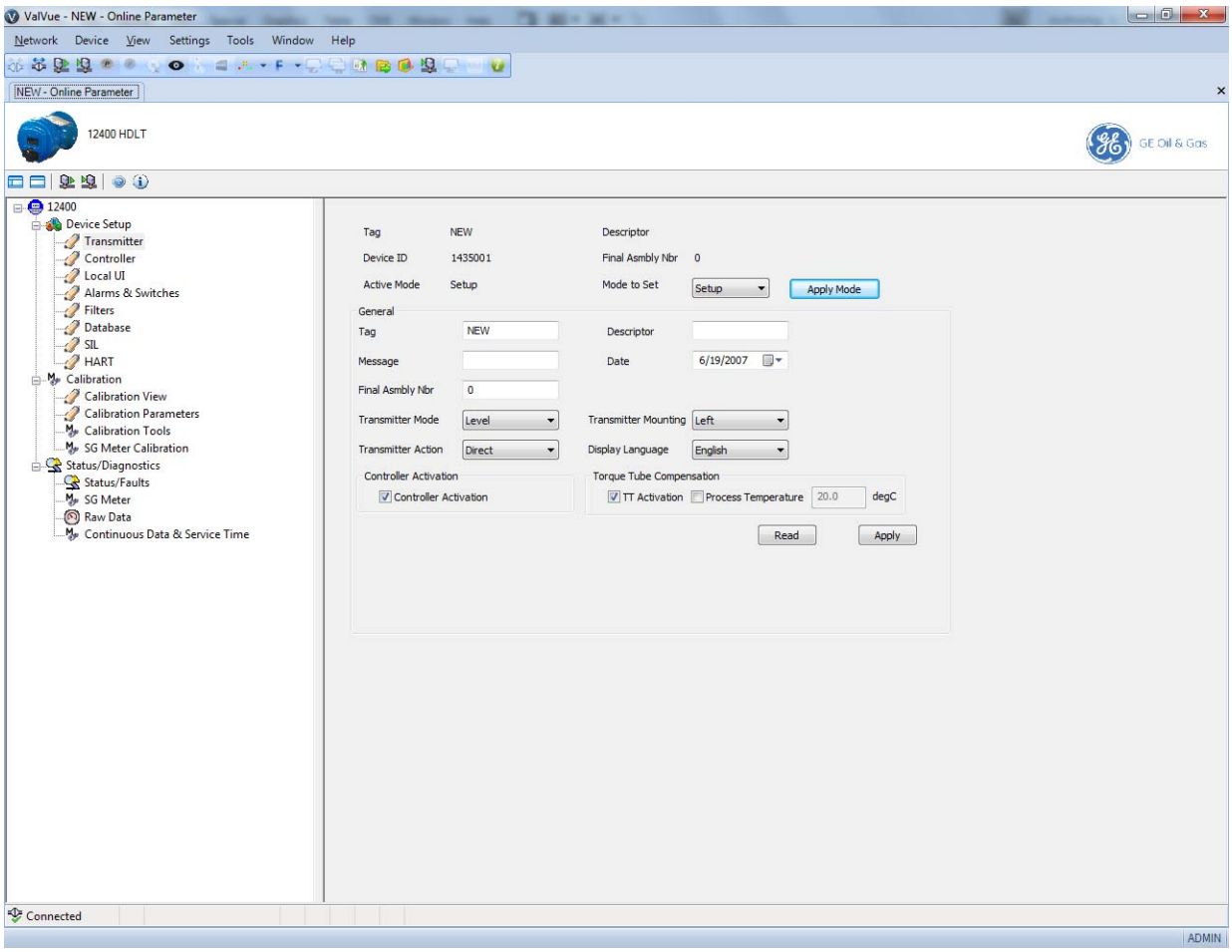


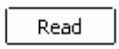
Figure 51 Transmitter

NOTE

Consult both device nameplates and the 12400 Instruction Manual (GEA19367) for a complete description of the nameplates.

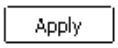
Buttons and Fields

Tag	Enter a unique name of up to eight characters that include letters, numerals, and punctuation. The lower case letters are converted to UPPER CASE. The following are invalid characters: ` { | } ~ A recommended use is for a unique label related to the plant that correlates to the field device on a control system plant drawing. The *Tag* is used during HART® communications.
Message	Enter up to 32 characters for a message related to the 12400.
Final Asmbly Number	Entered at the factory. Usually not changed.
Descriptor	Enter up to 16 characters of user-defined text.
Date	Enter a date related to the device, such as the install date. The format for *Date* input must be DD/MM/YYYY, for example 25/11/15 or use the popup calendar.
Transmitter Mode	Use this pulldown to set for the transmitter to work strictly as a level transmitter to interface with a computer remotely. Select either: ☐ *Level*: Sets it so that the system uses the level of the liquid as the basis for operation. ☐ *Interface*: Sets it so that the system looks for the difference in the specific gravity between two liquids in the vessel as the basis for operation.
Transmitter Action	Use the pulldown to choose either *Direct* or *Reverse*. The 12400 can be operated to transmit either direct (current increases when level increases) or reversed (current decreases when level increases).
Transmitter Mounting	Use the pulldown to either *Left Mounted* or *Right Mounted*. The 12400 can be mounted on either the left or the right side of the torque tube. This field is mainly for informational purposes and does not impact operation.
Display Language	Use this pulldown to select the LCD display language: *English, French, Spanish, Portuguese, Japanese, Italian* and *German*.
Controller Activation	Click the checkbox to activate the controller feature, if installed. See *Setting Controller Activation*.
Torque Tube Compensation	Us this area to select the type of compensation for use by the system: ☐ *TT Activation*: Click this to activate torque tube compensation for use by the software. ☐ *Process Temperature*: Click this in addition if you want the process to target a specific temperature and enter the temperature in the field. See *Setting Torque Tube Compensation*.



Read

Loads the data related to the active tab from the 12400 to the DTM software.



Apply

Stores the data related to the active tab to the 12400 from the DTM software.

Setting Controller Activation

1. Change to *Setup* mode.
2. Click **Controller Activation**.
3. Click Apply to apply changes from this tab to the 12400.

Setting Torque Tube Compensation

1. Change to *Setup* mode.
2. Click **TT Activation**.
3. Click **Process Temperature** and enter degrees in the field to the right, if required.
4. Click Apply to apply changes from this tab to the 12400.

Controller Setup

Use this tab to:

- Configure the setpoint ranges and units and enable setpoint tracking.
- Set PID parameters to tune 12400 operations.
- Configure basic controller action and controller tuning issues.
- Set controller alarms and alarm type.

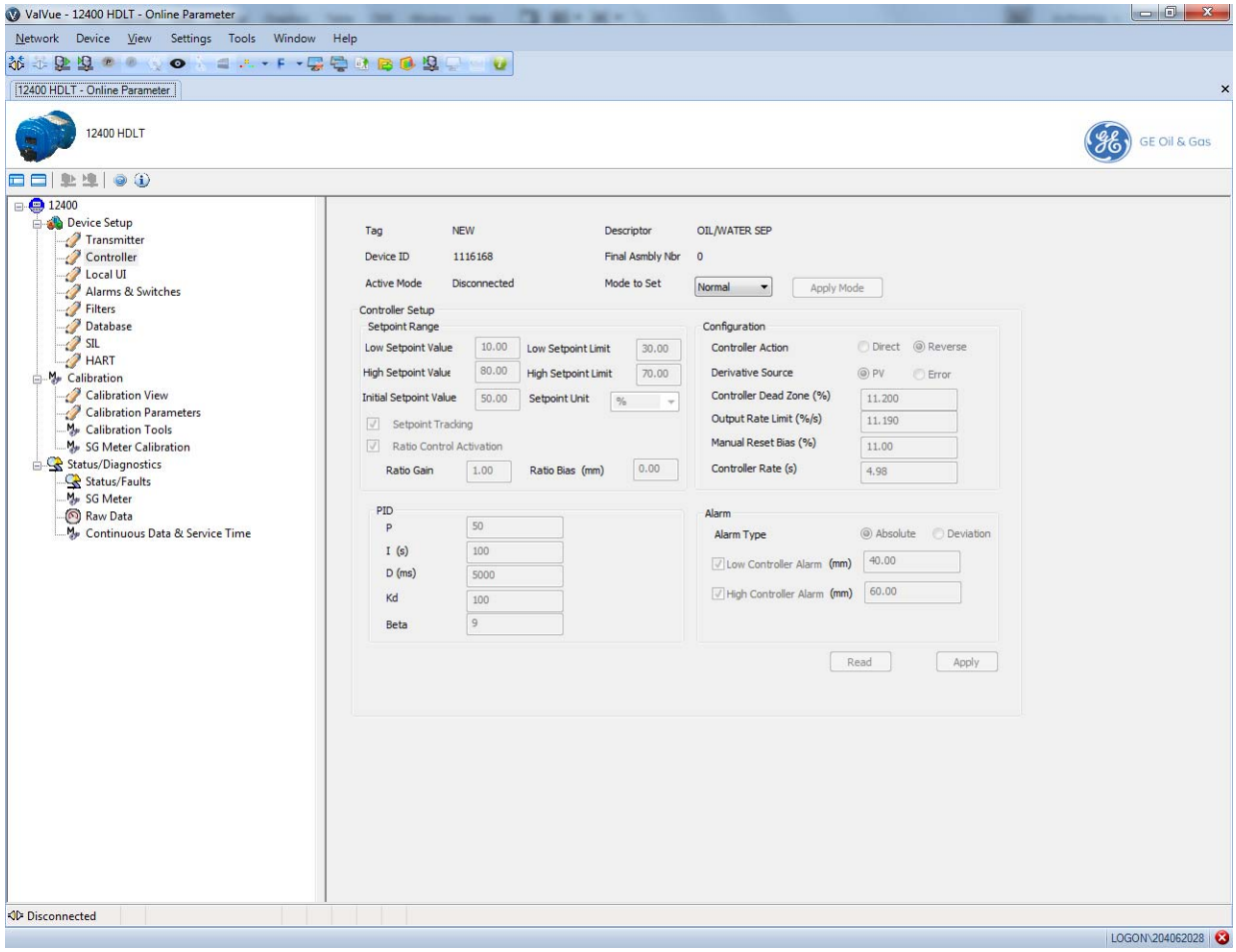


Figure 52 Controller Setup

Buttons and Fields

Low Setpoint Value	Enter the desired lowest controller setpoint value. The value can fall below this as in *Low Setpoint Limit*. This limit must be within 10% of the *Lower Controller Alarm* value.
High Setpoint Value	Enter the desired highest controller setpoint value. The value can go above this as in *High Setpoint Limit*. This limit must be within 10% of the *Higher Controller Alarm* value.
Initial Setpoint Value	Enter the value for the power up controller setpoint.
Low Setpoint Limit	Enter the lowest allowable controller setpoint value.
High Setpoint Limit	Enter the highest allowable controller setpoint value.
Setpoint Unit	Use the pulldown to select the unit for use in the program: ☐ *%* ☐ *mm* ☐ *cm* ☐ *m* ☐ *liter* ☐ *m3* ☐ *inch* ☐ *feet* ☐ *Cu-in* ☐ *Cu-ft* ☐ *kg* ☐ *g* ☐ *pound* If the setpoint units do not match the level units, the *Ratio Control Activation* automatically activates.
Setpoint Tracking	Click to enable setpoint tracking. When enabled, if the controller is changed from manual mode to normal mode, the setpoint is set equal to the current process variable.
Ratio Control Activation	Self-enables when setpoint and level engineering units do not match to have the program perform calculations to compensate.
Ratio Gain	Enter the gain coefficient to convert controller setpoint process variable units.
Ratio Bias	Enter the bias coefficient to convert controller setpoint process variable units.

PID	Use these fields to set the PID parameters. This is for Controller-enabled versions only.
P	P is a dimensionless gain factor related to the proportioning action of the algorithm. It ranges from 0 to 50.
I (s)	Integral time or reset time, is the time constant of integral control. Higher values of I cause slower integral action. Common values are 0 to 100 (10 seconds). A value of zero disables integral action.
D (ms)	Derivative time or rate time is the time constant of derivative control expressed in msec. A value of zero disables derivative action. Units: milliseconds. It ranges from 0 to 5000
K_d	Differential gain used in PID controller for position. It ranges from 0 to 100.
Beta	Beta is a nonlinear dimensionless gain factor, ranging from -9 to 9. When beta is 0, the controller gain is linear. Otherwise the gain is the function of error. The larger the beta, the smaller the gain for small error.
Configura-tion	
Controller Action	
Controller Action	Click either: *Direct* or *Reverse*.
Derivative Source	Click either: *PV*: To set the software to use the process variable value *Error:* To set the software to use an error value as determined by: PV1 - PV2; where PV1 is the previous process variable and PV2 is the most current process variable.
Controller Dead Zone (%)	Enter the percentage for the control dead zone.
Output Rate Limit (%/s)	Enter a value to limit the controller output rate.
Manual Reset Bias (%)	Enter the percentage for the controller bias during a reset.
Controller Rate (s)	Enter the value for the time before running the process controller
Alarm	
Alarm Type	

Alarm Type	Click either: ☐ *Absolute*: Determines that alarming is performed when the difference between the *Low Setpoint Value* and the *Low Controller Alarm* value is exceeded or the *High Setpoint Value* and the *High Controller Alarm* value is exceeded. ☐ *Deviation*: Determines that alarming is performed when the difference between the *Low Setpoint Value* and the *Low Controller Alarm* is exceeded or the *High Setpoint Value* and the *High Controller Alarm* value is exceeded using a deviation calculation.
Low Controller Alarm (&)/ High Controller Alarm (&)	Click the checkbox and enter a value for the appropriate level (s). These limits must be within 10% of the *High Setpoint* value *and High Setpoint* value, respectively.
Read *Read*	Loads the data related to the active tab from the 12400 to the DTM software.
Apply *Apply*	Stores the data related to the active tab to the 12400 from the DTM software.

Error Messages

If you set a value outside of acceptable ranges, an error message appears:

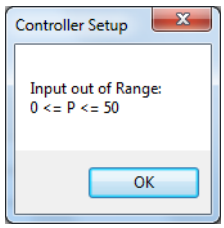


Figure 53 Controller Setup Error Message

Local User Interface

Use this tab to lock/unlock the pushbutton interface for use. You only have access to this tab as per how user permissions are configured by role on the *Security View* tab accessed in the *Right-Click Menu*).

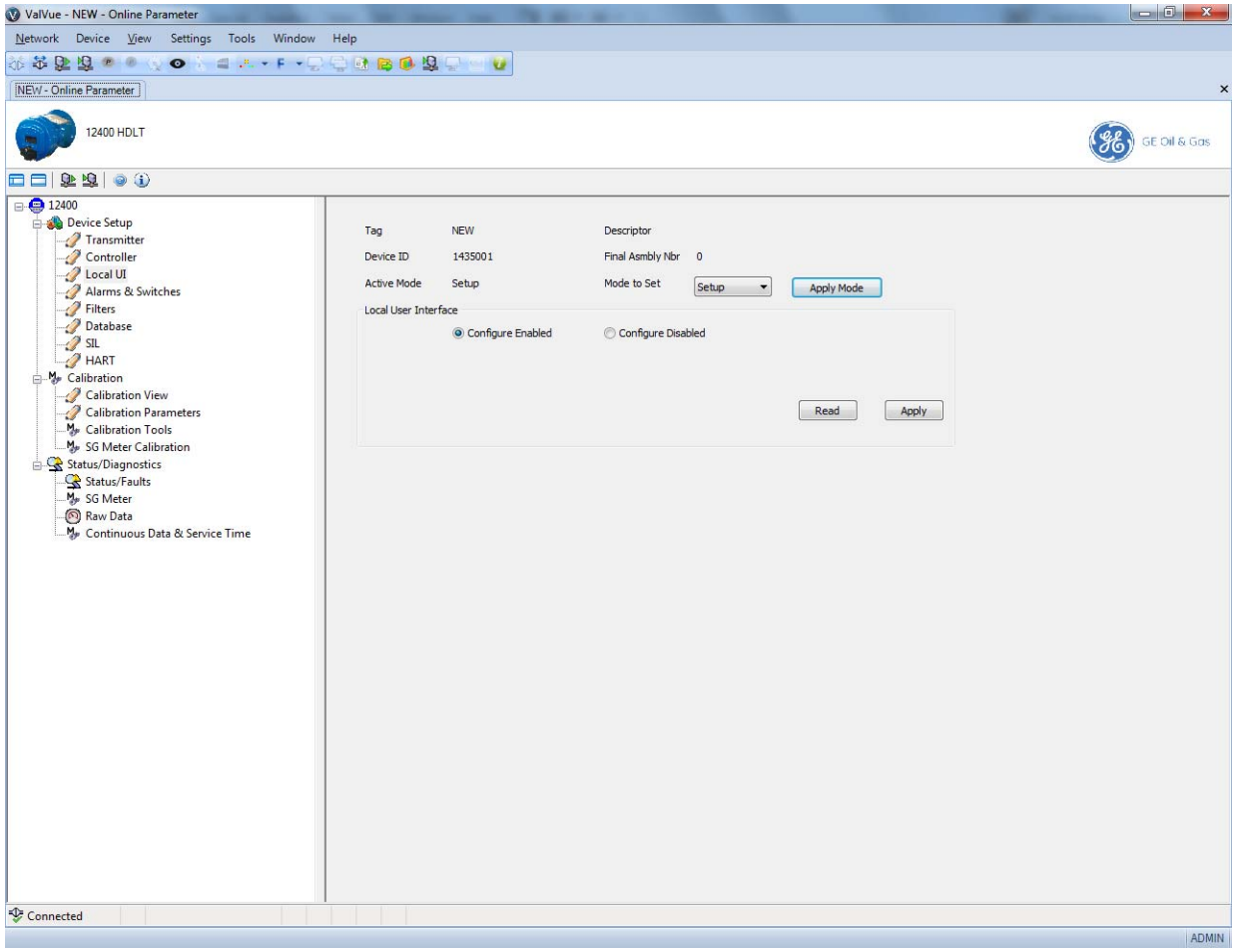
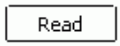
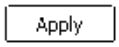


Figure 54 Local UI

Buttons and Fields

Local User Interface	
Configure Enabled/ Configure Disabled	Use these radio buttons to set access control to the 12400 through the *Local User Interface:* ☐ *Configure Enabled* - allows 12400 control through LCD display and local buttons ☐ *Configure Disabled* - prevents a local user from writing any changes made through 12400.
 *Read*	Loads the data related to the active tab from the 12400 to the DTM software.
 *Apply*	Stores the data related to the active tab to the 12400 from the DTM software.

Alarms & Switches

Use this tab to perform two major tasks:

- Define conditions for when an alarm is triggered. There are two alarms available, with a high low value setting for each alarm and a hysteresis value. Alarms occur when the level falls outside of the configured ranges.
- Define the normally open/closed state for the DO switches and set their triggering condition. See *Configure DO Switches*.

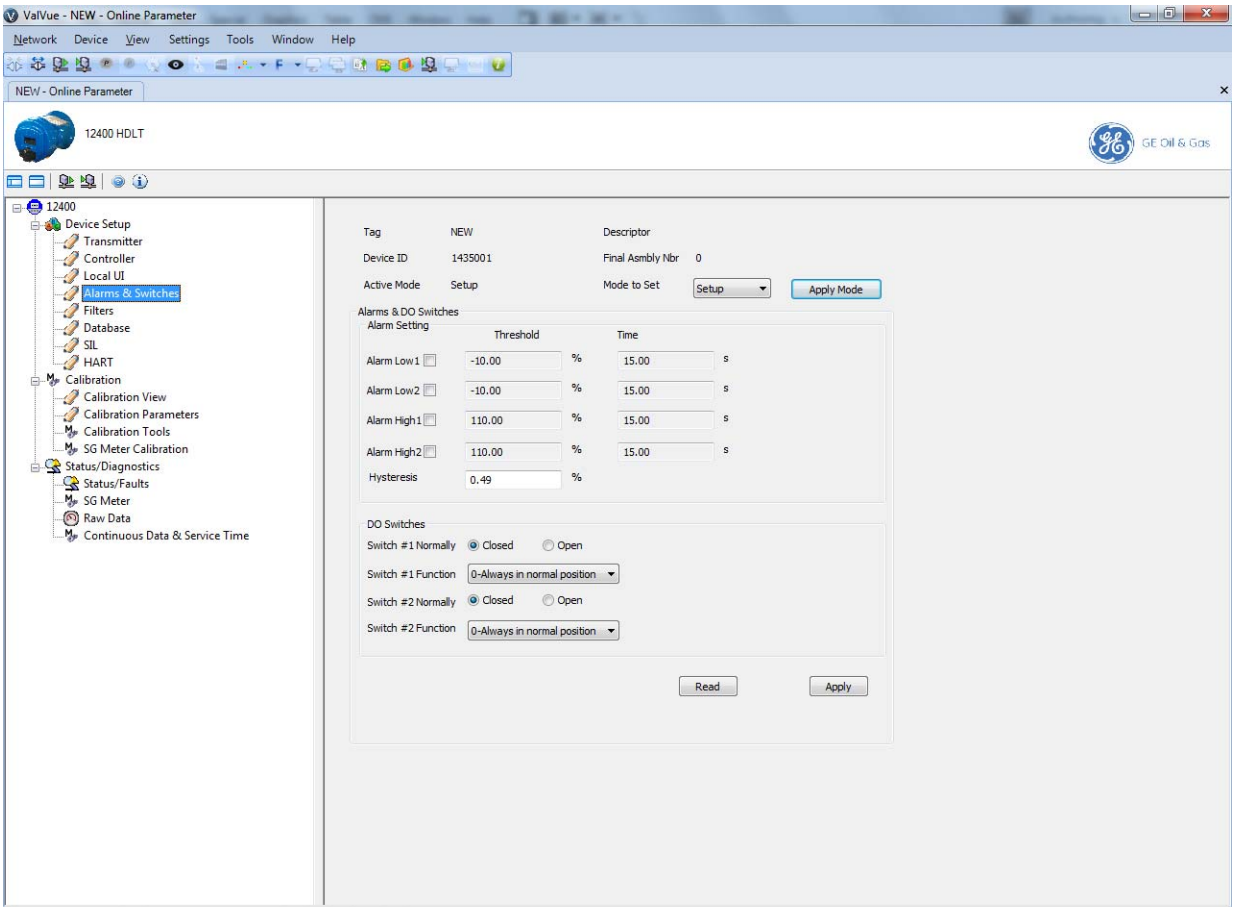
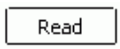
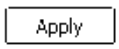


Figure 55 Alarms and Switches

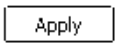
Buttons and Fields

Alarm Setting	
Alarm Low1 and 2/Alarm High 1 and 2	Use the checkbox associated with an alarm to activate it.
Threshold	Enter the required low or high value

Time	Enter a duration after which an alarm is set if it is outside the threshold or it resets if it is inside the threshold.
Hysteresis	Enter and alarm threshold hysteresis as a percentage of level range. This applies to all of the alarms.
DO Switches	
Switch #1 Normally/ Switch #2 Normally	Click **Closed** to set the switch as closed normally and **Open** to set it to open normally.
Switch #1 Function/ Switch #2 Function	Choose one of the pre-defined switch triggers. See *DO Switches*.
 *Read*	Loads the data related to the active tab from the 12400 to the DTM software.
 *Apply*	Stores the data related to the active tab to the 12400 from the DTM software.

Change Alarm Settings

To change settings:

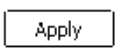
1. Place the 12400 in *Setup* mode.
2. Enable an alarm by clicking the checkbox, located to the right of the alarm name.
3. Enter the alarm *Threshold* and *Time* values.
4. Click  to apply changes from this tab to the 12400.

   If the *Alarm Low* time is less than one second, or greater than 600 seconds, the 12400 DTM displays a red exclamation point (**!**) next to an invalid entry.

   If the *Alarm Low Threshold* + *Hysteresis* is greater than *Alarm High Threshold*, the 12400 DTM displays a red exclamation point (**!**) next to an invalid entry.

Set Hysteresis

You can adjust the hysteresis value for alarms. To change the *Hysteresis*:

1. Place the 12400 in *Setup* mode.
2. Enter the new *Hysteresis* value.
3. Click  to apply changes from this tab to the 12400.

   If you enter an Alarm Hysteresis value less than 0.49% or greater than 50%, a red exclamation point (**!**) appears next to an invalid entry.

DO Switches

The 12400 supports two identical contact outputs which can be logically linked to status bits. The two output switches can be opened or closed in response to conditions that the 12400 detects. These conditions are:

Always In Normal Position - the switch is not controlled by the 12400 and remains in it's default position.

Failsafe - the switch is activated when the 12400 is in failsafe mode.

Reset - the switch is activated whenever a reset has occurred and the switch remains activated until the 12400 status is cleared.

Not Normal Mode- the switch is activated whenever operating mode is anything but Normal.

Time Working - the switch is activated only for 12400 working time.

Low Level_1 - the switch is activated whenever the 12400 detects the low level of this switch control.

Low Level_2 - the switch is activated whenever the 12400 detects the low level of this switch control.

High Level_1 - the switch is activated whenever the 12400 detects the high level of this switch control.

High Level_2 **-** the switch is activated whenever the 12400 detects the high level of this switch control.

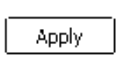
Fault Detected - the switch is activated whenever a fault is detected.

Local UI Off - the switch is activated whenever the local UI is Off.

The switch can be configured to default as normally open or normally closed.

Configure DO Switches

To configure the *DO Switches*:

1. Place the 12400 in *Setup* mode.
2. Select if the switch is normally closed or open by clicking the associated radio button.
3. Use the drop down list to select the function, as listed above.
4. Click 

to apply changes from this tab to the 12400.

   The newly selected switch function appears in the switch field.

Filters

Use this tab to:

- Run Autotune.
- Filter the output of the Hall effect sensor before the signal is digitally processed.

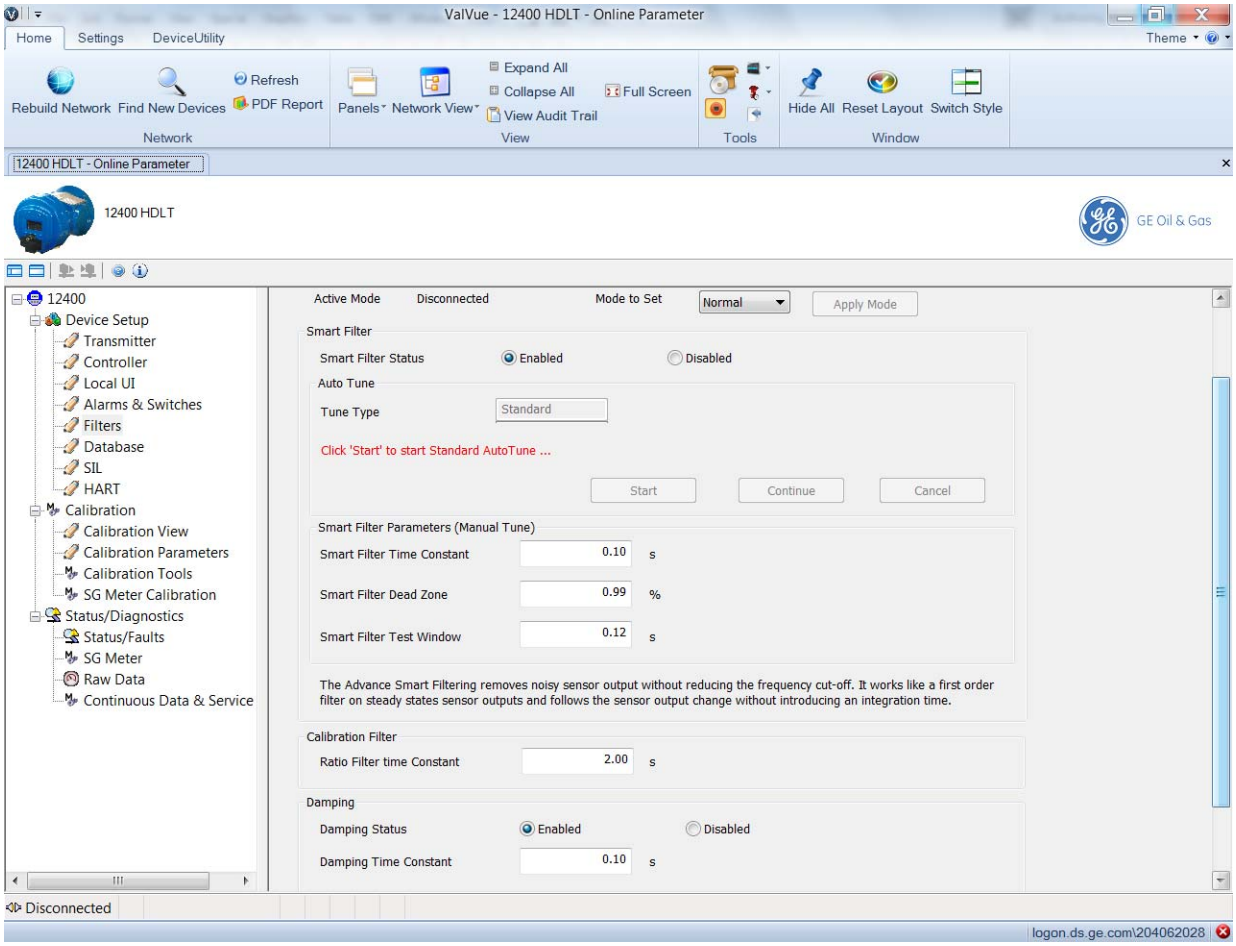
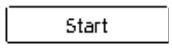
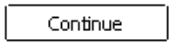
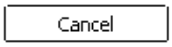
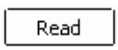
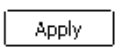


Figure 56 Filters

Buttons and Fields

Smart Filter	The *Smart Filter* eliminates noise from the Hall effect sensor output.
Smart Filter Status	Click **Enabled** to the activate the *Smart Filter*. This enables the fields below.
Auto Tune	Use this to run autotune as it relates only to Smart Filter operations.
Tune Type	Use the pulldown to select the type: - *Standard*

 *Start*	Starts the *Auto Tune* as selected in the *Tune Type*.
 *Continue*	Click as the software directs to step thought the Auto Tune.
 *Cancel*	Cancels the *Auto Tune* and returns the system to the previous tune values.
Smart Filter Parameters (Manual Tune)	Use these parameters to remove noisy sensor output without reducing the frequency cut-off. It works like a first order filter on steady state sensor outputs and follows the sensor output change without introducing an integration time. *The overall Smart Filter functionality is for use by only highly qualified personnel qualified.*
Smart Filter Time Constant	Enter a constant that works like a first order filter with a T 63%, expressed in seconds and scaled between 0.10 and 60 seconds. This is a cutoff time below which variations are not reported.
Smart Filter Dead Zone	Use this value to create a dead zone based on the process waves noise and amplitude. It is expressed in percentage of the transmitter signal and is scaled between 0.01 and 100%.
Smart Filter Test Window	Use this field to enter a value after which, if the test window has expired, and the signal remains outside of the *Smart Filter Dead Zone* for the time in the *Smart Filter Time Constant*, then the smoothing calculation starts after this time passes. Range: 0.06 sec to 60.00 sec. This is the time window for which the Smart Filter *Dead Zone* is effective.
Calibration Filter Ratio Filter Time Constant	Use this field to enter a value that configures the Smart Filter. A low value allows a broader range and a higher value in seconds configures for a smaller range of frequencies allowed by the filter. Range: 0.10 and 60.00 seconds
Damping	*Damping* is an output current filtering. This filters circuitry noise and eliminates upper frequency output and can compensate for fluid turbulence.
Damping Status	Use the radio buttons to enable/disable the *Damping* function.
Damping Time Constant	Enter a value in *Damping Time Constant*, which corresponds to T63 for a first order filter. Range: 0.10 sec to 60.00 secs.
 *Read*	Loads the data related to the active tab from the 12400 to the DTM software.
 *Apply*	Stores the data related to the active tab to the 12400 from the DTM software.

Damping

To change the *Damping*:

1. Place the system in *Setup* mode.
2. Click the **Enabled** radio button.
3. Enter a new *Damping Time Constant*, click Apply to apply changes from this tab to the 12400. A red exclamation point (**!**) appears next to an invalid entry.

Auto Tune

1. Place the 12400 in *Setup* mode.
2. Select the **Tune Type** using the pulldown.
3. Click Start and then click Continue to start the selected *Auto Tune*.

   The *Auto Tune* completes.
4. Click Apply to apply changes from this tab to the 12400.

Smart Filter Parameters

1. Place the system in *Setup* mode.
2. Edit the filter fields as required. A red exclamation point (**!**) appears next to an invalid entry.
3. Click Apply to apply changes from this tab to the 12400.

Configuration Database

Use the *Database* tab to specify the *Displacer* and *Torque Tube and Chamber* parameters.

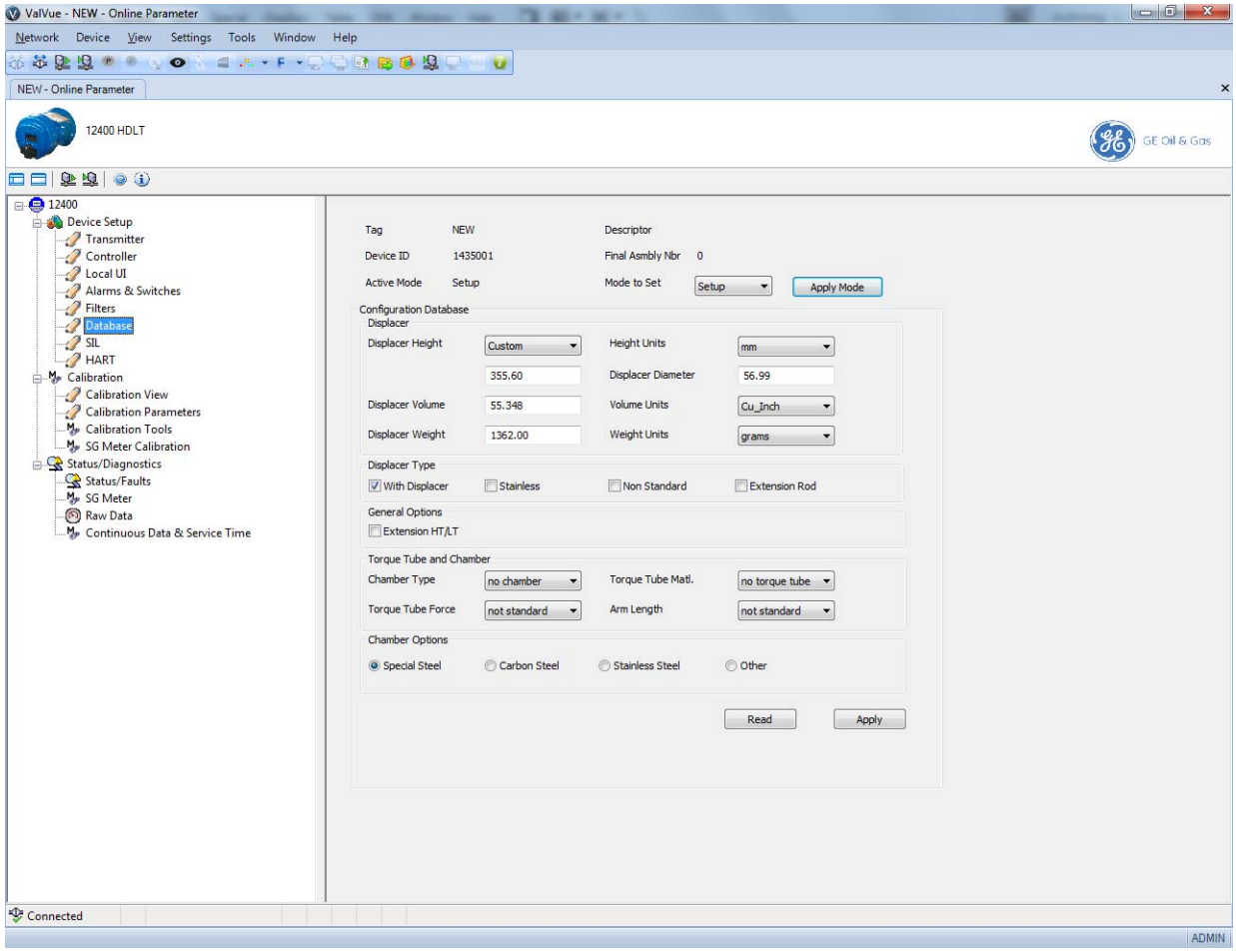


Figure 57 Configuration Database

Buttons and Fields

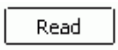
Displacer

Displacer Height — Use the drop down list to choose a height in inches (mm): *14" (356), 32" (813), 48" (1219), 60" (1524), 72" (1829), 84" (2134), 96" (2438), 120" (3048)*, or *Custom*. If selecting *Custom* you must type in the value in the field associated with the *Displacer Height*. Range: 0.0 in. to 3937.0 in.

Height Units — Use the pulldown to choose whether the height used is in *inches* or *mm*.

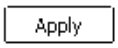
Displacer Volume — Enter the volume for the displacer in *liter* or *Cu-inch*, as determined by the *Volume Units* pulldown. Range: 0 liter (0 Cu-inch) to 40 liter (2441 Cu-inch)

Volume Units	Use the pulldown to choose either *liter* or *Cu-inch*.
Displacer Weight	Enter the weight for the displacer in *grams*, *kg* or *pound*, as determined by the *Weight Units* pulldown. Range: 0 kg (0 gram, 0lb) to 100 kg (100000 gram, 220.46 lb).
Weight Units	Use the pulldown to choose either *grams*, *kg* or *pound*.
Displacer Type	Use the checkboxes to choose the displacer attributes: ☐ *With Displacer*: Activates the other three selections and indicates a displacer exits. ☐ *Stainless*: Indicates the displacer is stainless steel. ☐ *Non Standard*: Indicates the displacer is not standard. ☐ *Extension Rod*: Indicates there is an extension rod. Information entered in these fields is only for informational value.
General Options Extension HT/LT	Comprised only of a checkbox to indicate that the extension for high or low temperature extension exists. This extension is from the torque tube and the 12400 head.
Torque Tube Chamber	You can specify the following *Torque Tube* and *Chamber* parameters: ☐ *Chamber Type* ☐ *Torque Tube Matl.* ☐ *Torque Tube Force* ☐ *Arm Length* Information entered in these fields is only for informational value.
Chamber Type	Use the pulldown to choose the type: *No Chamber*, *12400*, *12401*, *12402*, *12403*, *12404*, *12405*, *12406*, *12407*,*12408* or *12409*.
Torque Tube Force	Use the pulldown to select: *Non Standard*, *1*, *2*, or *4*.
Torque Tube Matl.	Use the pulldown to select the material the chamber is constructed from: *No Torque Tube*, *Inconel/Carbon*, *Inconel/Stainless*, *Inconel/Special*, *Stainless/Carbon*, *Stainless/Stainless*, *Stainless/Special*, *Monel/Carbon*, *Monel/Stainless*, *Monel/Special*, *Special/Carbon*, *Special/Stainless*, or *Special/Special*.
Arm Length	Use the pulldown to set the length of the arm: *Non Standard*, *4"*, *8"*, or *16"*.
Chamber Options	Use the radio buttons to select the chamber material: ☐ *Special Steel* ☐ *Carbon Steel* ☐ *Stainless Steel* ☐ *Other* Information entered in these fields is only for informational value.



Read

Loads the data related to the active tab from the 12400 to the DTM software.



Apply

Stores the data related to the active tab to the 12400 from the DTM software.

Configure Displacer

A red exclamation point (!) appears next to an invalid entry.

1. Place the system in *Setup* mode.
2. Use the pulldown to select the *Displacer Height* and if *Custom* enter a value in the field below.
3. Use the pulldown to select *Height Units*.
4. Use the pulldown to select the *Volume Units* and enter a value in the *Displacer Volume* field.
5. Use the pulldown to select the *Weight Units* and enter a value in the *Displacer Weight* field.
6. Click **With Displacer** and then click any/all of the three checkboxes to the right.
7. Click **Extension HT/LT**, if required.
8. Click Apply to apply changes from this tab to the 12400.

Configure Torque Tube and Chamber

A red exclamation point (!) appears next to an invalid entry.

1. Place the system in *Setup* mode.
2. Use the pulldown to select the *Chamber Type*.
3. Use the pulldown to select *Torque Tube Force*.
4. Use the pulldown to select the *Torque Tube Matl*.
5. Use the pulldown to select the *Arm Length*.
6. Click a radio button for *Special Steel*, if required.
7. Click Apply to apply changes from this tab to the 12400.

SIL2

Use this screen to set SIL2 settings, which include designating it as a SIL2 unit and setting timeouts for selected fault conditions.

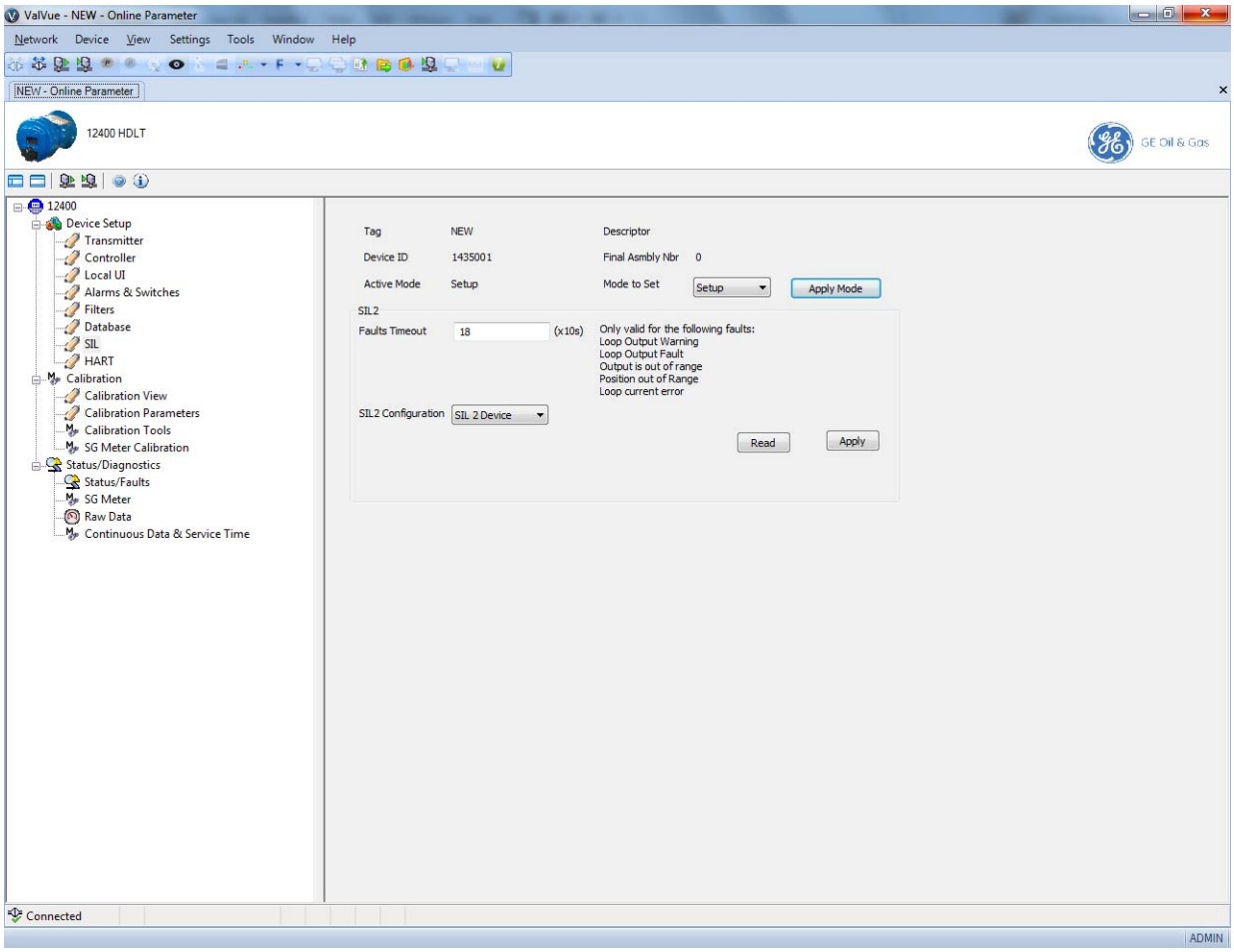


Figure 58 SIL2

Buttons and Fields

Faults Timeout	There are five SIL2 related faults that this is used in conjunction with: ☐ *Output is out of range*: Output exceeds -200% to 105%. ☐ *Loop Output Warning*: Small mismatch between commanded and read 4-20 mA loop output (lower than 0.32 mA). ☐ *Loop Output Fault*: Mismatch between commanded and read 4-20 mA loop output (lower than 0.64mA). ☐ *Position out of Range*: Level sensor fault. ☐ *Loop Current Error:* Mismatch between commanded and read loop output. Diagnosed only in Normal mode. Each of these are a failsafe producing fault. To avoid a false failsafe, you can use the *Faults Timeout* field to enter a time (in 10 second increments) during which a fault is not reported. For example, a setting of 2 sets a timeout of 20 seconds.
SIL 2 Configuration	Use the pulldown to set whether the device is a *Non-SIL Device* or a *SIL 2 Device*.
Read *Read*	Loads the data related to the active tab from the 12400 to the DTM software.
Apply *Apply*	Stores the data related to the active tab to the 12400 from the DTM software.

Configure SIL Setting

A red exclamation point (!) appears next to an invalid entry.

1. Place the system in *Setup* mode.
2. Enter a value in *Faults Timeout*.
3. Use the *SIL2 Configuration* pulldown to activate/deactivate SIL2.
4. Click Apply to apply changes from this tab to the 12400.

HART® Information

Use this tab to view HART®-related information that is useful for troubleshooting and to configure the Burst Mode.

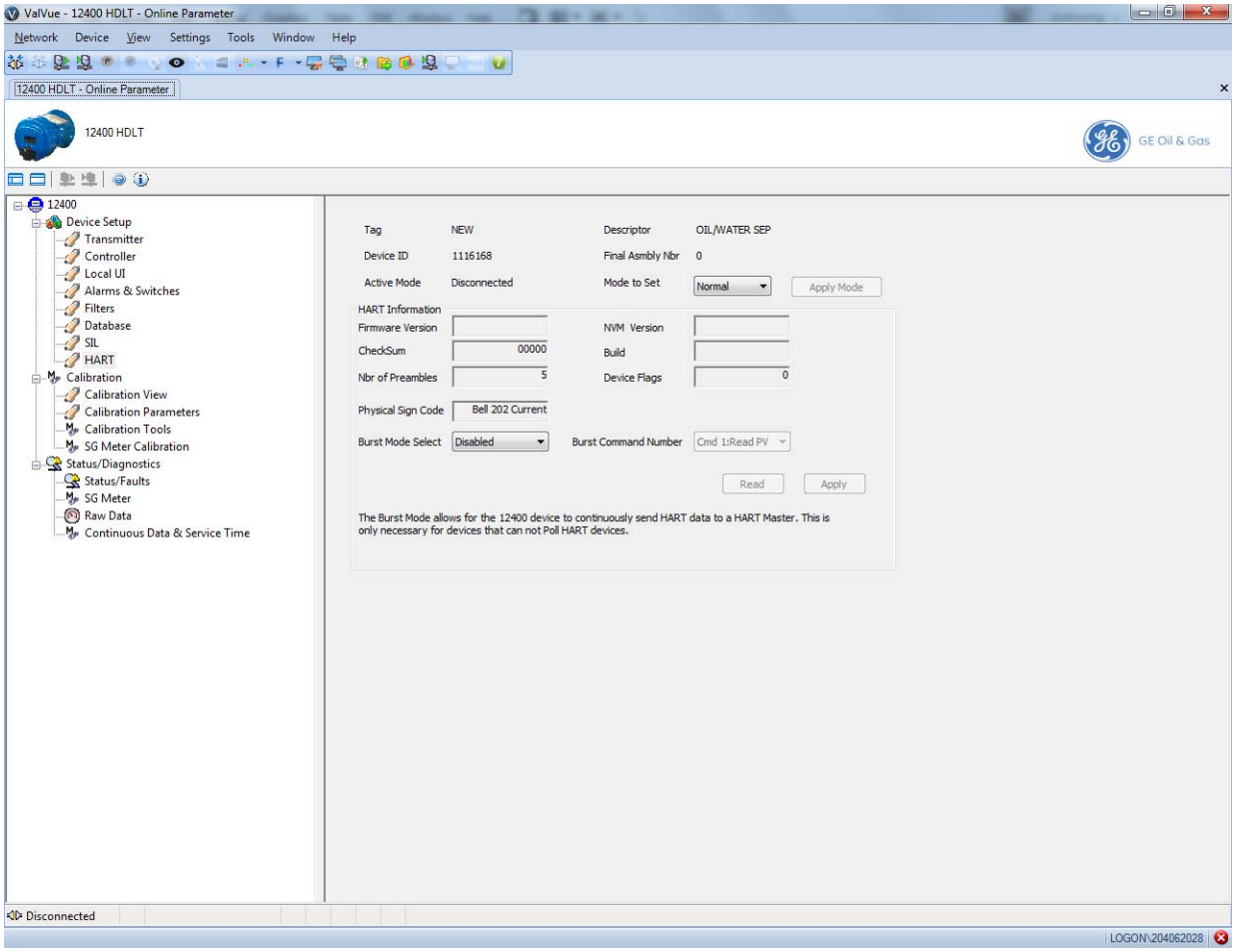
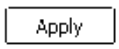


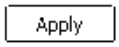
Figure 59 HART®

Buttons and Fields

Firmware Version	Displays the detected firmware version.
CheckSum	Displays the latest checksum.
Nbr of Preambles	Displays the number of preambles required from the host by the field device for which the software is configured.
Physical Sign Code	Displays the Physical Signaling Code. This is the type of hardware physical layer that comprises the HART® communication port.

NVM Version	Displays the detected non-volatile memory version.
Build	Displays the firmware build date.
Device Flags	Describes field device special features that affect the data link layer.
Burst Mode Select	Use the pulldown to activate the burst mode (*Enter*) or deactivate (*Exit*). The Burst mode is when the HART® device continuously sends out data for a device not capable of being polled by a Master. Use this mode only for devices that are passive (i.e. not a HART® master), such as a HART® to Analog converter (SPA from Moore Industries, Tri-Loop by Rosemount). Turning on Burst mode in cases where it is not required affects the communication bandwidth.
Burst Command Number	Use the pulldown to select the type of bust mode: □ *Cmd 1* - Reads the PV only. □ *Cmd 2* - Read the current. □ *Cmd 3* - Reads all variables, including: PV and SV.
 *Apply*	Stores the data related to the active tab to the 12400 from the DTM software.

Set Burst Mode

1. Ensure the 12400 is in *Setup* mode.
2. Use the *Burst Mode Select* pulldown to select **Enter**.
3. Use the *Burst Command Number* pulldown to select the command type.
4. Click  to apply changes from this tab and store them to the 12400.

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10. Calibration

Calibration

The 12400 DTM allows you to calibrate each of the Analog Output (AO) signal.

The milliammeter used must have an accuracy rating better than that of the Model 12400. The meter accuracy rating should be better than 8 microamperes.

Connect the transmitter Primary Signal (or Secondary Signal) with a milliammeter in series with a 12 to 30 VDC supply. When the circuit is interrupted to insert the milliammeter, the power is interrupted and the transmitter starts up in Normal mode. It must be changed to Setup mode before opening the *Calibration*.

WARNING

These procedures cause the output current of the transmitter to change. Always put the control system in Manual before performing this operation. The 12400 Level transmitter must be in Setup mode to proceed.

Transmitter Calibration

Use this tab to set calibration specifics for the transmitter calibration.

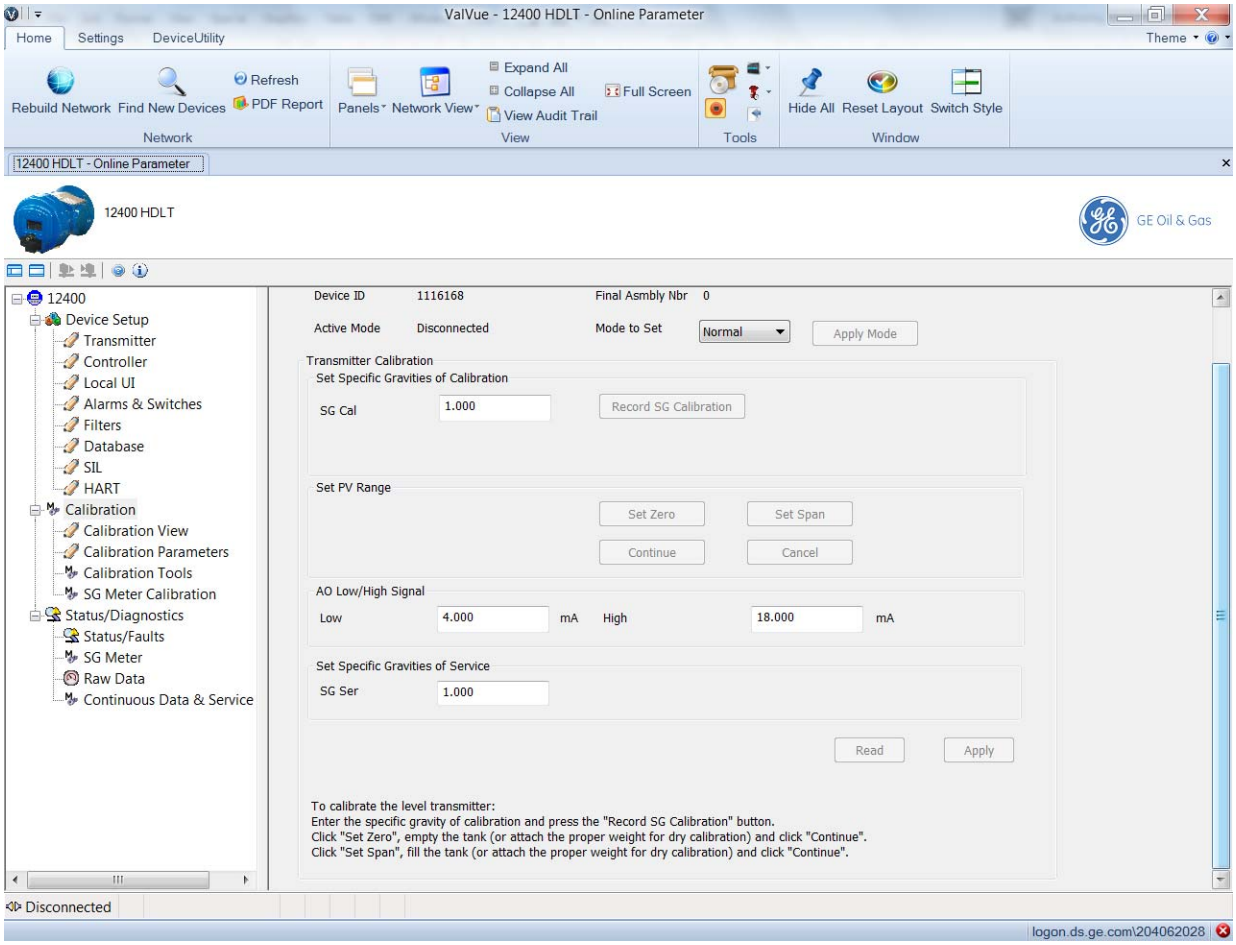
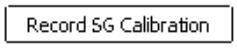


Figure 60 Transmitter Calibration

Buttons and Fields

Set Specific Gravities of Calibration

SG Cal — Enter the specific gravity of the process liquid.



Record SG Calibration — Click to record the calibration once the value for the liquid is entered. See *Perform a Transmitter Calibration*.

Set PV Range — Use the buttons in this area to perform specific gravity calibration functions for the process variable, which include:

- *Set Span* (*Perform a Transmitter Calibration*)
- *Set Zero* (*Perform a Transmitter Calibration*)

Set Zero *Set Zero*	Click to perform the set zero function. See *Perform a Transmitter Calibration*.
Set Span *Set Span*	Click to perform the set span function. See *Perform a Transmitter Calibration*.
AO Low/High Signal	Use this area to set the *Low* and *High* range in mA in which the transmitter is expected to operate. These values are then sent as the target levels by the transmitter during operation. The roles of these fields are reversed if the 12400 is configured for reverse transmitter action.
Low and *High*	Enter the appropriate value and click Apply.
Set Specific Gravities of Service *SG Ser*	Use this to set the Specific Gravity (SG) of the process liquid if it is different from the calibration set on the *SG Meter Calibration* tab. The *Service SG* must be between 0.001 and 20.000 or you receive an error message.
Read *Read*	Loads the data related to the active tab from the 12400 to the DTM software.
Apply *Apply*	Stores the data related to the active tab to the 12400 from the DTM software.

Perform a Transmitter Calibration

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This procedure can be performed completely or the *Set PV Range* and *Record SG Calibration* can be done independently.

1. Place the 12400 in *Setup* mode.
2. Enter a specific gravity value for the process liquid into the *SG* field and click Record SG Calibration.
   An error message appears on the tab if the recalculated specific gravity is out of range.
3. Empty the displacer chamber.
4. Click Set Zero and then click Continue.
   After the *Zero* reading is complete, a message appears.
5. Click Set Span.
6. Fill the displacer chamber and then click Continue.
7. Enter a *Low* and *High* value in *AO Low/High Signal* fields.
8. Enter a *Level SG* value in *Set Specific Gravities of Service*.
9. Click Apply to apply changes from this tab to the 12400.

Calibration Parameters

Use this tab to set the expected calibration values based on the range of motion in the specific application.

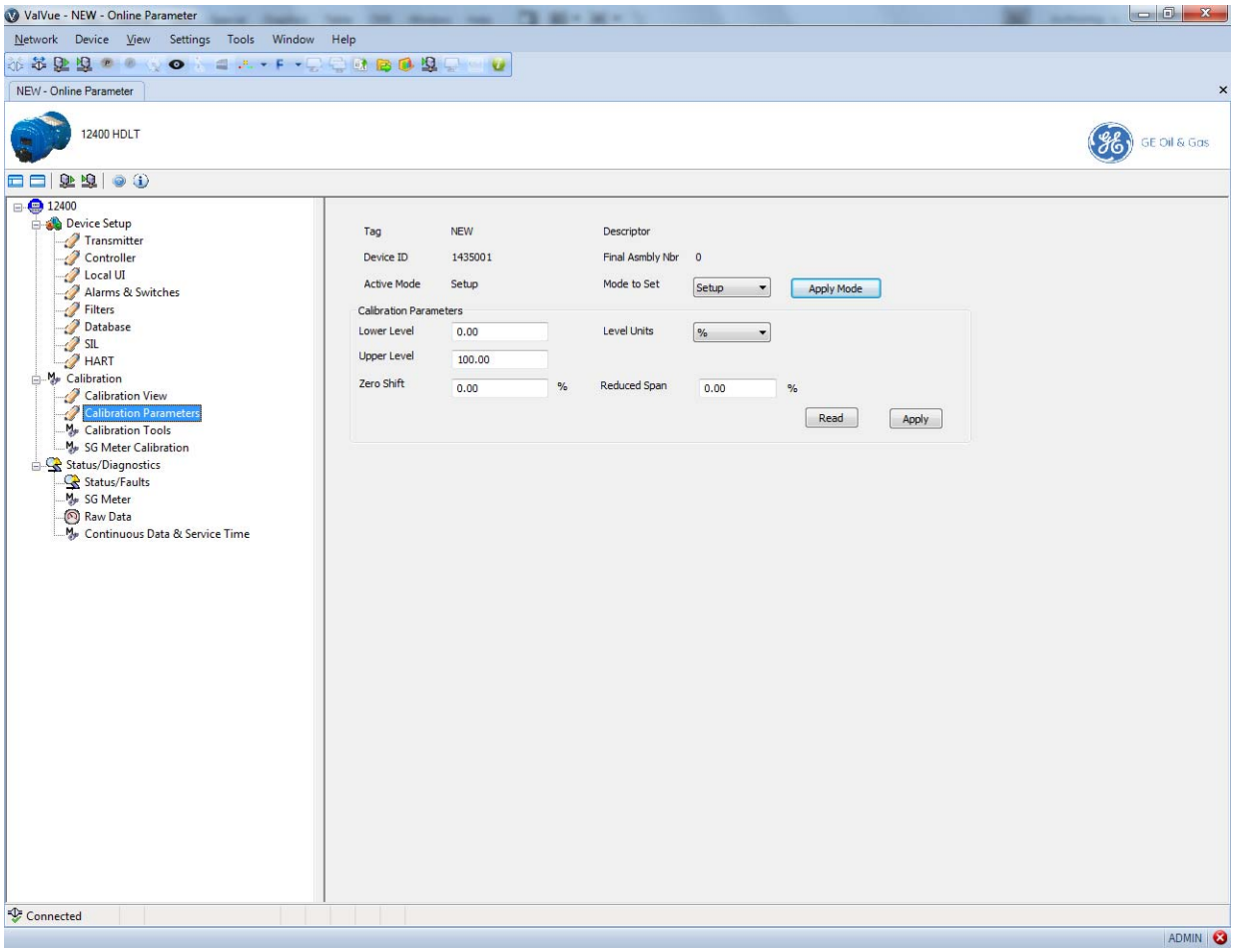
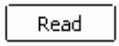
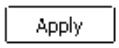


Figure 61 Calibration Parameters

Buttons and Fields

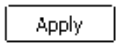
Calibration Parameters

Lower Level	Enter the target low level value for the tank. This can represent either the low level of a uniform fluid for a *Level* setup or the low level for one of two fluids in an *Interface* application.
Upper Level	Enter the target high level value for the tank. This can represent either the high level of a uniform fluid for a *Level* setup or the high level for one of two fluids in an *Interface* application.
Zero Shift	The value in percent of calibration to shift the zero value.

Level Units	Use the pulldown to select the units for use: ☐ *%* ☐ *mm* ☐ *cm* ☐ *m* ☐ *liter* ☐ m^3 ☐ *inch* ☐ *feet* ☐ *Cu-in* ☐ *Cu-ft* ☐ *kg* ☐ *g* ☐ *pound*
Reduced Span	The value in percent of calibration to reduce the span.
 *Read*	Loads the data related to the active tab from the 12400 to the DTM software.
 *Apply*	Stores the data related to the active tab to the 12400 from the DTM software.

Calibrate Parameters

A red exclamation point (!) appears next to an invalid entry.

1. Place the 12400 in *Setup* mode.
2. Enter values in *Lower Level*, *Upper Level*, *Zero Shift* and *Reduced Span*, as required.
3. Select **Level Units** using the pulldown.
4. Click  to apply changes from this tab to the 12400.

Calibration Tools

Use this tab to:

- Set the 4 - 20 mA calibration for the *Primary Signal Output* and *Secondary Signal Output*.
- Configure the *Current Generator* (*Use the Current Generator*).
- Tune the coupling (*Use Coupling*).

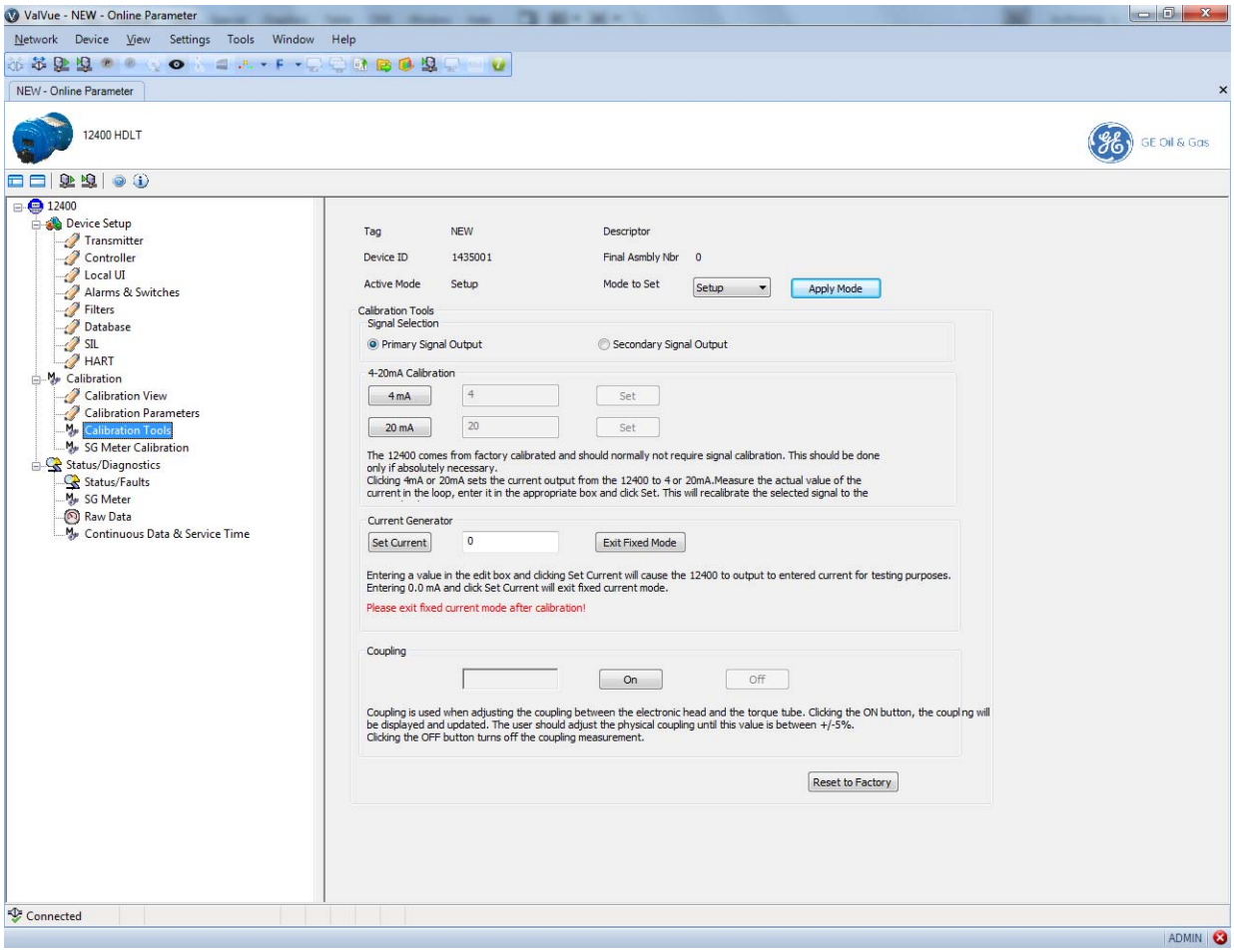
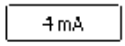
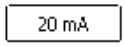
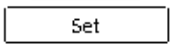
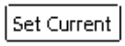
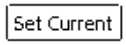


Figure 62 Calibration Tools

Buttons and Fields

Signal Selection

Primary Signal Output	Click the radio button to select calibration for the primary signal. This signal is the 4-20 mA analog output signal, available on AO_1 terminals, and is the controller output signal generated by a PID algorithm based on error between the local setpoint and the level process variable. HART® communication is available on AO_1. The AO signals are options and are not configurable if not purchased.
Secondary Signal Output	Click the radio button to select calibration for the secondary signal. This signal is the 4-20 mA analog output signal, available on the AO_2 terminals, is the level or interface measurement signal. No HART® communication. The AO signals are options and are not configurable if not purchased.
4-20 mA Calibration	Use this area to calibrate the 4-20 mA loop current. This is not necessary under normal circumstances. If it is required. See *Use Signal Selection*. You can either reset the 4 mA or 20 mA setting or set custom high or low values for use in calibrations. See *Use Signal Selection*.
 *4 mA*	Click to reset the lower range top 4 mA while in *Setup* mode. See *Use Signal Selection*.
 *20 mA*	Click to reset the upper range top 20 mA while in *Setup* mode. See *Use Signal Selection*.
 *Set*	Click this button to set the value entered into the field associated with the button, which must then be stored to the device by clicking  .
Current Generator	Use this area to generate an output current for checking the current loop and to check 12400 calibration.
 *Set Current*	Enter a test current into the associated field and click this button to test the current loop. Using this function automatically places the system in a fixed current mode. See *Use the Current Generator*.
 *Exit Fixed Mode*	Click this to exit the fixed current mode used for testing. You can also enter 0.0 in the field and click  to accomplish this.

Coupling	Use this feature to check and adjust the coupling of the instrument electronic head to the torque tube. See the 12400 instruction manual for details of the mechanical method that must be performed. Coupling adjustment is normally performed in the workshop when the instrument is assembled to the torque tube. The adjustment can be inspected using the DTM and a special weight. The displacer must be removed and the instrument removed from service to perform the check. See *Use Coupling*.
Reset to Factory *Reset to Factory*	Use this button to reset the items on this tab to their factory default values.

Use the Current Generator

A red exclamation point (!) appears next to an invalid entry.

Use this to generate an output current for checking the current loop and to check 12400 calibration. To generate output the desired current:

1. Change the mode to *Setup*.
2. Enter the current output value in the *Set Current* field.
3. Click Set Current .

   The 12400 DTM displays messages on the tab.
4. Verify that the current output is correct with a precision milliammeter in series with the AO output.
5. Click Exit Fixed Mode .

Use Signal Selection

Use this to calibrate the 4 - 20 mA source for the AO signal.

4 mA Calibration

A red exclamation point (!) appears next to an invalid entry.

To calibrate *Zero* at 4 mA:

1. Change the mode to *Setup*.
2. Click 4 mA .

   Once 4 mA calibration is started, the *4 mA* button is gray out.
3. Read the value from the precision milliammeter.
4. Enter the reading from the milliammeter into the field and click Set .

   The 12400 DTM displays error messages on the tab.
5. Click **Yes** to confirm setting the 4 mA calibration.

20 mA Calibration

A red exclamation point (!) appears next to an invalid entry.

To calibrate *Span* at 20 mA:

1. Change the mode to *Setup*.
2. Click 20 mA .

   Once 20 mA calibration is started, the *20 mA* button is grayed out.
3. Read the value from the precision milliammeter.
4. Enter the reading from the milliammeter into the field and click Set .

   The 12400 DTM displays error messages on the tab.
5. Click **Yes** to confirm setting the 20 mA calibration.

Correct Calibration Error

If you receive an error message (Transmitter specific error or *Parameter value too large*), it means that AO is calibrated incorrectly, and the read- back signal is out of range. And the calibration process is aborted.

The solution is:

1. Click **Reset to factory**.
2. Redo calibration.

Use Coupling

A red exclamation point (!) appears next to an invalid entry.

To start the coupling calibration:

1. Change the mode to *Setup*.
2. Tighten the adjustment screw. (For a standard displacer (907 cm3, 1362 gr), hang 727.1 gr on the torque arm. (See the manufacturer's instruction for a special displacer.)
3. Click **On**.
4. Pull the indexing flexure until it is centered by the pin.

   The 12400 DTM displays the coupling value. The reading must be adjusted until it is between -5% and +5% (Refer to the *Masoneilan 12400 Series Level Transmitter/Controller Instruction Manual* & *Safety Guide (GEA19367* or *P/N)* for the workshop method.).
5. Click **Off** to complete, then click  .

SG Meter Calibration

Use the *SG Meter (Specific Gravity) Calibration* tab to set the specific gravity meter settings. *SG Meter* is used to perform on site new calibration or simulation, with or without liquid. To complete the *SG Meter Calibration* function you must first enter a specific gravity for the process liquid, then *Zero* the SG and then perform a *Span* reading to arrive at the new *SG Calibration*. You must perform this operation before placing the 12400 into service.

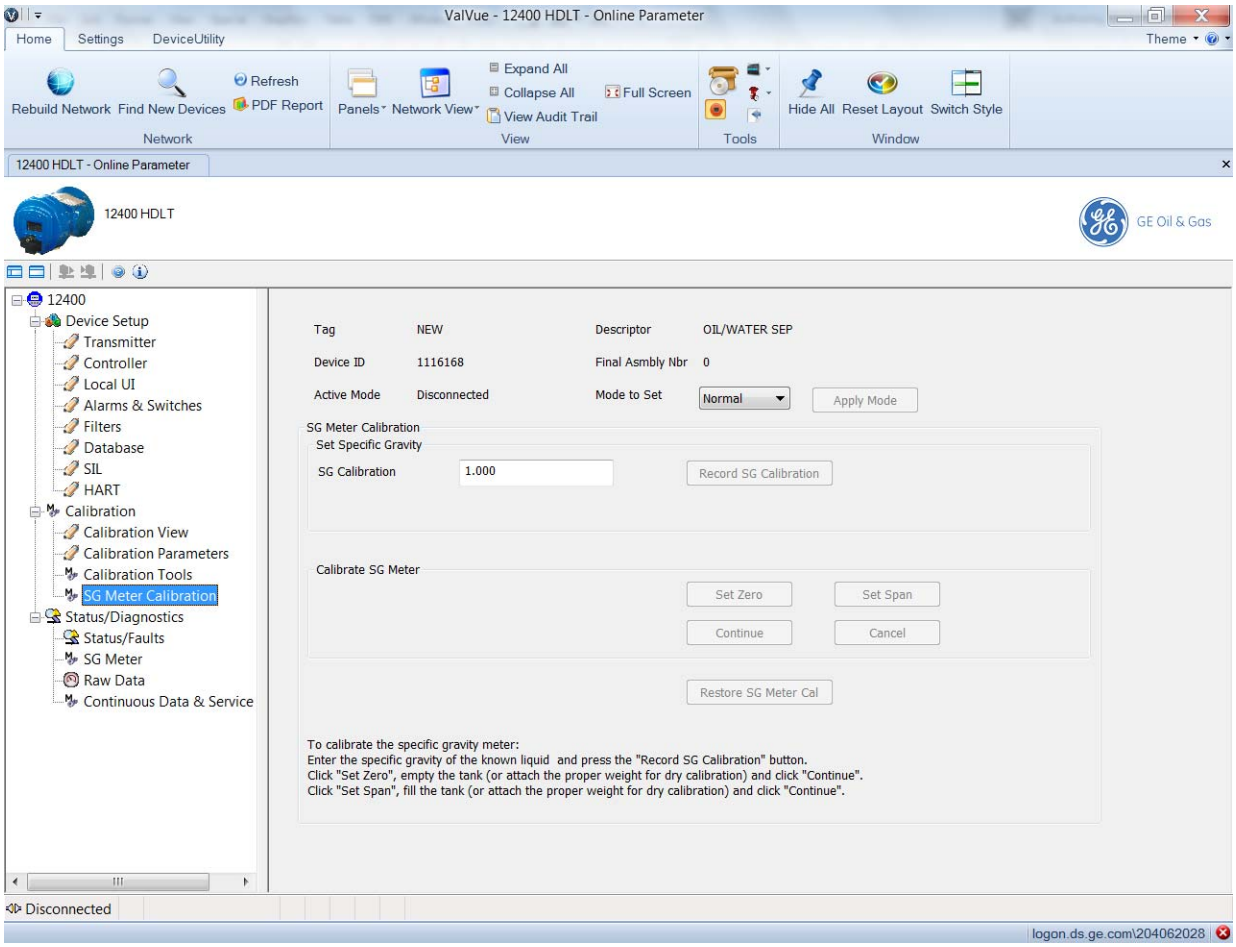
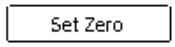
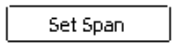
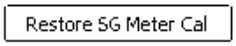


Figure 63 SG Meter Calibration

Buttons and Fields

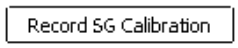
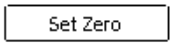
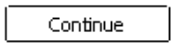
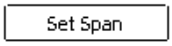
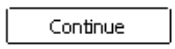
Set Specific Gravity

SG Calibration	Enter the specific gravity of the process liquid.
Record SG Calibration *Record SG Calibration*	Click to record the calibration once the value for the liquid is entered. See *Perform a Specific Gravity Meter Calibration*.

Calibrate SG Meter	Use the buttons in this area to perform specific gravity calibration functions, which include: Set *Span* (See *Perform a Specific Gravity Meter Calibration*) Set *Zero* (See *Perform a Specific Gravity Meter Calibration*) Restore the original SG Meter calibration (*Restore SG Meter Cal*)
 *Set Zero*	Click to perform the set zero function. See *Perform a Specific Gravity Meter Calibration*.
 *Set Span*	Click to perform the set span function. See *Perform a Specific Gravity Meter Calibration*.
 *Restore SG Cal*	Click to restore the meter calibration to it factory settings. See *Restore SG Meter Cal*.

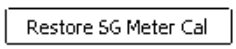
Perform a Specific Gravity Meter Calibration

A red exclamation point (!) appears next to an invalid entry.

1. Change the mode to *Setup*.
2. Enter a specific gravity value for the process liquid into the *SG Calibration* field and click  A message appears on the tab if successful.
3. Empty the displacer chamber.
4. Click  and then click  .
   After the Zero reading is complete, a message appears.
5. Fill the displacer chamber.
6. Click  and then click  .

Restore SG Meter Cal

If you would like to restore the *SG Calibration* to the factory default:

- Click  and status messages appear on the tab.

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11. Status/Diagnostics

Status/Faults

Use the *Status/Faults* tab to see at a glance the operating and internal status of the 12400. The screen is divided into a series of sub-tabs that provides active faults, log only, annunciate, and fail safe. On the *Status* tab you can reset the *Current Faults* or *All Faults* (Current and Historical). The tab has selectable tabs that display the associated parameters for each tab when selected; e.g. when you select **Log Only** tab the Log only status and fault codes appear. When you are on the *Active Faults* tab the current active faults appear as shown below.

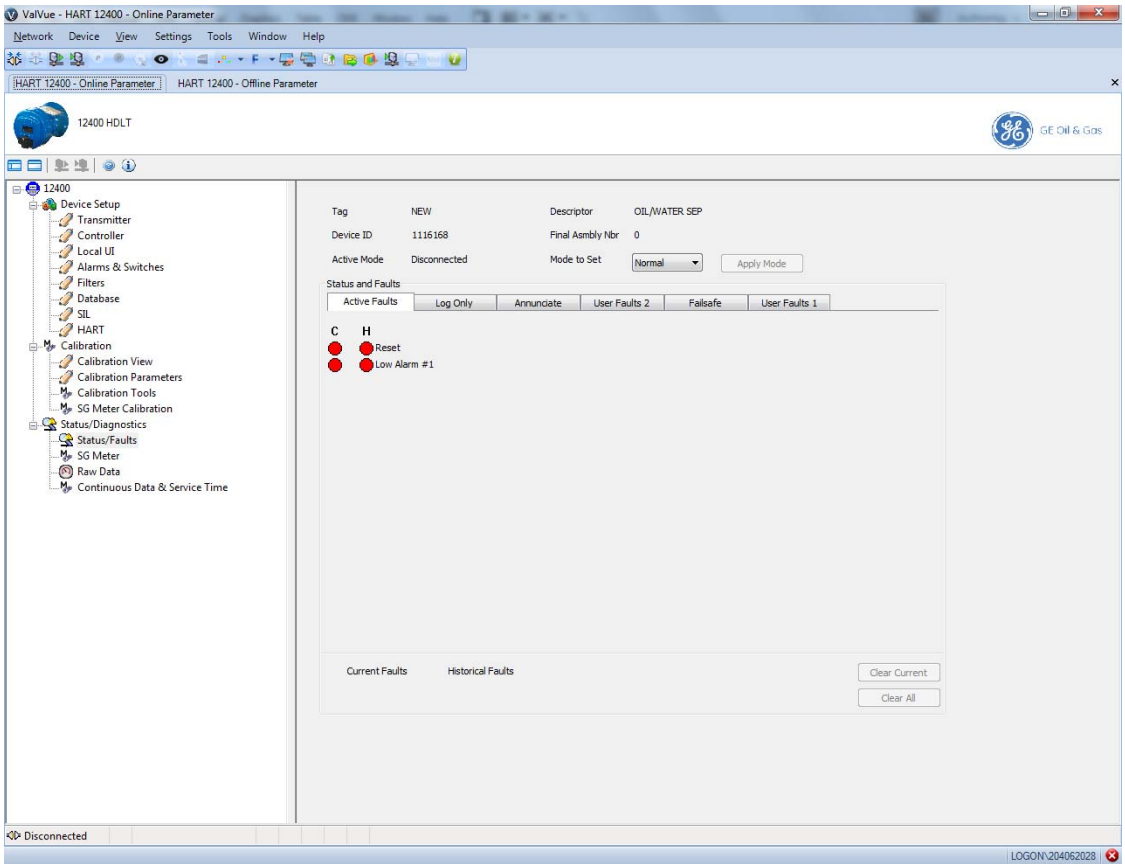


Figure 64 Status Screen

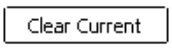
Buttons and Fields

Current Faults

Displays LEDs that indicate whether a fault is active. An active fault is one whose trip condition has occurred and not been resolved. Once the trip condition is resolved the red LED is cleared using the *Clear Current* button.

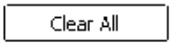
Historical Faults

Displays LEDs related to faults that have occurred and been cleared and faults that have occurred and are uncleared. A *Historical Fault* remains active (red) until the *Clear All* action is performed.



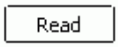
Clear Current

Click to reset the status in the 12400 for all current faults only. The buttons on the *Status* screen indicating the current faults revert to green, if the condition is no longer valid.



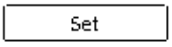
Clear All

Click to reset the status bit in the 12400 for all faults, both historical and current. The buttons on the *Status* screen indicating the current and historical faults revert to green. If a fault condition exists for an item it will reassert and the green LED in the *Current* column goes red.



Read

Click to read whether the faults are configured to *Fail High* or *Fail Low* from the device. Available on the *Failsafe*, *User Faults 2* and *User Faults 1* tabs.



Set

Click to set whether the faults are configured to *Fail High* or *Fail Low.* Available on the *Failsafe*, *User Faults 2* and *User Faults 1* tabs.

Fail Low/Fail High

On the *Status* screen *User Faults 2* and *User Faults 1* tabs you can set whether position sensor, temperature readings, temperature sensor, current sensor, or loop output testing fail at the predefined high or low level. The Fail High and Fail Low fields are not active for a SIL2 device. See *Set Fail High/Fail Low*.

Log Only

The *Log Only* status tab displays all faults that have been logged. These are low priority faults.

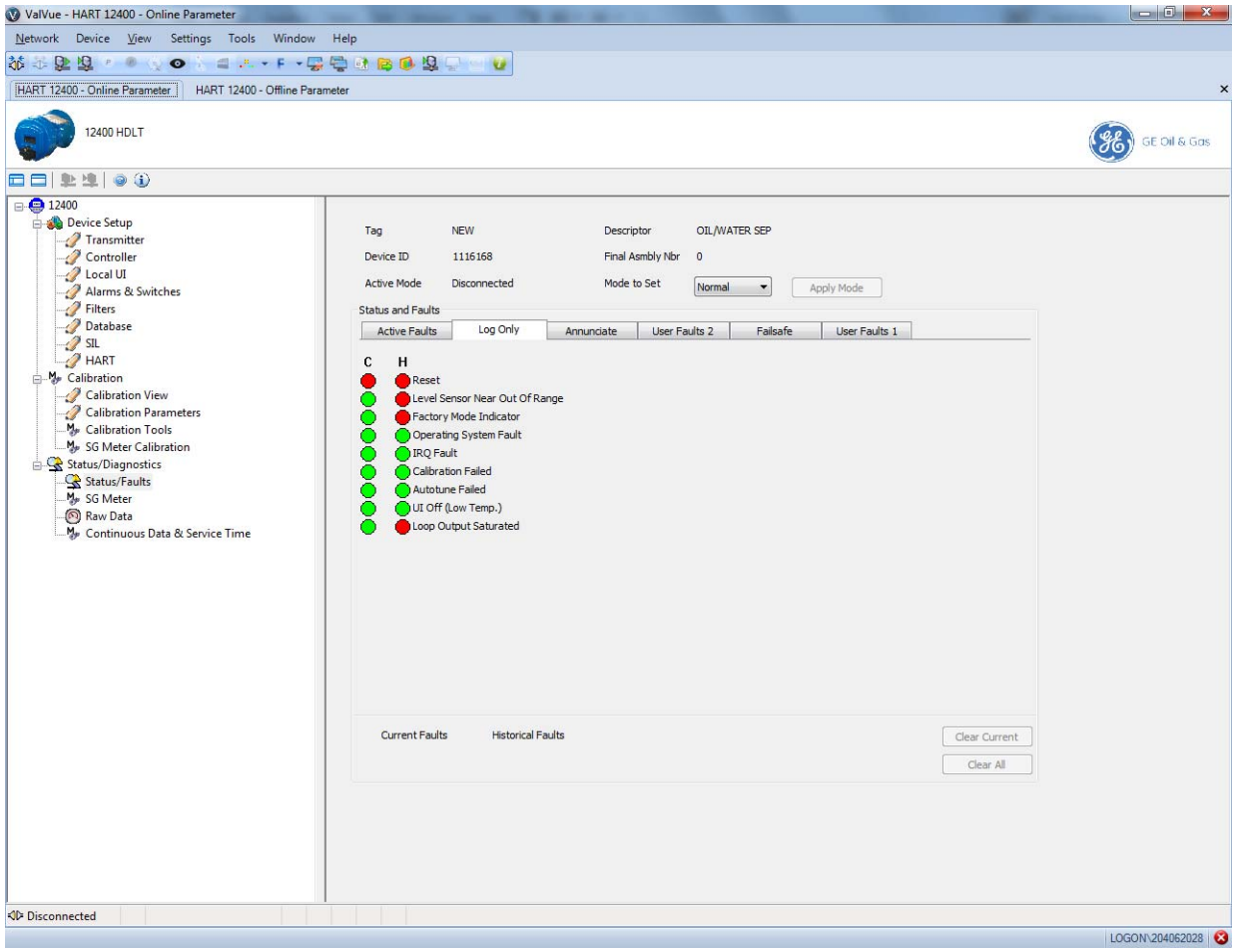


Figure 65 Status Screen Log Only Tab

Buttons and Fields

See *Status/Faults Buttons and Fields.*

Annunciate

The *Annunciate* status tab displays all faults that have been annunciated.

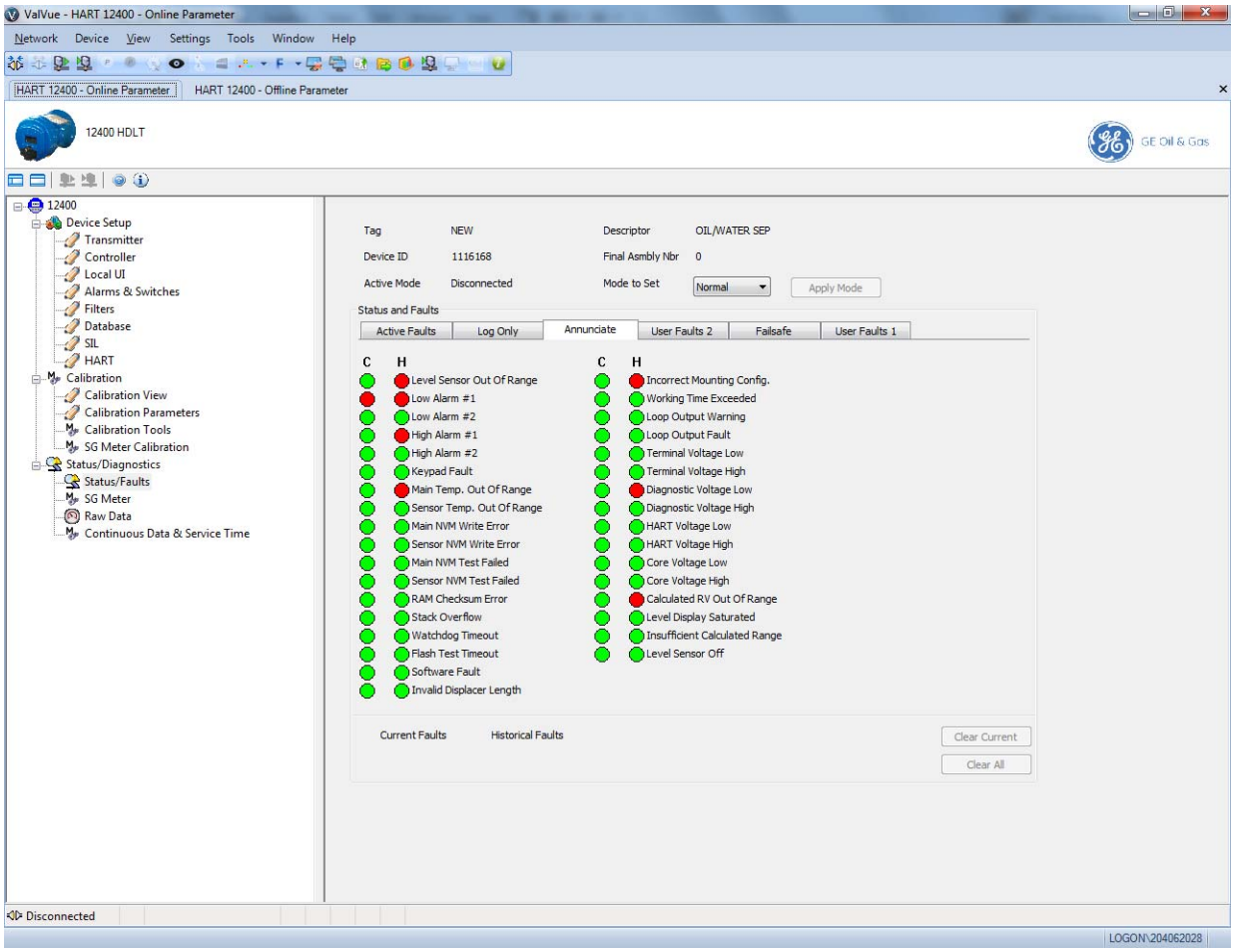


Figure 66 Status Screen Annunciate Tab

Buttons and Fields

See *Status/Faults Buttons and Fields.*

User Faults 1

The *User Faults 1* status tab displays user related, current sensor and loop output faults. The *Fail High* and *Fail Low* fields are not active for a SIL2 device.

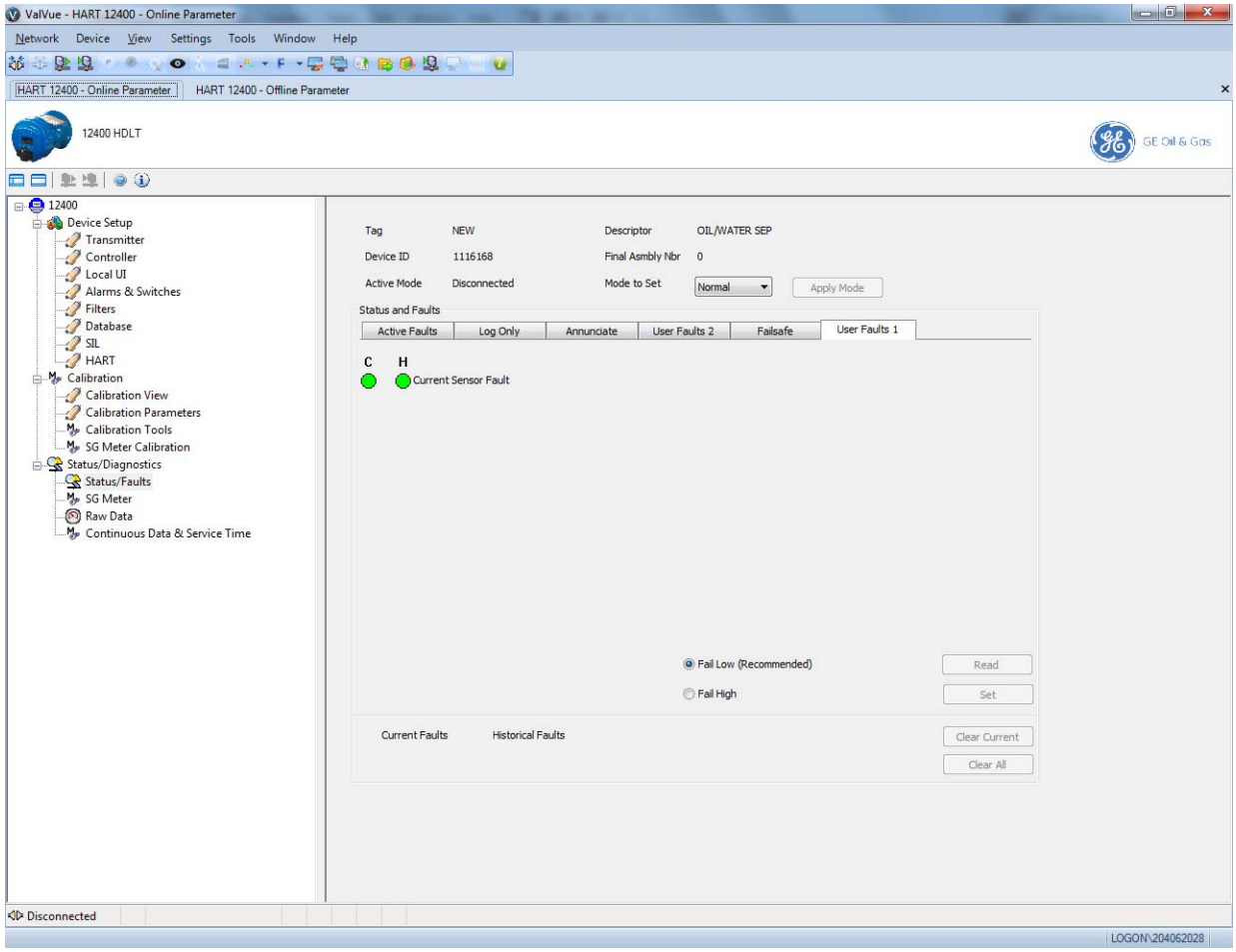


Figure 67 Status Screen User Faults 1 Tab

Buttons and Fields

See *Status/Faults Buttons and Fields.*

User Faults 2

The *User Faults 2* status tab, shown in the figure below, displays user related, position sensor and temperature read/sensor faults. The *Fail High* and *Fail Low* fields are not active for a SIL2 device.

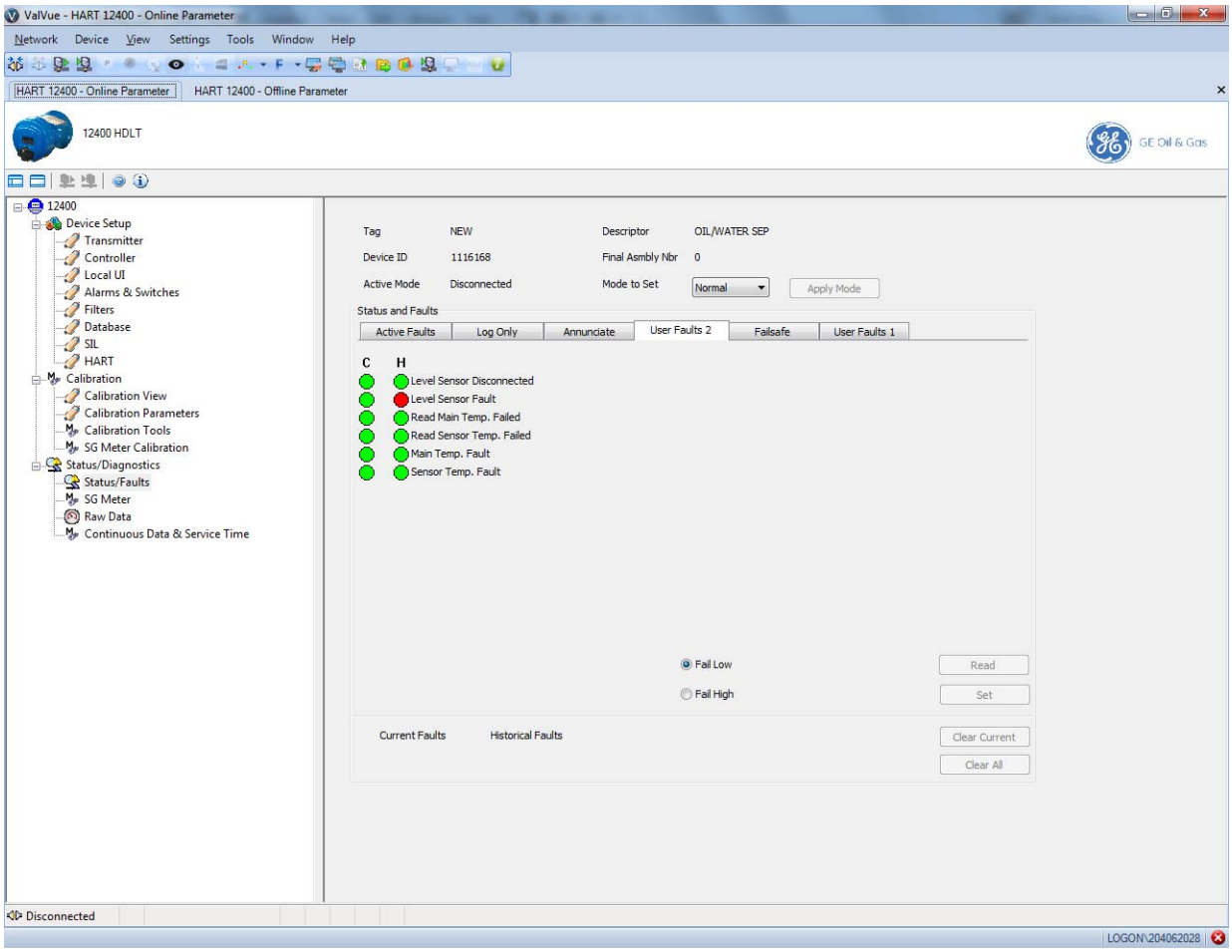


Figure 68 Status Screen User Faults 2 Tab

Buttons and Fields

See *Status/Faults Buttons and Fields.*

Failsafe

The *Failsafe* status tab displays failsafe faults. If configured as a SIL2 device the three faults in the red box appear.

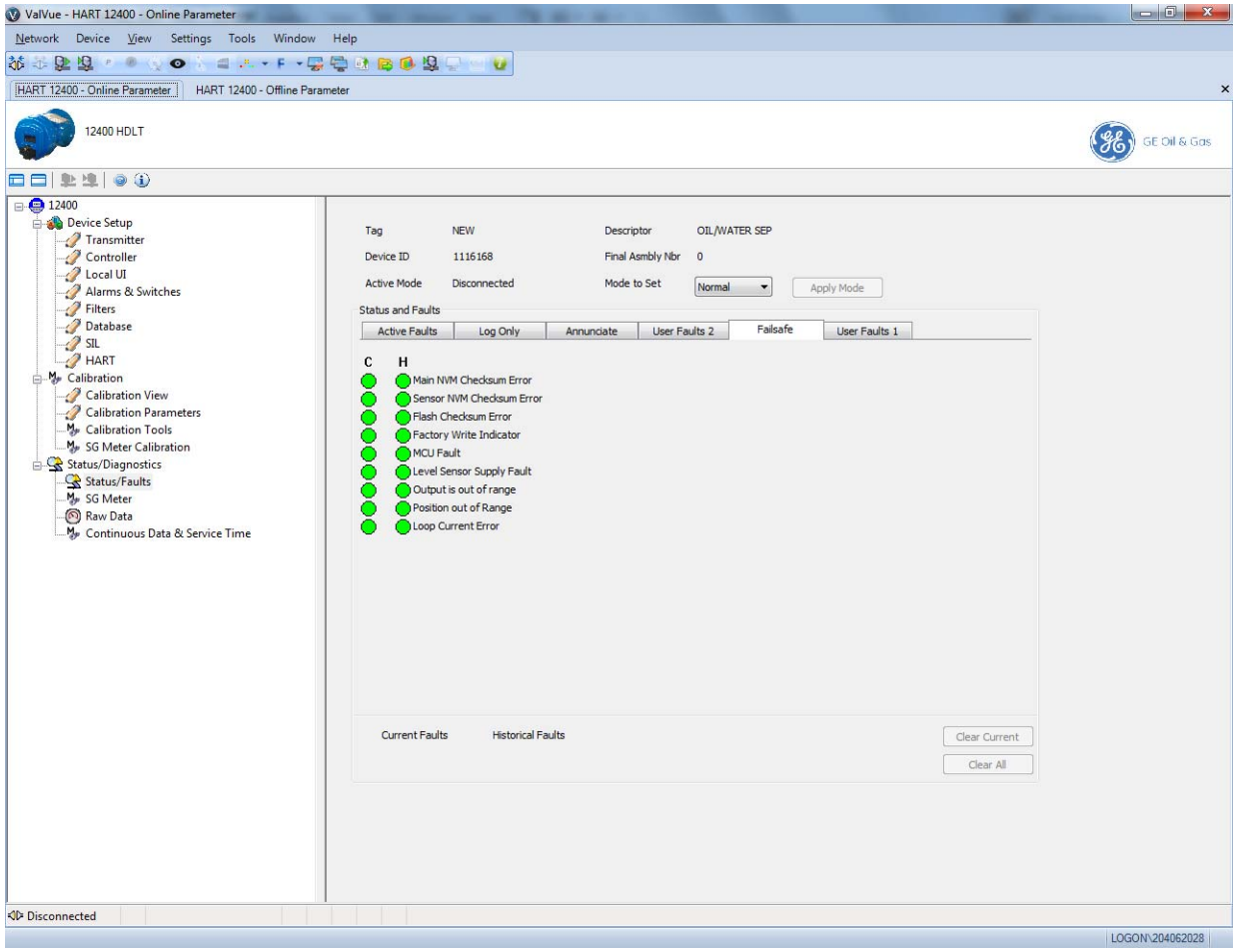


Figure 69 Status Screen Failsafe Tab

Buttons and Fields

See *Status/Faults Buttons and Fields.*

Set Fail High/Fail Low

On the *User Faults 2* and *User Faults 1* tab on the *Status* screen you can set whether position sensor, temperature readings, temperature sensor, current sensor, or loop output testing fail at the predefined high or low level. The *Fail High* and *Fail Low* fields are not active for a SIL2 device. If you *Fail High*, you run the risk of not knowing a condition exists early enough to respond.

To change this setting:

1. Enter *Setup* mode.
2. Click on the correct radio button; **Fail High** or **Fail Low.**
3. Click **Set** to change the setting.

SG Meter

Use this screen to start the *Specific Gravity Meter* to assist in diagnosing transmitter problems. Before the meter can be used it must be calibrated (See *Perform a Specific Gravity Meter Calibration*).

You can use this tab to measure the specific gravity of an unknown fluid. If the meter is already calibrated for water and then you fill with the unknown liquid, you use this function to determine the percentage relative to water.

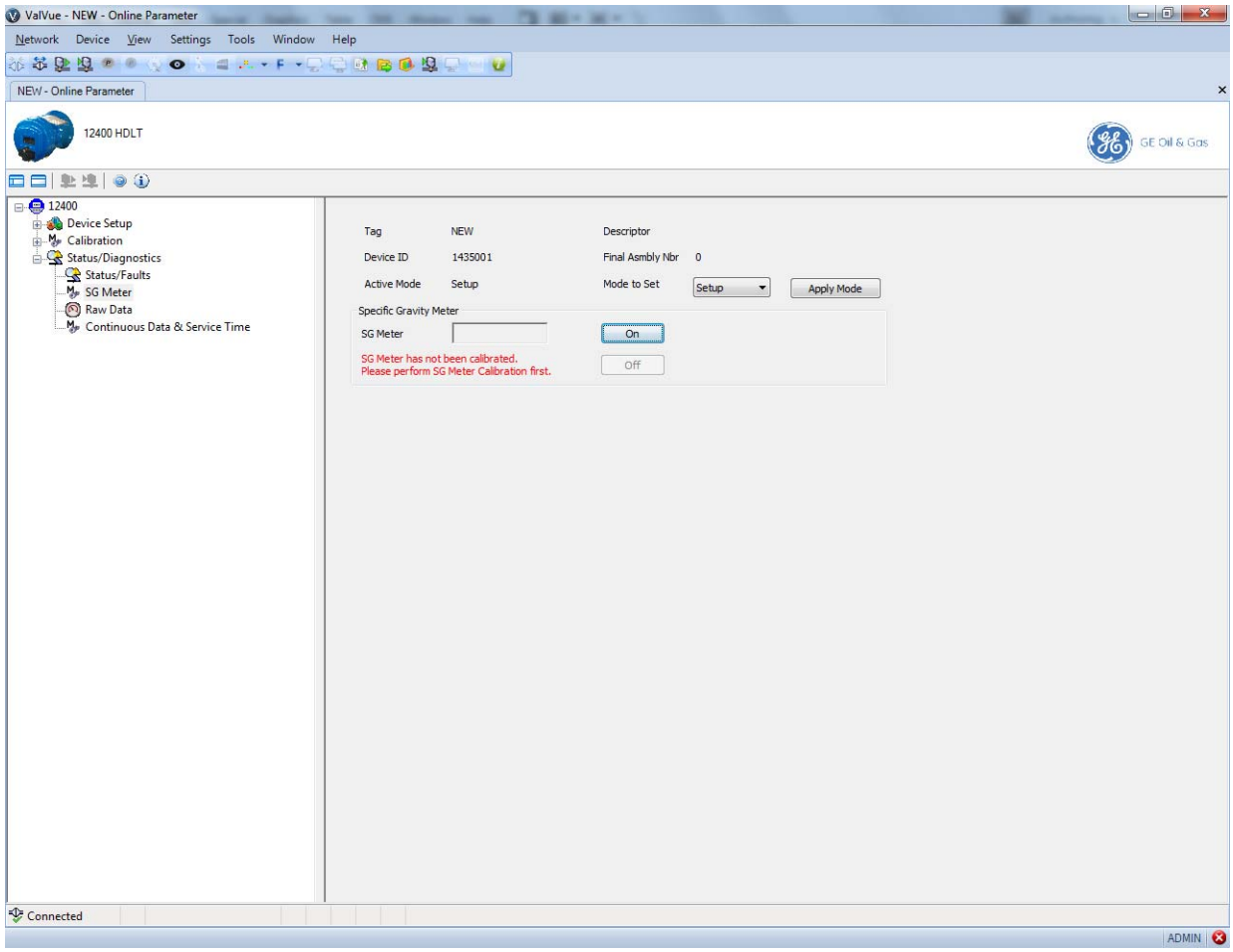


Figure 70 Specific Gravity Meter

Buttons and Fields

SG Meter	Displays the specific gravity of the fluid being measured.
On	Click to set the meter to on.
Off	Click to set the meter off.

Raw Data

Use this screen to monitor some of the basic parameters. This screen is used primarily for troubleshooting. The *Raw Data* screen has two areas of data:

- *Temperature-Corrected Values*: These are temperature-compensated counts from the HART® 221 command.
- *Range of Calibration*: The lower and upper SG Meter and Calibration values.

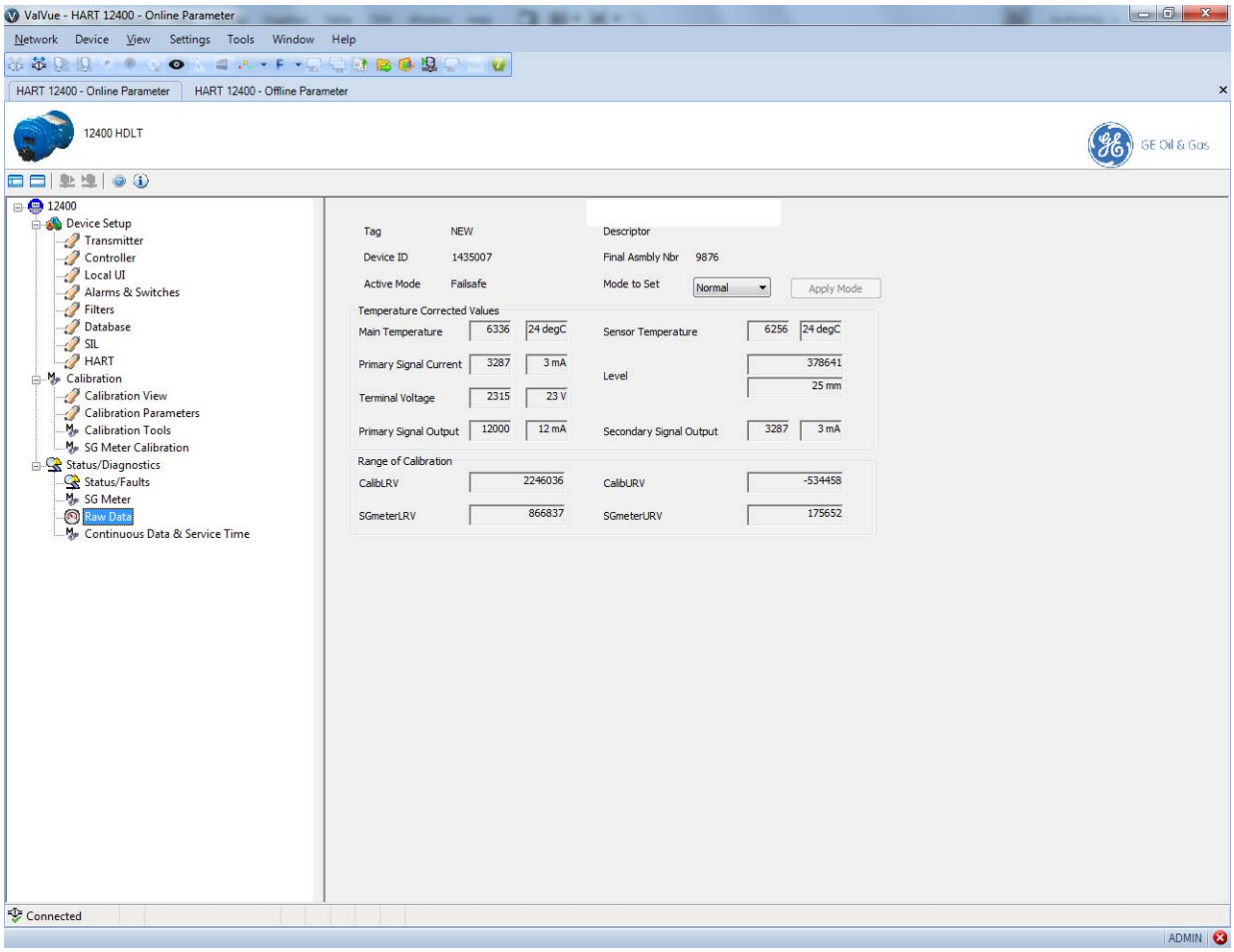


Figure 71 Raw Data

Buttons and Fields

Temperature Corrected Values	Displays the temperature corrected values based on the counts detected by the firmware in the left column. The right column lists the values calculated from those counts in engineering units.
Main Temperature	Displays the raw temperature counts for the main board from the TMP100 sensor in the left field and the calculated temperature in the right field.
Primary Signal Current	Displays the temperature compensated current counts detected by the board in the left column and the calculated value in the right column.
Terminal Voltage	Displays the temperature compensated current counts detected by the board in the left column and the calculated value in the right column.
Primary Signal Output	Displays the temperature compensated analog output voltage counts detected by the board in the left column, which have been adjusted for user-entered calibration factors. Displays the calculated value in the right column.
Sensor Temperature	Displays the raw sensor temperature counts from the TMP100 sensor on the main board in the left field and the calculated temperature in the right field.
Level	Displays the raw ratiometric counts read from the level sensor compensated for the *Main Temperature* and the *Sensor Temperature* and then linearized in the left column. The right column displays the value in user-selected values. This result is used in level calculations.
Secondary Signal Output	Displays the temperature compensated analog output voltage counts detected by the board in the left column, which have been adjusted for user-entered calibration factors. Displays the calculated value in the right column.
Range of Calibration	Use this set of parameters to view the low/high calibration ranges and low/high specific gravity meter ranges.
CalibLRV	Displays the raw counts detected for the calibration low range value. The target for the low level value in user-entered units, is entered on the *Calibration Parameters* tab (See *Calibrate Parameters*). If the LRV is less than 3.8 mA or if the URV is greater than 20.5 mA, you receive the error message.
SGMeterLRV	Displays linearized lower range value for the *SG Meter Calibration* as set when setting the span on the *SG Meter Calibration* tab (See *SG Meter Calibration*).
CalibURV	Displays the raw counts detected for the calibration upper range value. The target for the high level value in user-entered units, is entered on the *Calibration Parameters* tab (See *Calibrate Parameters*). If the LRV is less than 3.8 mA or if the URV is greater than 20.5 mA, you receive the error message.
SGMeterURV	Displays linearized upper range value for the *SG Meter Calibration* as set when setting the span on the *SG Meter Calibration* tab (See *SG Meter Calibration*).

Continuous Data and Service Time

Use the *Continuous Data and Service Time* tab to view and set tank and service time related issues.

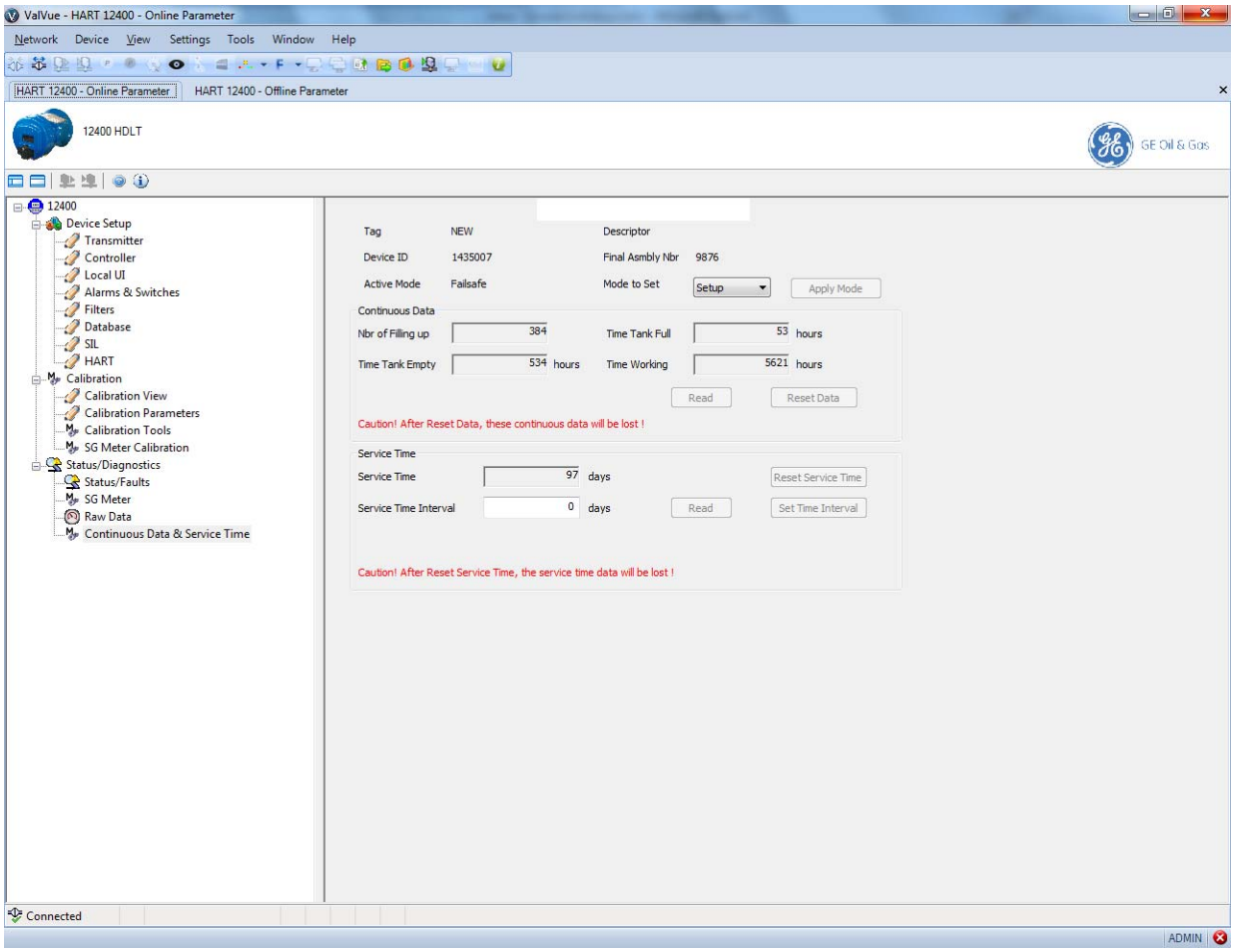


Figure 72 Continuous Data and Service Time

Buttons and Fields

Continuous Data	Use this area to read data from a connected device and to reset the data in the device.
Nbr of Filling Up	Displays the number of times the tank has been filled to its maximum since the last reset.
Time Tank Empty	Displays the time in hours that the displacer was between -5% and +5% since the last reset.
Time Tank Full	Displays the time in hours that the displacer was between 95% and 105% since the last reset.
Time Working	Displays the service hours since the last reset.
Read	Click to read the *Continuous Data* from the device.
Reset Data	Click to reset the *Continuous Data* in the device. resets can not be undone.
Service Time	Use this area to manage fields that determine *Service Time*.
Service Time	Displays the *Service Time*. This can be used as a user-determined running time to suit their needs.
Service Time Interval	Enter a time in days for the intended time between servicing.
Reset Service Time	Click to reset the *Service Time*.
Set Time Interval	Saves the value in *Service Time Interval* to the database. Then click the Store the active page to the device icon (). Values: 0 - 24855.
Read	Click to read the *Service Time* and *Service Time Interval* from the device.

Reset Data

You can reset continuous diagnostic data collection. To reset data:

1. Enter *Setup* mode.
2. Click Reset Data .

Reset Service Time

To reset the *Service Time*:

1. Enter *Setup* mode.
2. Click Reset Service Time.

Set Time Interval

To set the *Service Time* interval:

1. Enter *Setup* mode.
2. Enter a value in the *Set Time Interval* field.
3. Click Set Time Interval.

Status/Fault Tab Errors

Table 5 describes the faults that exist on the *Status/Faults* tabs, their cause and possible resolutions where applicable.

Table 5 Status/Fault Tab Errors

Tab	Sequence, Byte #, Bit #	Tab Error Condition	Cause	Resolution
Active Faults	1, 0, 0	*Reset*	Any reset, except for trap a configuration.	Reset the flag using the DTM or HART® Host.
	45, 5 4	*Loop Output Warning*	Mismatch between user-configured and read loop output (narrow range). Mismatch margin 0.32 mA.	Check and fix problems with the power source to the 12400. See *Calibration Tools*.
	46, 5, 5	*Loop Output Fault*	Mismatch between user-configured and read loop output (wider range). Mismatch margin is twice wider that the one for LOOP_OUTPUT_WARN (0.64mA). Diagnosed only in Normal mode.	Check and fix problems with the power source to the 12400. Take the 12400 out of Failsafe using the DTM or pushbuttons. See *Calibration Tools*.
	57, 7, 0	*Calculated RV Out of Range*	Set if specific gravity recalculated range exceeds the linearization table limits {-2.8e6 to +2.8e6}. Indicates a disparity between the expected user-entered specific gravity and the specific gravity of the fluid in use. As a result of recalculation, the following can occur: Level measured is outside of calibrated range.	Check the settings s on *Calibration*: Check the settings for SG CAL, SG SER, Displacer volume and Weights, Coupling, Zero shift.

Table 5 Status/Fault Tab Errors (Continued)

Tab	Sequence, Byte #, Bit #	Tab Error Condition	Cause	Resolution
Log Only	4, 0, 3	*Level Sensor Near Out of Range*	AMR level sensor fault; outside of +/ -2.8 degrees angle.	Check the physical installation of the sensor. Check the settings s on *Calibration*: Check coupling, displacer, SG SER, SG CAL
	12, 1, 3	*Factory Mode Indicator*	Indicates that factory mode commands are enabled.	N/A
	27, 3, 2	*Operating System Fault*	If any RTOS (realtime operating system) task overruns itself (times out). An internal error from which the device recovered automatically.	1- Clear the condition the DTM or HART® Host. 2- If condition persists, replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.
	31, 3, 6	*IRQ Fault*	After a reset, a valid hidden record (in RAM), indicates that an illegal interrupt occurred. An internal error from which the device recovered automatically.	1- Clear the condition the DTM or HART® Host. 2- If condition persists, replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.
	35, 4, 2	*Calibration Failed*	Indicates an AO calibration failed. Occurs if the zero is above the span or the scale is too low.	Try to calibrate the Zero if Span failed or vice versa.
	37, 4, 4	*Autotune Failed*	Indicates an Autotune failed for any reason.	Using the DTM or HART® Host, perform a manual tune. See *Controller Setup*.
	47, 5, 6	*UI Off (Low Temp.)*	Indicates the UI is turned off because it is not responsive at low (main board) temperature, -15 °C. LCD blank at -15 °C, but LCD performance may degrade below -10 °C.	Check the environment temperature.
	56, 6, 7	*Loop Output Saturated*	Indicates the output is above the normal clamped values: 3.8 mA to 20.5 mA.	Check the process SG, displacer dimensions, or for other mechanical problems.

Table 5 Status/Fault Tab Errors (Continued)

Tab	Sequence, Byte #, Bit #	Tab Error Condition	Cause	Resolution
Annunci-ate	5, 0, 4	*Level Sensor Out of Range*	AMR level sensor fault; Similar to out-of-normal-range but wider limits of full linearization table range. The sensor reading cannot be used as it falls outside the usable range. It is clamped to the range; the fault indicates significant performance degradation.	1. Physically check level sensor. 2. Check *Calibration*: SG CAL, SG SER, Displacer volume and Weights, Coupling, and Zero shift.
	7. 0, 6	*Low Alarm #1*	If this error is configured and the level outside the range for the configured time.	1. Check level of process liquid. 2. Check values in *Alarms* & *Switches*.
	8, 0, 7	*Low Alarm #2*	If this error is configured and the level outside the range for the configured time.	1. Check level of process liquid. 2. Check values in *Alarms* & *Switches*.
	9, 1, 0	*High Alarm #1*	If this error is configured and the level outside the range for the configured time.	1. Check level of process liquid. 2. Check values in *Alarms* & *Switches*.
	10, 1, 1	*High Alarm #2*	If this error is configured and the level outside the range for the configured time.	1. Check level of process liquid. 2. Check values in *Alarms* & *Switches*.
	11, 1, 2	*Keypad Fault*	Indicates a malfunction with the keypad. If a *phantom* non-existent pushbutton appears pressed (e.g. with water in there).	Physically check the keypad.
	13, 1, 4	*Main Temp. Out Of Range*	Indicates that the detected unit temperature is out of range. Range: [-40, 85] °C.	Check the ambient temperature.
	14, 1, 5	*Sensor Temp. Out Of Range*	Indicates that the detected sensor temperature is out of range. Range [-40, 85] °C. Process temp too high or too low.	Modify process as required.
	21, 2, 4	*Main NVM Write Error*	FRAM or data repairing failed on the main board.	Replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.

Table 5 Status/Fault Tab Errors (Continued)

Tab	Sequence, Byte #, Bit #	Tab Error Condition	Cause	Resolution
	22, 2, 5	*Sensor NVM Write Error*	FRAM or data repairing failed on the sensor board.	Replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.
	23, 2, 6	*Main NVM Test Failed*	Both a FRAM record and its copy have CRC errors (as detected by a main board background test).	Replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.
	24, 2, 7	*Sensor NVM Test Failed*	Both a FRAM record and its copy have CRC errors (as detected by a sensor board background test).	Replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.
	25, 3, 0	*RAM Checksum Error*	After a reset, a valid hidden record (in RAM), has failed checksum.	Replace device and report problem at svisupport@bhge.com.
	28, 3, 3	*Stack Overflow*	After a reset, a valid hidden record (in RAM), indicates that a stack overflow has occurred. An internal error from which the device recovered automatically.	1- Clear the condition the DTM or HART® Host. 2- If condition persists, replace device and report problem at svisupport@bhge.com. They replace the whole deice correct?
	30, 3, 5	*Watchdog Timeout*	Stored on reset. An internal error from which the device recovered automatically.	1- Clear the condition the DTM or HART® Host. 2- If condition persists, replace device and report problem at svisupport@bhge.com. They replace the whole deice correct?
	32, 3, 7	*Flash Test Timeout*	Indicates that a flash test is not completed in two hrs. An internal error from which the device recovered automatically.	1- Clear the condition the DTM or HART® Host. 2- If condition persists, replace device and report problem at svisupport@bhge.com.
	34, 4, 1	*Software Fault*	After a reset, a valid hidden record (in RAM), indicates that a CPU exception (such as invalid instruction) occurred, or that an invalid device target mode was found.	1- Clear the condition using the DTM or HART® Host. 2- If condition persists, replace device and report problem at svisupport@bhge.com.

Table 5 Status/Fault Tab Errors (Continued)

Tab	Sequence, Byte #, Bit #	Tab Error Condition	Cause	Resolution
	39, 4, 6	*Invalid Displacer Length*	Set if the span (in eng.units) exceeds the length of the displacer plus an 8.2 mm margin.	Check the settings for the *Displacer Length* and *Span* on *Configuration Database* and *Calibration Tools*, respectively.
	40, 4, 7	*Incorrect Mounting Config*	Set during range calibration if the auto-detected mounting type doesn't match the user-entered configuration.	Check the settings for the *Transmitter Mounting* on *Transmitter General*.
	43, 5, 2	*Working Time Exceeded*	Working time exceeded a configured threshold. Cleared when the time is reset to 0.	Check the settings for the *Time Working* on *Continuous Data and Service Time*.
	48, 5, 7	*Terminal Voltage Low*	Loop voltage (ULOOP) below user-configured threshold.	See *Controller Setup*. Check power supply.
	49, 6, 0	*Terminal Voltage High*	Loop voltage (ULOOP) above threshold.	See *Controller Setup*. Check power supply.
	50, 6, 1	*Diagnostic Voltage Low*	Diagnostic (shunt) voltage is below user-configured threshold.	See *Controller Setup*. Check power supply.
	51, 6, 2	*Diagnostic Voltage High*	Diagnostic (shunt) voltage above user-configured threshold.	See *Controller Setup*. Check power supply.
	52, 6, 3	*HART® Voltage Low*	HART® voltage below user-configured threshold.	Check the settings for the *4-20 mA* settings on *Calibration Tools*.
	53, 6, 4	*HART® Voltage High*	HART® voltage above user-configured threshold.	Check the settings for the *4-20 mA* settings on *Calibration Tools*. Check power supply.
	54, 6, 5	*Core Voltage Low*	Core voltage below threshold. Note: core voltage is the voltage to the CPU.	Not enabled at factory.
	55, 6, 6	*Core Voltage High*	Core voltage above threshold. Note: core voltage is the voltage to the CPU.	Not enabled at factory.
	58, 7, 1	*Level Display Saturated*	Set if internal position or adjusted position is outside the range of +/ -200%.	Check *Calibration*: SG CAL, SG SER, Displacer volume and Weights, Coupling, and Zero shift.

Table 5 Status/Fault Tab Errors (Continued)

Tab	Sequence, Byte #, Bit #	Tab Error Condition	Cause	Resolution
	59, 7, 2	*Insufficient Calculated Range*	Set if abs value of specific gravity recalculated range is too small: < (2.8e6 * 2 / 100). Indicates a disparity between the expected user-entered specific gravity and the specific gravity of the fluid in use. As a result of recalculation, the following can occur: Recalculated range is too narrow.	Check *Calibration*: SG CAL, SG SER, Displacer volume and Weights, Coupling, and Zero shift.
	61, 7, 4	*Level Sensor Off*	Sensor turned off because of insufficient current for more than five seconds.	Check the power source to the transmitter.
User Faults 2	3, 0, 2	*Level Sensor Disconnected*	Level sensor disconnected.	Check the connections between the sensor and the main board.
	6, 0, 5	*Level Sensor Fault*	Compensated AMR level sensor read is outside worst-case limits for both sensor output @90° magnetic field and at worst-case temperature tolerances (computes to -+8,420,026).	1. Check the physical setup of the transmitter. 2- If condition persists, replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.
	15, 1, 6	*Read Main Temp. Failed*	Failure to read main board temperature sensor.	1. Check the physical setup of the transmitter. 2- If condition persists, replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.
	16, 1, 7	*Read Sensor Temp. Failed*	Failure to read sensor board temperature sensor.	1. Check the physical setup of the transmitter. 2- If condition persists, replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.

Table 5 Status/Fault Tab Errors (Continued)

Tab	Sequence, Byte #, Bit #	Tab Error Condition	Cause	Resolution
	17, 2, 0	*Main Temp. Fault*	The main board temperature compensated temperature sensor reading is outside the range [-55.0, 125.0] °C for five reads in a row.	1.Check the conditions working of the 12400. The min/max extended ambient temperature must be between -50°C to 85°C on the 12400 electronic head. 2.Check the process temperature. Above 150°C, an torque tube extension is requested. 3.Check the temperature radiation or conduction from the process to avoid head temperature above the limit given in point 1. 4.If working conditions on the head are inside the limits given on point 1, sensor, main electronic board or complete head could be replaced.
	18, 2, 1	*Sensor Temp. Fault*	The main sensor temperature compensated temperature sensor reading is outside the range [-55.0, 125.0] °C for five reads in a row.	1.Check the conditions working of the 12400. The min/max extended ambient temperature must be between -50°C to 85°C on the 12400 electronic head. 2.Check the process temperature. Above 150°C, an torque tube extension is requested. 3.Check the temperature radiation or conduction from the process to avoid head temperature above the limit given in point 1. 4.If working conditions on the head are inside the limits given on point 1, sensor, main electronic board or complete head could be replaced.
Failsafe	19, 2, 2	*Main NVM Checksum Error*	Main board NVMEM fault.	1- Remove power to the device for a few seconds and restart the device. 2- If condition persists, replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.

Table 5 Status/Fault Tab Errors (Continued)

Tab	Sequence, Byte #, Bit #	Tab Error Condition	Cause	Resolution
	20, 2, 3	*Sensor NVM Checksum Error*	Sensor board NVMEM fault.	1- Remove power to the device for a few seconds and restart the device. 2- If condition persists, replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.
	26, 3, 1	*Flash Checksum Error*	Flash CRC test fails.	1- Remove power to the device for a few seconds and restart the device. 2- If condition persists, replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.
	29, 3, 4	*Factory Write Indicator*	Indicates a raw write to FRAM.	N/A
	33, 4, 0	*MCU Fault*	After a reset, a valid hidden record (in RAM), indicates that a fatal event (watchdog, illegal interrupt, stack overflow, data checksum) occurred twice in a N-second period. (DLT N= 20).	1- Remove power to the device for a few seconds and restart the device. 2- If condition persists, replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.
	60, 7, 3	*Level Sensor Supply Fault*	Sensor supply voltage outside sensor specification.	1- Remove power to the device for a few seconds and restart the device. 2- If condition persists, replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.
	62. 7, 5	*Output is out of Range*	Output exceeds [-200%; 105%] range.	Check the settings on *Calibration*: Check *Calibration*: SG CAL, SG SER, Displacer volume and Weights, Coupling, and Zero shift.
	63, 7, 6	*Position out of Range*	AMR level sensor fault; similar to out-of-normal-range but with wider limits of full linearization table range. This is a SIL2 project specific fault. The Fault is based on 10 -- 1000s timer.	1. Check the sensor mechanical parts mainly the coupling with the torque tube. This could be also a bad calibration setting. Check the settings on *Calibration Tools*.

Table 5 Status/Fault Tab Errors (Continued)

Tab	Sequence, Byte #, Bit #	Tab Error Condition	Cause	Resolution
	64, 7, 7	*Loop Current Error*	Mismatch between user-configured and read loop output (wider range). Mismatch margin is twice that for LOOP_OUTPUT_WARN (0.64mA). Diagnosed only in Normal mode. This is a SIL2 project specific fault. The Fault is based on 10 -- 1000s timer.	*Calibration Tools*Check power supply. If the fault still appears change the main electronic board.
User Faults 1	44, 5, 3	*Current Sensor Fault*	The temperature compensated read-back sensor reading is outside the range [-1.0, 30.0] mA for five reads in a row.	1- Remove power to the device for a few seconds and restart the device. 2- If condition persists, replace device and report problem at svisupport@bhge.com. Sensor, main electronic board or complete electronic head could be replaced.

12. How Do I?

Getting Started Tasks

- ☐ Set Nameplate Data. See *Transmitter General*.
- ☐ Set *Transmitter Mode*, *Action*, and *Mounting*. See *Transmitter General*.
- ☐ Activate the controller. See *Transmitter General*.
- ☐ Set *Zero*, *Span. Level SG* and *Specific Gravity*. See *Calibration Parameters*.
- ☐ Set the *Signal Range*. See *Calibration Tools*.
- ☐ Perform *Autotune*. See *Filters*.
- ☐ Perform *SG Meter Calibration*. See *SG Meter Calibration*.

How Do I?

- ☐ *Change Controller Output*
- ☐ *Change Level Measurement*
- ☐ *Setting Controller Activation*
- ☐ *Setting Torque Tube Compensation*
- ☐ *Change Alarm Settings*
- ☐ *Configure DO Switches*
- ☐ *Auto Tune*
- ☐ *Set Burst Mode*
- ☐ *Perform a Transmitter Calibration*
- ☐ *Perform a Specific Gravity Meter Calibration*
- ☐ *Reset Data*
- ☐ *Set Time Interval*

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13. How Do I Interface with ValVue3?

The lists below give you an idea of what tasks you need to accomplish using ValVue 3 (or PactWARE® , fdtContainer,® etc.). The tasks are split into *Getting Started Tasks* that are necessary at least the first time you configure and *Common Tasks* for tasks performed at anytime. All tasks are listed using the title by which you can find them in the ValVue 3 help.

Getting Started Tasks

- ☐ Add a Field Network
- ☐ Work with Device Areas
- ☐ Add New Device
- ☐ Update DTM Library (Done automatically (ver 3.30 or later) or manually by ValVue 3.)
- ☐ Add/Remove DTMs in the DTM Updates List
- ☐ Installation and Logon
- ☐ Add an Area and Move Device (s)
- ☐ Import Configuration (Done automatically (ver 3.30 or later) or manually by ValVue 3.)

Common Tasks

- ☐ Add a Field Network
- ☐ Work with Device Areas: Use this for creating device areas and child areas. Once areas are created, existing specific devices and groups of devices can be assigned to that area. At the higher level you can assign multiple devices to a new area or an existing area. An individual device can be reassigned to a newly created are or an existing area.
- ☐ Add New Device
- ☐ PDF Report
- ☐ Add an Area and Move Device (s)
- ☐ Delete Device Areas
- ☐ Assign Criticality to a Device or Area
- ☐ Register the Product
- ☐ View Events Details
- ☐ Filter Events
- ☐ Acknowledge Event
- ☐ Create Report of Event and Audit Trail
- ☐ Export Event and Audit Trail Report
- ☐ Update DTM Library
- ☐ Add/Remove DTMs in the DTM Updates List
- ☐ Edit a Field Network

- Sequencer Settings: Sequencer Settings is comprised of:
  - Task Settings: Use this to assign values to they system task performed during a user-configured sequence.
    Tasks are predefined and are categorized into three categories: *Configuration*, *Calibration*, and *Diagnostics* tasks.
  - Sequencer Management: Use this to add, edit and delete sequences of tasks configured in Task Settings.
    A sequencer is a set of tasks that ValVue requests device/DTM to perform silently.
  - Execute Sequencer: Execution of a sequencer can apply to one or multiple devices. You can choose whether a sequencer is executed concurrently or sequentially. The execution can also be schedule based.
  - Sequencer Execution Management: Use this dialog to view a listing of all sequencer executions (All tab), sequencer executions that have been run (History tab) and those that have just been scheduled (Scheduled tab), but not executed.
- Valve Data Management: This section discusses the capabilities to associate a positioner with a valve and in doing so associate, view and analyze test data for that valve.
- Import Configuration: Use this feature as a quick means to copy an existing SVI II AP configuration and its parameters to another SVI II AP positioner.
- Signature Management: Use this feature to view a list of signatures, filter the list, import and export signatures and delete signatures.

DIRECT SALES OFFICE LOCATIONS

AUSTRALIA
Brisbane
Phone: +61-7-3001-4319
Fax: +61-7-3001-4399

Perth

Phone: +61-8-6595-7018
Fax: +61-8-6595-7299

Melbourne
Phone: +61-3-8807-6002
Fax: +61-3-8807-6577

BELGIUM
Phone: +32-2-344-0970
Fax: +32-2-344-1123

BRAZIL

Phone: +55-19-2104-6900

CHINA
Phone: +86-10-5738-8888
Fax: +86-10-5918-9707

FRANCE
Courbevoie
Phone: +33-1-4904-9000
Fax: +33-1-4904-9010

GERMANY
Ratingen
Phone: +49-2102-108-0
Fax: +49-2102-108-111

INDIA
Mumbai
Phone: +91-22-8354790
Fax: +91-22-8354791

New Delhi
Phone: +91-11-2-6164175
Fax: +91-11-5-1659635

ITALY

Phone: +39-081-7892-111
Fax: +39-081-7892-208

JAPAN
Tokyo
Phone: +81-03-6871-9008
Fax: +81-03-6890-4620

KOREA
Phone: +82-2-2274-0748
Fax: +82-2-2274-0794

MALAYSIA
Phone: +60-3-2161-0322
Fax: +60-3-2163-6312

MEXICO

Phone: +52-55-3640-5060

THE NETHERLANDS
Phone: +31-15-3808666

RUSSIA
Veliky Novgorod
Phone: +7-8162-55-7898
Fax: +7-8162-55-7921

Moscow

Phone: +7 495-585-1276
Fax: +7 495-585-1279

SAUDI ARABIA

Phone: +966-3-341-0278
Fax: +966-3-341-7624

SINGAPORE
Phone: +65-6861-6100
Fax: +65-6861-7172

SOUTH AFRICA

Phone: +27-11-452-1550
Fax: +27-11-452-6542

SOUTH and CENTRAL
AMERICA AND THE CARIBBEAN
Phone: +55-12-2134-1201
Fax: +55-12-2134-1238

SPAIN
Phone: +34-93-652-6430
Fax: +34-93-652-6444

UNITED ARAB EMIRATES
Phone: +971-4-8991-777
Fax: +971-4-8991-778

UNITED KINGDOM
Bracknell
Phone: +44-1344-460-500
Fax: +44-1344-460-537

Skelmersdale
Phone: +44-1695-526-00
Fax: +44-1695-526-01

UNITED STATES
Jacksonville, Florida
Phone: +1-904-570-3409

Deer Park, Texas

Phone: +1-281-884-1000
Fax: +1-281-884-1010

Houston, Texas
Phone: +1-281-671-1640
Fax: +1-281-671-1735

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