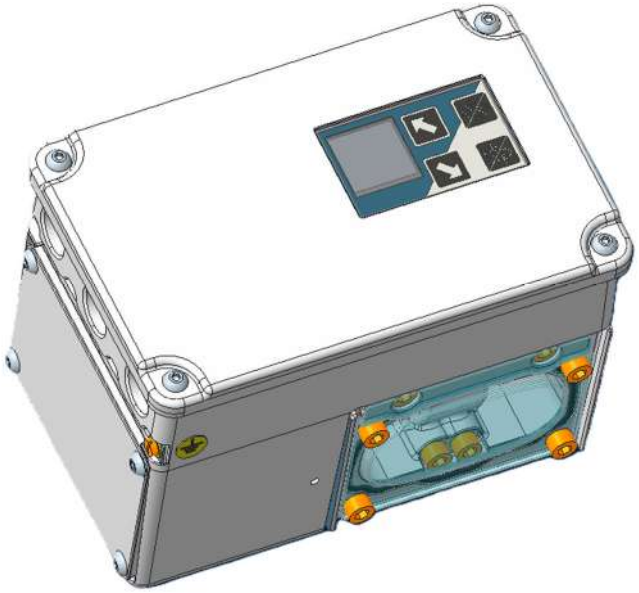
Process
Automation
IMI STI – 4055_r05_En rev.05 30/06/2025

# INSTRUCTION MANUAL

## Smart High Performance Positioner

**SERIES**: SHP



## INSTRUCTION MANUAL 4055

(software & settings)

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| - | - | - | - | - |
|---|---|---|---|---|
| *05* | *30/06/2025* | *General Revision* | T. Stupka | R. Valoti |
| *04* | *06/03/2025* | ***Added*** *New chapter: Partial Stroke Test (PST) + Updated the rest of the manual accordingly*<br><br>***Added*** *List of SHP Device Specific Statuses*<br><br>***Updated*** *Digital I/O description*<br><br>***Updated*** *Calibration wizard description + Added info about 'Reverse' function for SA actuators.*<br><br>***Added*** *'Long Tag' description*<br><br>***Updated*** *Dynamic Variables Assignments description*<br><br>***Added*** *List of all possible events that can be logged*<br><br>***Updated*** *LUI chapter – Tree menu views* | T. Stupka | R. Valoti |
| *03* | *23/09/2024* | ***Updated*** *Analog Feedback (new impact on LUI)* | T. Stupka | R. Valoti |
| *02* | *28/06/2024* | ***Added*** *COM Port Reconnection update and Polling Address Scan feature description*<br><br>***Added*** *Pressure Sensors + Loop Current Calibration Window description*<br><br>***Added*** *OP Trial License description*<br><br>***Added*** *New chapter: Local User Interface*<br><br>***Updated*** *Logger screenshot (new 'On-Time' field)*<br><br>***Removed*** *'Gr.Panel' explanation (removed in new version)*<br><br>***Added*** *Graph Text File Description*<br><br>***Added*** *Contactless Remote Sensor Description* | T. Stupka | R. Valoti |
| *01* | *28/02/2024* | *Minor Corrections* | T. Stupka | R. Valoti |
| *00* | *23/11/2023* | *First Issue* | T. Stupka | R. Valoti |
| Revision | Date | Description | Issued by | Checked by |

# INDEX

# 1 GENERAL INFORMATION

## 1.1 GENERAL WARNING

This Instruction Manual is an integral part of the machine, it should be carefully read before carrying out any operation and it should be kept for future references.
The operators shall adopt the safety precautions required by the country where the product is installed.

## 1.2 GENERALITIES

IMI STI products are conceived, manufactured and controlled according to the Quality Control System in compliance with EN ISO 9001 International Standard.

## 1.3 MANUFACTURER

According to Machinery Directive 2006/42/EC, the Manufacturer of the described product is:

IMI STI, Via Dei Caravaggi 15
24040 Levate, Bergamo, Italy
Tel. +39 035 29282
Fax +39 035 2928247
imisti.sales@imi-critical.com
sti.support@ imi-critical.com

## 1.4 TERMS AND CONDITIONS

IMI STI guarantees each single product to be without defects and to conform to current goods specifications. Unless otherwise stated on the purchased order, the warranty period is one year from the date of installation by the user, or eighteen months from the date of shipment to the first user, whichever occurs first. Additionally:

- The warranty does not cover products which have been subject to improper storage, improper installation, misuse, corrosion, or which have been modified or repaired by unauthorized personnel (it is not advisable that customer or end users modify the device characteristics).
- The warranty does not cover special products or components not covered by warranty in their turn by subcontractors.

## 1.5 MANUFACTURER'S LIABILITY

IMI STI declines all liability in the event of:

- The use of the product does not comply with local legislation on safety at work.
- Disregard or incorrect application of the instructions provided on the product label and/or in the instruction manual.
- Incorrect installation and/or use of the product.
- Modifications without STI's authorization and/or work done on the unit by unqualified or unsuitable personnel.

## 1.6 APPLICABLE STANDARDS AND DIRECTIVES

| | |
|---|---|
| EN ISO 12100 | Safety of machinery - General principles for design. Risk assessment and risk reduction |
| EN ISO 9001 | Quality Management Systems - Requirements |
| 2014/35/UE | Directive for Low Voltage Equipment (LV) |
| 2004/108/EC | Directive relating to the Electromagnetic Compatibility (EMC) |
| EN 60079-0 | Explosive atmospheres - Part 0: Equipment - General requirements |
| EN 60079-1 | Explosive atmospheres - Part 1: Equipment - Equipment protection by flameproof enclosures "d" |
| EN 60079-11 | Explosive atmospheres - Part 11: Equipment - Equipment protection by intrinsic safety "i" |
| EN ISO 60079-36 | Explosive atmospheres. Non-electrical equipment for explosive atmospheres. Basic method and requirements. |
| EN ISO 80079-34 | Explosive atmospheres. Part 34: Application of quality management systems for Ex Product manufacture. |
| EN 61508:2010 | Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 1: General requirements. |

This product is designed in accordance with the applicable International Standards and Directives, but the following regulations must be observed in any case:

- General and safety regulations.
- Plant specific regulations and requirements.
- Proper use of personal devices, protective devices (glasses, clothing, gloves, etc.), tools and transport equipment.

See also other related manuals/addendums:

- 4056 – Instruction Manual (hardware).
- 4058 – Approval Nameplates.
- 4059 – QuickStart Guide.
- 4060 – Instruction Manual (SIS & PST)
- 7008 – SHP Model Selection.
- 7010 – RS Model Selection.
- Safety Manual (specific for each certification).

Safety Manuals are not available on IMI STI's website. Safety manuals are shipped with the product. If needed, contact IMI STI to receive a digital copy.

## 1.7 ABOUT THIS MANUAL

Welcome to the User Guide for **Remote Control**, the dedicated software interface for the **SHP Positioner**. This guide provides an overview of the software's functionalities, enabling you to get started quickly and efficiently.

**Remote Control** is a powerful tool specifically designed for controlling and managing the **SHP Positioner**. It offers a user-friendly interface and a range of features that make it easy to operate the device.

The **SHP Positioner** is equipped with a suite of diagnostic tools. The **online diagnostic tools** include:

- **Logger: Records and tracks data over time.**
- **Events & Counters: Monitors and counts specific occurrences.**
- **PST: Partial Stroke Test.**
- **NE107 Status: Offers standardized status warnings reflecting the device's health.**

Additionally, the **offline diagnostic tools** consist of:

- **Valve Signature Test: Detects friction inside the valve.**
- **Step Response Test: Evaluates system reaction.**
- **Frequency Response Test: Determines system stability.**

In this guide, you will find step-by-step instructions on how to navigate the Remote Control interface and troubleshoot common issues.

This guide is divided into nine chapters to help you navigate through the different aspects of the software:

1. **General Information**: Provides general information and definitions about the manual.
2. **Software Installation**: Walk through the process of installing the Remote Control software on your system.
3. **Getting Started**: Learn about the initial setup, configuration, and basic operations of the software.
4. **Main Tabs**: Understand the functions of the main tabs in the software interface and how to navigate them.
5. **Partial Stroke Test (PST)**: Learn how to configure and perform the Partial Stroke Test.
6. **Graph Tool**: Dive into the Graph Tool, its features, and how to effectively use it.
7. **Offline Diagnostic Tools**: Discover the offline diagnostic tools available in the software and how to use them.
8. **Local User Interface (LUI):** Learn how to interact with the LCD display and touch screen keyboard.
9. **Option Packs**: Explore the additional features available in the Option Packs and how to activate them.

We hope this guide helps you maximize the potential of our Remote Control software for the SHP Positioner.

### 1.7.1 SIGNS OF WARNING AND INFORMATION

Be careful where the following symbols are shown. They indicate a potentially hazardous situation, and they warn that if the steps are not properly performed, they may cause serious injury, death or long-term risks to health of exposed persons.

| | |
|---|---|
|  |  |
| Warning | Info |

## 1.8 DEFINITIONS & ABBREVIATIONS

| | |
|---|---|
| SHP | Smart High-Performance Positioner |
| HART | Highway Addressable Remote Transducer |
| RC | Remote Control (software) |
| LUI | Local User Interface (positioner's display) |
| PST | Partial Stroke Test |
| Option Pack | Purchasable group of features that enhance the functionality and control of the positioner. |
| OP1 | Option Pack 1 |
| OP2 | Option Pack 2 |
| OP3 | Option Pack 3 |
| OP4 | Option Pack 4 (Reserved) |
| SU | Super User |

# 2 SOFTWARE INSTALLATION

## 2.1 SYSTEM REQUIREMENTS

Before installing Remote Control, it's important to ensure that your system meets the necessary requirements for the software to run smoothly and efficiently. Here are the minimum system requirements for Remote Control :

- Operating System : Remote Control is compatible with Windows 7, Windows 10, and Windows 11. Please ensure that your system is running one of these operating systems.

- Memory : Your system should have at least 4GB of RAM. This allows the software to perform optimally without causing your system to slow down.

- .NET Framework : Remote Control requires the latest version of the .NET Framework. The .NET Framework is a software development framework from Microsoft that runs primarily on Microsoft Windows. It provides a controlled programming environment where software can be developed, installed, and executed on Windows-based operating systems.

- Disk Space : Ensure that your system has at least 100 MB of free disk space available for the software installation. Verify and clear up space if needed before proceeding with the installation.

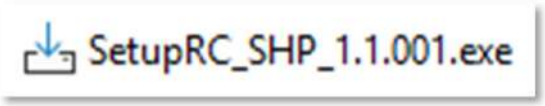
Please ensure that your system meets these requirements before proceeding with the installation of Remote Control. If your system does not meet these requirements, you may experience performance issues, or the software may not function as intended.

## 2.2 INSTALLATION WIZARD

The Installation Wizard is a tool that guides you through the process of installing the Remote Control software. Here are the steps to follow:

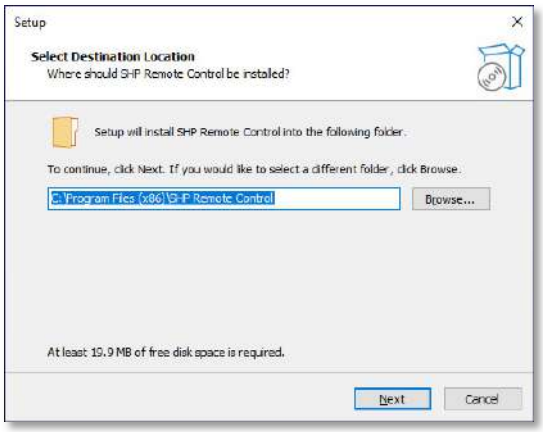
- **Step 1 -** Run the Installation File:

Locate the installation file on your system and double-click it to run the Installation Wizard.



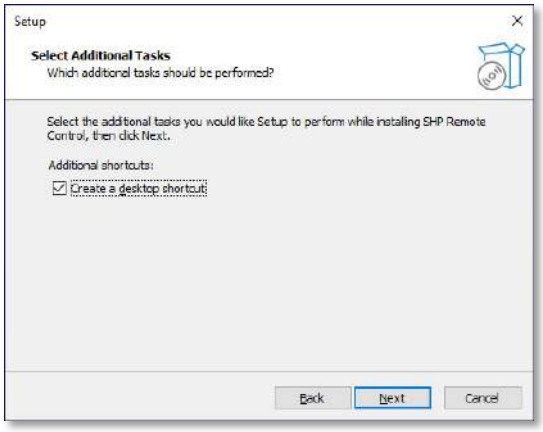
- **Step 2 - Select Destination Location:**

The first screen of the wizard will ask you to select the destination location for the software. Choose the desired location and click "Next".



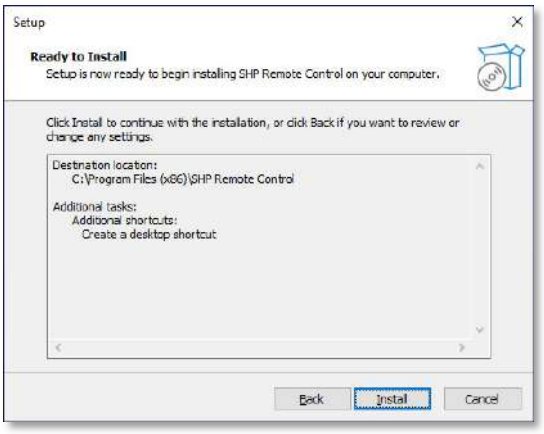

- **Step 3 - Select Additional Tasks:**

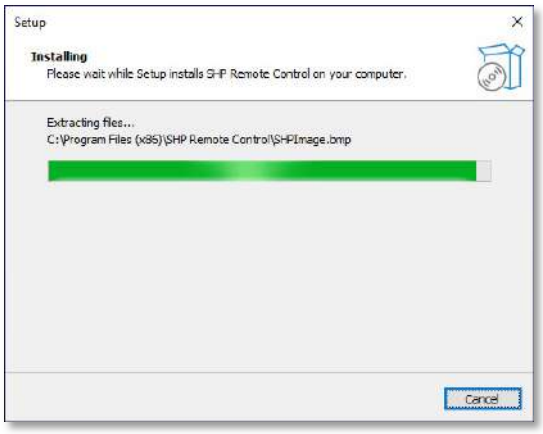
The next screen will ask if you want to select additional tasks. Here, you can choose to create a desktop shortcut for easy access to the software. Check the box if you wish to create a shortcut, then click "Next".



- **Step 4 - Install:**

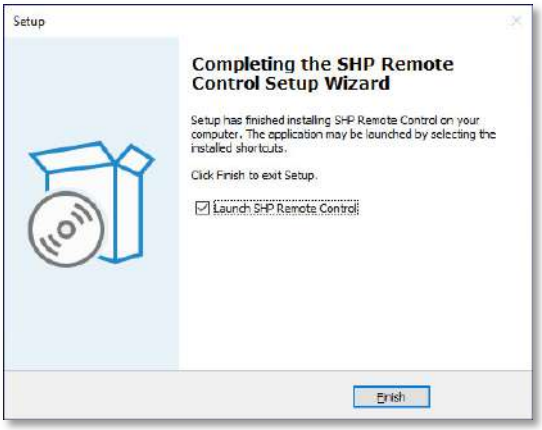
The wizard will now be ready to install the software. Click the “Install” button to begin the installation process. Please wait while the software is being installed.




- **Step 5 - Finish:**

Once the installation is complete, click the “Finish” button to close the Installation Wizard.




Please refer to the screenshots provided for each step to help guide you through the installation process. If you encounter any issues during installation, please contact IMI STI

.

# 3 GETTING STARTED

## 3.1 POWER AND COMMUNICATION PORTS

Before you can start using the Remote Control software, it's important to ensure that the SHP Positioner is properly powered and connected to your computer.

Power Supply:
Connect the 4-20mA power supply to the positioner's **J3 port**, ensuring the correct polarity.

| | |
|---|---|
| | The input voltage shall not exceed 30V ! |

Communication Ports:
The SHP positioner can exchange data using two different communication protocols:

- HART Protocol — **J3** HART Modem Connection
- Serial Protocol — **J7** High Speed Cable Port

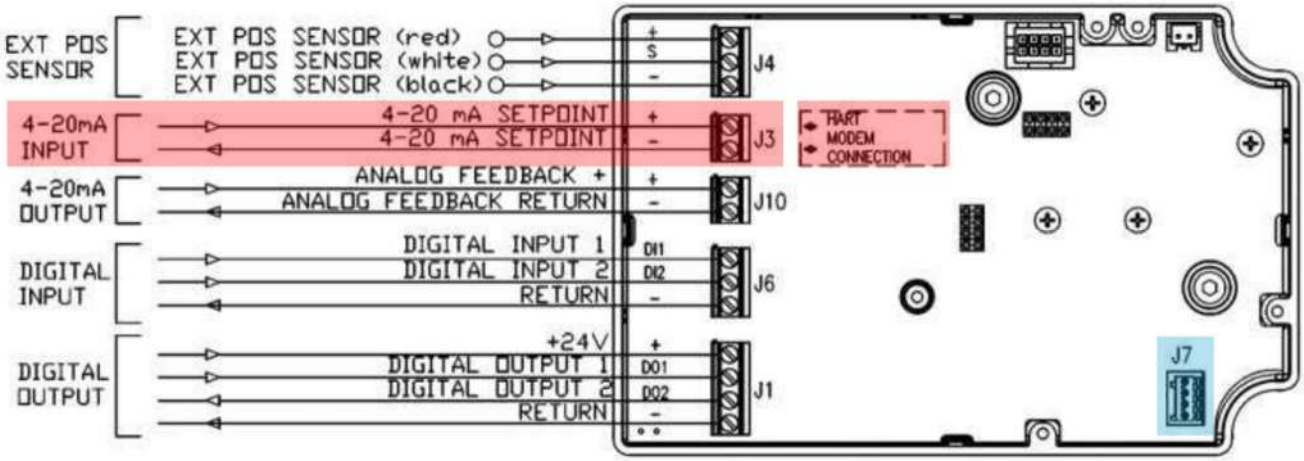



*Figure 1 - SHP PVB Board + Power & Communication Ports*

| | |
|---|---|
| | Always <u>connect</u> the communication cable in the following sequence :<br>1 = laptop –> 2 = positioner<br><br>Always <u>disconnect</u> the communication cable in the following sequence :<br>1 = positioner –> 2 = laptop |

## 3.2 CONNECTION WITH REMOTE CONTROL

Please follow the steps bellow to setup the communication port with Remote Control:

- **Step 1 – Connect the positioner to your computer:**

Before opening the Remote Control software, make sure that the SHP Positioner is connected to your computer using the appropriate cable.

- **Step 2 – Launch the software:**

Once the positioner is connected, you can open the Remote Control software. Upon opening, a window titled "Select Communication" will appear.

- **Step 3 – Select the COM Port:**

In the "Select Communication" window, you will need to select the correct COM port that the positioner is connected to.

If the COM port is detected but communication with the SHP is not possible, perhaps due to an incorrect COM port selection, the initial COM port selection screen is shown again. This allows the user to reselect the correct COM port.

It is suggested to the operator to check that the positioner is not turned off or that the cable is not disconnected.

- **Step 4 – Select the Communication Mode:**

The SHP Positioner can communicate via:

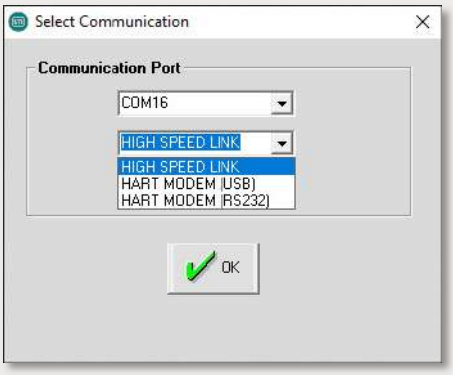
- TTL High Speed Cable
- HART modem (specify whether it's a USB HART modem or an RS232 HART modem).

Choose the mode that corresponds to your setup. If the connection with the SHP is via HART modem and a wrong polling address is chosen, the operator is then presented with the option to scan for field devices in order to find their correct polling addresses.

- **Step 5 – Confirm the Settings:**

After all the necessary selections have been made, click "OK" to confirm the settings and proceed.

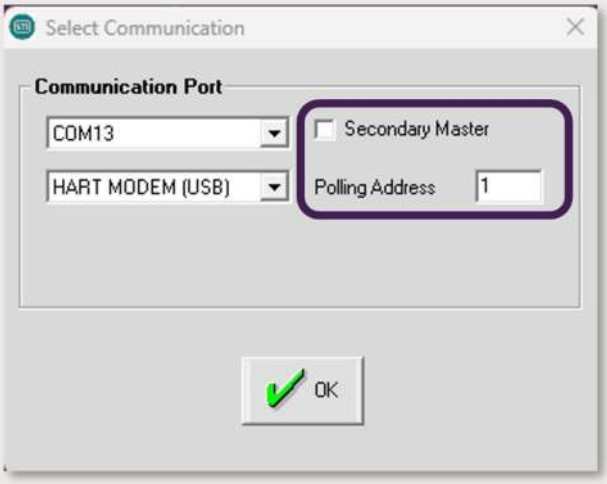
Communication Window



If the "**COMx**" number is not appearing in the list, it means that the cable is not recognized : the communication driver is not installed, or you don't have the administrative rights to install it, contact your IT manager.

The "**Secondary Master**" flag allows communication by HART when a DCS is already connected on the same channel to monitor the instrument.

Communication Window – Secondary Master & Polling Address




| | |
|---|---|
| | Please note that the correct setup of the communication port is crucial for the successful operation of Remote Control with the SHP ! |

## 3.3 MAIN WINDOW

Upon launching the Remote Control software, you will be presented with the main interface window. This window is divided into two main areas :

- **Permanent Control Section - highlighted in purple:** This section contains five essential panels for controlling the positioner. These panels are always visible, regardless of the tab you're currently viewing.

- **Current Tab View - highlighted in yellow:** This area changes based on the tab you select. By default, the Diagnostic tab (DIAG) will be opened when you launch the software.

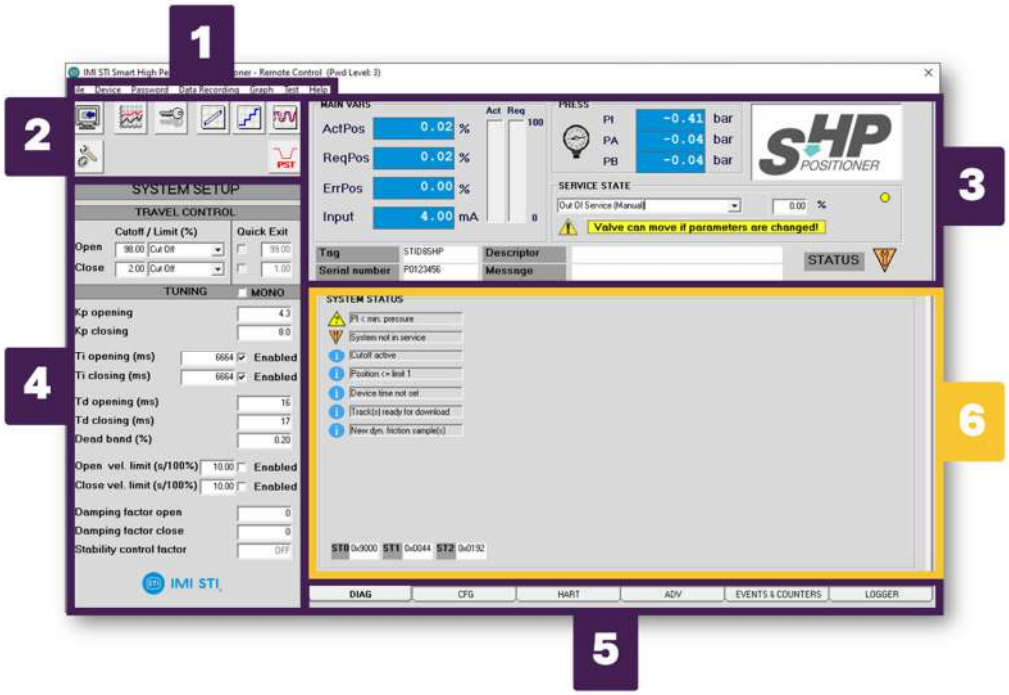



*Figure 2 - Remote Control Main Window*

| | | |
|---|---|---|
| 1 | Ribbon Bar | This is where you can access the different tabs of the software. Each tab opens a different set of tools and options in the Current Tab View. |
| 2 | Quick Access Buttons | These buttons provide quick access to commonly used functions and settings. |
| 3 | Process Variables & Status Information | This panel displays important information about the status of the positioner and the current settings. |
| 4 | System Setup Panel | Here you can adjust the settings of the positioner and tune its performance. |
| 5 | Access to the Main Menus | This area provides access to the main menus of the software, where you can find additional settings and options. |
| 6 | Currently Opened Menu | This zone displays the menu that is currently opened in the Current Tab View. |

## 3.4 RIBBON BAR & QUICK ACCESS BUTTONS

### 3.4.1 QUICK ACCESS BUTTONS

The "Quick Access Buttons" section is designed to provide you with immediate access to eight key tools that enhance the functionality and usability of the SHP interface. Each button, when clicked, opens a window that contains the corresponding tool. This allows for a streamlined and efficient user experience, reducing the need for navigating through multiple menus or screens.

| | | | |
|---|---|---|---|
|  | Device Calibration<br>*(Pressure + Loop Current)* |  | Valve Signature Test |
|  | Download SHP Configuration |  | Step Response Test |
|  | Graph Tool |  | Frequency Response Test |
|  | Remote Control Login |   | Partial Stroke Test |

Please note that the offline tests (Valve Signature, Step Response and Frequency Response) are only active if the user has activated the appropriate Option Pack. For more information on how to activate these packs, please refer to the corresponding section in the manual.

### 3.4.2 RIBBON BAR

The Ribbon Bar provides easy access to various features and functions of the software.

Ribbon Bar

#### 3.4.2.1 File

This menu allows you to manage your parameters.

| | |
|---|---|
| – Load | Load a saved set of parameters into the Remote Control interface. |
| – Save | Save the current set of parameters in a .shp file, the proprietary format used for the 'Load' command. |
| – Report | Generate a readable document ( .rtf format) to keep trace of the actual configuration. |
| – Exit | Close Remote Control. |

#### 3.4.2.2 Device

This menu provides options for managing the connection with the positioner.

| | |
|---|---|
| – Download from Positioner | Download/Refresh parameters from the positioner. |
| – Upload Param | Send the displayed parameters to the positioner. |
| – Upload Param + CalibData | Generate a readable document ( .rtf format) to keep trace of the actual configuration. |
| – Measurement Units | Choose between Metric and Imperial units. |

'CalibData' is related to a specific SHP positioner (like pressure sensor calibration), the command must be used only to restore the configuration of the same positioner from which the data comes from.

'Upload Param' can be used from a different SHP in order to apply the same settings (i.e. when you have similar configuration on multiple devices).

#### 3.4.2.3 Password

This menu provides options for managing your password and license keys.

| | |
|---|---|
| – Login | Login to Remote Control. |
| – Change | Change the password. |
| – Keys | Opens the License Code Manager for configuring Option Packs. |
| – Superuser | Allows to unlock specific device configurations.<br>A special permission from STI is required. |

#### 3.4.2.4 Graph Menu

Opens the Graph Tool.

#### 3.4.2.5 Test Menu

Contains access to the main diagnostic tests.

| | |
|---|---|
| – Valve Signature | Valve Signature Test<br>(see corresponding chapter) |
| – Step Response | Step Response Test<br>(see corresponding chapter) |
| – Freq. Response | Frequency Response Test<br>(see corresponding chapter) |
| – PST | Partial Stroke Test<br>(see corresponding chapter) |

#### 3.4.2.6 Help Menu

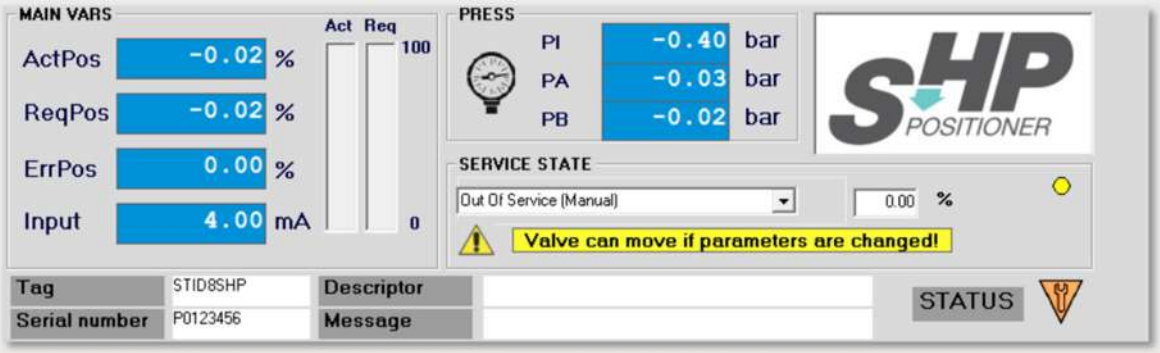
Information about the software and device.

| | |
|---|---|
| – Info | Contains information about the software/firmware version and the device. |

## 3.5 PROCESS VARIABLES & STATUS INFORMATION

The "Process Variables & Status" panel contains a dashboard that provides real-time information about the positioner's process variables and current status. This panel is designed to give you a quick and clear overview of the positioner's operation, making it easier for you to monitor and control its performance.

**Process Variables and Status Panel**



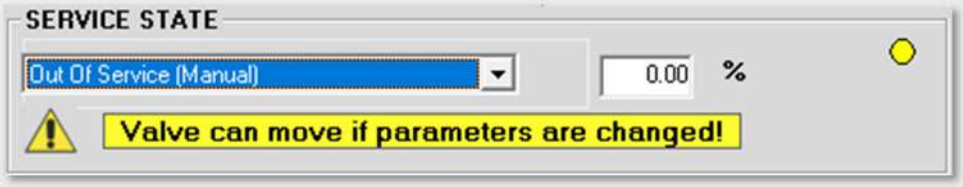

### 3.5.1 PROCESS VARIABLES

| | | |
|---|---|---|
| **ActPos**<br>*Actual Position* | [%] | Valve's current position |
| **ReqPos**<br>*Required Position* | [%] | Setpoint |
| **ErrPos**<br>*Error Position* | [%] | Difference between the Required Position and the Actual Position |
| **Input**<br>*4-20mA Signal* | [mA] | Input signal |
| **PI**<br>*Line Pressure* | [bar] or [psi] | Pressure in the supply line that feeds the positioner |
| **PA**<br>*Pressure in Port A* | [bar] or [psi] | Pressure measured at Port A of the positioner |
| **PB**<br>*Pressure in Port B* | [bar] or [psi] | Pressure measured at Port B of the positioner<br>(The field is hidden in case of a single acting actuator) |

### 3.5.2 SERVICE STATE

The "Service State" panel provides information about the current operational state of the SHP Positioner.

Service State Panel




Here's a closer look at each service state.

| | |
|---|---|
| **In Service** | The positioner is in normal operation mode and uses the 4-20mA information like required position. |
| **Out Of Service** | The positioner is not in operation. Port B is fully pressurized, Port A is exhausted. |
| **Out Of Service (Manual)** | The positioner is not following the 4-20mA signal and accepts 'manual' inputs to define the target position.<br><br>→ *An input field appears next to the service state.* |
| **Out Of Service (Fixed PWM)** | The positioner is out of service and is operating at a fixed Pulse Width Modulation (PWM) value. This is typically used for testing or calibration purposes.<br><br>→ *An input field appears next to the service state.* |
| **Out Of Service (Fixed DP)** | This state indicates that the positioner is out of service and is maintaining a fixed Delta Pressure (DP). DP represents the difference between the pressures at Port A (PA) and Port B (PB) of the positioner (Port A for single acting).<br><br>→ *An input field appears next to the service state.* |

The service state of the SHP Positioner not only indicates its operational status but also determines the availability of certain configuration features in the Remote Control software. Depending on the current service state, some features may be enabled or disabled. This is designed to prevent unintended changes or operations during certain states, ensuring the safe and efficient operation of the positioner.

Next to the Service State option, there is a LED indicator that shows the communication status between the positioner and the software.

| | | |
|---|---|---|
|  | **Blinking Yellow LED** | The communication is running correctly. |
|  | **Blinking Red LED** | The communication is lost. |

### 3.5.3 STATUS INFORMATION

The "Status Information" panel provides standard details about the positioner.

Status Information Fields


It consists of four fields described below.

| | |
|---|---|
| **Tag** | Positioner's unique identifier |
| **Descriptor** | Possibility to add a brief description |
| **Serial Number** | Assigned positioner's serial number |
| **Message** | Possibility to add a brief message |

These fields are only editable in the Diagnostic Tab.

The panel also includes the NAMUR NE107 condensed status warning. This feature provides a quick and clear overview of the positioner's health, allowing for efficient monitoring and troubleshooting.

Only the highest (most important) active warning is displayed. The complete device status can be viewed in the Diagnostic Tab (see corresponding chapter).

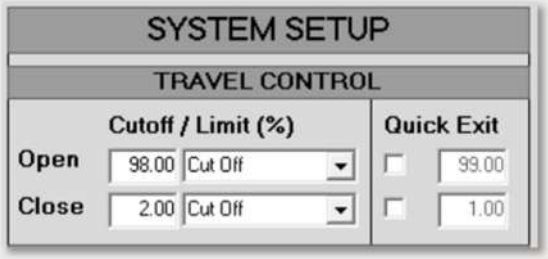
## 3.6 SYSTEM SETUP PANEL

The "System Setup" panel is divided into two sub-panels: "Travel Control" and "Tuning".
Parameters cannot be changed if the positioner is in 'IN SERVICE' mode.

### 3.6.1 TRAVEL CONTROL

This panel assists the user in configuring the behaviour of the positioner when close to the travel limits.

**Travel Control Panel**




The cutoff (and quick exit) can be configured both for the opening and closing directions. The user can select the cutoff (and quick exit) limits (in %) and one of the cutoff modes, described below.

#### 3.6.1.1 CUTOFF MODES

| | |
|---|---|
| Off | No modification is applied to the signal. The positioner will work to move the valve in the position defined by the 4-20mA signal. |
| Limit | When this option is enabled, even if the 4-20mA signal falls within the 'limit region' the value is capped at the specified limit.<br><br>*For instance, if the LIMIT is set to 98% and the signal corresponds to 99%, the required position will be restricted to 98%. This configuration is typically used for the open position where fully opening the valve is unnecessary. By applying this limit, stress on the valve bonnet can be reduced.* |
| Cutoff | When this option is enabled, the required position is forced to the hard limit of the cutoff region if the signal falls within it.<br><br>*For instance, if the CUTOFF is set to 2% and the signal is less than 2%, the required position will be forced to 0%, and full pressure will be applied to keep the valve as close as possible. This configuration is typically used for the close position.* |
| Soft Cutoff | When this option is enabled, the positioner will reduce the speed of the valve as it approaches the SOFTCUTOFF setting to avoid a significant impact on the final position. Although full pressure will be applied at the end, this feature minimizes the chance of a strong impact. This configuration is typically used in the close position for valves that require careful handling to avoid damaging the seat. **Soft Cutoff is available with OP2**. |

| | |
|---|---|
|  | Soft Cutoff is available with OP2 |

#### 3.6.1.2 QUICK EXIT FROM CUTOFF

When this option is enabled, the quick exit allows the valve to leave the cutoff region quickly, reducing the dead time on the seat.

*For example, if the CUTOFF is set at 97% and the Quick Exit is set at 98.5%, the following scenarios will occur:*

- *Setpoint between 98.5% and 100%: -> **Full thrust on the seat is applied**.*
- *Setpoint between 97% and 98.5%: -> **The valve is kept closed but without full thrust**.*
- *Setpoint less than 97%: -> **The valve will move to the required position**.*

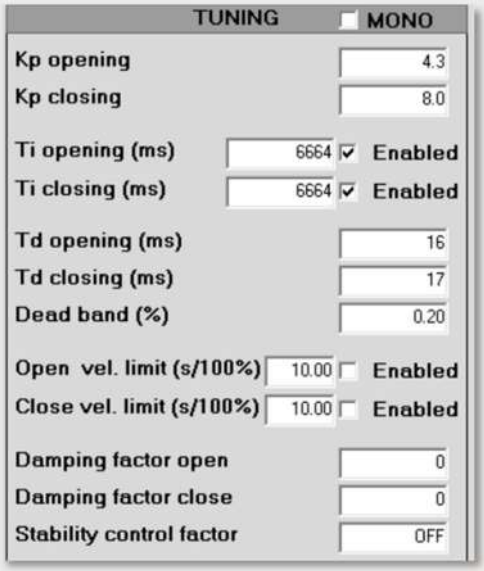
With a smart control system and the Quick Exit option, it is possible to pre-alert the positioner to be ready to exit the cutoff region quickly, consistently reducing the dead time on the seat.

| | |
|---|---|
|  | Quick Exit From Cutoff is available with OP4<br>(RESERVED FEATURE) |

### 3.6.2 TUNING

The "Tuning" panel is designed for manual adjustment of the control parameters.

**Tuning Panel**




The editable parameters are described below.

| | | |
|---|---|---|
| **Kp**<br>*Proportional Gain* | Min: 0.1<br>Max: 25 | The proportional gain is the multiplier of the error (the difference between input signal and actuator actual position) and it is expressed in percent.<br>It is active only for an error which is bigger than the dead band value. A different gain for each stem direction can be selected. It can be configured both for the opening and closing directions. |
| **Ti**<br>*Integral Factor* | Off: 0 [ms]<br>Min: 100 [ms]<br>Max: 100 000 [ms] | The integral factor is used to eliminate the residual steady-state error that occurs with a proportional only controller. However, since the integral term is responding to accumulated errors from the past, it can cause the present value to overshoot the setpoint value and cause hunting. A small 'Ti' value is equal to an aggressive integral effect. It can be configured both for the opening and closing directions. **Use the flag to enable/disable it** ( ☐ Enabled ). When disabled, Ti equals to '0'. |
| **Td**<br>*Derivative Factor* | Off: 0 [ms]<br>Min: 0 [ms]<br>Max: 1000 [ms] | The derivative factor slows the rate of change of the controller's output. Increasing the value increases the derivative action that acts like a brake when the valve is moving too fast to the final position. Be careful, as a too high derivative can sometimes cause instability. It can be configured both for the opening and closing directions. **Use the flag to enable/disable it** ( ☐ Enabled ). When disabled, Td equals to '0'. |

| | | |
|---|---|---|
| **Deadband**<br>*Intentional Deadband* | Min: 0.00 [%]<br>Max: 10.00 [%] | The intentional dead band is used to define the acceptable error tolerance for the positioner. In any real-world system, there is a minimum movement—known as the system's resolution—that occurs when the positioner attempts to adjust the valve. This resolution is primarily influenced by valve friction and actuator size.<br><br>Whenever the positioner moves the valve, the actual movement will be at least as large as this resolution. By configuring a deadband, we prevent the positioner from continuously trying to achieve an unattainable level of precision. This avoids unnecessary oscillations around the target position, thereby reducing wear and tear on mechanical components. |
| **Velocity Limit**<br>*Max Stroking Time* | Min: 0.00 [s/100%]<br>Max: 327.67 [s/100%] | The velocity limit specifies the stroking time, in seconds, for the valve to move from 0% to 100% (or vice versa). This limit is applied to setpoint changes. It can be configured both for the opening and closing directions.<br><br>*For instance, a velocity limit of 10 seconds means that a full-scale change from 0% to 100% will be executed as a linear ramp over 10 seconds, resulting in an effective rate of 10% per second. This parameter helps reduce the valve's speed, improving system stability and minimizing mechanical stress.* |
| **Damping Factor** | Min: 0<br>Max: 255 | Applies a damping effect at the signal rate of change. Increasing the damping factor causes a smooth effect on the signal rate of change. It can be configured both for the opening and closing directions. |
| **Stability Control Factor** | Off: 0<br>Min: 5<br>Max: 200 | This feature activates a special algorithm that manages the valve in the event of instability, performing damping action only when instability is detected. **This feature is available with OP2.**<br><br>The Stability Control Factor parameter can take several values:<br><br>• 0 : This turns OFF the functionality.<br>• 5 - 200 : Lower values trigger the stability control only for high-frequency oscillations, while higher values activate the stability control for both high and low-frequency oscillations. |

| | |
|---|---|
|  | Stability Control Factor is available with OP2 |

#### 3.6.2.1.1 Mono option

Numerous parameters can be configured with distinct settings for both the ‘open’ and ‘close’ directions to optimize system performance. If the MONO flag is checked, the first value of each parameter is automatically duplicated to the second one.

| Mono Option |
| --- |
|  |

# 4 MAIN TABS

## 4.1 ACCESS AND LOGIN

Remote Control interface is organized into six main tabs, each dedicated to a specific aspect of the system's operation. These tabs are: "Diagnostics", "Configuration", "HART", "Advanced Configuration", "Events & Counters", and "Logger".

**Remote Control Main Tabs**


To access them, the user need to log in to Remote Control using the Quick Access Button "Login".

**Login**


A password is required to access the interface features. Depending on the access level, one of four different passwords may be used. The menus and features available at each level are described below.

LEVEL 0
*Default*

PASSWORD:

01234

DISABLED TABS:

- CFG (Configuration)
- HART
- ADV (Advanced)
- LOGGER

DISABLED VISIBLE FUNCTIONS:

- Graph
- Start System Calibration
- Step Response
- Valve Signature
- Frequency Test
- Partial Stroke Test
- Superuser
- Calibration

DISABLED HIDDEN FUNCTIONS:

- PID Integral Fast Decay
- Spool Oscillation Detection
- DP Calibration Data
- Universal Request 110

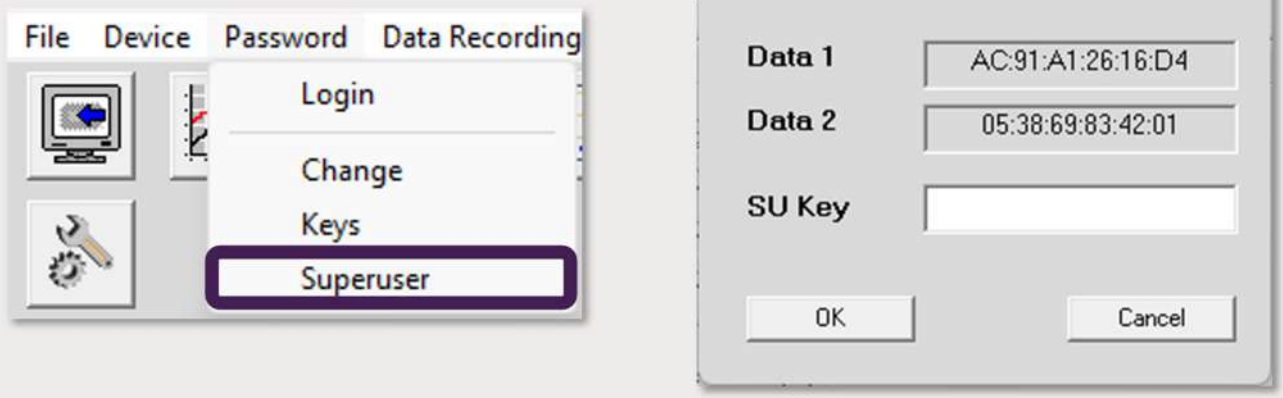
| | | | |
|---|---|---|---|
| LEVEL 1 | PASSWORD:<br>12345 | DISABLED TABS:<br>• ADV (Advanced) | DISABLED HIDDEN FUNCTIONS:<br>• PID Integral Fast Decay<br>• Spool Oscillation Detection<br>• DP Calibration Data<br>• Universal Request 110 |
| LEVEL 2 | PASSWORD:<br>23456 | EVERY TAB IS ENABLED | DISABLED VISIBLE FUNCTIONS:<br>• PID Integral Fast Decay<br>• Spool Oscillation Detection<br><br>DISABLED HIDDEN FUNCTIONS:<br>• DP Calibration Data<br>• Universal Request 110 |
| LEVEL 3 | PASSWORD:<br>34567 | EVERY TAB IS ENABLED | EVERY FUNCTION IS ENABLED<br>*(Except Superuser)* |

### 4.1.1 SUPERUSER

The Superuser tool is intended for use only in specific situations where special assistance is needed in the field for tuning the device. To enable Superuser access, please contact STI to request support.

STI will provide a unique Superuser (SU) Key, which must be entered into the software interface. Once access is granted, the user will be able to view and modify advanced parameters, including inner loop calibration settings.

Superuser Access & Window




| | |
|---|---|
| | This feature automatically expires after 60 minutes or when the software is closed ! |

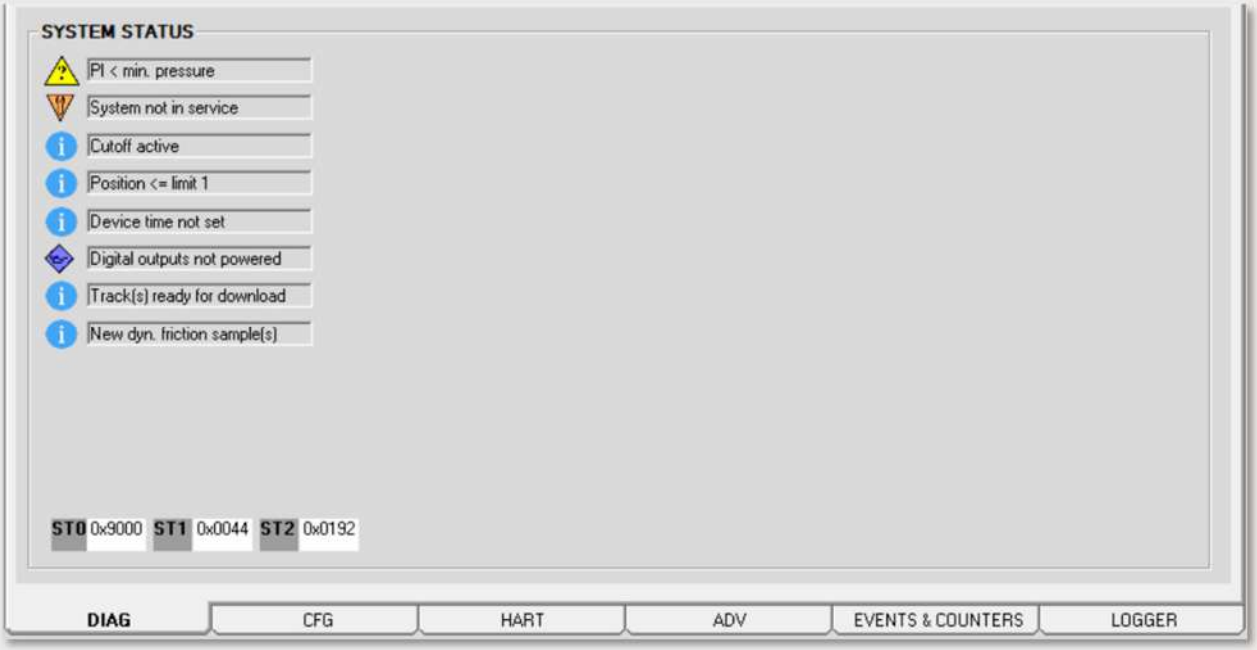
| | |
|---|---|
| | Access to the Superuser tool is restricted to specific tuning-related situations and requires contacting STI to request assistance. |

## 4.2 DIAGNOSTIC TAB: DIAG

The Diagnostic Tab is your go-to place for real-time system status updates. It displays the system status panel that provides live updates on all active NAMUR NE107 warnings, along with details about the events that triggered these warnings. This feature is crucial for users to keep an eye on the SHP status and act quickly on any potential issues.

Typically, this is the first tab you'd want to check when you need more information about the displayed Condensed Status warning.

Diagnostic Tab



### 4.2.1 NAMUR NE107 PICTOGRAMS

NAMUR NE107 defines a set of pictograms to communicate the status and diagnostics of field devices. The table below outlines each symbol and its meaning.

| | |
|---|---|
|  FAILURE | One or more device variables are invalid or inaccurate. |
|  CHECK FUNCTION | Field device is being serviced – device variable(s) may be frozen or invalid. |
|  OUT OF SPECIFIATION | Device variable value(s) may be compromised due to past or present ambient or operating conditions deviating from device requirements. |
|  MAINTENANCE | Maintenance required to ensure continued proper operation. |
|  GOOD / NORMAL | The device is operating under typical operating conditions such that Maintenance Requirement, Out of Specification, Failure and Function Check are not active. |

The system status also provides additional information using the info pictogram (not part of the NE107 standard).

| | |
|---|---|
|  INFO | Unlike the other NAMUR NE107 warnings, the "info" pictogram provides non-essential yet useful information about the device's status. |

### 4.2.2 DEVICE STATUS WORDS

These three values, also known as "words", represent the active warnings of the SHP. They are beneficial for IMI STI software developers when diagnosing system status malfunctions. In the event of a system status malfunction, the user may be asked to provide these values.

| Status Words |
|---|
|  |

### 4.2.3 DEVICE SPECIFIC STATUS ALARMS

The table below lists all the possible Device Specific Statuses with their associated NE107 pictogram, indicating its severity.

| | | |
|---|---|---|
| User Configuration Has Been Reset |  | MAINTENANCE |
| Cannot Recover User Config |  | FAILURE |
| Factory Settings Have Been Reset |  | MAINTENANCE |
| Factory Settings Were Corrupt At Power On |  | MAINTENANCE |
| System Has Not Been Configured |  | MAINTENANCE |
| System Is Not Calibrated |  | MAINTENANCE |
| Position Sensor Fault |  | FAILURE |
| Too Close Physical Limits |  | MAINTENANCE |
| Position Out Of Range |  | MAINTENANCE |
| Port A Sensor Out Of Range |  | FAILURE |
| Port B Sensor Out Of Range |  | FAILURE |
| Supply Pressure Sensor Out Of Range |  | FAILURE |
| Supply Pressure < Min Pressure |  | OUT OF SPECIFICATION |
| Position Control Error |  | FAILURE |
| Input Current Low |  | OUT OF SPECIFICATION |
| System Not In Service |  | FUNCTION CHECK |
| Set Point Is Being Clamped (Lower) |  | INFO |

| | | |
|---|---|---|
| Set Point Is Being Clamped (Upper) |  | INFO |
| Cutoff Pull Is Active |  | INFO |
| Cutoff Push Is Active |  | INFO |
| Quick Exit From Cutoff Is Active (Pull) |  | INFO |
| Quick Exit From Cutoff Is Active (Push) |  | INFO |
| Position <= Limit 1 |  | INFO |
| Position >= Limit 2 |  | INFO |
| Digital Input 1 Active |  | INFO |
| Digital Input 2 Active |  | INFO |
| Digital Output 1 Active |  | FUNCTION CHECK |
| Digital Output 2 Active |  | FUNCTION CHECK |
| System Override Activated |  | FUNCTION CHECK |
| Fail-Freeze |  | FUNCTION CHECK |
| Current Below Fail Freeze Threshold |  | INFO |
| Backup User Configuration Fail |  | MAINTENANCE |
| Calibration In Progress |  | FUNCTION CHECK |
| Positioner Date & Time Not Set |  | INFO |
| Pressure Fallback Mode Active |  | OUT OF SPECIFICATION |

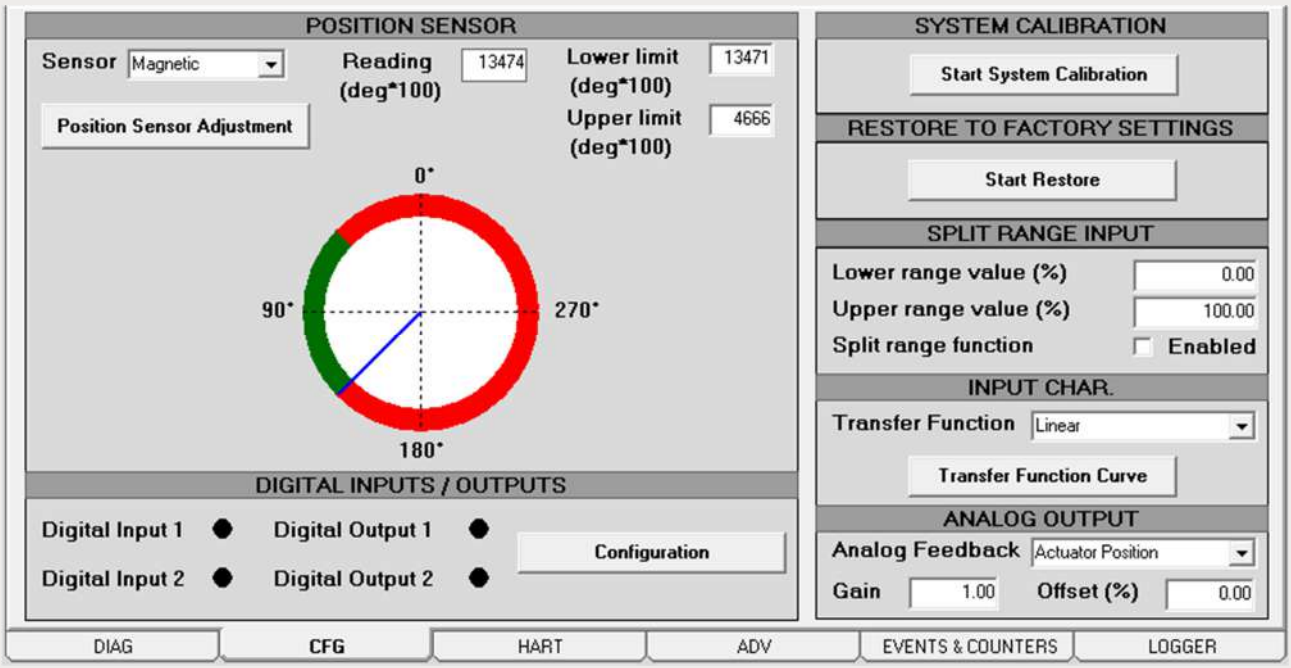
| | | |
|---|---|---|
| Position Transmitter Not Connected |  | MAINTENANCE |
| Digital Outputs Not Powered |  | MAINTENANCE |
| Position Sensor Not Connected |  | FAILURE |
| Magnetic Position Sensor - Low Field |  | FAILURE |
| Track(s) Ready For Download |  | INFO |
| I/P Module Disconnected |  | FAILURE |
| Partial Stroke Test ON |  | INFO |
| Last Partial Stroke Test OK |  | INFO |

## 4.3 CONFIGURATION TAB: CFG

The Configuration Tab is the second main menu item in Remote Control. This tab is your central hub for configuring the positioner. It offers a wide range of configuration options, organized into seven distinct panels. Each panel serves a unique purpose, catering to different aspects of the positioner's setup and operation.

From calibrating the system to managing digital inputs/outputs and adjusting/selecting the position sensor, the Configuration Tab provides you with the tools you need to customize the positioner's settings to your specific requirements. Whether you're restoring factory settings or configuring the analog output, this tab makes the process straightforward and efficient.

Configuration Tab




### 4.3.1 POSITION SENSOR

The first section within the Configuration tab is dedicated to the sensor settings. This panel enables you to choose from three compatible sensor options for the SHP positioner :

| | |
|---|---|
| MAGNETIC SENSOR | Contactless high-reliability position sensor |
| POTENTIOMETER | Traditional position sensor |
| ACTIVE REMOTE | Contactless remote position sensor |

The Position Sensor panel contains three fields that provide information about the calibration of the sensor described below.

| | | |
|---|---|---|
| **Reading**<br>*Position Sensor Reading* | Min: 0 deg [deg x 100]<br>Max: 360 [deg x 100]<br>*(Magn. Sensor)* | In the case of a Magnetic Sensor, it provides an angle ranging from 0 to 360 degrees (expressed as degrees × 100). |
| | Min: 0<br>Max: 4095<br>*(Potentiometer / Active Remote)* | In the case of a Potentiometer or the Active Remote sensor, it provides an ADC bit value ranging from 0 to 4095. |
| **Lower Limit**<br>*Position Sensor Lower Limit* | Min: 0 deg [deg x 100]<br>Max: 360 [deg x 100]<br>*(Magn. Sensor)* | In the case of a Magnetic Sensor, the limit can be between 0 and 360 degrees (expressed as degrees × 100). |
| | Min: 0<br>Max: 4095<br>*(Potentiometer / Active Remote)* | In the case of a Potentiometer or the Active Remote sensor, the limit can be between an ADC bit value between 0 and 4095. |
| **Upper Limit**<br>*Position Sensor Upper Limit* | Min: 0 deg [deg x 100]<br>Max: 360 [deg x 100]<br>*(Magn. Sensor)* | In the case of a Magnetic Sensor, the limit can be between 0 and 360 degrees (expressed as degrees × 100). |
| | Min: 0<br>Max: 4095<br>*(Potentiometer / Active Remote)* | In the case of a Potentiometer or the Active Remote sensor, the limit can be between an ADC bit value between 0 and 4095. |

### 4.3.2 LOWER & UPPER LIMITS

Lower and Upper limits are detected automatically by the positioner during self-tune and can be adjusted manually.

The panel also includes a function called "Position Sensor Adjustment". This function opens a window that assists the user in moving the actuator at a safe speed in either direction.

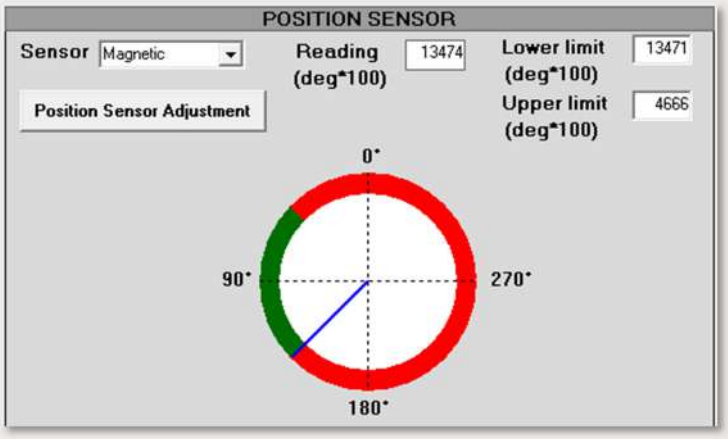
**When the sensor type is changed, the Lower and Upper Limits must be changed !**

#### 4.3.2.1 Magnetic Sensor Dynamic Representation

When a magnetic sensor is selected, a dynamic graphic is displayed showing a trigonometric circle that represents the full sensor range. The green portion of the circle represents the selected range of the sensor (e.g., from 45 to 135 degrees), and the red portion represents the unused range.

A blue line indicates the angle towards which the Magnetic Sensor is currently pointing (translating the "Reading" value).

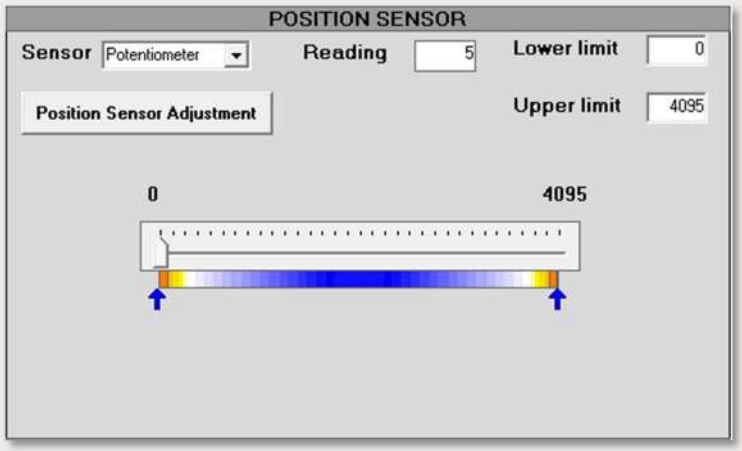
**Magnetic Sensor Dynamic Representation**




#### 4.3.2.2 Potentiometer / Active Remote Dynamic Representation

In the case of the Potentiometer and Active Remote, a graduated bar from 0 to 4095 is displayed, with three cursors indicating key positions. Two blue arrows indicate the upper and lower range values, and a larger grey arrow shows the "Reading" value. This visual representation helps users understand the current status and range of the Potentiometer (or Active Remote).

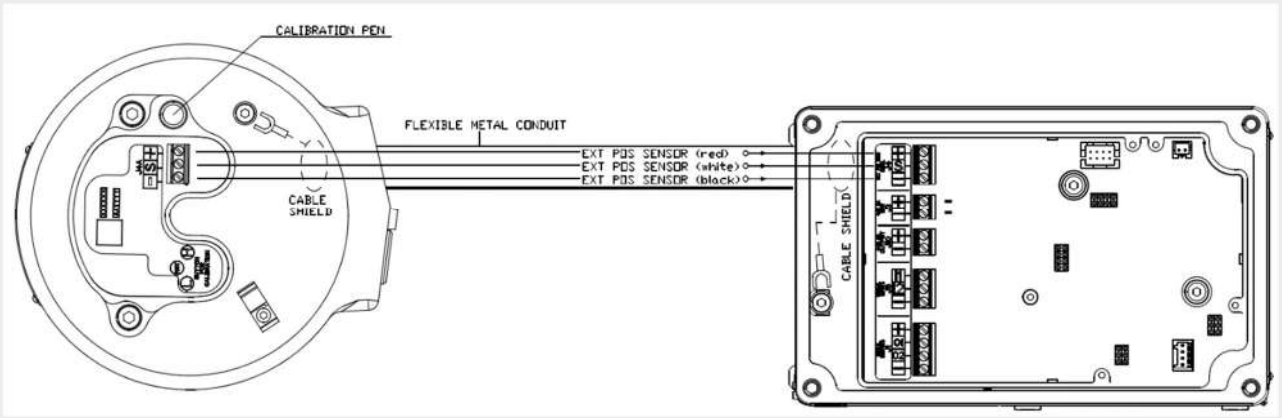
**Potentiometer / Active Remote Dynamic Representation**



### 4.3.3 ACTIVE REMOTE POSITION SENSOR CALIBRATION

The Active Remote Sensor is wired to the positioner as described below.

Active Remote Position Sensor Wiring




Using the calibration pen (magnet) located inside the Active Remote Sensor enclosure, calibrate the sensor by following the steps below.

- **Step 1 – Reset Limits Configuration:**

Using the Calibration Pen inside the enclosure, place it on the "RST" label for 15 seconds.

- **Step 2 – Lower Hard Limit Configuration:**

Move the valve to the lower hard limit.
Using the Calibration Pen inside the enclosure, place it on the letter "L" label for 5 seconds.

- **Step 3 – Upper Hard Limit Configuration:**

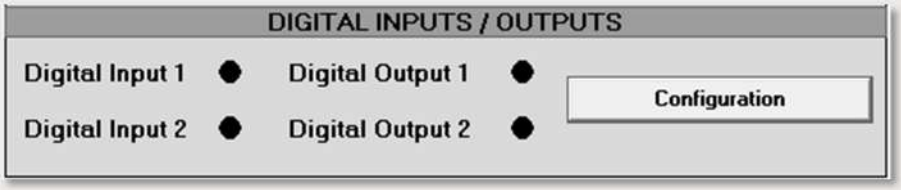
Move the valve to the higher hard limit.
Using the Calibration Pen inside the enclosure, place it on the letter "H" label for 5 seconds.

After completing the steps above, the Active Remote Position Sensor limits are now successfully configured.

### 4.3.4 DIGITAL INPUTS & OUTPUTS

Bellow the Position Sensor configurations, you'll find the "Digital Inputs / Outputs" panel. This panel gives you control over the 2 Digital Inputs and 2 Digital Outputs of the SHP. One of the features of this panel is the LED indicator. It shows you in real-time which of the Digital Inputs / Outputs is currently active, making it easier to monitor and manage these settings.

Digital Inputs & Outputs Panel




For more detailed adjustments, a configuration window can be accessed directly from this panel by hitting the "Configuration" button.

### 4.3.5 DIGITAL INPUTS & OUTPUTS - CONFIGURATION

#### 4.3.5.1 Digital Outputs

The configuration window offers a range of options for customizing the triggers for the two Digital Outputs. There are ten different events that can be configured to trigger each output. The triggers can be enabled simply by checking the corresponding flag.

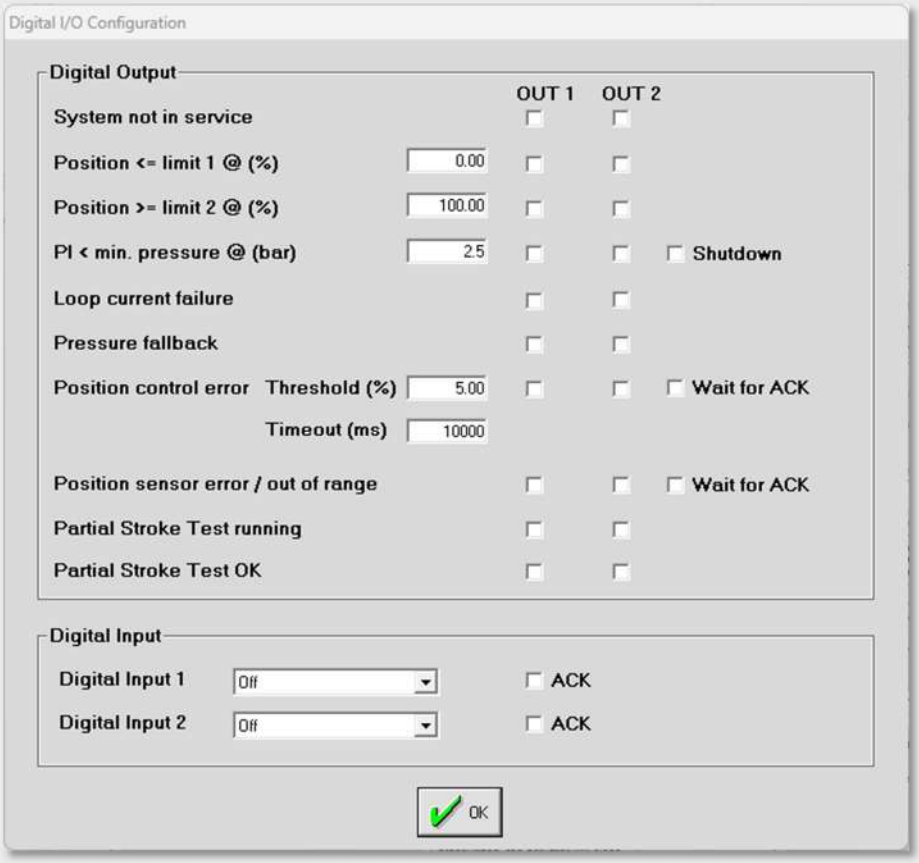
| | |
|---|---|
| 1 | System Not in Service |
| 2 | Loop Current Failure |
| 3 | Pressure Fallback *(Available with OP1)* |
| 4 | Position Sensor Error / Out of Range |
| 5 | Partial Stroke Test Running |
| 6 | Partial Stroke Test OK |
| 7 | Position <= Limit 1 |
| 8 | Position >= Limit 2 |
| 9 | PI < Min. Pressure |
| 10 | Position Control Error |

Some triggers offer advanced options, allowing you to define specific triggering conditions such as a limit value, threshold, timeout, shutdown, and 'Wait for Acknowledge signal' to disable the output. Please refer to the following table for more details.

| TRIGGERS | ADVANCED OPTIONS | | | |
|---|---|---|---|---|
| | Limit Value | Threshold + Timeout | Shutdown | Wait for ACK |
| System Not in Service | no | no | no | no |
| Position <= Limit 1 | yes | no | no | no |
| Position >= Limit 2 | yes | no | no | no |
| PI < Min. Pressure | yes | no | yes | no |
| Loop Current Failure | no | no | no | no |
| Pressure Fallback *(Available with OP1)* | no | no | no | no |
| Position Control Error | no | yes | no | yes |
| Position Sensor Error / Out of Range | no | no | no | yes |
| Partial Stroke Test Running | no | no | no | no |
| Partial Stroke Test OK | no | no | no | no |

| | |
|---|---|
|  | Pressure Fallback is available with OP1 |

Digital Inputs & Outputs Configuration Window




### 4.3.5.2 Digital Inputs

The second part of the configuration window is dedicated to configuring the two Digital Inputs. In this panel, you can define the actions that the SHP positioner will perform when a Digital Input signal is detected. There are four different actions you can select from as shown below.

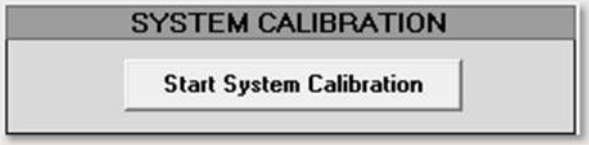
| | |
|---|---|
| Off | No action is performed when a Digital Input signal is detected |
| Shut Down | Upon detection of a Digital Input signal, a shutdown is initiated |
| Pressurize Port A | Detection of a Digital Input signal triggers the pressurization of Port A |
| Start Partial Stroke Test | Initiates a Partial Stroke Test |

In addition to these actions, the Digital Input signal can also be used to "reset" the "Wait for Acknowledge" flag of the concerned Digital Output.

### 4.3.6 SYSTEM CALIBRATION

The "System Calibration" panel simplifies the tuning process of your system. It features a single button that, when clicked, initiates a wizard. This wizard is designed to guide you through the auto-tuning process of the system in a step-by-step manner, consisting of five steps in total.

**System Calibration Panel**




Upon completion, for achieving perfect system reactivity, you can manually adjust the parameters of the PID (Proportional-Integral-Derivative) controller. This allows for a higher level of customization and can lead to even better performance.

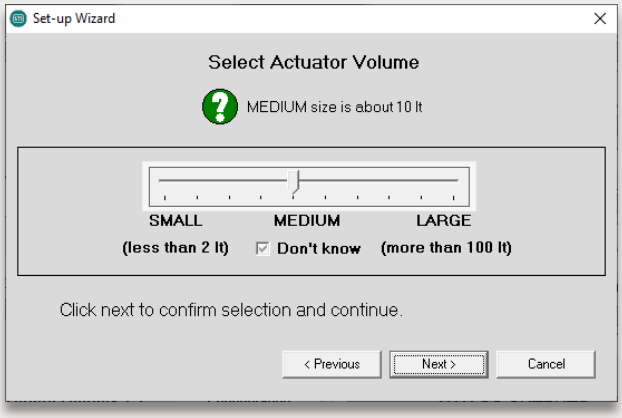
**Step 1 – Starting Page**


Instructions:

In the initial step, you are required to specify the action that occurs when the 4-20mA signal is removed while air is present.

Depending on the pneumatic connection, the actuator will move in one direction or the other. For instance, when the 4-20 mA signal is removed and port B is fully pressurized, the actuator will close the valve.

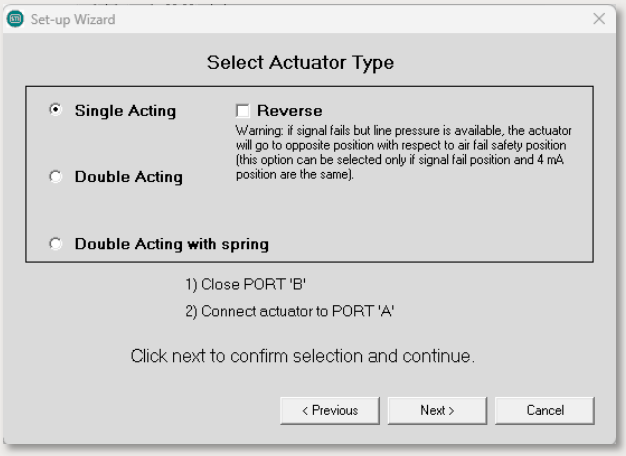
**Step 2 – Select Actuator Volume**




Instructions:

If known, select the actuator volume.

## Step 3 – Select Actuator Type




Instructions:

Specify the type of actuator.

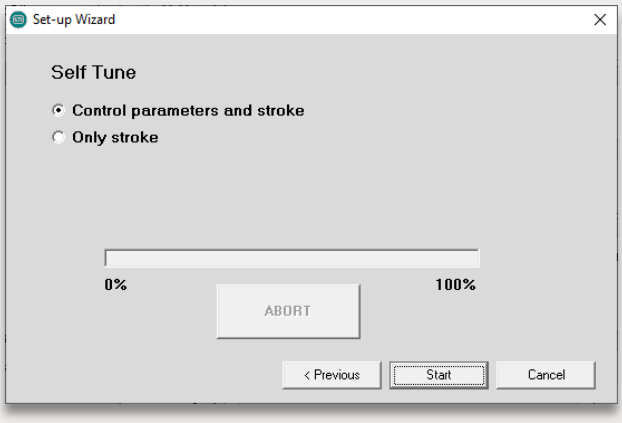
For single acting actuators, check the "Reverse" checkbox if you need to connect the actuator to the positioner's "Port B" instead of the default "Port A".

## Step 4 – Boosters or Quick Exhaust


Instructions:

Specify if the actuator has boosters or a quick exhaust.

## Step 5 – Select Self-Tune Mode




Instructions:

Select "Control parameters and stroke" if you want to perform a full Self Tune procedure.

Select "Only stroke" if you want only to update the hardware limits of your valve.

Press "Start" the perform the Self Tune. The progress bar informs you about the self-tune status.

Wait for the positioner to perform the calibration.

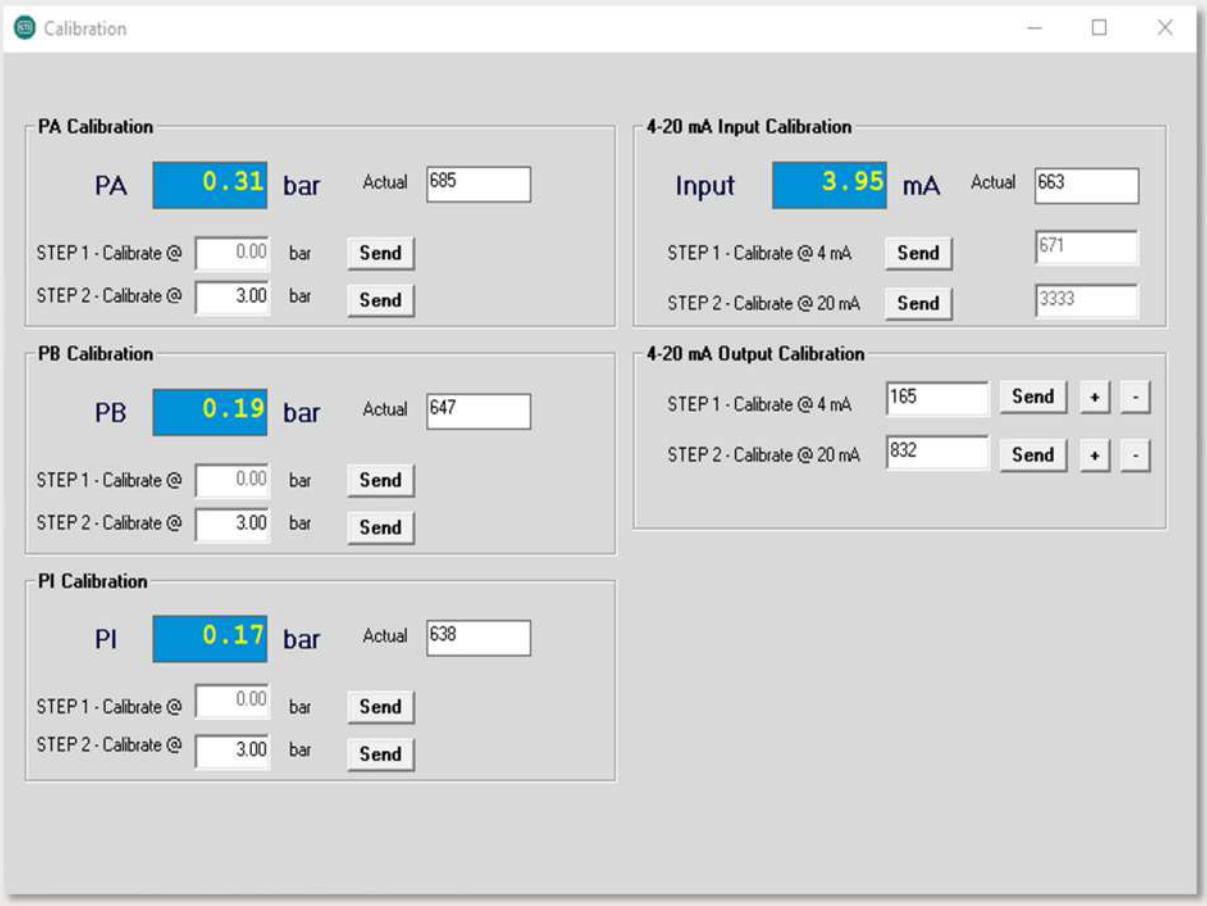
### 4.3.7 PRESSURE SENSORS & LOOP CURRENT CALIBRATION

#### 4.3.7.1 Description & Access

The SHP positioner allows users to manually calibrate the pressure sensors and the Loop Current if necessary. The Calibration Menu can be accessed by clicking on the "Calibration" Quick Access button. This action will open a window divided into five sections, each corresponding to a sensor that can be calibrated.

Device Calibration
*(Pressure + Loop Current)*

Calibration Window



On the left side of the window, you will find the pressure sensors calibration boxes, described below.

| | |
|---|---|
| PA Calibration | Calibration of the chamber A pressure sensor |
| PB Calibration | Calibration of the chamber B pressure sensor |
| PI Calibration | Calibration of the line pressure sensor |

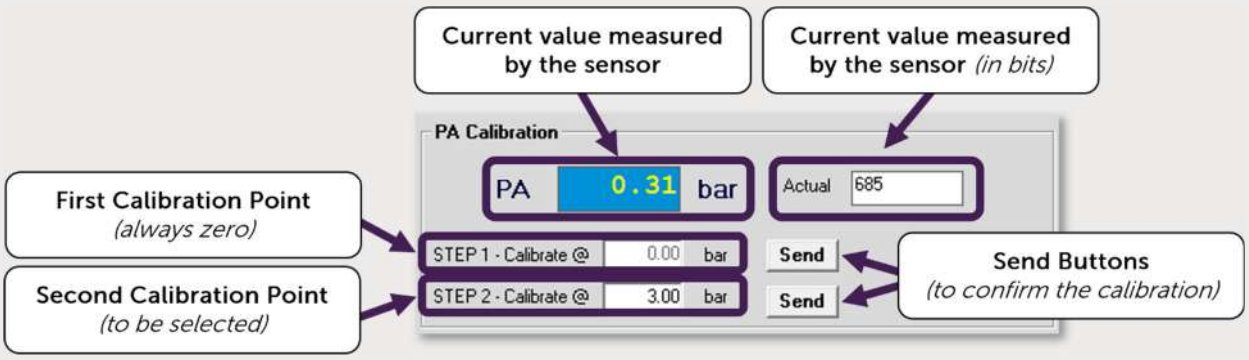
On the right side, there are two boxes for calibrating the input and output currents.

| | |
|---|---|
| 4-20 mA Input Calibration | Calibration of the input current |
| 4-20 mA Output Calibration | Calibration of the output current |

#### 4.3.7.2 Pressure Sensor Calibration Procedure

The calibration of the three pressure sensors is identical and can be summarized in two steps. Two calibration points are needed: calibration at 0 bar (psi) and calibration at x bar (psi). For each step, use a manometer to read the exact pressure.

**Sensor Calibration Procedure**




- **Step 1 – First Calibration Point:**

Ensure that the pressure is null for the sensor you are calibrating, using the manometer. Press the "Send" button to calibrate the pressure sensor at 0 bar (psi).

- **Step 2 – Second Calibration Point:**

Depending on the line pressure supported by your actuator, pressurize the corresponding sensor with a pressure between 1 bar and 10 bar. We recommend not choosing a too low pressure value; if possible, choose the line pressure value. Once the pressure is stabilized and confirmed with the manometer, press the "Send" button to calibrate the pressure sensor.

REPEAT THE STEPS FOR THE REMAINING PRESSURE SENSORS

#### 4.3.7.3 Input & Output Current Calibration

##### 4.3.7.3.1 4-20mA Input Calibration

The calibration of the 4-20mA Input Current follows the same steps as the pressure sensors calibration. However, this time a fluke is used to confirm the results. The two calibration points are fixed at 4mA and 20mA.

- **Step 1 – 4mA Calibration Point:**

Set the current to 4mA using the fluke. Once the current is set, press the "Send" button to calibrate the input current at 4mA.

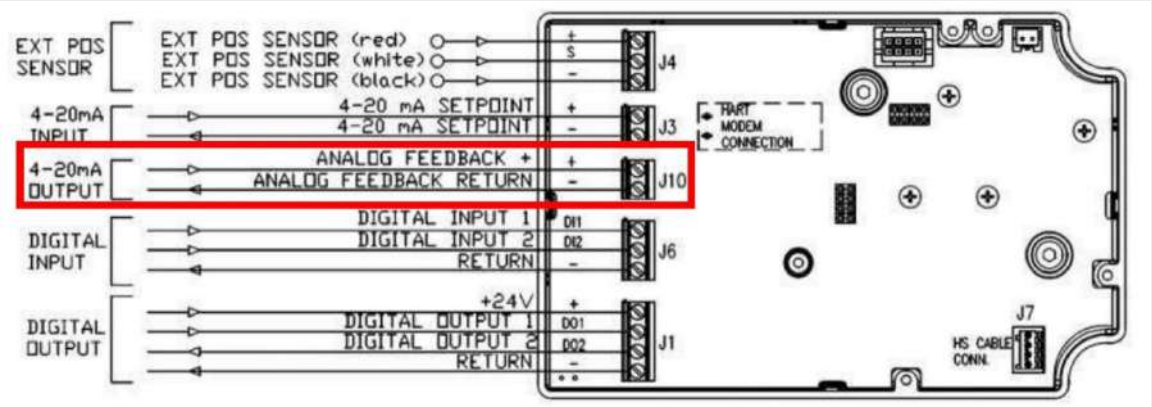
- **Step 2 – 20mA Calibration Point:**

Set the loop current to 20mA using the fluke. Once the current is set, press the "Send" button to calibrate the input current at 20mA.

##### 4.3.7.3.2 4-20mA Output Calibration

The calibration of the 4-20mA Output Current is slightly different. The user must first power the SHP Analog Output by using another fluke connected to the J10 port.

SHP Analog Output – J10 Connector



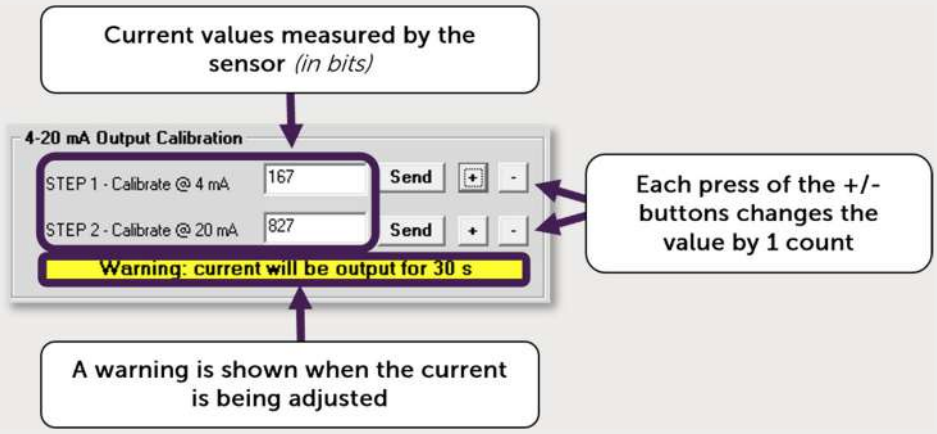

- **Step 1 – 4mA Calibration Point:**

Press the "+" or "-" buttons to output a current for 30 seconds. During this time, read the current value on the fluke that is connected to the J10 port. Adjust the output current by pressing the "+" or "-" buttons to get as close as possible to 4mA. Once this is done, press the "Send" button to save the calibration.

- **Step 2 – 20mA Calibration Point:**

Repeat the same procedure for the 20mA point.

Analog Output Calibration




### 4.3.8 RESTORE FACTORY SETTINGS

This panel contains a single button labelled "Restore Factory Settings". Upon clicking this button, the system will initiate a process to revert all configurable settings of the SHP positioner back to their original factory defaults.

Restore Factory Settings Panel


This function is particularly useful in situations where the device's settings have been extensively modified, or if the device is exhibiting unexpected behaviour that could be attributed to misconfiguration. By restoring the factory settings, users can ensure that the device returns to a known, stable state.

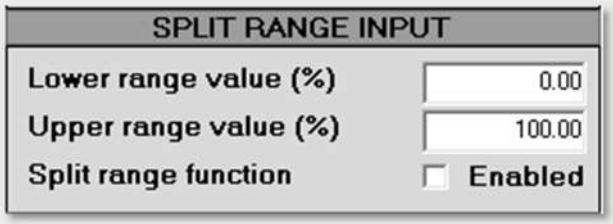
Please note, executing this function will erase any custom settings. Therefore, it is recommended to backup or note down important configurations before proceeding with this operation.

| | |
|---|---|
| | Please note, the action you're about to take is irreversible. It's highly recommended that you save your SHP configuration prior to executing this function ! |

### 4.3.9 SPLIT RANGE INPUT

This panel is dedicated to managing the split range function of the SHP positioner. It provides a set of controls and indicators that allow you to define and visualize how the positioner interprets its 4-20mA input signal.

Split Range Input Panel




The panel's fields are described below.

| | | |
|---|---|---|
| **Lower Range Value** | Min: 0.00 [%]<br>Max: 100.00 [%] | This value defines the lower limit of the input range and corresponds to the 4 mA point on the input signal. |
| **Upper Range Value** | Min: 0.00 [%]<br>Max: 100.00 [%] | This value defines the upper limit of the input range and corresponds to the 20 mA point on the input signal. |
| **Split Range Function** | Off<br>*On* | When enabled, the positioner will interpret its input signal according to the lower and upper range values you've specified.<br>**Use the flag to enable/disable it** ( Enabled ). |

Please note that a minimum distance of 20% is required between the lower and upper range values. This allows up to five split range areas to be configured in different concatenated positioners.

For example, if the lower range value is set to 0% and the upper range value is set to 100%, the positioner will interpret 4mA as a 0% position request and 20mA as a 100% position request.

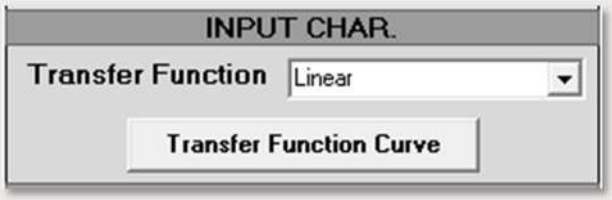
If the upper range value is instead set to 50%, the positioner will interpret 4mA as a 0% position request and 12mA (which is 50% of the way between 4mA and 20mA) as a 100% position request.

| | |
|---|---|
|  | **Remember to always verify your settings before leaving this panel, as incorrect configurations can lead to unexpected behaviour from the positioner !** |

### 4.3.10 INPUT CHAR.

This panel is where you define the relationship between the input signal and the requested position of the SHP positioner. It provides a set of controls for specifying the transfer function, which determines how the positioner interprets its input signal.

Input Char. Panel




#### 4.3.10.1 Transfer Function

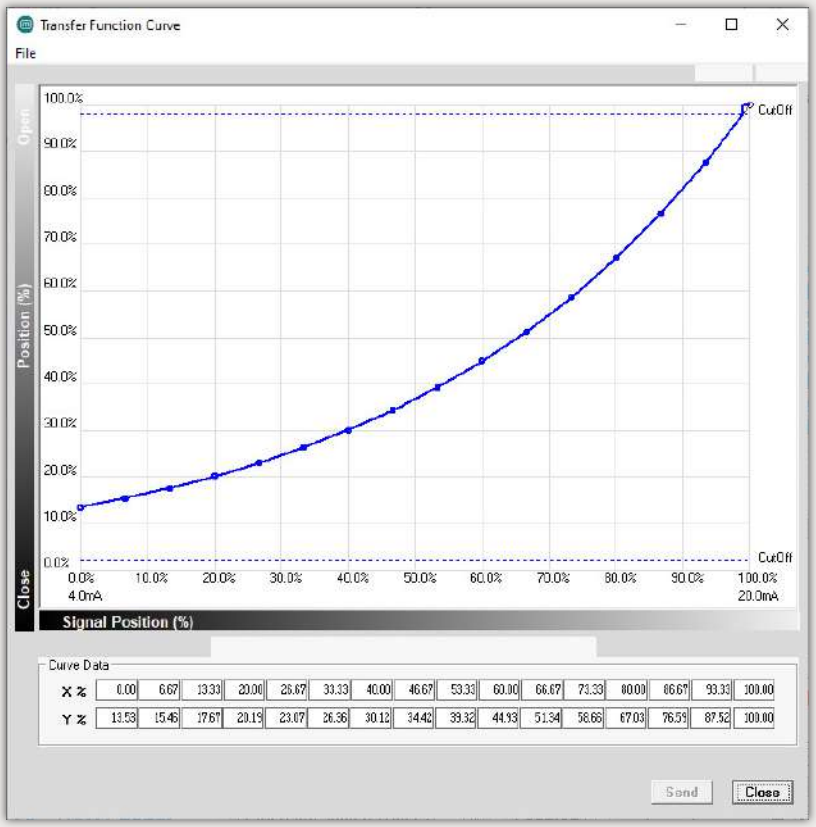
Here's a breakdown of the available transfer functions:

| | |
|---|---|
| Linear | A straight-line relationship between the input signal and the requested position. |
| Standard curve 1-50 | An equi-percentage 1:50 curve. |
| Standard curve 50-1 | An inverse equi-percentage 1:50 curve. |
| User Curve | A user-defined curve. |
| Standard curve 1-25 | An equi-percentage 1:25 curve. |
| Standard curve 25-1 | An inverse equi-percentage 1:25 curve. |
| Standard curve 1-30 | An equi-percentage 1:30 curve. |
| Standard curve 30-1 | An inverse equi-percentage 1:30 curve. |
| Feedback Linearization | A linearization based on feedback from the positioner. |

#### 4.3.10.2 Transfer Function Curve Button

This button opens the Transfer Function Curve window, where you can view a graphical representation of the selected transfer function. This can be helpful for visualizing how different characterizations will affect the positioner's behaviour.

**Transfer Function Window**




This window provides a graphical representation of the transfer function, which shows the relationship between the input signal and the requested position. Here's an overview of its capabilities.

| | |
|---|---|
| **Requested Position Axis** | The "Close" and "Open" labels on this axis show the effect of the "Signal Fail Action" selection. |
| **Signal Position Axis** | The "4.0mA" and "20.0mA" labels on this axis show the effect of the "Split Range" setup. |
| **Limit and CutOff** | The effects of "Limit" and "CutOff" are shown on the graph. |

| | |
|---|---|
| User Curve Modification | Only the "User Curve" can be modified; the other curves are fixed. If you want to start from a standard curve and generate a user curve, you can follow these steps:<br>1. *Select the starting curve.*<br>2. *Save the Table (File→ Save Table).*<br>3. *Select "User Curve".*<br>4. *Load the saved Table.*<br>5. *Modify the table.* |
| Send Button | To send a "User Curve" to the Positioner, press the "Send" button. |
| Signal Position Steps | These steps are fixed; you can only change the Requested position value. |
| Value Modification | You can change a value in the table or click & drag the dot in the graph. |
| Linear Interpolation | If you hold down the shift key and click on two dots, the system will automatically perform a linear interpolation between these two points. |

#### 4.3.10.3 Feedback Linearization

This feature allows you to compensate for position errors that arise from the mechanical linkage and/or the sensor. When you select "Feedback Linearization" in the "Transfer function" dropdown, all other characterization options will be disabled, as this feature applies to a linear transfer curve.

Upon selecting "Feedback Linearization" and pressing the "Transfer Function Curve" button, a window with an input panel will appear with the following information :

| | |
|---|---|
| X axis | Represents the external reference scale, which could be a gauge or meter that provides a secure reference. |
| Y axis | Shows the actual position as seen by the SHP |
| FB Lin Wizard button | Starts a wizard that helps you align your external reference. |
| Manual Setpoint | If the "Service State" is "Out Of Service (Manual)", you can use this tool to manually move the valve. |

| | |
|---|---|
| Probe value | Displays the actual position of the system that is used for linearization. Please note that this value is not affected by the “Feedback Linearization” effect. |
| Send button | This button sends the Feedback curve to the positioner. |

Remember, the Feedback Linearization feature is designed to help you achieve more accurate positioning by compensating for mechanical and sensor errors. Always verify your settings before leaving this panel, as incorrect configurations can lead to unexpected behaviour from the positioner.

### 4.3.11 ANALOG OUTPUT

This panel allows you to configure the analog output of the SHP positioner. The analog output is a 4-20mA signal that can be used to report the position of the actuator.

Analog Output. Panel


The panel's fields are described below.

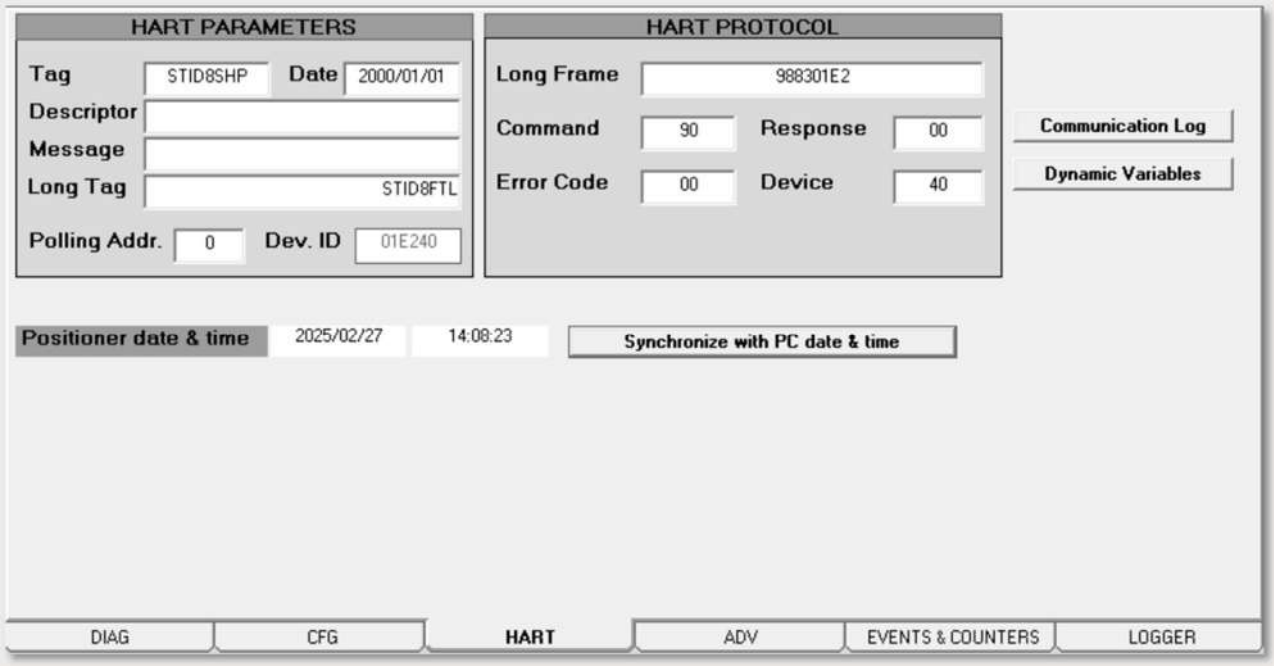
| | | |
|---|---|---|
| **Analog Feedback** | Dropdown menu (see description) | This dropdown menu allows you to select what the analog output will report. You can choose between "Actuator Position" and "Reverse Actuator Position". The "Actuator Position" option will cause the output to directly reflect the position of the actuator, while the "Reverse Actuator Position" option will cause the output to reflect the inverse of the actuator's position.<br><br>When "Reverse Actuator Position" is selected, the Local User Interface (LUI) will display the Actual and Required positions using the same reversed logic:<br><br>o 4mA → LUI displays 100%<br>o 20mA → LUI displays 0%<br><br>This change only affects the LUI and not Remote Control. |
| **Gain** | Min: -5.0 [%]<br>Max: 5.0 [%] | This control allows you to adjust the gain of the analog output. The gain is a multiplier that affects how much the output signal changes in response to changes in the actuator's position.<br><br>A higher gain will result in larger changes in the output signal for a given change in position. |
| **Offset** | Min: -100.00 [%]<br>Max: 100.00 [%] | Allows you to adjust the offset of the analog output. The offset is a value that is added to the output signal, effectively shifting it up or down.<br><br>This can be useful for aligning the output signal with an external reference or for compensating for a sensor that doesn't read exactly zero when the actuator is at its default position. |

## 4.4 HART TAB

The "HART Tab" is a dedicated section within the SHP software interface that provides a suite of tools and parameters for managing and monitoring the HART protocol communication with your device.

This tab is used to interact with various HART parameters, access detailed information about the HART protocol, manage the device's date and time settings, and utilize functions such as Poll Device, Communication Log, and Dynamic Variables Assignment.
As you navigate through this tab, you'll find each feature intuitively laid out, making it easier for you to configure and troubleshoot your device effectively.

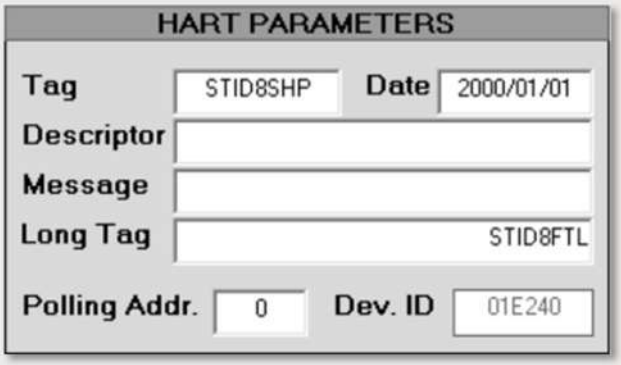
HART Tab




### 4.4.1 HART PARAMETERS

This panel displays a set of editable fields that enable configuration and identification of key HART parameters for the positioner, including Tag, Date, Descriptor, Message, Long Tag, Polling Address, and Device ID.

HART Parameters Panel



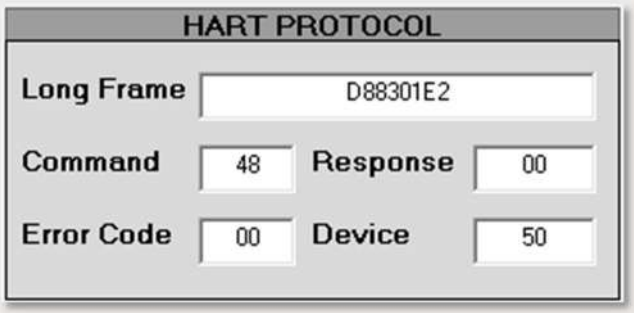

The panel's fields are described below.

| | | |
|---|---|---|
| **Tag** | Max: 8 characters | The Tag is a short, user-defined identifier, used to label the device within the control system for easy recognition. |
| **Date** | YYYYMMDD | The Date field is used to record a relevant date, such as installation, last calibration, or maintenance, and is formatted as YYYYMMDD. |
| **Descriptor** | Max: 16 characters | The Descriptor provides a space for additional descriptive information about the device or its function, such as its location or role in the process. |
| **Message** | Max: 32 characters | The Message field allows up to 32 characters for user-entered notes, which can include maintenance instructions, warnings, or configuration comments. |
| **Long Tag** | Max: 32 characters | The Long Tag extends the identification capability by allowing up to 32 characters, offering more detailed naming for systems that support it. |
| **Polling Address** | Min: 0<br>Max: 63 | The Polling Address is a numeric value between 0 and 63 that identifies the device on a HART communication loop, especially in multidrop configurations, where each device must have a unique address. |
| **Device ID** | Unique ID | The Device ID is a unique identifier assigned to each HART device, composed of the manufacturer ID, device type code, and serial number, and is used for device recognition and traceability in the network. |

### 4.4.2 HART PROTOCOL

This panel displays a set of communication parameters that can be useful for debugging communication problems.

HART Protocol Panel




The panel's fields are described below.

| | |
|---|---|
| Long Frame | The HART Long Frame Address refers to a 5-byte unique identifier used to address a specific field device in a HART network. It includes the manufacturer ID, device type, and device serial number, allowing for precise identification and communication with individual devices, especially in complex or multidrop configurations. |
| Command | A HART Command is a structured instruction sent from a master (such as a control system or handheld communicator) to a field device, requesting data or instructing the device to perform a specific action. Commands are categorized into Universal, Common Practice, and Device-Specific types, each serving different levels of functionality.<br><br>This field shows the command code for the last HART command that was sent or received. |
| Response | The Command Response is the message returned by the field device after receiving a HART command. It contains the requested data or confirmation of the action taken, along with any relevant status or error information, ensuring two-way communication and verification. |
| Error Code | An Error Code in the HART protocol is a standardized numeric value included in the command response to indicate whether the command was executed successfully or if an issue occurred. These codes help diagnose communication problems, configuration errors, or device malfunctions. |
| Device | This field displays information about the device that is communicating with the positioner. This can be useful for identifying the source of any communication issues. |

### 4.4.3 ADDITIONAL FUNCTIONS

**Additional Functions**

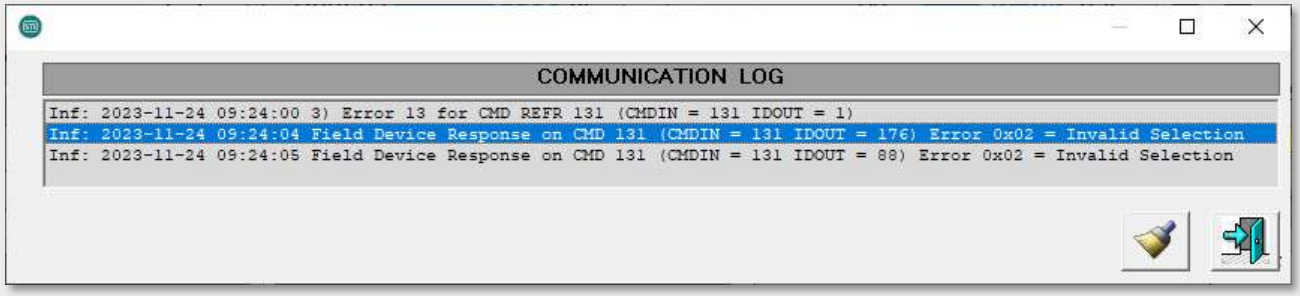

#### 4.4.3.1 Poll Device

This function is typically used to request data from the positioner. It sends a signal to the device, prompting it to send back information about its current status. This can be useful for checking the device's connectivity and responsiveness.

#### 4.4.3.2 Communication Log

This function provides a record of the HART commands that have been sent or received. Each entry in the log includes the date and time of the command, the command code, and any responses or errors.

**Communication Log**




For example, the entry:

"Inf : 2023-11-24 09:24:05 Field Device Response on CMD 131 (CMDIN = 131 IDOUT = 88) Error 0x02 = Invalid Selection"

indicates that a command (CMD 131) was sent at the specified date and time, and the device responded with an error indicating an invalid selection.

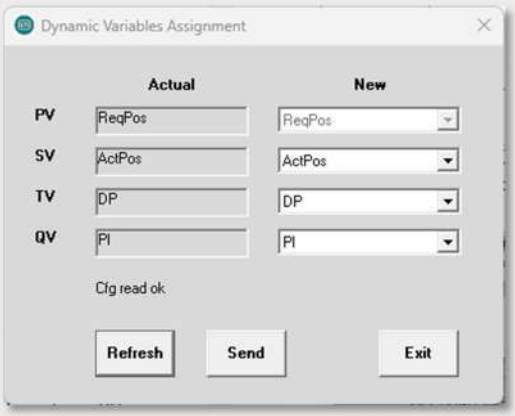
### 4.4.4 DYNAMIC VARIABLES

This function opens a window displaying the four Dynamic Variables of the positioner:
**Primary (PV), Secondary (SV), Tertiary (TV)** and **Quaternary (QV).**
Dynamic variables can be assigned to one of the eight Device Variables supported by the SHP.

| DEVICE VARIABLES | |
|---|---|
| REQPOS | Required Position (Setpoint) |
| ACTPOS | Actual Position (Travel) |
| ERRPOS | Error Position (ErrPos = ReqPos - ActPos) |
| INPUT | Loop Current (4-20mA signal) |
| PI | Line Pressure |
| PA | Pressure in Chamber A |
| PB | Pressure in Chamber B |
| DP | Delta Pressure (DP = PA - PB) |

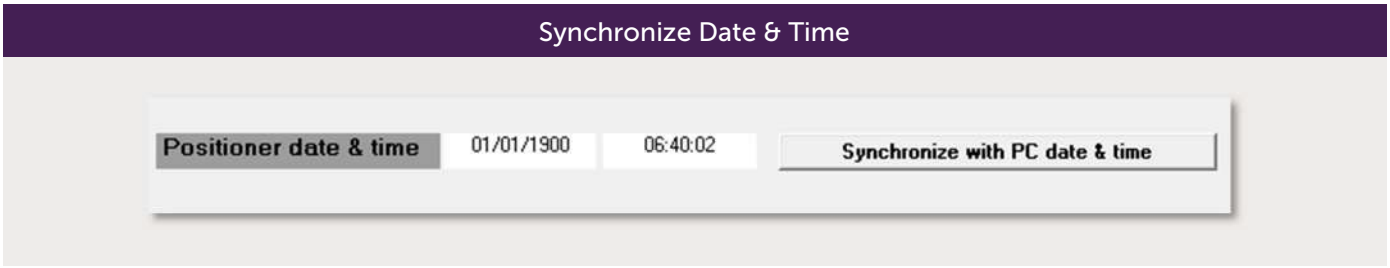
| DYNAMIC VARIABLE ASSIGNEMENT | |
|---|---|
| PV | Fixed to REQPOS |
| SV | Assignable to any Device Variable |
| TV | Assignable to any Device Variable |
| QV | Assignable to any Device Variable |

**Dynamic Variables Assignment**



### 4.4.5 SYNCHRONIZE DATE & TIME

This function allows you to synchronize the SHP's internal clock with the date and time of your PC. When activated, it will automatically update the positioner's date and time settings to match those of your computer.




This can be particularly useful in ensuring that the positioner's time-based functions and logs are accurate and aligned with your local time. Remember to use this function whenever there is a significant time difference between your positioner and your PC, such as after daylight saving time changes or when moving the positioner to a different time zone.

## 4.5 ADVANCED CONFIGURATION TAB: ADV

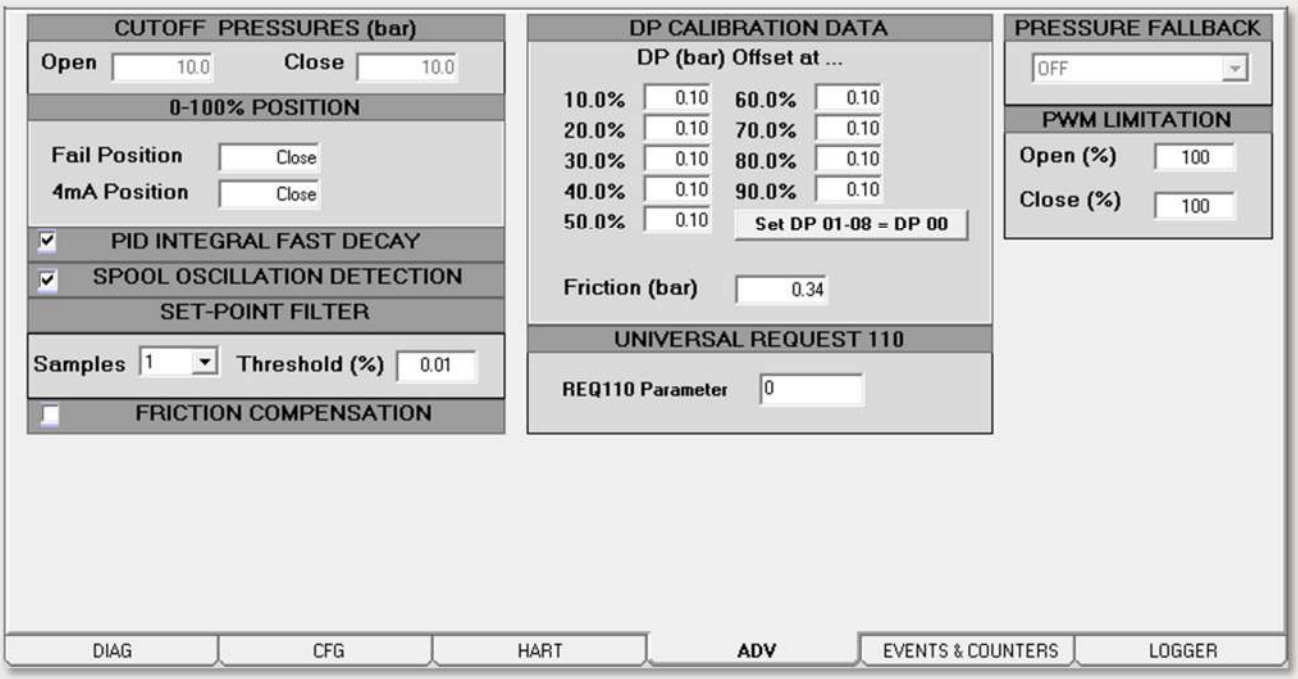
The "Advanced Configuration Tab" is a specialized section within the SHP software interface that offers a suite of advanced tools and parameters for fine-tuning the operation of your positioner. This tab is designed for advanced users who have a deep understanding of the positioner's functionality and the technical expertise to adjust its settings in a precise manner.

The tab is organized into nine panels, each focusing on a specific aspect of the positioner's operation. These panels provide controls for a range of advanced features, from spool oscillation detection to friction compensation, and from DP calibration data to PWM limitation.

| | |
|---|---|
|  | Please note that advanced configurations are intended for advanced users only ! |

Adjusting these settings can significantly impact the performance of your positioner, so it's important to understand what each setting does before making any changes. If you're not sure about a particular setting, it's best to leave it at its default value or consult with a qualified professional.

Advanced Configuration Tab



### 4.5.1 CUTOFF PRESSURES

In the context of valve control, the user has two options when it comes to maintaining a closed position. For example :

| | |
|---|---|
| Option 1 | The user can opt to apply the maximum available pressure to keep the valve closed. This approach ensures a tight seal, preventing any potential leakage.<br>However, the downside is that it requires more time to open the valve due to the high pressure. |
| Option 2 | Alternatively, if the user knows a certain pressure (lower than the maximum) is sufficient to maintain a closed position without leakage, they can set this as the cutoff pressure.<br>This method has the advantage of allowing the valve to open faster when required, as it doesn't have to overcome the maximum pressure. |

The "Cutoff Pressure" setting allows the user to define this optimal pressure for both the closed and open positions, providing a balance between secure sealing and operational efficiency.

**Cutoff Pressures Panel**


| | | |
|---|---|---|
| Open<br>*Cutoff Pressure Limit for Valve Open Position* | Min: 0.0 [bar] (or 0.0 psi)<br>Max: 10.0 [bar] (or 145.0 psi) | This field allows you to set the cutoff pressure limit for when the valve needs to stay in the fully open position. |
| Close<br>*Cutoff Pressure Limit for Valve Close Position* | Min: 0.0 [bar] (or 0.0 psi)<br>Max: 10.0 [bar] (or 145.0 psi) | This field allows you to set the cutoff pressure limit for when the valve needs to stay in the fully closed position. |

The default value for both fields is 10 bars, which means that all the available pressure in the line is used. If you want to speed up the movement of the valve from the fully closed or opened position, you could reduce the used pressure by adjusting these settings.

| | |
|---|---|
|  | **Reducing the pressure may prevent the valve from fully closing, potentially leading to leakage. This could damage the valve!**<br><br>**Please note, the pressure limitation is only effective when the positioner is operational.**<br><br>**If the power supply (4-20mA loop) is disconnected, the output from the positioner will match the line pressure. Therefore, the actuator and valve must be capable of handling the full pressure!** |

### 4.5.2 0-100% POSITION

The "0-100% Position" panel is designed to establish a correlation between the 4mA value and the valve's status, which can be either "Close" or "Open". By default, the SHP positioner is configured such that when power is removed (i.e., when the 4-20mA signal is lost), "Port A" is connected to the atmosphere and "Port B" is fully pressurized. The position of the valve when power is removed depends on the pneumatic connection.

0-100% Position


An exception to this rule occurs when the "Fail Freeze" option device is used. In this case, if the signal is lost, the valve will remain in its last valid position due to a special electronic and 3-way valves.

During the self-tuning phase, the software will ask whether the valve is "Close" or "Open" when power is removed. This is done to establish a relationship between the tuning parameter and its effect on the valve. However, this does not adjust the direction of movement, as that depends on the pneumatic connection.

The "Fail Position" field displays the selection made during the self-tuning phase. If necessary, this can be changed. The "4mA Position" field allows for adjustment of the "4mA position" in relation to the "Fail Position".

| | |
|---|---|
|  | Setting the "4mA Position" different from the "Fail position" can be dangerous !<br><br>For example, with 4mA, the valve could be fully open.<br>When the signal goes below the minimum threshold, the valve moves to the fully closed position.<br><br>If the signal is unstable and close to the minimum value, the valve may continuously move between the closed and open positions. |

### 4.5.3 PID INTEGRAL FAST DECAY

This function affects the PID controller by "softening" the action of the integral component.
(Previously called "Dynamic Offset Map")

PID Integral Fast Decay


### 4.5.4 SPOOL OSCILLATION DETECTION

This function detects DP oscillations and adopts safe spool position to avoid potential wear. This feature is to be used primarily when override valves (e.g., fail freeze valves) are placed between the positioner outputs and the actuator. In this case the air volume in the pipes can be very low, resulting in spool oscillations when trying to control DP.

Spool Oscillation Detection


By detecting DP oscillations when the position is fixed it is possible to identify the spool oscillation and set the control mode to fully pressurise either port A or port B.

### 4.5.5 SET-POINT FILTER

The "Set-Point Filter" is a feature designed to handle a noisy input signal. It employs a moving average filter to smooth out the signal and reduce high-frequency noise.

Set-Point Filter Panel

The panel's fields are described below.

| | | |
|---|---|---|
| **Samples**<br>*Number of signal samples to be considered* | Min: 1<br>Max: 32 | The "Samples" field allows the user to select the number of signal samples to be considered for the filtering process. The available options are 1, 2, 4, 8, 16, and 32. |
| **Threshold**<br>*Threshold for the signal noise level* | Min: 0.01 [%]<br>Max:10.00 [%] | This value acts as a threshold for the signal noise level. If the noise level exceeds this threshold, the filter is activated to smooth out the signal. |

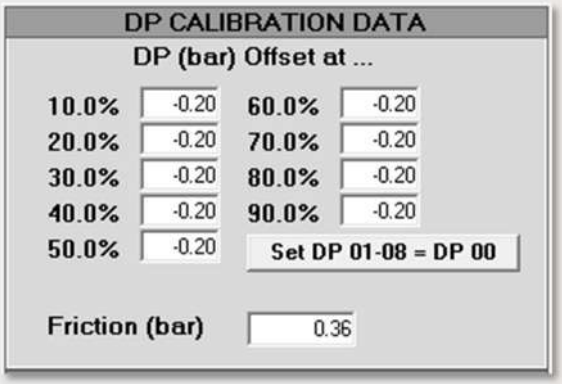
When the noise level crosses the set threshold, the Set-Point Filter averages out the signal over the selected number of samples, reducing high-frequency noise and ensuring a more stable and reliable control of the actuator.

### 4.5.6 DP CALIBRATION DATA

This tool is designed to adjust the theoretical Delta Pressure (DP) value that is required to maintain the actuator at a specific position, ranging from 10% to 90%.

The required DP value can vary depending on the system's architecture. self-tune. The "Set DP 01-08 = DP 00" button sets a DP value of 0 bar for all configurable positions. The "Friction" field is automatically calculated by the software.

DP Calibration Data Panel




| | | |
|---|---|---|
| **DP Offset 10.0% - 90.0%** | Min: -5.00 [bar] (or -72.51 psi)<br>Max: 5.00 [bar] (or 72.51 psi) | Theoretical Delta Pressure (DP) value that is required to maintain the actuator at a specific position, ranging from 10% to 90%. |
| **Friction** | Min: 0.0 [bar] (or 0.0 psi)<br>Max: 10.0 [bar] (or 145.0 psi) | The deducted friction, automatically computed by the software. |

### 4.5.7 UNIVERSAL REQUEST 110

The "Universal Request 110" panel is a specialized feature designed for advanced procedures. It contains a single field, "REQ110 Parameter", where users can input a "Special Request Code". Each code corresponds to a specific action, providing a way to execute special procedures that are not typically part of the standard operation.

Universal Request 110 Panel


This feature is particularly useful for IMI STI when assisting with customer issues, as it allows them to perform specific actions. However, it should be noted that this feature is intended for use in very specific circumstances and should be used with caution. The list of possible actions and their corresponding codes can be obtained upon request. Always refer to this list before using the "Universal Request 110" panel to ensure the correct code is being used.

### 4.5.8 PRESSURE FALLBACK

The "Pressure Fallback" option for the SHP positioner is a feature designed to enhance the reliability of the device. This function automatically switches from travel control to pressure control if a position feedback issue is detected, thereby ensuring the valve remains operational.

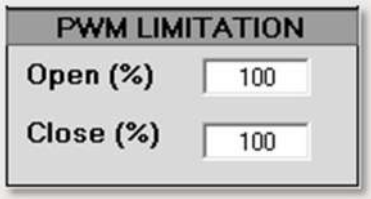
Pressure Fallback Panel


| | |
|---|---|
| | Pressure Fallback is available with OP1 |

### 4.5.9 PWM LIMITATION

The PWM Limitation is a feature that allows users to control the range of the spool in the SHP valve positioner, thereby limiting the flow of air circulating within the positioner. This is achieved by applying a Pulse Width Modulation (PWM) limitation, which directly influences the position of the spool.

PWM Limitation Panel




Users have the flexibility to set a PWM limitation for both the valve closing and opening positions. This ensures precise control over the valve's operation, enhancing the efficiency and effectiveness of the process. This feature is particularly useful for small actuators that cannot handle a high Cv providing them with the necessary control without overwhelming their capabilities.

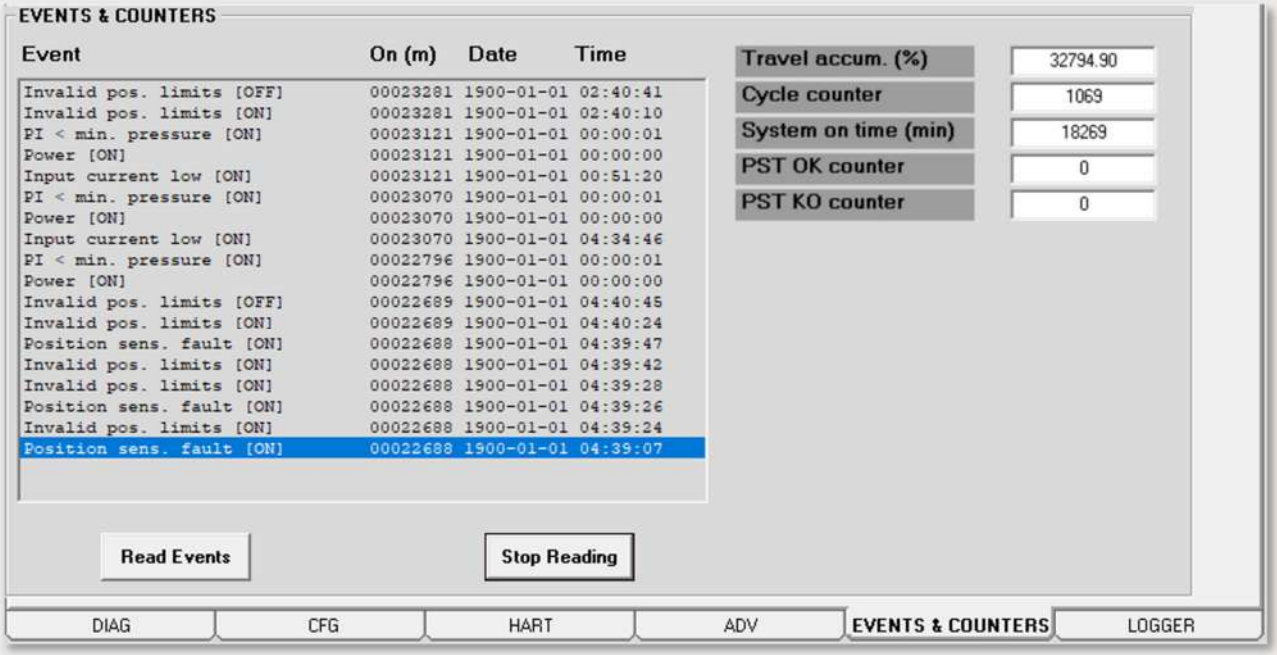
| | | |
|---|---|---|
| Open | Min: 10 [%]<br>Max: 100 [%] | PWM Limitation in the opening direction. |
| Close | Min: 10 [%]<br>Max: 100 [%] | PWM Limitation in the closing direction. |

## 4.6 EVENTS & COUNTERS TAB

The "Events & Counters" tab serves as an Online Diagnostic tool that records and displays significant events that have occurred within the system. This feature provides users with a quick overview of any past abnormal behaviours exhibited by the device, offering valuable insights into its operational history.

In addition to event tracking, this tab also presents key indicators of the system's life status, including parameters such as Travel Accumulation, Cycle Counter, System On Time or PST related counters. These metrics offer a comprehensive view of the device's usage over time.

Events & Counters Tab




### 4.6.1 EVENT LOGS

This panel displays a list of past events that have occurred within the system. Each event is characterized by its nature, whether it appeared [ON] or disappeared [OFF], and its timestamp. The timestamp includes the event's Date and Time, as well as the "On Time", which represents the duration the positioner has been on since the event occurred.

The events are sorted by time, with the most recent ones appearing at the top of the list. The SHP can store up to 200 events. The memory operates on a circular basis, meaning that when it's full, the oldest event will be replaced by the newest one.

This panel contains two buttons described below.

| | |
|---|---|
| **Read Events** | This button retrieves the content of a cycle memory present in the device, allowing you to review past events. |
| **Stop Reading** | This button halts the memory retrieval process. |

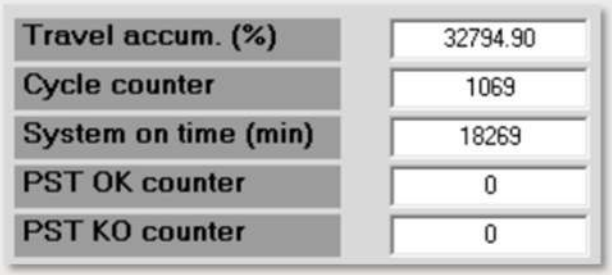
Remember, the Event Logs panel is a valuable tool for understanding the device's operational history and identifying any patterns or recurring issues. It provides a comprehensive view of each event, making it easier to monitor the device's performance and troubleshoot any problems. The table below describes all the 21 possible events that can be logged.

| Event Catalogue | | | |
|---|---|---|---|
| 1 | Position Out of Range [ON] / [OFF] | 12 | Factory Configuration Recovery Failed [ON] / [OFF] |
| 2 | Position Physical Limits [ON] / [OFF] | 13 | User Configuration Reset [ON] / [OFF] |
| 3 | PB Out of Range [ON] / [OFF] | 14 | User Configuration Recovery Failed [ON] / [OFF] |
| 4 | PA Out of Range [ON] / [OFF] | 15 | Position Sensor Magnetic Field Low [ON] / [OFF] |
| 5 | PI Out of Range [ON] / [OFF] | 16 | I-P Module Disconnected [ON] / [OFF] |
| 6 | PI < Min. Pressure [ON] / [OFF] | 17 | Trial License [ON] / [OFF] |
| 7 | Position Control Failure [ON] / [OFF] | 18 | PST Started |
| 8 | Power [ON] / [OFF] | 19 | PST Finished OK |
| 9 | Input Current Low [ON] / [OFF] | 20 | PST Finished KO |
| 10 | Position Sensor Fault [ON] / [OFF] | 21 | PST Aborted |
| 11 | Factory Configuration Reset [ON] / [OFF] | | |

### 4.6.2 COUNTERS

This panel provides a set of counters that track key operational metrics of the actuator since commissioning.

Counters Panel




| | | |
|---|---|---|
| Travel Accumulator | [%] | This counter measures the total "distance" (in %) travelled by the actuator since commissioning. It functions similarly to an odometer (or milometer) in a car, providing a cumulative measure of the actuator's movement. |
| Cycle Counter | [cycles] | This counter keeps track of the number of valve cycles. One cycle is counted as up and down travel of the stem. |
| System On Time | [min] | This counter records the total time (in minutes) during which the device was "ON" since commissioning. |
| PST OK Counter | | Provides the total count of successful Partial Stroke Tests since commissioning. |
| PST KO Counter | | Provides the total count of unsuccessful Partial Stroke Tests since commissioning. |

These counters offer essential understanding into the usage and performance of the actuator over time, helping you monitor its condition and plan maintenance activities accordingly.

## 4.7 LOGGER TAB

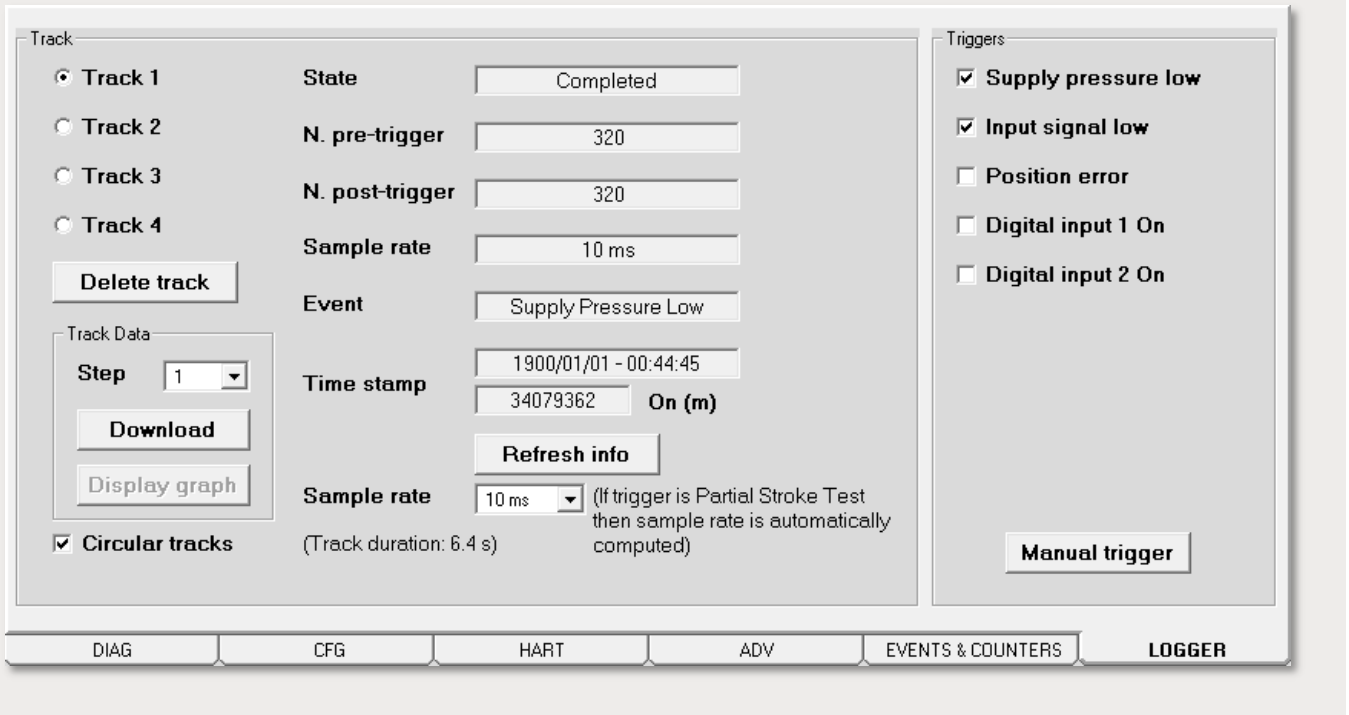
The "Logger Tab" is part of the Online Diagnostic tools in the SHP software and is available with the OP3. It is specifically designed to capture and record essential data from the device, such as Actual Position, Required Position, Pressures, and more. This data is stored in non-volatile memory areas known as "Tracks".

The Logger tool starts recording when certain events, or "Triggers", occur, capturing both pre-trigger (data before the event) and post-trigger (data after the event) data. Each track consists of a header and captured data. The header contains information about the track's state, the number of samples recorded before and after the trigger, the sampling rate, the event that caused the trigger, and the timestamp of the event.

The recorded data can be visualized in a graph for subsequent analysis, and the tool has the capacity to save up to four tracks. This feature is invaluable for monitoring device performance and planning maintenance activities. It is also used to visualize a graph of a Partial Stroke Test (PST).

| | |
|---|---|
|  | Please note that the Logger tool is exclusively available with Option Pack 3.<br><br>PST:<br>However, it can be used for free when used together with the Partial Stroke Test.<br>See the PST chapter for more info. |

Logger Tab



### 4.7.1 TRIGGERS

The first panel of the Logger tab is titled “Triggers”. Here, you have the option to select up to five different triggers that will initiate the Logger. The different types of triggers are listed below.

| | |
|---|---|
| 1 | Supply Pressure Low |
| 2 | Input Signal Low |
| 3 | Position Error |
| 4 | Digital Input 1 On |
| 5 | Digital Input 2 On |

| | |
|---|---|
| | PST Trigger:<br>Performing a Partial Stroke Test (PST) will act like a trigger.<br>This is done automatically and does not require any configuration.<br>The PST graph is stored in one of the Logger’s Tracks. |

In addition to these, there is a special test button called the “Manual Trigger”.

| Manual Trigger Button |
|---|
|  |



This feature allows manual triggering of the Logger at any given moment, providing the flexibility to monitor and record device data as needed.

### 4.7.2 TRACK

The second panel of the Logger tab is titled "Track". It is used to parameter the Logger, read the header of each track, visualize, and save the data. The different features are described below.

| | |
|---|---|
| **Tracks** | Serve as non-volatile memory areas where data is recorded. |
| **Delete Track** *(Button)* | Allows for the removal of the selected track from the memory. |
| **Step** | A parameter that determines the number of samples saved in the .txt file. It aims to reduce download time by decreasing the "resolution" of the track. The step values can range from 1 (all samples are saved) to 16 (1 in 16 samples is saved). |
| **Download** *(Button)* | Saves track data, in a .txt file.<br>The saved data can later be read in the Graph tool. |
| **Display Graph** | Opens the Graph tool to visualize the data in the graph. |
| **Circular Tracks** | This feature enables or disables the circular memory. When the memory is full, the oldest data is replaced by the newest data as time goes on. |

### 4.7.3 TRACK STATES

The logger can be in several states which are described below.

| | |
|---|---|
| IDLE | No samples are inserted in this track. |
| RUNNING | Samples are inserted in this track at each sampling instant. |
| TRIGGERED | A trigger event has occurred, and the Logger continues to insert samples until the sum of the pre-trigger and post-trigger samples equals 640 (max number of samples). |
| COMPLETED | The track is complete, and all samples have been recorded. |
| PARTIAL | The track is partially filled with data. This state occurs if the SHP is switched off or reset while the track is still in the TRIGGERED state. |

Upon startup, if a track is in the RUNNING state, it automatically changes to the IDLE state. If a track is in the TRIGGERED state, it automatically changes to the PARTIAL state. If the header of a track contains out-of-range data, this track is reset and returned to the IDLE state.

Along with the track's state, the other fields in the panel show details about the track being viewed. The remaining fields are described below.

| | |
|---|---|
| **N. pre-trigger** | The number of samples recorded before the trigger |
| **N. post-trigger** | The number of samples recorded after the trigger. (In total, the Logger can record a maximum of 640 samples.) |
| **Sample Rate** *(Related to the viewed track)* | This is the time interval between two samples in ms. |
| **Event** | The track's trigger. |
| **Time Stamp** | The date, time and the current 'On-Time' when the trigger occurred. |
| **Refresh Info** *(Button)* | This button refreshes the following parameters:<br>State, N. pre/post-trigger, Sample rate, Event, Time stamp. |
| **Sample Rate** *(Related to the configuration of a new track)* | This is the time interval between two samples. The user can select the following values: 10 ms, 20 ms, 30ms, 40 ms, 50 ms, 60 ms, 70 ms or 80 ms. |

# 5 PARTIAL STROKE TEST

NOTE:

The Partial Stroke Test functionality is now documented in a dedicated manual to provide more detailed guidance and support.

Please refer to the separate document titled "4060 – Instruction Manual (SIS & PST)" for complete instructions and information.

# 6 GRAPH TOOL

## 6.1 OVERVIEW

The Graph Tool is a central feature of the Remote Control Software, designed to provide real-time visualization of all SHP device variables, including positions and pressures. This utility not only allows you to monitor these variables in real time but also offers the capability to load saved data for further analysis.

This saved data could be records captured by the Logger tool or data saved with Offline Diagnostic tools such as Valve Signature, Step Response Test, and Frequency Response Test. By providing a comprehensive view of device performance, the Graph Tool serves as a critical resource for understanding and optimizing the SHP positioner.

In the following sections, we will explore the various options that the Graph Tool provides, enabling you to fully utilize its capabilities for your specific needs.

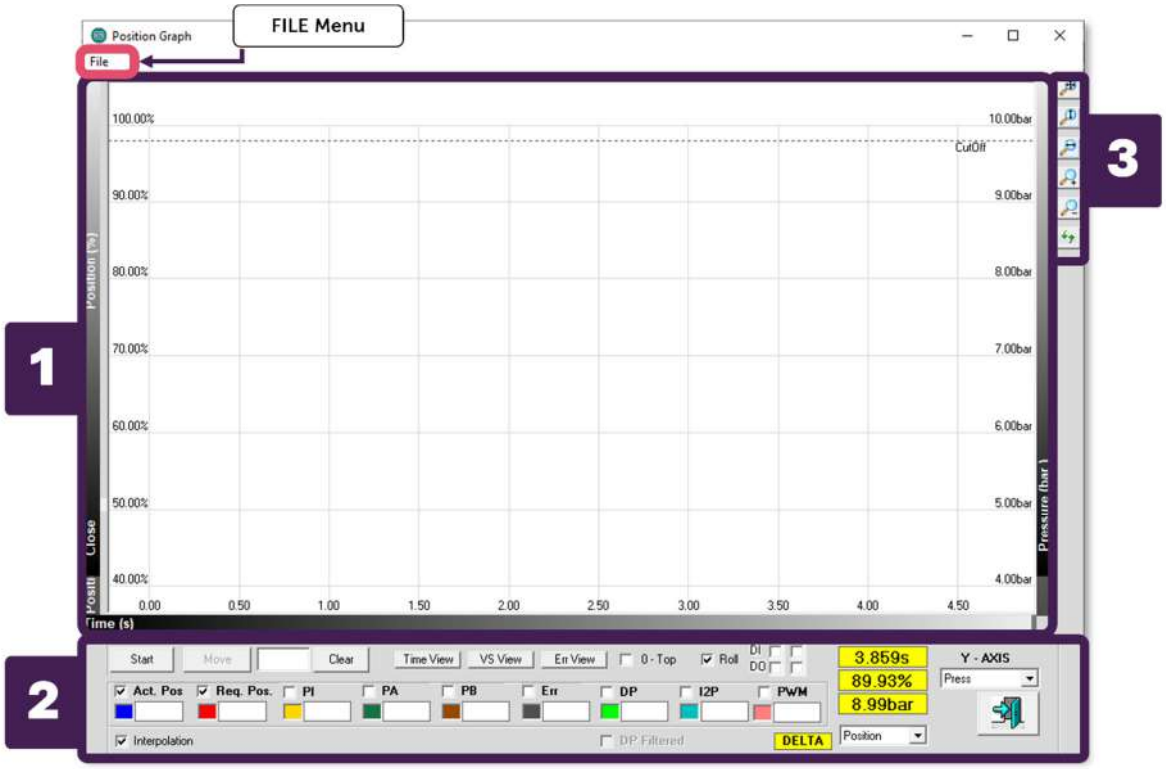



*Figure 3 - Graph Tool Window*

| | | |
|---|---|---|
| 1 | Graph | The graph area where the different curves are displayed.<br>The default axes are:<br>Y (left) = Position [%] ; Y (right) = Pressure [bar/psi] ; X = Time [ms] |
| 2 | Options Panel | Graph main control panel. Its features are detailed in the next paragraph. |
| 3 | Zoom & Auto-Scale | Auto-Scale / Zoom / Refresh buttons |

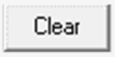
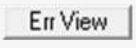
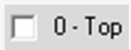
## 6.2 FEATURES & USAGE

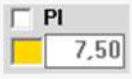
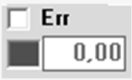
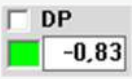
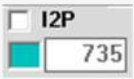
In this section, we will describe the comprehensive functionalities of the Graph Tool. These functionalities include basic operations such as starting and stopping the recorder and moving the actuator to a chosen position.

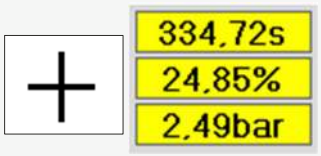
The Graph Tool also offers advanced features like setting different views for data analysis, displaying various curves, and customizing your data visualization with checkboxes and option boxes.

Additionally, the Graph Tool provides a File Menu for saving and loading graphs and even comparing two graphs. The Graph Tool also includes a practical feature - the reticle. This feature, while common in many graph tools, enhances the user experience by displaying the X,Y values based on where you place the reticle. It's a simple yet effective way to interact with your data.

Whether you're interested in viewing position or pressure over time, analysing error rates, or comparing graphs, the Graph Tool has a feature to meet your needs.

| | | |
|---|---|---|
| Start / Stop |   | Starts or Stops to record the selected variables |
| Move |   | Moves the actuator to a chosen position<br>("Out of Service (Manual)" must be selected) |
| Clear |   | Clear the input field |
| Time View |   | Sets the axis as follows:<br>Y = position [%] / pressure [bar/psi] and X = time [s] |
| VS View |   | Sets the axis as follows:<br>Y = Error [%] and X = requested position [%].<br>Also displays the Limit and CutOff position |
| Err View |   | Sets the axis as follows:<br>Y = Error [%] and X = requested position [%]. Also displays the Limit and CutOff position |
| 0-Top |   | Sets the axis Y = 0 at the top of the screen<br>(with Time View only) |
| Roll |   | When the chart line reaches the right edge of the graph, the abscissa values shift to the right, allowing the user to continuously observe the progression of the line |
| DI / DO |   | If selected, displays the digital Inputs/Outputs 1 and 2 |

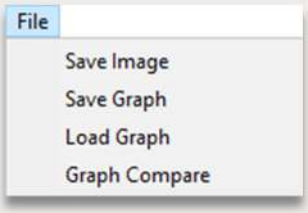
| | | |
|---|---|---|
| Y - AXIS |  | Let the user choose the Y-Axis :<br>Pressure or DP (with Time View only) |
| DELTA |  | Let the user select the type of "Delta" (DP) :<br>Delta Position or Delta Pression |
| ActPos |  | Displays the Actual Position |
| ReqPos |  | Displays the Required Position |
| PI |  | Displays the Line Pressure |
| PA |  | Displays the Pressure in the chamber A |
| PB |  | Display the Pressure in the chamber B |
| Err |  | Displays the Position Error<br>(difference between the Actual and Required position) |
| DP |  | Displays the Delta Pressure<br>(difference between PA and PB) |
| I2P |  | Displays the current of the I2P converter |
| PWM |  | Displays the PWM |
| Interpolation |  | If checked, the graph interpolates values between each sample of the data being visualized |

| | | |
|---|---|---|
| DP Filtered |  | If checked, the graph applies a filter to the DP values to produce a smoother curve |
| Reticle and pointed values |  | Depending on where the user positions the reticle (pointer), the corresponding X,Y values are displayed |
| Exit |  | Closes the Graph tool |

### 6.2.1 FILE MENU

The "File" menu in the Graph Tool provides several functionalities that allow you to manage and analyze your data.

**Graph Tool File Menu**




| | |
|---|---|
| Save Image | This option allows you to save the current graph as an image, providing a convenient way to document or share your findings. |
| Save Graph | This feature enables you to save the entire graph as a .txt document. This can be particularly useful for preserving your work or for further analysis. |
| Load Graph | This function allows you to load a saved graph or data from a .txt document. This could be data recorded by the Logger tool or from one of the offline tests such as Valve Signature, Step Response Test, or Frequency Response Test. |
| Graph Compare | This feature allows you to compare two graphs. To align the two images, keep the 'SHIFT' key pressed, hold down the right mouse button, and move in the graph area (left or right). |

### 6.2.2 SAVED GRAPH TEXT FILE

When a graph is saved, a text file is generated. This file encapsulates all the essential data required by the software to reconstruct the graph when it is reloaded into the graph tool. The structure of the file is as follows :

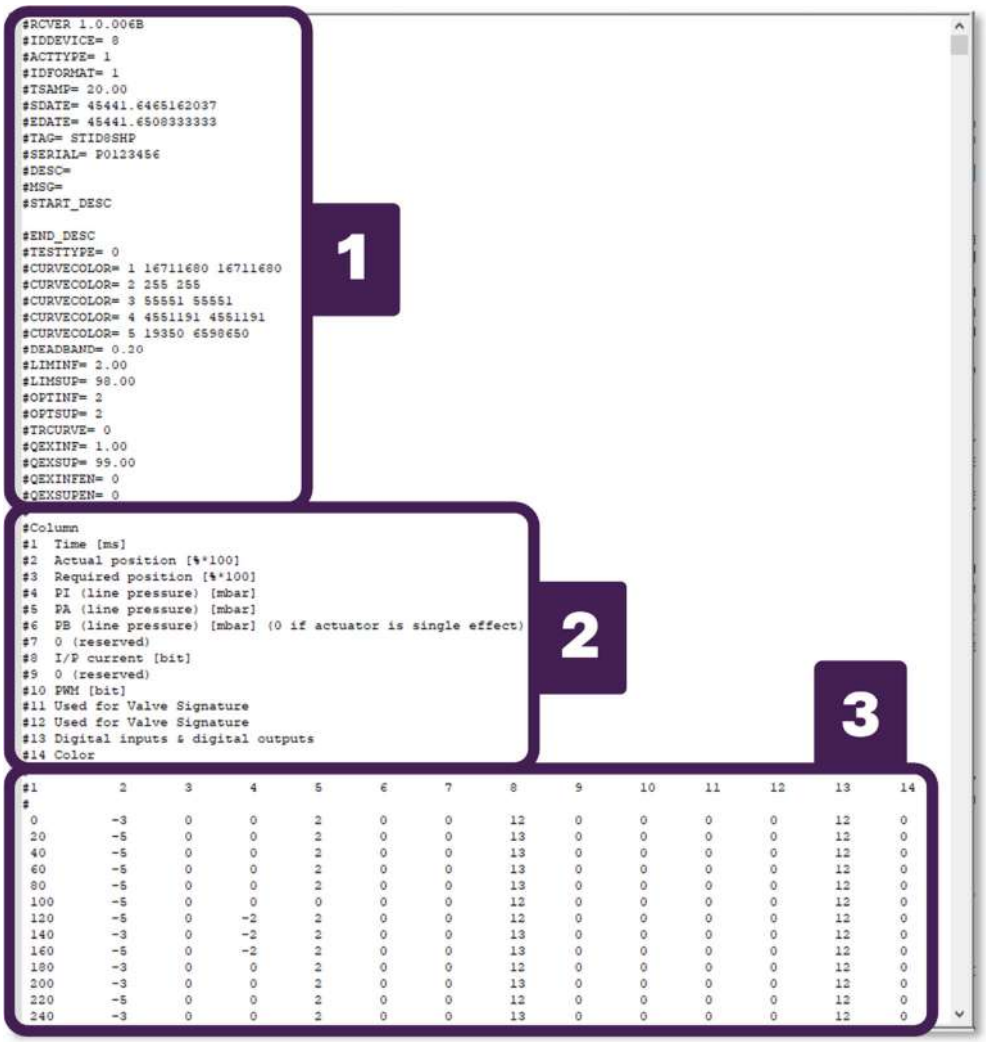



*Figure 4 - Graph Text File Structure*

| | | |
|---|---|---|
| **1** | Header | Each file includes a header section with information used exclusively by the software. |
| **2** | Curve Data Column Legend | Columns are numbered from 1 to 14, and the legend maps each number to its corresponding curve data. |
| **3** | Curve Data | Each column corresponds to the data points of a distinct curve on the graph. |

# 7 OFFLINE DIAGNOSTIC TOOLS

## 7.1 INTRODUCTION TO OFFLINE DIAGNOSTICS

This chapter will guide you through the use of three specific diagnostic tools. These tools are engineered to operate in an offline mode, necessitating the isolation of the valve from the plant process to facilitate the execution of the tests.

The application of these diagnostic resources is essential in a variety of operational scenarios. This could be during the commissioning phase, where the system is being set up for the first time. It could also be during the maintenance phase, a critical period for ensuring the system's continuous smooth operation. Even in instances where the valve exhibits unexpected behaviour, such as not following to the input signal, these offline diagnostic tools prove to be a crucial asset.

The benefits of these tools are significant. They allow you to get a clear picture of the valve's health before you start fixing any issues. They generate a detailed test report that gives you a comprehensive overview of the system's status. They help you avoid unnecessary valve disassembly, saving you both time and effort.
In this chapter, we will delve into three specific tests: the Valve Signature Test, the Step Response Test, and the Frequency Response Test. Each of these tests provides unique insights and contributes to the effective diagnosis and resolution of issues.

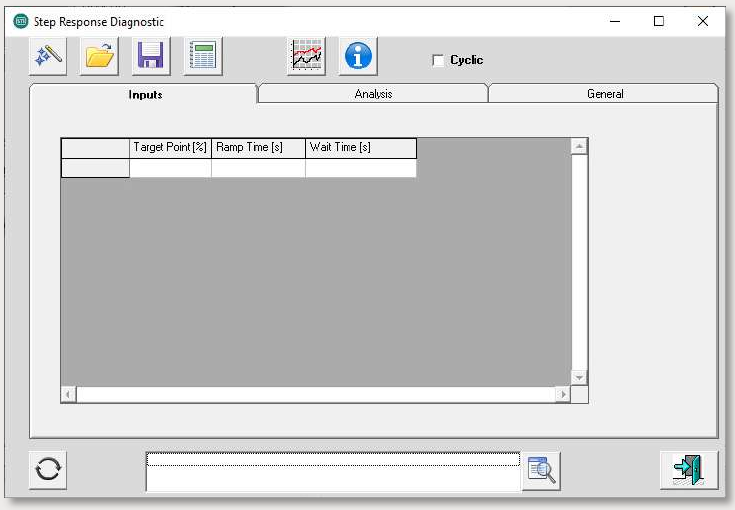
All these tests can be saved, and their data loaded in the Graph Tool for further analysis. You can also compare two tests done at two different times to check how the valve evolved. At the end of each test, a report is generated with a summary of all the important data and screenshots of the important curves (positions, pressures). Please note that this is a quick guide and won't go into detail about the usage and results interpretation of all these tests.

## 7.2 COMMON FEATURES

### 7.2.1 INPUTS TAB

This tab is used to configure the input data for the test. It allows you to set the parameters necessary for the specific diagnostic tool you are using.

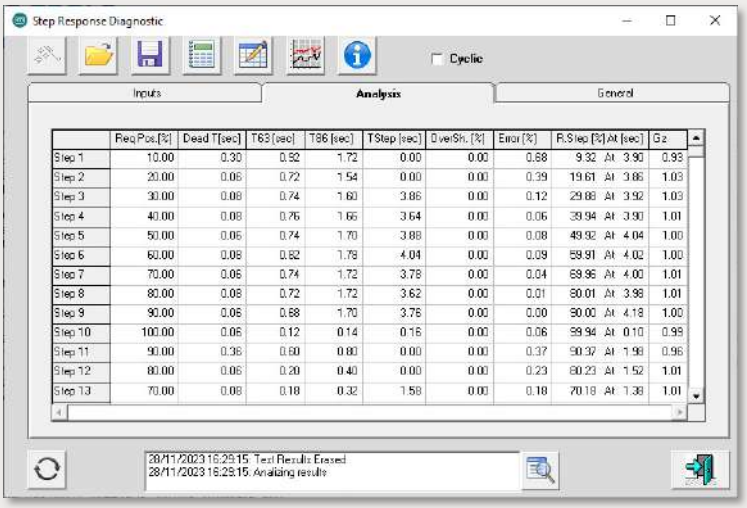
Offline Test Window – Inputs Tab



### 7.2.2 ANALYSIS TAB

This tab provides a preview of the analysis results of the offline test. However, to access the full report, the user must download the report.

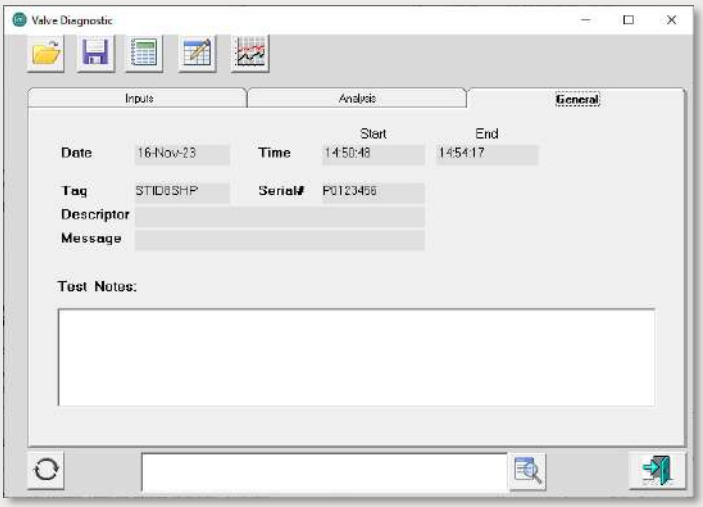
**Offline Test Window – Analysis Tab**




### 7.2.3 GENERAL TAB

This tab retrieves the timestamp of the test, the serial number of the positioner, and other information related to the test. It is used to easily identify a test that was done in the past. The user can also add personal notes/comments in this tab.

**Offline Test Window – Analysis Tab**



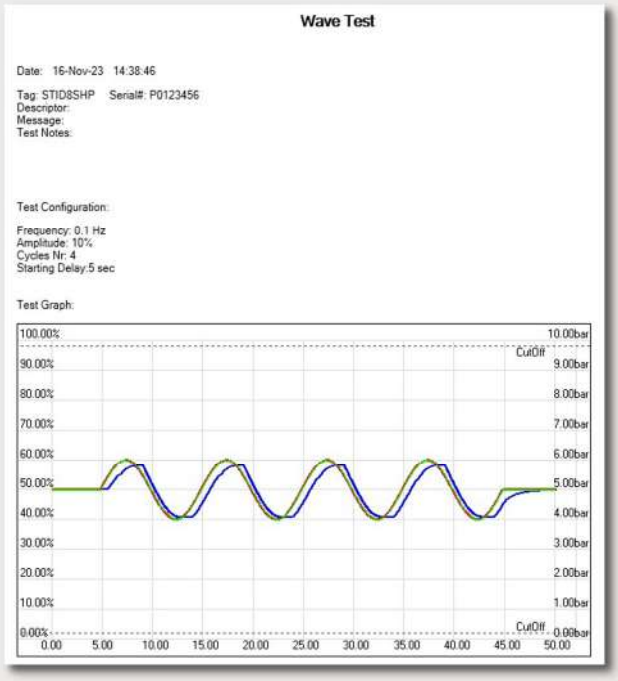
### 7.2.4 GENERATED TEST REPORT FILES

After each test, the user has the option to download two types of files:

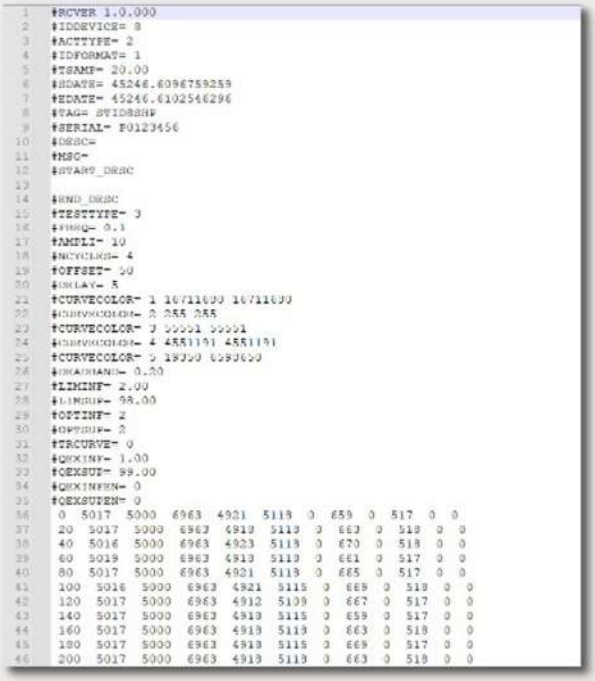
| | |
|---|---|
| TXT FILE | This file contains the raw data from the test.<br>The data in this file is readable by the Graph Tool. |
| RTF FILE | This file is a test report that can be opened in Word.<br>The report retrieves all the test results, the timestamp, and screenshots of the curves. |

Below is an example of Frequency Test Report files.

**Example – Frequency Test Report Files**




RTF FILE




TXT FILE

## 7.3 VALVE SIGNATURE TEST (OP1)

### 7.3.1 TEST INSIGHTS

The Valve Signature Test is a diagnostic tool designed to assess the health status of a valve. It operates by moving the valve within a specified stroke range, thereby exploring the internal friction of the valve and actuator. This process allows for the identification of friction-related issues such as erosion, chamber or membrane damage, and actuator misalignment. The test conducts an evaluation of the actuator's positions and pressures throughout a complete forward and backward stroke.

The operator can use this test to accurately pinpoint areas where friction exceeds the usual level. Data collected during the test is used to generate a report, which can be saved and visualized using the Graph Tool. These reports can be generated at various times, allowing for a comparison of friction changes over time.
Please be aware that each report consists of a .txt file containing raw data, which can be loaded into the Graph Tool, and a readily comprehensible report (.rtf file) that can be opened with Word.

For actuators equipped with a spring, the system also evaluates the spring range based on the measured data. The test effectively maps out the relationship between Delta Pressure (DP) and position, offering valuable insights into the functioning and performance of the valve.

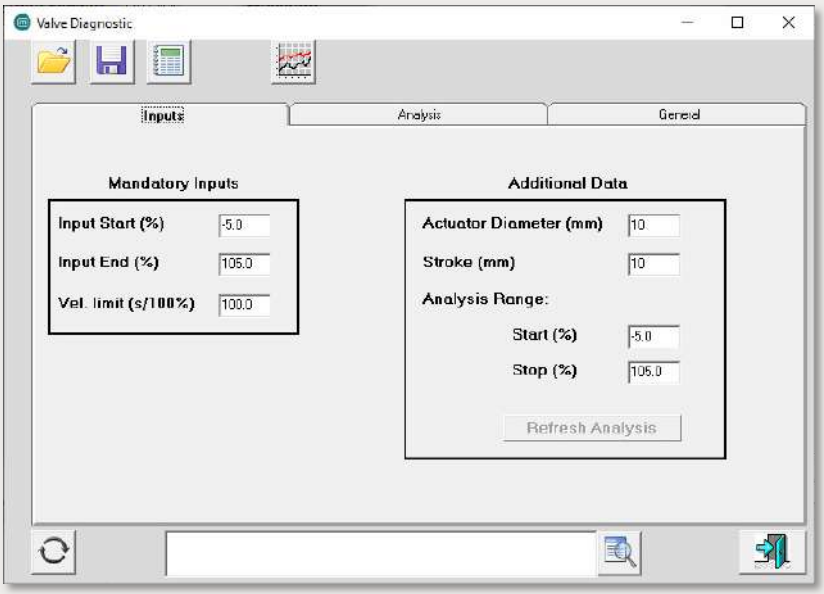
| | |
|---|---|
|  | Please note that this offline test is only available with the Option Pack 1. |

| | |
|---|---|
|  | Ensure all safety requirements are met before starting.<br>As the test moves the valve regardless of the 4-20mA setpoint ! |

### 7.3.2 INITIATING THE TEST

You can initiate the Valve Signature Test by either clicking on the Quick Access Button or navigating to: "Ribbon Bar" → "Test" → "Valve Signature". Upon initiation, a configuration window appears with several options.

**Valve Signature Test Window**




**OPEN button**
*Let the user open and load an old valve signature test.*

**SAVE button**
*Saves the actual valve signature test results.*

**CREATE button**
*Generates a report with the results.*

**GRAPH button**
*Opens the graph (works also while the test is running).*

**START button**
*Starts the valve signature test.*

**STOP button**
*Stops the valve signature test.*

**DETAILS button**
*Shows the details of the valve signature test process status.*

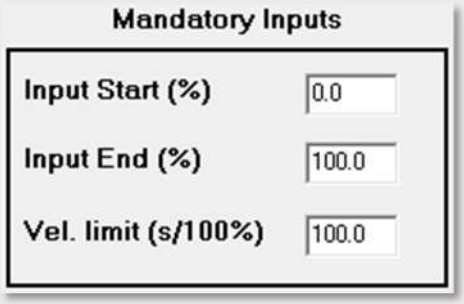
**EXIT button**
*Closes the valve signature test window*


REFRESH ANALYSIS button
*Recalculates the analysis data based on the updated parameters : actuator diameter, stroke, analysis range.*

### 7.3.3 MANDATORY INPUTS

This panel contains the key configuration parameters of the Valve Signature Test.

Mandatory Inputs Panel




Its field are described below.

| | | |
|---|---|---|
| **Input Start**<br>*Starting position* | Min: -5.0 [%]<br>Max: 105.0 [%] | Specifies the actuator's initial position before the actual test starts. The data collection begins once this point is reached. |
| **Input End**<br>*Ending position* | Min: -5.0 [%]<br>Max: 105.0 [%] | The test's final position. |
| **Velocity Limit**<br>*Max Stroking Time* | Min: 0.0 [s/100%]<br>Max: 327.7 [s/100%] | The stroke speed for the test (in s/100%). |

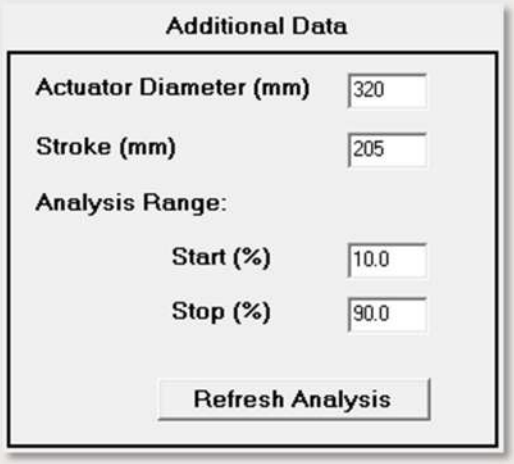
### 7.3.4 ADDITIONAL DATA

The "Additional Data" panel needs also to be configured prior to conducting a Valve Signature Test.

If the actuator being tested contains a spring, the user is required to input the Actuator Diameter and the Actuator Stroke. These inputs are essential for determining the characterization of the spring.

For all actuators, the user must specify the analysis range by setting the "Start" and "Stop" parameters. It's important to note that to obtain accurate results, it's generally recommended to exclude the initial and final parts of the valve signature data. This ensures that the analysis focuses on the most relevant and reliable portion of the data

Additional Data Panel



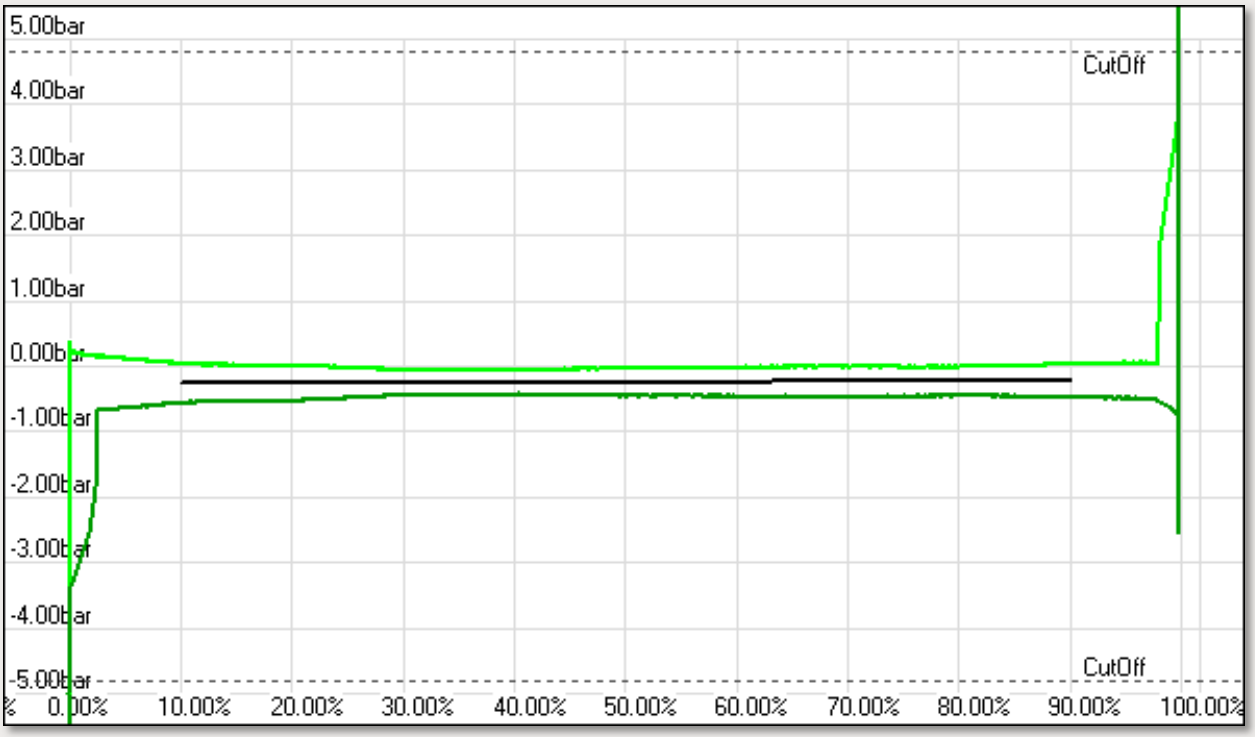

The additional data fields are described below.

| | | |
|---|---|---|
| **Actuator Diameter** | Min: 0 [mm]<br>Max: 2000 [mm] | Defines the actuator diameter. |
| **Stroke**<br>*Stroke Size* | Min: 0 [mm]<br>Max: 2000 [mm] | Defines the stroke size. |
| **Analysis Range Start** | Min: -5.0 [%]<br>Max: 105.0 [%] | Starting position from which the gathered data should be included in the valve signature test analysis. |
| **Analysis Range End** | Min: -5.0 [%]<br>Max: 105.0 [%] | Ending position from which the gathered data should be included in the valve signature test analysis. |

The SHP Service State must be in "Manual mode" to start the test. After setup, the Start button is used to begin the test.

During the test, you can observe the Valve Signature's evolution in real time by hitting the "Graph button". Once completed, the Graph displays DP versus position. Use the "Time view" or "VS view" buttons to change the visualization. The "Err view" button shows the dynamic error. You can also load a saved test for comparison.

**Example – Valve Signature Graph**
*DP vs Position (in VS View)*



## 7.4 STEP RESPONSE TEST (OP1)

### 7.4.1 TEST INSIGHTS

The Step Response Test is a diagnostic tool designed to evaluate the performance of the PID controller and assess the stability of the system. It operates by moving the valve to different positions based on a list of endpoints.

This process allows for the identification of potential issues with the PID controller's performance and offers an assessment of how the system responds to changes. With this test, operators can manually tune the PID controller. It allows them to observe the effects of the proportional gain (Kp), integral time (Ti), and derivative time (Td) on the system's response.

Data collected during the test is used to generate a report, which can be saved and visualized using the Graph Tool.

Please be aware that each report consists of a .txt file containing raw data, which can be loaded into the Graph Tool, and a readily comprehensible report (.rtf file) that can be opened with Word.

These reports can be generated at various times, allowing for a comparison of changes in the system's response over time. The test thus provides a comprehensive overview of each step, offering valuable insights into the functioning and performance of the system.

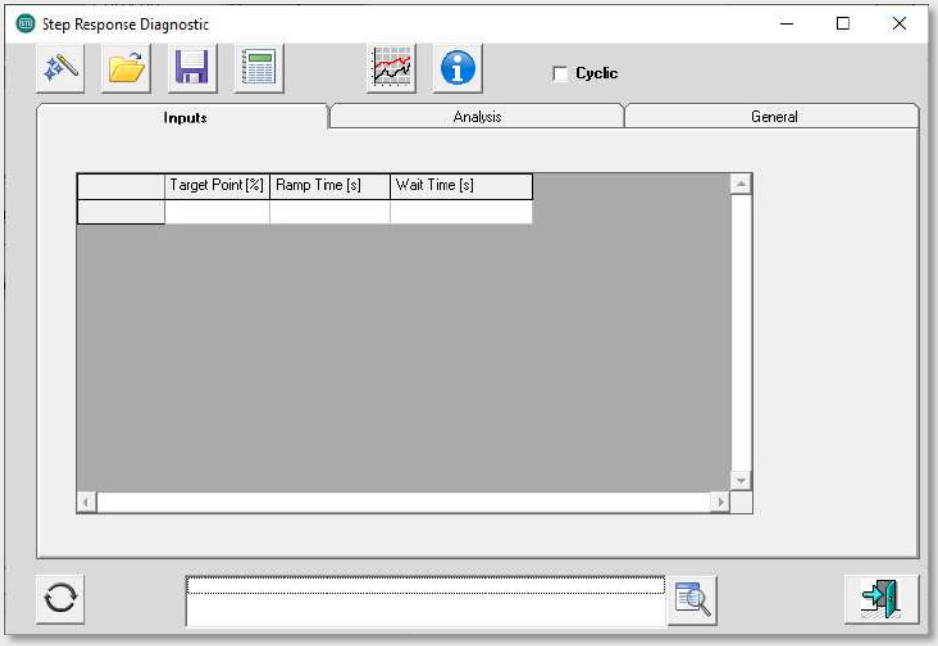
| | |
|---|---|
|  | Please note that this offline test is only available with the Option Pack 1. |

| | |
|---|---|
|  | Ensure all safety requirements are met before starting.<br>As the test moves the valve regardless of the 4-20mA setpoint ! |

### 7.4.2 INITIATING THE TEST

The Step Response Test can be initiated by either clicking on the Quick Access Button or navigating to: "Ribbon Bar" → "Test" → "Step Response". Upon initiation, a configuration window appears with several options.

**Step Response Test Window**




OPEN button
*Let the user open and load an old step response test.*

SAVE button
*Saves the actual step response test results.*

CREATE button
*Generates a report with the results.*

GRAPH button
*Opens the graph (works also while the test is running).*

START button
*Starts the step response test.*

STOP button
*Stops the step response test.*

DETAILS button
*Shows the details of the step response test process status.*

EXIT button
*Closes the step response test window*

WIZARD button
*Opens a window with pre-configured parameters for the step response test.*

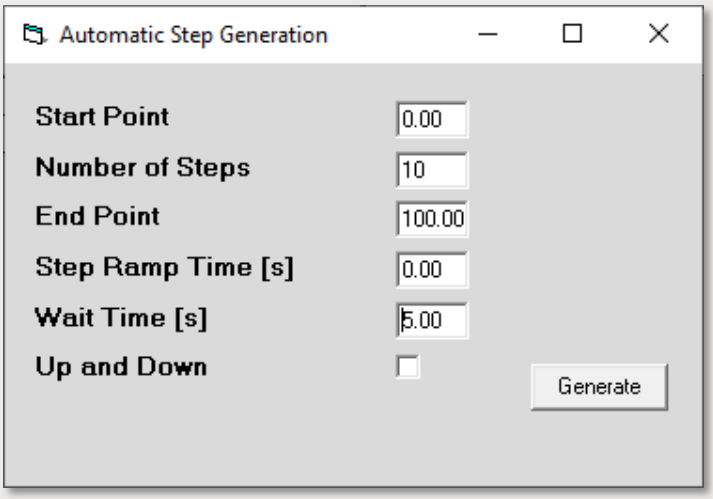
INFO button
*Opens a window with help.*

In order to initiate the configuration start by pressing the "Wizard" button, the "Automatic Step Generation" window will appear to assist the user in configuring the Step Response Test parameters.

### 7.4.3 MANDATORY INPUTS

This panel contains the key configuration parameters of the Step Response Test.

**Mandatory Inputs Panel**



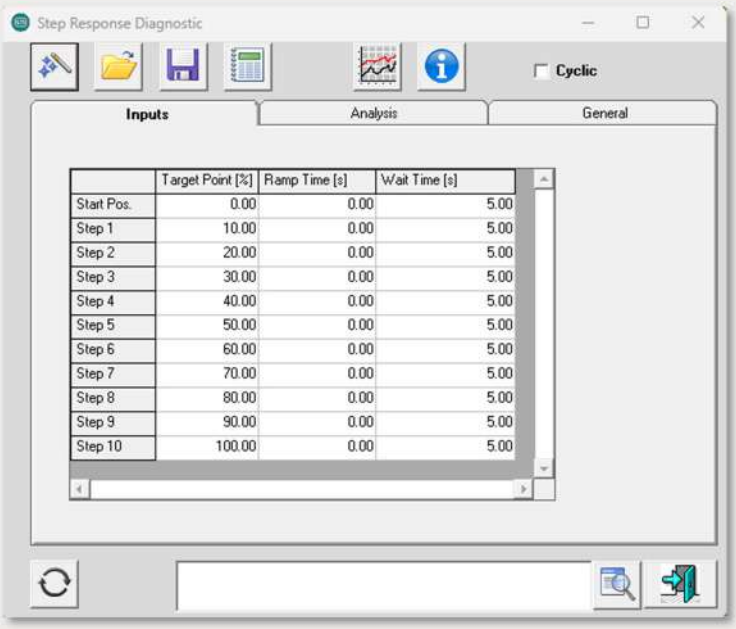

The inputs fields are described below.

| | | |
|---|---|---|
| **Start Point** | Min: 0.00 [%]<br>Max: 100.00 [%] | Specifies the actuator's initial position before the actual test starts. The data collection begins once this point is reached. |
| **Number of Steps** | Min: 1 [steps]<br>Max: 100 [steps] | Specifies the number of steps to perform. |
| **End Point** | Min: 0.00 [%]<br>Max: 100.00 [%] | Specifies the actuator's final position. |
| **Step Ramp Time** | Min: 0.00 [s]<br>Max: 32.77 [s] | Refers to the ramp time required to reach the step's target position. |

| | | |
|---|---|---|
| **Wait Time** | Min: 0.00 [s]<br>Max: 100.00 [s] | Defined as the duration after a step input change during which the system waits for the response to stabilize at the new value.<br><br>If the "Ramp Time" is not zero, the "Wait time" begins following the "Ramp Time". |
| **Up and Down** | Enabled<br>Disabled | If selected, the Step Response Test will move the valve back and forth between the "Start Point" and the "End Point", effectively doubling the number of steps. |

Once the inputs completed, click on "Generate" to configure the steps. A table appears with information about each step. It is possible to change the value of each step by double clicking on a cell.

**Step Generation**



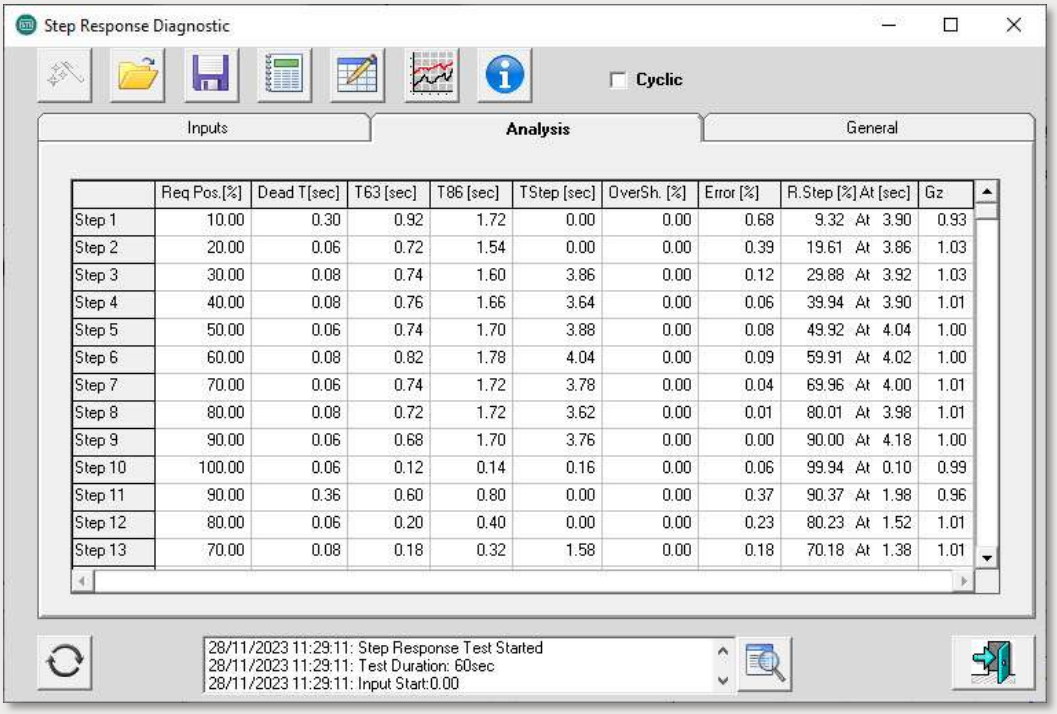

- Click on "Start" to initiate the test.
- To view the graph, click on "Graph".
- To generate a detailed report, click on "Create Report".

At the end of the test, you can view test details including information about dead time, T63 and T86 for a particular step, and overshoot (with the percentage of overshoot relative to a particular step).

### 7.4.4 STEP RESPONSE TEST ANALYSIS

After performing the test, open the "Analysis Tab".

**Step Response Test Analysis Tab**




| | Req Pos.[%] | Dead T[sec] | T63 [sec] | T86 [sec] | TStep [sec] | OverSh. [%] | Error [%] | R.Step [%] At [sec] | Gz |
|---|---|---|---|---|---|---|---|---|---|
| Step 1 | 10.00 | 0.30 | 0.92 | 1.72 | 0.00 | 0.00 | 0.68 | 9.32 At 3.90 | 0.93 |
| Step 2 | 20.00 | 0.06 | 0.72 | 1.54 | 0.00 | 0.00 | 0.39 | 19.61 At 3.86 | 1.03 |
| Step 3 | 30.00 | 0.08 | 0.74 | 1.60 | 3.86 | 0.00 | 0.12 | 29.88 At 3.92 | 1.03 |
| Step 4 | 40.00 | 0.08 | 0.76 | 1.66 | 3.64 | 0.00 | 0.06 | 39.94 At 3.90 | 1.01 |
| Step 5 | 50.00 | 0.06 | 0.74 | 1.70 | 3.88 | 0.00 | 0.08 | 49.92 At 4.04 | 1.00 |
| Step 6 | 60.00 | 0.08 | 0.82 | 1.78 | 4.04 | 0.00 | 0.09 | 59.91 At 4.02 | 1.00 |
| Step 7 | 70.00 | 0.06 | 0.74 | 1.72 | 3.78 | 0.00 | 0.04 | 69.96 At 4.00 | 1.01 |
| Step 8 | 80.00 | 0.08 | 0.72 | 1.72 | 3.62 | 0.00 | 0.01 | 80.01 At 3.98 | 1.01 |
| Step 9 | 90.00 | 0.06 | 0.68 | 1.70 | 3.76 | 0.00 | 0.00 | 90.00 At 4.18 | 1.00 |
| Step 10 | 100.00 | 0.06 | 0.12 | 0.14 | 0.16 | 0.00 | 0.06 | 99.94 At 0.10 | 0.99 |
| Step 11 | 90.00 | 0.36 | 0.60 | 0.80 | 0.00 | 0.00 | 0.37 | 90.37 At 1.98 | 0.96 |
| Step 12 | 80.00 | 0.06 | 0.20 | 0.40 | 0.00 | 0.00 | 0.23 | 80.23 At 1.52 | 1.01 |
| Step 13 | 70.00 | 0.08 | 0.18 | 0.32 | 1.58 | 0.00 | 0.18 | 70.18 At 1.38 | 1.01 |

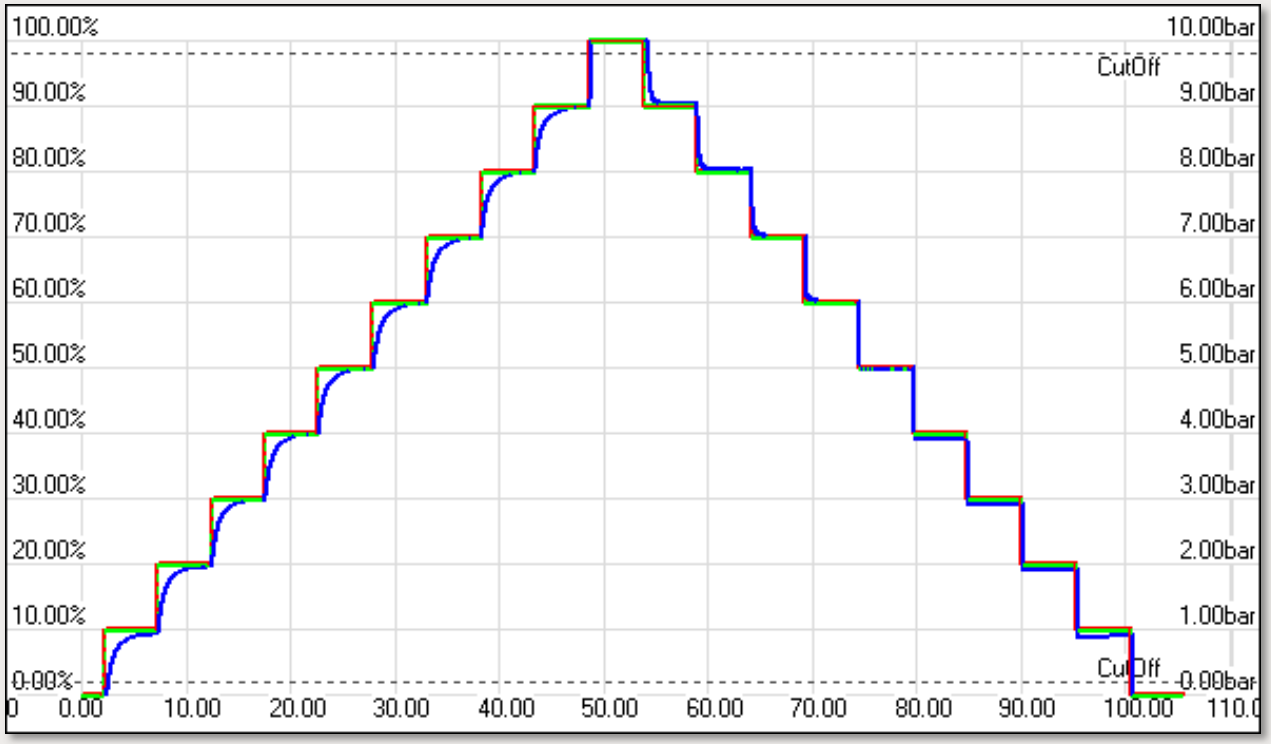
The quick overview of each analyzed parameter is detailed below.

| | | |
|---|---|---|
| **ReqPos**<br>*Required Position* | [%] | It indicates the target position requested at each step. This does not represent an actual analysis value. |
| **Dead T**<br>*Dead Time* | [s] | It is the delay between the initiation of an input signal change and the moment when the system begins to respond. During this period, no observable changes occur in the system's output. |
| **T63** | [s] | The time interval between the initiation of an input signal change and the moment when the first order dynamic system reaches 63.2% of the full steady state change. |
| **T86** | [s] | The time interval between the initiation of an input signal change and the moment when the first order dynamic system reaches 86.5% of the full steady state change. |
| **TStep**<br>*First Time to Target* | [s] | The time interval between the initiation of an input signal change and the moment when the system enters in the intentional tolerance band (dead band). |

| | | |
|---|---|---|
| **OverSh**<br>*Overshoot* | [%] | The overshoot, expressed as a percentage of the full stroke. |
| **Error** | [%] | The Error between the Steady Step Position and the Requested position in % of total stroke. |
| **RStepAt**<br>*Reached Step* | [%] | This refers to the steady state position at the settling time. In other words, it's the point where the system has stabilized after a change. |
| **Gz**<br>*Response Gain* | | The ratio of the steady state magnitude of the process change Δz divided by the requested step Δs that caused the change. Gz = Δz /Δs. |

During the test, you can observe the Step Response evolution in real time by hitting the "Graph button".

**Example – Step Response Test Graph**
*Actual + Required Position vs Time*



## 7.5 FREQUENCY RESPONSE TEST (OP2)

### 7.5.1 TEST INSIGHTS

The Frequency Response Test is a specialized diagnostic tool designed to evaluate the performance and precision of the valve by generating a sinusoidal setpoint. This test is particularly useful for testing anti-surge valves, as it provides valuable insights into the system's speed and precision. The ability to save multiple configurations in memory for future tests adds to its convenience and efficiency.

The data gathered during the test is utilized to produce a report. This report can be saved for future reference, and its contents can be visualized using the Graph Tool. Each report is made up of two components: a .txt file and an .rtf file. The .txt file contains the raw data from the test, which can be imported into the Graph Tool for further analysis. The .rtf file, on the other hand, presents the data in a format that is easy to understand and can be opened with Word. (This specific test generates two separated .rtf reports.)

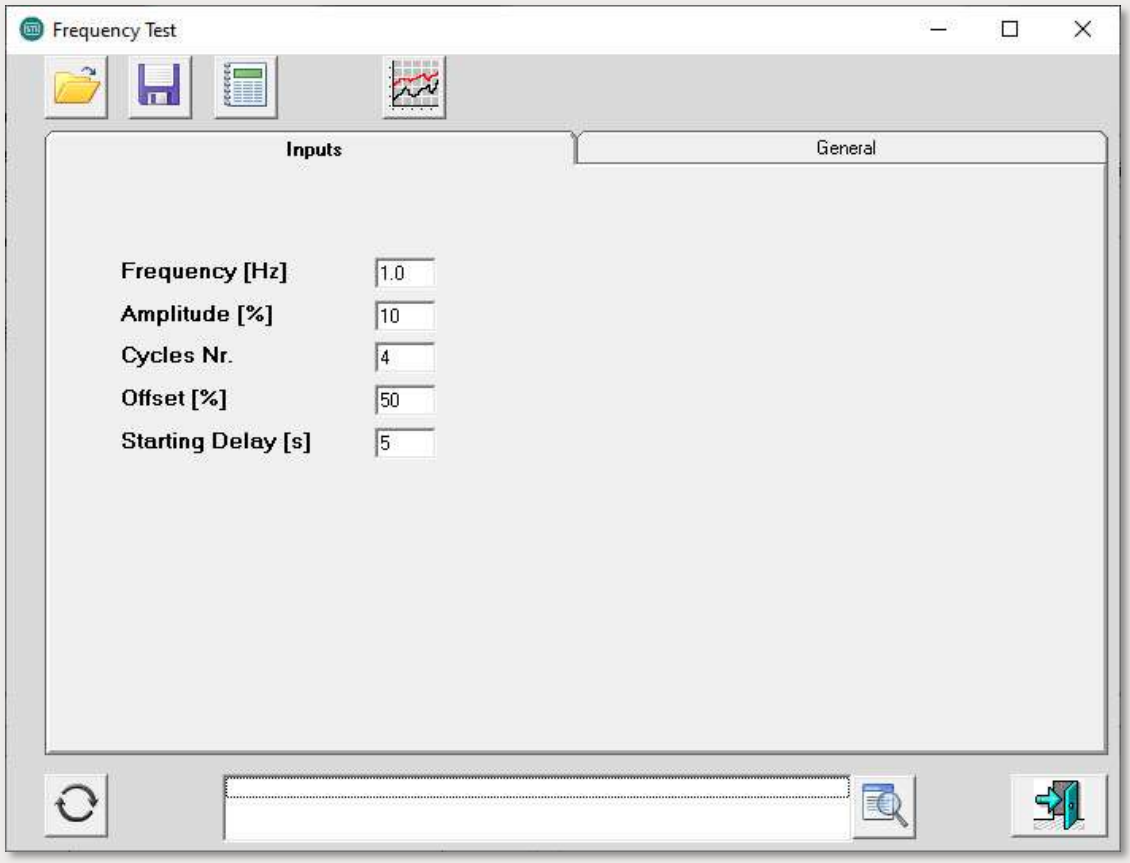
| | |
|---|---|
|  | Please note that this offline test is only available with the Option Pack 2 |

| | |
|---|---|
|  | Ensure all safety requirements are met before starting.<br>As the test moves the valve regardless of the 4-20mA setpoint ! |

### 7.5.2 INITIATING THE TEST

The Frequency Response Test can be initiated by either clicking on the Quick Access Button or navigating to: "Ribbon Bar" → "Test" → "Freq. Response". Upon initiation, a configuration window appears with several options described below.

**Frequency Response Test Window**




OPEN button
*Let the user open and load an old frequency response test.*

SAVE button
*Saves the actual frequency response test results.*

CREATE button
*Generates a report with the results.*

GRAPH button
*Opens the graph (works also while the test is running).*

START button
*Starts the frequency response test.*

STOP button
*Stops the frequency response test.*

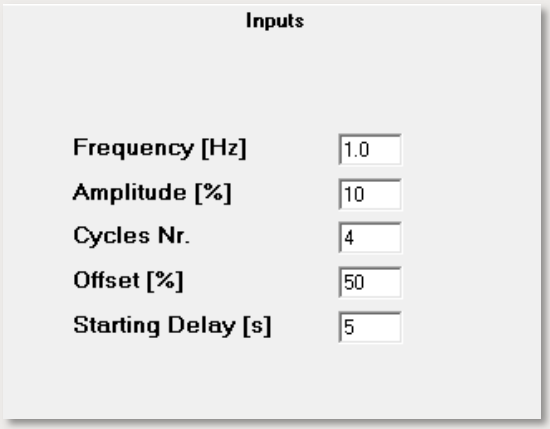
DETAILS button
*Shows the details of the step response test process status.*

EXIT button
*Closes the frequency response test window*

### 7.5.3 MANDATORY INPUTS

This panel contains the key configuration parameters of the Frequency Response Test.

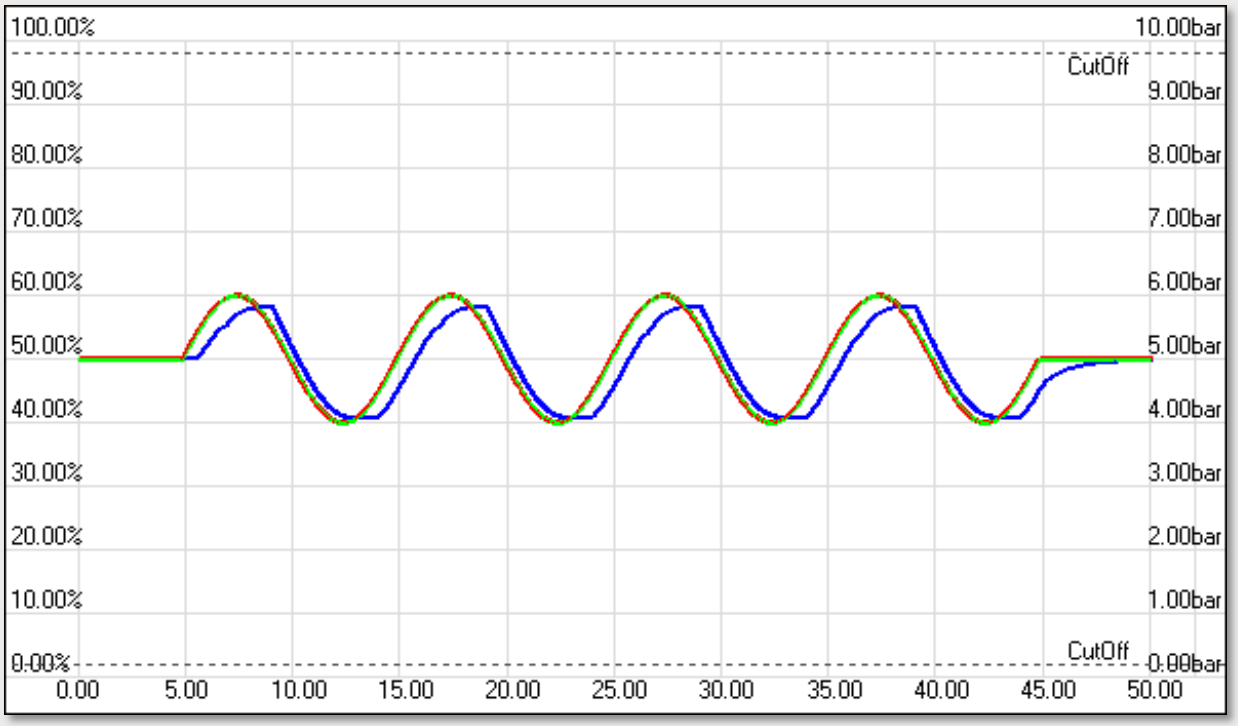
**Mandatory Inputs Panel**




| | | |
|---|---|---|
| **Frequency** | Min: 0.1 [Hz]<br>Max: 10.0 [Hz] | Frequency of the required position sinusoid. |
| **Amplitude** | Min: 1 [%]<br>Max: 10 [%] | The amplitude of the sinusoid. |
| **Cycles Nr**<br>*Number of Cycles* | Min: 1 [cycles]<br>Max: 255 [cycles] | The number of sinusoid cycles. |
| **Offset** | Min: 0 [%]<br>Max: 100 [%] | The offset of the sinusoid. |
| **Starting Delay** | Min: 0 [s]<br>Max: 100 [s] | The actuator is initially moved to the "Offset" position. The "Starting Delay" parameter defines the waiting period before the Frequency Test Response begins after reaching the "Offset" position. |

To initiate the test, click on "Start". As the test progresses, you can monitor the real-time evolution of the Frequency Response by selecting the "Graph" icon. Upon completion of the test, a detailed report can be generated by clicking on "Create" icon.

**Example – Frequency Response Test Graph**
*Actual + Required Position vs Time*




At the end of the test, you can view test details including information about the phase shift (absolute value) and the gain amplification/attenuation. Using the right button of the mouse, it is possible to measure the results of the test. The feature allows to select any two points on the graph.

# 8 LOCAL USER INTERFACE (LUI)

## 8.1 DESCRIPTION

The Local User Interface (LUI) is an optional feature of the SHP positioner, designed to provide users with quick and easy access to the main information and configurations of the device. The LUI consists of a small LCD display and four buttons, all housed within a robust enclosure available in both aluminium and SS 316 options.

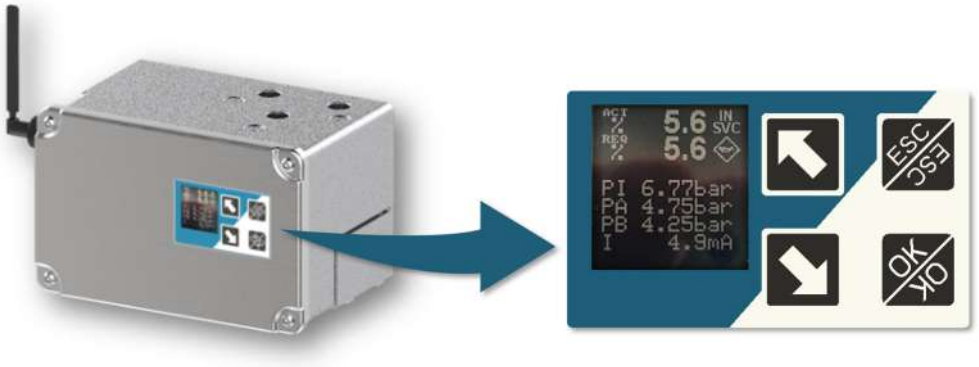



*Figure 5 - Local User Interface Panel*

One of the standout features of the LUI is its touch screen keyboard, which can be operated without opening the enclosure. This ensures the durability and longevity of the device even in challenging environments.

## 8.2 CONTROLS & LCD DISPLAY

### 8.2.1 BUTTONS

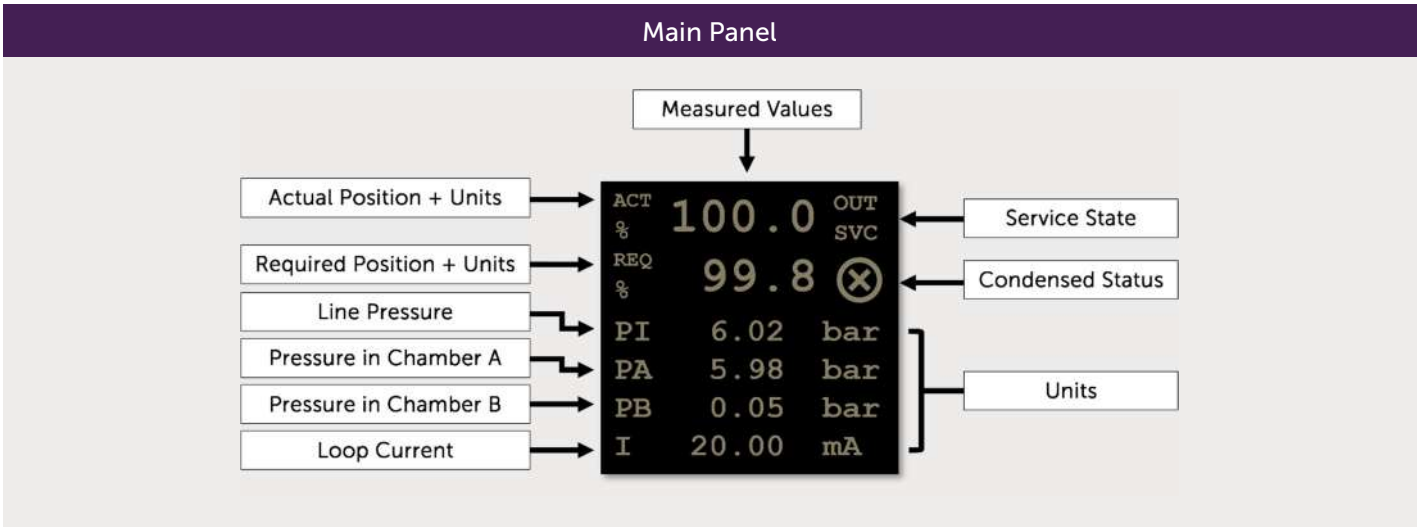
The LUI is equipped with an LCD display and four buttons, serving as the primary means of interaction. Their function is detailed below.

| | | | |
|---|---|---|---|
| UP<br>*Navigate Up or Increase* | | ESC<br>*Escape* | |
| DOWN<br>*Navigate Down or Decrease* | | OK<br>Enter or Validate | |

| | |
|---|---|
| | To ensure accurate detection, do not press the buttons in quick succession ! |

### 8.2.2 DISPLAY

The main screen displays information about the positioner's process variables and its current status.




The main screen also shows the condensed status with its related NE107 pictogram for quick problem identification.

Press "ESC" in order to check the details of all the active NE107 alarms. The active alarms will automatically scroll one after the other. Press "ESC" again to return to the main screen.


*Figure 6 - Example of NE107 Active Alarms*

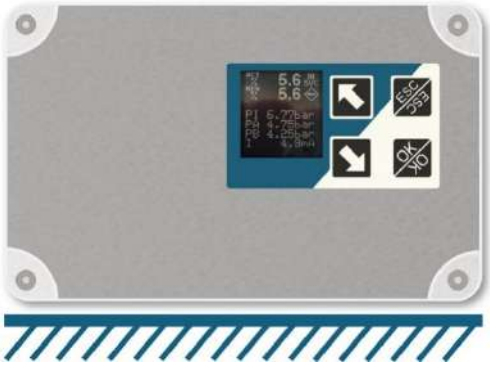
### 8.2.3 PASSWORD

To access the menus, a 5 digit pin code is requested. To enter the pin code, press "OK" and then type the sequence shown below.


### 8.2.4 DISPLAY ORIENTATION

Depending on the actuator, the positioner can be mounted either vertically or horizontally. This in turn requires the adjustment of the Local User Interface (LUI) orientation to ensure optimal readability and user experience.

For the LUI to correctly interpret which arrow button corresponds to the "UP" or "DOWN" direction, the display information must always be presented with the correct orientation to the user (the operator SHOULD NOT need to tilt his/her head to read the information). If this condition is not met, the LUI may not know what the position of the SHP is, and as a result, the "UP" and "DOWN" buttons may behave in reverse.



LUI DEFAULT ORIENTATION

Below is an example of a positioner mounted vertically. On the left, the LUI orientation is correct. However, on the right, the operator did not adjust the LUI orientation, resulting in the reverse behaviour of the "UP" and "DOWN" buttons.

LUI CORRECT ORIENTATION

LUI WRONG ORIENTATION

To adjust the display orientation, follow the steps below.

1. Navigate to the CONFIG menu
2. Select DISP. ROT.
3. Choose Disp. Rot.
4. Select the desired orientation: 0 deg, 90 deg, 180 deg or 270 deg.

0 DEG ORIENTATION

90 DEG ORIENTATION

180 DEG ORIENTATION

270 DEG ORIENTATION

## 8.3 MENU STRUCTURE

### 8.3.1 ROOT MENUS

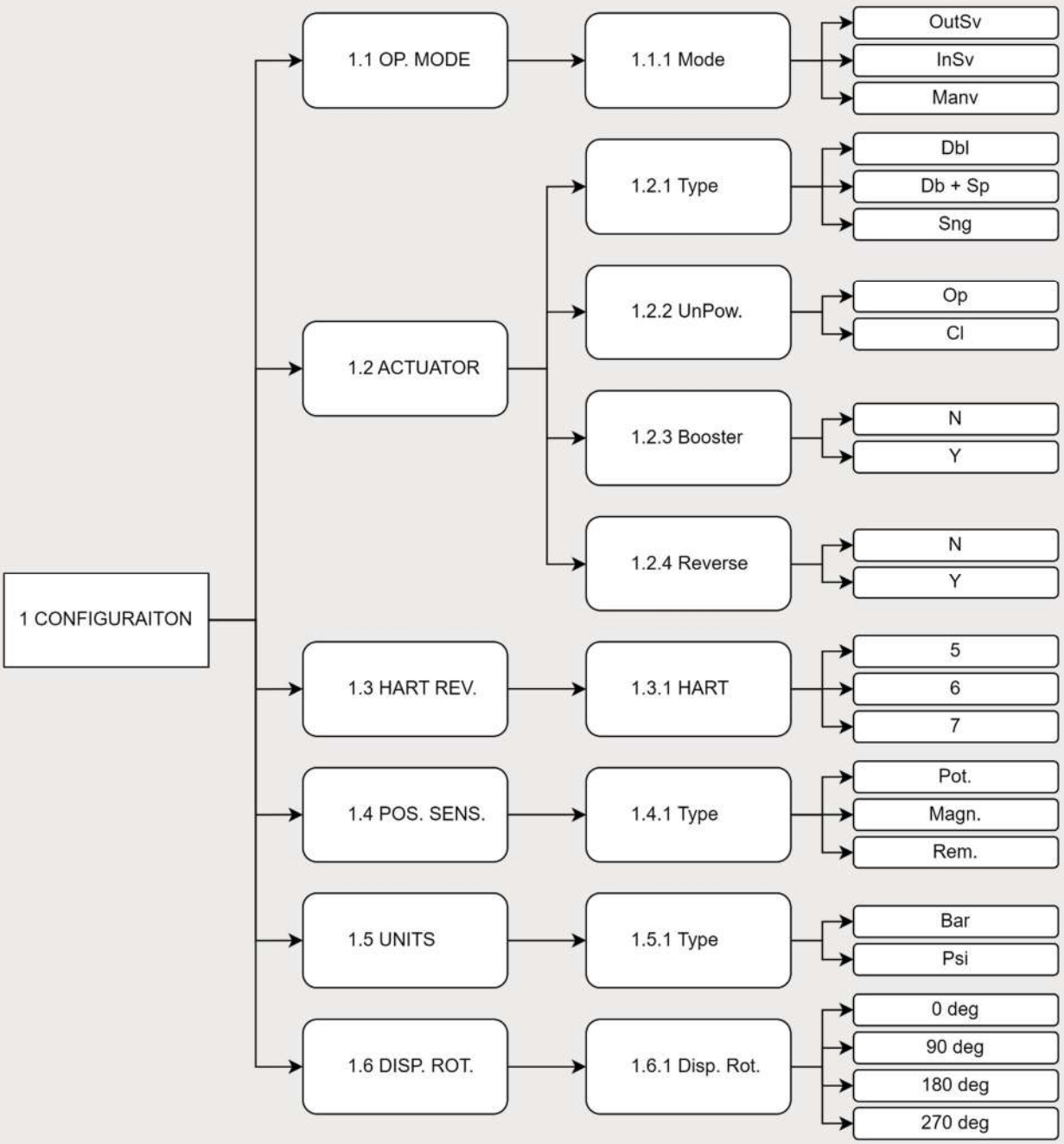
The Local User Interface (LUI) is organized into seven root menus, each providing access to different items of the positioner's configuration and information.

| | | |
|---|---|---|
| 1 | CONFIGURATION | Allows changing the main settings of the positioner. |
| 2 | SYSTEM INFO | Displays information such as the device firmware version and serial number. |
| 3 | CALIBRATION | Provides access to the calibration wizards and factory reset option. |
| 4 | SET-UP | Allows changing the tuning and the travel control parameters. |
| 5 | COUNTERS | Displays system counters.<br>(Travel accumulator, Cycles counter and Device On Time). |
| 6 | RAW DATA | Displays some relevant device variables in their internal representation (e.g. bits, etc.). |
| 7 | PST | Access to the Partial Stroke Test menu. |

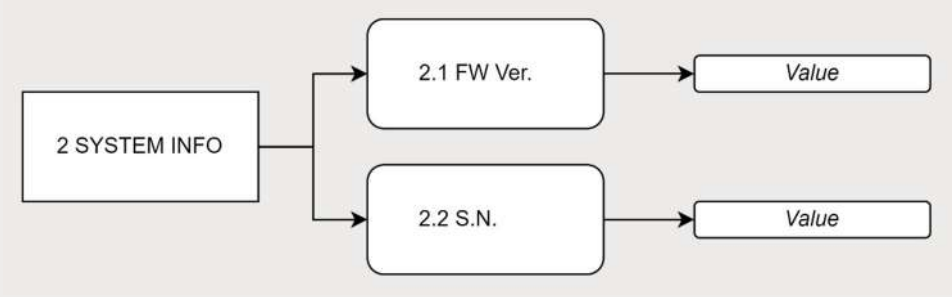
### 8.3.2 HIERARCHICAL MENU LAYOUT

The LUI's menu structure is organized in a layered manner, with each root menu leading to various options and nested menus. The following section provides a visual representation of the menu hierarchy, to show how to navigate through the different levels of menus. The hierarchical structure is shown using a tree diagram, where each box represents a menu, and the connecting lines indicate their relationships.

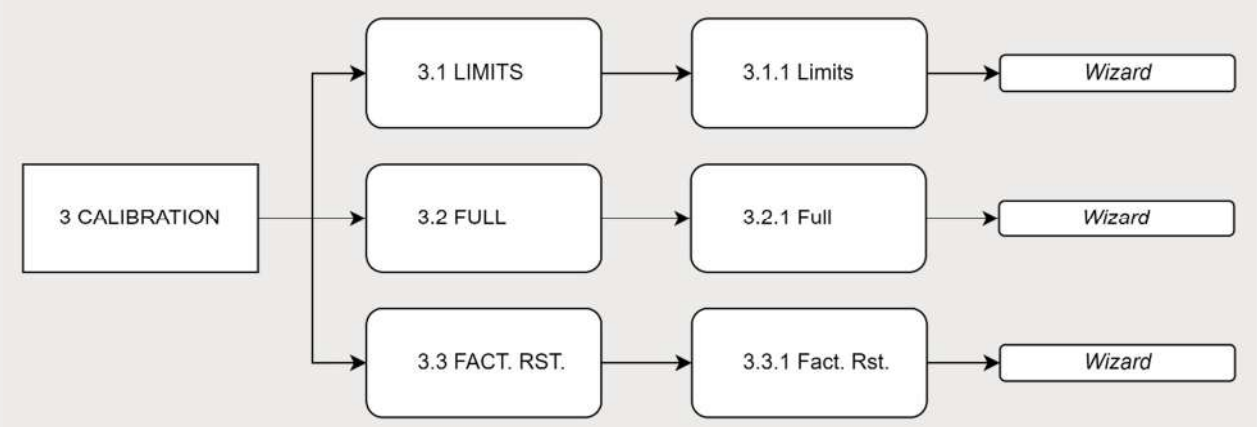
## 1 CONFIGURATION



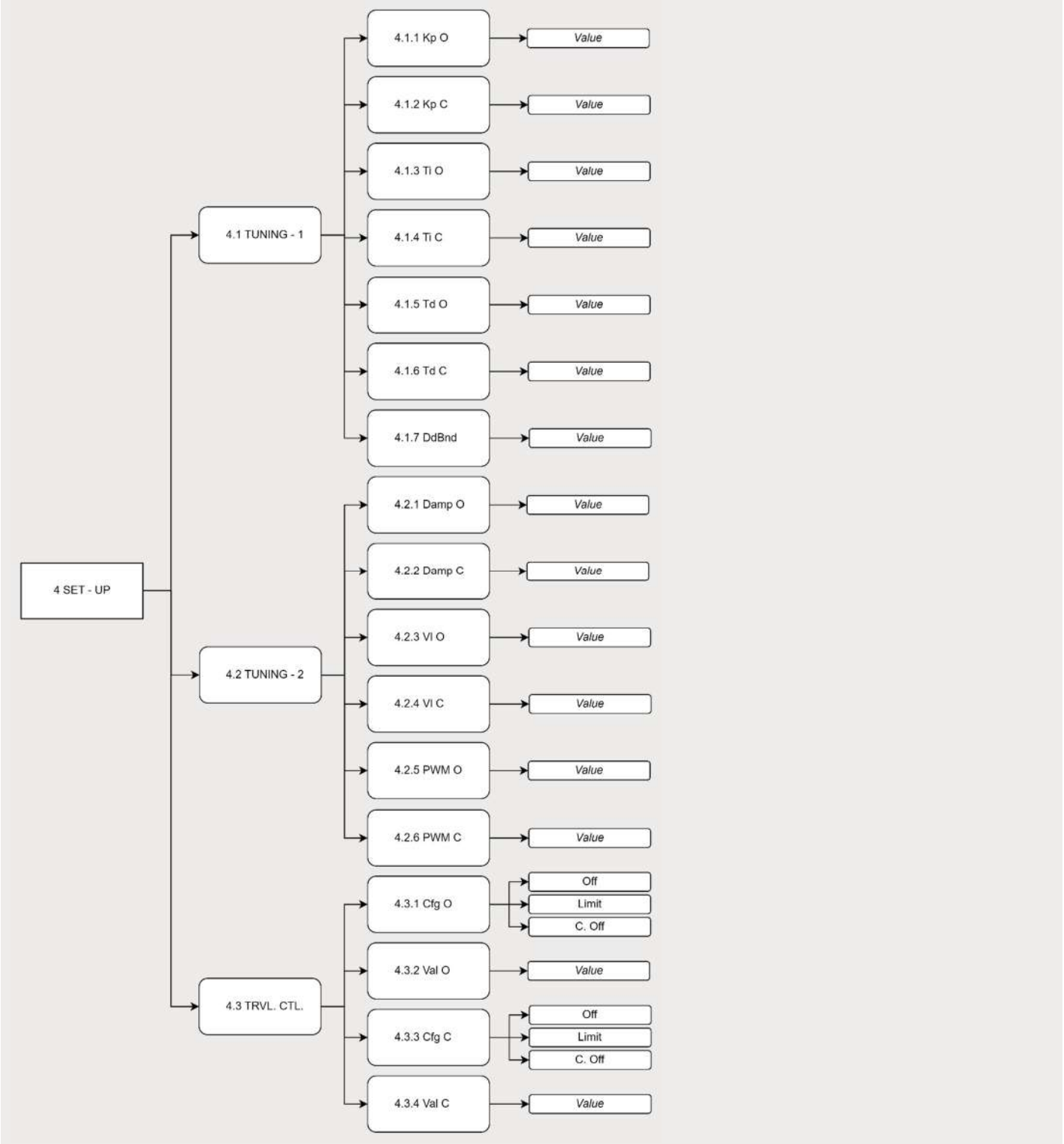
## 2 SYSTEM INFO



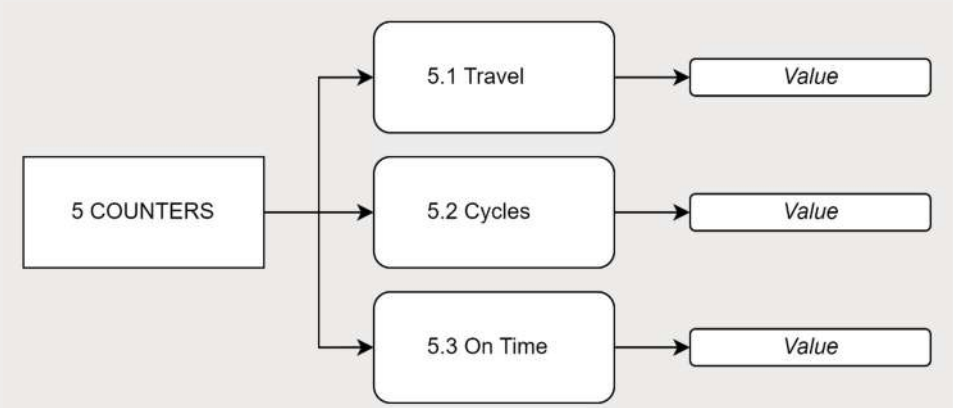

## 3 CALIBRATION



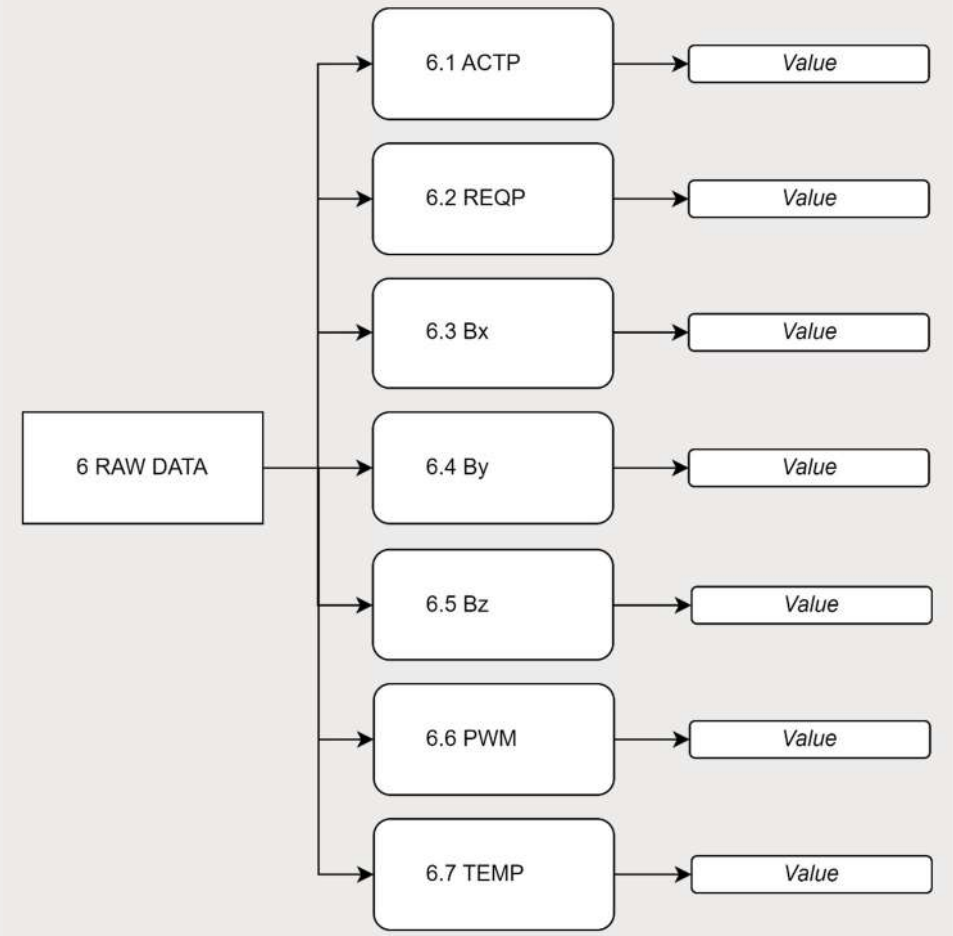
## 4 SET-UP


4 SET - UP
4.1 TUNING - 1
4.1.1 Kp O
Value
4.1.2 Kp C
Value
4.1.3 Ti O
Value
4.1.4 Ti C
Value
4.1.5 Td O
Value
4.1.6 Td C
Value
4.1.7 DdBnd
Value
4.2 TUNING - 2
4.2.1 Damp O
Value
4.2.2 Damp C
Value
4.2.3 VI O
Value
4.2.4 VI C
Value
4.2.5 PWM O
Value
4.2.6 PWM C
Value
4.3 TRVL. CTL.
4.3.1 Cfg O
Off
Limit
C. Off
4.3.2 Val O
Value
4.3.3 Cfg C
Off
Limit
C. Off
4.3.4 Val C
Value

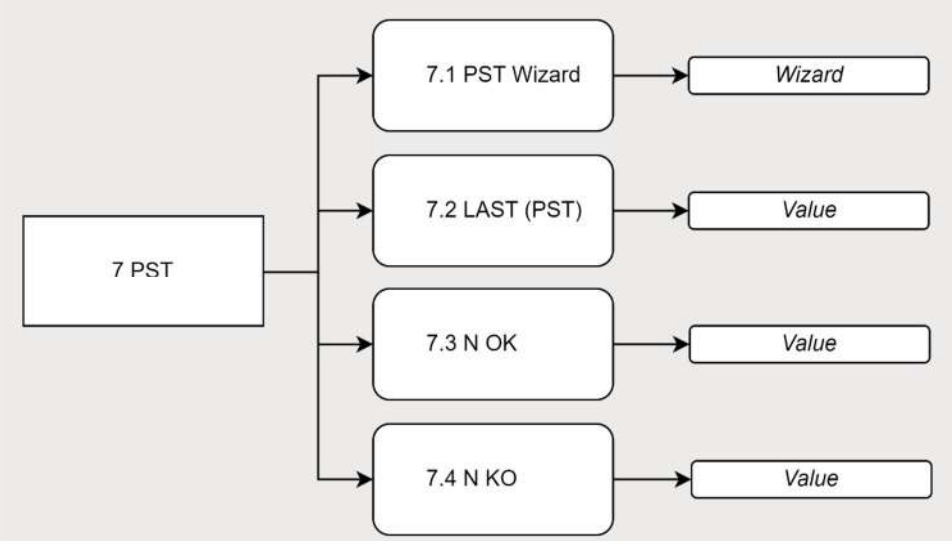
## 5 COUNTERS




## 6 RAW DATA



## 7 PST


7 PST
7.1 PST Wizard
Wizard
7.2 LAST (PST)
Value
7.3 N OK
Value
7.4 N KO
Value

# 9 OPTION PACKS

The SHP positioner is designed with flexibility in mind, offering a range of features, including Online and Offline Diagnostic tools to meet your specific needs. By default, every SHP positioner comes with the "Standard Pack", which includes basic instruments such as Parameter Monitoring, Graph Tool, Self-tuning, System Status and Events & Counters. However, for those who require additional functionalities, we offer three different Option Packs that can be purchased separately.



## 9.1 OPTION PACK FEATURES

| | | | | |
|---|---|---|---|---|
| STANDARD PACK | = | > Self-Tuning<br>> Pilot Test<br>> System Status<br>> Process Variables Monitoring<br>> Position/Pressure Time Meas. | | > Graph Comparison<br>> Counters<br>> Events<br>> Attenuation/Phase-delay Meas.<br>> Partial Stroke Test |
| OPTION PACK 1 | = | Standard Pack | + | > Pressure Fallback Option<br>> Step Response Test<br>> Valve Signature Test |
| OPTION PACK 2 | = | Standard Pack<br>+<br>Option Pack 1 | + | > Stability Control Option<br>> Soft CutOff Option<br>> Frequency Response Test |
| OPTION PACK 3 | = | Standard Pack<br>+<br>Option Pack 1<br>+<br>Option Pack 2 | + | > Quick Exit From CutOff<br>> Logger |

### 9.1.1 OPTION PACK 4 (RESERVED)

Option Pack 4 contains reserved features that will be available in the future.
The reserved features are:

> Quick Exit from Cutoff (visible - read-only)
> Dynamic Friction (hidden)

## 9.2 TRIAL LICENSE

This feature provides users with the opportunity to trial all the option packs (1, 2, and 3) for a limited period of time. Each pack is designed to provide additional tools and features to enhance your control and understanding of the SHP positioner.

The trial license can be activated only once per device. Once activated, it enables all the option packs for a duration of 24 hours.

Please note that each time the positioner is turned OFF and then ON again while the trial license is active, the remaining time of the trial license is reduced by 6 hours. This is designed to prevent misuse of the trial license.

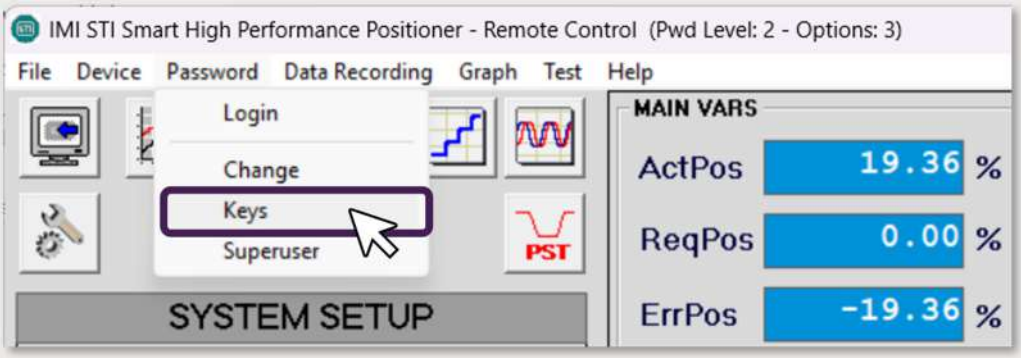
When the trial license expires, only the option packs that had been enabled previously remain active. If a code is sent to enable option packs while the license is active, the code is evaluated only upon the expiration of the license.

## 9.3 ACTIVATING OPTION PACKS

Option Packs are not free of charge, you can get a license (related to your specific positioner identified by the serial number ) contacting IMI STI that will provide you with a License Key. This Key needs to be entered into the Remote Control Interface.

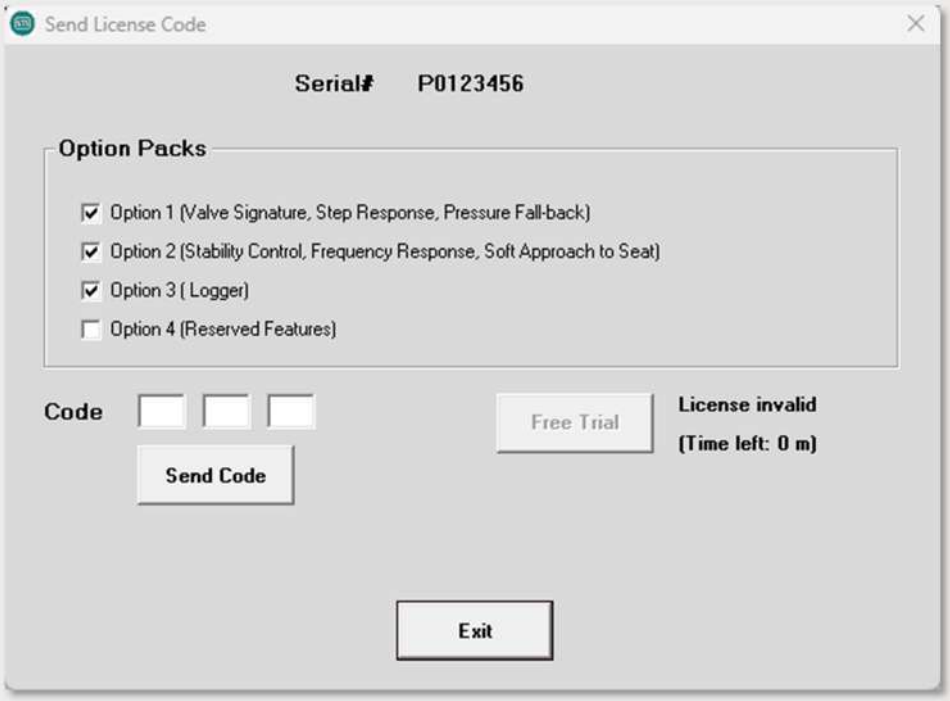
To do this, navigate to the interface ribbon bar, select Password → Keys, and enter the Key.

Option Pack Activation Procedure




The features of the purchased Option Pack will then be automatically unlocked on your specific positioner. Please note that in order to perform this operation, the service state must be "Out of Service". This ensures a seamless integration of the new features into your existing system.

Option Pack Activation Window




By clicking the "OK" button, you will unlock the features associated with the entered Option Pack.

| | |
|---|---|
| | Please note, if you input an incorrect key, any previously enabled option pack will be deactivated !<br><br>In the event of an incorrect key entry leading to the deactivation of a validly licensed option pack, please contact IMI STI.<br><br>Assistance can be provided in retrieving your key if it has been misplaced or forgotten. |

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