ValveSight User Manual for D3 HART®
Advanced version

Experience In Motion

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VALVESIGHT™ D3 HART DTM

Welcome to the Flowserve ValveSight™ DTM online help for the D3 HART Positioner. This help provides the user with complete functionality information for the DTM for maintenance, diagnostics, calibration, and configuration of D3 HART Positioner, and associated Actuator, and Valve.

ValveSight™ D3 DTM Navigation map: Click on the links below to directly access the specific information.

Introduction

The ValveSight™ D3 HART DTM comes in Basic and Advanced versions. The Basic version is a free-of-charge DTM containing limited alarm, diagnostic, and configuration features. The Advanced version of the DTM provides a more extensive dashboard view, alarm services, calibration, configuration, and diagnostics (small step, multi step, and ramp signature tests, partial stroke test, histograms, online data logger, event logging, etc). The Basic version may be upgraded to the Advanced version. Contact your local sales representative for more details regarding Advanced DTM licensing.

The Advanced version of the DTM has the following features:

Dashboard: The Dashboard is the default view of the DTM. It shows the online health status of the positioner, actuator, valve, and overall control response. It shows real time measured values of setpoint, position, deviation, ambient temperature of the positioner, supply, C+, and C- pressures. The setpoint mode can be selected and modified from the Dashboard. The Dashboard uses intuitive, user-friendly graphics to display vital data.

Alarm Service: The DTM displays the real time digital output and diagnostic alarm information received from the device. These alarms can be enabled, disabled, and acknowledged. The device stores alarm events in a non-volatile memory. This alarm log information can be viewed in the DTM. The Digital Output and Diagnostic alarm settings and limits can be configured from the alarm configuration views.

Diagnostics: The D3 positioner comes with extensive ValveSight™ Diagnostics.

The following diagnostics can be performed from their respective views.

- Small step, multi step, and ramp tests for evaluating the valve response time, undershoot/overshoot, and settling time in response to the setpoint.
- Partial stroke test for an in-process check to ascertain if the valve is stuck in its current position.
- Histogram for studying the time spent by the valve stem in different zones of its travel range.
- Event Logging shows all of the significant events that have happened in positioner, actuator, valve, and control areas. They are stored chronologically in a non-volatile memory. These events help to monitor the condition of the equipment. They help the user to take corrective action or analyze the root causes of the failure.

- The Data Logger works as an electronic recorder. It continuously monitors the values of position, setpoint, deviation, supply pressure, C+ pressure, C- pressure, ambient temperature of the positioner, and friction. The sampling rate and data collection time can be selected.
- Trends display the values of position, deviation, friction, and number of cycles per hour. The values are accumulated in the device daily for one day, one month, one year, and five years.

Calibration: The calibration views allow automatic calibration of e.g. travel range, calibration of the pressure sensors (supply, C+, and C-), setpoint, and transmitter.

Configuration: All of the configurable parameters of the device are read and written in the configuration views. These variables are presented in groups such as Valve, Actuator, Positioner, Tuning, Units, etc.

HART Information: The HART-specific information can be accessed and/or modified from the HART Information view.

Failure Mode: If a minor fault in the application, such as a leakage in the air tubing, affects the performance of the positioner, the user can put the positioner in Failure Mode. With this setting the positioner operates in a stable mode avoiding an abrupt breakdown in the process. This will give the process operators time to take corrective action before isolating the valve for maintenance.

See Also:

- Dashboard
- DTM Layout

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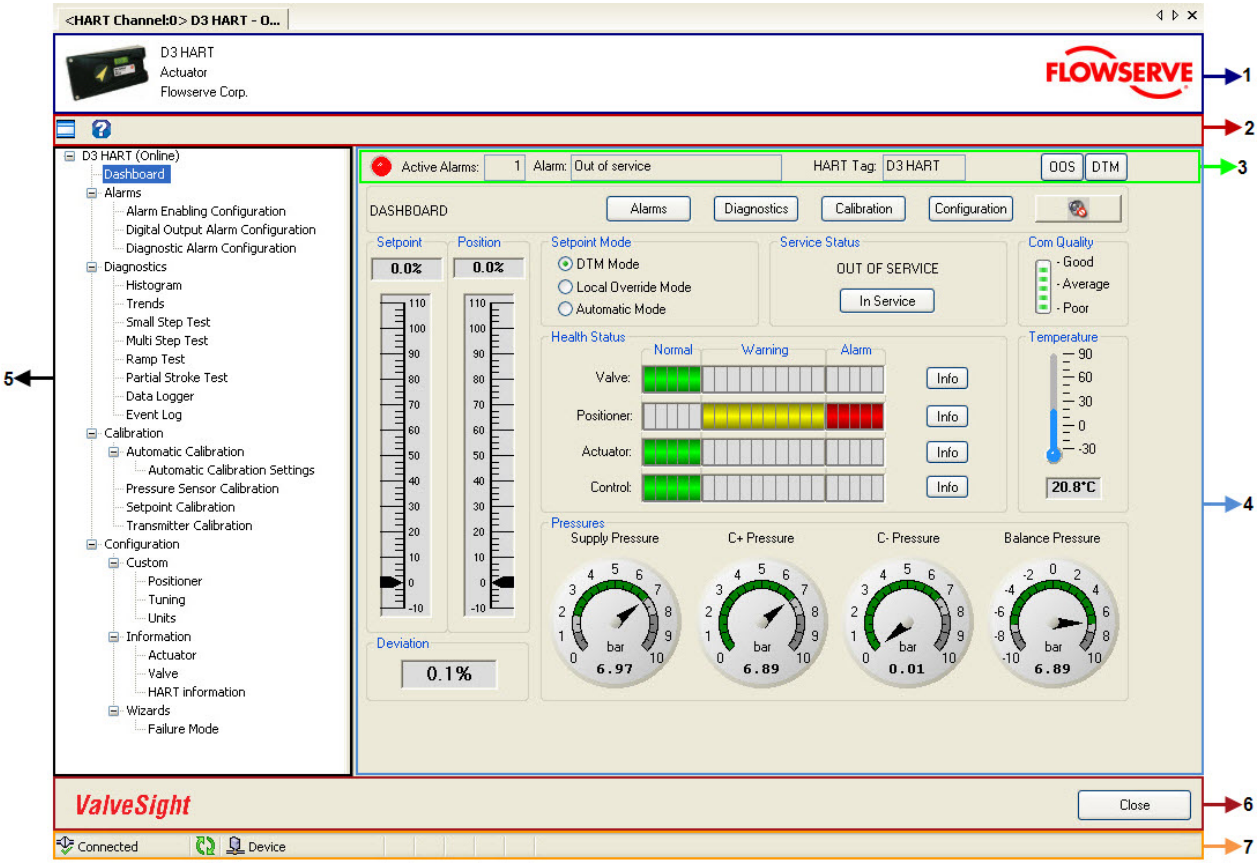
DTM Layout

The D3 HART DTM user interface is based on the FDT DTM style guide v1.0.



1. **Device Identification Area:** This area displays the picture of the D3 Positioner, type of device, and device manufacturer name.
2. **Tool Bar:** The tool bar contains buttons to toggle the navigation tree and for accessing the online help.
3. **Universal Sub Information Area (USIA):** The top row of visual controls in the application area is called the Universal Sub Information Area and is the same in all the views. It contains the following elements:

   LED: The color of the LED changes depending on the alarms in the device as explained below:

   - **Red** - indicates that at least one alarm with category "Failure" is active (each alarm belongs to a specific category)
   - **Orange** - indicates that at least one alarm is active but no alarm with category "Failure"
   - **Green** - indicates no active alarm

   Active Alarms: The number of active alarms present in the device is shown here.

Alarm: The name of the most recent active alarm in the highest category is shown. If several alarms are active, they are sorted with respect to their categories in the following order: "Failure", "Check Function", "Maintenance Required", and "Out of specification". Example: An alarm with category "Check Function" is not shown if an alarm with category "Failure" is active and so forth.

HART Tag: The HART tag for the device is displayed only in the USIA of the Dashboard view and can be used for quick reference to know which device the current DTM is associated with.

Failure Mode: If the device is working in the failure mode condition, the 

indication is shown. If the device is working in normal conditions, no indication of failure mode is shown.

Service Status: In Service 

indicates that the device is following the setpoint. Out Of Service 

indicates that the device is not following the setpoint. Step and Ramp signature tests can be performed in Out Of Service state.

Setpoint Mode: The setpoint of the D3 Positioner can be modified from three different locations - DTM, device local display panel and remote IO of DCS.

- DTM Setpoint Mode 

indicates that the setpoint can be set from the Dashboard of the DTM.
- Local Override Mode 

indicates that the setpoint can be set from the local display panel of D3 Positioner.
- Automatic Setpoint Mode 

indicates that the setpoint is set by the input current from the DCS remote IO or from hand held devices.

4. **Application Area:** This is the area where functional related Input/Output visual controls, text boxes, buttons, dials, progress bars, etc, are located.
5. **Navigation Area:** The navigation area contains the navigation tree of nodes/links to access different views that are grouped into Dashboard, Alarms, Diagnostics, Calibration, and Configuration. Almost all the individual views can be accessed from the links in the navigation tree. Some views are provided with the navigation buttons to access the relevant views for easier user operation.
6. **Action Area:** The action area contains a **CLOSE** button. By clicking the **CLOSE** button, communication with the device ends and DTM is closed.
7. **Status Bar:** The status bar displays icons indicating the connection status to the device.
   - 

- Indicates that communication is taking place between the device and the DTM.
   - 

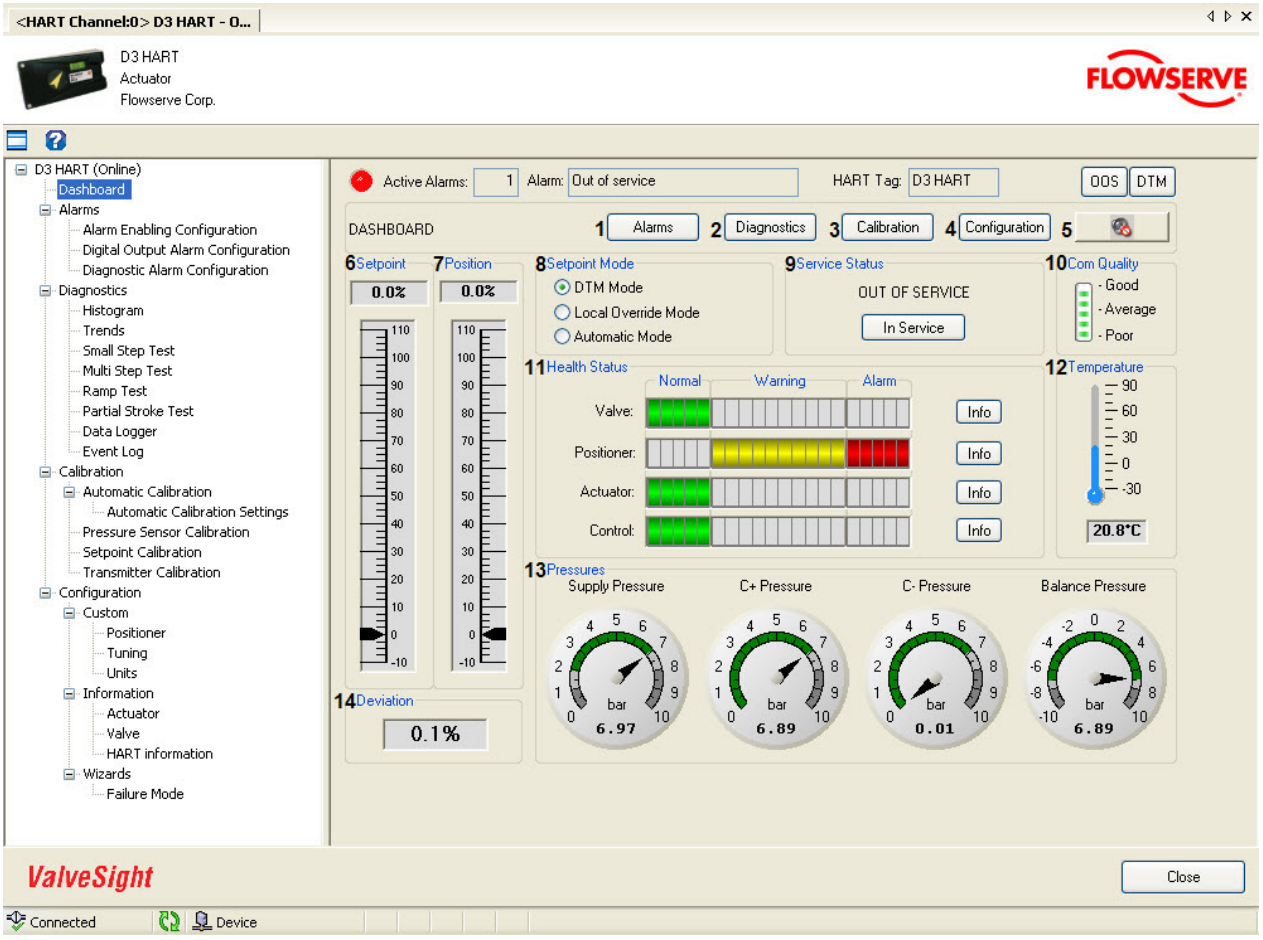
- Indicates that the communication with the device has been lost.
   - 
- Indicates that the DTM is requesting information from the device.

See Also:

Dashboard

The Dashboard is the default view of the DTM showing online health status of the positioner, actuator, valve, and control. It also shows real time measured values of setpoint, position, deviation, and ambient temperature of the positioner, as well as pressure values of supply, C+, C-, and balance of C+ and C-. The setpoint can be modified from the Dashboard.

NOTE: All D3 HART devices are currently not equipped with the ValveSight™ diagnostic tools. Contact your local sales representative for ValveSight™ diagnostic tools.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Alarms	Click on the **ALARMS** button to navigate to the Alarms view. The Alarms view displays real time digital output and diagnostic alarm information received from the device. These alarms can be enabled/disabled and the limits and settings can be configured from the alarm views.
2	Diagnostics	Click on the **DIAGNOSTICS** button to navigate to the

		Diagnostics view. The Diagnostics view contains navigation buttons to Histogram, Trends, Small Step Test, Multi Step Test, Ramp Test, Partial Stroke Test, Data Logger, and Event Log views where the user can access diagnostic information and/or perform diagnostic tests.
3	Calibration	Click on the **CALIBRATION** button to navigate to the Calibration view. The Calibration view contains navigation buttons to Automatic, Pressure sensors, Setpoint, and Transmitter calibration views.
4	Configuration	Click on the **CONFIGURATION** button to navigate to the Configuration view. The Configuration view contains navigation buttons to Custom, Information/License, and Wizards views.
5	Alarm Sound	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
6	Setpoint	The value of the setpoint is displayed in text box and on the vertical indicator. If the Setpoint Mode is not in **DTM setpoint mode** the text box and the vertical indicator are read only. Select **DTM Setpoint Mode** in **Setpoint Mode** to modify the setpoint using the text box or the vertical indicator. Click on the vertical indicator at the required position or modify the value in the text box and press the **ENTER** key. The setpoint value is written to the device and the arrow on the setpoint bar moves automatically to the requested setpoint value.
7	Position	The measured value of valve stem position is displayed in the text box and on the vertical indicator.
8	Setpoint Mode	The setpoint can be modified from three different locations. The user can select any option below by clicking on respective buttons. **DTM Setpoint Mode** - By selecting this option, the text box and the vertical indicator of the setpoint become active. Modify the value in the text box and press the **ENTER** key, or simply click on the appropriate value on the vertical indicator to write a new setpoint to the device. **Local Override Setpoint Mode (Manual Mode)** - By selecting this option, the setpoint can be modified from the local display panel of the D3 positioner. **Automatic Setpoint Mode** - By selecting this option, the setpoint is taken from the DCS remote IO.
9	Service Status	The Positioner can be put into In Service or Out of Service by clicking on the toggle button. The actual service status is displayed above the button. 1. In Service - the device follows the setpoint signal. 2. Out of Service - the device does not follow the setpoint signal. Diagnostic tests such as Step Signature and Ramp Signature tests can be performed in this service

		status only.
10	Com Quality	The quality of communication between the DTM and the device is calculated based on the expected and actual round trip time. Move the mouse pointer over the bar to get detailed information on communication.
11	Health Status	The Health Status of the D3 Positioner is based on alarms that are divided into four groups - **Valve**, **Actuator**, **Positioner**, and **Control.** The respective Health Status information is displayed on a set of bars in the following manner: If one or several of the alarms are active, the whole **Warning** bar is orange and the **Alarm** bar is red, otherwise the **Normal** bar is green. The filled length of the **Warning** bar represents the proximity to alarm occurrence. The alarm that is closest to becoming active determines the filled length of the **Warning** bar. The alarm details will pop-up by clicking on the **INFO** button to the right of respective alarm bar. If all alarms are far from becoming active, the filled length of **Warning** bar is zero and the **Normal** bar is green. **NOTE:** For some alarms, it is not possible to determine the proximity to become active. In this case, the filled length of **Warning** bar is zero until it is an active alarm.
12	Temperature	The thermometer provides a visual display of the ambient temperature of the positioner. Below the thermometer the numerical reading of the ambient temperature and its unit of measure is displayed.
13	Pressures	The measured values of supply pressure, C+ pressure, C- pressure, and balance pressure are displayed in the respective gauges. The gauges are visible only when the positioner is equipped with pressure sensors. The C- and balance pressure gauges display **NA** (Not Applicable) if the actuator is of the single acting type.
14	Deviation	The setpoint minus the measured position is displayed in the text box.

See also:

- Introduction
- Alarms

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Alarms

Alarms

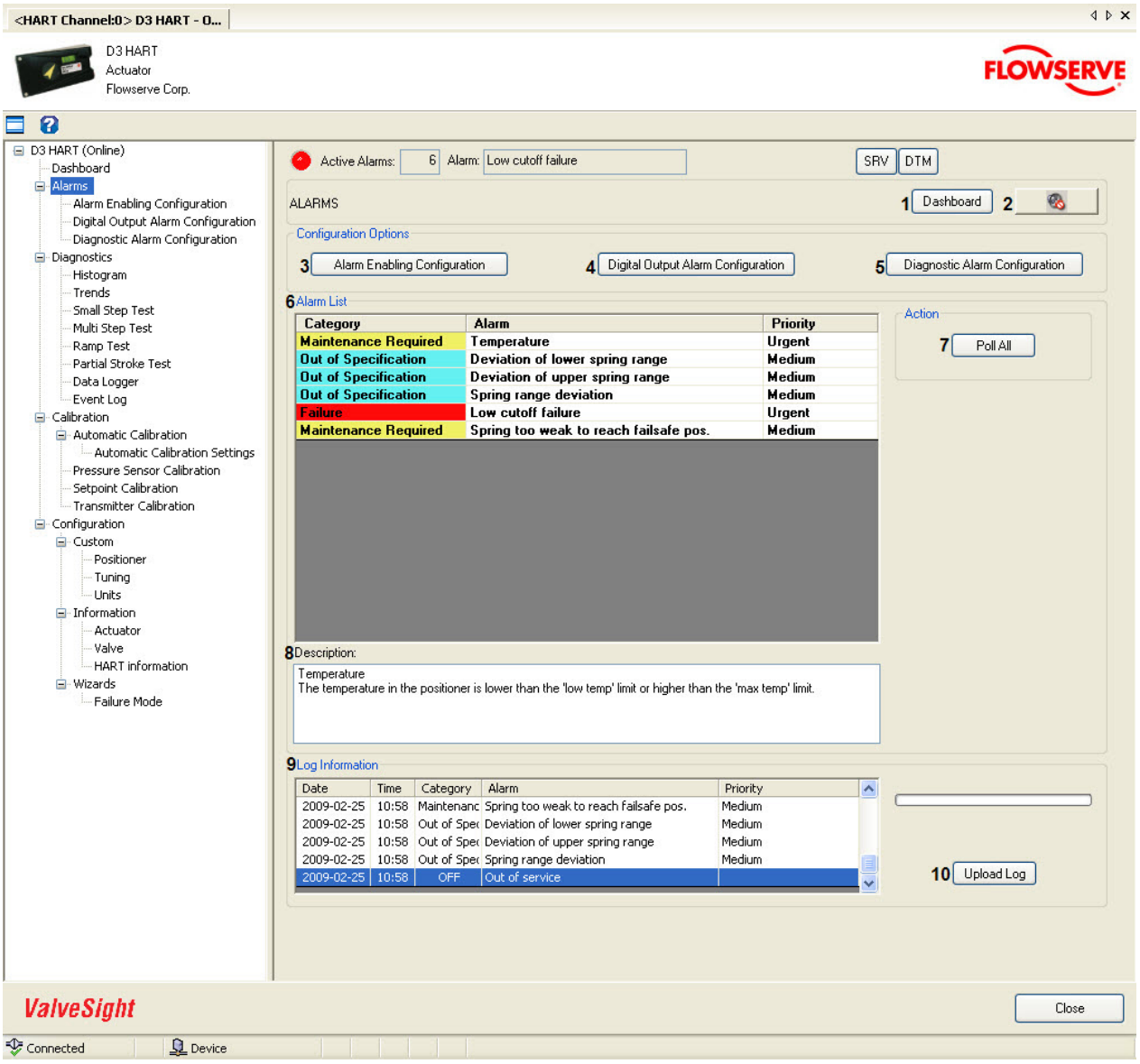
The Alarms view displays all active alarms present in the device. The **ALARM LIST** shows all present alarms with Category, Alarm name, and Priority. When the defect causing the alarm has been corrected/repaired, the alarm will disappear from the **ALARM LIST**.

Click on any alarm in the **ALARM LIST** to view the alarm description in the **DESCRIPTION** area.

Double click on any alarm in the **ALARM LIST** to open the Alarm Information view with more details about the selected alarm. The alarms can also be ignored from this view.

Alarm events are accumulated in a non-volatile memory of the device in the chronological order with calculated time of occurrence based on the run time of the device. The alarm event list is displayed in the **LOG INFORMATION** table. Alarm events are logged in the device even when the DTM is not connected to the device.

NOTE: The alarm functionality is turned on after the first complete Automatic Calibration has been performed. No alarms are generated before that.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
2	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
3	Alarm Enabling Configuration	Click on the **ALARM ENABLING CONFIGURATION** to navigate to the Alarm Enabling Configuration view. This view provides an overview of all alarms and allows

		configuration of the enabling status.
4	Digital Output Configuration	Click on the **DIGITAL OUTPUT ALARM CONFIGURATION** to navigate to the Digital Output Alarm Configuration view. Limits and settings of the digital output alarms can be configured in this view.
5	Diagnostic Alarm Configuration	Click on the **DIAGNOSTIC ALARM CONFIGURATION** to navigate to the Diagnostic Alarm Configuration view. Symptom limits and settings can be configured in this view.
6	Alarm List	This list displays the active alarms present in the device. The alarm categories are: Out of Specification, Maintenance Required, Check Function, and Failure. The alarm priorities are: Low, Medium, High, and Urgent
7	POLL ALL	Click on **POLL ALL** to read all the alarms including the acknowledged alarms from the device, irrespective of the cyclic update of the alarms. This button can be used to refresh the **ALARM LIST**.
8	Description	A detailed description of the alarm that is selected in the **ALARM LIST** is displayed in this box.
9	Log Information	The alarm events that are accumulated in the device are displayed on this grid.
10	Refresh Log	Click on **REFRESH LOG** to initiate the upload of the alarm events from the device.

See Also:

- Alarm Information
- Alarm Enabling Configuration
- Digital Output Alarm Configuration
- Diagnostics Alarm Configuration
- Alarm Descriptions

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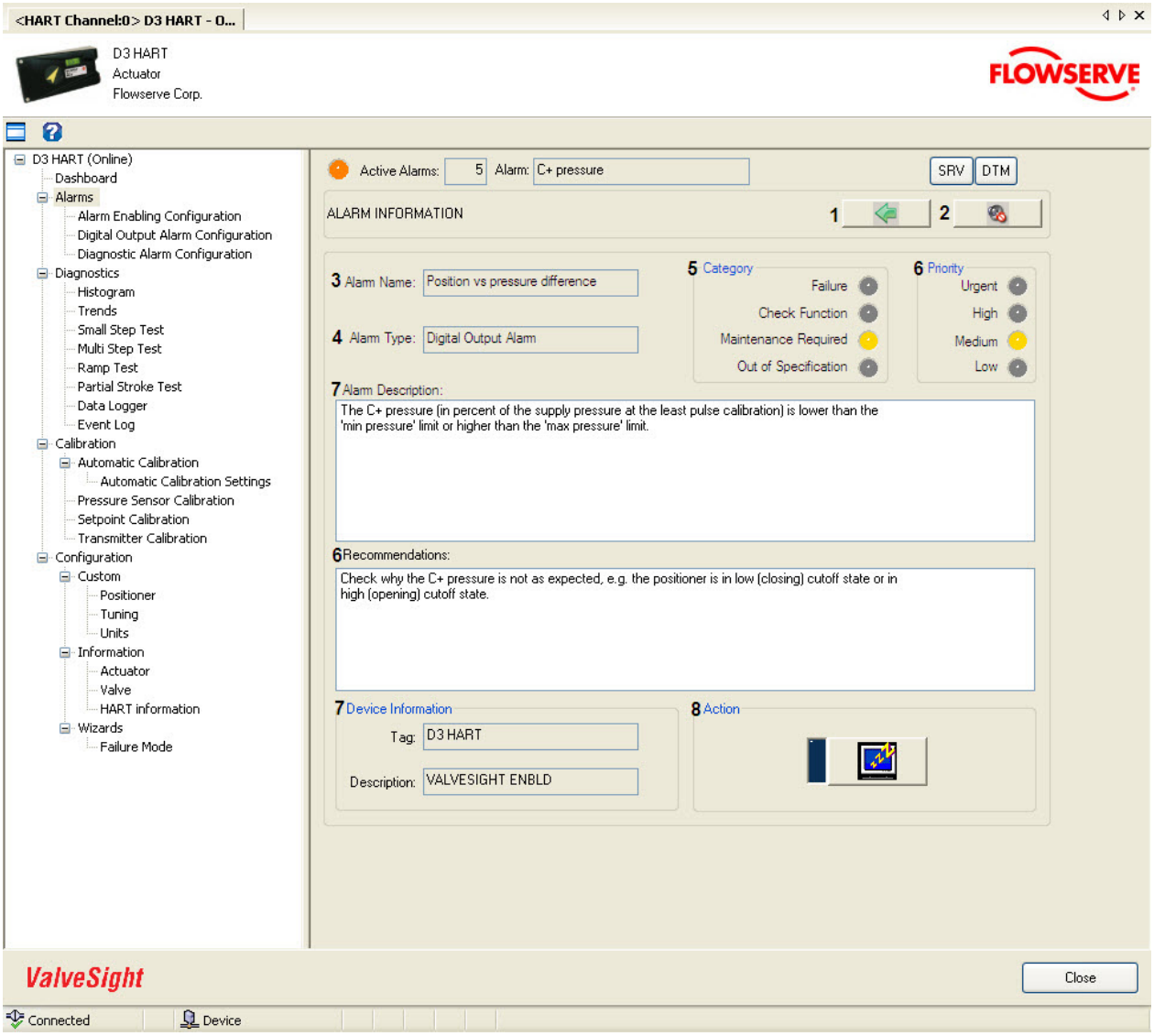
Alarm Information

The Alarm Information view pops up only when the user double clicks on a particular alarm in the Alarm List of Alarms view. The Alarm Information view node is not visible in the navigation tree. The Alarm Information view displays detailed information on the selected alarm. The user can ignore the alarm from this view and the alarm will then appear in gray in the Alarm List of the Alarms view.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Alarms view.
2	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle sound

		ON / OFF. This is for audible indication along with visual indication of the LED, if the alarms are present in the device.
3	Alarm Name	The name of the selected alarm for the Alarms view.
4	Alarm Type	The alarm type of the selected alarm; Digital output alarm or Diagnostic alarm.
5	Category graphics	Category of the selected alarm is indicated in the light array.
6	Priority graphics	Priority of the selected alarm is indicated in the light array. The priority indicates how fast the defect causing this alarm needs to be rectified.
7	Alarm Description	Detailed description of the selected alarm is displayed in the text box.
8	Recommendations	Recommendations to rectify the defect causing the alarm are displayed. These are the probable but not limited solutions.
9	Device Information	The Device Information area contains two fields: **Tag:** Displays the device tag information set in the HART Information view. **Description:** Displays the device description information set in the HART Information view.
10	IGNORE	Click on the **IGNORE** button to ignore the selected alarm. The alarm will be grayed out in the Alarm List of the Alarms view, but is still active. The rectangle to the left of the button is blue when the alarm is ignored.

See Also:

- Alarms
- Alarm Enabling Configuration
- Digital Output Alarm Configuration
- Diagnostic Alarm Configuration
- Alarm Descriptions

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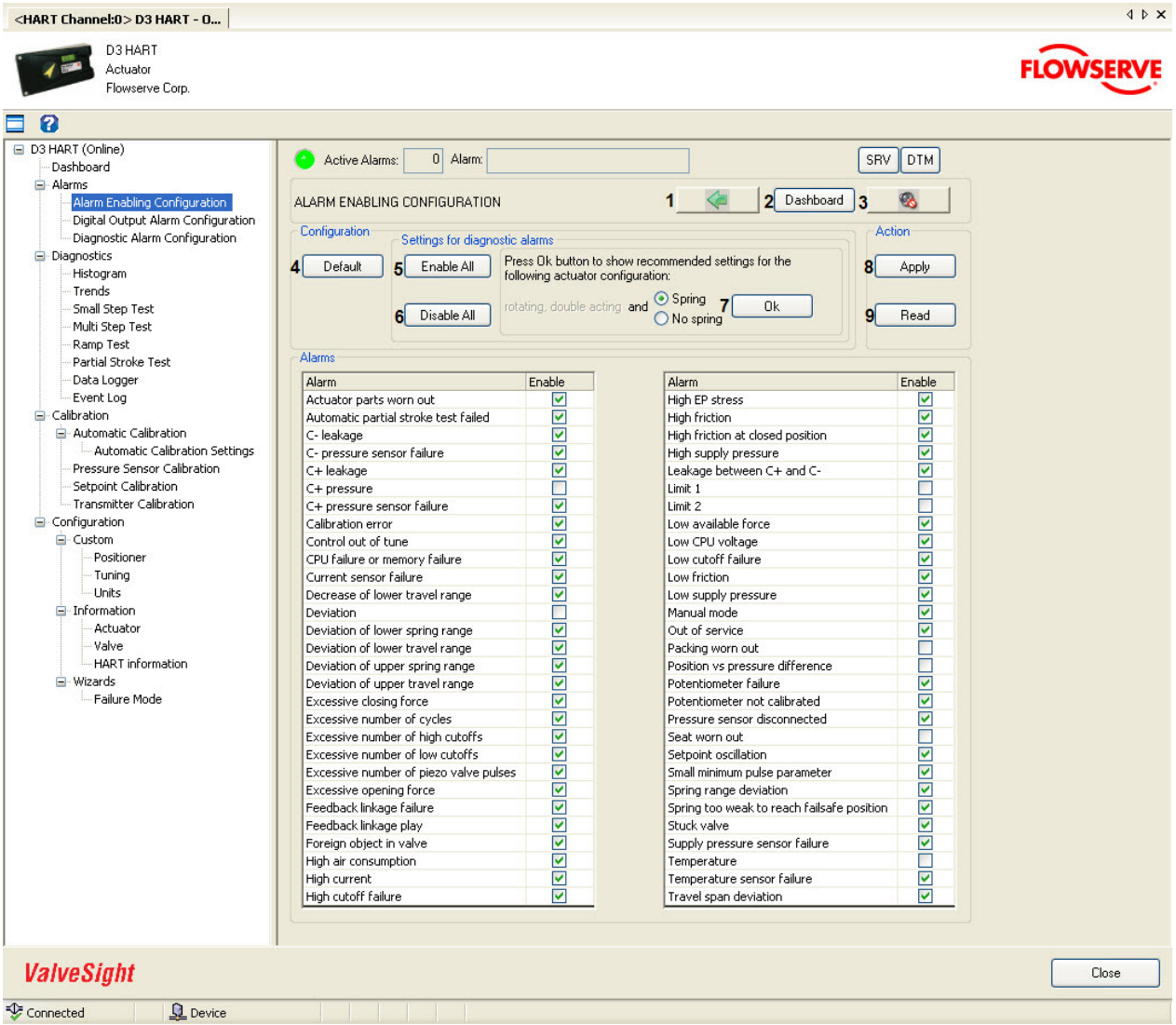
Alarm Enabling Configuration

The Alarm Enabling Configuration view provides an overview of all alarms and allows configuration of the enabling status. It contains a default setup that presents a suggestion of alarms that should be enabled. It also contains recommended settings that are dependent of the actuator configuration as well as enable/disable all buttons for the diagnostic alarms.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Alarms view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.

3	Sound On/Off	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Default	Click on the **DEFAULT** button to display the default setup of enabled alarms.
5	Enable All	Click on the **ENABLE ALL** button to check all the check boxes for the diagnostic alarms.
6	Disable All	Click on the **DISABLE ALL** button to uncheck all the check boxes for the diagnostic alarms.
7	Ok	Click on the **OK** button to check the check boxes of the recommended setting, depending on actuator function, actuator type, and spring availability.
8	Apply	Click on the **APPLY** button to write the alarm enabling configuration to the device.
9	Read	Click on the **READ** button to read the alarm enabling configuration from the device.

See Also:

- Alarms
- Alarm Information
- Digital Output Alarm Configuration
- Diagnostic Alarm Configuration
- Alarm Descriptions

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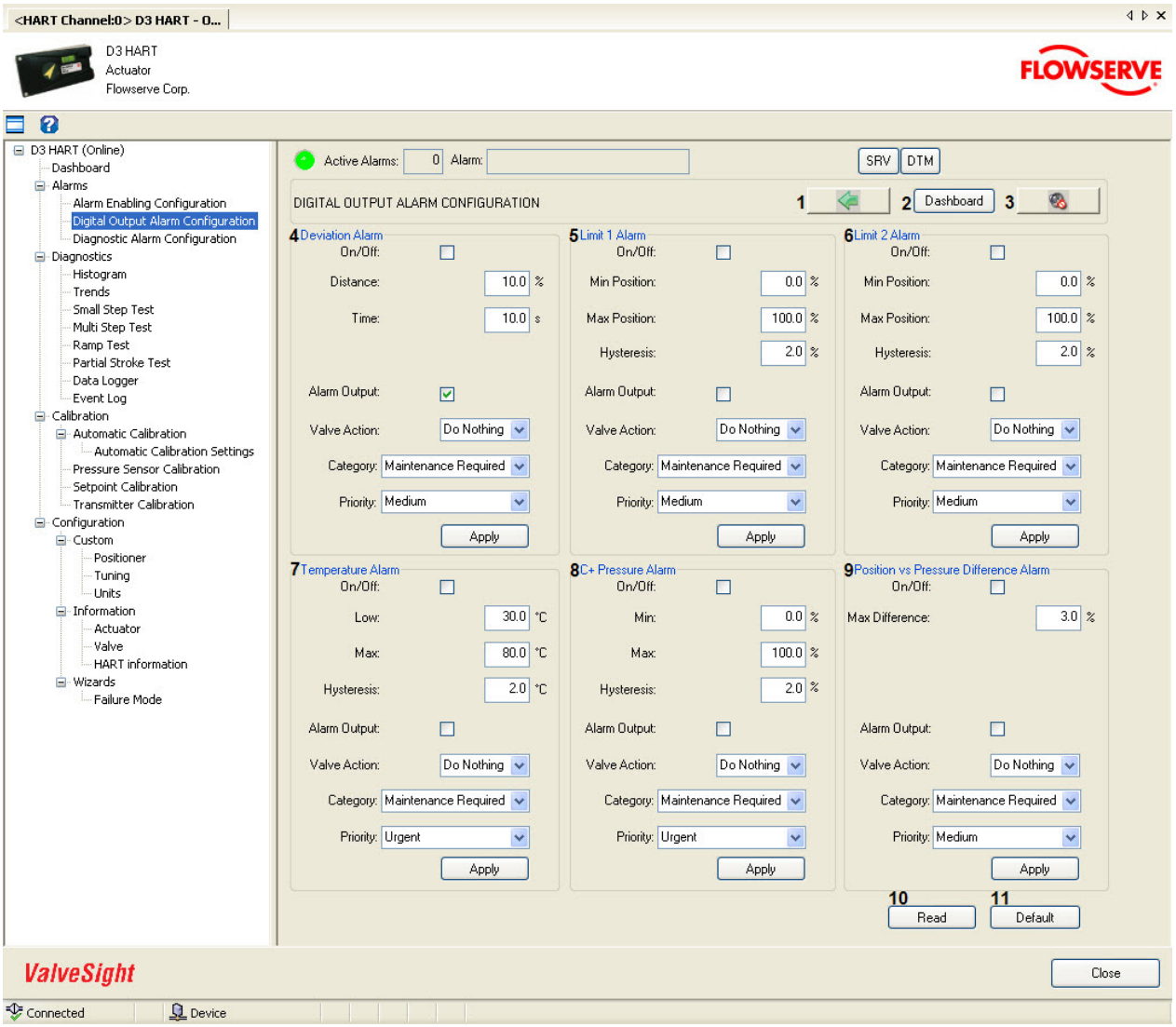
Digital Output Alarm Configuration

In the Digital Output Alarm Configuration view the settings for six different digital output alarms can be modified. Contrary to the diagnostic alarms, the digital output alarms can affect the alarm output on the D3 positioner and generate a valve action.

All modified values are validated against predefined ranges. If the modified value is invalid, a ! is displayed next to the input text box with the valid range in the tool tip.



The navigation buttons and input/output visual control elements are explained in the table below:

Sl. No.	Navigation Field	Description

1	Back	Click on the **BACK** button to navigate to the Alarms view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Deviation Alarm	The **Deviation** alarm is activated when the deviation between the position and the setpoint is larger than the **Distance** limit and it has been so for a period longer than the **Time** limit. The alarm becomes inactive as soon as the deviation is smaller than the **Distance** limit. **Recommendations:** Review other active alarms to find root causes of this alarm. Consider if the limits are reasonable. The alarm is enabled/disabled from the **On/Off** check box. The alarm output is enabled/disabled from the **Alarm Output** drop down list, and the valve response to the alarm occurrence is set from the **Valve Action** drop down list. The category is set from the **Category** drop down list and the priority is set from the **Priority** drop down list. By clicking on the **APPLY** button, the configured values for this alarm are written to the device.
5	Alarm Limit 1	The **Limit 1** alarm is activated when the position is lower than the **Min position** limit or higher than the **Max position** limit. The alarm becomes inactive when the position is higher than the **Min position** limit plus the **Hysteresis** limit and lower than the **Max position** limit minus the **Hysteresis** limit. **Recommendations:** Check to see if the setpoint is outside the interval defined by the limits or near these limits. If it is not, the deviation must be large. In this case, review other active alarms to find root causes of the large deviation. The alarm is enabled/disabled from the **On/Off** check box. The alarm output is enabled/disabled from the **Alarm Output** drop down list, and the valve response to the alarm occurrence is set from the **Valve Action** drop down list. The category is set from the **Category** drop down list and the priority is set from the **Priority** drop down list. By clicking on the **APPLY** button, the configured values for this alarm are written to the device.
6	Alarm Limit 2	The **Limit 2** alarm is activated when the position is lower than the **Min position** limit or higher than the **Max position** limit. The alarm becomes inactive when the position is higher than the **Min position** limit plus the **Hysteresis** limit and lower than the **Max position** limit minus the **Hysteresis** limit. **Recommendations:** Check to see if the setpoint is outside the

		interval defined by the limits or near these limits. If it is not, the deviation must be large. In this case, review other active alarms to find root causes of the large deviation. The alarm is enabled/disabled from the **On / Off** check box. The alarm output is enabled/disabled from the **Alarm Output** drop down list, and the valve response to the alarm occurrence is set from the **Valve Action** drop down list. The category is set from the **Category** drop down list and the priority is set from the **Priority** drop down list. By clicking on the **APPLY** button, the configured values for this alarm are written to the device.
7	Temperature Alarm	The **Temperature** alarm is activated when the temperature in the positioner is lower than the **Low temp** limit or higher than the **Max temp** limit. The alarm becomes inactive when the temperature is higher than the **Low temp** limit plus the **Hysteresis** limit and lower than the **Max temp** limit minus the **Hysteresis** limit. **Recommendations:** Regulate the temperature of the positioner. If the temperature reading is in error, replace the mother board. The alarm is enabled/disabled from the **On / Off** check box. The alarm output is enabled/disabled from the **Alarm Output** drop down list, and the valve response to the alarm occurrence is set from the **Valve Action** drop down list. The category is set from the **Category** drop down list and the priority is set from the **Priority** drop down list. By clicking on the **APPLY** button, the configured values for this alarm are written to the device.
8	C+ Pressure Alarm	The **C+ pressure** alarm is activated when the C+ pressure (in percent of the supply pressure at the least pulse calibration) is lower than the **Min pressure** limit or higher than the **Max pressure** limit. The alarm becomes inactive when the C+ pressure is higher than the **Min pressure** limit plus the **Hysteresis** limit and lower than the **Max pressure** limit minus the **Hysteresis** limit. **Recommendations:** Check why the C+ pressure is not as expected, e.g. the positioner is in low (closing) cutoff state or in high (opening) cutoff state. The alarm is enabled/disabled from the **On / Off** check box. The alarm output is enabled/disabled from the **Alarm Output** drop down list, and the valve response to the alarm occurrence is set from the **Valve Action** drop down list. The category is set from the **Category** drop down list and the priority is set from

		the **Priority** drop down list. By clicking on the **APPLY** button, the configured values for this alarm are written to the device.
9	Position vs Pressure Difference Alarm	The **position vs pressure difference** alarm is activated when the deviation between the position (in percent) and the C+ pressure (in percent of the supply pressure at the least pulse calibration) is larger than the **max difference** limit. Note that, in the case of ATC (air to close), the position is compared with 100% minus C+ pressure instead. **Recommendations:** Check if the relationship between C+ pressure and position is as expected. If it is, increase the limit. If it is not, check the functionality of the pressure and position sensors and the actuator spring. The alarm is enabled/disabled from the **On/Off** check box. The alarm output is enabled/disabled from the **Alarm Output** drop down list, and the valve response to the alarm occurrence is set from the **Valve Action** drop down list. The category is set from the **Category** drop down list and the priority is set from the **Priority** drop down list. By clicking on the **APPLY** button, the configured values for this alarm are written to the device.
10	Read	Click on the **READ** button to read all the alarm configuration values from the device.
11	Default	Click on the **DEFAULT** button to display the default values for all the digital output alarms settings. By clicking on the **DEFAULT** button, default values are just displayed in the view. If required to write these values to the device, click on respective **APPLY** button.

See Also:

- Alarms
- Alarm Information
- Alarm Enabling Configuration
- Diagnostic Alarm Configuration
- Alarm Descriptions

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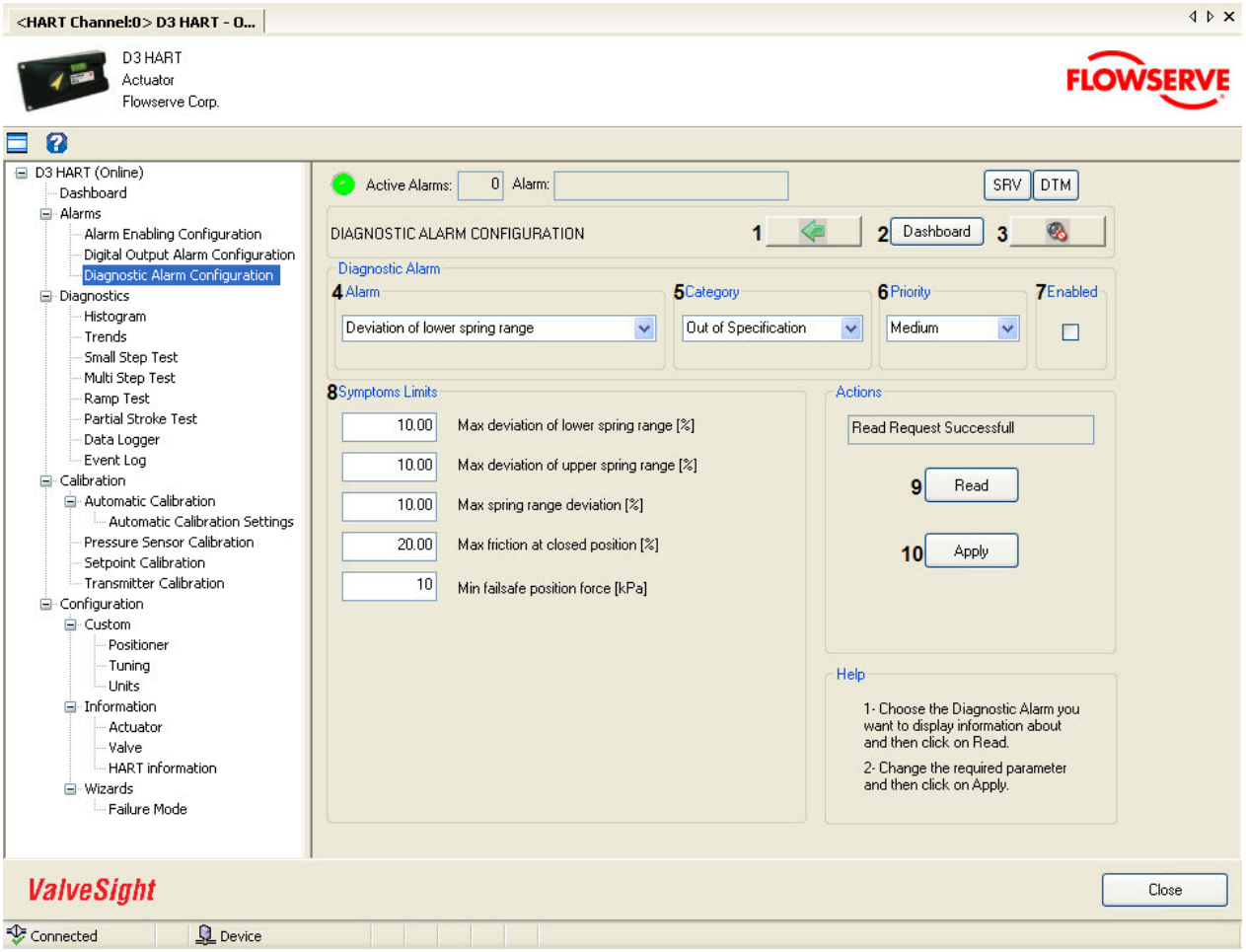
Diagnostic Alarm Configuration

In the Diagnostic Alarm Configuration view the diagnostic alarms can be enabled or disabled. Furthermore, the category, priority, and symptom limits can be modified for these alarms.

To read the settings and symptom limits of any alarm from device, select that particular alarm from the **ALARM** drop down list and click on the **READ** button.

To modify the setting and/or symptom limits, change the values in the associated text boxes, drop down lists, or check box and click on the **APPLY** button.



NOTE: It is recommended to read the values from the device before modifying and writing new values to the device.

The navigation buttons and input/output visual control elements are explained in the table below:

Field	Field	Description

No.	Name	
1	Back	Click on the **BACK** button to navigate to the Alarms view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button  to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Alarm	Drop down list contains all the diagnostic and process alarms. The user can select any one to read its setting from device.
5	Category	Drop down list contains different alarm categories indicating the type of the selected alarm: ▪ Out of specification ▪ Maintenance Required ▪ Check Function ▪ Failure
6	Priority	Drop down list contains priority levels indicating how fast the defect causing the selected alarm needs to be attended: ▪ Low ▪ Medium ▪ High ▪ Urgent
7	Enabled	To Enable/Disable the alarm. Once the Alarm is disabled by deselecting the check box, it cannot be active in the device and, therefore, it will not be displayed in the Alarms view.
8	Symptoms Limits	If the selected alarm has symptom limits to be set, this area will contain the alarm limit information.
9	Read	Click on the **READ** button to read the settings and symptom limits of the alarm selected from Alarm drop down list. On successful read, the associated symptom limits are shown in the Symptom Limits area and other setting are set in respective drop down list or check boxes.
10	Apply	Click on the **APPLY** button to write the settings and/or symptom limits of the alarms selected from Alarm drop down list.

Principles used for limit units

The units used for some limits may seem strange. This section will explain the principles used for limits units.

The positioner is equipped with pressure sensors. To be able to calculate a force (or torque) from pressure measurements, information about the area of the bellows is needed. This information is not available unless the user provides it. Therefore, the diagnostic performed by the positioner is based on pressure values instead of forces (or torques). Furthermore, forces, such as friction, are shown as pressures so that they can also be shown in cases

where no information about the area has been provided. If the magnitude of a force is needed, multiply the corresponding pressure value with the area value. However, by using a pressure value instead of a force value, it may be easier to conclude if the value is large or not, e.g. it may be suitable to compare the friction with the supply pressure.

All limits are initially set to a default value. To be able to find default values that are reasonable for a wide range of actuators and valves, some limits are normalized e.g. with supply pressure and average stroke time.

See Also:

- Alarms
- Alarm Information
- Alarm Enabling Configuration
- Digital Output Alarm Configuration
- Alarm Descriptions

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Alarm Descriptions

Alarm Name	Description	Recommendations
Actuator parts worn out	The 'actuator parts worn out' alarm is activated when the time for which positioner has been powered is larger than the 'actuator maintenance period' limit or the accumulated travel divided by the travel span is larger than the 'max accumulated travel' limit.	Follow routine procedures for actuator maintenance. Increase the 'actuator maintenance period' and 'max accumulated travel' limits to new accepted values. If the 'packing worn out' alarm is also reported, increase the 'max accumulated travel' limit to the new accepted value for the part that is not being replaced.
Automatic partial stroke test failed	The 'automatic partial stroke test failed' alarm is activated when the latest automatic partial stroke test has failed. The position does not reach 63% of the desired step within maximum waiting time.	Follow plant procedure for failed partial stroke.
C- leakage	The 'C- leakage' alarm is activated when the C- pressure drop rate is larger than the 'max C- drop for a stroketime' limit (divided by the average stroke time). Furthermore, the sum of C+ and C- drop rates is larger than the 'max C+ C- sum drop for a stroketime' limit.	Repair pneumatic leaks at the tubing junctions and actuator seals related to C-. Consider if the limits are reasonable.
C- pressure sensor failure	The 'C- pressure sensor failure' alarm is activated when the C- pressure sensors measurement gives an extreme value.	Check that the cable between the pressure sensor board and the mother board is in working order and properly connected.
C+ leakage	The 'C+ leakage' alarm is activated when the C+ pressure drop rate is larger than the 'max C+ drop for a stroketime' limit (divided by the average stroke time). Furthermore, for double acting actuators, the sum of C+ and C- drop rates is larger than the 'max C+ C- sum drop for a stroketime' limit.	Repair pneumatic leaks at the tubing junctions and actuator seals related to C+. Consider if the limits are reasonable.
C+ pressure	The 'C+ pressure' alarm is activated when the C+ pressure (in percent of the supply pressure at the least pulse calibration) is lower than the 'min pressure' limit or higher than the 'max pressure' limit. The alarm becomes inactive when the C+ pressure is higher than the 'min pressure' limit plus the 'hysteresis' limit and lower than the 'max pressure' limit minus the 'hysteresis' limit.	Check why the C+ pressure is not as expected, e.g. the positioner is in low (closing) cutoff state or in high (opening) cutoff state.
C+ pressure sensor failure	The 'C+ pressure sensor failure' alarm is activated when the C+ pressure sensor measurement gives an extreme value.	Check that the cable between the pressure sensor board and the mother board is in working order and properly connected.
Calibration error	The 'calibration error' alarm is activated when an error occurs during a calibration.	Execute 'Auto Calibration' from the 'Calibration/Automatic' view to obtain more detailed information about the calibration error.
Control out of	The 'control out of tune' alarm is activated	Execute 'Auto Tune' from the

tune	when the number of cycles per 5 seconds is larger than the 'max cycles per 5 seconds' limit and one or several of the following conditions are true for the latest offline step response (multiple step test or small step test): 1. The dead time is larger than the 'max dead time in step response' limit. 2. The settling time is larger than the 'max settling time in step response' limit. 3. The overshoot is larger than the 'max overshoot in step response' limit.	'Calibration/Automatic' view and then perform a step test from the 'Diagnostics/Step Test' view. If the alarm appears again, try to manually adjust the control parameters in the 'Tuning Configuration View'. Consider if the limits are reasonable.
CPU failure or memory failure	The 'CPU failure or memory failure' alarm is activated when there is an error in the CPU or the memory circuits.	Replace the mother board.
Current sensor failure	The 'current sensor failure' alarm is activated when the setpoint current sensor measurement gives an extreme value.	If the presented setpoint is very high, the shunt resistor in the current measurement circuit is destroyed. If it is very low, a filter resistor for the A/D converter is out of order. In both cases, replace mother board.
Decrease of lower travel range	The 'decrease of lower travel range' alarm is activated when the estimated travel span has increased more than the 'max travel span increase' limit since the latest travel calibration. Furthermore, the estimated closed valve position has decreased more than the 'max deviation of lower travel range' limit.	Set 'Travel Control Low' to cutoff. Change the setpoint to 0%. If the alarm does not disappear, check for play in positioner mounting, linkage, and feedback potentiometer. Also check if the valve seat is eroded. Consider if the limits are reasonable.
Deviation	The 'deviation' alarm is activated when the deviation between the position and the setpoint is larger than the 'distance' limit and it has been so for a period longer than the 'time' limit. The alarm becomes inactive directly when the deviation is smaller than the 'distance' limit.	Review other active alarms to find root causes of this alarm. Consider if the limits are reasonable.
Deviation of lower spring range	The 'lower spring range deviation' alarm is activated when the deviation between the estimated lower spring range and the 'lower spring range' parameter is larger than the 'max deviation of lower spring range' limit. To be more precise, the deviation in percent of the 'upper spring range' parameter is used when comparing with the limit.	Check parameter, limit, and spring.
Deviation of lower travel range	The 'deviation of lower travel range' alarm is activated when the deviation between the estimated closed valve position and the closed valve position measured at the latest travel calibration is larger than the 'max deviation of lower travel range' limit.	Set 'Travel Control Low' to cutoff. Change the setpoint to 0%. If the alarm does not disappear, check for play in positioner mounting, linkage, and feedback potentiometer. Also check for mechanical problems in the valve and actuator at the end position. Consider if the limit is reasonable.
Deviation of upper spring range	The 'deviation of upper spring range' alarm is activated when the deviation between the estimated upper spring range and the 'upper spring range' parameter is larger than the 'max deviation of upper spring range' limit.	Check parameter, limit, and spring.

	To be more precise, the deviation in percent of the 'upper spring range' parameter is used when comparing with the limit.	
Deviation of upper travel range	The 'deviation of upper travel range' alarm is activated when the deviation between the estimated opened valve position and the opened valve position measured at the latest travel calibration is larger than the 'max deviation of upper travel range' limit.	Set 'Travel Control High' to cutoff. Change the setpoint to 100%. If the alarm does not disappear, check for play in positioner mounting, linkage, and feedback potentiometer. Also check for mechanical problems in the valve and actuator at the end position. Consider if the limit is reasonable.
Excessive closing force	The 'excessive closing force' alarm is activated when the force applied by actuator to close the valve is larger than the 'max closing force' limit. To be more precise, the force in percent of the supply pressure at the least pulse calibration is used when comparing with the limit. (When calculating the force, only the air pressure and the spring force are considered.)	Decrease supply pressure. If air-to-open actuator, consider redimensioning of the actuator.
Excessive number of cycles	The 'excessive number of cycles' alarm is activated when the number of cycles is larger than the 'max cycles' limit.	Follow routine procedures for valve package maintenance such as checking the packing tightness, and checking linkages for wear, misalignment, and tightness. After maintenance, increase the limit.
Excessive number of high cutoffs	The 'excessive number of high cutoffs' alarm is activated when the number of cutoffs at high setpoint (near 100%) is larger than the 'max number of high cutoffs' limit.	Check the upper valve movement stop in the package and maintain if necessary. Thereafter, increase the limit.
Excessive number of low cutoffs	The 'excessive number of low cutoffs' alarm is activated when the number of cutoffs at low setpoint (near 0%) is larger than the 'max number of low cutoffs' limit.	Check that the valve seat and plug are not worn out and maintain if necessary. Thereafter, increase the limit.
Excessive number of piezo valve pulses	The 'excessive number of piezo valve pulses' alarm is activated when the number of pulses performed by the piezo valves is larger than the 'max piezo pulses' limit.	Replace the air relay. Thereafter, increase the limit.
Excessive opening force	The 'excessive opening force' alarm is activated when the force applied by actuator to open the valve is larger than the 'max opening force' limit. To be more precise, the force in percent of the supply pressure at the least pulse calibration is used when comparing with the limit. (When calculating the force, only the air pressure and the spring force are considered.)	Decrease supply pressure. If air-to-close actuator, consider redimensioning of the actuator.
Feedback linkage failure	The 'feedback linkage failure' alarm is activated when no movement is detected (i.e. the change in the position each second is less than or equal to the 'no movement tolerance' limit) even though the setpoint oscillates.	Check linkage and feedback potentiometer. Also check that the cable between the potentiometer and the mother board is in working order and properly connected.
Feedback linkage play	The 'feedback linkage play' alarm is activated when the play in feedback linkage	Execute 'Auto Tune' from the 'Calibration/Automatic' view (or 'Play

	is larger than the 'max feedback linkage play' limit.	estimation' from the local positioner display) to verify the result from the last play estimation. If the alarm does not disappear, check for play in positioner mounting, linkage, and feedback potentiometer. Consider if the limit is reasonable.
Foreign object in valve	The 'foreign object in valve' alarm is activated when the estimated travel span has decreased more than the 'max travel span decrease' limit since the latest travel calibration. Furthermore, the estimated closed valve position has increased more than the 'max deviation of lower travel range' limit or the estimated opened valve position has decreased more than the 'max deviation of upper travel range' limit.	Set 'Travel Control Low' and 'Travel Control High' to cutoff. Change the setpoint to 0%, wait one minute, and finally change the setpoint to 100%. If the alarm does not disappear, check for play in positioner mounting, linkage, and feedback potentiometer. Also check if there is a foreign object in the valve or the actuator that makes the valve not open or close fully. Consider if the limits are reasonable.
High air consumption	The 'high air consumption' alarm is activated when the percent of time any of the piezo valves are open is larger than the 'max duty cycle (per stroketime)' limit (multiplied by the average stroke time).	Check if there is an air leakage or if the inner and outer loop control is not proper. If these problems are not present, increase the limit.
High current	The 'high current' alarm is activated when the setpoint current is too high.	Decrease the current so that it is less than or equal to 20 mA.
High cutoff failure	The 'high cutoff failure' alarm is activated when one or several of the following statements are true even though the state is high (opening) cutoff. 1. The deviation between the present valve position and the opened valve position measured at the latest travel calibration is larger than the 'max high cutoff position deviation' limit. 2. The deviation between the present C+ pressure and the expected pressure (depressurized or supply pressure) is larger than the 'pressure tolerance' limit. 3. The deviation between the present C- pressure and the expected pressure (depressurized or supply pressure) is larger than the 'pressure tolerance' limit. (This statement is not considered for single acting actuators.)	If the first statement is true, check for play in positioner mounting, linkage, and feedback potentiometer. Also check for mechanical problems in the valve and actuator at the end position. If the second or third statement is true, check if the pressure sensors give correct measurements and recalibrate pressure sensors if necessary. Consider if the limits are reasonable.
High EP stress	The 'high EP stress' alarm is activated when C- has been depressurized and C+ has been pressurized with supply pressure for more than 30 days in succession.	Execute a partial stroke since it will decrease the electric stress on the piezo valves.
High friction	The 'high friction' alarm is activated when the estimated friction is higher than the 'max friction [kPa/bar/psi]' limit or higher than the 'max friction [%]' limit. To be more precise, the estimated friction in percent of the supply pressure at the least pulse calibration is used when comparing with the 'max friction [%]' limit.	Determine if the friction is significantly interfering with the valve control. If not, consider increasing one or both of the friction limits. Consider the following to reduce friction: Stroke the valve to clear off build-up, remove any external mechanical obstruction, and loosen the packing. Clean the stem, repair or replace internal valve components, repair or replace the actuator.
High friction	The 'high friction at closed position' alarm is	Determine if the friction prohibits final closing

at closed position	activated when the estimated friction at closed position is higher than the 'max friction at closed position' limit. To be more precise, the estimated friction at closed position in percent of the supply pressure at the least pulse calibration is used when comparing with the limit.	or initial opening. If not, consider increasing the limits. Consider the following to reduce friction at closed position: Stroke the valve to clear off build-up, remove any external mechanical obstruction, and loosen the packing. Clean the stem, repair or replace internal valve components, repair or replace the actuator.
High supply pressure	The 'high supply pressure' alarm is activated when the supply pressure is higher than the 'max positioner supply pressure' limit or higher than the 'max actuator supply pressure' limit.	Regulate the supply pressure at the positioner below the limits. Recalibrate pressure sensors. Replace pressure sensor board if necessary.
Leakage between C+ and C-	The 'leakage between C+ and C-' alarm is activated when the C+ pressure drop rate is larger than the 'max C+ drop for a stroketime' limit (divided by the average stroke time) or the C- pressure drop rate is larger than the 'max C- drop for a stroketime' limit. Furthermore, the sum of C+ and C- drop rates is less than the 'max C+ C- sum drop for a stroketime' limit.	Repair pneumatic leaks between C+ and C- chambers. Consider if the limits are reasonable.
Limit 1	The 'limit 1' alarm is activated when the position is lower than the 'min position' limit or higher than the 'max position' limit. The alarm becomes inactive when the position is higher than the 'min position' limit plus the 'hysteresis' limit and lower than the 'max position' limit minus the 'hysteresis' limit.	Check if the setpoint is outside the interval defined by the limits or near these limits. If it is not, the deviation must be large. In this case, review other active alarms to find root causes of the large deviation.
Limit 2	The 'limit 2' alarm is activated when the position is lower than the 'min position' limit or higher than the 'max position' limit. The alarm becomes inactive when the position is higher than the 'min position' limit plus the 'hysteresis' limit and lower than the 'max position' limit minus the 'hysteresis' limit.	Check if the setpoint is outside the interval defined by the limits or near these limits. If it is not, the deviation must be large. In this case, review other active alarms to find root causes of the large deviation.
Low available force	The 'low available force' alarm is activated when the supply pressure reduced with friction and spring forces is lower than the 'min available force' limit at one or both of the end positions. (The end position corresponding to depressurized C+ is not considered in the case of single acting actuators.)	Consider the following actions: Increase the supply pressure. Reduce the friction. Check the actuator spring. Resize the actuator. Adjust the limit.
Low CPU voltage	The 'low CPU voltage' alarm is activated when the CPU voltage is too low.	Make sure that the setpoint current is at least 4 mA. If the alarm remains even though the current is not low, replace the mother board.
Low cutoff failure	The 'low cutoff failure' alarm is activated when one or several of the following statements are true even though the state is low (closing) cutoff. 1. The deviation between the present valve position and the closed valve position measured at the latest travel calibration is larger than the 'max low	If the first statement is true, check for play in positioner mounting, linkage, and feedback potentiometer. Also check for mechanical problems in the valve and actuator at the end position. If the second or third statement is true, check if the pressure sensors give correct measurements and recalibrate

	cutoff position deviation' limit. 2. The deviation between the present C+ pressure and the expected pressure (depressurized or supply pressure) is larger than the 'pressure tolerance' limit. 3. The deviation between the present C- pressure and the expected pressure (depressurized or supply pressure) is larger than the 'pressure tolerance' limit. (This statement is not considered for single acting actuators.)	pressure sensors if necessary. Consider if the limits are reasonable.
Low friction	The 'low friction' alarm is activated when the estimated friction is lower than the 'min friction [kPa/bar/psi]' limit or lower than the 'min friction [%]' limit. To be more precise, the estimated friction in percent of the supply pressure at the least pulse calibration is used when comparing with the 'min friction [%]' limit.	Check for a packing leak. Tighten or replace the valve packing. Consider if the limit is reasonable.
Low supply pressure	The 'low supply pressure' alarm is activated when the supply pressure is lower than the 'min positioner supply pressure' limit or lower than the 'min actuator supply pressure' limit.	Regulate the supply pressure at the positioner above the limits. Recalibrate pressure sensors. Replace pressure sensor board if necessary. Ensure system air/gas supply is adequate. Repair kinked supply tubing. Check for pneumatic leaks in the actuator and actuator tubing.
Manual mode	The 'manual mode' alarm is activated when the positioner is put in manual mode.	No measures have to be taken if the positioner should be in manual mode.
Out of service	The 'out of service' alarm is activated when the positioner is put out of service.	No measures have to be taken if the positioner should be out of service.
Packing worn out	The 'packing worn out' alarm is activated when the time the positioner has been powered is larger than the 'packing lifetime' limit or the accumulated travel divided by the travel span is larger than the 'max accumulated travel' limit.	Follow routine procedures for valve packing maintenance. Increase the 'packing lifetime' and 'max accumulated travel' limits to new accepted values. If the 'actuator parts worn out' alarm is also reported, increase the 'max accumulated travel' limit to the new accepted value for the part that is not being replaced.
Position vs pressure difference	The 'position vs pressure difference' alarm is activated when the deviation between the position (in percent) and the C+ pressure (in percent of the supply pressure at the least pulse calibration) is larger than the 'max difference' limit. Note that, in the case of ATC (air to close), the position is compared with 100% minus C+ pressure instead.	Check if the relationship between C+ pressure and position is as expected. If it is, increase the limit. If it is not, check the functionality of the pressure and position sensors and the actuator spring.
Potentiometer failure	The 'potentiometer failure' alarm is activated when the position sensor measurement gives an extreme value.	Check that the cable between the potentiometer and the mother board is in working order and properly connected.
Potentiometer not calibrated	The 'potentiometer not calibrated' alarm is activated when the potentiometer is not calibrated.	Perform a potentiometer calibration form the local positioner display.
Pressure sensor disconnected	The 'pressure sensor disconnected' alarm is activated when no pressure sensor board can be detected.	Check that the cable between the pressure sensor board and the mother board is in working order and properly connected.

Seat worn out	The 'seat worn out' alarm is activated when the number of cutoffs at low setpoint (near 0%) is larger than the 'max number of low cutoffs' limit.	Check that the valve seat and plug are not worn out and maintain if necessary. Thereafter, increase the limit.
Setpoint oscillation	The 'setpoint oscillation' alarm is activated when the setpoint oscillates with an amplitude that is larger than the 'setpoint oscillation tolerance' limit and the number of periods in each 5 seconds time interval is larger than the 'setpoint oscillations to detect' limit.	Check what causes the oscillation, e.g. check if the setpoint controller is set too aggressively.
Small minimum pulse parameter	The 'small minimum pulse parameter' alarm is activated when the value of the 'min pulse' parameter that is used by the controller is smaller than the real minimum pulse width minus the 'tolerance of min pulse' limit.	Execute 'Auto Tune' from the 'Calibration/Automatic' view (or 'Pulse Tune' from the local positioner display).
Spring range deviation	The 'spring range deviation' alarm is activated when the deviation between the estimated spring range and the user-entered spring range is larger than the 'max spring range deviation' limit. To be more precise, the deviation in percent of the user-entered spring range is used when comparing with the limit. (Here the expression user-entered spring range means: the 'upper spring range' parameter minus the 'lower spring range' parameter.)	Check parameters, limit, and spring.
Spring too weak to reach failsafe position	The 'spring may be too weak to reach failsafe position' alarm is activated when the actuator spring force reduced with friction force is lower than the 'min failsafe position force' limit at the failsafe position. (The failsafe position is the end position corresponding to minimum C+ chamber volume.) This alarm should be disabled for double-acting actuators without spring.	This alarm should be disabled for double-acting actuators without spring, i.e. for actuators that are not designed to reach a specific failsafe position upon loss of air supply. For other actuators: Check for high friction. Repair or replace actuator spring. Reduce process load. Consider if the limit is reasonable.
Stuck valve	The 'stuck valve' alarm is activated when no movement is detected even though the control error, control signal, and the actuator force are all large.	Check that the measured C+ pressure is approximately equal to the supply pressure or zero when the setpoint is put well above the position and that the C+ pressure changes to the other value when the setpoint is put well below the position. For double-acting actuators, check the C- pressure in the same way. Execute 'Travel Calibration' from the 'Calibration/Automatic' view and check if the travel calibration succeeds or not. If the message 'no movement' is generated, repeat the travel calibration while visually (or by other means) observing the positioner, actuator, and valve to conclude if there is any physical movement or not. If there is no physical movement, maintenance of valve and/or actuator is needed.

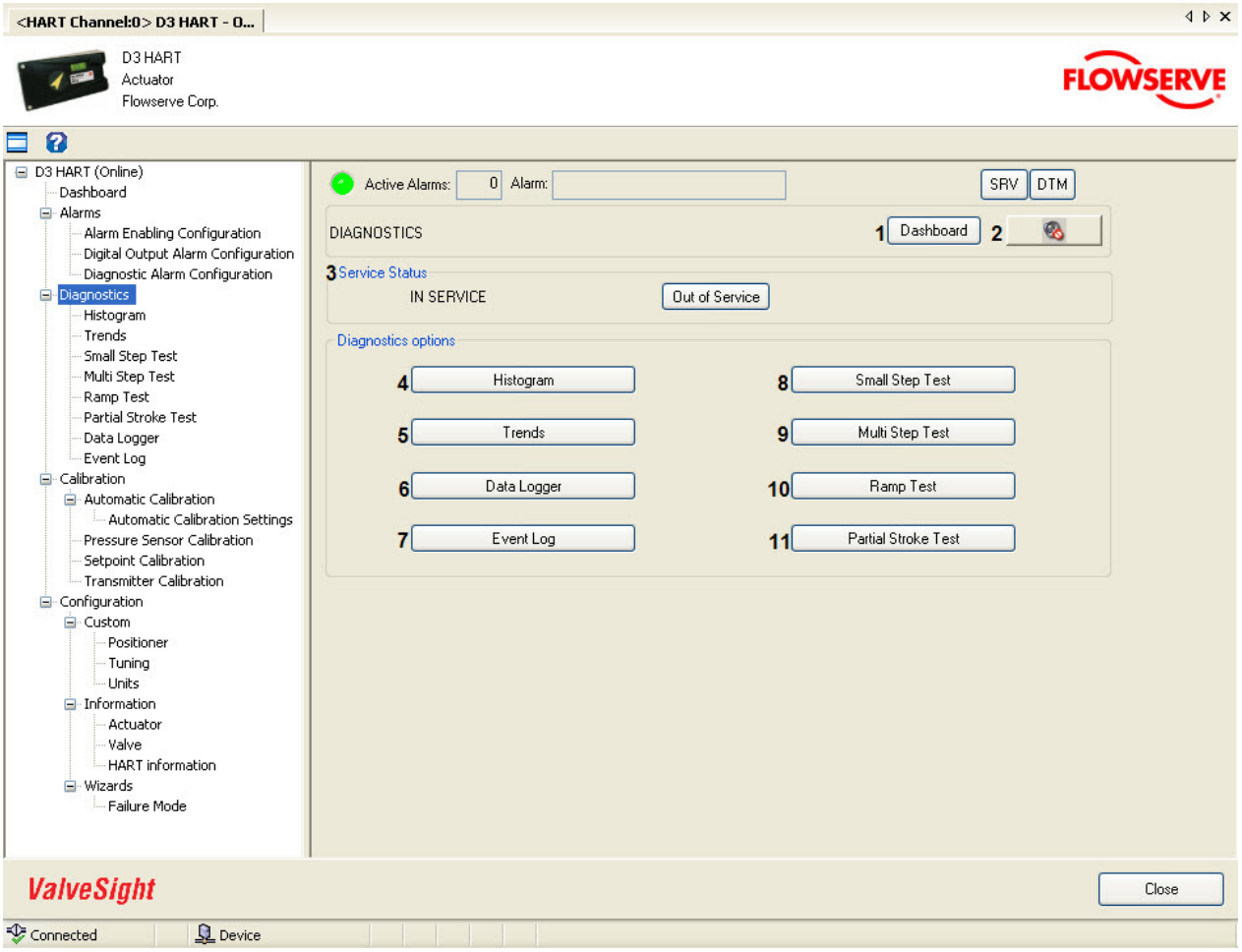
Supply pressure sensor failure	The 'supply pressure sensor failure' alarm is activated when the supply pressure sensor measurement gives an extreme value.	Check that the cable between the pressure sensor board and the mother board is in working order and properly connected. If no faults are found, check if the supply pressure is extremely high.
Temperature	The 'temperature' alarm is activated when the temperature in the positioner is lower than the 'low temp' limit or higher than the 'max temp' limit. The alarm becomes inactive when the temperature is higher than the 'low temp' limit plus the 'hysteresis' limit and lower than the 'max temp' limit minus the 'hysteresis' limit.	Regulate the temperature of the positioner. If the temperature reading is in error, replace the mother board.
Temperature sensor failure	The 'temperature sensor failure' alarm is activated when the temperature sensor measurement gives an extreme value.	The NTC thermistor is out of order and mother board needs to be replaced.
Travel span deviation	The 'travel span deviation' alarm is activated when the estimated travel span has increased more than the 'max travel span increase' limit or decreased more than the 'max travel span decrease' limit since the latest travel calibration.	Set 'Travel Control Low' and 'Travel Control High' to cutoff. Change the setpoint to 0%, wait one minute, and finally change the setpoint to 100%. If the alarm does not disappear, check for play in positioner mounting, linkage, and feedback potentiometer. Also check for mechanical problems in the valve and actuator at the end positions.

Diagnostics

Diagnostics

The Diagnostics view is a navigation view containing the navigation buttons to individual diagnostic views.

NOTE: The Small Step Test, Multi Step Test and Ramp Test can only be started when the Service Status is Out Of Service. The Service Status can be changed in the Diagnostics and Dashboard views.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.

2	Sound On/Off	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
3	Service Status	Reports the current device service status (In Service or Out of Service) and allows the user to change service status by clicking the **IN SERVICE/OUT OF SERVICE** button.
4	Histogram	Click on the **HISTOGRAM** button to navigate to the Histogram view. Histogram is for studying the time spent by the valve stem in different zones of its travel range.
5	Trends	Click on the **TRENDS** button to navigate to the Trends view. The trends of Position, Deviation, Friction, and Number of Cycles are accumulated in the device for one day, one month, one year, and five years of device run time. These trends are displayed in this view.
6	Data Logger	Click on the **DATA LOGGER** button to navigate to the Data Logger view. Measured values of position, setpoint, deviation, supply pressure, C+ pressure, C- pressure, ambient temperature and friction are continuously monitored. The duration of the time and sampling rate can also be selected. This view works as an electronic recorder.
7	Event Log	Click on the **EVENT LOG** button to navigate to the Event Log view. All the significant events happening in the positioner, actuator, valve, and control are stored chronologically in a non-volatile memory. These events are displayed in this view. These events help in monitoring the condition of the equipment to take corrective action and also in root cause analysis of the failures.
8	Small Step Test	Click on the **SMALL STEP TEST** button to navigate to the Small Step Test view. The Small Step test can be performed from this view and the results are drawn on completion of the test. The Small Step test is for evaluating the valve response time, undershoot/overshoot, and settling time in response to the setpoint.
9	Multi Step Test	Click on the **MULTI STEP TEST** button to navigate to the Multi Step Test view. The Multi Step test can be performed from this view and the results are drawn on completion of the test. The Multi Step test is for evaluating the valve response time, undershoot/overshoot, and settling time in response to the setpoint.
10	Ramp Test	Click on the **RAMP TEST** button to navigate to the Ramp Test view. The Ramp test can be performed from this view and the results are drawn on completion of the test. The Ramp test is of two types - one way ramp test and round trip ramp test. This test is for evaluating the valve response to a continuously changing setpoint.
11	Partial Stroke Test	Click on the **PARTIAL STROKE TEST** button to navigate to the Partial Stroke Test view. The Partial Stroke test is the in-process check to ascertain if the valve is stuck in its current position.

See Also:

- Histogram

- Trends
- Small Step Test
- Multi Step Test
- Ramp Test
- Partial Stroke Test
- Data Logger
- Event Log

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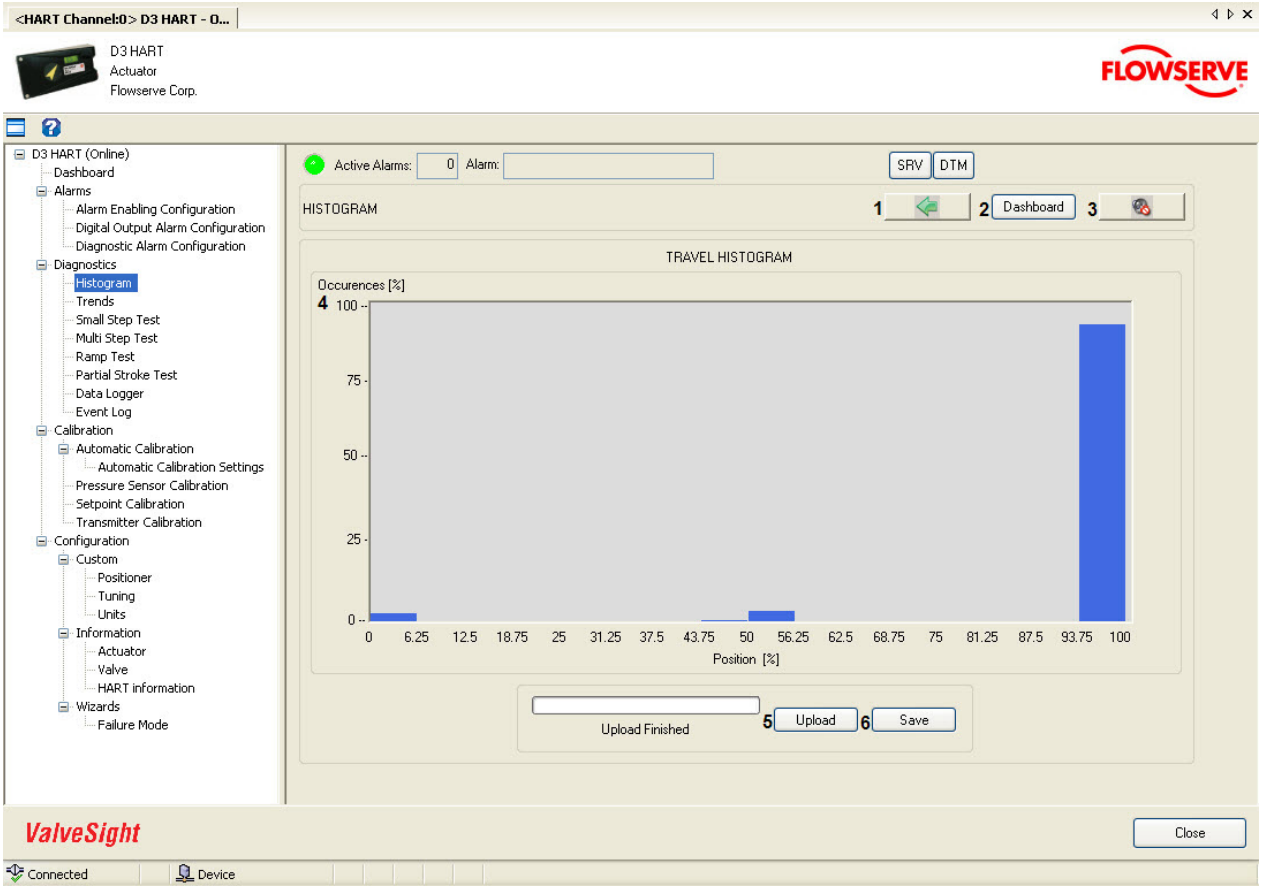
Histogram

The Histogram view is for studying the time spent by the valve stem in different zones of its travel range during its operation. Click on the **UPLOAD** button to read the travel histogram from the device.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Diagnostics view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Graph window	The travel histogram is displayed after clicking on the **UPLOAD** button.
5	Upload	Click on the **UPLOAD** button to read the travel histogram from the device to display in the graph.

6	Save	Click on the **SAVE** button to save the travel histogram graph into a local file.

See Also:

- Diagnostics
- Trends
- Small Step Test
- Multi Step Test
- Ramp Test
- Partial Stroke Test
- Data Logger
- Event Log

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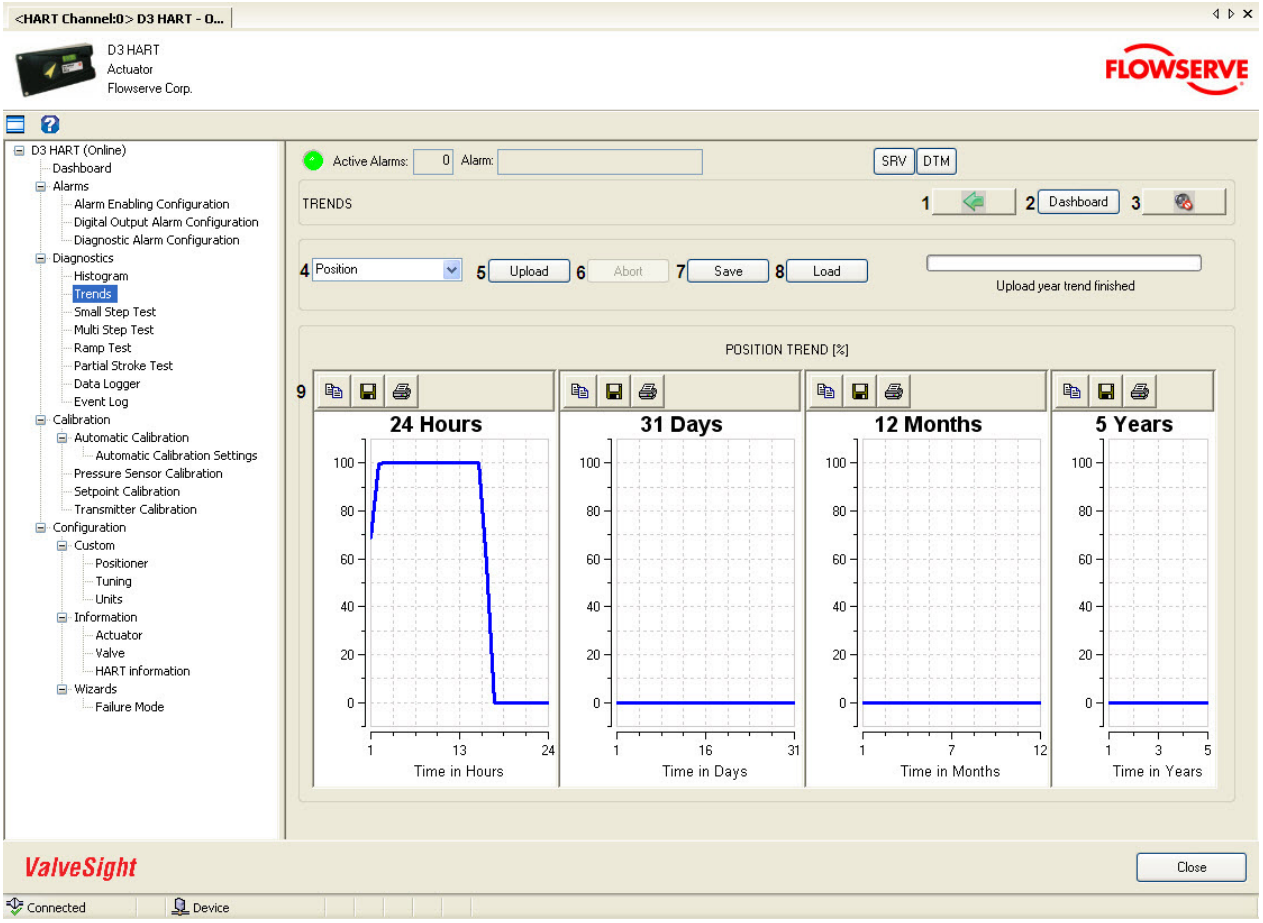
Trends

Trends of Position, Deviation, Friction, and Cycles per hour are accumulated in the device for one day, one month, one year, and five years of device run time. These trends are displayed in this view.

Every 24'th hour, the device calculates the average of each variable, adds the results to the daily trend, and resets the hourly trend. Every 31'st day, the corresponding average of each variable during the last month is calculated and added to the monthly trends, and then the daily trends are reset. The monthly and yearly trends are updated in a corresponding way.

NOTE: Time intervals where values have not yet been accumulated, are displayed as zero in the graphs.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Diagnostics view.

2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button  to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Select Variable	Select a variable among Position, Deviation, Friction, and Cycles per hour to retrieve the trend from the device
5	Upload	Click on the **UPLOAD** button to retrieve the trend data from the device and to display it in the graphs.
6	Abort	Click on the **ABORT** button to abort the upload of the trends.
7	Save	Click on the **SAVE** button to save the data presented in the graphs
8	Load	Click on the **LOAD** button to retrieve a saved trend file and load it into the graphs.
9	Graph window	The selected trends are displayed after clicking on the **UPLOAD** button.

Procedure:

1. Select a variable (Position/Deviation/Friction/Cycles per hour) from the drop-down list.
2. Click on the **UPLOAD** button to read the trend data from the device to display in the graph.
3. Click on the **ABORT** button to abort the upload of trend data from device. The **ABORT** button is enable while upload of the selected variable is in progress.
4. Click on the **SAVE** button to save the plotted trend into a local file.

See Also:

- Diagnostics
- Histogram
- Small Step Test
- Multi Step Test
- Ramp Test
- Partial Stroke Test
- Data Logger
- Event Log

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Small Step Test

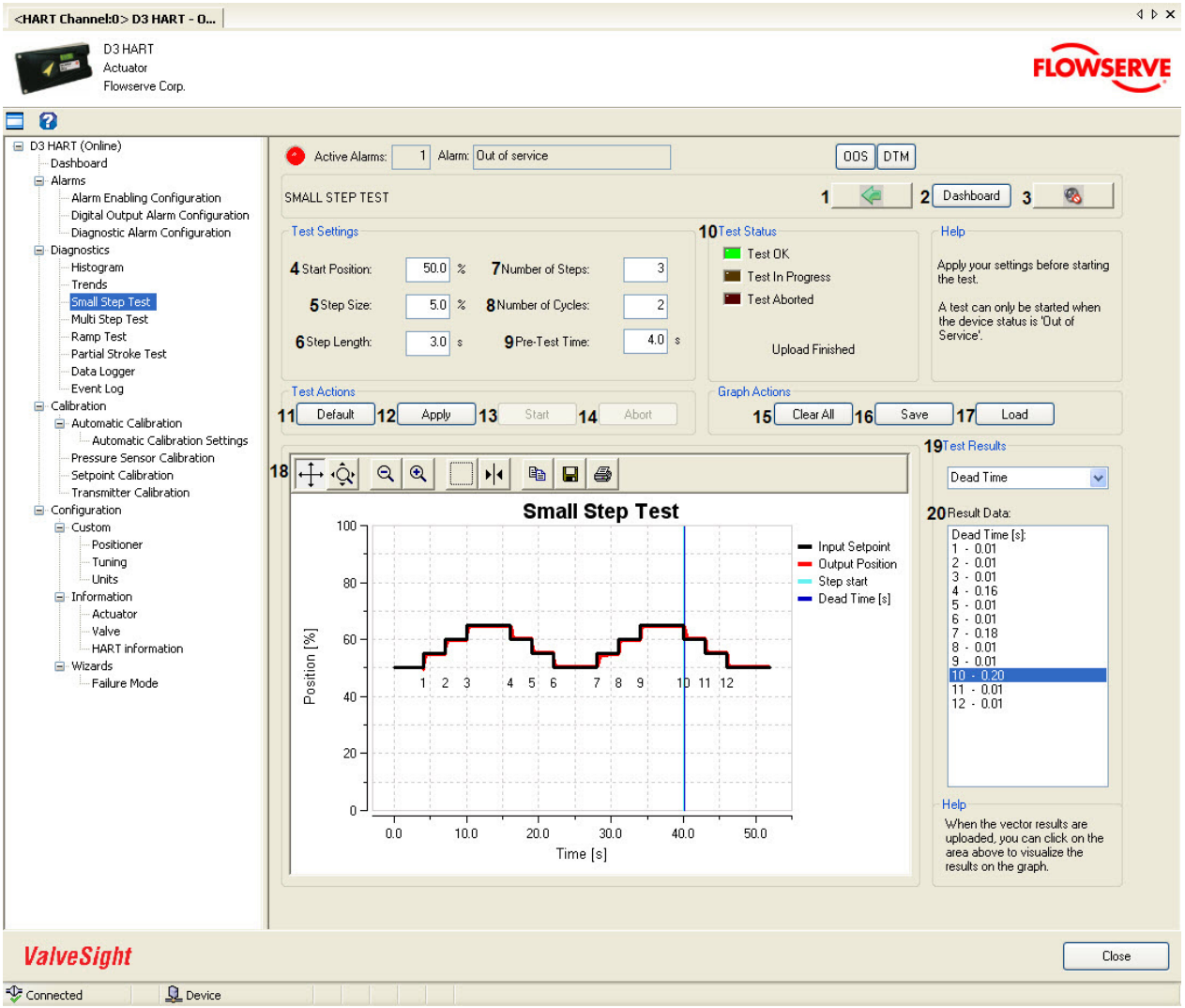
The Small Step test is a diagnostic tool to observe position response timings, overshoot/undershoot, and settling time against small step in setpoint. By comparing the responses taken at different times, it is possible to ascertain the integrity of the valve. This test can be performed on valves mounted on a test bench or installed in the process lines, but isolated from the process. The device must be Out of Service.

The Small Step test, as well as the Multi Step test, and Ramp test, is for comparing performance for the positioner, actuator, and valve together.

Following five parameters are calculated in the device based on position response against the setpoint:

1. Dead time: The time it takes for the position to reach 5% of its total change. (The total change is defined as the difference between final and initial position.)
2. Response time, T_{63}: The time it takes for the position to reach 63% of its total change.
3. Response time, T_{86}: The time it takes for the position to reach 86% of its total change.
4. Overshoot: Overshoot gives the information on how far the position goes beyond its final value expressed in percent of total change.
5. Settling time: The time elapsed from the application of setpoint step to the time at which the position has reached and remained within the interval [final position minus 5% of total change, final position plus 5% of total change].

⚠**Warning:** The test must be performed while the valve is isolated from the process. During the test the valve stem will move.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Diagnostics view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Start Position	This is the start position from which the small step starts. Valid range: [-20, 120] %.
5	Step Size	This is the size of each step of input. It can be either positive or negative. Depends on the sign of the value, the first step goes upward or downward, resulting movement of the stem either towards close or open. Valid range: [-25, 25] %, except from 0.

6	Step Length	This is the pulse duration allowing the position to stabilize before the next setpoint step is given. Valid interval: [1, 15] s.
7	Number of Steps	This is the number of steps taken in one direction. Valid range: [1, 50].
8	Number of Cycles	A small step test cycle is based on start position, step size, step length, and number of steps. The Number of Cycles value defines how many times the test shall be repeated with the same cycle. Value range: [1, 2].
9	Pre Test Time	This is the time to wait before starting the test. The reason for this is to allow the valve stem to reach a steady state before giving the first pulse of input. This time interval depends on the size of the actuator and valve. Value interval: [0, 65] s.
10	Test Status	The status of the test is displayed with the help of three LEDs. These LEDs are normally OFF. ▪ Red - **ON** means the test failed in the device or was aborted by the user. ▪ Orange - **ON** means the test is in progress. A progress bar will show the progress of the test completion. ▪ Green- **ON** means the test was successfully completed. The test results will automatically be uploaded when the test is successfully completed. A progress bar will show the progress of the upload.
11	Default	Click on the **DEFAULT** button to reset the test parameters to default values.
12	Apply	Click on the **APPLY** button to write the values to the device. The **APPLY** button is only enabled if all values are valid. A calculated input setpoint is drawn in the graph based on the values provided in the input text boxes.
13	Start	Click on the **START** button to start the test. The button is enabled after clicking on the **APPLY** button, but only if the Service Status is Out of Service.
14	Abort	Click on the **ABORT** button to abort the test.
15	Clear all	Click on the **CLEAR ALL** button to clear input setpoint and output position from the graph.
16	Save	Click on the **SAVE** button to save the graph into a local file.
17	Load	Click on the **LOAD** button to load a previously saved file.
18	Graph window	A calculated input setpoint is drawn (in black color) when clicking on the **APPLY** button. On successful completion of the test, the output position data will be uploaded and drawn (in red color) in the same graph. Buttons at the top of the graph can be used for sliding and zooming the graph.
19	Test Results drop down list	Select any one parameter among dead time, T_{63}, T_{86}, overshoot or settling time from this drop down list. On selecting the parameter, respective values corresponding to each input step are listed in Parameters Result list box
20	Parameter result	Double click on any value in the Parameter Results list box to observe visual presentation of this value in the graph with respect to the corresponding input step.

Test Procedure:

1. Modify the test parameter values if required. All the values are validated against predefined ranges. If the modified value is invalid, a is displayed next to the input text box with the valid range in the tool tip.
2. Click on the **APPLY** button to write the values to device. A calculated input setpoint is drawn in the graph based on the values provided in the input text boxes.
3. Click on the **START** button to start the test. Note that the Service Status must be Out of Service. If needed, change status in the Diagnostics or Dashboard view.
4. Click on the **ABORT** button if the test is to be aborted before completion. The **ABORT** button is enabled while the test is in progress.
5. When the test is successfully completed, the results will automatically be uploaded and the position is drawn in the same graph against the input setpoint.
6. Select any one parameter among dead time, T_{63}, T_{86}, overshoot, and settling time from the Test Result drop down list. On selecting the parameter, respective values corresponding to each input step are listed in the Parameters Result list box.
7. Double click on any value in the Parameter Results list box to observe visual presentation of this value in the graph.

See Also:

- Diagnostics
- Histogram
- Trends
- Multi Step Test
- Ramp Test
- Partial Stroke Test
- Data Logger
- Event Log

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Multi Step Test

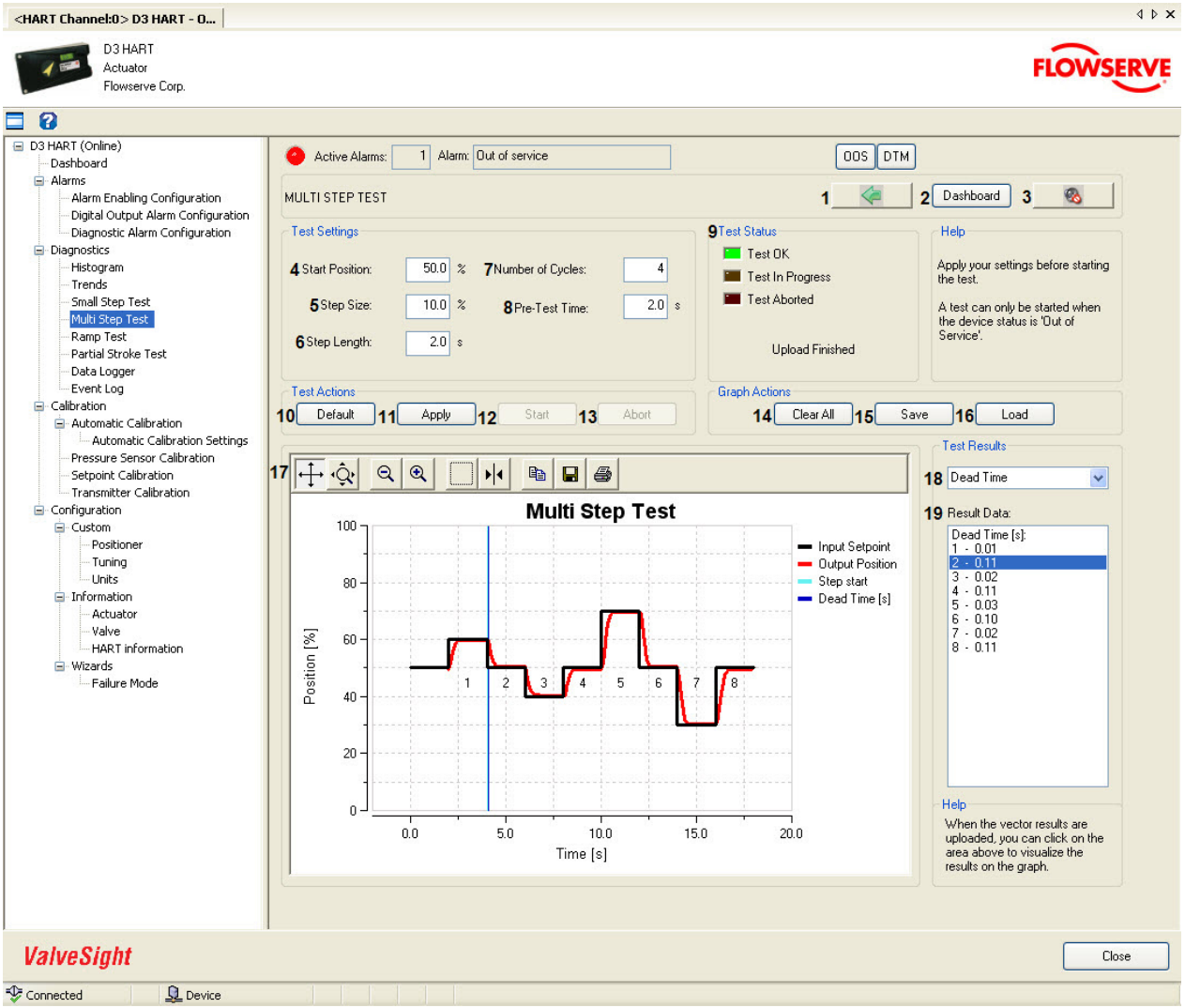
The Multi Step test is a diagnostic tool to observe position response timings, overshoot/undershoot, and settling time against multiple steps in setpoint. Multi step test is similar to the small step test with the exception in constructing the setpoint. The input pulse height is increased by a factor of 2 for every successive pulse. By comparing the responses taken at different times, it is possible to ascertain the integrity of the valve. This test can be performed on valves mounted on a test bench or installed in the process lines, but isolated from the process. The device must be Out of Service.

The Multi Step test, as well as the Small Step test, and Ramp test, is for comparing performance for the positioner, actuator, and valve together.

Following five parameters are calculated in the device based on position response against the setpoint:

1. Dead time: The time it takes for the position to reach 5% of its total change. (The total change is defined as the difference between final and initial position.)
2. Response time, T_{63}: The time it takes for the position to reach 63% of its total change.
3. Response time, T_{86}: The time it takes for the position to reach 86% of its total change.
4. Overshoot: Overshoot gives the information on how far the position goes beyond its final value expressed in percent of total change.
5. Settling time: The time elapsed from the application of setpoint step to the time at which the position has reached and remained within the interval [final position minus 5% of total change, final position plus 5% of total change].

⚠**Warning:** The test must be performed while the valve is isolated from the process. During the test the valve stem will move.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Diagnostics view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Start Position	This is the start position from which the multi step starts. Valid range: [-20, 120] %.
5	Step Size	This is the size of each step of input. It can be either positive or negative. Depends on the sign of the value, the first step goes upward or downward, resulting in a movement of the stem either towards close or open. Valid range: [-120, 120] %,

		except from 0.
6	Step Length	This is the pulse duration allowing the position to stabilize before the next setpoint step is given. Valid interval: [1, 15] s.
7	Number of Cycles	One cycle consists of 2 steps. The Step Size is doubled for each new cycle. Value interval: [1, 14].
8	Pre Test Time	This is the time to wait before starting the test. The reason for this is to allow the valve stem to reach steady state before giving the first pulse of input. This time interval depends on the size of the actuator and valve. Value interval: [0, 65] s.
9	Test Status	The status of the test is displayed with the help of three LEDs. These LEDs are normally **OFF**. ▪ Red - **ON** means the test failed in the device or was aborted by the user. ▪ Orange - **ON** means test is in progress. A progress bar will show the progress of the test completion. ▪ Green - **ON** means the test was successfully completed. The test results will automatically be uploaded when the test is successfully completed. A progress bar will show the progress of the upload.
10	Defaults	Click on the **DEFAULT** button to reset the test parameters to default values.
11	Apply	Click on the **APPLY** button to write the values to the device. The **APPLY** button is only enabled if all values are valid. A calculated input setpoint is drawn in the graph based on the values provided in the input text boxes.
12	Start	Click on the **START** button to start the test. The button is enabled after clicking on the **APPLY** button, but only if the Service Status is Out of Service.
13	Abort	Click on the **ABORT** button to abort the test.
14	Clear all	Click on the **CLEAR ALL** button to clear input setpoint and output position from the graph.
15	Save	Click on the **SAVE** button to save the graph into a local file.
16	Load	Click on the **LOAD** button to load a previously saved file.
17	Graph window	A calculated input setpoint is drawn (in black color) when clicking on the **APPLY** button. On successful completion of the test, the output position data will be uploaded and drawn (in red color) in the same graph. Buttons at the top of the graph can be used for sliding and zooming the graph.
18	Test Results drop down list	Select any one parameter among dead time, T_{63}, T_{86}, overshoot or settling time from this drop down list. On selecting the parameter, respective values corresponding to each input step are listed in Parameters Result list box
19	Parameter result	Double click on any value in the Parameter Results list box to observe visual presentation of this value in the graph with respect to the corresponding input step.

Test Procedure:

1. Modify the test parameter values if required. All the values are validated against predefined ranges. If the modified value is invalid, a is displayed next to the input text box with valid range in the tool tip.
2. Click on the **APPLY** button to write the values to device. A calculated input setpoint is drawn in the graph based on the values provided in the input text boxes.
3. Click on the **START** button to start the test. Note that the Service Status must be Out of Service. If needed, change status in the Diagnostics or Dashboard view.
4. Click on the **ABORT** button if the test is to be aborted before completion. The **ABORT** button is enabled while the test is in progress.
5. When the test is successfully completed, the results will automatically be uploaded and the position is drawn in the same graph against the input setpoint.
6. Select any one parameter among dead time, T_{63}, T_{86}, overshoot, and settling time from the Test Result drop down list. On selecting the parameter, respective values corresponding to each input step are listed in the Parameters Result list box.
7. Double click on any value in the Parameter Results list box to observe visual presentation of this value in the graph.

See Also:

- Diagnostics
- Histogram
- Trends
- Small Step Test
- Ramp Test
- Partial Stroke Test
- Data Logger
- Event Log

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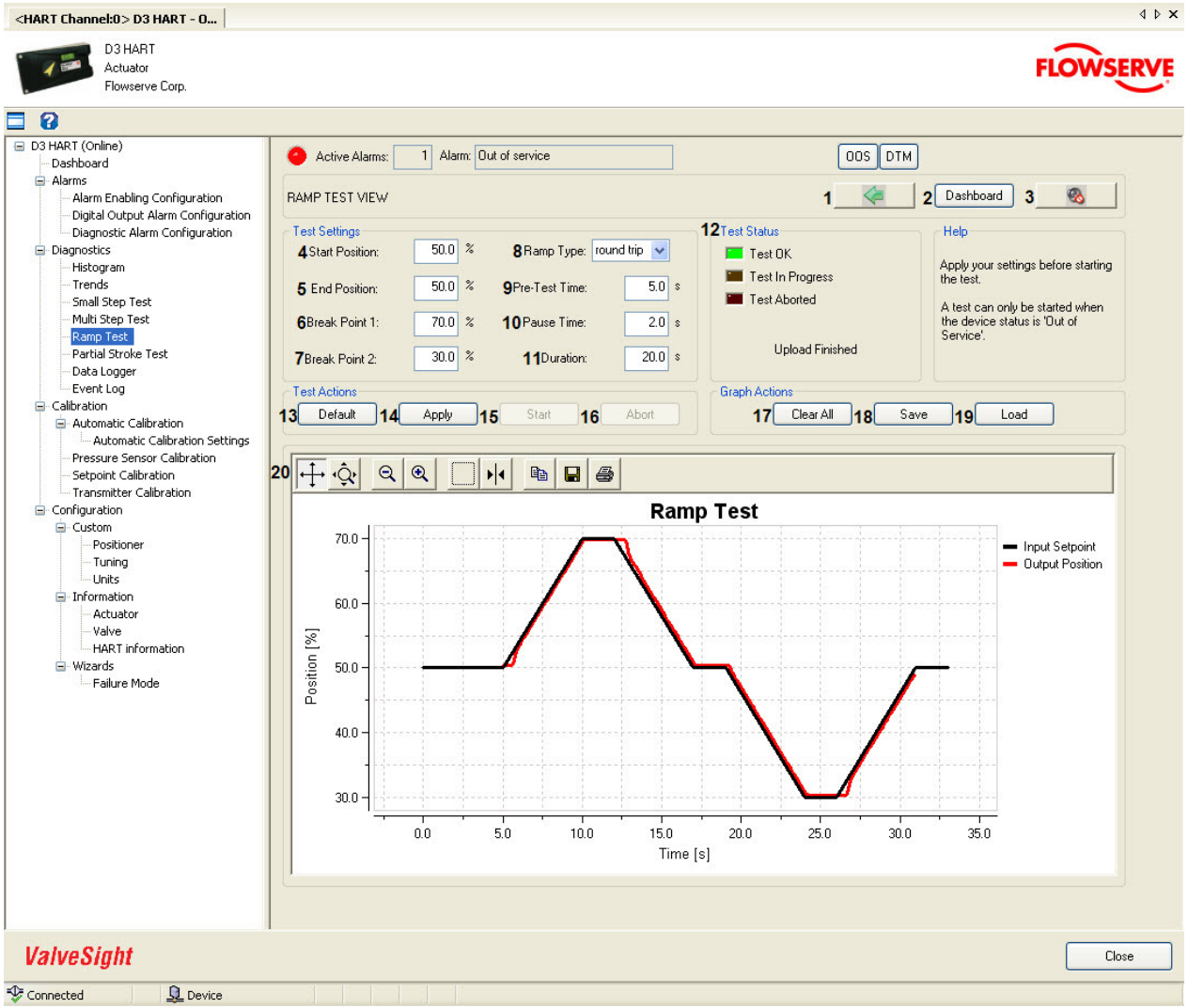
Ramp Test

The Ramp test is a diagnostic tool to observe position response to continuous changing setpoint. The ramp test can either be a one way ramp test or a round trip ramp test. In the one way ramp test, the test consists of two ramps, whereas in the round trip ramp test, the test consists of four ramps. By comparing the responses taken at different times, it is possible to ascertain the integrity of the valve. This test can be performed on valves mounted on a test bench or installed in the process lines, but isolated from the process. The device must be Out of Service.

The Ramp test, as well as the Small Step test, and Multi Step test, is for comparing performance for the positioner, actuator, and valve together.

Warning: The test must be performed while the valve is isolated from the process. During the test the valve stem will move.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Diagnostics view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Start Position	This is the start position from which the input ramp starts. Valid range: [-20, 120] %.
5	End Position	This is the position where the input ramp ends. Valid range: [-20, 120] %.
6	Break Point 1	The first position where the ramp changes direction and continues either towards the end position in case of one way ramp test, or towards break point 2 in case of round trip ramp test. Valid range: [-20, 120] %.
7	Break Point 2	Break point 2 is applicable only in round trip ramp test. The second position where the ramp changes direction and continues towards the end position. Valid range: [-20, 120] %.
8	Ramp Type	The user can select either the **ONE WAY** or **ROUND TRIP** depending on the type of signature test to be conducted.
9	Pre Test Time	This is the time to wait before starting the test. The reason for this is to allow the valve stem to reach steady state before giving the ramp input. This time interval depends on the size of the actuator and valve. Value interval: [0, 65] s
10	Pause Time	The duration of time for which setpoint remains at the break point 1 before it continues in opposite direction. Valid interval: [0,40] s.
11	Duration	The amount of time taken by the ramp to reach from start point to end potion. Valid interval: [1, 65] s.
12	Test Status	The status of the signature test is displayed with the help of three LEDs. These LEDs are normally **OFF**. ▪ Red - **ON** means the test failed in the device or was aborted by the user. ▪ Orange - **ON** means test is in progress. A progress bar will show the progress of the test completion. ▪ Green - **ON** means the test was successfully completed. The test results will automatically be uploaded when the test is successfully completed. A progress bar will show the progress of the upload.
13	Default	Click on the **DEFAULT** button to reset the test parameters to default values.
14	Apply	Click on the **APPLY** button to write the values to the device. The **APPLY** button is only enabled if all values are valid. A calculated input setpoint is drawn in the graph based on the values provided in the input text boxes.

15	Start	Click on the **START** button to start the test. The button is enabled after clicking on the **APPLY** button, but only if the Service Status is Out of Service.
16	Abort	Click on the **ABORT** button to abort the test.
17	Save	Click on the **SAVE** button to save the graph into a local file.
18	Load	Click on the **LOAD** button to load a previously saved file.
19	Clear all	Click on the **CLEAR ALL** button to clear input setpoint and output position from the graph.
20	Graph window	A calculated input setpoint is drawn (in black color) when clicking on the **APPLY** button. On successful completion of the test, the output position data will be uploaded and drawn (in red color) in the same graph. Buttons at the top of the graph can be used for sliding and zooming the graph.

Test Procedure:

1. Modify the test parameter values if required. All the values are validated against predefined ranges. If the modified value is invalid, a is displayed next to the input text box with the valid range in the tool tip.
2. Click on the **APPLY** button to write the values to device. A calculated input setpoint is drawn in the graph based on the values provided in the input text boxes.
3. Click on the **START** button to start the test. Note that the Service Status must be Out of Service. If needed, change status in the Diagnostics or Dashboard view.
4. Click on the **ABORT** button if the test is to be aborted before completion. The **ABORT** button is enabled while the test is in progress.
5. When the test is successfully completed, the results will automatically be uploaded and the position is drawn in the same graph against the input setpoint. If the test is aborted in between, click on the **UPLOAD** button to upload the results from the partially completed test.

See Also:

- Diagnostics
- Histogram
- Trends
- Small Step Test
- Multi Step Test
- Partial Stroke Test
- Data Logger
- Event Log

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Partial Stroke Test

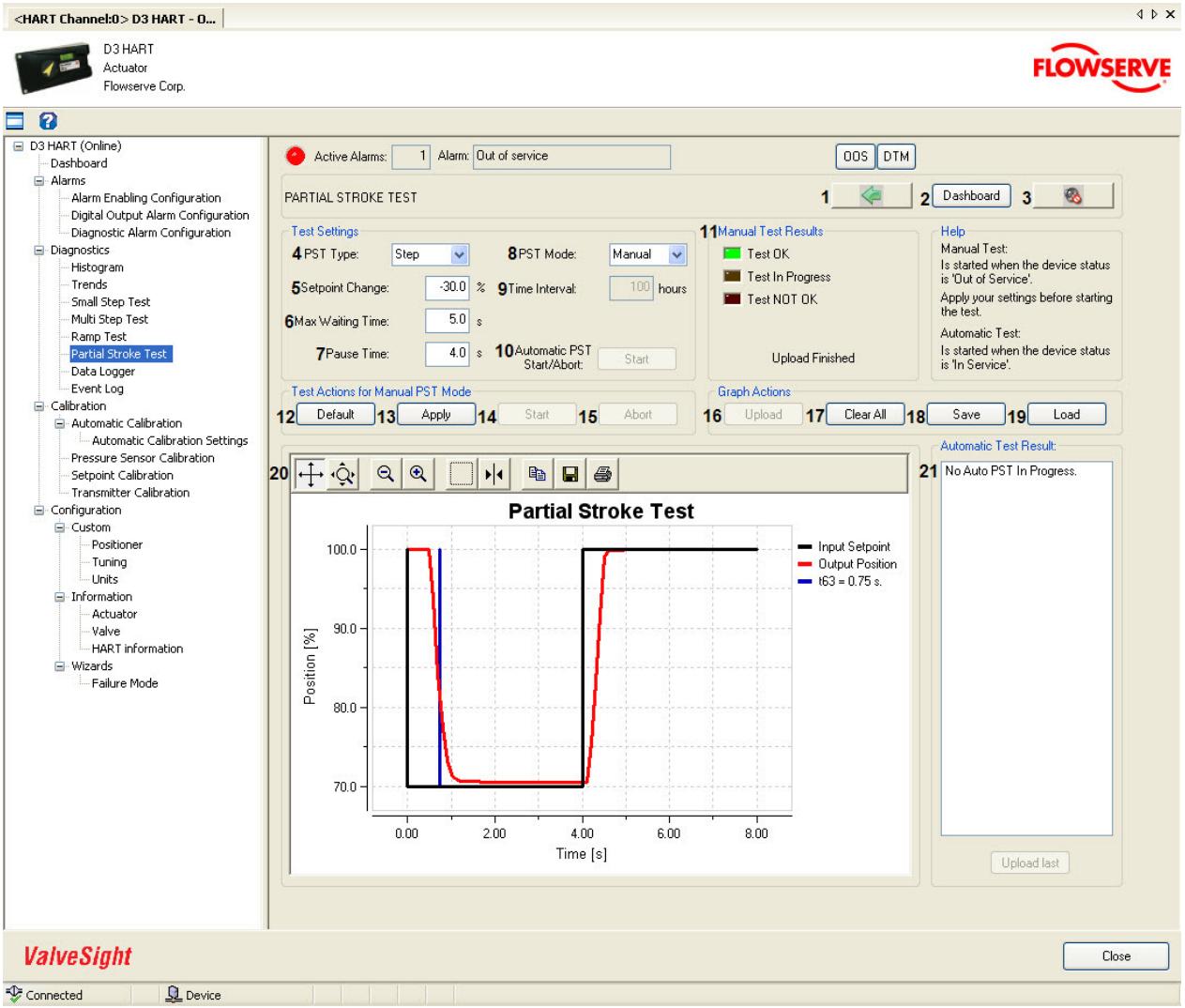
The Partial Stroke Test (PST) is a diagnostic tool for both in service and out of service testing of valves that can be partially stroked. In applications where the valve remains in the same position for extended time periods, the stem may get jammed or damaged. This cannot be assessed without operating the valve. The PST allows stroking of the valve without affecting the process too much. ValveSight™ Partial Stroke Test allows the user to configure an automatic test so that the positioner will perform a partial stroke test at specified intervals for a specified time regularly and store the results in volatile memory. The results of the latest test overwrites the previous test results. The user can upload the results and analyze the results either immediately after completion of the test or later. The automatic PST is only available when the device service status is In Service. The manual partial stroke test mode allows the user to perform a test both In Service and Out of Service.

The Partial Stroke Test increases the probability of operation of the valves on demand.

This tool is most suited for Emergency Shutdown Device (ESD) valves that normally remain in one position for extended time periods without any mechanical movement.

This test can be performed by changing the setpoint from the present value to a new value and back to the present value as a step change or ramp change.

⚠**Warning:** There will be a small variation in the flow while performing a Partial Stroke Test.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Diagnostics view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	PST Type	Select the type of partial stroke step, either step or ramp.
5	Setpoint Change	The setpoint is changed to new value by the amount specified in this parameter. There are two ways for the PST test to stop. Either it stops after Max Waiting Time or it stops when the position has reached 63% of the Setpoint change. Example: If the Setpoint change is set to 20 % the PST stops when the position has reached 12.6%.

		Value interval: [-30, 30] %, except from 0.
6	Max Waiting Time	This time, given in seconds, restricts the duration of the test. If the position has not reached 63% of the chosen setpoint change within this wait time, the test has been unsuccessful. Value interval: [0, 60] s.
7	Pause Time	As described above there are two ways for the PST to stop. When the PST has stopped it shall return to its start position. A Pause Time can be entered to delay the return to the start position. If Pause Time = 0, then setpoint is set to the original value when position reaches 63% of setpoint change. Value interval: [0, 60] s.
8	PST Mode	Select either manual or automatic mode of the partial stroke test.
9	Time Interval	This is the time interval between two successive automatically initiated partial stroke tests. This parameter is applicable for the automatic PST only. Value interval: [1, 11000] hours.
10	Automatic PST Start/Abort	By clicking **START**, the automatic PST is started. By clicking **ABORT**, the test is aborted and the next automatic PST is disabled. Note that the Service Status needs to be In Service.
11	Manual Test Results	The status of the partial stroke test is displayed with the help of three LEDs. These LEDs are normally OFF. ▪ Red - **ON** means the test failed in the device or was aborted by the user. ▪ Orange **- ON** means test is in progress. A progress bar will show the progress of the test completion. ▪ Green - **ON** means the test was successfully completed. The test results will automatically be uploaded when the test is successfully completed. A progress bar will show the progress of the upload.
12	Default	Click on the **DEFAULT VALUES** button to reset the test parameters to default values.
13	Apply	Click on the **APPLY** button to write the values to the device. The **APPLY** button is only enabled if all values are valid. A calculated input setpoint is drawn in the graph based on the values provided in the input text boxes.
14	Start	Click on the **START** button to start the test.
15	Abort	Click on the **ABORT** button to abort the test.
16	Upload	To upload the results of the latest test performed in the device, click on the **UPLOAD** button. The results are plotted in the graph.
17	Clear all	Click on the **CLEAR ALL** button to clear the input setpoint and output position from the graph.
18	Save	Click on the **SAVE** button to save the graph into a local file.

19	Load	Click on the **LOAD** button to load a previously saved .pst file.
20	Graph window	A calculated input setpoint is drawn (in black color) when clicking on the **APPLY** button. On successful completion of the test, the output position data will be uploaded and drawn (in red color) in the same graph. Buttons at the top of the graph can be used for sliding and zooming the graph.
21	Automatic Test Result	Results of the automatic PST tests are displayed in this text box.

Test Procedure:

Manual Partial Stroke Test:

1. Select **Manual** from the **PST MODE** drop down list.
2. Modify the test parameter values if required. All the values are validated against predefined ranges. If the modified value is invalid, a ! is displayed next to the input text box with the valid range in the tool tip.
3. Click on the **APPLY** button to write the values to device. A calculated input setpoint is drawn in the graph based on the values provided in the input text boxes.
4. Click on the **START** button to start the test.
5. Click on the **ABORT** button if the test is to be aborted before completion. The **ABORT** button is enabled while the test is in progress.
6. When the test is successfully completed, click on the **UPLOAD** button to upload the results from the completed test, the position is drawn in the same graph against the input setpoint. If the test is aborted in between, click on the **UPLOAD** button to upload the results from the partially completed test.

Auto Partial Stroke Test:

1. Select **Automatic** from the **PST MODE** drop down list.
2. Modify the test parameter values if required. All the values are validated against predefined ranges. If the modified value is invalid, a ! is displayed next to the input text box with the valid range in the tool tip.
3. Click the **AUTOMATIC PST START / ABORT** button to **START** the partial stroke test automatically at every interval specified in the **TIME INTERVAL** text box. A partial stroke test will start immediately.
4. If the **AUTOMATIC PST START / ABORT** is turned to **START**, the PST is conducted at regular intervals. To upload the results of the latest test performed in the device, click on the **UPLOAD** button. The results are plotted in the graph.
5. To abort the automatic start of PST tests, click **ABORT** on the **AUTOMATIC PST START / ABORT** button.

See Also:

- Diagnostics
- Histogram
- Trends
- Small Step Test
- Multi Step Test
- Ramp Test

- Data Logger
- Event Log

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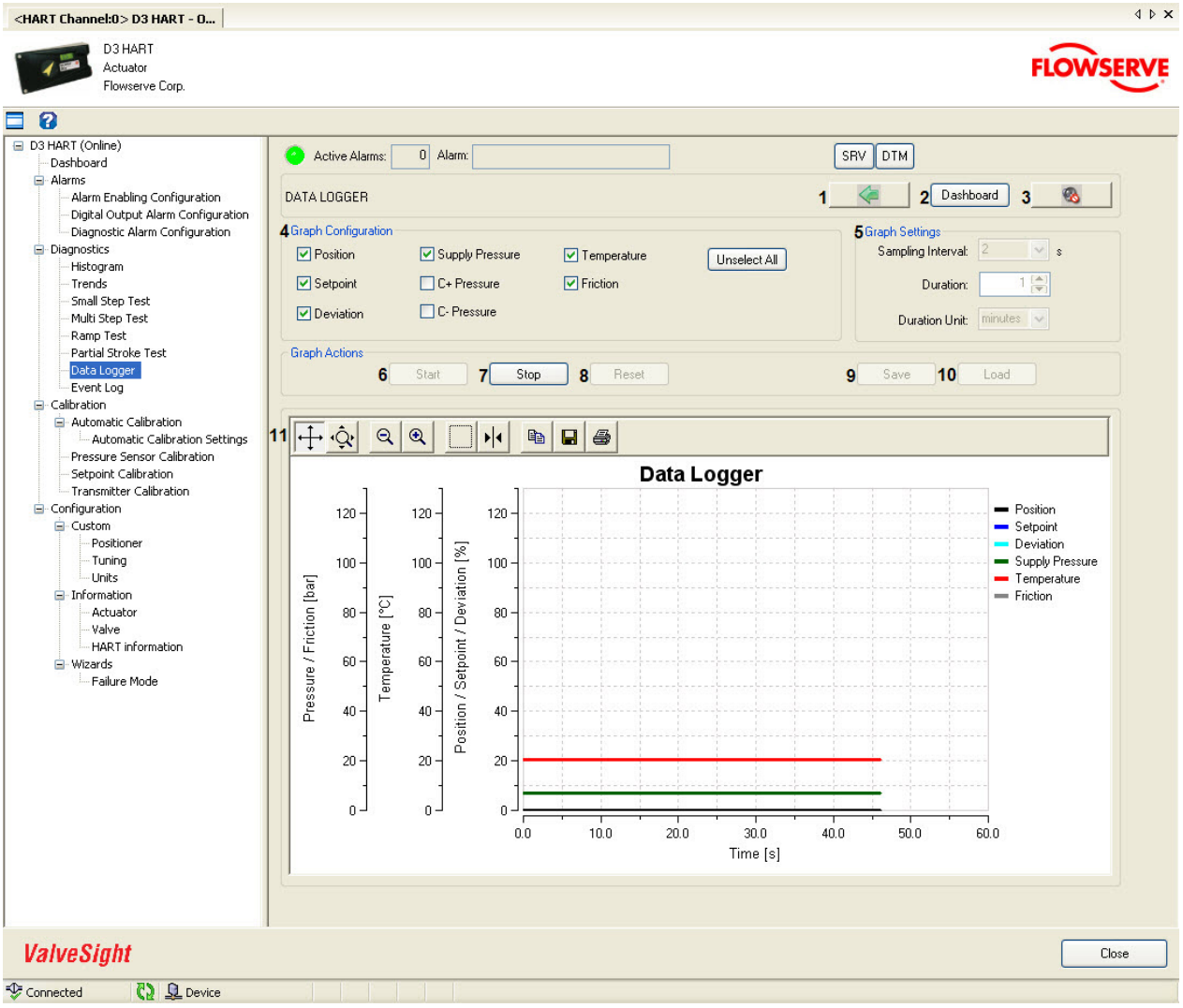
Data Logger

Measured values of position, setpoint, deviation, supply pressure, C+ pressure, C- pressure, ambient temperature of the positioner, and friction are continuously monitored in this view. Sampling rate and data collection time can also be selected as per the field requirements. This view works as an electronic recorder.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Diagnostics view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound

		ON / OFF. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Graph Configuration	Select one or more of the parameters - **Position**, **Setpoint**, **Deviation**, **Supply pressure**, **C+ pressure**, **C- pressure**, **Temperature**, and **Friction**. Click on the **UN-SELECT ALL** button to un-select all the selected variables.
5	Graph Settings	▪ **Sampling Interval** - defines the sampling interval for data collection from device in seconds. ▪ **Duration** - defines the data collection duration. ▪ **Duration Unit** - defines the unit of measure for duration i.e. minutes or hours.
6	Start	Click on the **START** button to start collection of data from device and plot in the graph.
7	Stop	Click on the **STOP** button to stop data collection from device and plot in the graph.
8	Reset	Click on the **RESET** button to clear the graph for the next operation.
9	Save	Click on the **SAVE** button to save the collected data to a .lgr file that can be opened with any spread sheet like MS Excel for further analysis or archive.
10	Load	Click on the **LOAD** button to load a previously saved .lgr file.
11	Graph Window	The values received from the device for the variables selected in the Graph Configuration are plotted.

Test Procedure:

1. Select the parameters whose values are to be monitored.
2. Select the sampling time and data collection time.
3. Click on the **START** button to start data collection of the selected parameters.
4. Click on the **STOP** button to stop logging the values before the selected time is over.
5. Click on the **RESET** button to clear the graph for next operation.

See Also:

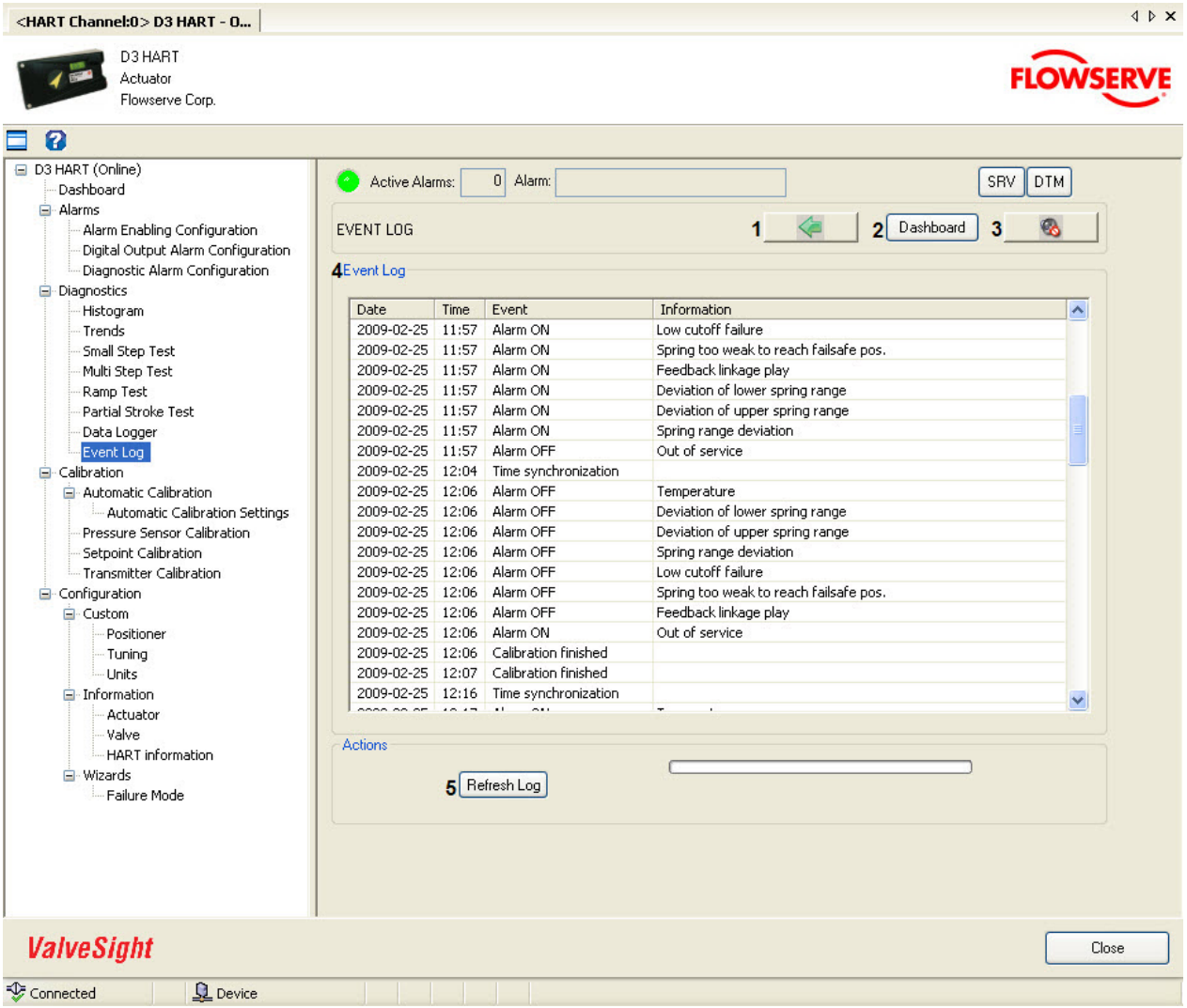
- Diagnostics
- Histogram
- Trends
- Small Step Test
- Multi Step Test
- Ramp Test
- Partial Stroke Test
- Event Log

Event Log

All the significant events happening in the positioner, actuator, valve, and control are saved chronologically in a non-volatile memory. The time stamp is calculated based on the runtime of the device. This event log helps in condition monitoring of the equipment and allows the user to take corrective action. The event log also helps in root cause analysis of the failures.

The Event Log view presents the 100 latest events. The events are displayed in the grid with the time stamp relative to the system time.

To retrieve the event log from the positioner, click on the **REFRESH LOG** button.



The navigation buttons and input/output visual control elements are explained in the table below:

Field	Field	Description

No.	Name	
1	Back	Click on the **BACK** button to navigate to the Diagnostics view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Event Log List	Displays the 100 latest events that are saved in the device.
5	Refresh Log	Click on the **REFRESH LOG** button to retrieve the event log from the device.

See Also:

- Diagnostics
- Histogram
- Trends
- Small Step Test
- Multi Step Test
- Ramp Test
- Partial Stroke Test
- Data Logger

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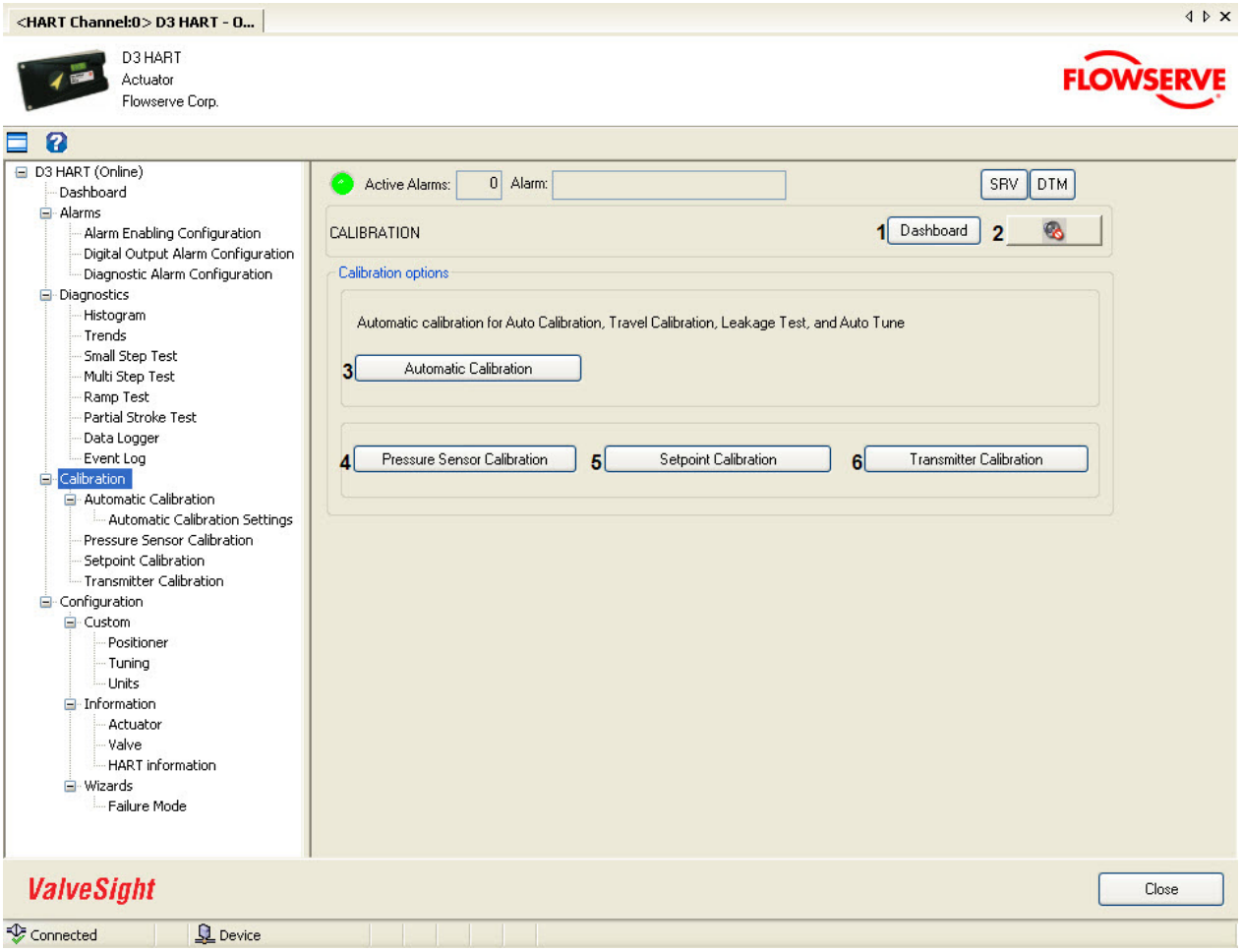
Calibration

Calibration

The Calibration view is a navigation view containing the navigation buttons to individual calibration views - Automatic Calibration view, Pressure Sensors Calibration view, Setpoint Calibration view, and Transmitter Calibration view.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
2	Sound On/Off	Click on the **SOUND ON/OFF** button to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
3	Automatic	Click on the **AUTOMATIC CALIBRATION** button to navigate

	Calibration	to the Automatic calibration view, where Auto Calibration, Travel Calibration, Leakage Test, and Auto Tune can be performed.
4	Pressure Sensor Calibration	Click on the **PRESSURE SENSOR CALIBRATION** button to navigate to the Pressure Sensor calibration view. If the D3 Positioner is equipped with a pressure board, the pressure sensors can be calibrated from this view.
5	Setpoint Calibration	Click on the **SETPOINT CALIBRATION** button to navigate to the Setpoint calibration view to calibrate setpoint signal.
6	Transmitter Calibration	Click on the **TRANSMITTER CALIBRATION** button to navigate to the Transmitter calibration view to calibrate the transmitter, if the D3 Positioner is equipped with one.

See Also:

- Automatic Calibration
- Automatic Calibration Settings
- Pressure Sensor Calibration
- Setpoint Calibration
- Transmitter Calibration

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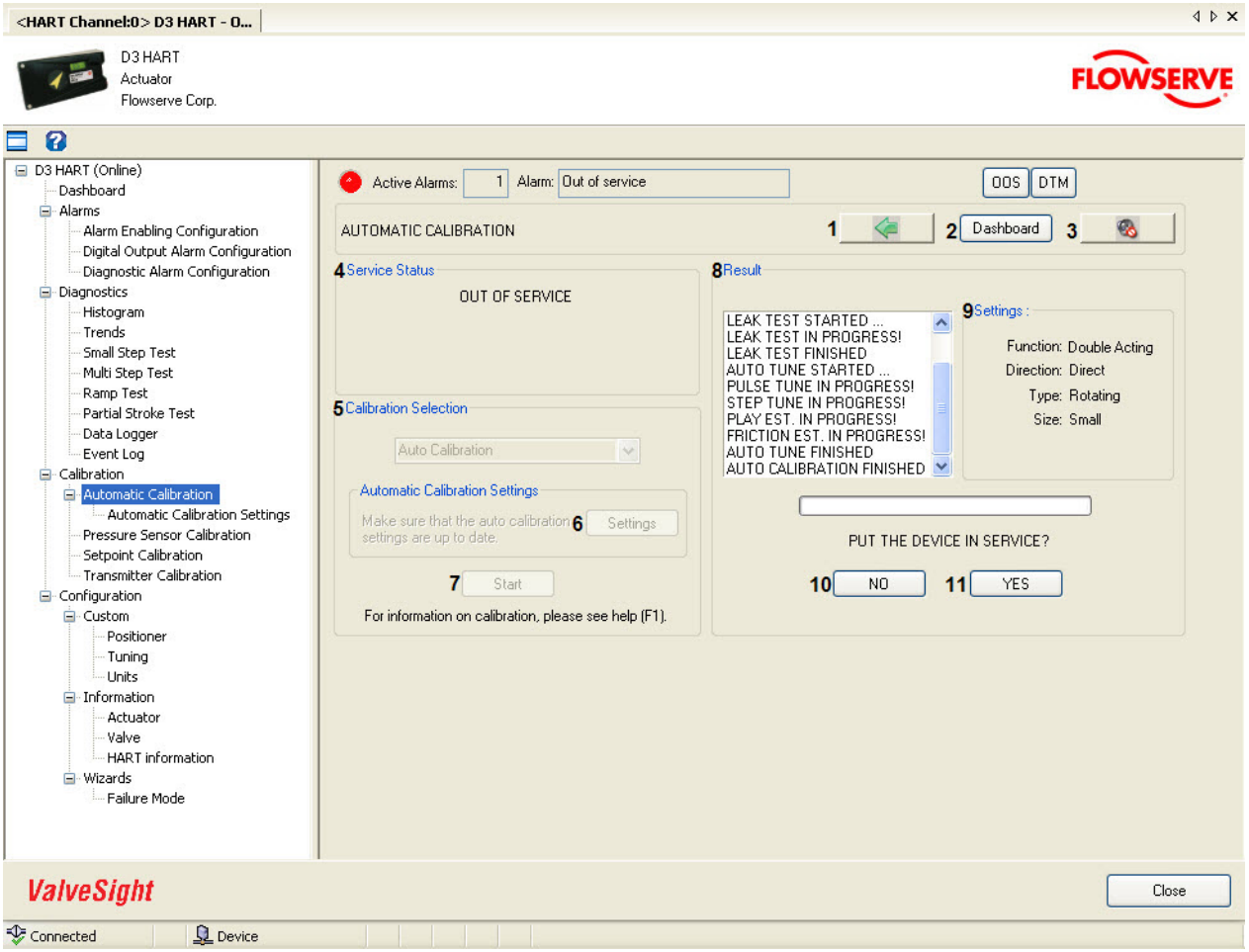
Automatic Calibration

Automatic Calibration

In Automatic Calibration view, the Auto Calibration, Travel Calibration, Leakage Test, and Auto Tune can be performed. If required to perform any one of the above calibrations, the user can select from Calibration Selection drop down list and perform the calibration.

To perform the calibrations, the device service status has to be Out of Service. The service status can be changed to Out of Service when entering the view, and in the Dashboard and Diagnostics views.

Warning: The calibration must be carried out while the valve is isolated from the process. During the calibration the valve stem will move.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Calibration view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Service Status	Displays the Service Status.
5	Result	The activities happening in the device during the calibration are displayed in this area.
6	Settings	The current calibration settings are displayed in this area. These can be changed in the Autocal Settings view.
7	Calibration Selection	Select the required item from the **CALIBRATION SELECTION** drop down list. The selected item may consist of one or several of the following calibration steps: ▪ Travel calibration. The stroke time is measured and the two end positions are found. ▪ Leakage test. Leakage is detected by observing valve stem movement when there should be no movement. ▪ Pulse tune. Four values of the minimum pulse width used for controlling the piezo valves are determined. Furthermore, the air dynamics in the tubing is determined to obtain accurate pressure measurements. ▪ Step tune. Suitable parameters for the PID controller are determined. The online friction estimator needs information about the system dynamics and this information is also determined here. ▪ Play estimation. The magnitude of the play in the position measurement system is determined. ▪ Friction estimation. The overall friction affecting valve stem movements is determined in this offline test and the result is used as a starting point for the online friction estimator. Furthermore, the friction at the valve seat is determined. Selection Criteria: ▪ By selecting **Auto Calibration** - All the operations mentioned above are performed in the same order. ▪ By selecting **Travel Calibration** - Only travel calibration is performed. ▪ By selecting **Leakage Test** - Only leakage test is performed. ▪ By selecting **Auto Tune** - Pulse tune, step tune, play estimation, and friction estimation are performed.
8	Settings	Current setting values are shown in the **SETTINGS** list. Click on the **SETTINGS** button to modify and write the new settings to the device.

9	Start	Click on the **START** button to start the calibration. Calibration starts only when the device service status is OUT OF SERVICE.
10	Abort/NO	Click on the **ABORT** button to abort the calibration before its completion or click on **NO** if wanting to stay Out of Service after Automatic calibration is finished.
11	OK/YES	Click on the **OK** button to confirm completion of the calibration or click on **YES** if wanting to be In Service after Automatic calibration is finished.

Calibration Procedure:

1. Select the **Automatic Calibration** view from the navigation tree or through navigation buttons.
2. Make sure that the device service status is **OUT OF SERVICE**.
3. If the device service status is **IN SERVICE**, click on the **YES** button to change the device service status to **OUT OF SERVICE**. The device service status can also be changed in the Dashboard view.
4. Select **Auto Calibration** in Calibration Selection drop down list to perform all the three calibration automatically. To perform any particular calibration, select the same from the Calibration Selection drop down list.
5. Calibration settings are displayed in the **SETTINGS** list. Click on the **SETTINGS** button to modify and write the new settings to the device as per field installation.
6. Click on the **START** button to start the calibration.
7. Observe the status and responses received from the device and displayed in the **RESULT** text box.
8. Click on the **ABORT** button to abort the calibration before completion.
9. Click on the **OK** button to confirm completion of the calibration.
10. If an automatic calibration was performed, select **YES**/**NO** to be In Service/Out of Service.

See Also:

- Calibration
- Automatic Calibration Settings
- Pressure Sensor Calibration
- Setpoint Calibration
- Transmitter Calibration

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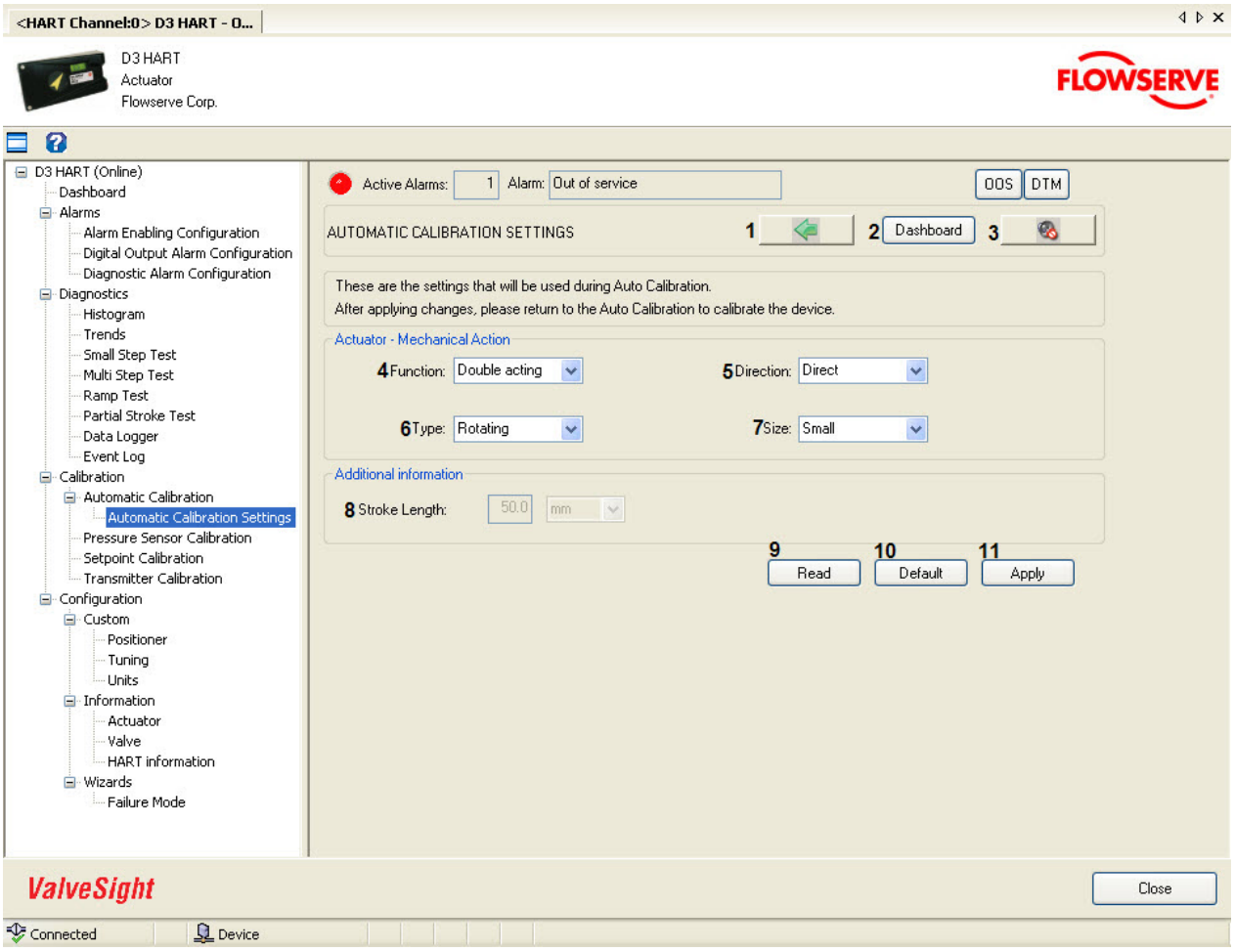
Automatic Calibration Settings

In the Automatic Calibration Settings view, the Automatic calibration parameter values are configured.

All modified values are validated against predefined ranges. If the modified value is invalid, a ! is displayed next to the input text box with the valid range in the tool tip.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Automatic calibration view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual

		indication of the LED, if alarms are present in the device.
4	Function	Select either Double acting or Single acting as per the device functionality.
5	Direction	Select either Direct or Reverse as per the device operation.
6	Type	Select either Rotating or Linear as per the device operation.
7	Size	Select Small, Medium, Large or Very large as per the actuator size.
8	Stroke Length	Set the stroke length if the positioner is of Linear type. Valid Range: [5, 157] mm. Note that this parameter is not used in Automatic calibration and, therefore, does not have to be set before the calibration is performed.
9	Read	Click on the **READ** button to read the values of the parameters from the device.
10	Default	Click on the **DEFAULT** button to display the default values for all the parameters in the view. By clicking on the **DEFAULT** button, default values are just displayed in the view. If required to write these values to the device, click on the **APPLY** button.
11	Apply	Click on the **APPLY** button to write the parameter values shown in this view to device. The **APPLY** button is only enabled if all values are valid.

See Also:

- Calibration
- Automatic Calibration
- Pressure Sensor Calibration
- Setpoint Calibration
- Transmitter Calibration

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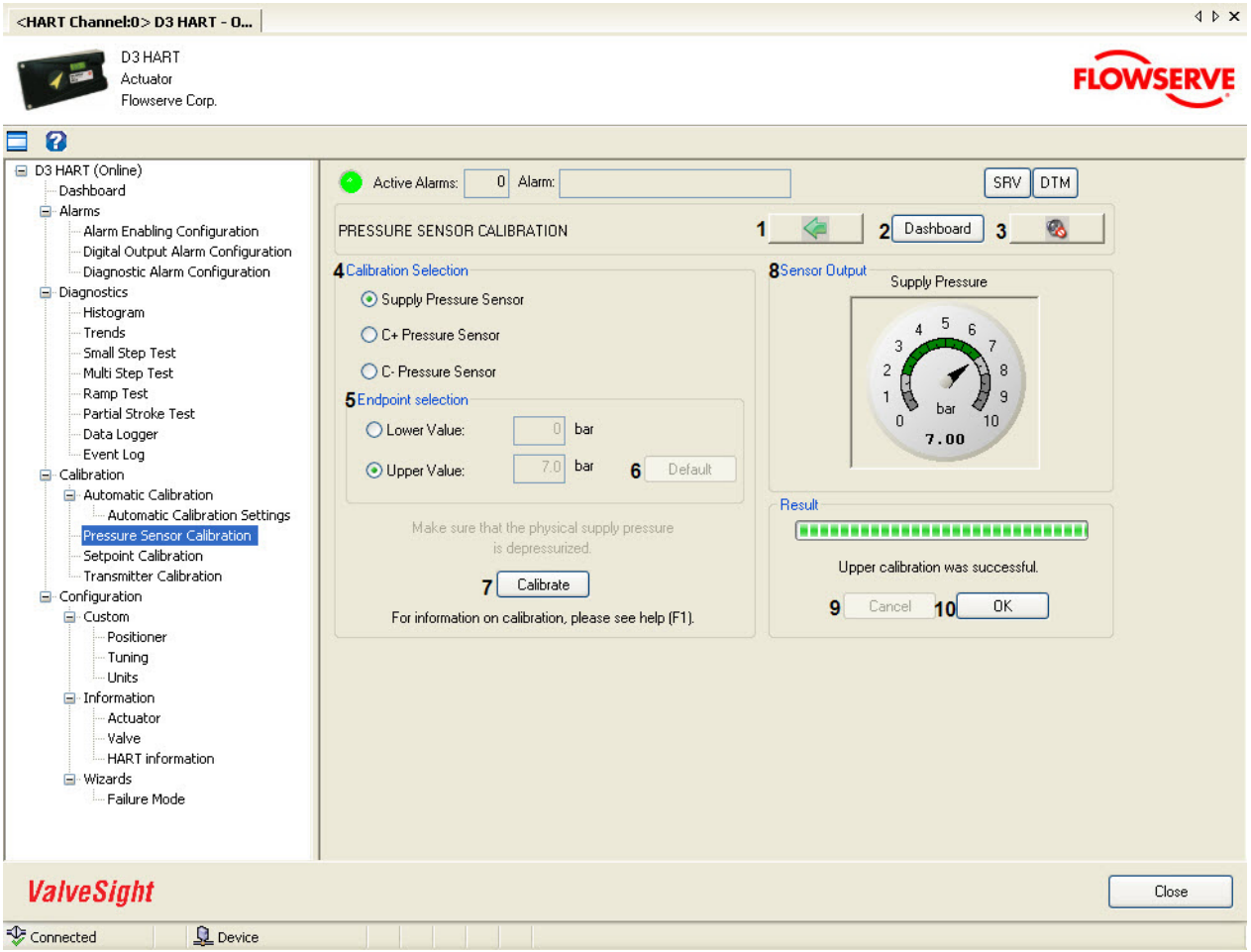
Pressure Sensor Calibration

In the Pressure Sensor Calibration view, the supply pressure sensor, C+ pressure sensor, and C- pressure sensor can be calibrated, provided the positioner is equipped with pressure sensors. C- Pressure sensor calibration is possible only when the actuator is of double acting type. The calibration of pressure sensors can be carried out irrespective of the device service status i.e. **IN SERVICE** or **OUT OF SERVICE**.

The modified Upper Value is validated against a predefined range, which is dependent on the pressure unit. If the modified value is invalid, a ! is displayed next to the input text box with the valid range in the tool tip.

NOTE: This view is only enabled for D3 Positioners equipped with pressure sensors.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Calibration view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Calibration Selection	Select any one of the radio buttons to select **Supply Pressure Sensor**, **C+ Pressure Sensor**, or **C- Pressure Sensor** depending on the calibration to be performed.
5	Endpoint selection	Select either Lower Value or Upper Value depending on the calibration to be performed. Enter the value in the text box as explained in the calibration procedure.
6	Default	Click on the **DEFAULT** button to reset the settings to predefined values.
7	Calibrate	Click on the **CALIBRATE** button to start the calibration. Ensure that the selections in Calibration selection and Endpoint selection and the pressure at the ports are as per the calibration procedure.
8	Sensor Output	This pressure gauge shows the measured value at the port that is selected in Calibration selection.
9	Cancel	Click on the **CANCEL** button to stop the calibration before its completion.
10	OK	Click on the **OK** to confirm the calibration result and reset the view.

Calibration Procedure:

Supply pressure sensor, lower value:

1. Select the **SUPPLY PRESSURE SENSOR** radio button from Calibration selection.
2. Select the **LOWER VALUE** radio button from Endpoint selection.
3. Turn **OFF** the pressure source connected to supply port of the positioner.
4. Click on the **CALIBRATE** button to start the calibration.
5. On completing the calibration, the message is displayed in the **RESULT** area.
6. Observe that the reading in the pressure gauge is 0.
7. Confirm the calibration by clicking on the **OK** button.

Supply pressure, upper value:

1. Select the **SUPPLY PRESSURE SENSOR** radio button from Calibration selection.
2. Select the **UPPER VALUE** radio button from Endpoint selection.
3. Turn **ON** the pressure source connected to supply port of the positioner and measure the physical supply pressure with an external pressure sensor.
4. Enter the value of the physical supply pressure in the **UPPER VALUE** text box.

5. Click on the **CALIBRATE** button to start the calibration.
6. On completing the calibration, the message is displayed in the **RESULT** area.
7. Observe that the reading in the pressure gauge is equal to the physical supply pressure at the supply port of the positioner.
8. Confirm the calibration by clicking on the **OK** button.

C+ pressure, lower value:

1. Select the **C+ PRESSURE SENSOR** radio button from Calibration selection.
2. Select the **LOWER VALUE** radio button from Endpoint selection.
3. Fully depressurize the C+ port of the positioner. See note below.
4. Click on the **CALIBRATE** button to start the calibration.
5. On completing the calibration, the message is displayed in the **RESULT** area.
6. Observe that the reading in the pressure gauge is 0.
7. Confirm the calibration by clicking on the **OK** button.

C+ pressure, upper value:

1. Select the **C+ PRESSURE SENSOR** radio button from Calibration selection.
2. Select the **UPPER VALUE** radio button from Endpoint selection.
3. Fully pressurize the C+ port of the positioner and measure the physical C+ pressure with an external pressure sensor. See note below.
4. Enter the value of the physical C+ pressure in the **UPPER VALUE** text box.
5. Click on the **CALIBRATE** button to start the calibration.
6. On completing the calibration, the message is displayed in the **RESULT** area.
7. Observe that the reading in the pressure gauge is equal to the physical pressure at the C+ port of the positioner.
8. Confirm the calibration by clicking on the **OK** button.

C- pressure, lower value: (Applicable only if the actuator is of double acting type)

1. Select the **C- PRESSURE SENSOR** radio button from Calibration selection.
2. Select the **LOWER VALUE** radio button from Endpoint selection.
3. Fully depressurize the C- port of the positioner. See note below.
4. Click on the **CALIBRATE** button to start the calibration.
5. On completing the calibration, the message is displayed in the **RESULT** area.
6. Observe that the reading in the pressure gauge is 0.
7. Confirm the calibration by clicking on the **OK** button.

C- pressure, upper value: (Applicable only if the actuator is of double acting type)

1. Select the **C- PRESSURE SENSOR** radio button from Calibration selection.
2. Select the **UPPER VALUE** radio button from Endpoint selection.
3. Fully pressurize the C- port of the positioner and measure the physical C- pressure with an external pressure sensor. See note below.

4. Enter the value of the physical C- pressure in the **UPPER VALUE** text box.
5. Click on the **CALIBRATE** button to start the calibration.
6. On completing the calibration, the message is displayed in the **RESULT** area.
7. Observe that the reading in the pressure gauge is equal to the physical pressure at the C- port of the positioner.
8. Confirm the calibration by clicking on the **OK** button.

NOTE. A method to fully pressurize or depressurize the C+ or C- port without turning off the pressure source is presented here. Make sure the Travel Control is in Cutoff (this can be modified in the Positioner Configuration view). Change the setpoint to 0% so that one of the C+ and C- ports is now fully pressurized and the other port is fully depressurized. If the pressure at the port is not according to the calibration procedure, change the setpoint to 100% so that the pressures at the C+ or C- ports are now switched. One advantage with this method is that the external pressure sensor can be connected to the supply port also in the cases the upper values of C+ and C- pressures are calibrated, since the C+ and C- pressures are the same as the supply pressure.

See Also:

- Calibration
- Automatic Calibration
- Automatic Calibration Settings
- Setpoint Calibration
- Transmitter Calibration

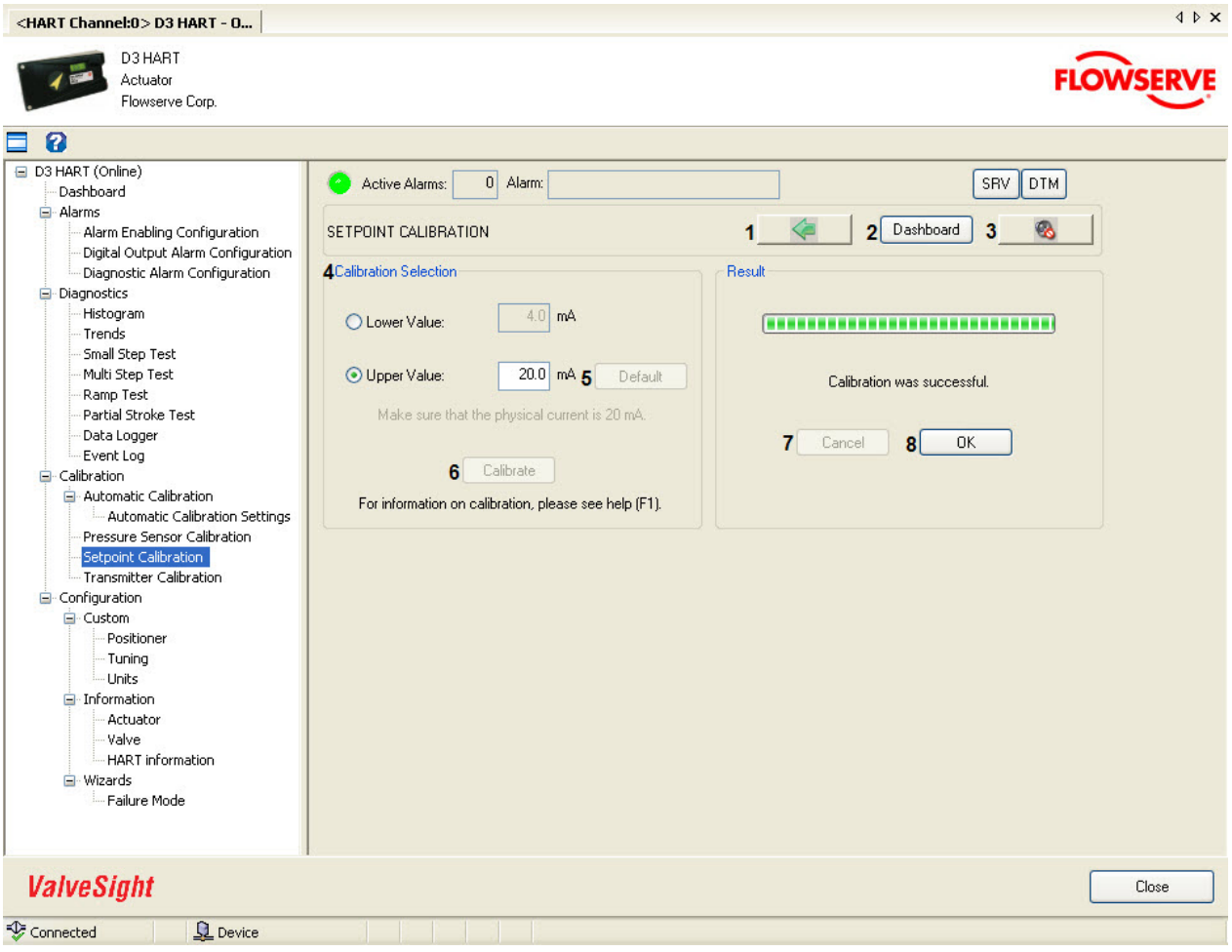
Previous Home Next

Setpoint Calibration

In the Setpoint Calibration, the input setpoint current can be calibrated. The setpoint calibration can be carried out irrespective of the device service status i.e. **IN SERVICE** or **OUT OF SERVICE**.

The modified values are validated against predefined ranges. If the modified value is invalid, a ! is displayed next to the input text box with the valid range in the tool tip.

⚠**Warning:** If the service status is **IN SERVICE**, the valve stem may move during the setpoint calibration even if the magnitude of the physical current is constant.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Calibration view.

2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Calibration Selection	Select either Lower Value or Upper value depending on the calibration to be performed. Enter the current value in the text box. The modified value is validated against the predefined range.
5	Default	Click on the **DEFAULT** button to reset the entered value to the default value.
6	Calibrate	Click on the **CALIBRATE** button to start the calibration.
7	Cancel	Click on the **CANCEL** button to stop the calibration before its completion.
8	OK	Click on the **OK** to confirm the calibration result and reset the view.

Calibration Procedure:

Lower setpoint current value:

1. Select the **LOWER VALUE** radio button from Calibration Selection.
2. Ensure the physical input current connected at the input terminal of the Positioner and the value entered in the text box are equal. If not matching, change one or both of them until they match. Suitable current is in the range [4, 5] mA.
3. Click on the **CALIBRATE** button to start the calibration.
4. On completing the calibration, the message is displayed in the **RESULT** area.
5. Confirm the calibration by clicking on the **OK** button.

Upper setpoint current value:

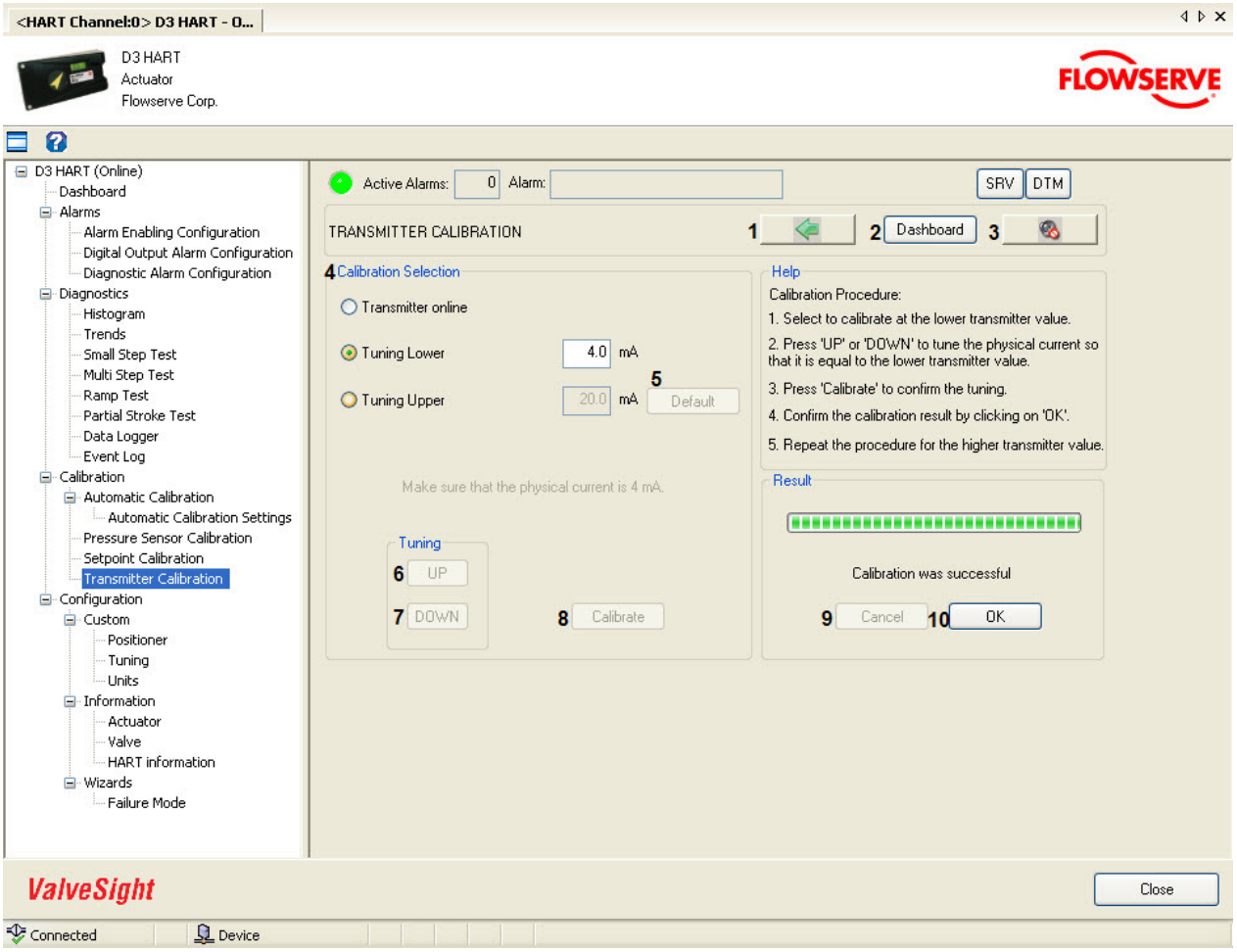
1. Select the **UPPER VALUE** radio button from Calibration Selection.
2. Ensure the physical input current connected at the input terminal of the Positioner and the value entered in the text box are equal. If not matching, change one or both of them until they match. Suitable current is in the range [19, 20] mA.
3. Click on the **CALIBRATE** button to start the calibration.
4. On completing the calibration, the message is displayed in the **RESULT** area.
5. Confirm the calibration by clicking on the **OK** button.

See Also:

- Calibration
- Automatic Calibration
- Automatic Calibration Settings
- Pressure Sensor Calibration
- Transmitter Calibration

Transmitter Calibration

In the Transmitter Calibration view, the Transmitter can be calibrated, provided the device is equipped with a transmitter.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Calibration view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Calibration Selection	Select any one of the following options: ▪ **Transmitter online** - normal operation state.

		▪ **Tuning lower** - to calibrate the lower transmitter value. ▪ **Tuning upper** - to calibrate the upper transmitter value. Enter the tuning value in the text box. The modified value is validated against the predefined range.
5	Default	Click on the **DEFAULT** button to reset the entered value with the default value.
6	UP	Click on the **UP** button to increase the physical current.
7	DOWN	Click on the **DOWN** button to decrease the physical current.
8	Calibrate	Click on the **CALIBRATE** button to start the calibration.
9	Cancel	Click on the **CANCEL** button to stop the calibration before its completion.
10	OK	Click on the **OK** to confirm the calibration result and reset the view.

Calibration Procedure:

Lower transmitter value:

1. Select the **TUNING LOWER** radio button from Calibration selection.
2. Enter the required output current in the corresponding text box. Suitable current is in the range [4, 5] mA.
3. Click on the **UP** or **DOWN** button to tune the physical output current until it is equal to the lower transmitter value entered in the text box.
4. Click on the **CALIBRATE** button to start the calibration.
5. On completing the calibration, the message is displayed in the **RESULT** area.
6. Confirm the calibration by clicking on the **OK** button.

Upper transmitter value:

1. Select the **TUNING UPPER** radio button from Calibration selection.
2. Enter the required output current in the corresponding text box. Suitable current is in the range [19, 20] mA.
3. Click on the **UP** or **DOWN** button to tune the physical output current until it is equal to the upper transmitter value entered in the text box.
4. Click on the **CALIBRATE** button to start the calibration.
5. On completing the calibration, the message is displayed in the **RESULT** area.
6. Confirm the calibration by clicking on the **OK** button.

See Also:

- Calibration
- Automatic Calibration
- Automatic Calibration Settings
- Pressure Sensor Calibration

- Setpoint Calibration

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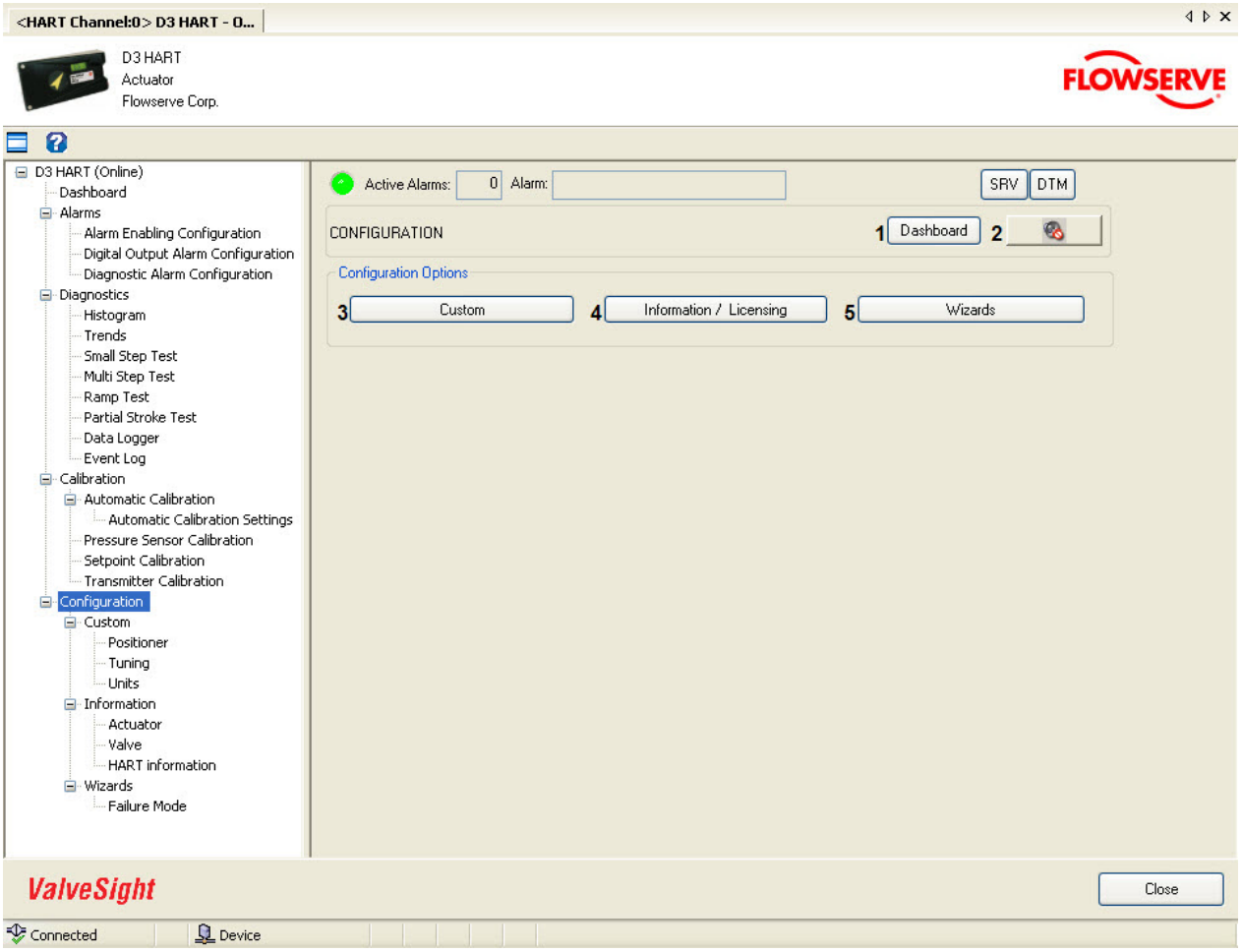
Configuration

Configuration

The Configuration view is a navigation view containing the navigation buttons to sub groups of configuration views - Custom, Information/Licensing, and Wizards views. These views have navigation buttons for relevant configuration views.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
2	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
3	Custom	Click on the **CUSTOM** button to navigate to the Custom view. The Custom view contains the navigation buttons for Positioner,

		Tuning, and Units configuration views.
4	Information/ Licensing	Click on the **INFORMATION/LICENSING** button to navigate to the Information view. The Information view contains the navigation buttons for Actuator, Valve, and HART information configuration views. The registration of the DTM advanced license is done in this view.
5	Wizards	Click on the **WIZARDS** button to navigate to the Wizards view. The Wizards view contains the navigation button for Failure Mode configuration view.

See Also:

- Custom
- Information
- Wizards

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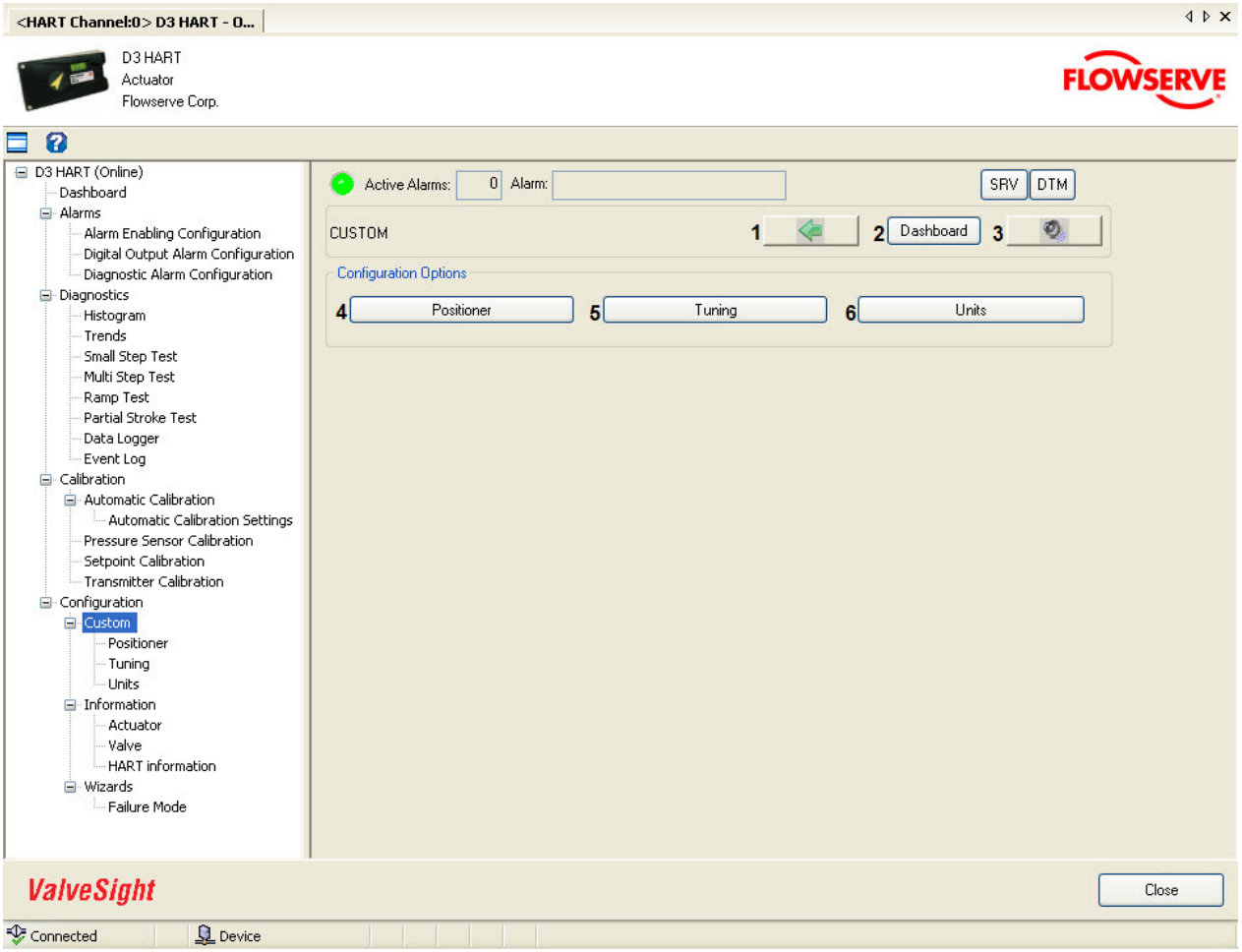
Custom

Custom

The Custom view contains the navigation buttons for Positioner, Tuning, and Units configuration views.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Configuration view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Positioner	Click on the **POSITIONER** button to navigate to the Positioner

		configuration view. All the parameters that are related to the Positioner can be configured from this view.
5	Tuning	Click on the **TUNING** button to navigate to the Tuning configuration view. All the tuning parameters that are used for fine tuning the equipment can be configured from this view.
6	Units	Click on the **UNITS** button to navigate to the Units configuration view. All the units of the physical parameters that are used in the DTM can be configured from this view for the convenience of user.

See Also:

- Configuration
- Positioner
- Tuning
- Units

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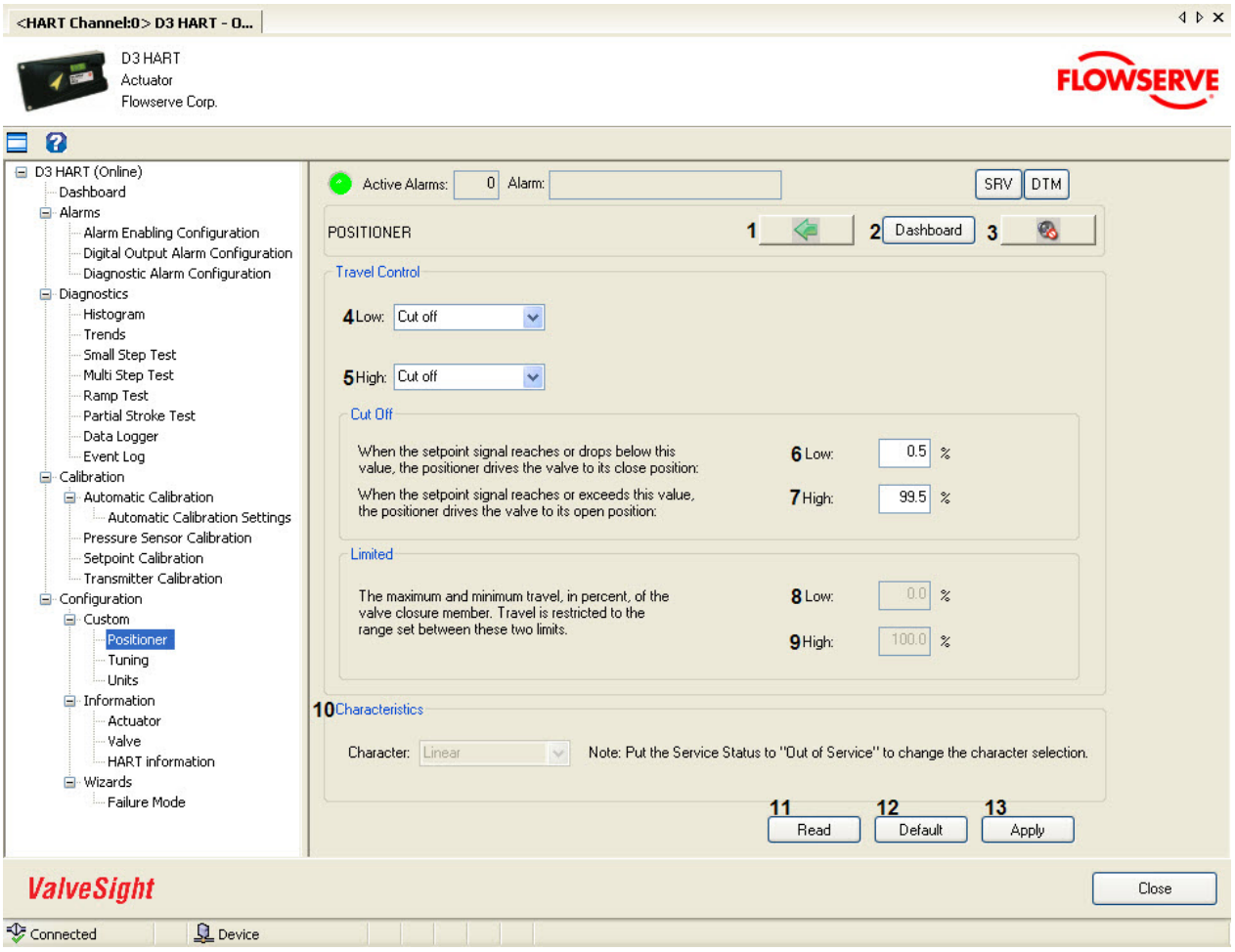
Positioner

In the Positioner configuration view the travel control and characteristics of the D3 Positioner are configured.

All modified values are validated against predefined ranges. If the modified value is invalid, a ! is displayed next to the input text box with the valid range in the tool tip.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Custom view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the

		device.
4	Low	Click on the **LOW** button to select the low travel control.
5	High	Click on the **HIGH** button to select the high travel control.
6	Cut Off Low	When the setpoint signal reaches or drops below this value, the positioner will drive the valve to its closed position (if Cut off is selected in the **TRAVEL CONTROL** - **Low**). Valid range: [0, 99.5] %.
7	Cut Off High	When the setpoint signal reaches or exceeds this value, the positioner will drive the valve to its open position (if Cut off is selected in the **TRAVEL CONTROL**- **High**). Valid range: [0.5, 100] %.
8	Limited Low	The valve will not close more than the position specified here (if Limited is selected in the **TRAVEL CONTROL** - **Low**). Valid range: [0, 99.5] %.
9	Limited High	The valve will not open more than the position specified here (if Limited is selected in the **TRAVEL CONTROL** - **High**). Valid range: [0.5, 100] %.
10	Characteristics	Select any one type of the character curve from linear, equal percentage, quick opening, square root, and custom curve.
11	Read	Click on the **READ** button to read the values of all the parameters from the device.
12	Default	Click on the **DEFAULT** button to display the default values for all the parameters in the view. By clicking on the **DEFAULT** button, default values are just displayed in the view. If required to write these values to the device, click on the **APPLY** button.
13	Apply	Click on the **APPLY** button to write the parameter values shown in this view to the device. The **APPLY** button is only enabled if all values are valid.

See Also:

- Configuration
- Custom
- Tuning
- Units

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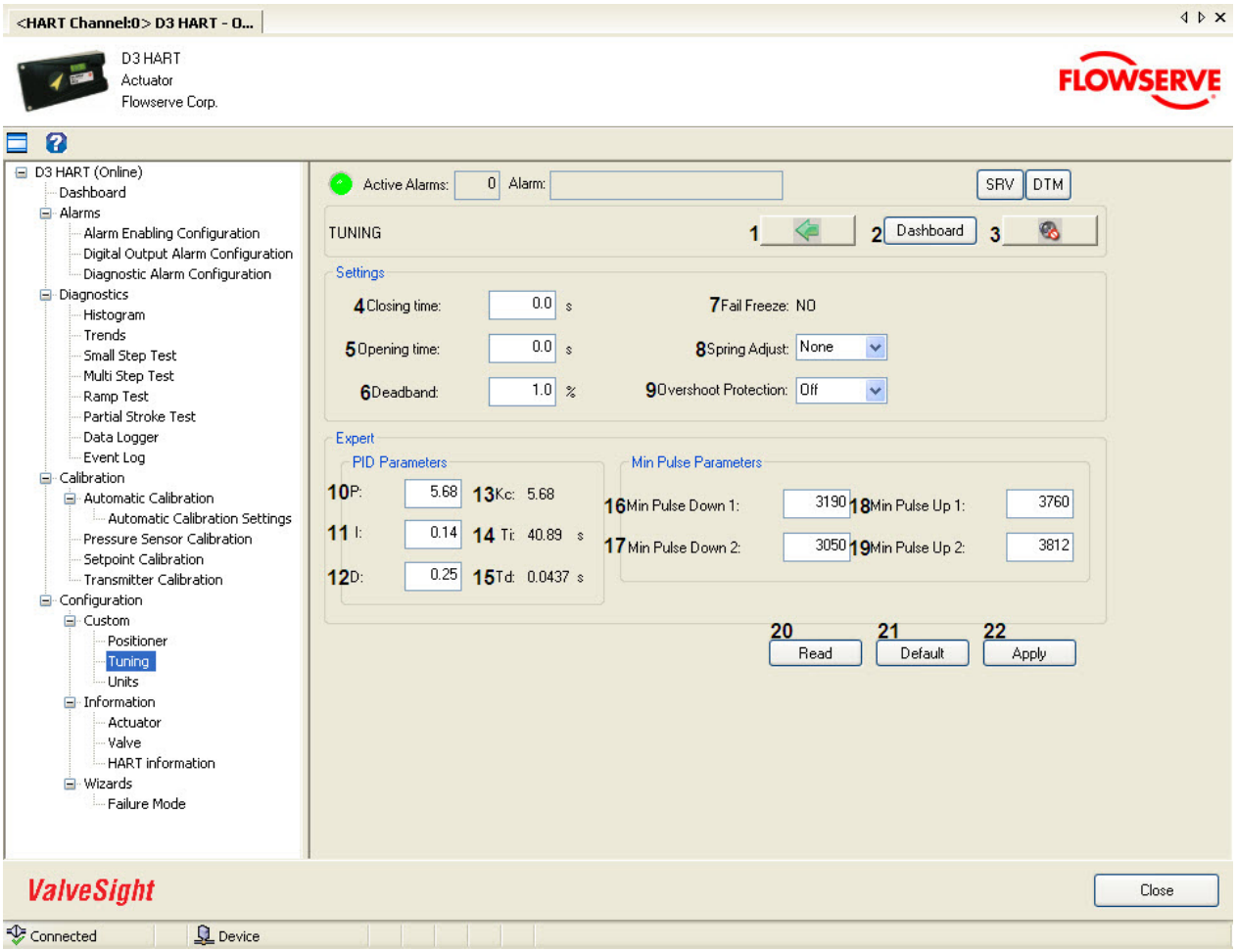
Tuning

In the Tuning configuration view, the tuning parameters can be configured for the tuning.

All modified values are validated against predefined ranges. If the modified value is invalid, a ! is displayed next to the input text box with the valid range in the tool tip.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Custom view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON/OFF** button to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
Settings:		

4	Closing time	The minimum time taken from fully open position to fully closed position. This is achieved by limiting the setpoint rate. Value interval: [0, 600].
5	Opening time	The minimum time taken from fully closed position to fully open position. This is achieved by limiting the setpoint rate. Value interval: [0, 600].
6	Deadband	Twice the tolerated deviation. The position deviation within half the deadband will not be actively controlled by the device. Value interval: [0, 10].
7	Fail Freeze	If the fail freeze option is installed, the device will, on loss of input current, remain fixed at the last known input current position. Also referred to as fail safe or fail in place operation.
8	Spring Adjust	The positioner inner loop gains are internally lowered as the actuator spring extends. This can reduce the variations in dynamics.
9	Overshoot Protection	Reduces overshoot and oscillations by a very strong counter pulse. Option for stabilizing high-friction valves.
Expert:		
10	P	Tuning of the Proportional gain. (P=Kc) Value interval: [0, 1000].
11	I	Tuning of the Integral gain. (I=P/Ti) Value interval: [0, 256].
12	D	Tuning of the Derivate gain. (D=P*Td) Value interval: [0, 10].
13	Kc	Display of the **Kc** parameter, which is dependent on the **P** parameter.
14	Ti	Display of the **Ti** parameter (in seconds), which is dependent on the **P** and **I** parameters.
15	Td	Display of the **Td** parameter (in seconds), which is dependent on the **P** and **D** parameters.
16	Min Pulse Down 1	The minimum pulse width used by the controller when C+ pressure should be decreased at small C+ volume. Value interval: [1500, 20000].
17	Min Pulse Down 2	The minimum pulse width used by the controller when C+ pressure should be decreased at large C+ volume. Value interval: [1500, 20000].
18	Min Pulse Up 1	The minimum pulse width used by the controller when C+ pressure should be increased at small C+ volume. Value interval: [1500, 20000].
19	Min Pulse Up 2	The minimum pulse width used by the controller when C+ pressure should be increased at large C+ volume. Value interval: [1500, 20000].
20	Read	Click on the **READ** button to read the values of all the parameters from the device.
21	Default	Click on the **DEFAULT** button to display the default values for all the parameters in the view. By clicking on the **DEFAULT** button, default values are just displayed in the view. If required to write these values to the device, click on the **APPLY** button.
22	Apply	Click on the **APPLY** button to write the parameter values shown in

		this view to the device. The **APPLY** button is only enabled if all values are valid.

See Also:

- Configuration
- Custom
- Positioner
- Units

Previous Home Next

Units

In the Units configuration view, the units associated with the physical parameters can be changed. The selected units are displayed together with the converted value of the parameters in all the views where those parameters are displayed.

The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Custom view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Setpoint	Select any of the units from the available units for the setpoint - mA, %, mm, inch, cm, and degrees.
5	Position	Select any of the units from the available units for the position - %, mm, inch, cm, and degrees.
6	Deviation	The unit of deviation follows the unit selected for **Setpoint**.
7	Pressure	Select any of the units from the available units for the pressure - bar, psi, and kPa.
8	Friction	The unit of friction follows the unit selected for **Pressure**.
9	Temperature	Select any of the units from the available units for the temperature - degrees Celsius (C), Fahrenheit (F), and Kelvin (K).
10	Device Language	Select the language for the device's local display panel. This selected language does not influence the local language of DTM.
11	Read	Click on the **READ** button to read the values of all the parameters from the device.
12	Default	Click on the **DEFAULT** button to display the default values for all the parameters in the view. By clicking on the **DEFAULT** button, default values are just displayed in the view. If required to write these values to the device, click on the **APPLY** button.
13	Apply	Click on the **APPLY** button to write the parameter values shown in this view to the device. The **APPLY** button is only enabled if all values are valid.

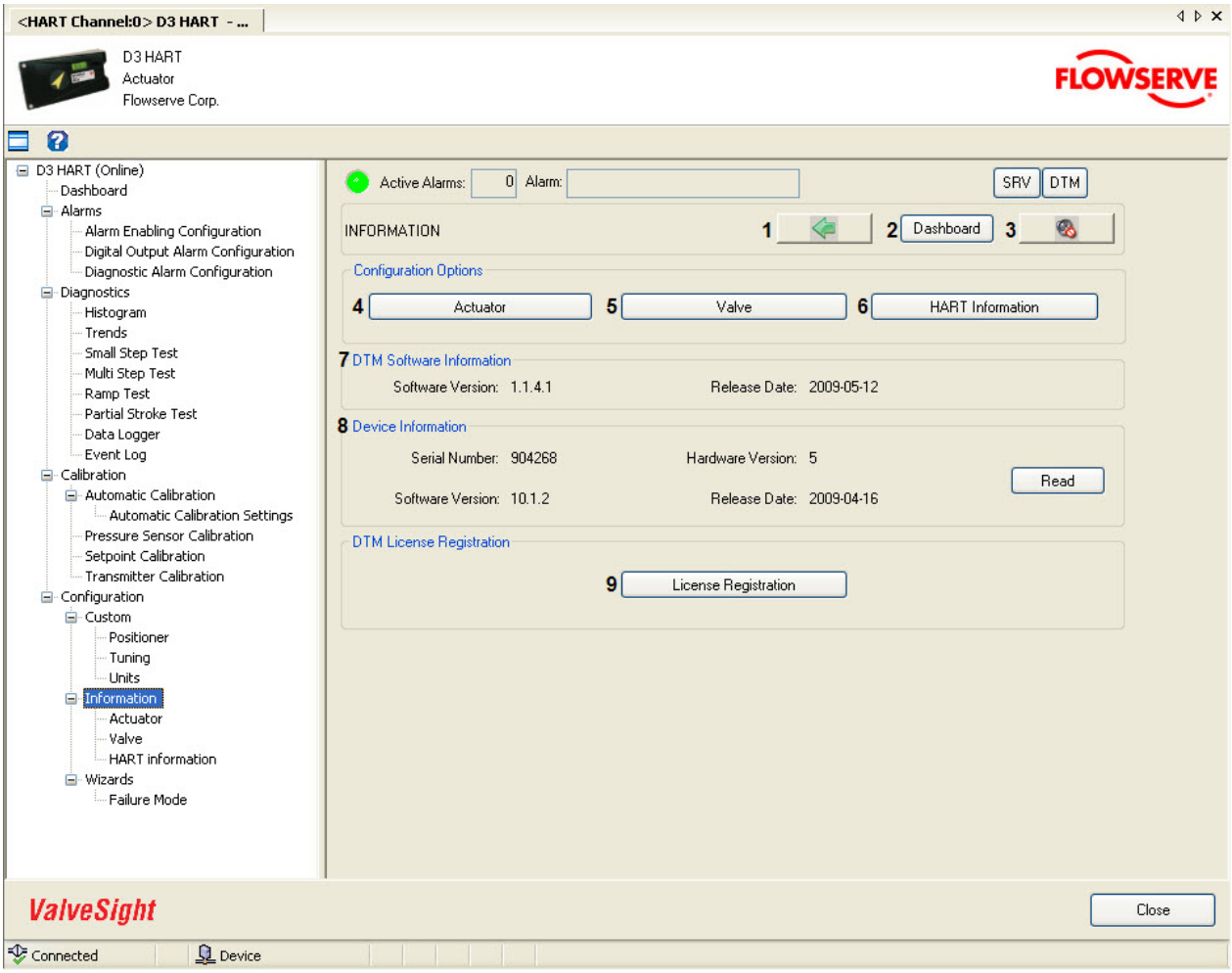
See Also:

- Configuration
- Custom
- Positioner
- Tuning

Information

Information

The Information view displays the device software and DTM software revisions, and contains the navigation buttons for Actuator, Valve, and HART Information configuration views and to the License Registration view.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Configuration view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound

		ON / OFF. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Actuator	Click on the **ACTUATOR** button to navigate to the Actuator configuration view. All values of the parameter related to actuator can be modified from this view.
5	Valve	Click on the **VALVE** button to navigate to the Valve configuration view. All values of the parameter related to valve can be modified from this view.
6	HART information	Click on the **HART INFORMATION** button to navigate to the HART Information configuration view. All values of the parameters - Tag name, Descriptor, and Message can be modified from this view. This view also shows the quality of the HART communication.
7	DTM Software Information	The DTM software version and the release date are displayed in this view.
8	Device Information	Information related to the device - serial number of the device, the device hardware, software version, and release date are displayed here.
9	License Registration	Click on the **LICENSE REGISTRATION** button to navigate to the License Registration view. Here you can unregister the ValveSight™ DTM and/or enable the bypass of the Private Dialog restriction.

See Also:

- Configuration
- License Registration
- Actuator
- Valve
- HART Information

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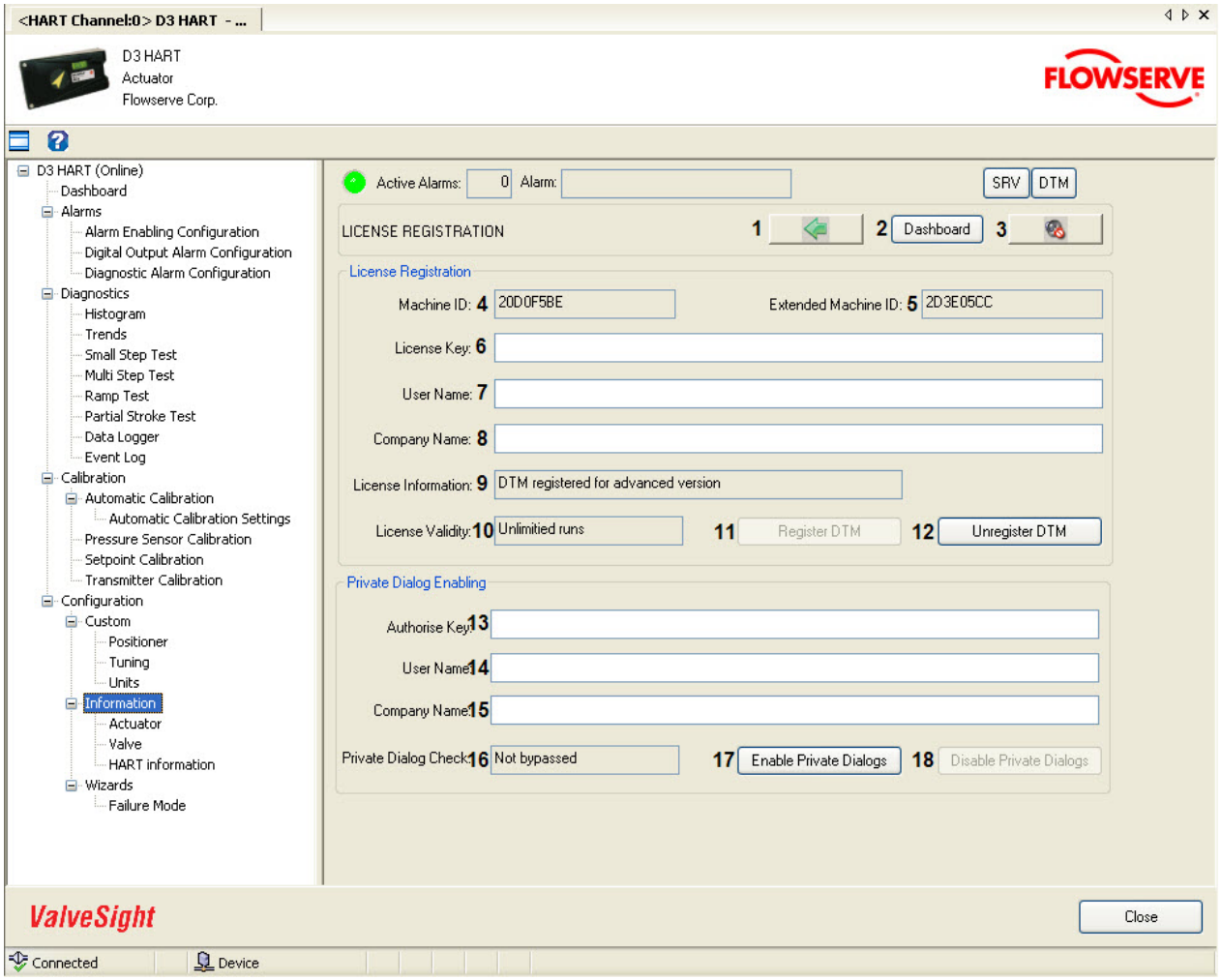
License Registration

The License Registration view handles the upgrade to the Advanced DTM version. It also handles the bypass of the Private Dialogs restriction that some frames have.

How to enter the DTM license

1. Supply the Machine ID to Flowserve, and Flowserve will provide a license key for the Advanced version of the ValveSight™ DTM. For more information on Licensing, contact your local sales representative.
2. Enter the license key, user name, and company name in the corresponding fields and click on the **REGISTER DTM** button to register the ValveSight DTM in the host system. The Advanced version of the Dashboard view is opened.

Alternately, it is also possible to register the DTM from the Start menu of the host computer, by selecting **All Programs -> Flowserve -> ValveSight D3 HART DTM -> License registration.**



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Configuration view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Machine ID	This calculated Machine ID is used when generating the license.
5	Extended Machine ID	The Extended Machine ID can be used when generating the license.
6	License Key	Enter the license key received from Flowserve to register the ValveSight™ DTM.
7	User Name	Enter the User Name of the license.
8	Company Name	Enter the Company Name of the license.
9	License Information	Displays the license version.
10	License Validity	Displays the validity of the license and contains information on when the license will expire.
11	Register DTM	This button is disabled in the Advanced version. Click on the **REGISTER DTM** button to register the ValveSight™ DTM with the license key received from Flowserve. You will be redirected to the advanced version of the Dashboard view
12	Unregister DTM	Click on the **UNREGISTER DTM** button to unregister the DTM on the host system. You will be redirected to the basic version of the Dashboard view
13	Authorise Key	Enter the Authorise Key received from Flowserve to bypass of the Private Dialogs restriction that some frames have. The frames has Private Dialog restriction if you are unable to for example open the pop-up from the INFO buttons on the Dashboard view.
14	User Name	Enter the User Name of the Private Dialog enabling license.
15	Company Name	Enter the Company Name of the Private Dialog enabling license.
16	Private Dialog Check	Displays the Private Dialog status, the private dialog restriction bypassed or not.
17	Enable Private Dialogs	Click on the **ENABLE PRIVATE DIALOGS** button to bypass the private dialog restriction with the license key received from Flowserve.
18	Disable Private Dialogs	Click on the **DISABLE PRIVATE DIALOGS** button to activate the private dialog restriction possibility.

See Also:

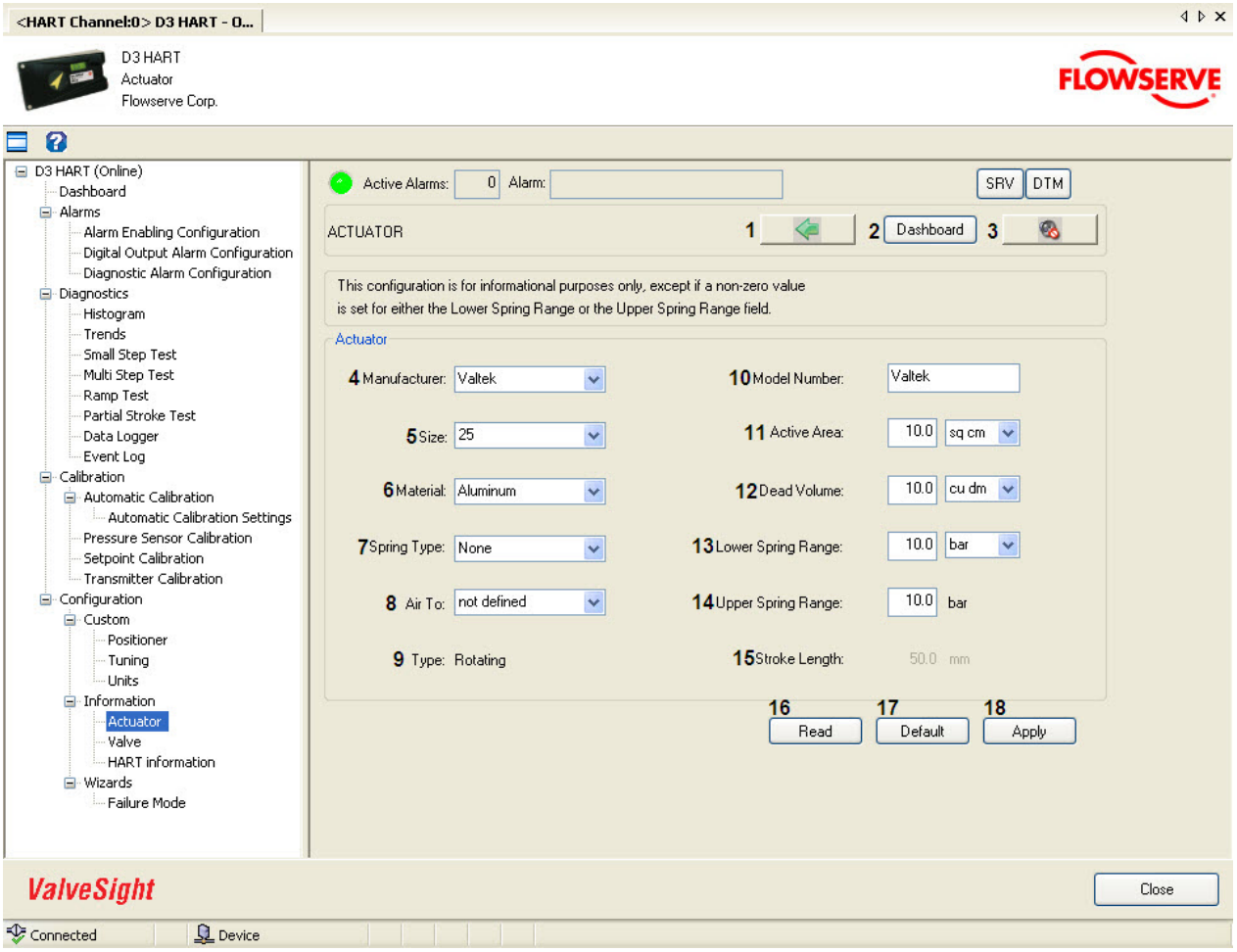
- Configuration
- Information

- Actuator
- Valve
- HART Information

Actuator

The Actuator view is an informational view, this means the information is for record keeping and does not affect the operation of the positioner or valve. However, if a non-zero value is set for either the spring range lower or spring range upper, both values will be used in the determination of three alarms; Lower spring range deviation, Upper spring range deviation, and Spring span deviation.

All modified values are validated against predefined ranges. If the modified value is invalid, a ! is displayed next to the input text box with the valid range in the tool tip.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Information view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.

3	Sound On/Off	Click on the **SOUND ON / OFF** button  to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Manufacturer	Information about the actuator manufacturer.
5	Size	Information about the actuator size.
6	Material	Information about the actuator material.
7	Spring Type	Information about the actuator spring type
8	Air To	Information about whether the actuator/valve is air to open or air to close.
9	Type	Information about the actuator type. This parameter can be changed in the Automatic Calibration Settings view.
10	Model Number	Information about the actuator model number, max 12 characters.
11	Active Area	Information about the actuator active area. Value interval: [0, 5000] sq cm, [0, 775] sq in.
12	Dead Volume	Information about the actuator dead volume. Value interval: [0, 1000] cu dm, [0, 35.3] cu ft.
13	Spring Range Lower	Information about the lower spring range value. Value interval: [0, 10] bar, [0, 145] psi, [0, 1000] kPa.
14	Spring Range Upper	Information about the upper spring range value, with the same unit as in the Spring Range Lower field. Value interval: [0, 10] bar, [0, 145] psi, [0, 1000] kPa.
15	Stroke Length	Stroke length information, Applicable if the Actuator is of a linear type. This parameter can be changed in the Automatic Calibration Settings view.
16	Read	Click on the **READ** button to read the values of all the parameters from the device.
17	Default	Click on the **DEFAULT** button to display the default values for all the parameters in the view. By clicking on the **DEFAULT** button, default values are just displayed in the view. If required to write these values to the device, click on the **APPLY** button.
18	Apply	Click on the **APPLY** button to write the parameter values shown in this view to the device. The **APPLY** button is only enabled if all values are valid.

NOTE: If a non-zero value is set for either the spring range lower or spring range upper, both values will be used in the determination of three alarms; Lower spring range deviation, Upper spring range deviation, and Spring span deviation.

See Also:

- Configuration
- Information
- License Registration
- Valve
- HART Information

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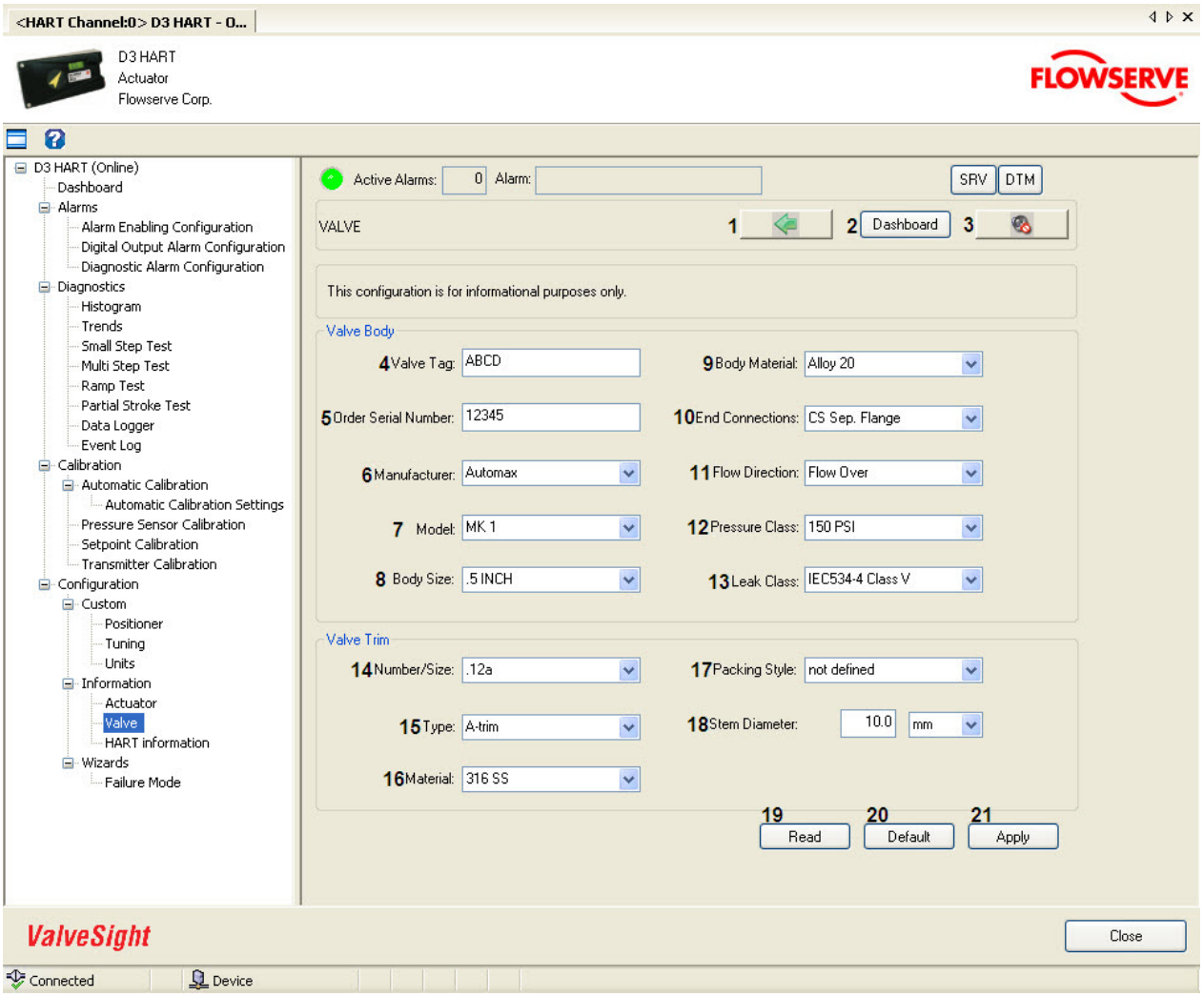
Valve

The Valve view is an informational view, this means that the information is for record keeping and does not affect the operation of the positioner or valve.

All modified values are validated against predefined ranges. If the modified value is invalid, a ! is displayed next to the input text box with the valid range in the tool tip.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Information view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.

3	Sound On/Off	Click on the **SOUND ON / OFF** button  to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
Valve Body:		
4	Valve Tag	Information about the valve tag. Max 12 characters.
5	Order Serial Number	Information about the valve serial number. Max 12 characters.
6	Manufacturer	Information about the valve manufacturer.
7	Model	Information about the valve model.
8	Body Size	Information about the valve body size.
9	Body Material	Information about the valve body material.
10	End Connections	Information about the valve end connections.
11	Flow Direction	Information about the valve flow direction.
12	Pressure Class	Information about the valve pressure class.
13	Leak Class	Information about the valve leak class.
Valve Trim:		
14	Number/Size	Information about the valve trim size.
15	Type	Information about the valve type.
16	Material	Information about the valve trim material.
17	Packing Style	Information about the valve packing style.
18	Stem Diameter	Stem diameter information. Value interval: [0, 100] mm, [0, 4] in.
19	Read	Click on the **READ** button to read the values of all the parameters in this view.
20	Default	Click on the **DEFAULT** button to display the default values for all the parameters in the view. By clicking on the **DEFAULT** button, default values are just displayed in the view. If required to write these values to the device, click on the **APPLY** button.
21	Apply	Click on the **APPLY** button to write the parameter values shown in this view to the device. The **APPLY** button is only enabled if all values are valid.

See Also:

- Configuration
- Information
- License Registration
- Actuator
- HART Information

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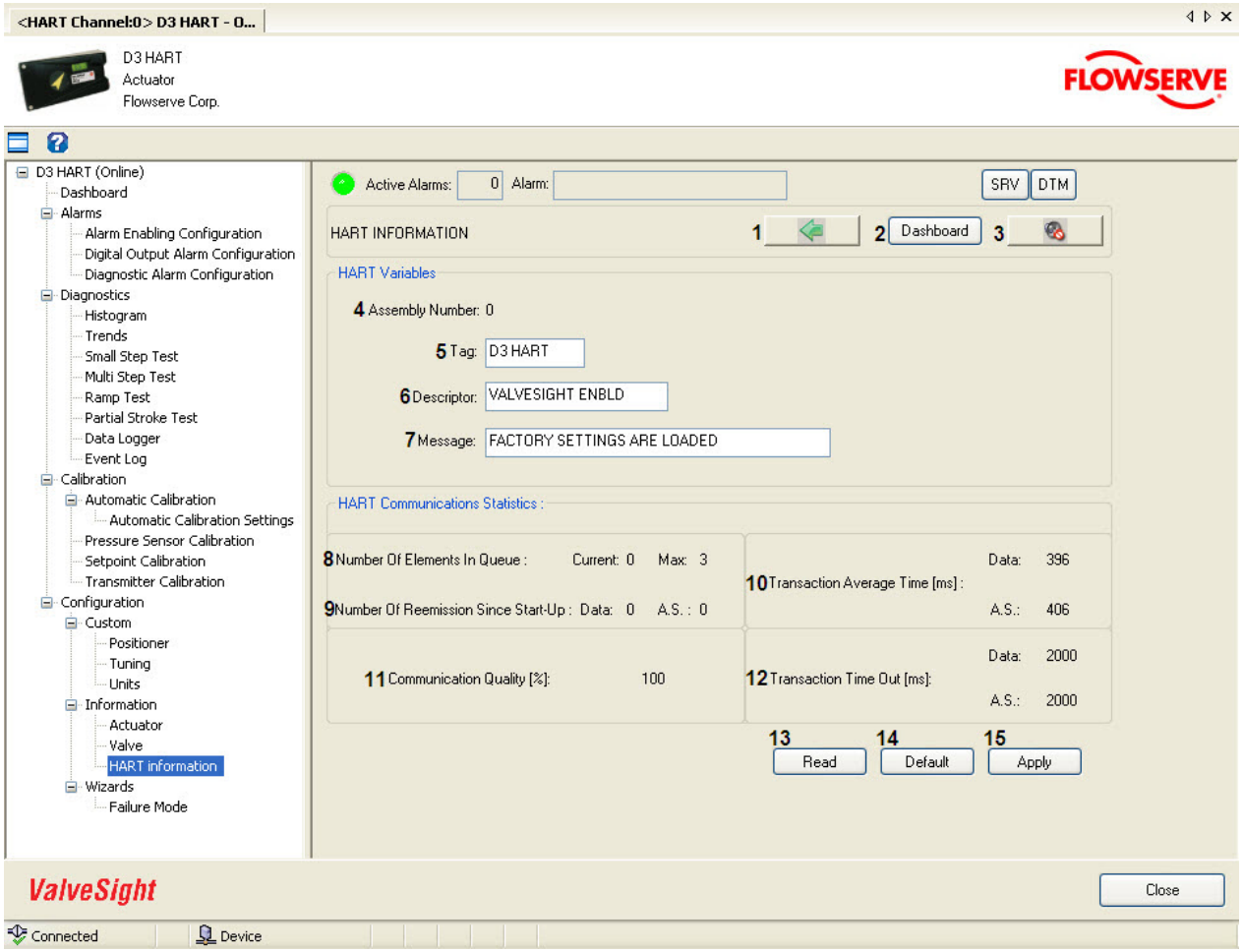
HART Information

The HART Information view is an informational view. The HART Communications Statistics displays the quality/speed of the communication between the DTM and the device.

NOTE: The characters (e.g. capital letters and spaces) in the text fields need to be removed before editing the field. Capital letters and space consume the maximum number of characters.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Information view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.

3	Sound On/Off	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Assembly Number	The assembly number stored in the device.
5	Tag	The tag can be used to label the device with a name, maximum of 8 characters. The tag is also shown in the Alarm Information view.
6	Descriptor	The descriptor can be used to describe the location of the device, maximum 16 characters, The descriptor is also shown in the Alarm Information view.
7	Message	The message can be used to label the device with a message, maximum 32 characters.
8	Number Of Elements In Queue	Displays the number of requests, which are queued in the transmission queue, and the maximum value of queued requests.
9	Number of Remissions Since Start-Up	Displays the number of discarded requests, both for Data (parameters) and for Alarm Service.
10	Transaction Average Time (ms)	Displays the average transaction time, both for Data (parameters) and for Alarm Service.
11	Communication Quality (%)	Displays the communication quality in %.
12	Transaction Time Out (ms)	Displays the transaction time out, both for Data (parameters) and for Alarm Service.
13	Read	Click on the **READ** button to read the values of all the parameters in this view.
14	Default	Click on the **DEFAULT** button to display the default values for all the parameters in the view. By clicking on the **DEFAULT** button, default values are just displayed in the view. If required to write these values to the device, click on the **APPLY** button.
15	Apply	Click on the **APPLY** button to write the parameter values shown in this view to the device. The **APPLY** button is only enabled if all values are valid.

See Also:

- Configuration
- Information
- License Registration
- Actuator
- Valve

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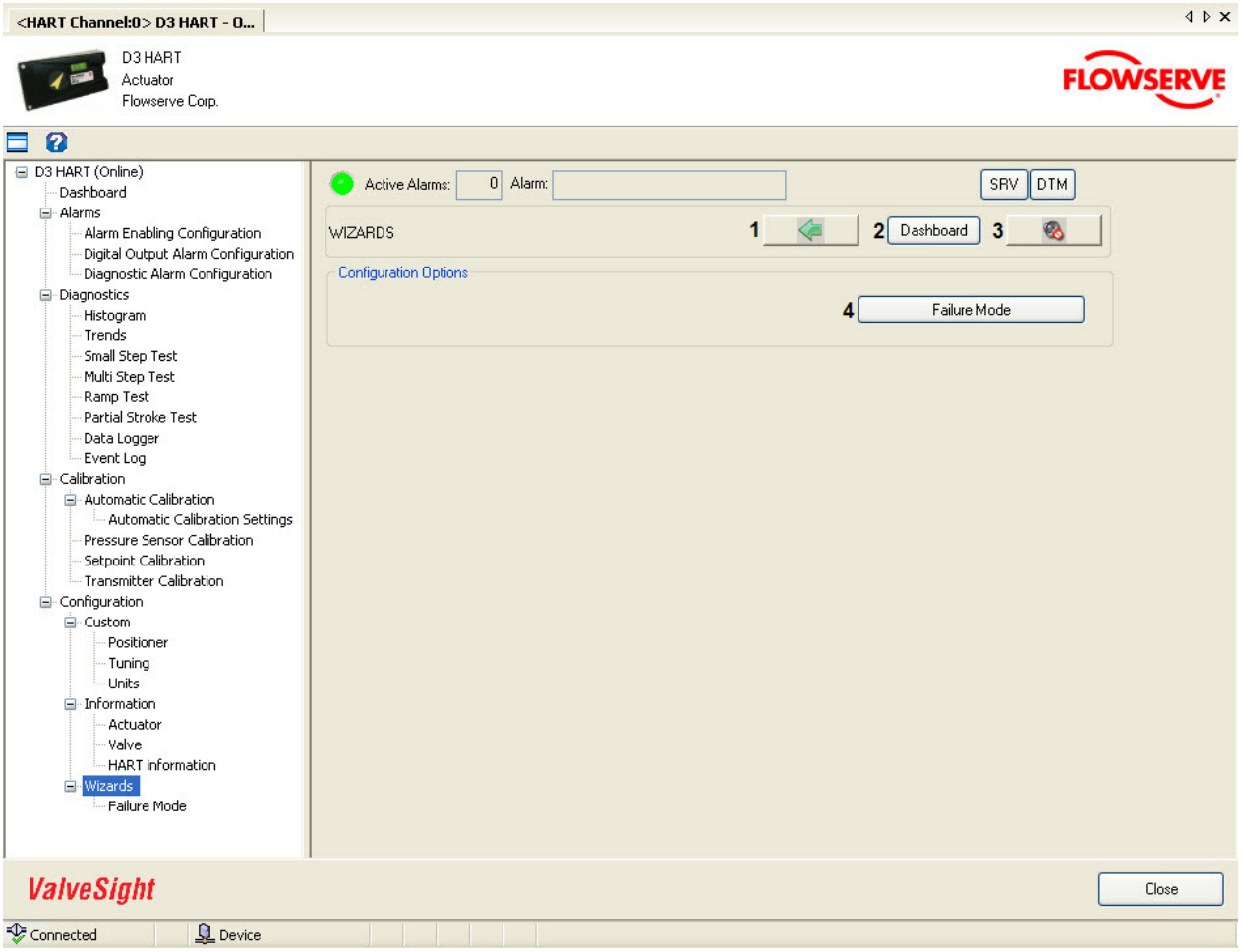
Wizards

Wizards

The Wizards view is a menu view from which the Failure Mode view can be reached.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Configuration view.
2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON / OFF** button to toggle the sound **ON / OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Failure Mode	Click on the **FAILURE MODE** button to navigate to the Failure Mode view, in which the user can put the device into Failure

		mode of operation.

See Also:

- Failure Mode

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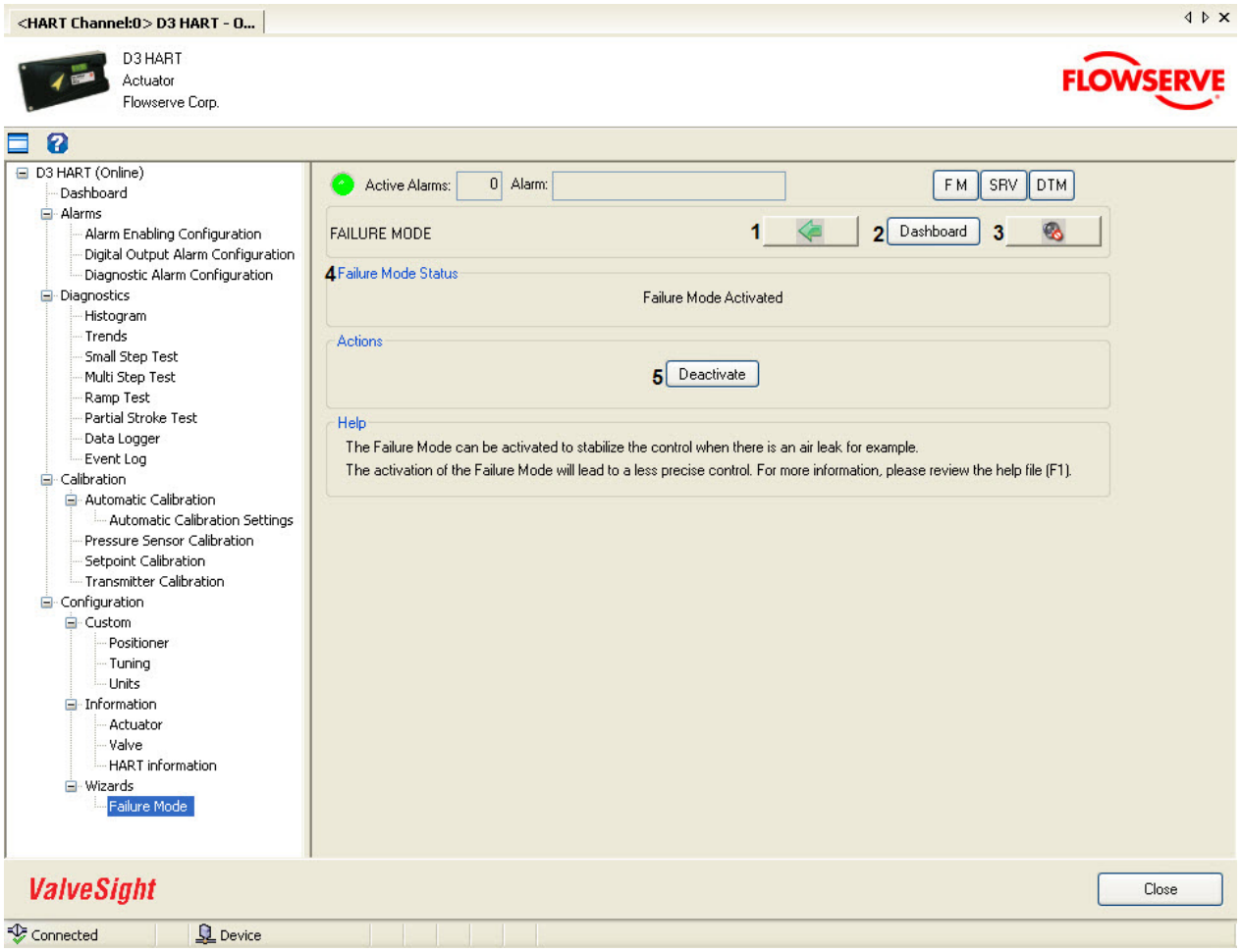
Failure Mode

The Failure Mode view is used to activate the Failure mode of the device operation. The Failure mode can be used for controlling after a bad calibration that cannot be improved.

It limits the min pulses and has a minimum deadband of 2%. Furthermore it treats the deadband asymmetrically, i.e. if the position exits the deadband due to an air leak, it will lower the deadband with 1/4 in the leak direction before correcting the position. It also counts the P-effect from the deadband limit as opposed to the setpoint in normal control.

Failure Mode is mostly for stabilizing the control when there are leaks. When the Failure mode is activated, an 

icon is shown in the top right corner on every view.



The navigation buttons and input/output visual control elements are explained in the table below:

Field No.	Field Name	Description
1	Back	Click on the **BACK** button to navigate to the Wizards view.

2	Dashboard	Click on the **DASHBOARD** button to navigate to the Dashboard view.
3	Sound On/Off	Click on the **SOUND ON/OFF** button  to toggle the sound **ON/OFF**. This is for an audible indication together with a visual indication of the LED, if alarms are present in the device.
4	Failure Mode Status	Displays the Failure Mode status.
5	Activate/ Deactivate	Click on the **ACTIVATE/DEACTIVATE** button to activate or deactivate the Failure mode.

See Also:

- Wizards

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D3 Hardware

The D3 is a digital positioner where high air delivery capacity is combined with low air consumption. It suits both linear and rotary actuators, single or double acting. Five keys and a large graphic display make D3 simple to configure and adjust. The pneumatic relay consists of piezo electric valves and is made of plastic to offer high corrosion resistance.

An easily accessible built in replaceable filter is provided to offer durability together with a sealed compartment for the terminals.

For more information, refer the D3 manual.

The digital air relay

As opposed to analogue positioners, digital positioners may utilize the fact that they are indeed digital, and a true digital controlled air relay can be designed.

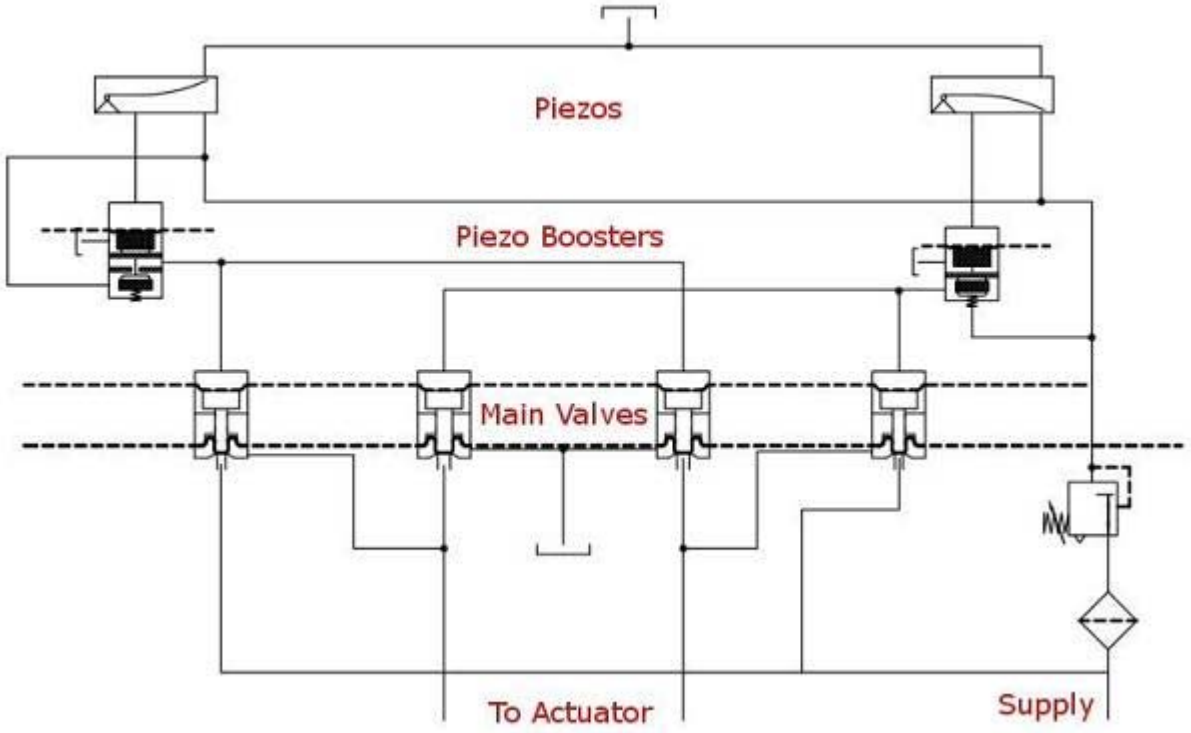
By controlling the air relay with two digital piezos, the air relay may be set to 4 different states. The states resemble an analogue positioner's spool valve - stand still, go right and go left. The fourth state is 'go right and left' and is not used.

The control is exerted by selecting the states with a pulse width modulated signal. In contrast to the spool valve, where the travel speed is controlled, the digital air relay controls the time in which travel is done.

The piezo signals are boosted before controlling the final stage.

This solution produces air relays with extremely low air consumption or near zero bleed.

The digital nature of the air relay also makes it ideal for fail freeze (fail in place) operation as an option.



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