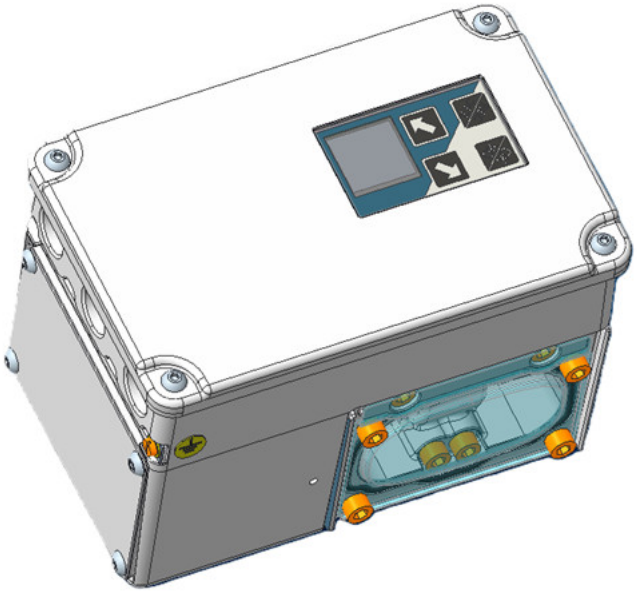
Process
Automation
IMI STI – 4055_r09_En rev.09 16/06/2026

INSTRUCTION MANUAL

Smart High Performance Positioner

SERIES: SHP



INSTRUCTION MANUAL 4055
(software & settings)

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-	-	-	-	-
09	*16/06/2026*	***Added*** *PST Test chapter* ***Updated*** *Option Pack paragraph* ***Removed*** *Quick Exit paragraph*	T.Stupka	R.Valoti
08	*09/04/2026*	***Updated*** *Connection with RC – Time Sync* ***Updated*** *Self-Tune Calibration screenshots* ***Updated*** *0-100% Position – Introduction of Valve Full Range Position parameter.*	T.Stupka	R.Valoti
07	*10/10/2025*	***Updated*** *Access and Login (Password Level 0)* ***Updated*** *LUI (4 Set-Up Menu)*	T.Stupka	R.Valoti
06	*10/09/2025*	***Added*** *SOV Test chapter* ***Added*** *LUI Events description*	T. Stupka	R. Valoti
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* ***Added*** *List of SHP Device Specific Statuses* ***Updated*** *Digital I/O description* ***Updated*** *Calibration wizard description + Added info about 'Reverse' function for SA actuators.* ***Added*** *'Long Tag' description* ***Updated*** *Dynamic Variables Assignments description* ***Added*** *List of all possible events that can be logged* ***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* ***Added*** *Pressure Sensors + Loop Current Calibration Window description* ***Added*** *OP Trial License description* ***Added*** *New chapter: Local User Interface* ***Updated*** *Logger screenshot (new 'On-Time' field)* ***Removed*** *'Gr.Panel' explanation (removed in new version)*	T. Stupka	R. Valoti

		Added *Graph Text File Description* ***Added*** *Contactless Remote Sensor Description*		
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
SOV	Solenoid Operated Valve
SIS	Safety Instrumented System
VFP	Valve Fail Position
VFRP	Valve Full Range Position
FW	Firmware
SW	Software

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

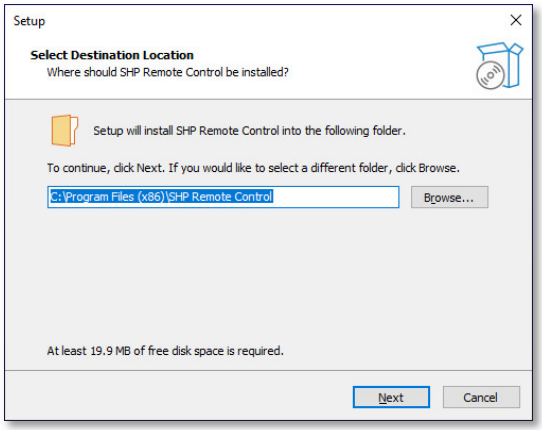
The Installation Wizard is a tool that guides you through the process of installing the Remote Control software. Here are the steps to follow:

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

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

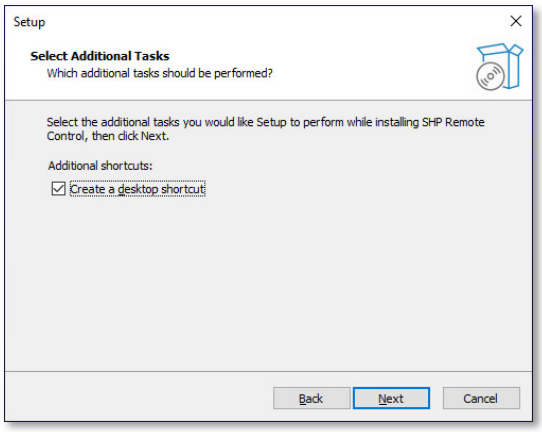
- **Step 2 - Select Destination Location:**

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



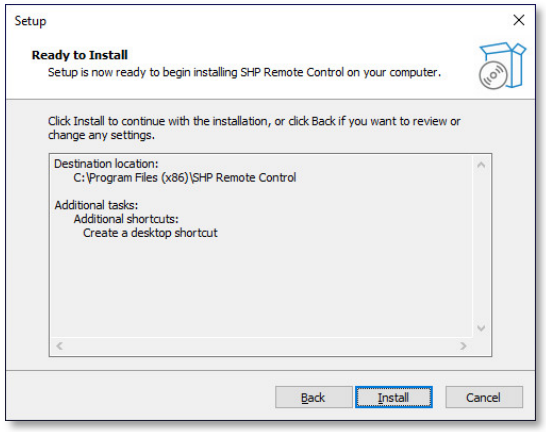
- **Step 3 - Select Additional Tasks:**

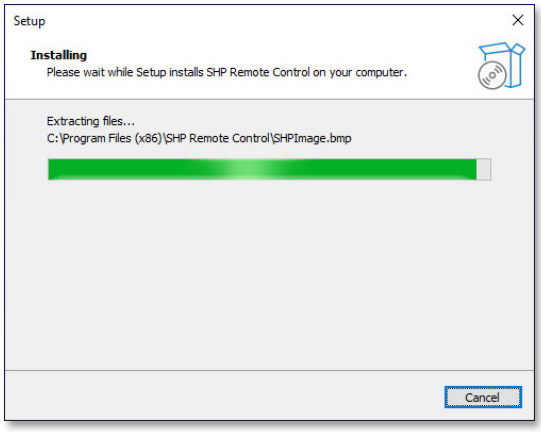
The next screen will ask if you want to select additional tasks. Here, you can choose to create a desktop shortcut for easy access to the software. Check the box if you wish to create a shortcut, then click “Next”.



- **Step 4 - Install:**

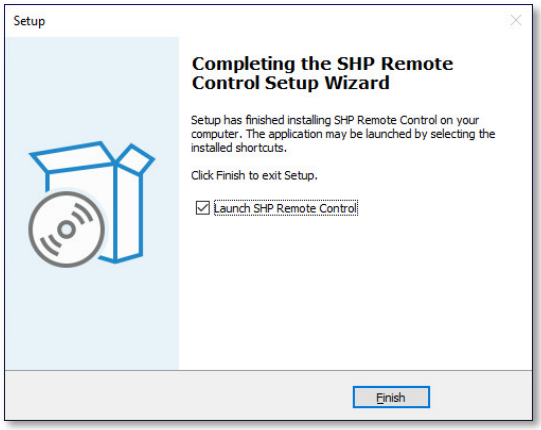
The wizard will now be ready to install the software. Click the "Install" button to begin the installation process. Please wait while the software is being installed.





- **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

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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

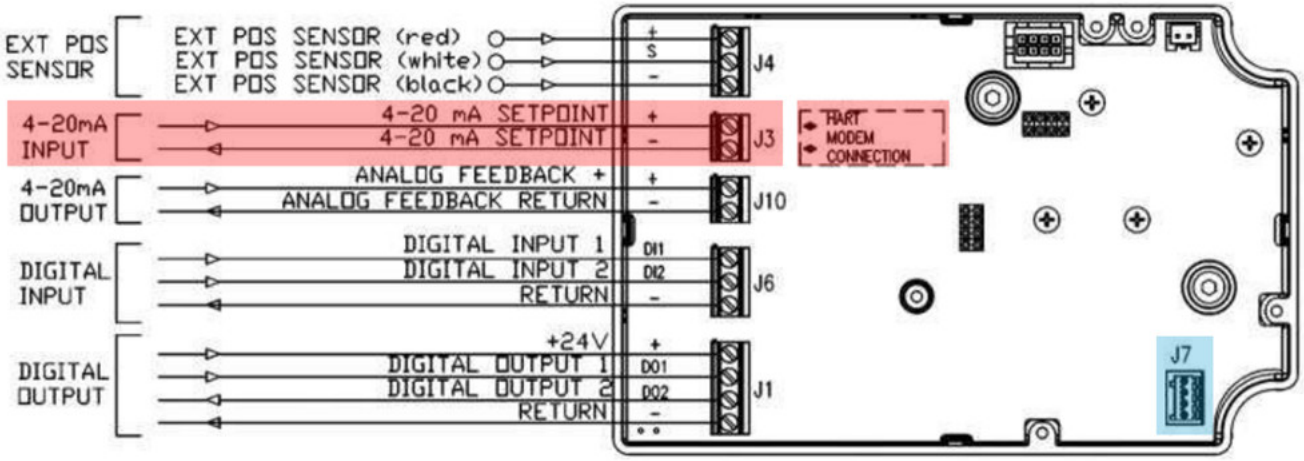


Figure 1 - SHP PVB Board + Power & Communication Ports

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

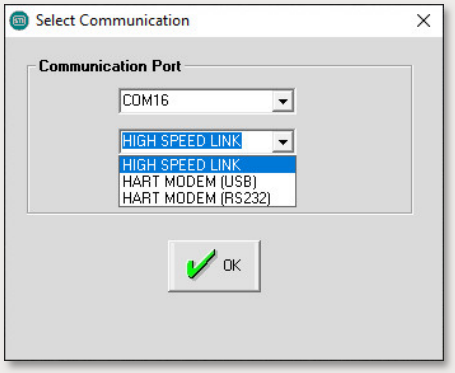
- TTL High Speed Cable
- HART modem (specify whether it's a USB HART modem or an RS232 HART modem).

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

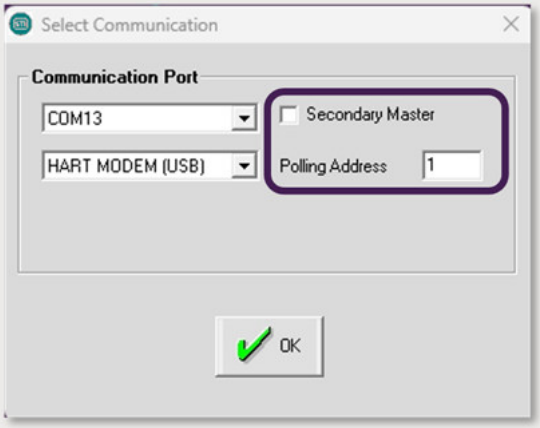


If the "**COMx**" number is not appearing in the list, it means that the cable is not recognized: the communication driver is not installed, or you don't have the administrative rights to install it, contact your IT manager.

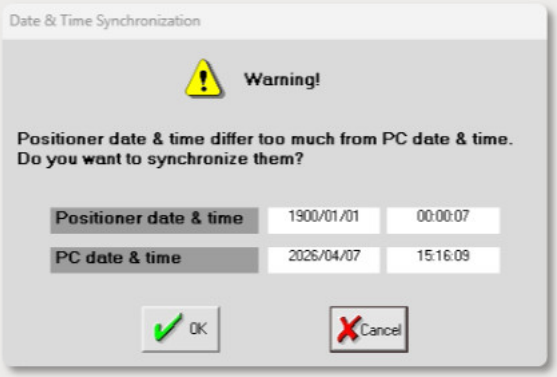
The "**Secondary Master**" flag allows communication by HART when a DCS is already connected on the same channel to monitor the instrument.

If the positioner's date and time are not synchronized, a dialog box will appear prompting you to synchronize them. Click **OK** to proceed.

Communication Window – Secondary Master & Polling Address



Date & Time Synchronization



	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.

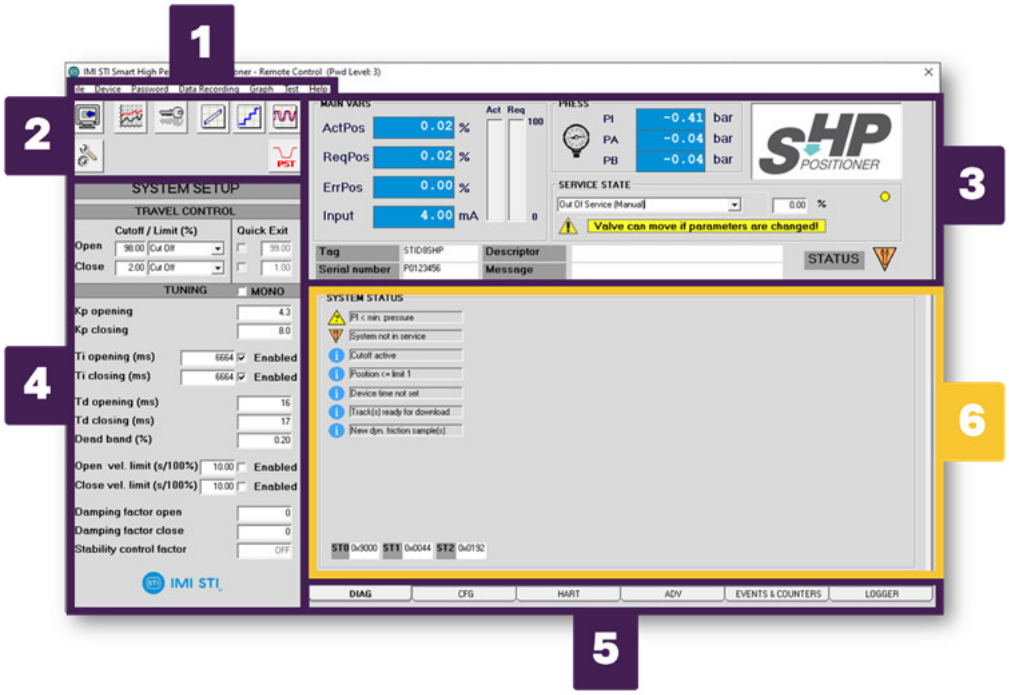


Figure 2 - Remote Control Main Window

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.

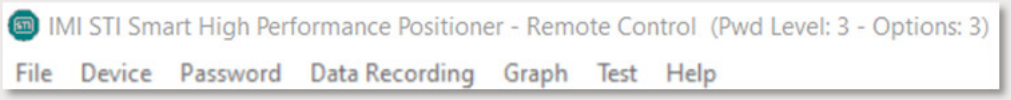
	Device Calibration *(Pressure + Loop Current)*		Valve Signature Test
	Download SHP Configuration		Step Response Test
	Graph Tool		Frequency Response Test
	Remote Control Login		Partial Stroke Test

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. 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 (see corresponding chapter)
– Step Response	Step Response Test (see corresponding chapter)
– Freq. Response	Frequency Response Test (see corresponding chapter)
– PST	Partial Stroke Test (see corresponding chapter)

3.4.2.6 Help Menu

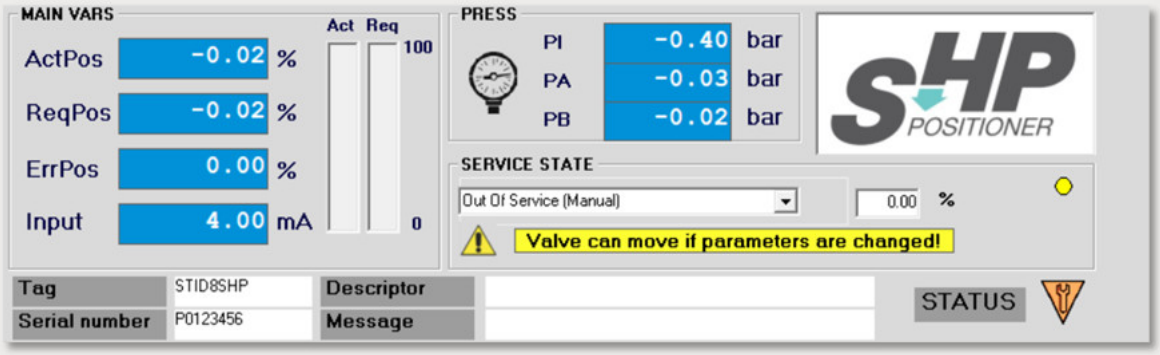
Information about the software and device.

– 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



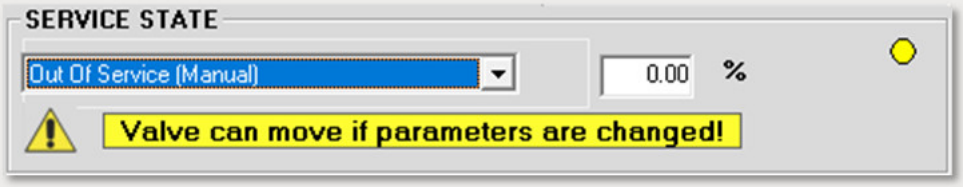
3.5.1 PROCESS VARIABLES

ActPos *Actual Position*	[%]	Valve's current position
ReqPos *Required Position*	[%]	Setpoint
ErrPos *Error Position*	[%]	Difference between the Required Position and the Actual Position
Input *4-20mA Signal*	[mA]	Input signal
PI *Line Pressure*	[bar] or [psi]	Pressure in the supply line that feeds the positioner
PA *Pressure in Port A*	[bar] or [psi]	Pressure measured at Port A of the positioner
PB *Pressure in Port B*	[bar] or [psi]	Pressure measured at Port B of the positioner (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. → *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. → *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). → *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).

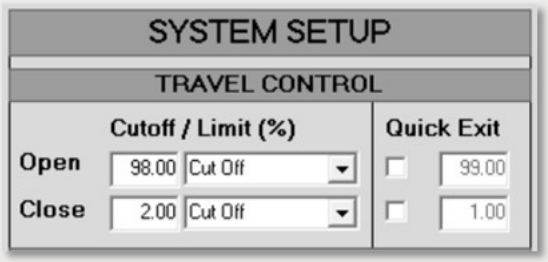
3.6 SYSTEM SETUP PANEL

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.

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.

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

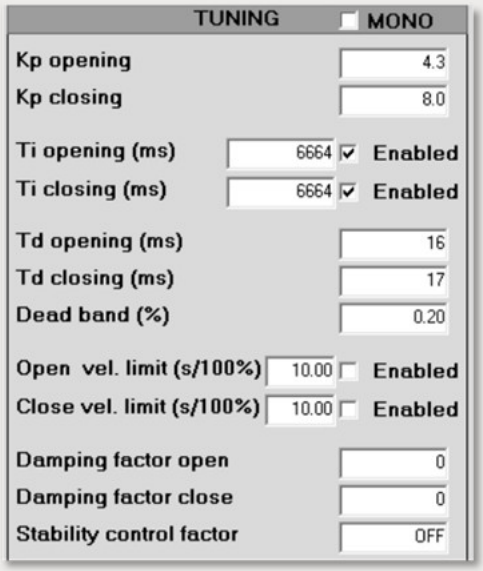
When this option is enabled, the positioner will reduce the speed of the valve as it approaches the SOFTCUTOFF setting to avoid a significant impact on the final position. Although full pressure will be applied at the end, this feature minimizes the chance of a strong impact. This configuration is typically 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

3.6.2 TUNING

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

Tuning Panel



The editable parameters are described below.

Kp *Proportional Gain*	Min: 0.1 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. 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 *Integral Factor*	Off: 0 [ms] Min: 100 [ms] 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 *Derivative Factor*	Off: 0 [ms] Min: 0 [ms] 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 *Intentional Deadband*	Min: 0.00 [%] 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. 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 *Max Stroking Time*	Min: 0.00 [s/100%] 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. *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 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 Min: 5 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.** The Stability Control Factor parameter can take several values: • 0 : This turns OFF the functionality. • 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.

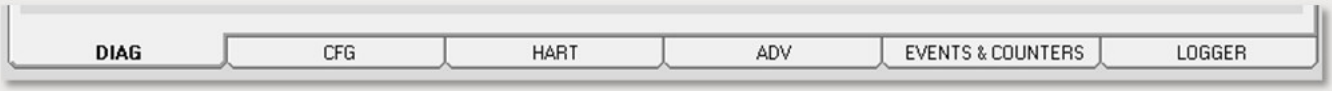
Mono Option


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 three different passwords may be used. If an incorrect password is entered, the level resets to the default (Level 0). The menus and features available at each level are described below.

LEVEL 0 *Startup Default Level*	PASSWORD: -	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

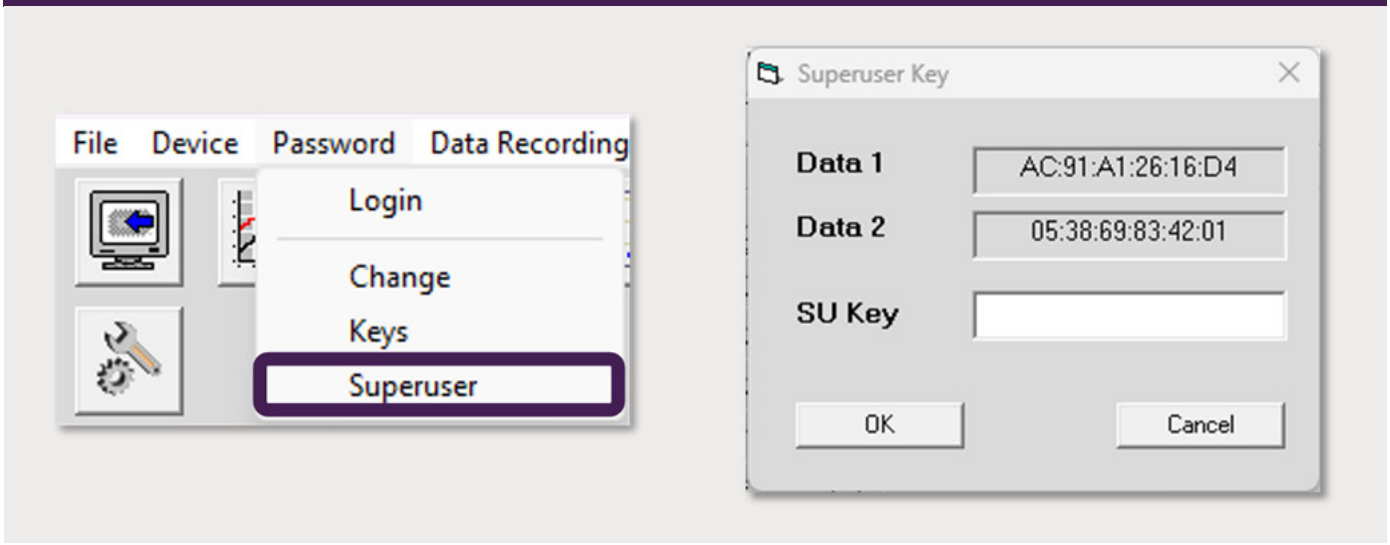
LEVEL 1	PASSWORD: 12345	DISABLED TABS: • ADV (Advanced)	DISABLED HIDDEN FUNCTIONS: • PID Integral Fast Decay • Spool Oscillation Detection • DP Calibration Data • Universal Request 110
LEVEL 2	PASSWORD: 23456	EVERY TAB IS ENABLED	DISABLED VISIBLE FUNCTIONS: • PID Integral Fast Decay • Spool Oscillation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

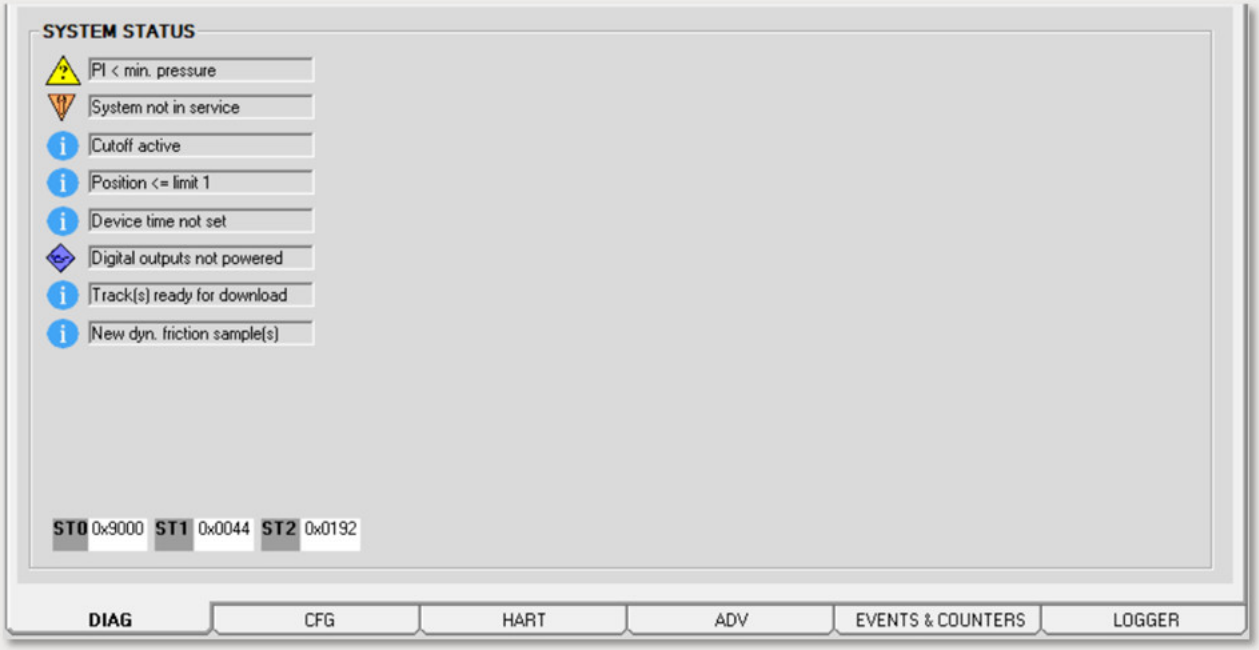
	Access to the Superuser tool is restricted to specific tuning-related situations and requires contacting STI to request assistance.

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

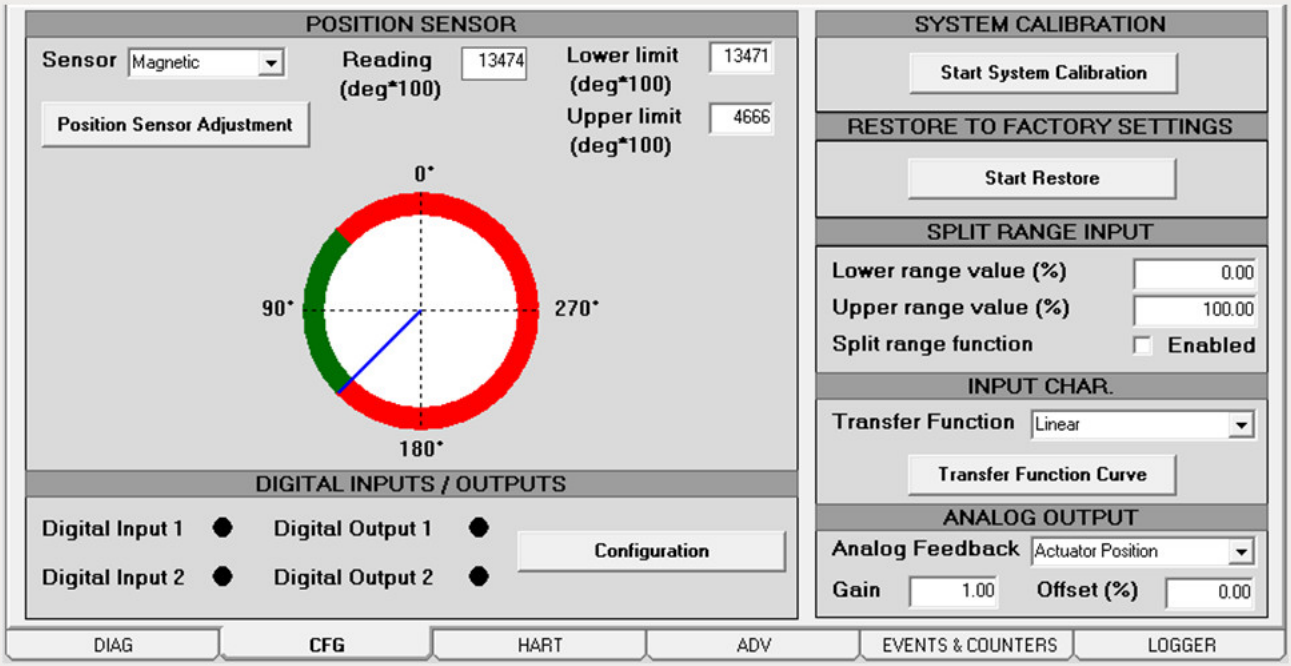
Position Transmitter Not Connected		MAINTENANCE
Digital Outputs Not Powered		MAINTENANCE
Position Sensor Not Connected		FAILURE
Magnetic Position Sensor - Low Field		FAILURE
Track(s) Ready For Download		INFO
I/P Module Disconnected		FAILURE
Partial Stroke Test ON		INFO
Last Partial Stroke Test OK		INFO

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 *Position Sensor Reading*	Min: 0 deg [deg x 100] Max: 360 [deg x 100] *(Magn. Sensor)*	In the case of a Magnetic Sensor, it provides an angle ranging from 0 to 360 degrees (expressed as degrees x 100).
	Min: 0 Max: 4095 *(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 *Position Sensor Lower Limit*	Min: 0 deg [deg x 100] Max: 360 [deg x 100] *(Magn. Sensor)*	In the case of a Magnetic Sensor, the limit can be between 0 and 360 degrees (expressed as degrees x 100).
	Min: 0 Max: 4095 *(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 *Position Sensor Upper Limit*	Min: 0 deg [deg x 100] Max: 360 [deg x 100] *(Magn. Sensor)*	In the case of a Magnetic Sensor, the limit can be between 0 and 360 degrees (expressed as degrees x 100).
	Min: 0 Max: 4095 *(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.

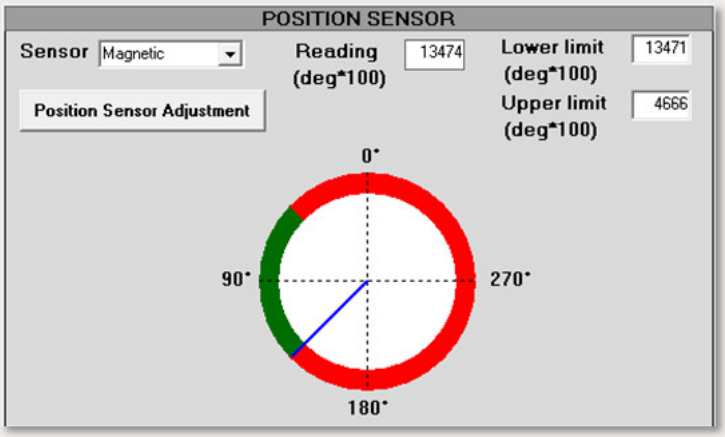
When the sensor type is changed, the Lower and Upper Limits must be changed !

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).

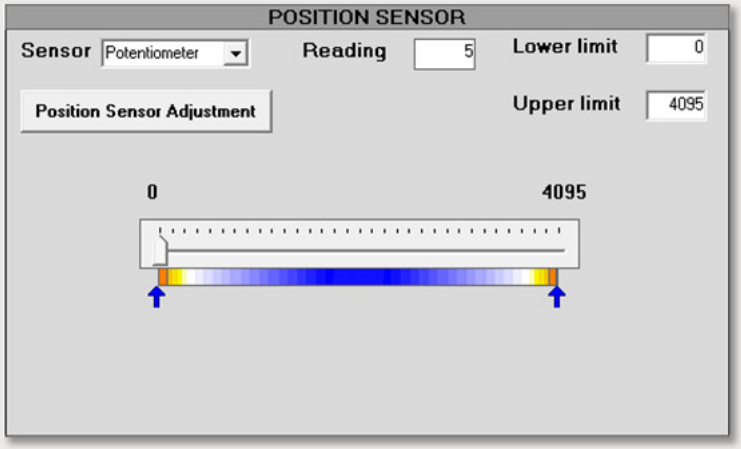
Magnetic Sensor Dynamic Representation



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).

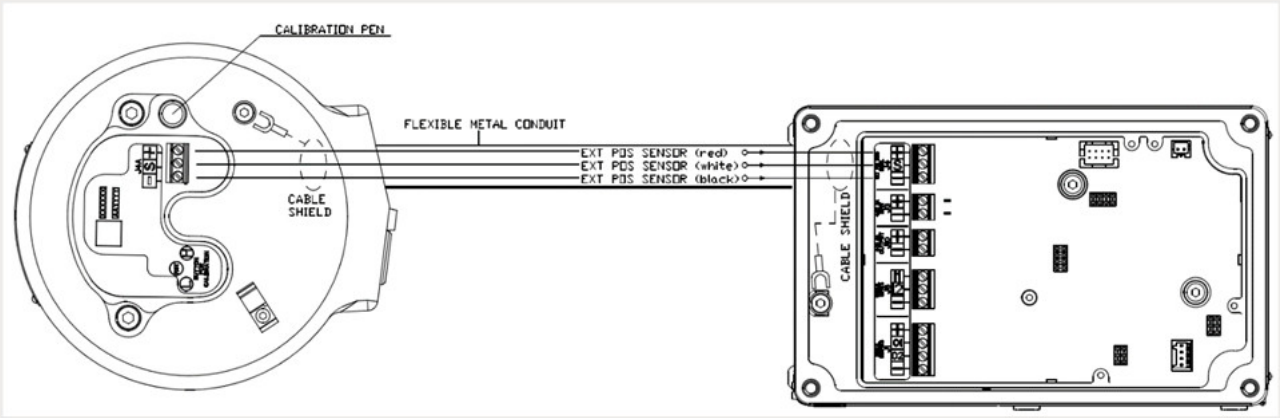
Potentiometer / Active Remote Dynamic Representation



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:**

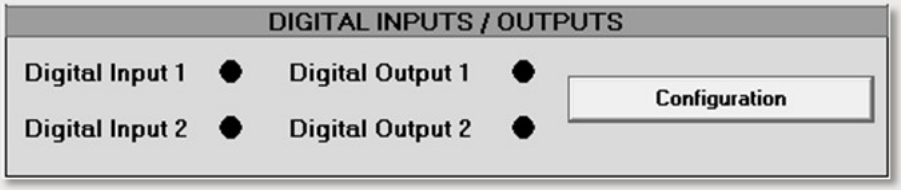
Move the valve to the higher hard limit.
Using the Calibration Pen inside the enclosure, place it on the letter "H" label for 5 seconds.

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.

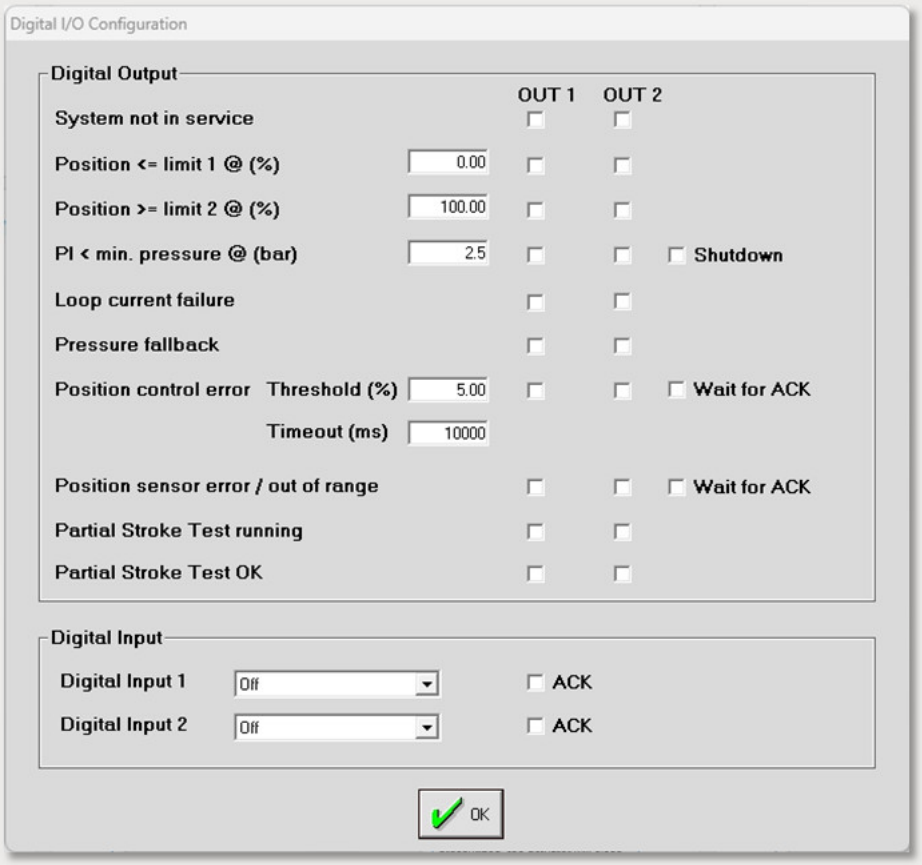
1	System Not in Service
2	Loop Current Failure
3	Pressure Fallback *(Available with OP1)*
4	Position Sensor Error / Out of Range
5	Partial Stroke Test Running
6	Partial Stroke Test OK
7	Position <= Limit 1
8	Position >= Limit 2
9	PI < Min. Pressure
10	Position Control Error

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.

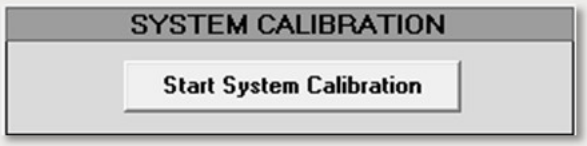
Off	No action is performed when a Digital Input signal is detected
Shut Down	Upon detection of a Digital Input signal, a shutdown is initiated
Pressurize Port A	Detection of a Digital Input signal triggers the pressurization of Port A
Start Partial Stroke Test	Initiates a Partial Stroke Test

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.

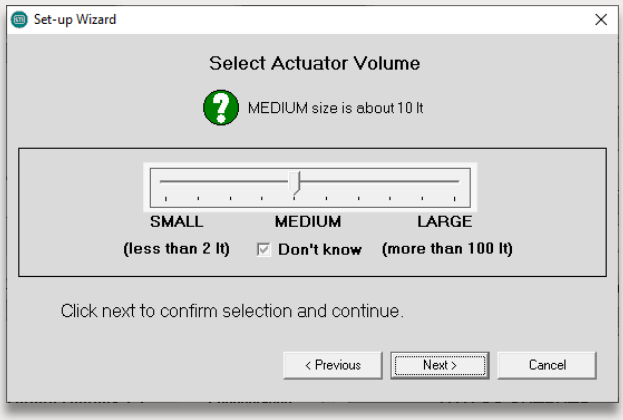
Step 1 – Starting Page

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



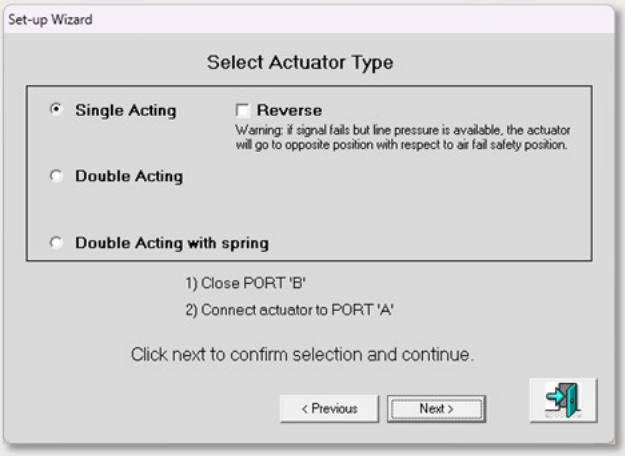
Instructions:

If known, select the actuator volume. The actuator size is specified as an integer from 1 to 10.

For values between 1 and 4 (small actuator), the self-tuning procedure automatically sets **Td = 0**.
For values greater than 4, or if the "**Don't know**" option is selected, Td is calculated based on the actuator rise and fall times.

If necessary, the Td value determined by the self-tuning procedure can be manually adjusted. This should be done **only by advanced users**.

Step 3 – Select Actuator Type



Instructions:

Specify the type of actuator.

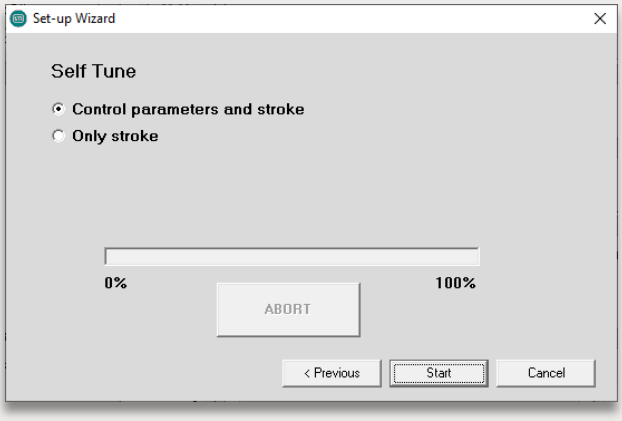
For single acting actuators, check the "Reverse" checkbox if you need to connect the actuator to the positioner's "Port B" instead of the default "Port A".

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.

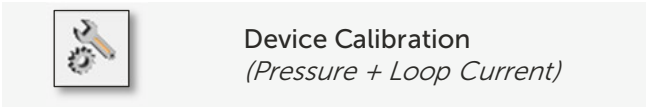
Press "Start" the perform the Self Tune. The progress bar informs you about the self-tune status.

Wait for the positioner to perform the calibration.

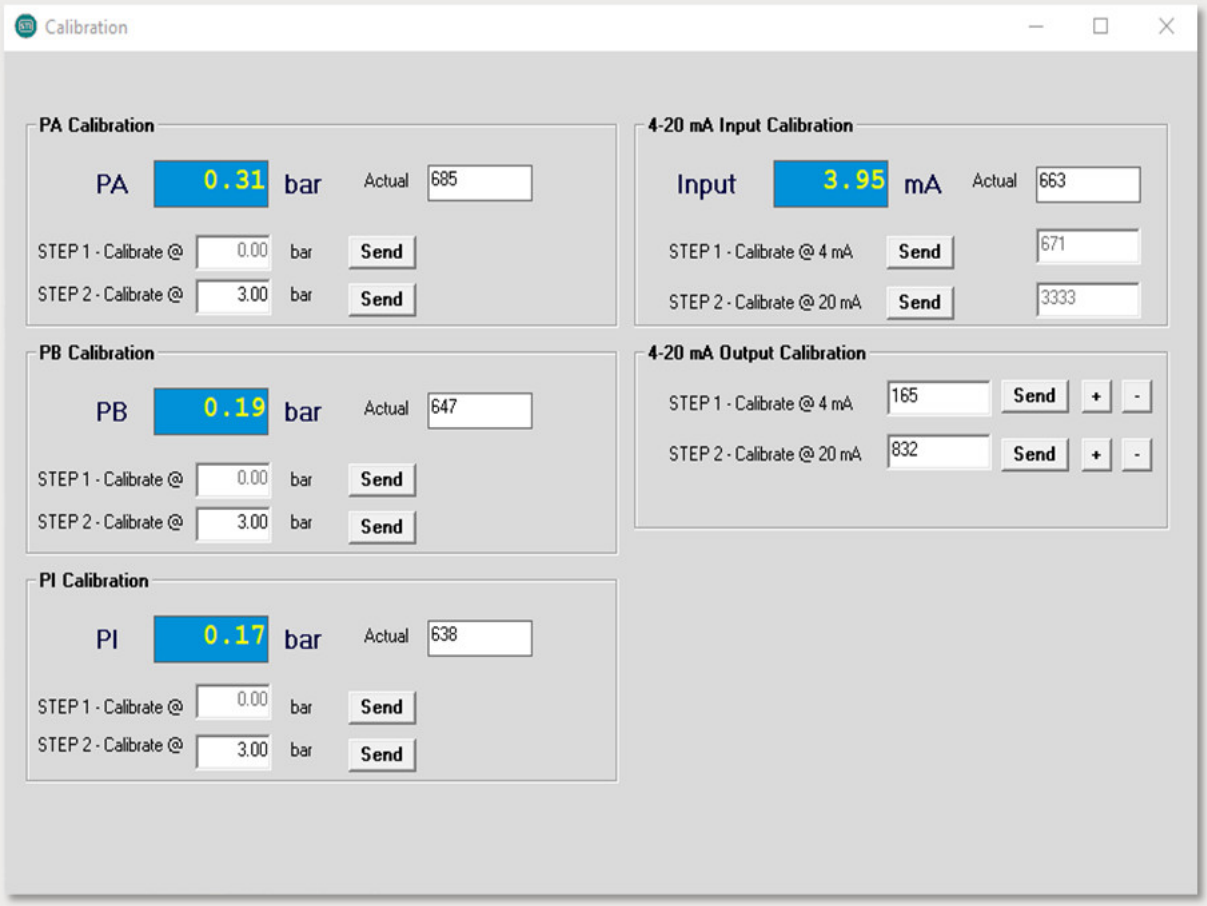
4.3.7 PRESSURE SENSORS & LOOP CURRENT CALIBRATION

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.



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

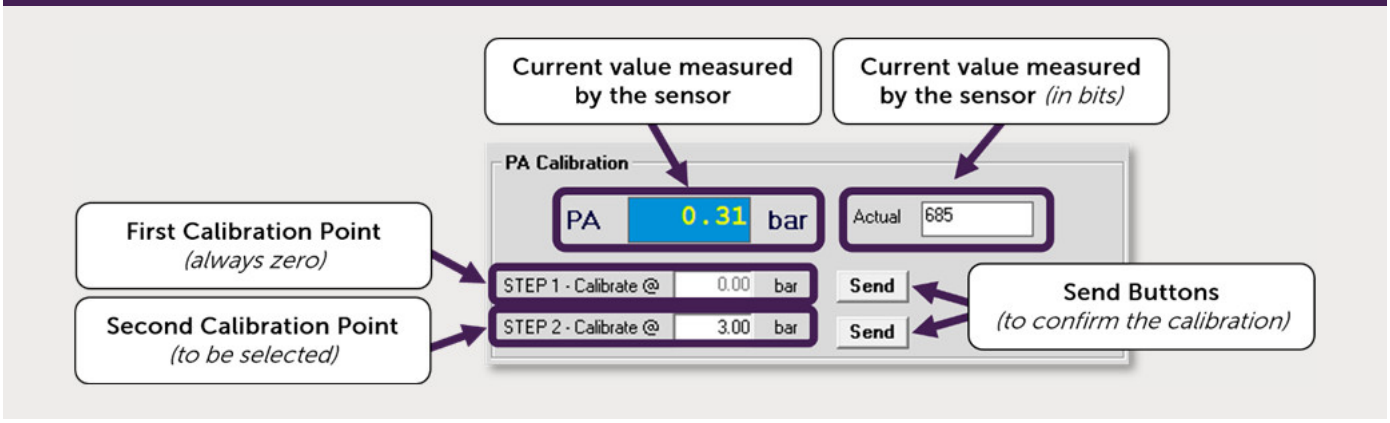
On the right side, there are two boxes for calibrating the input and output currents.

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.

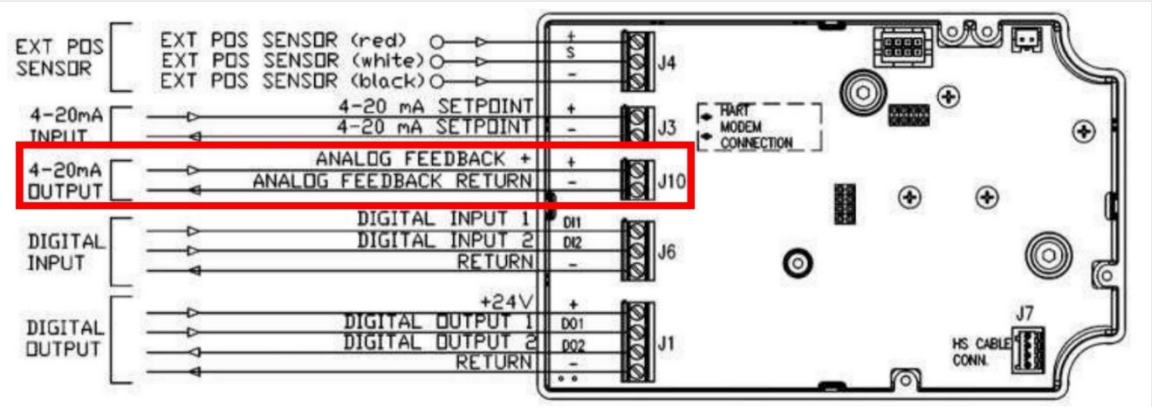
- **Step 2 – 20mA Calibration Point:**

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



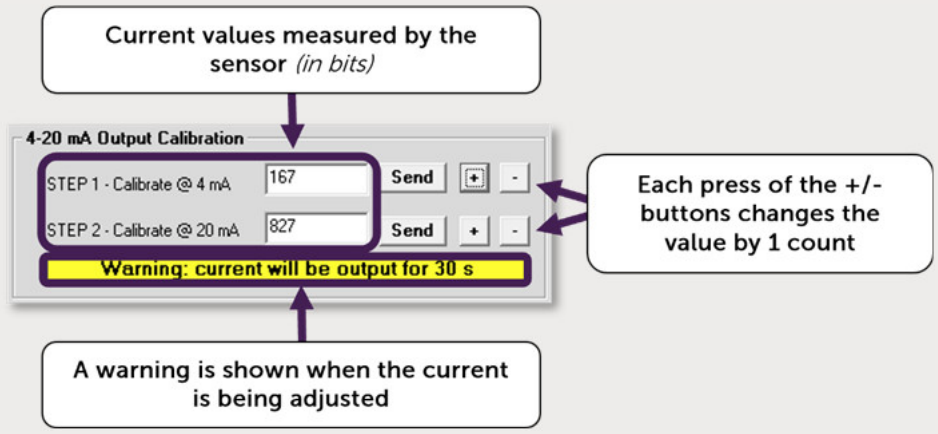
- **Step 1 – 4mA Calibration Point:**

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.

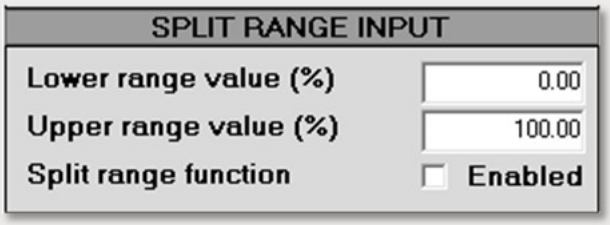
Please note, executing this function will erase any custom settings. Therefore, it is recommended to backup or note down important configurations before proceeding with this operation.

	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 [%] 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 [%] 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 *On*	When enabled, the positioner will interpret its input signal according to the lower and upper range values you've specified. **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.

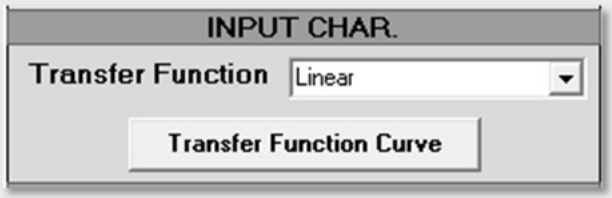
If the upper range value is instead set to 50%, the positioner will interpret 4mA as a 0% position request and 12mA (which is 50% of the way between 4mA and 20mA) as a 100% position request.

	**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

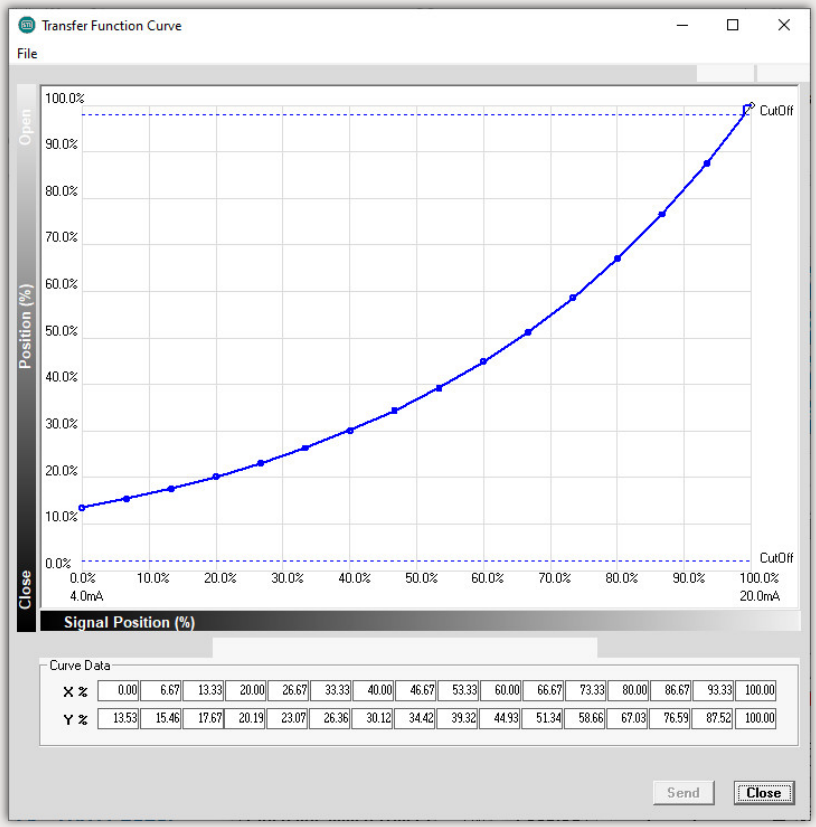
Here's a breakdown of the available transfer functions:

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: *1. Select the starting curve.* *2. Save the Table (File→ Save Table).* *3. Select "User Curve".* *4. Load the saved Table.* *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.

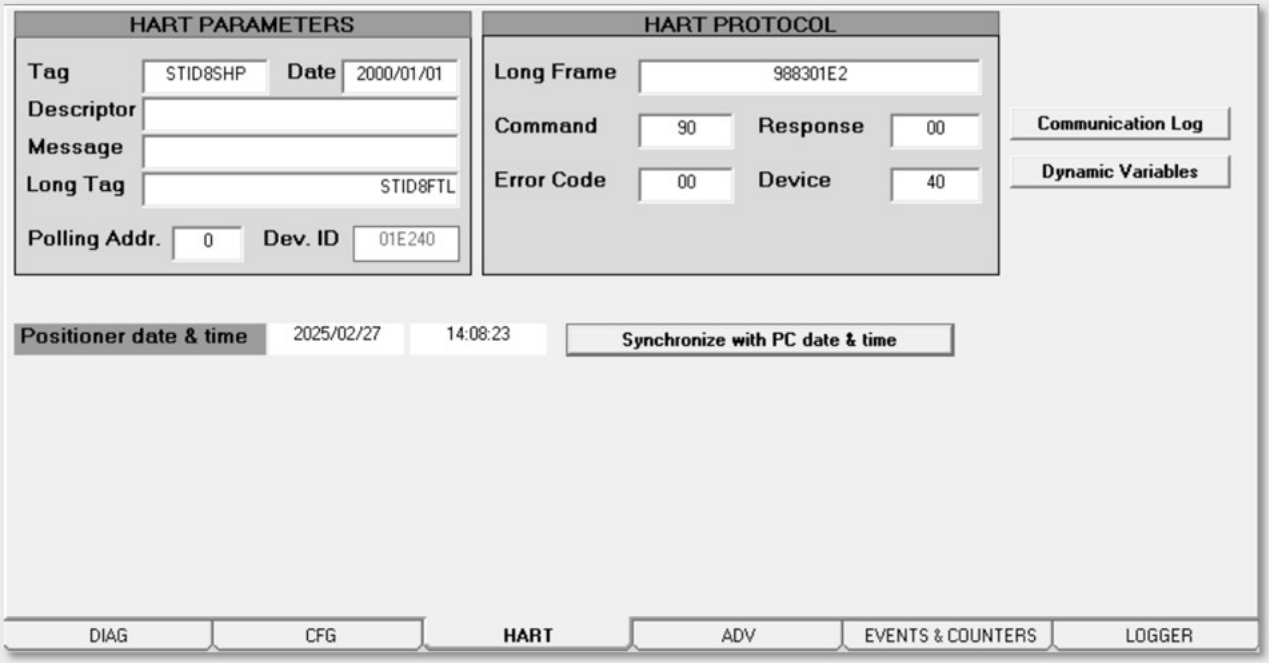
Analog Feedback	Dropdown menu (see description)	This dropdown menu allows you to select what the analog output will report. You can choose between "Actuator Position" and "Reverse Actuator Position". The "Actuator Position" option will cause the output to directly reflect the position of the actuator, while the "Reverse Actuator Position" option will cause the output to reflect the inverse of the actuator's position. When "Reverse Actuator Position" is selected, the Local User Interface (LUI) will display the Actual and Required positions using the same reversed logic: o 4mA → LUI displays 100% o 20mA → LUI displays 0% This change only affects the LUI and not Remote Control.
Gain	Min: -5.0 [%] 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. A higher gain will result in larger changes in the output signal for a given change in position.
Offset	Min: -100.00 [%] 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. 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.

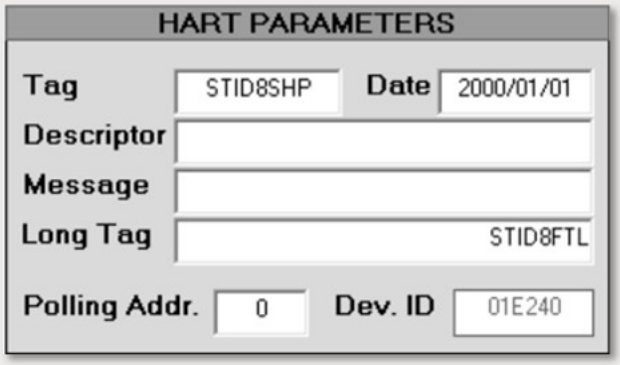
HART Tab



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



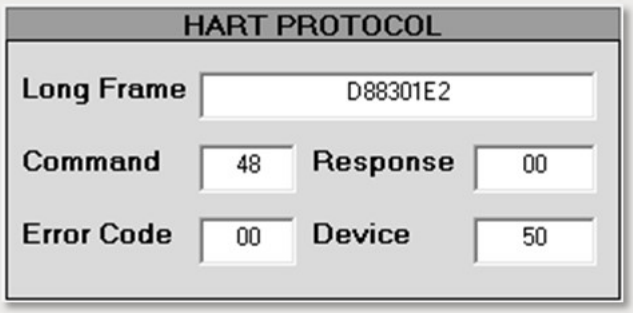
The panel's fields are described below.

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 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. 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

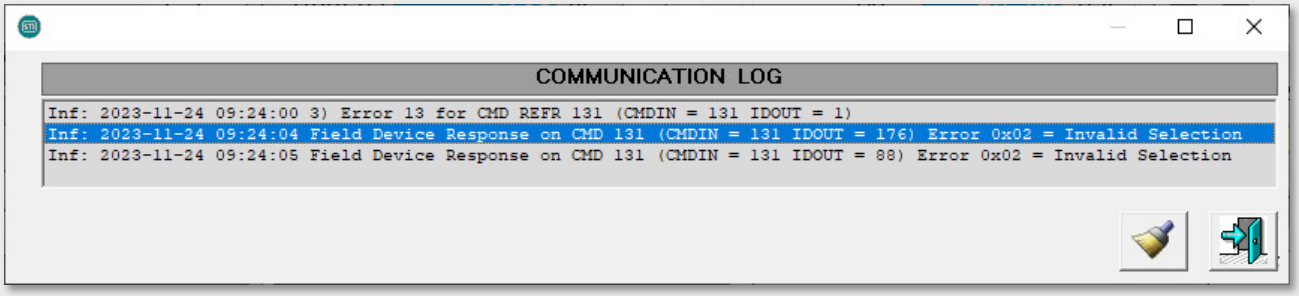
4.4.3.1 Poll Device

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.

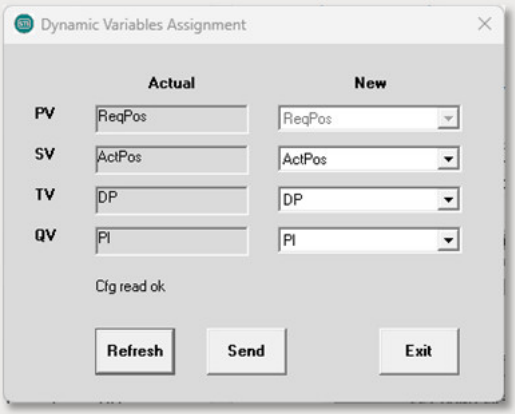
4.4.4 DYNAMIC VARIABLES

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)

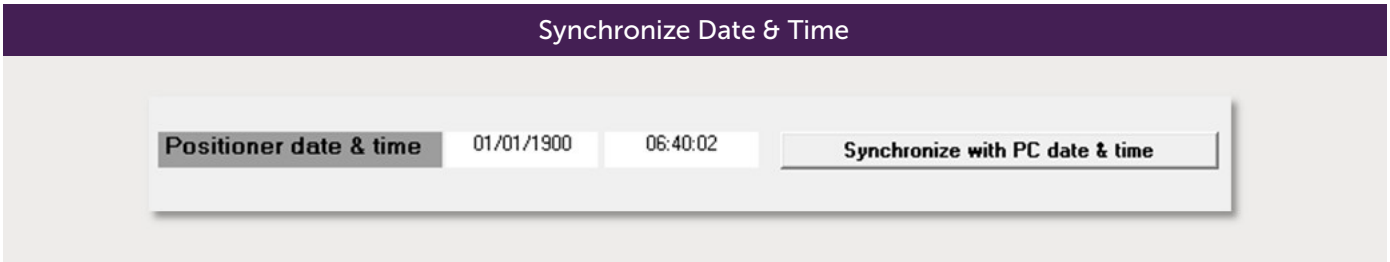
DYNAMIC VARIABLE ASSIGNEMENT	
PV	Fixed to REQPOS
SV	Assignable to any Device Variable
TV	Assignable to any Device Variable
QV	Assignable to any Device Variable

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

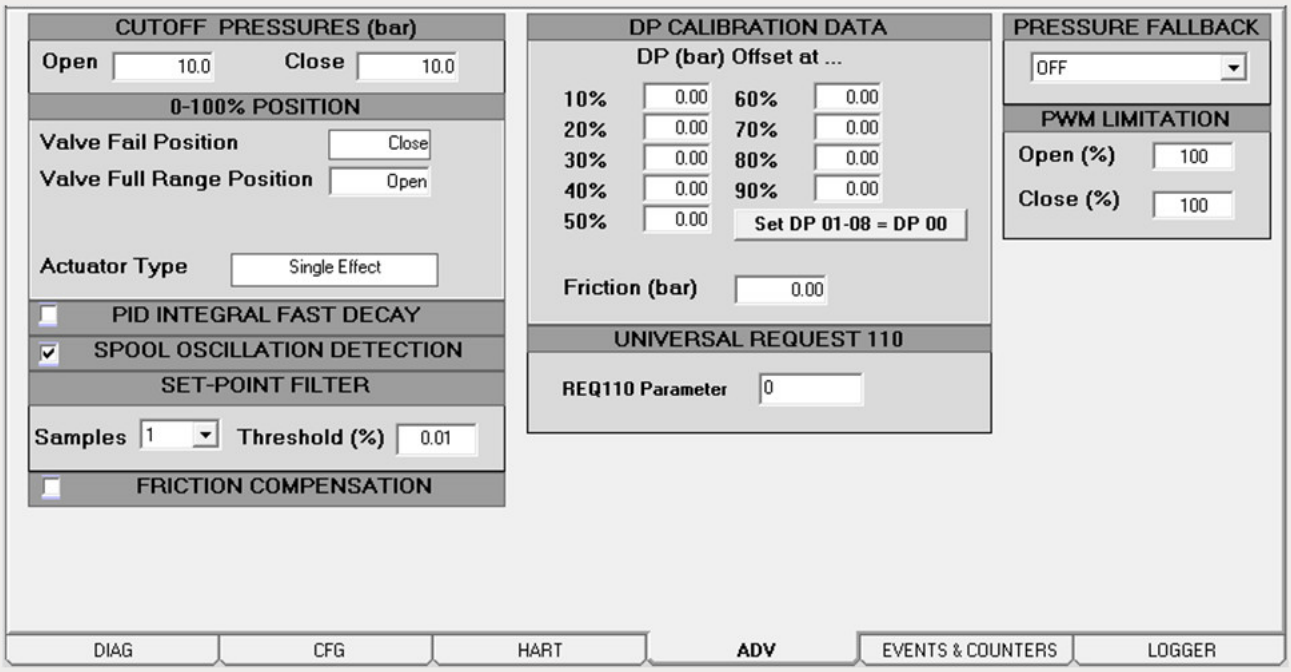
The "Advanced Configuration Tab" is a specialized section within the SHP software interface that offers a suite of advanced tools and parameters for fine-tuning the operation of your positioner. This tab is designed for advanced users who have a deep understanding of the positioner's functionality and 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. 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. 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 *Cutoff Pressure Limit for Valve Open Position*	Min: 0.0 [bar] (or 0.0 psi) 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 *Cutoff Pressure Limit for Valve Close Position*	Min: 0.0 [bar] (or 0.0 psi) 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.

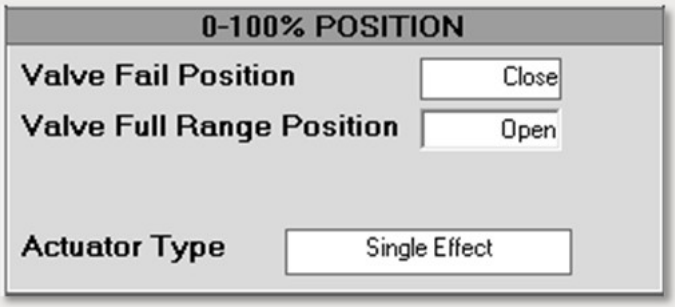
The default value for both fields is 10 bars, which means that all the available pressure in the line is used. If you want to speed up the movement of the valve from the fully closed or opened position, you could reduce the used pressure by adjusting these settings.

	**Reducing the pressure may prevent the valve from fully closing, potentially leading to leakage. This could damage the valve!** **Please note, the pressure limitation is only effective when the positioner is operational.** **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 contains parameters relative to the valve fail position.

0-100% Position



Valve Fail Position
Specifies the valve position assumed when the positioner loses power.

Open
Close

By default, the SHP positioner is configured so that, **when power is removed** (that is, when the 4–20 mA input signal is lost), **Port A is vented** to the atmosphere and **Port B is fully pressurized**. **The resulting valve position when power is removed depends on the pneumatic connections to the actuator.**

During the self-tuning wizard, the software prompts the user to specify whether the valve is **Open** or **Closed** when **power is removed**. This information is used solely to establish the relationship between the tuning parameters and their effect on the valve's response. It does not alter the direction of valve movement, which **is determined exclusively by the pneumatic configuration**.

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.

The Valve Fail Position parameter is **read-only** in this panel and **can be modified only through the self-tuning calibration wizard**.

Valve Full Range Position *Defines whether a valve position of 100% corresponds to the valve being Open or Closed.*	Open Close	This parameter defines whether a **position value of 100% corresponds to** the valve being **Open** or **Closed**. When the Valve Fail Position is set, the Valve Full Range Position is automatically configured to the **opposite state** to ensure consistent behaviour. If necessary, the user can manually override this and **force both parameters to the same value**. This parameter **affects only the software interpretation of position values**. The actual valve movement direction depends on the pneumatic configuration.
Actuator Type *Specifies the actuator type*	SE DE DE + spring	The Actuator Type parameter is **read-only** in this panel. It is provided for **reference only**, to assist in the configuration of the Valve Fail Position and Valve Full Range Position parameters. The actuator type is **selected** during the **self-tuning calibration wizard**. The following actuator types are supported: • **Single Effect** (also referred to as Single Acting) • **Double Effect** (also referred to as Double Acting) • **Single Effect with Spring** (also referred to as Single Acting with spring)

4.5.2.1 The STI convention

Historically, all STI positioners have followed the STI convention, under which the relationship between the analog input signal and the internal position reference is defined as follows:

- An input signal of **4 mA** always corresponds to **0%**
  (valve open/close depending on the Valve Fail Position).

- An input signal of **20 mA** always corresponds to **100%**
  (valve open/close depending on the Valve Fail Position).

Internally, the SHP firmware will continue to follow this STI convention.
However, from the **Remote Control** release 1.1.006 **+ SHP firmware** release 1.2.000, users are now free to define what **0–100%** and **Open–Close** represent for their specific application.

The sections below describe how these configuration choices affect the interpretation of signals and the corresponding interface elements.

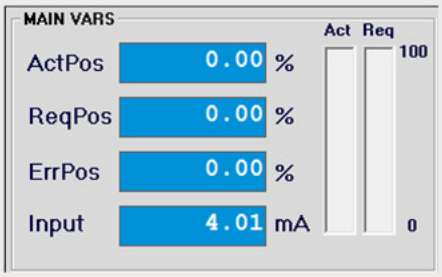
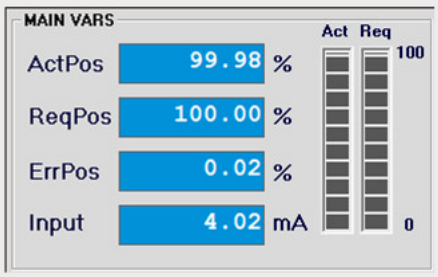
4.5.2.2 Interface Items Affected by Valve Position Settings

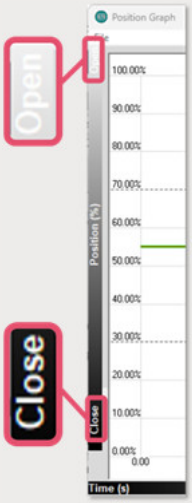
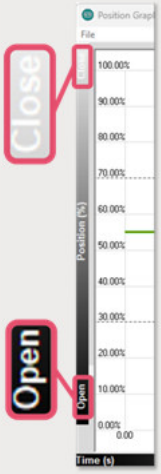
The combination of the **Valve Fail Position (VFP)** and **Valve Full Range Position (VFRP)** parameters determines how valve position and control signals are interpreted and presented throughout the user interface.

When both parameters are set to **different values** (for example, **VFP = Close** and **VFRP = Open**), the user interface follows the **STI convention**.

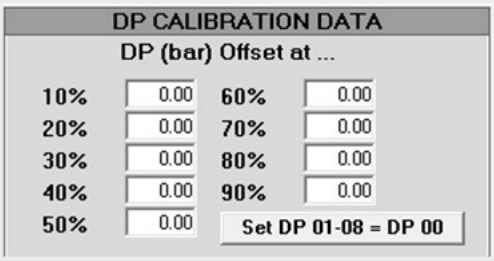
When the parameters are set to **the same values** (for example, **VFP = Open** and **VFRP = Open**), the interface behaviour **deviates** from the STI convention.

The examples below illustrate the resulting differences in position interpretation and display.

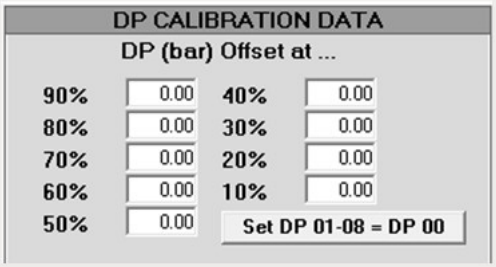
The correspondence between 4 mA / 20 mA set-points and displayed position values (0% / 100%)	
	
VFP ≠ VFRP *e.g. VFP = Close, VFRP = Open*	VFP = VFRP *e.g. VFP = Open, VFRP = Open*

The Open and Close labels shown on the Graph Tool position Y-axis.	
	
VFP ≠ VFRP *e.g. VFP = Close, VFRP = Open*	VFP = VFRP *e.g. VFP = Open, VFRP = Open*

Other minor label adjustments (e.g. DP Calibration Data)



VFP ≠ VFRP
e.g. VFP = Close, VFRP = Open



VFP = VFRP
e.g. VFP = Open, VFRP = Open

4.5.2.3 Valve Position Behaviour for Different Configuration Combinations

There are in total **4 different possible configurations**, summarized in the table below.

	Input Signal (power supply)	ReqPos / ActPos (RC)	Valve Position (RC graph labels)	Valve Fail Position	Valve Full Range Position
CASE 1	4mA	0%	OPEN	OPEN	CLOSE
	20mA	100%	CLOSE		

	Input Signal (power supply)	ReqPos / ActPos (RC)	Valve Position (RC graph labels)	Valve Fail Position	Valve Full Range Position
CASE 2	4mA	0%	CLOSE	CLOSE	OPEN
	20mA	100%	OPEN		

	Input Signal (power supply)	ReqPos / ActPos (RC)	Valve Position (RC graph labels)	Valve Fail Position	Valve Full Range Position
CASE 3	4mA	100%	OPEN	OPEN	OPEN
	20mA	0%	CLOSE		

	Input Signal (power supply)	ReqPos / ActPos (RC)	Valve Position (RC graph labels)	Valve Fail Position	Valve Full Range Position
CASE 4	4mA	100%	CLOSE	CLOSE	CLOSE
	20mA	0%	OPEN		

- If the Valve Fail Position is the same as the Valve Full Range Position, then 0% corresponds to 20 mA and 100% to 4 mA.
- If the Valve Fail Position is the opposite of the Valve Full Range Position, then 0% corresponds to 4 mA and 100% to 20 mA.

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 *Number of signal samples to be considered*	Min: 1 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 *Threshold for the signal noise level*	Min: 0.01 [%] 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.

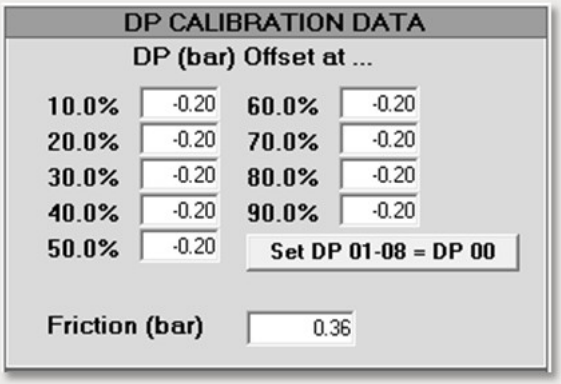
When the noise level crosses the set threshold, the Set-Point Filter averages out the signal over the selected number of samples, reducing high-frequency noise and ensuring a more stable and reliable control of the actuator.

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) 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) 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.

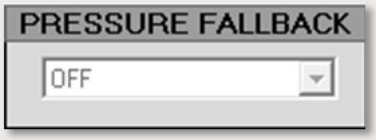
Universal Request 110 Panel

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

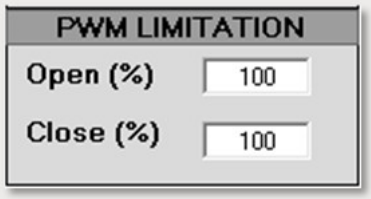


	Pressure Fallback is available with OP1

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.

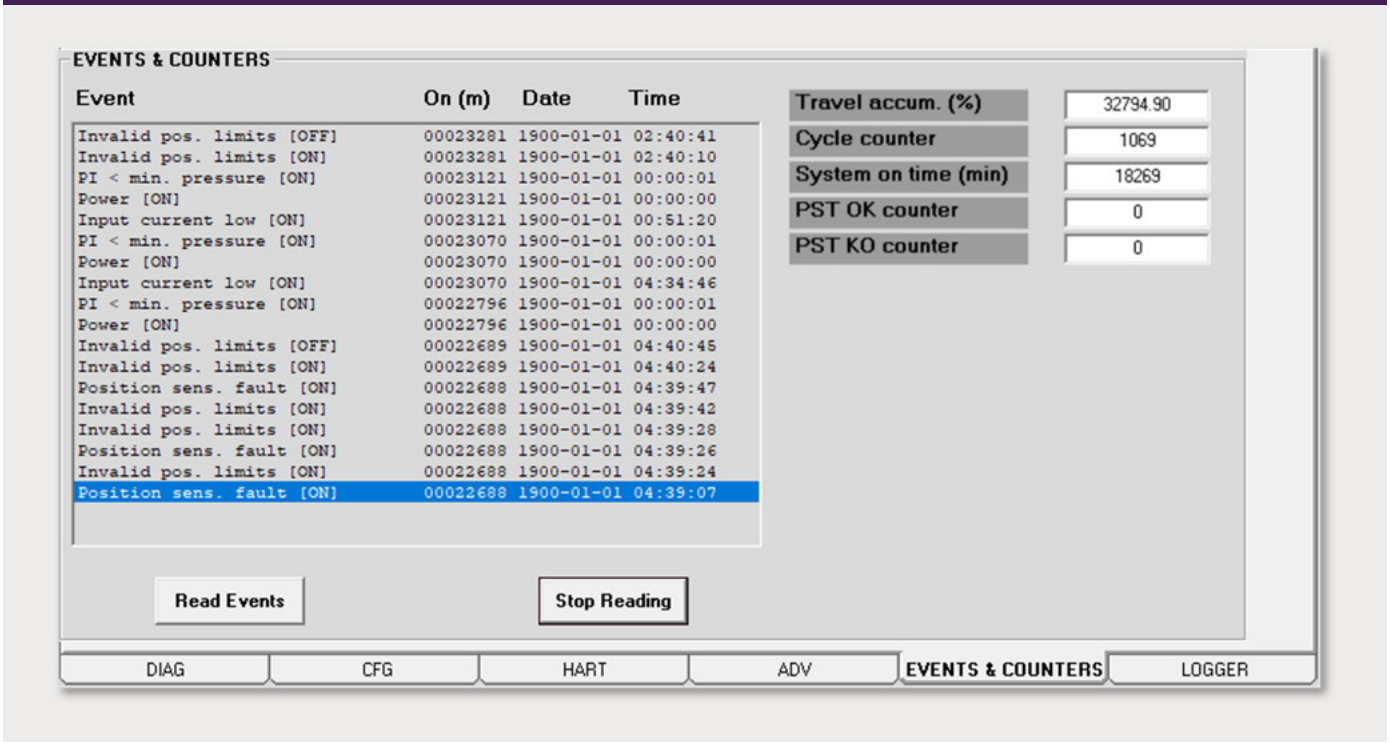
Open	Min: 10 [%] Max: 100 [%]	PWM Limitation in the opening direction.
Close	Min: 10 [%] Max: 100 [%]	PWM Limitation in the closing direction.

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.

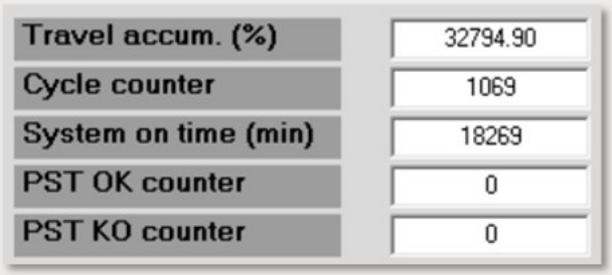
Remember, the Event Logs panel is a valuable tool for understanding the device's operational history and identifying any patterns or recurring issues. It provides a comprehensive view of each event, making it easier to monitor the device's performance and troubleshoot any problems. The table below describes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

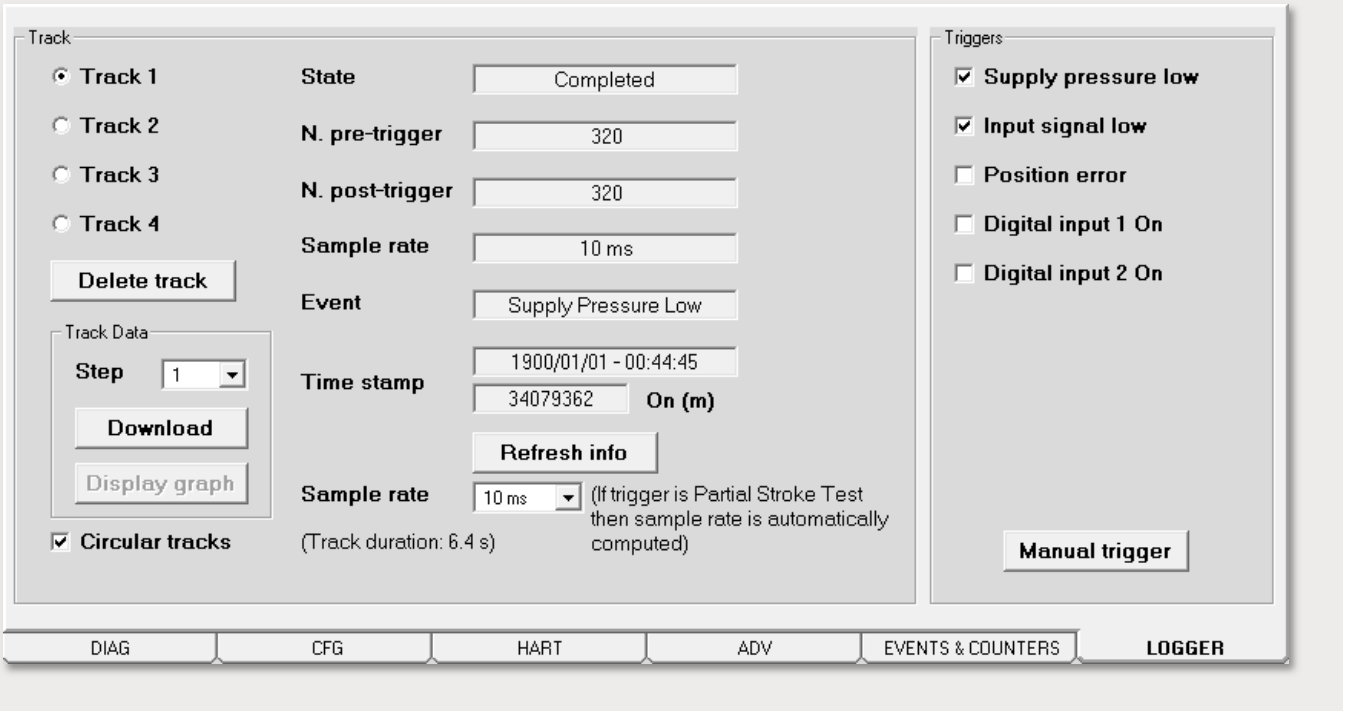
The "Logger Tab" is part of the Online Diagnostic tools in the SHP software and is available with the OP3. It is specifically designed to capture and record essential data from the device, such as Actual Position, Required Position, Pressures, and more. This data is stored in non-volatile memory areas 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. PST: However, it can be used for free when used together with the Partial Stroke Test. 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: Performing a Partial Stroke Test (PST) will act like a trigger. This is done automatically and does not require any configuration. 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. 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: 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

5.1 OVERVIEW

A Partial Stroke Test (PST) is an online diagnostic method used in process automation to confirm the functionality of safety shutdown valves without requiring full closure. It is essential for ensuring that valves will operate correctly in emergency situations, especially when full stroke testing is limited to infrequent shutdowns.

During a PST, the valve is briefly actuated within a small portion of its travel range, typically between 10 and 20%, and then returned to its original position. This helps verify valve responsiveness by detecting the most likely failure mode, which involves the valve being stuck.

The SHP-SIS positioner allows operators to configure PSTs remotely, retrieve test results from the positioner, and view performance data in graphical form. This supports ongoing safety assurance without disrupting normal plant operations.

	**Make sure the device is calibrated before performing a partial stroke test!**

5.2 PNEUMATIC CONNECTIONS

In order to work properly, the connection between the SHP-SIS and the actuator/valve must be performed keeping in consideration the fail-safe position of the actuator/valve and the fail-safe state of the positioner.
The SHP-SIS positioner is suitable for use in applications where functional safety requirements up to SIL 3 (according to IEC 61508 or IEC 61511) are required.
In case of failure, port A of the SHP-SIS positioner is depressurized, and port B is pressurized.
Upon mounting on single acting actuators, if the positioner is used as a safety device, when requested or in case of failure, the actuator will return to its fail position, dictated by the spring's functioning.
When performing pneumatic connection, this must be kept in mind, as an incorrect mounting will lead to a faulty movement of the actuator.
For further information, see dedicated instruction manual.

	**Pneumatic connections may differ or require additional accessories (such as volume booster). A careful study of the pneumatic diagram is mandatory for each application.**

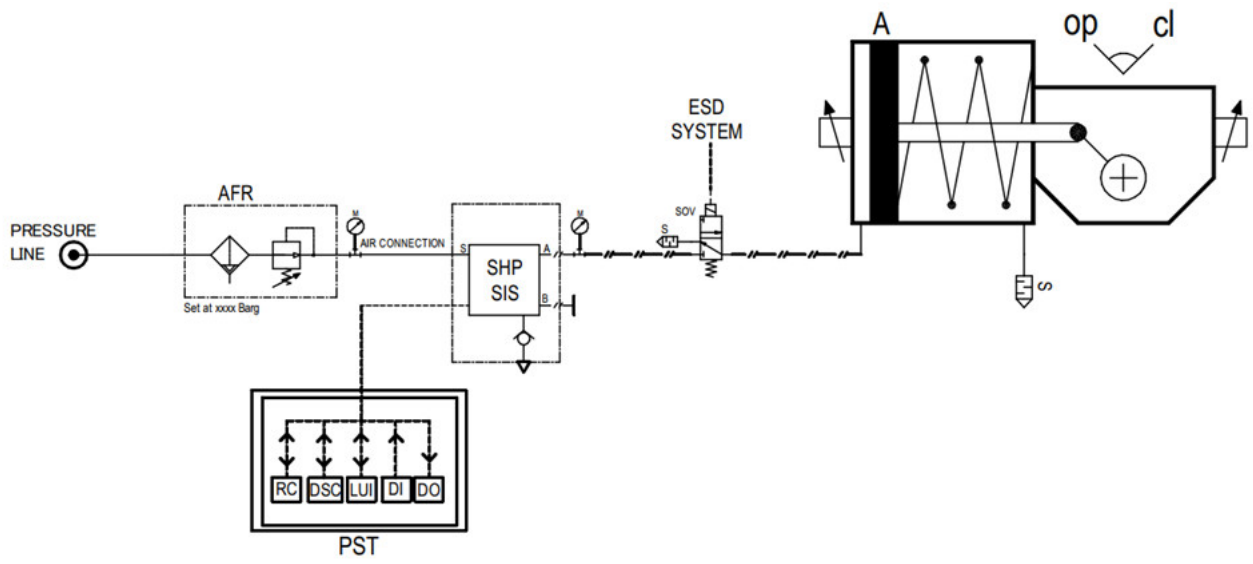
	**After the connection, make sure to calibrate the SHP-SIS positioner properly. Incorrect calibration may lead to unexpected behavior of the actuator.**

	**The fail position described in this manual is referred to IMI STI's standard actuators. There may be models that have an opposite fail position.**

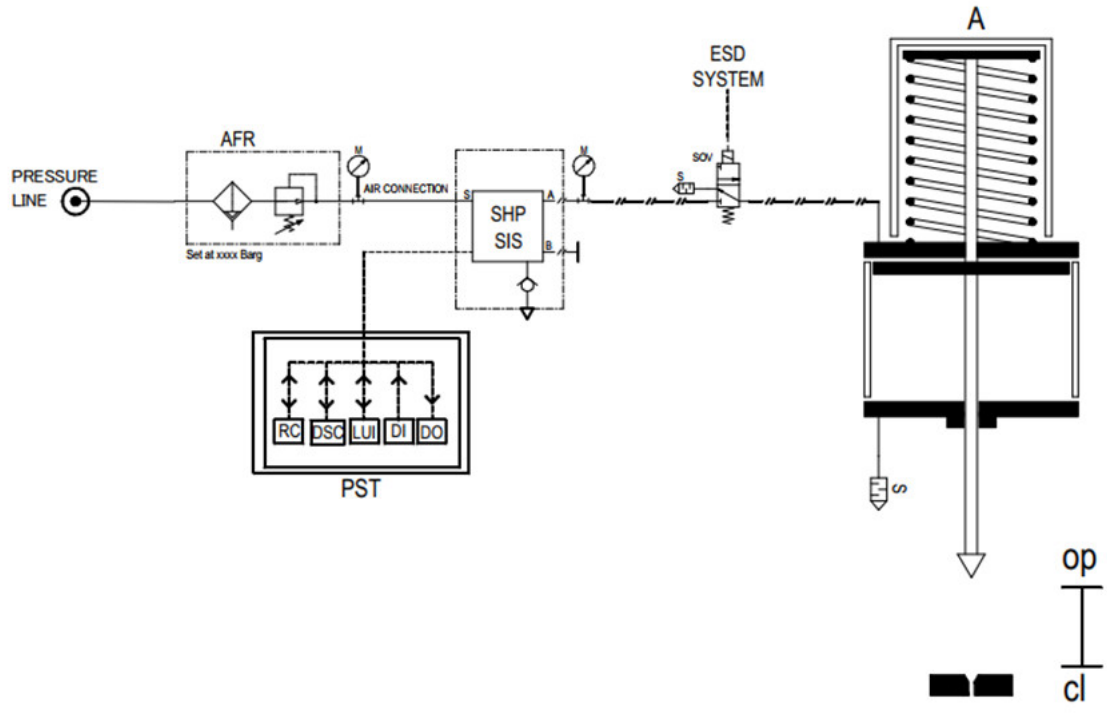
There are different types of connections that may be performed, depending on the fail action required by the application:

5.2.1 DIRECT CONNECTION

Spring Open
Rotary Actuator



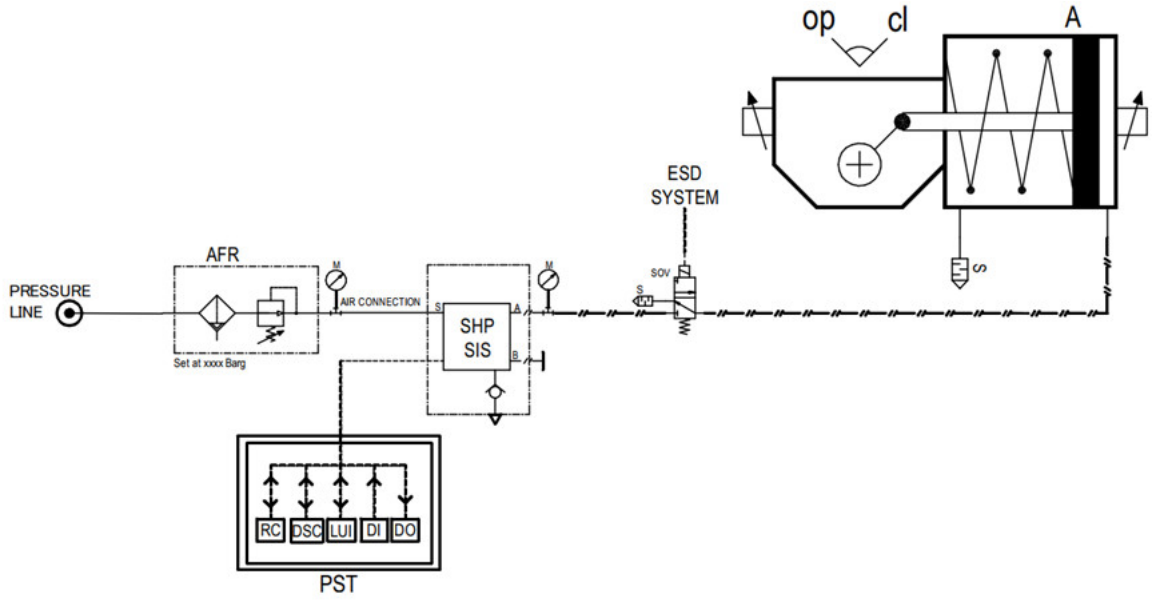
Linear Actuator



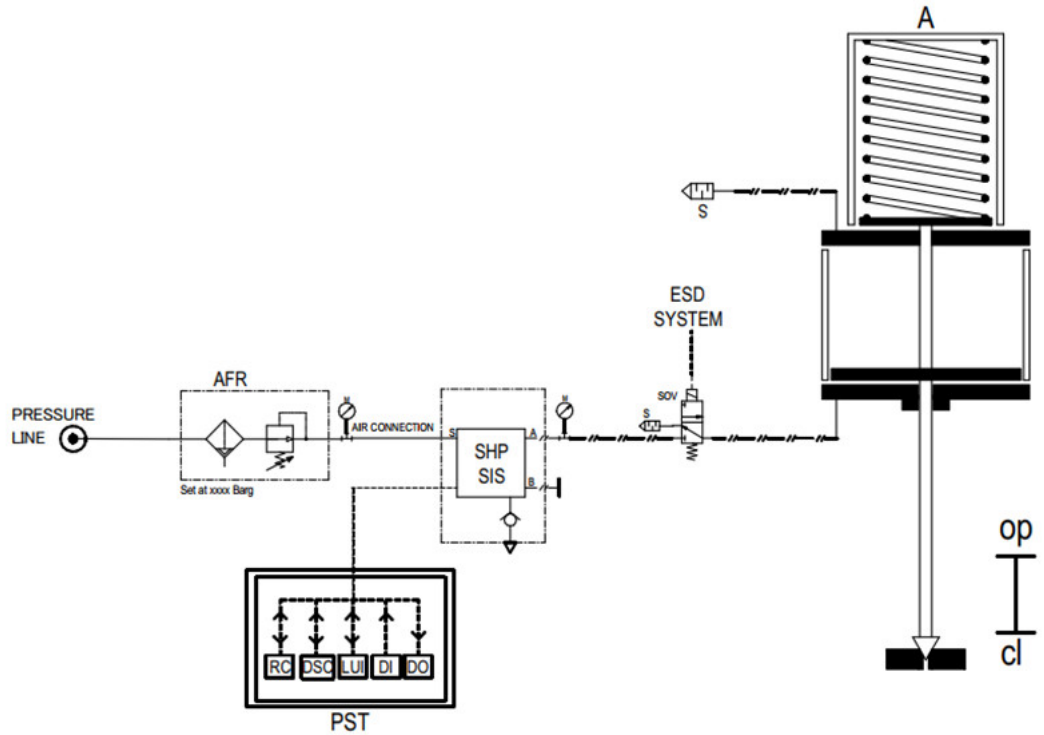
CONTROL LOGIC				
AIR SUPPLY	OK	OFF	ANY	OK
SOLENOID VALVE	ENERGIZED	ANY	DE-ENERGIZED	ENERGIZED
SIGNAL	0 mA	ANY	ANY	20 mA
ACTUATOR POS.	OPEN	OPEN	OPEN	CLOSED

Spring Close

Rotary Actuator



Linear Actuator

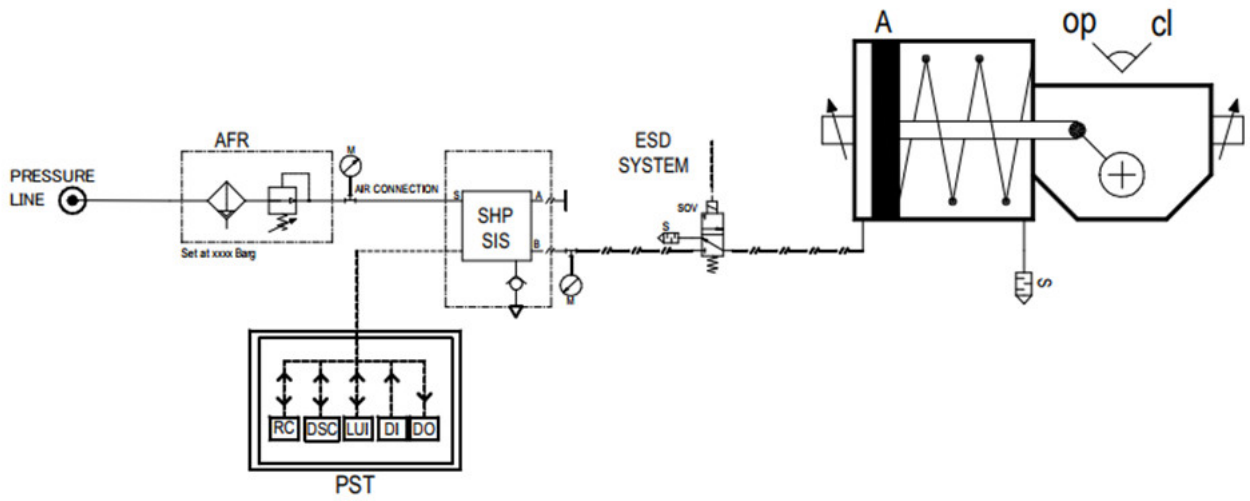


CONTROL LOGIC				
AIR SUPPLY	OK	OFF	ANY	OK
SOLENOID VALVE	ENERGIZED	ANY	DE-ENERGIZED	ENERGIZED
SIGNAL	0 mA	ANY	ANY	20 mA
ACTUATOR POS.	CLOSED	CLOSED	CLOSED	OPEN

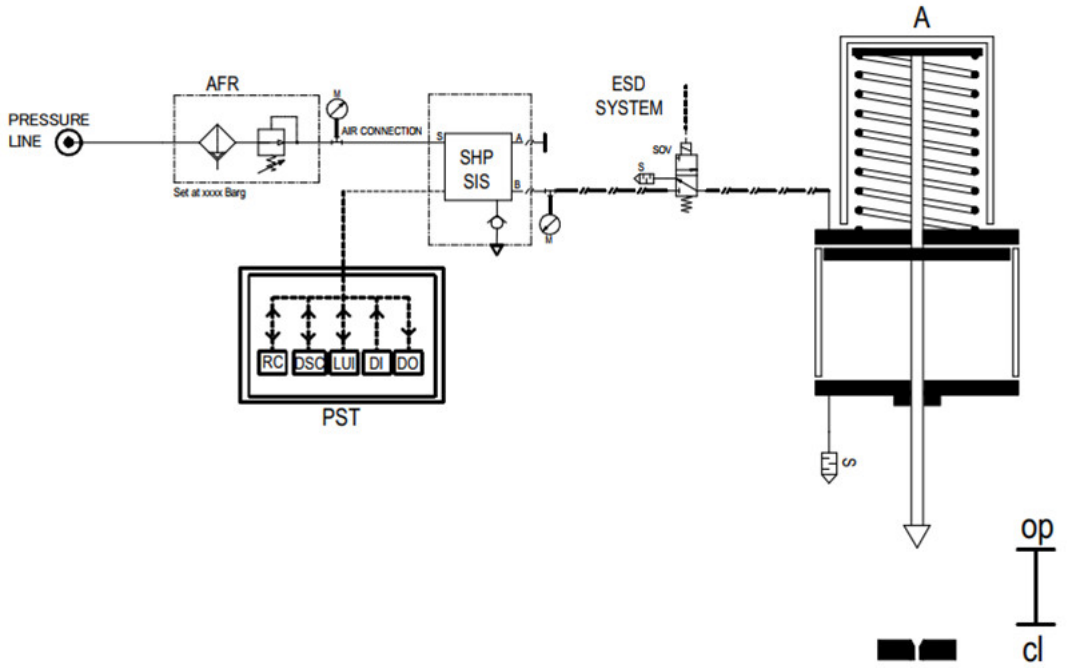
In direct connection, port A is connected to the actuating chamber, and port B is plugged.
The solenoid valve acts as the main safety accessory. When de-energised, the actuator exhausts air, therefore returning to its safe position, determined by the spring.
The SHP-SIS, given its SIL certification, enhances the safety capabilities. If a failure happens, the supply of air will be shut.

5.2.2 REVERSE CONNECTION

Spring Open
Rotary Actuator



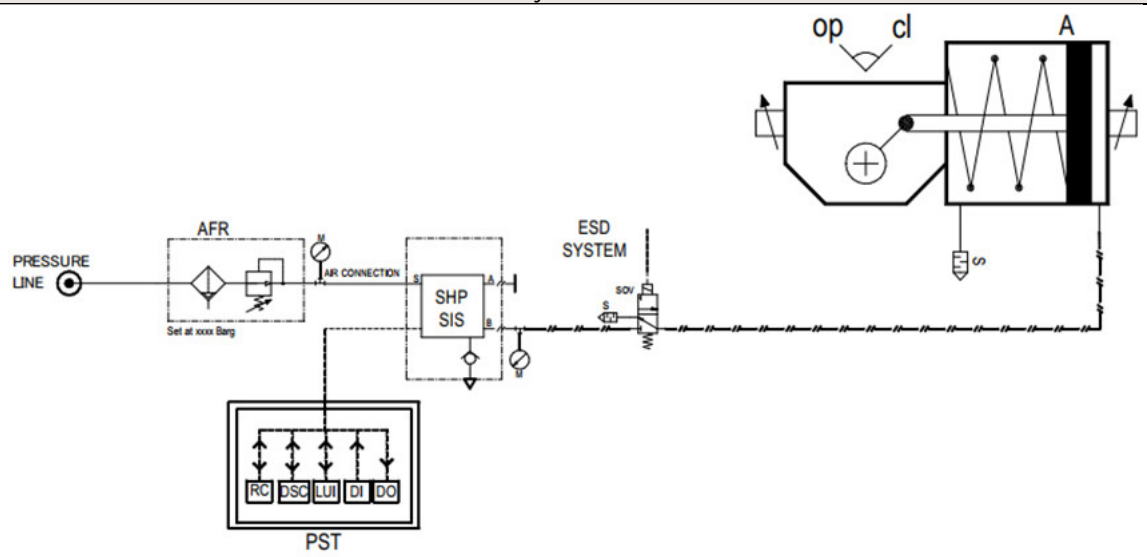
Linear Actuator



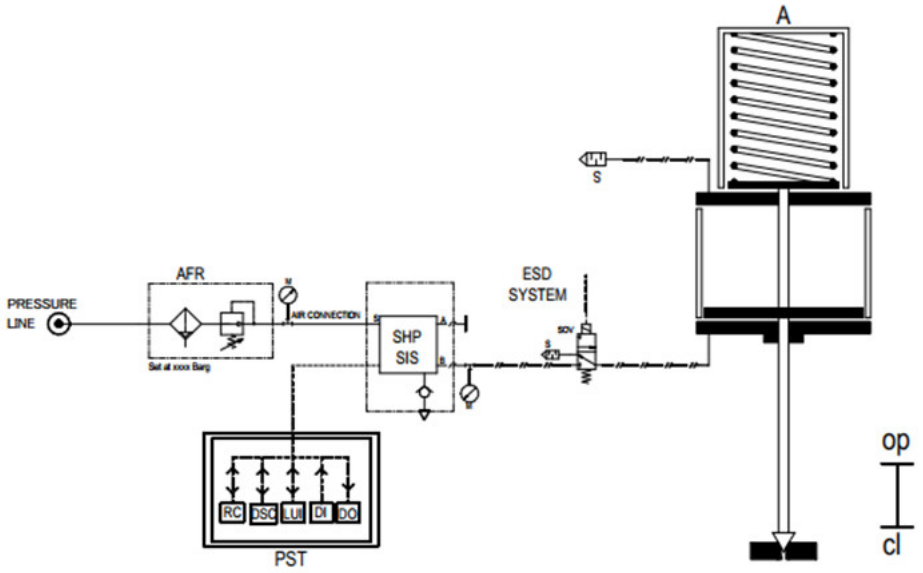
CONTROL LOGIC				
AIR SUPPLY	OK	OFF	ANY	OK
SOLENOID VALVE	ENERGIZED	ANY	DE-ENERGIZED	ENERGIZED
SIGNAL	0 mA	ANY	ANY	4 mA
ACTUATOR POS.	CLOSED	OPEN	OPEN	CLOSED

Spring Close

Rotary Actuator



Linear Actuator



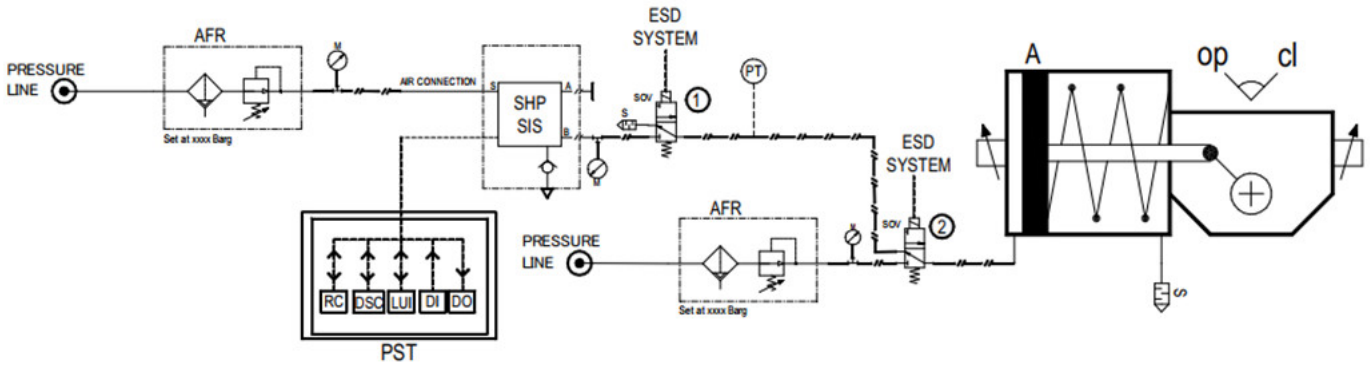
CONTROL LOGIC				
AIR SUPPLY	OK	OFF	ANY	OK
SOLENOID VALVE	ENERGIZED	ANY	DE-ENERGIZED	ENERGIZED
SIGNAL	0 mA	ANY	ANY	4 mA
ACTUATOR POS.	OPEN	CLOSED	CLOSED	OPEN

In reverse connection, port B is connected to the actuating chamber, and port A is plugged.
The solenoid valve acts as the main safety accessory. When de-energised, the actuator returns to the position determined by the spring.
The SHP-SIS guarantees that, in case of failure of the positioner, the supply of air is uninterrupted.
For the positioner to work in reverse mode, the option must be activated during calibration. See instruction manuals 4055 and 4056 for further details.

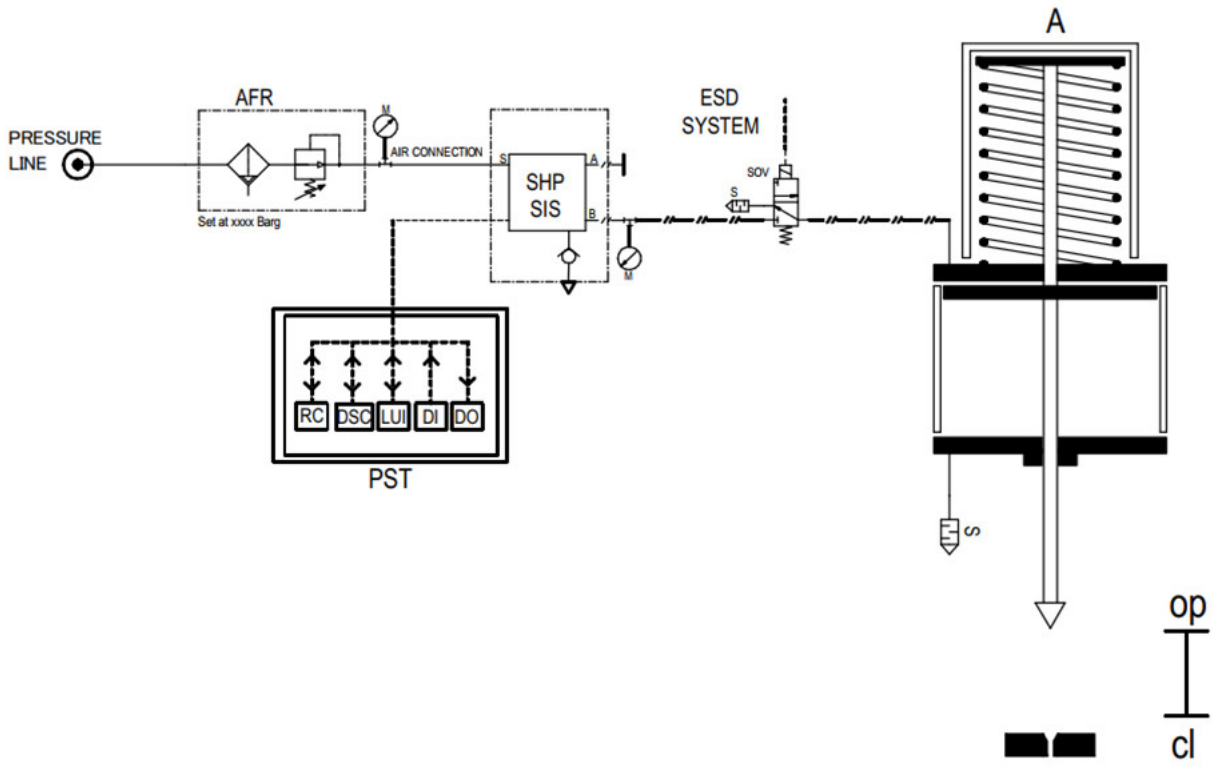
5.2.3 TEST SOV FEATURE

Spring Open

Rotary Actuator



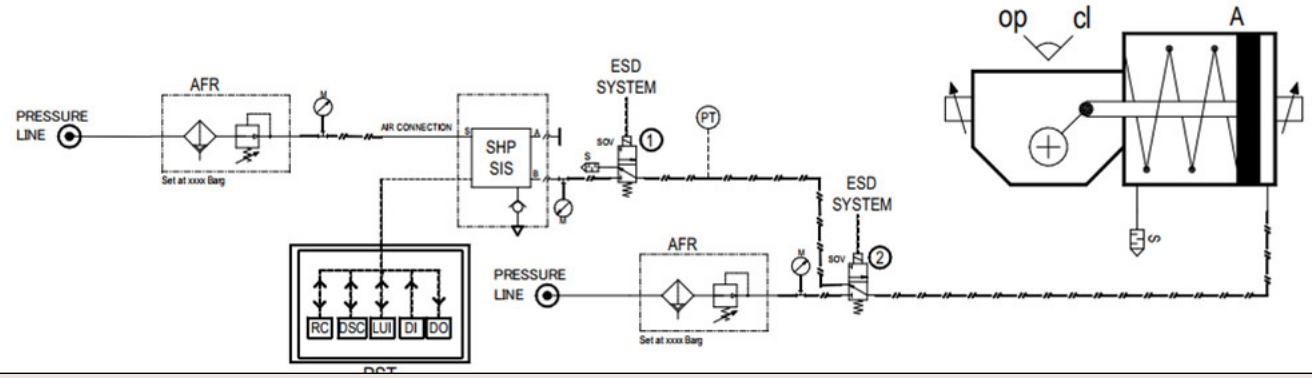
Linear Actuator



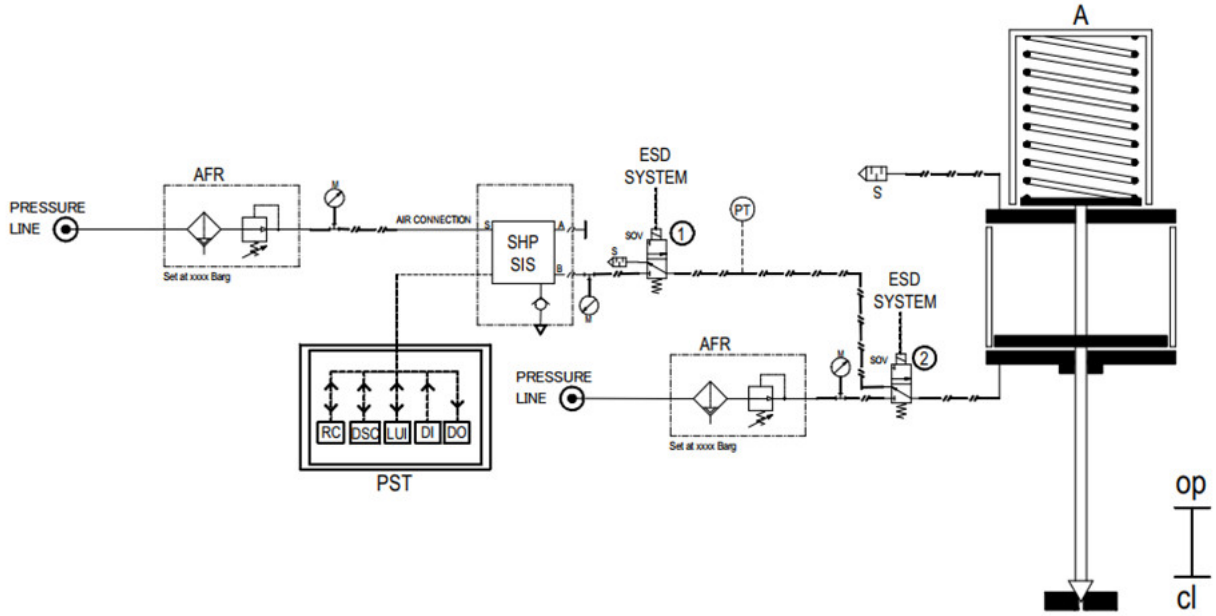
CONTROL LOGIC					
AIR SUPPLY	OK	OK	OFF	OK	OK
SOLENOID VALVE 1	ANY	DE-ENERGIZED	ANY	ENERGIZED	ENERGIZED
SOLENOID VALVE 2	ENERGIZED	DE-ENERGIZED	ANY	DE-ENERGIZED	DE-ENERGIZED
SIGNAL	ANY	ANY	ANY	0 mA	4 mA
ACTUATOR POS.	CLOSED	OPEN	OPEN	CLOSED	CLOSED

Spring Close

Rotary Actuator



Linear Actuator



CONTROL LOGIC					
AIR SUPPLY	OK	OK	OFF	OK	OK
SOLENOID VALVE 1	ANY	DE-ENERGIZED	ANY	ENERGIZED	ENERGIZED
SOLENOID VALVE 2	ENERGIZED	DE-ENERGIZED	ANY	DE-ENERGIZED	DE-ENERGIZED
SIGNAL	ANY	ANY	ANY	0 mA	4 mA
ACTUATOR POS.	OPEN	CLOSED	CLOSED	OPEN	OPEN

The Test SOV feature is an electro-pneumatic scheme that allows the user to use the SHP-SIS positioner to perform the PST, while being generally excluded from the functioning of the actuator.
With this configuration, the realiability of the system is improved, as the PST will also serve to test the correct functioning of SOV2. During installation, it is important to use the reverse mode on the positioner. This way, the availability of the system is ensured even during the test.
To perform the test, SOV 1 must first be energized: if the pressure transmitter signals that pressure is present after SOV 1, SOV 2 can be de-energized. The actuator will not move from its position, even if the positioner were to fail. The PST can then be launched as per the instructions in this manual.
After performing the test, SOV 2 must be energized first. Once this has happened, SOV 1 can be de-energized.

5.3 SUPPORTED INTERFACES

The PST can be controlled from four different interfaces:

LOCAL USER INTERFACE	The PST can be launched by a technician directly from the display of the SHP positioner (Local User Interface). It is easy, quick and it does not require any other instruments. It is also possible to view the last PST results.
REMOTE CONTROL	The complete fine configuration of the PST is done using the Remote Control software, which can be installed on any windows PC. The software can communicate with the SHP positioner both with a USB HART modem or with the High-Speed Data Transfer USB cable. The PST configuration menu is easy to use and provides a help window with detailed explanation. The user can select several parameters such as the frequency at which the PST is run, the amplitude of the test, the maximum velocity of the stroke, incoming/outgoing timeouts and more. Upon completion of the test, the software provides the user, a clear test result, an analysis of the test and the possibility to view the position/pressure trends in a graph.
DCS	Performing a PST from DCS is time saving and does not require the presence of a technician next to the actuator. PST configuration can be performed over HART from the DCS using a host supporting the FDI technology. The interface offers the same features as Remote Control.
BINARY I/O CHANNELS	The Partial Stroke Test (PST) can be manually initiated via the positioner's digital input channel 1 or 2. In addition, digital output channel 1 or 2 can be configured to indicate the PST status, such as when a test is in progress or when it has completed successfully.

5.4 FIRST-TIME CONFIGURATION USING - [REMOTE CONTROL]

The following setup refers to the PST configuration using Remote Control.
Before proceeding, please ensure the following two conditions are met:

	**Make sure the device is calibrated before performing a partial stroke test!**

	**Make sure the device's fail position is configured!**

If you need further information about calibrating the SHP, please refer to the Software Manual 4055.

The Partial Stroke Test menu can be accessed by hitting the PST button from Quick Access panel.

PST Button

Alternatively, navigate to: "Ribbon Bar" → "Test" → "PST." Upon initiation, a configuration window appears with several options. The PST window contains several buttons described below.

START button
Starts the PST.

CREATE button
Generates a report with the results.

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

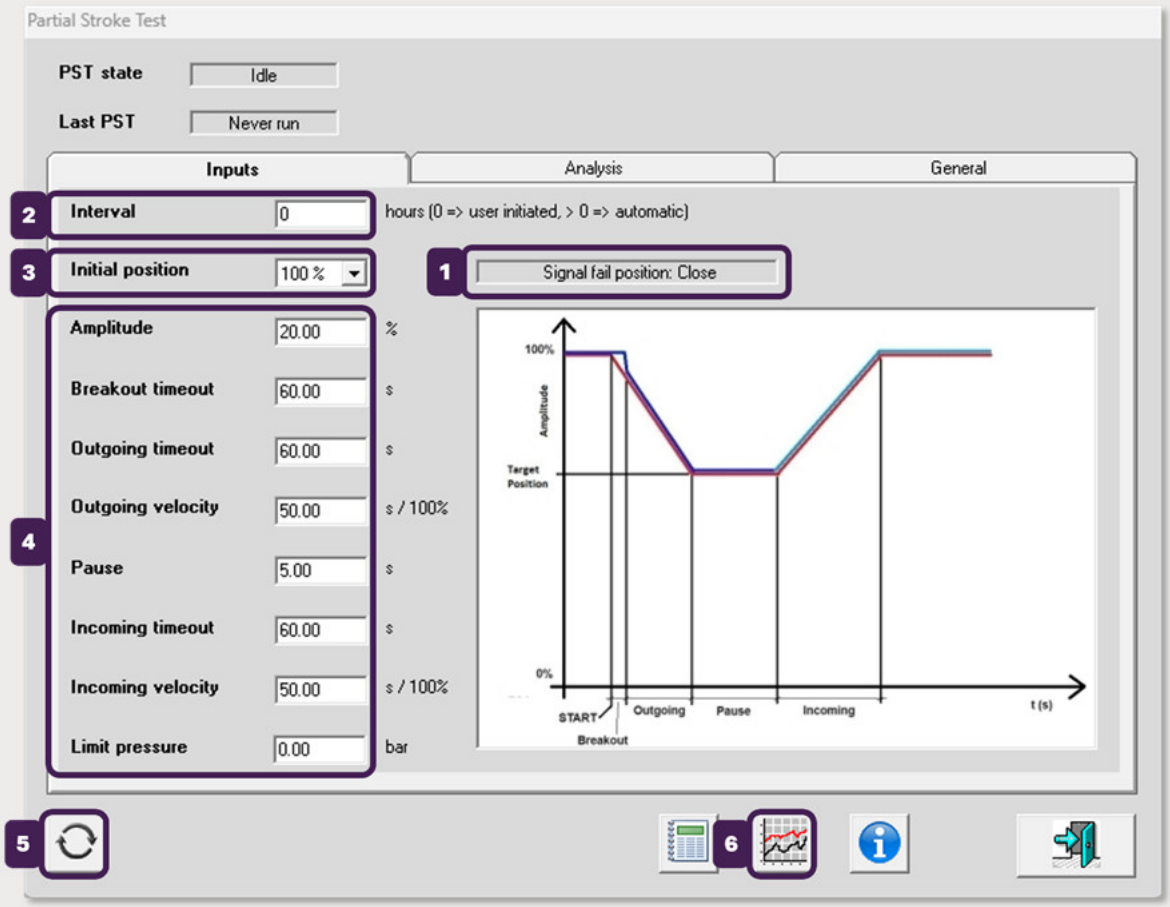
INFO button
Opens a window with help.

REFRESH button
Recomputes the analysis data based on the last PST.

EXIT button
Closes the PST window

Please follow the steps below to correctly initiate a PST. Make sure to be in the Inputs tab.

STEP 1 – Configure the Test Parameters



Instructions:

1- Verify the "Signal Fail Position" corresponds to the tested valve.
If not, close the PST window and calibrate the device - see Software Manual 4055.

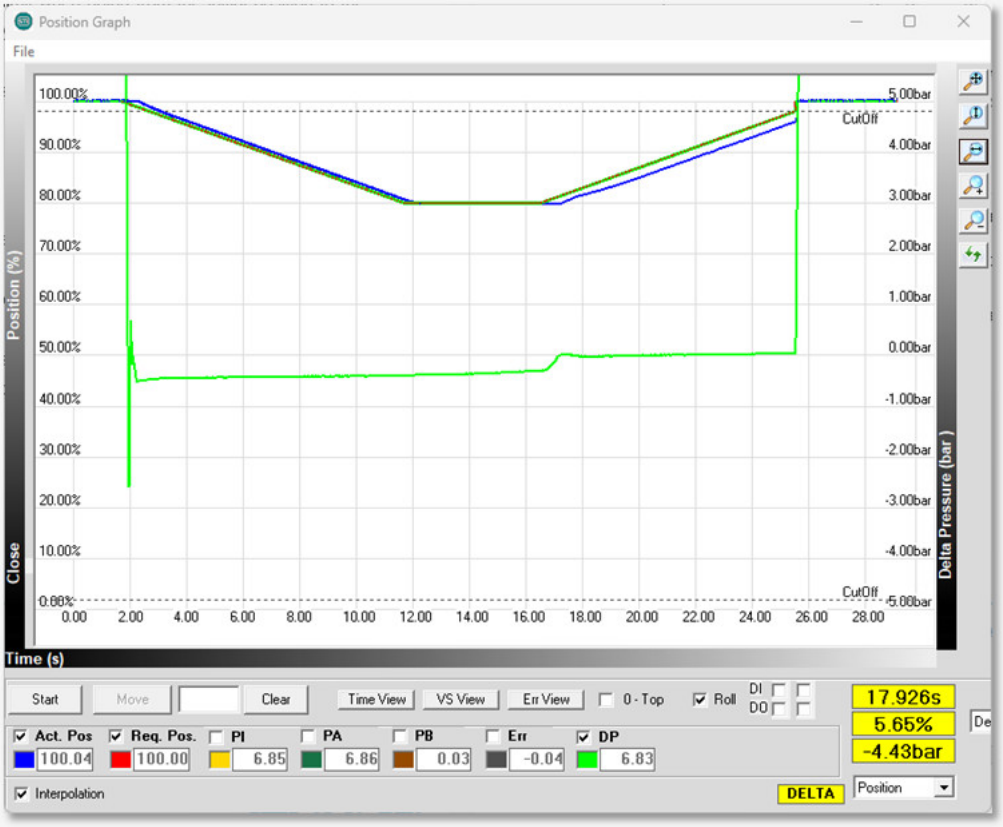
2- Double click on the "Interval" field and select "0" to perform a manual PST.
Alternatively, you can choose a specific time value to have the PST run automatically at regular intervals.

3- Select the "Initial Position" of the valve.
Please note that the "Initial Position" is always the opposite of the "Fail Position."

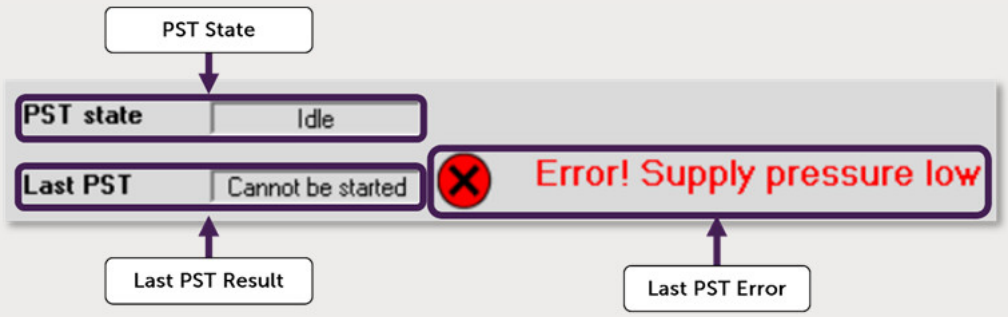
4- Review the default test parameters or adjust them if needed.

5- Initiate the PST by hitting the START button.

6- (Optional)
Open the graph to view the live trends (positions / pressures) measured by the positioner.



STEP 2 – Check the PST Window Header

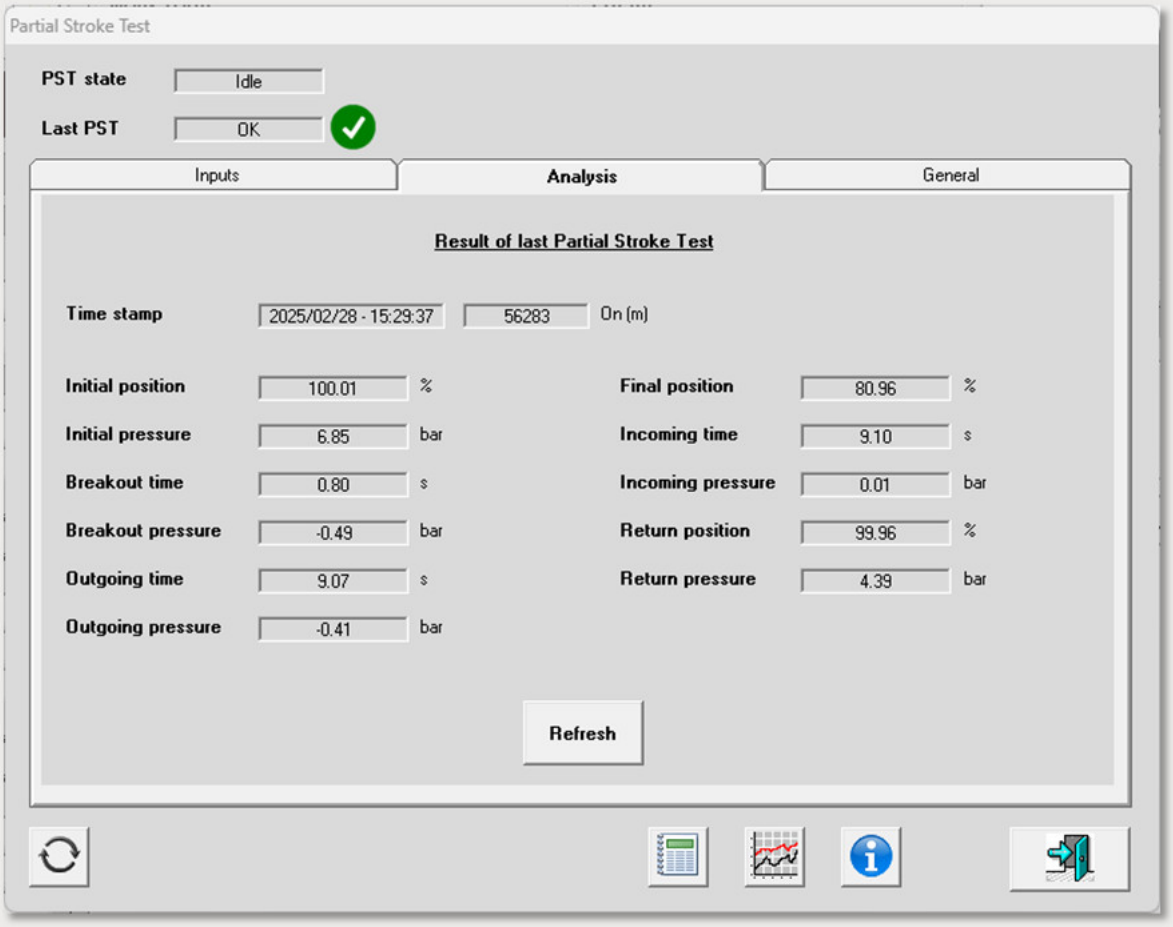


Instructions:

The header displays the current PST State, along with information about the Last PST Result and Last PST Error. When the PST State changes from Running to Idle, the test has concluded. At that point, the Last PST Result and Last PST Error fields will be updated accordingly.

Once a PST has been successfully performed, you can navigate to the "Analysis" tab in order to retrieve the results. In order to see the latest PST result, press on the "Refresh" button.

STEP 3 - PST Analysis



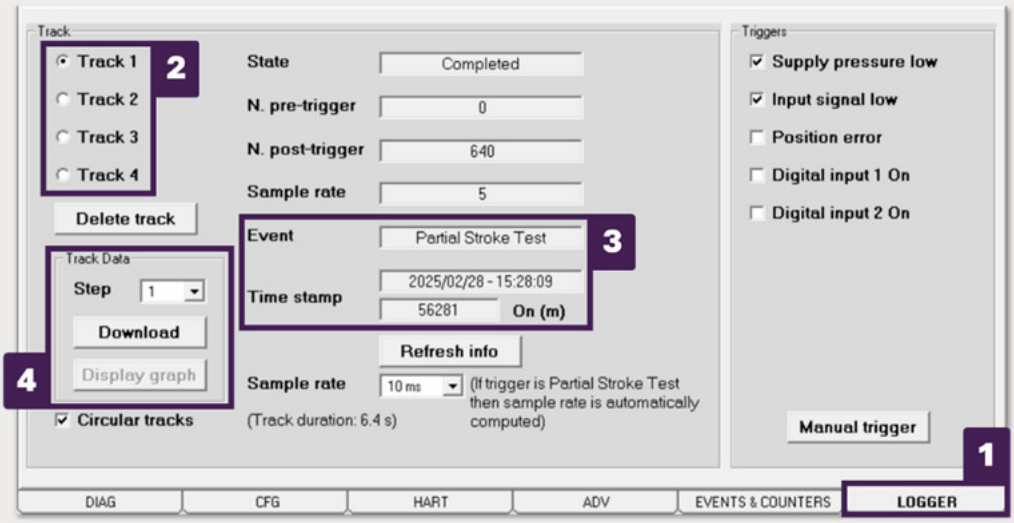
Instructions:

1- Open the "Analysis" tab to view the measured parameters.

2- Check if the PST timestamp corresponds to the last PST test. If not, hit the "Refresh" button.

3- *(Optional)* – The "General" 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.

STEP 4 – Retrieving PST Signature



Instructions:

Regardless of whether the PST is launched manually or automatically, the graph is always saved in the device's memory and can be retrieved using the Logger tool.

1- Navigate to the "Logger" tab.

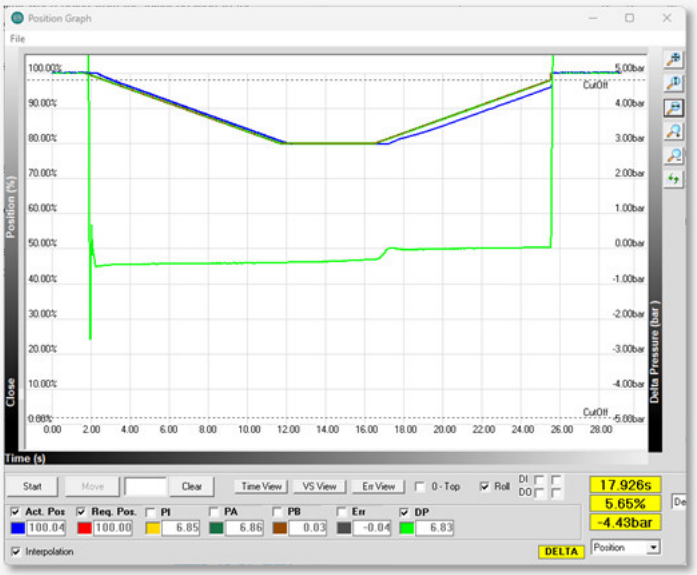
2- Browse the "Tracks" to find the latest recorded event corresponding to a PST.
(Look for "Event: Partial Stroke Test" and verify the Timestamp corresponds to the latest PST)

3- Check the Event and its Timestamp to identify the saved PST.

4- Keep the "Step = 1" to ensure the best resolution.

Hit the "Download" button to save the file.

Click on "Display Graph" for viewing the PST signature.



5.5 EXTENDED PST CONTROL MECHANISMS

5.5.1 PST USING - [LOCAL USER INTERFACE]

The following steps refers to the PST control possibilities using the Local User Interface.
Before proceeding, please ensure the following two conditions are met:

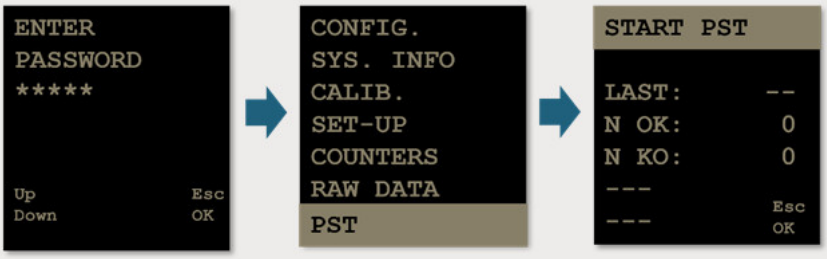
	Make sure the device is calibrated before performing a partial stroke test!

	Make sure the device's fail position is configured!

	The Local User Interface will allow a PST to be performed only if the device is in "Out of Service Manual Mode".

If you need further information about calibrating the SHP or changing its operating mode, please refer to the Software Manual 4055.

STEP 1 – Configure the Test Parameters



Instructions:

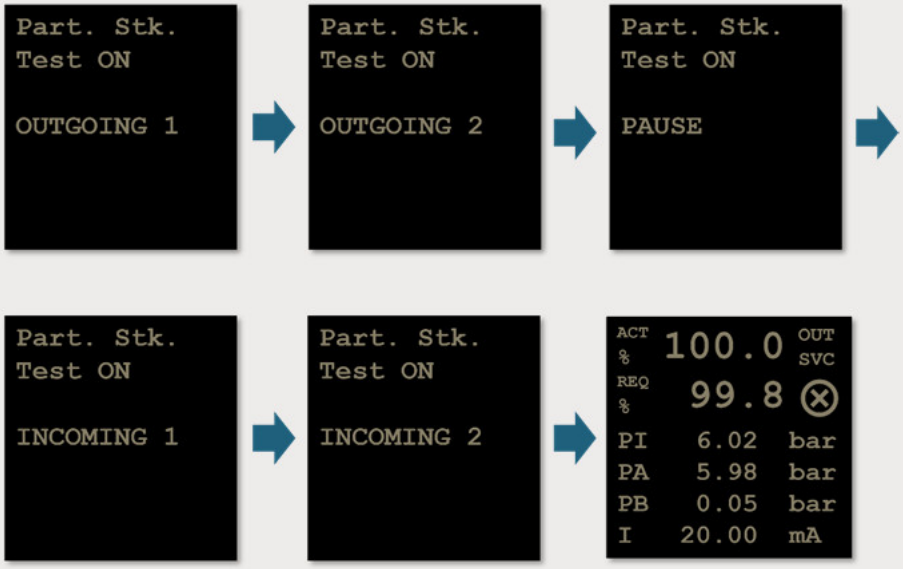
1- Unlock the LUI by typing the following password: 

2- Navigate to the "PST" menu.

3- When ready, select "START PST." The PST will be initiated immediately.
If not, make sure the device is in the "Out of Service" mode.

	Please note that PST configuration parameters cannot be set directly through the Local User Interface. The device will instead use the most recent (or default) PST configuration applied via Remote Control or the DCS.

STEP 2 – Follow the Test

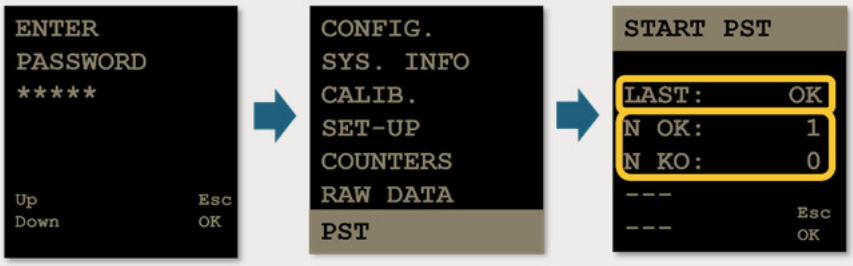


Instructions:

1- Each phase of the PST is displayed on the Local User Interface.

2- Once finished, the Local User Interface will come back to the main screen, showing the device variables.

STEP 3 – View the Result



Instructions:

1- To view the results, navigate once again to the PST menu.

2- Check the "LAST" field and verify the "N OK" or "N KO" counter has been incremented.

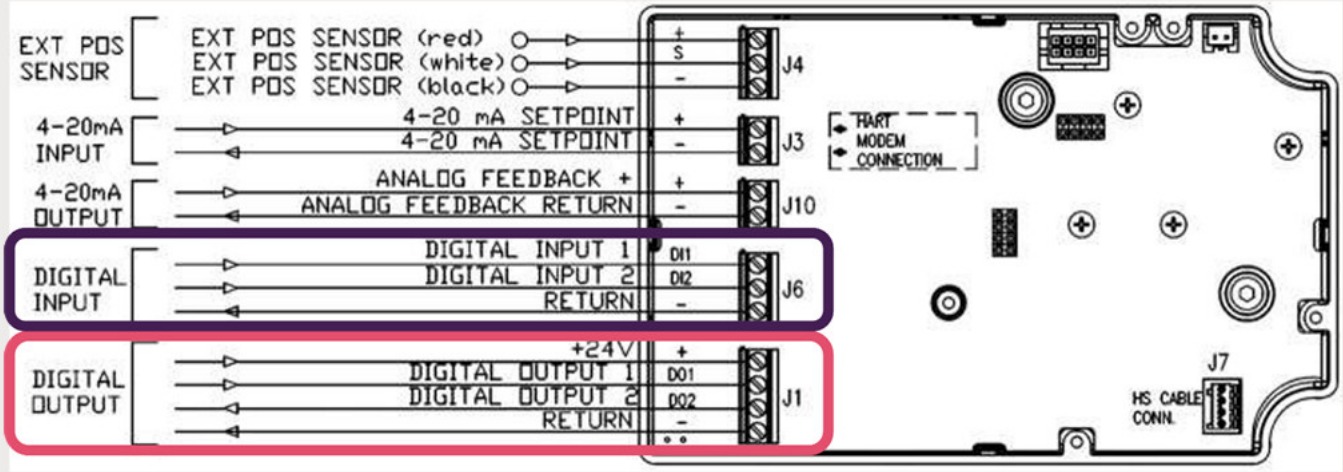
3- If the PST has been successful, the Local User Interface will show:
LAST: OK and N OK is incremented.

4- *(Optional)* – The PST Signature can be always retrieved from Remote Control or DCS.

5.5.2 PST USING - [BINARY I/O CHANNELS]

The SHP positioner is equipped with two digital inputs (DI1 and DI2) and two digital outputs (DO1 and DO2), which can be configured to initiate a PST and to provide status feedback upon its completion.

SHP Digital Inputs and Outputs



For detailed wiring instructions, please refer to the Instruction Manual 4056.

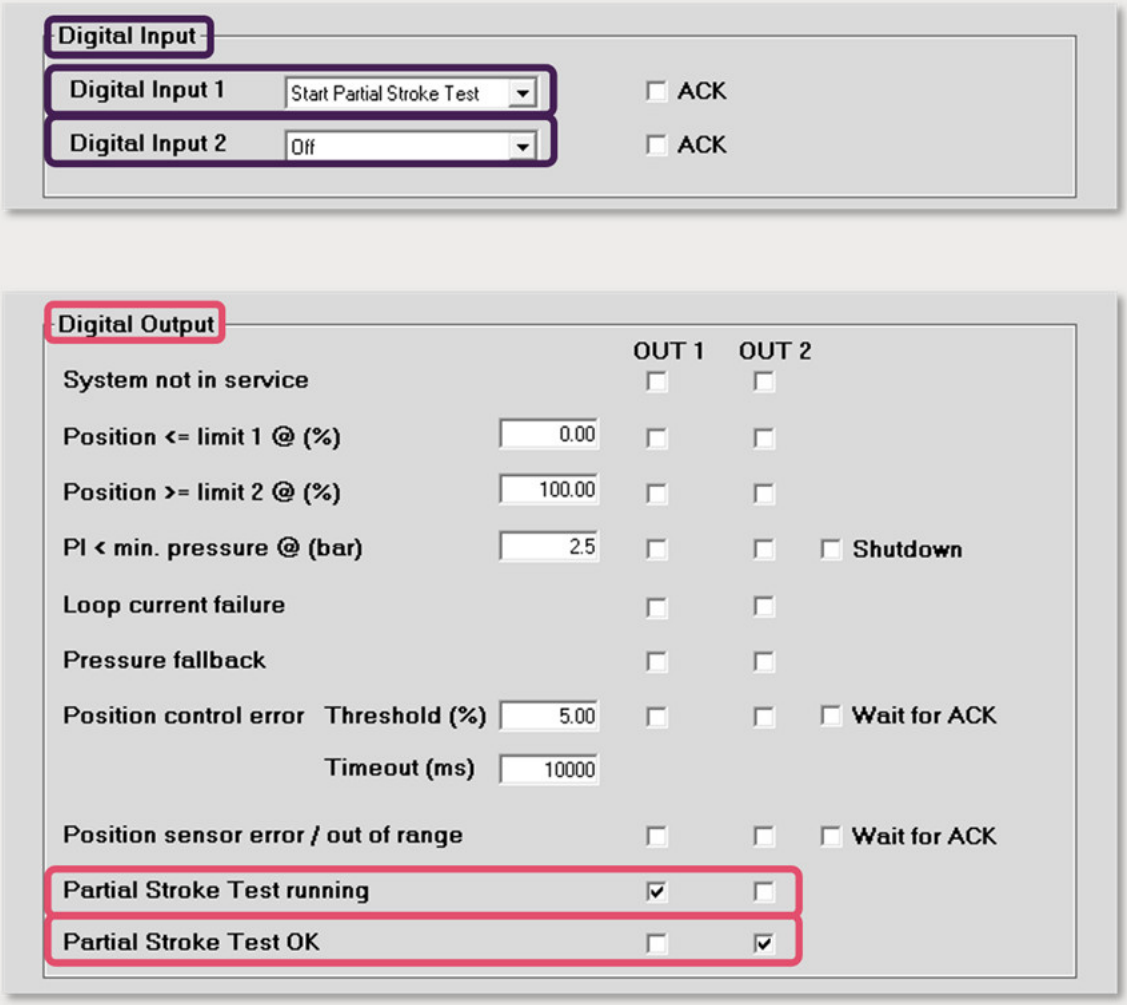
The configuration of the digital inputs and outputs can be done via Remote Control or from DCS.

Digital Inputs (DI1 & DI 2)	Can be configured to trigger a PST
Digital Outputs (DO1 & DO2)	Can be configured to provide PST status feedback: 1- Indicate when a PST is running 2- Indicate when a PST has completed successfully (PST OK)

Please note that PST configuration parameters must be set in advance, using the Remote Control software or from the DCS. If not, the device will use the default configuration.

Example of configuration using Remote Control.
The Digital I/O configuration window is available inside the Configuration tab (CFG).

Example of Configuration Using Remote Control



Description:

1- Digital Inputs (highlighted in violet):
   - DI1: Configured to trigger the PST
   - DI2: Not used in this configuration

2- Digital Outputs (highlighted in red):
   - DO1: Provides feedback when a PST is running
   - DO2: Provides feedback when a PST is successfully completed (PST OK)

For information on the software configuration of binary channels, please refer to the Software Manual 4055.

5.5.3 PST USING - [DCS]

The following setup refers to the PST configuration using the SHP FDI driver for DCS. In this example, the used host system is ABB FIM 3.0.1. It is assumed that the FDI package is already installed on the host system.
Before proceeding, take note of the following warnings:

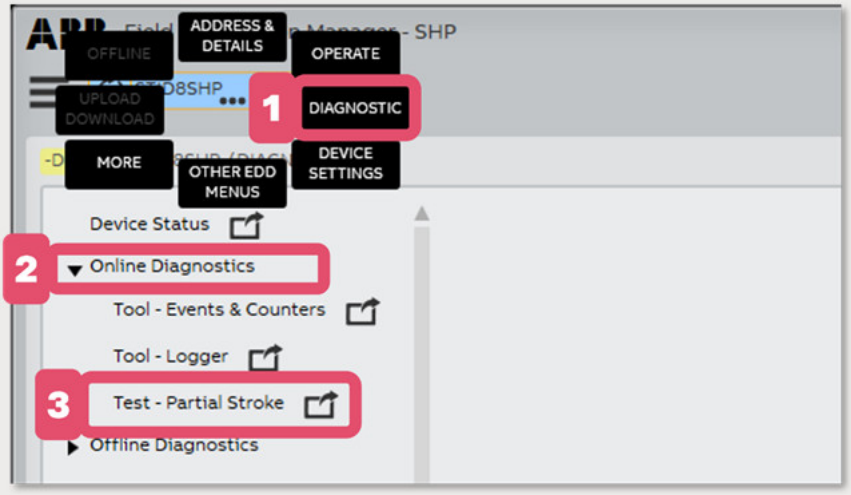
	Make sure the device is calibrated before performing a partial stroke test! Make sure the device's fail position is configured!

	The following instructions are provided solely as an example. They have only been tested on a specific version of the host system: ABB FIM 3.0.1. Please refer to the specific ABB guidelines for your application.

	The Host System will allow a PST to be performed only if the device is in "Out of Service Manual Mode" or "In Service".

If you need further information about calibrating the SHP or changing its operating mode, please refer to the Software Manual 4055.

STEP 1 – Access the PST menu



Instructions:

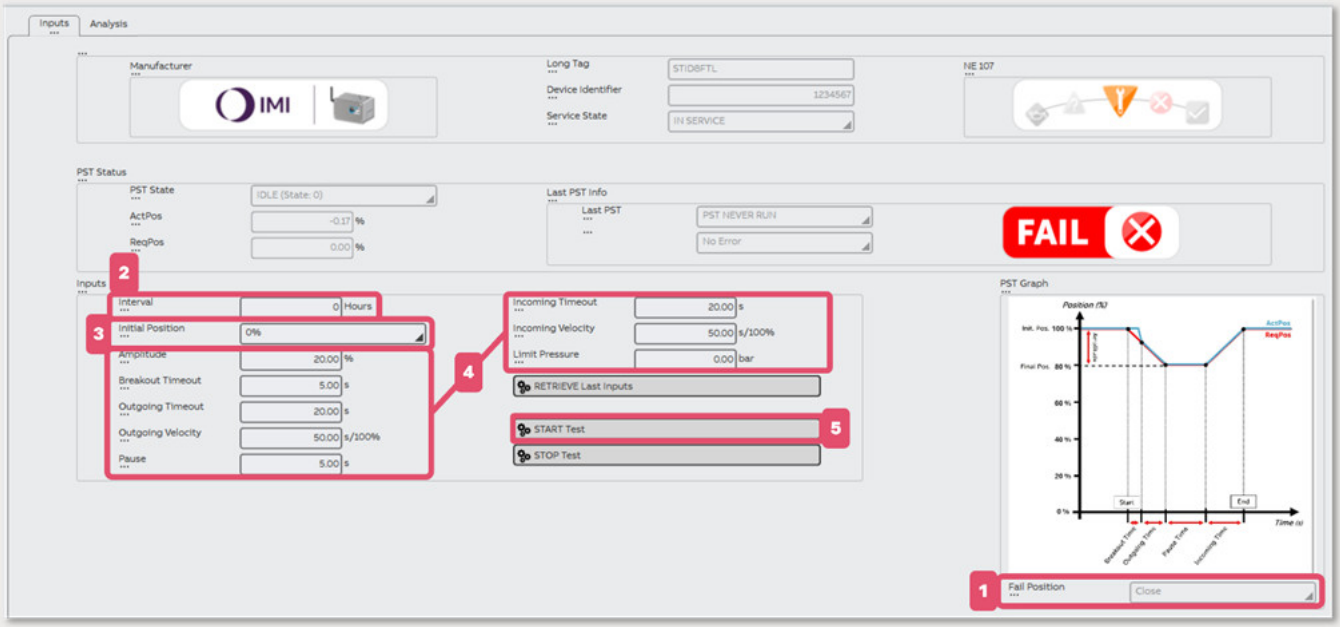
1- Open the "DIAGNOSTIC" root menu.

2- In the left panel, unfold the "Online Diagnostics" to view its content.

3- Open the "Test – Partial Stroke" menu.

Please follow the steps below to correctly initiate a PST. Make sure to be in the Inputs tab.

STEP 2 – Configure the Test Parameters



Instructions:

1- Verify the "Signal Fail Position" corresponds to the tested valve.
If not, close the PST window and calibrate the device - see Software Manual 4055.

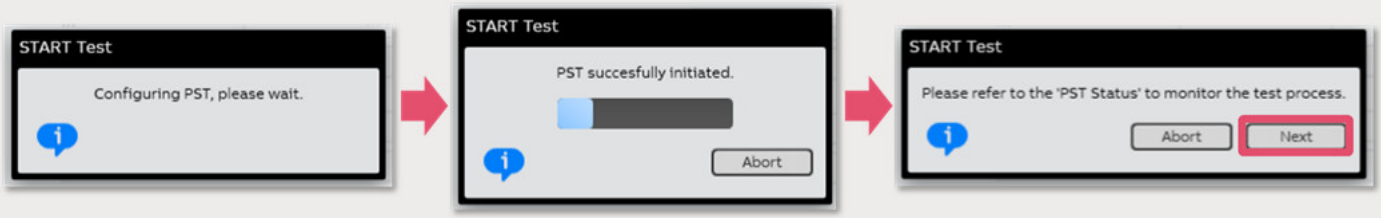
2- Double click on the "Interval" field and select "0" to perform a manual PST.
Alternatively, you can choose a specific time value to have the PST run automatically at regular intervals.

3- Select the "Initial Position" of the valve.

4- Review the default test parameters or adjust them if needed.

5- Initiate the PST by hitting the "START Test" button.

STEP 3 – Wait for the Test to be Initiated



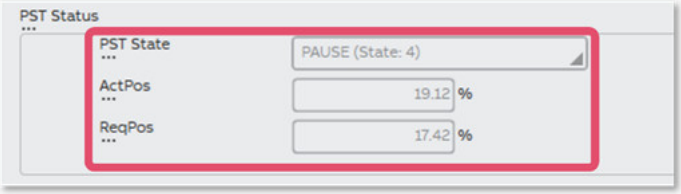
Instructions:

1- An information window will appear, indicating that the test initiation process has begun.

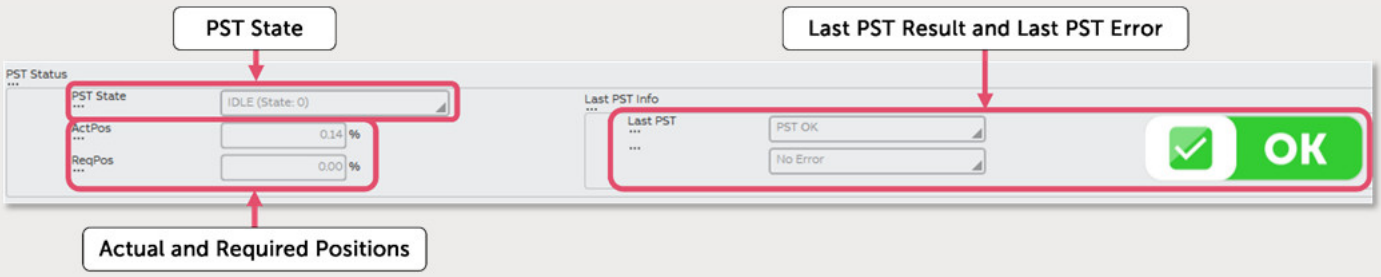
2- Please wait until you see "Please refer to the 'PST Status' to monitor the test process" and then click on "Next."

3- You can follow the PST phase and see the Actual and Required positions in the "PST Status" panel.

   Keep in mind that updates might be a bit slow because HART communication takes time.



STEP 4 – Check the PST Window Header



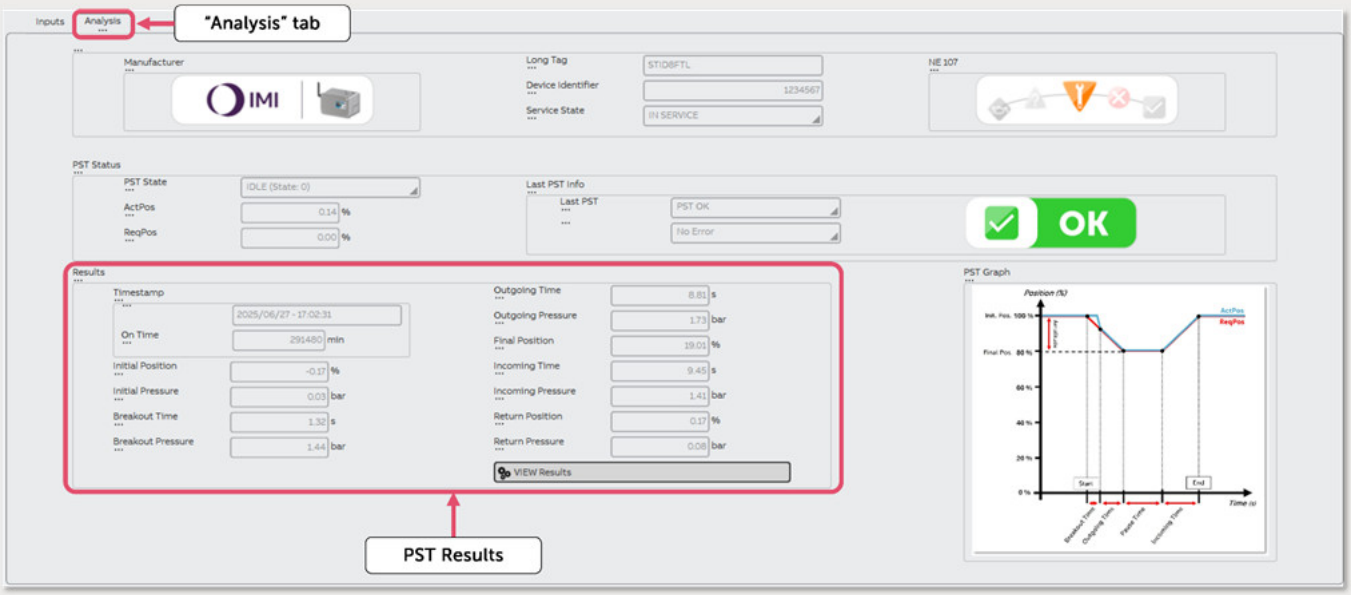
Instructions:

The header displays the valve's "Actual and Required" positions, the current "PST state," and information about the "last PST result and error."

When the "PST State" changes from "Running" to "Idle," the test has concluded. At that point, the "Last PST Result" and "Last PST Error" fields will be updated accordingly.

Once a PST has been successfully performed, you can navigate to the "Analysis" tab in order to retrieve the results. In order to see the latest PST result, press on the "VIEW Results" button.

STEP 5 - PST Analysis

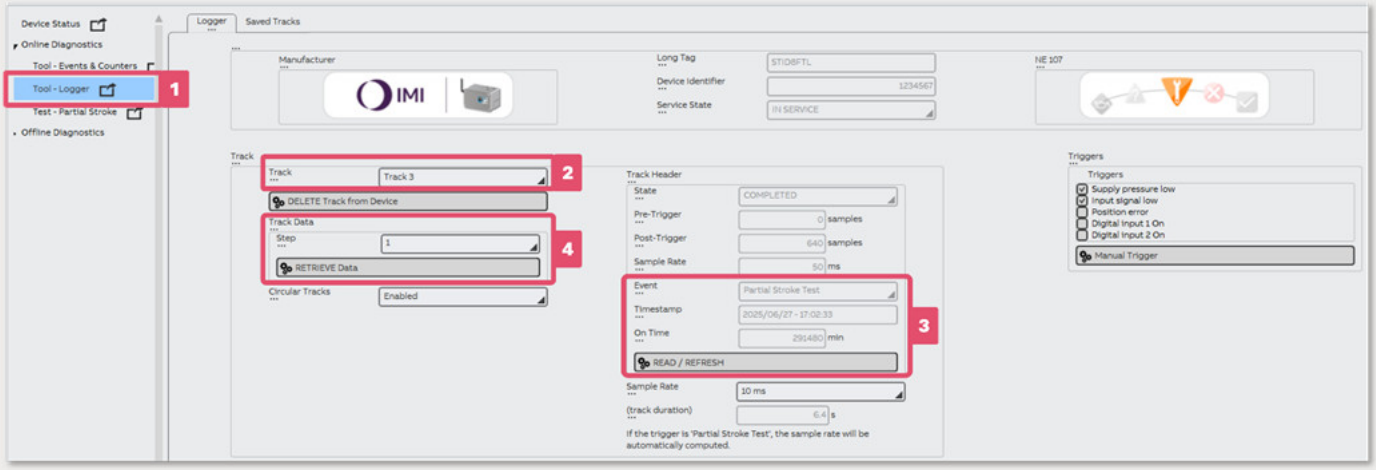


Instructions:

1- Open the "Analysis" tab to view the measured parameters.

2- Check if the PST timestamp corresponds to the last PST test. If not, hit the "VIEW Results" button.

STEP 6 – Retrieving PST Signature



Instructions:

Regardless of whether the PST is launched manually or automatically, the graph is always saved in the device's memory and can be retrieved using the Logger tool.

1- In the left panel, inside "Online Diagnostics," open the "Test – Logger" menu.

2- Browse the "Tracks" to find the latest recorded event corresponding to a PST. Please note that, whenever you select a "Track," you need to hit the "READ / REFRESH" button to load the "Track Header."
(Look for "Event: Partial Stroke Test" and verify the Timestamp corresponds to the latest PST)

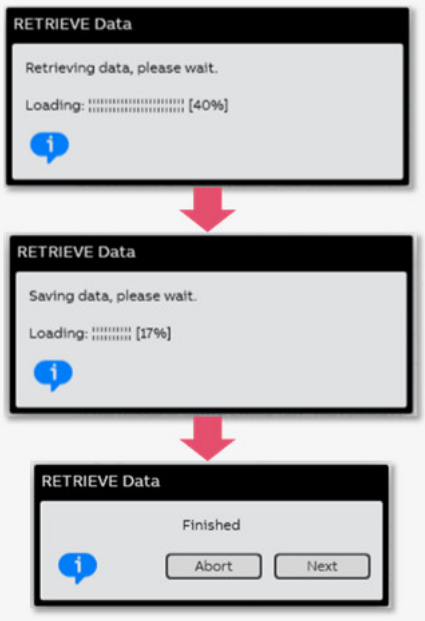
3- Check the Event and its Timestamp to identify the saved PST.

4- Keep the "Step = 1" to ensure the best resolution.
(You can also select a higher "Step" to speed up the download process. Note that this may result in reduced resolution.)

Hit the "RETRIEVE Data" button to save the PST signature.

Wait until the process is finished. It may take few minutes to complete.

When you see "Finished," hit the "Next" button to close the window.



STEP 7 – View PST Signature

Instructions:

1- Go to the "Saved Tracks" tab.

2- Select the correct "Saved Track" containing the PST signature.

3- Check the PST timestamp in the "Saved Track Header." You may need to wait few seconds before it updates.

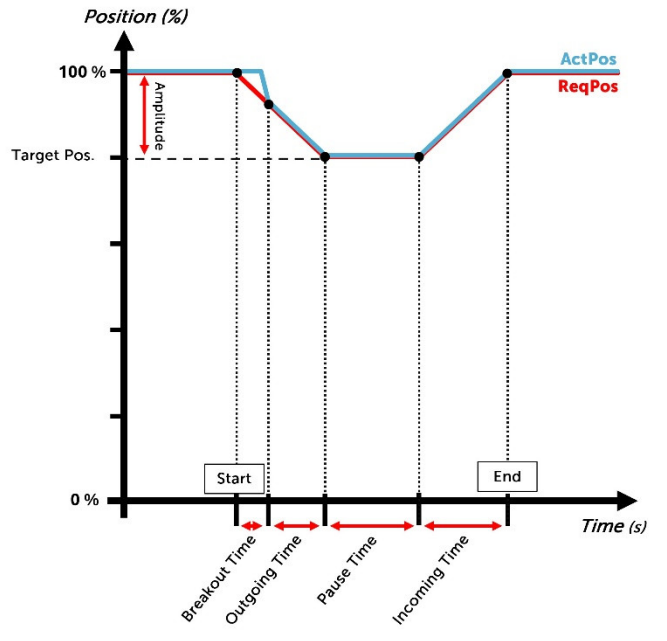
4- View the PST Signature. You may need to wait few seconds before it appears.

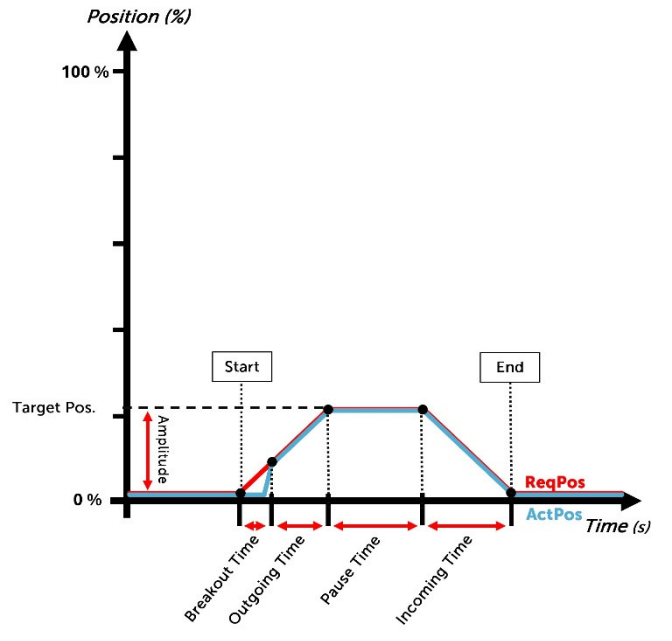
5.6 COMMON PST PARAMETERS

This section outlines the parameters associated with the PST that are consistently available across all supported user interfaces. Whether accessed via FDI, Remote Control, or LUI, these parameters maintain the same structure and functionality to ensure a unified configuration and diagnostic experience.

The graph below illustrates a typical PST cycle and serves as a visual aid to help interpret the key parameters described in this section.

Mode 1 - Initial position = 100 %	Mode 2 - Initial position = 0%





5.6.1 INPUT PARAMETERS

Interval *Test Interval*	Manual: 0 [hours] Min: 1 [hours] Max: 10 000 [hours]	The frequency at which the PST is run. If this value is set to '0' then the PST can only be started manually. If the Interval is set to a specific number (e.g., 2000 hours, which is approximately 3 months), the PST will start automatically after that period and will be repeated cyclically.
Initial Position *Starting position*	Min: 0 [%] Max: 100 [%]	The PST initial position can be either: 0% or 100% (it is the opposite of the safety position).
Amplitude *Test offset*	Min: 0 [%] Max: 30 [%]	The offset is measured from the initial position. The final position is calculated by adding the amplitude if the initial position is 0% or subtracting the amplitude if the initial

		position is 100%.
Breakout Timeout *Delay*	Min: 0.00 [s] Max: 655.35 [s]	Corresponds to the delay before starting to move.
Outgoing Timeout *Delay*	Min: 0.00 [s] Max: 655.35 [s]	Corresponds to the delay before reaching the final position.
Outgoing Velocity *Speed Limit*	Min: 0.00 [s/100%] Max: 327.67 [s/100%]	The maximum speed when moving from the initial position to the final position. If set to '0', this speed limit is disabled.
Pause *Delay*	Min: 0.00 [s] Max: 655.35 [s]	Corresponds to the delay after reaching the final position and before returning back to the initial position.
Incoming Timeout *Delay*	Min: 0.00 [s] Max: 655.35 [s]	The delay before returning to the initial position after the pause.
Incoming Velocity *Speed Limit*	Min: 0.00 [s/100%] Max: 327.67 [s/100%]	The maximum speed when returning from the final position to the initial position. If set to '0', this speed limit is disabled.
Limit Pressure	Min: 0.00 [bar] (or 0.00 psi) Max: 10.00 [bar] (or 145.0 psi)	The minimum (or maximum) pressure when moving from the initial position to the final position. This parameter is only used for single-effect actuators. It represents the minimum allowable pressure if the pressure decreases when reaching the final position, and the maximum allowable pressure if the pressure increases when reaching the final position. If set to '0', this check is disabled.

5.6.2 OUTPUT PARAMETERS

Timestamp *Test Date & Time*	-	The time stamp of the test, shown both as the 'system on time' value (minutes) and in the standard format YYYY-MM-DD HH:MM:SS.
Initial Position *Measured Position*	[%]	Measured position at the beginning of the test.
Initial Pressure *Measured Pressure*	[bar] (or psi)	Measured pressure at the beginning of the test.
Breakout Timeout *Measured Delay*	[s]	Elapsed time before the actuator starts to move.
Breakout Pressure *Measured Pressure*	[bar] (or psi)	Measured pressure when the actuator starts to move.

Outgoing Time *Measured Time*	[s]	Time to reach the final position.
Outgoing Pressure *Measured Pressure*	[bar] (or psi)	Measured pressure when the final position is reached.
Final Position *Measured Position*	[%]	Measured position at the end of the outgoing phase.
Incoming Time *Measured Time*	[s]	Time to go back to the initial position.
Incoming Pressure *Measured Pressure*	[bar] (or psi)	Measured pressure at the start of the incoming phase.
Return Position *Measured Position*	[%]	Measured position at the start of the incoming phase.
Return Pressure *Measured Pressure*	[bar] (or psi)	Measured pressure when the initial position is reached.

5.6.3 STATUS AND ERROR MESSAGES

5.6.3.1 PST States

IDLE	No PST is in progress. The positioner is ready for a new test.
RUNNING	The positioner is occupied with a PST at the moment. Wait for the test to finish before starting a new one.

5.6.3.2 Last PST Results

NEVER RUN	The PST has never been run on the device.
OK	The last PST has been successfully conducted.
FAILED	The last PST has failed.
ABORTED	The last PST has been aborted.
COULD NOT BE STARTED	The last PST was unable to begin.

5.6.3.3 Last PST Errors

NO ERROR *Success*	The PST concluded successfully with no errors detected.
POSITION SENSOR ERROR *Error*	The positioner has detected a position sensor error.
SUPPLY PRESSURE LOW *Error*	The positioner has detected a low supply pressure.
ACTUAL POSITION TOO DIFFERENT FROM INITIAL POSITION *Error*	The actual position differs significantly from the initial position.
BREAKOUT TIMEOUT *Error*	Breakout timeout reached.
OUTGOING TIMEOUT *Error*	Ongoing timeout reached.
INCOMING TIMEOUT *Error*	Incoming timeout reached.
LIMIT PRESSURE EXCEEDED *Error*	Pressure has exceeded the maximum limit.
WRONG OPERATION MODE *Error*	The positioner has detected an unrecognized error.

6 SOV TEST

The SHP positioner can be used to perform an SOV Test as part of a Safety Instrumented System (SIS) circuit. This test verifies the health state of the external solenoid valve (SOV) by briefly de-energizing it. This causes a minor pressure drop within the actuator chamber, resulting in a small variation in the valve position (approximately 2%). Detecting this "position error" confirms the SOV's responsiveness.

	This test introduces a slight valve movement. If this could affect your process, you should avoid running the test unless you are an advanced user. **The movement should remain minimal and should not compromise process safety or equipment integrity. By comparison, a Partial Stroke Test typically involves much larger displacements (up to 20%).**

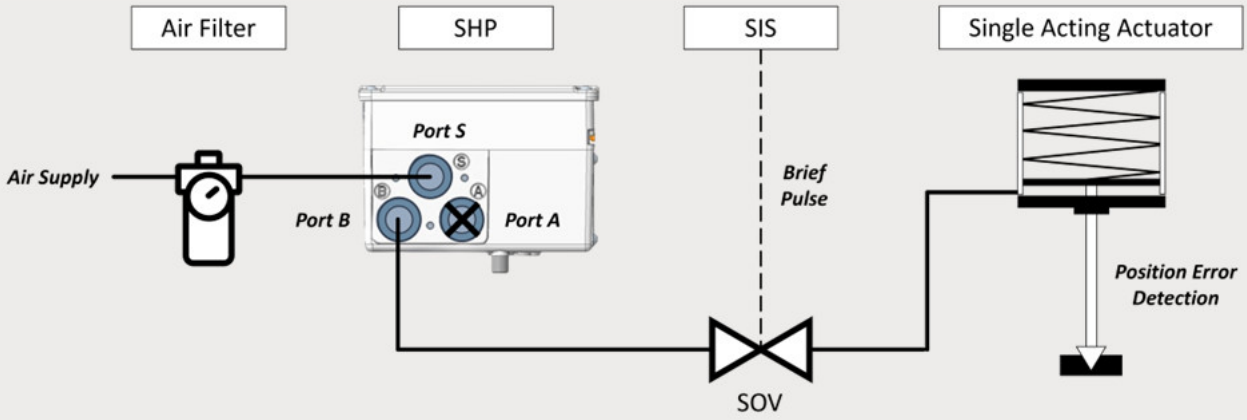
The SHP positioner executes the SOV Test while in service without additional tubing and can be performed on both single-acting and double-acting actuators, providing a reliable and efficient verification method.

6.1 REQUIREMENTS

- Single or double-acting valve actuator.
- A Logic Solver or external device must be able to generate brief, configurable, and repeatable voltage interruptions on the external SOV. These pulses typically range from 20 to 1000 milliseconds, depending on the actuator's size and volume.
- An external SOV without local manual reset.
- An SHP positioner.
- Remote Control software or FDI.

6.2 TUBING SCHEMATIC

Typical Tubing

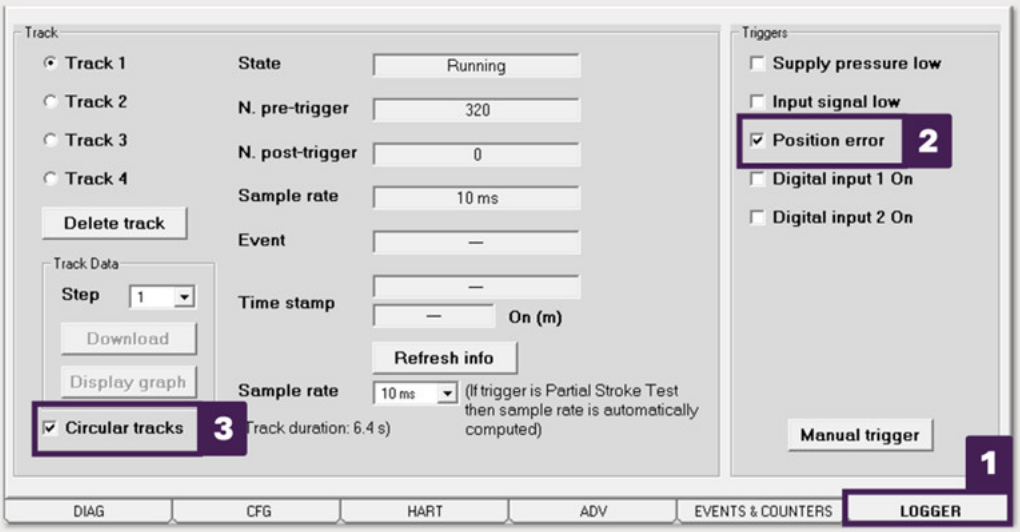


NOTE: The SOV Test can be performed both on single-acting and double-acting actuators.

6.3 CONFIGURATION IN REMOTE CONTROL

Before running the SOV Test, the SHP positioner must be properly configured. Connect the SHP positioner to a computer with Remote Control installed using either the High Speed Cable or a USB HART Modem. Launch Remote Control and follow the next steps to complete the configuration.

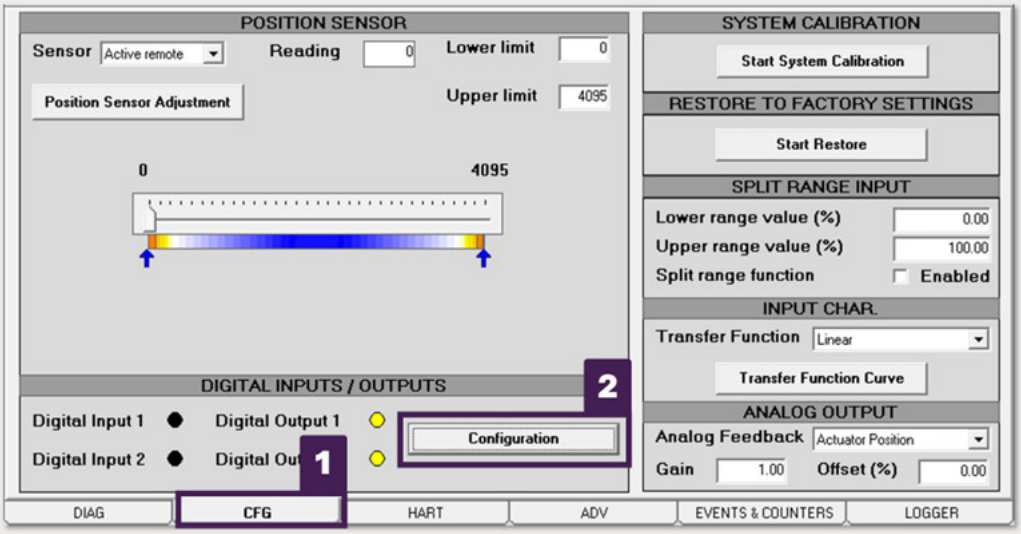
STEP 1 – Logger Configuration



Instructions:

4- Navigate to the "Logger" tab.
5- Enable the "Position error" trigger.
6- Make sure "Circular tracks" is enabled.

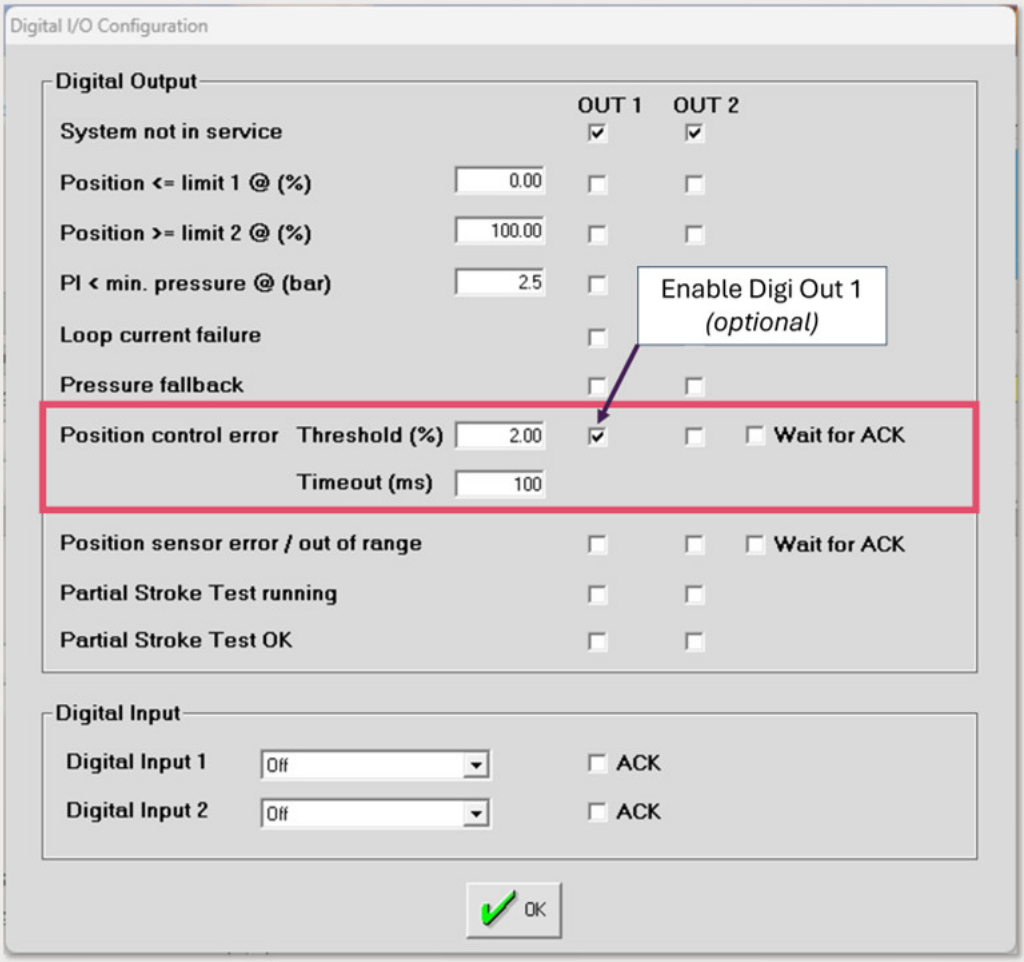
STEP 2 – SOV Pulse Detection Configuration



Instructions:

1- Navigate to the "CFG" (Configuration) tab.
2- Open "Configuration".

STEP 3 – SOV Pulse Detection Configuration



Instructions:

1- Set the position control error threshold to 2%.
2- Set the position control error timeout to a value between 20 ms and 1000 ms. Select the value according to the pulse duration sent to the SOV.
3- Digital output 1 and/or 2 can be enabled if required.

Upon completing these steps, the SHP positioner is ready for the SOV Test.

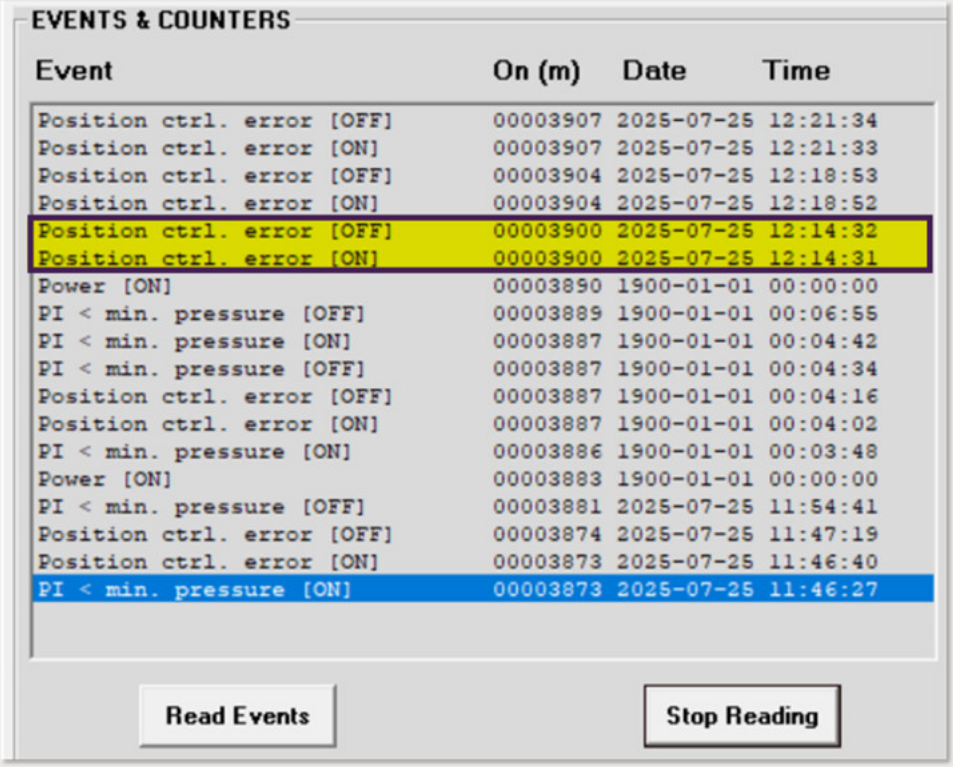
6.4 ACCESSING SOV TEST RESULTS

6.4.1 Events & Counters

The SHP positioner automatically detects and stores the SOV pulse as a "position control error" event.
This record can be viewed in the Events & Counters tab.

For detailed instructions on using the Events & Counters feature, refer to the chapter 4.6 EVENTS & COUNTERS TAB.
An example is shown in the screenshot below.

Example of SOV Test Record in Events & Counters



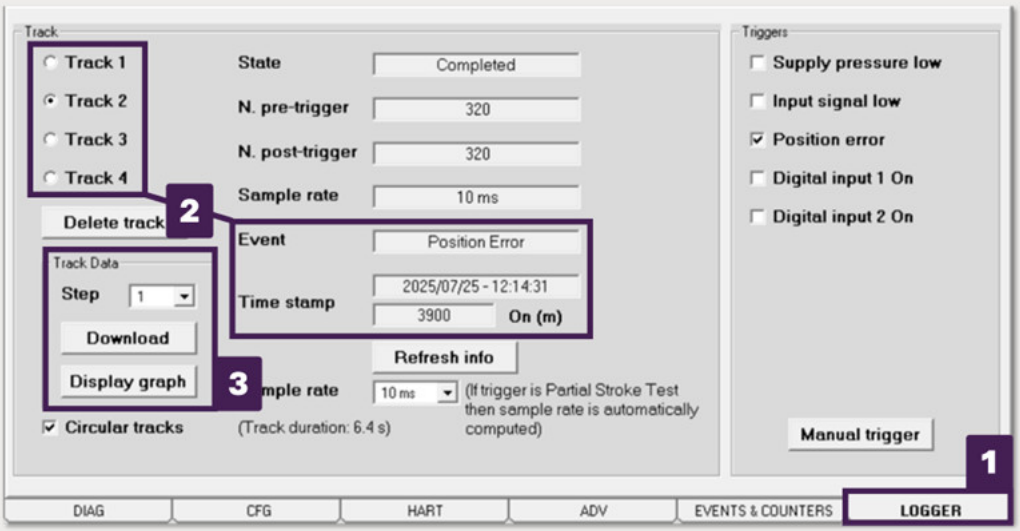
6.4.2 Logger & Graph Tool

The Logger tool allows you to retrieve detailed SOV Test results and visualize a graph of the key variables monitored during the test. For the SOV Test to be logged, the positioner must detect a position control error equal to or greater than the configured threshold (refer to "Step 3 – SOV Pulse Detection Configuration").

For detailed instructions on using the Logger, refer to the chapter 4.7 LOGGER TAB.
For more information about the Graph Tool, refer to the chapter 7 GRAPH TOOL.

Follow the steps shown below to retrieve the SOV Test results using the Logger tool.

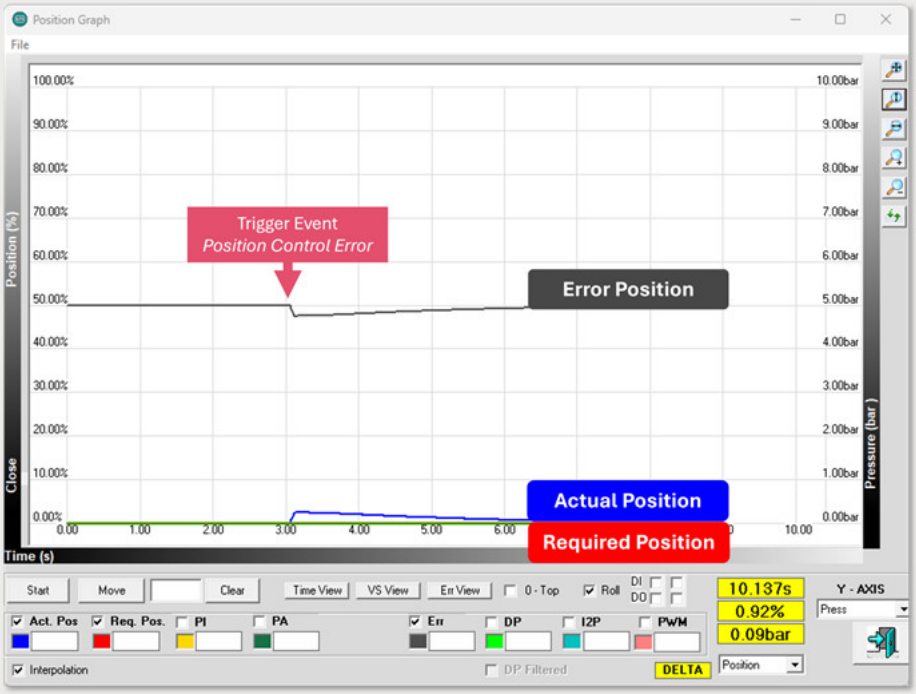
STEP 1 – Find the track in the Logger



Instructions:

1- Navigate to the "Logger" tab.
2- Select the track showing the "Position Error" event and verify its timestamp.
3- Display or download the recorded track.

STEP 2 – Display the SOV Test results with the Graph Tool



7 GRAPH TOOL

7.1 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.

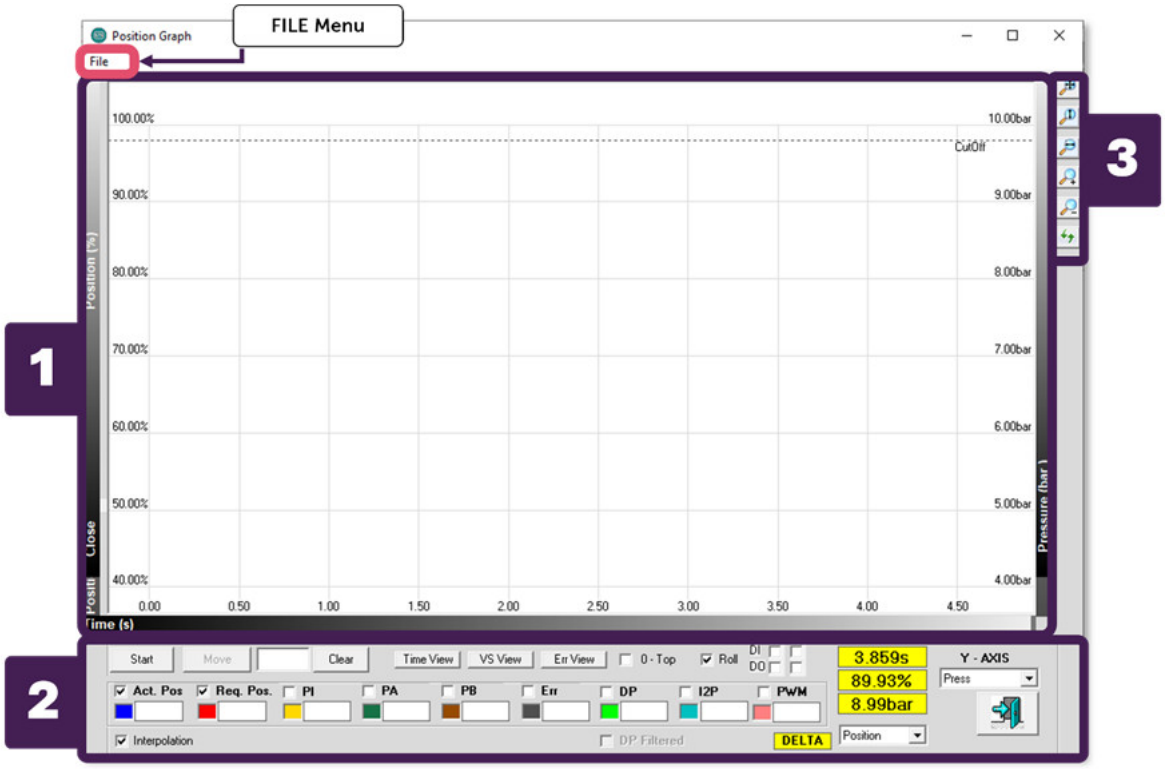


Figure 3 - Graph Tool Window

1	Graph	The graph area where the different curves are displayed. The default axes are: 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

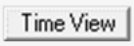
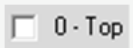
7.2 FEATURES & USAGE

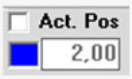
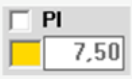
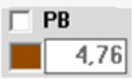
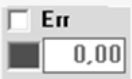
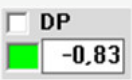
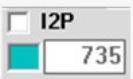
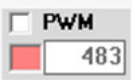
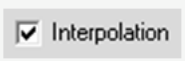
In this section, we will describe the comprehensive functionalities of the Graph Tool. These functionalities include basic operations such as starting and stopping the recorder and moving the actuator to a chosen position.

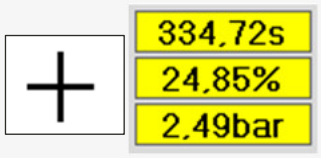
The Graph Tool also offers advanced features like setting different views for data analysis, displaying various curves, and customizing your data visualization with checkboxes and option boxes.

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 ("Out of Service (Manual)" must be selected)
Clear		Clear the input field
Time View		Sets the axis as follows: Y = position [%] / pressure [bar/psi] and X = time [s]
VS View		Sets the axis as follows: Y = Error [%] and X = requested position [%]. Also displays the Limit and CutOff position
Err View		Sets the axis as follows: 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 (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

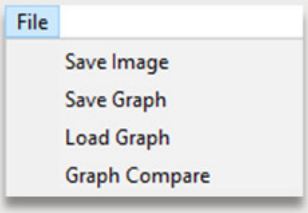
Y - AXIS		Let the user choose the Y-Axis : Pressure or DP (with Time View only)
DELTA		Let the user select the type of "Delta" (DP) : Delta Position or Delta Pression
ActPos		Displays the Actual Position
ReqPos		Displays the Required Position
PI		Displays the Line Pressure
PA		Displays the Pressure in the chamber A
PB		Display the Pressure in the chamber B
Err		Displays the Position Error (difference between the Actual and Required position)
DP		Displays the Delta Pressure (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

7.2.1 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).

7.2.2 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 :

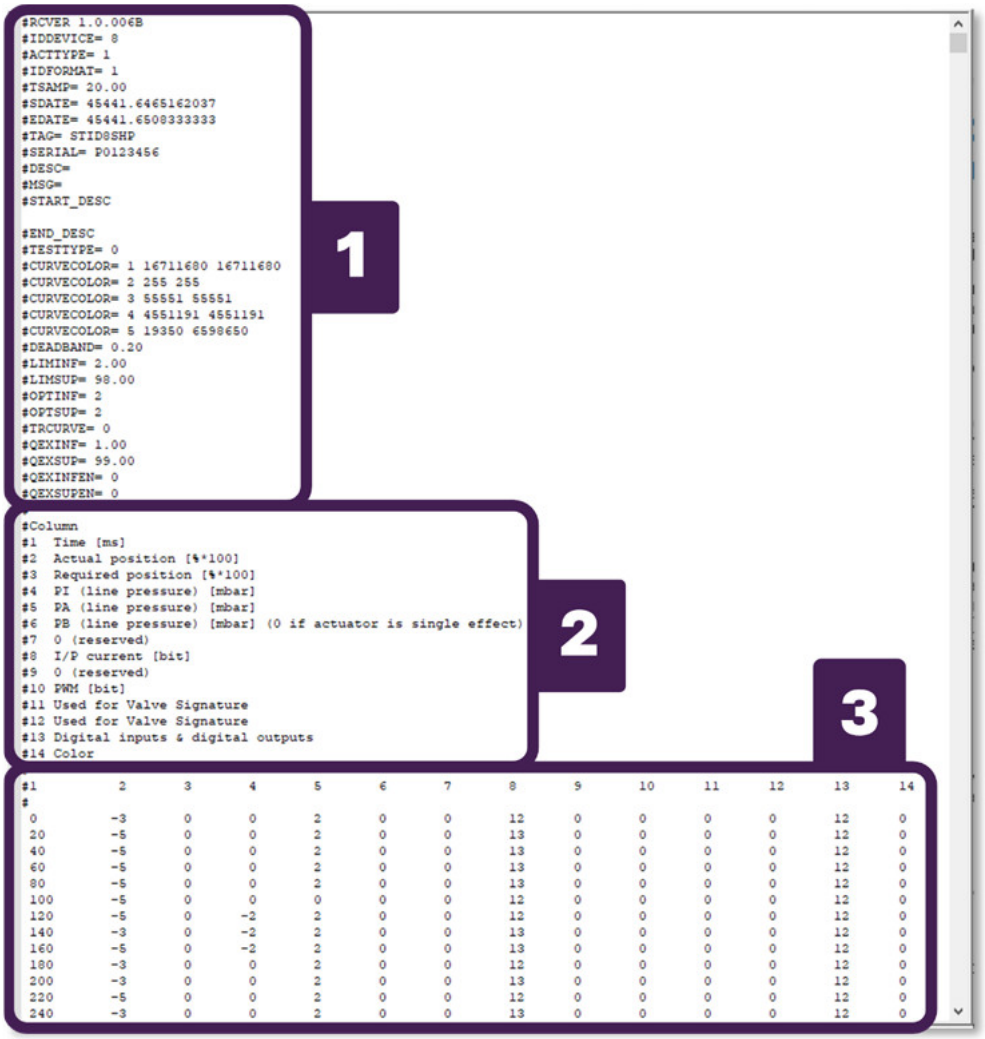


Figure 4 - Graph Text File Structure

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.

8 OFFLINE DIAGNOSTIC TOOLS

8.1 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.

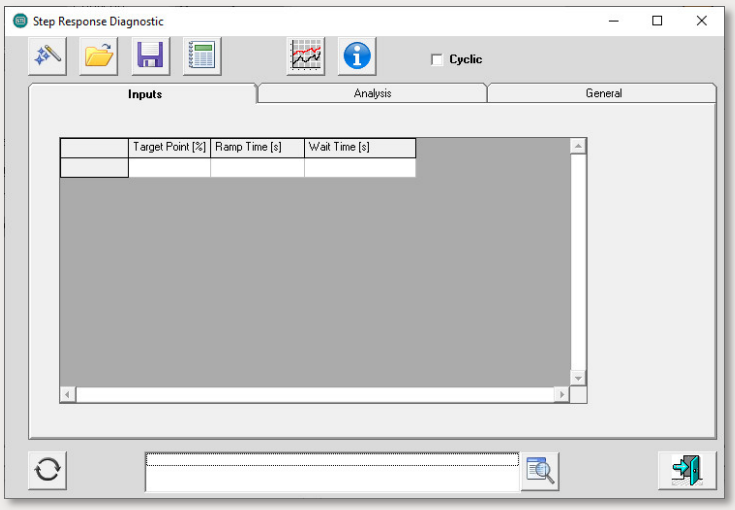
All these tests can be saved, and their data loaded in the Graph Tool for further analysis. You can also compare two tests done at two different times to check how the valve evolved. At the end of each test, a report is generated with a summary of all the important data and screenshots of the important 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.

8.2 COMMON FEATURES

8.2.1 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.

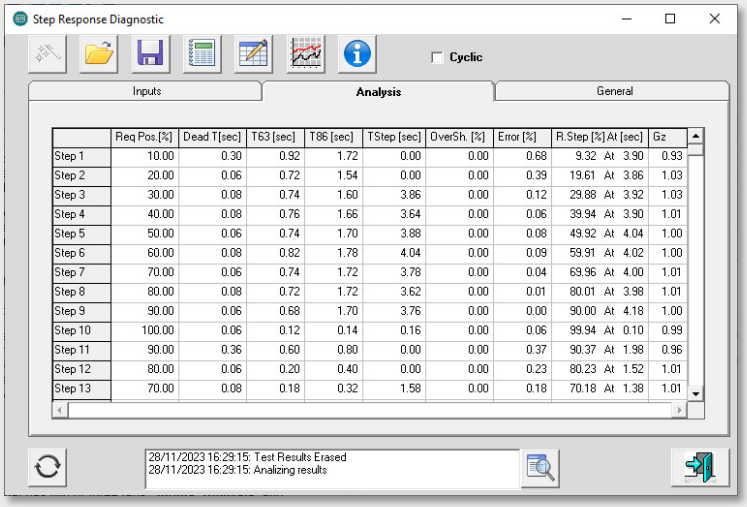
Offline Test Window – Inputs Tab



8.2.2 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

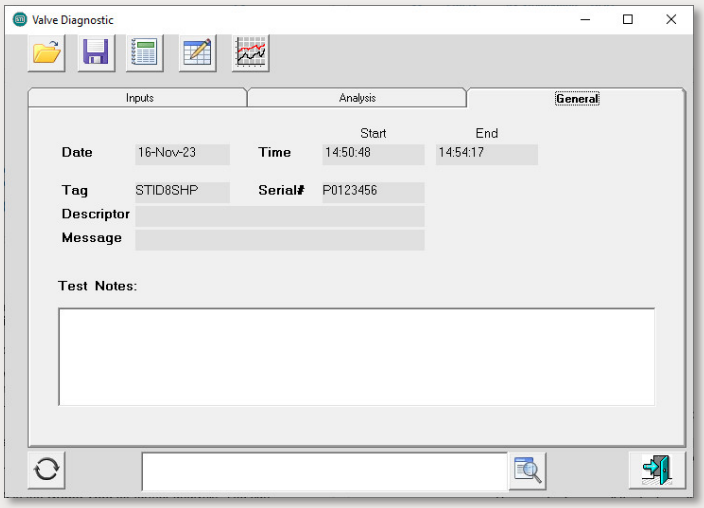


	Req Pos.[%]	Dead T[sec]	T63 [sec]	T86 [sec]	TStep [sec]	OverSh. [%]	Error [%]	R.Step [%] At [sec]	Gz
Step 1	10.00	0.30	0.92	1.72	0.00	0.00	0.68	9.32 At 3.90	0.93
Step 2	20.00	0.06	0.72	1.54	0.00	0.00	0.39	19.61 At 3.86	1.03
Step 3	30.00	0.08	0.74	1.60	3.86	0.00	0.12	29.88 At 3.92	1.03
Step 4	40.00	0.08	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

8.2.3 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



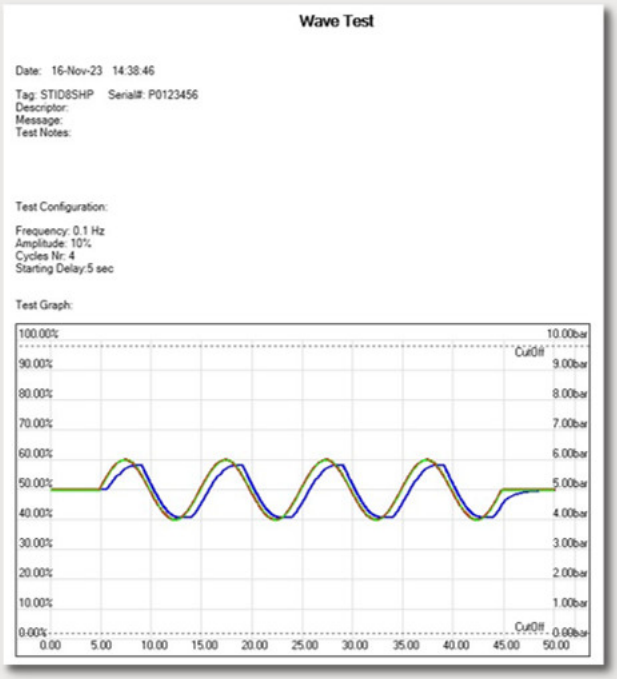
8.2.4 GENERATED TEST REPORT FILES

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

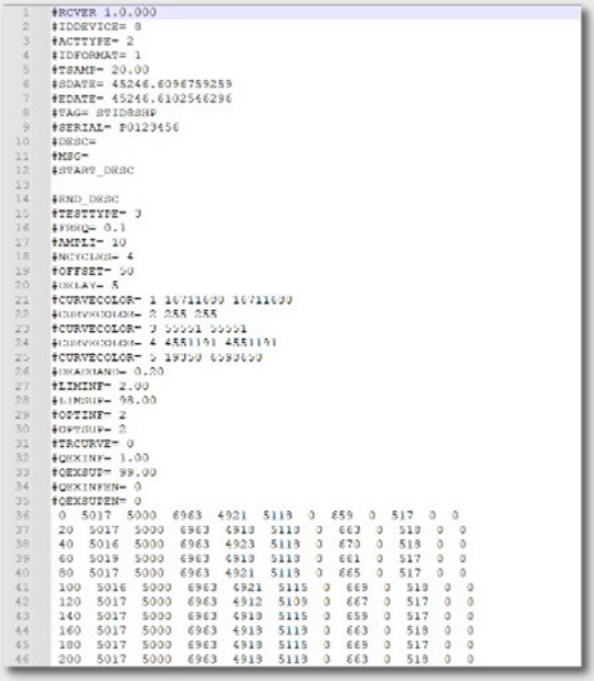
TXT FILE	This file contains the raw data from the test. The data in this file is readable by the Graph Tool.
RTF FILE	This file is a test report that can be opened in Word. The report retrieves all the test results, the timestamp, and screenshots of the curves.

Below is an example of Frequency Test Report files.

Example – Frequency Test Report Files



RTF FILE



TXT FILE

8.3 VALVE SIGNATURE TEST (OP1)

8.3.1 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.

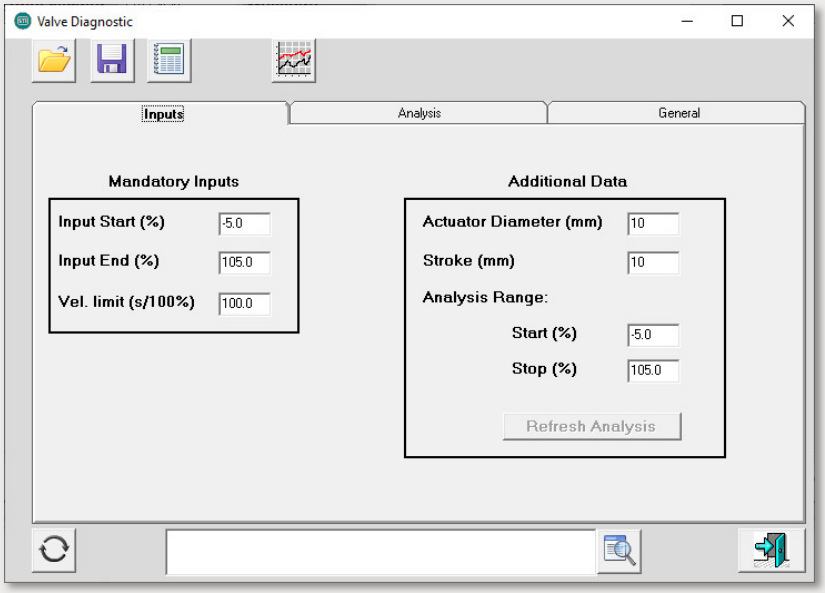
	Please note that this offline test is only available with the Option Pack 1.

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

8.3.2 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.

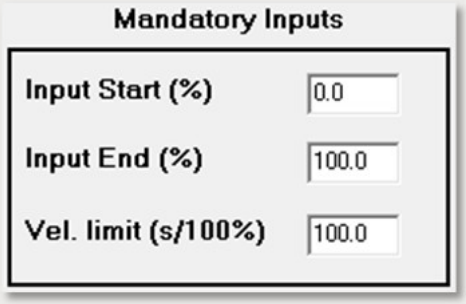
EXIT button
Closes the valve signature test window

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

8.3.3 MANDATORY INPUTS

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

Mandatory Inputs Panel



Its field are described below.

Input Start *Starting position*	Min: -5.0 [%] 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 *Ending position*	Min: -5.0 [%] Max: 105.0 [%]	The test's final position.
Velocity Limit *Max Stroking Time*	Min: 0.0 [s/100%] Max: 327.7 [s/100%]	The stroke speed for the test (in s/100%).

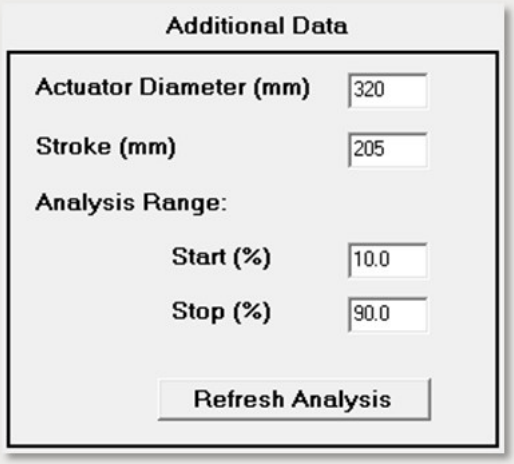
8.3.4 ADDITIONAL DATA

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



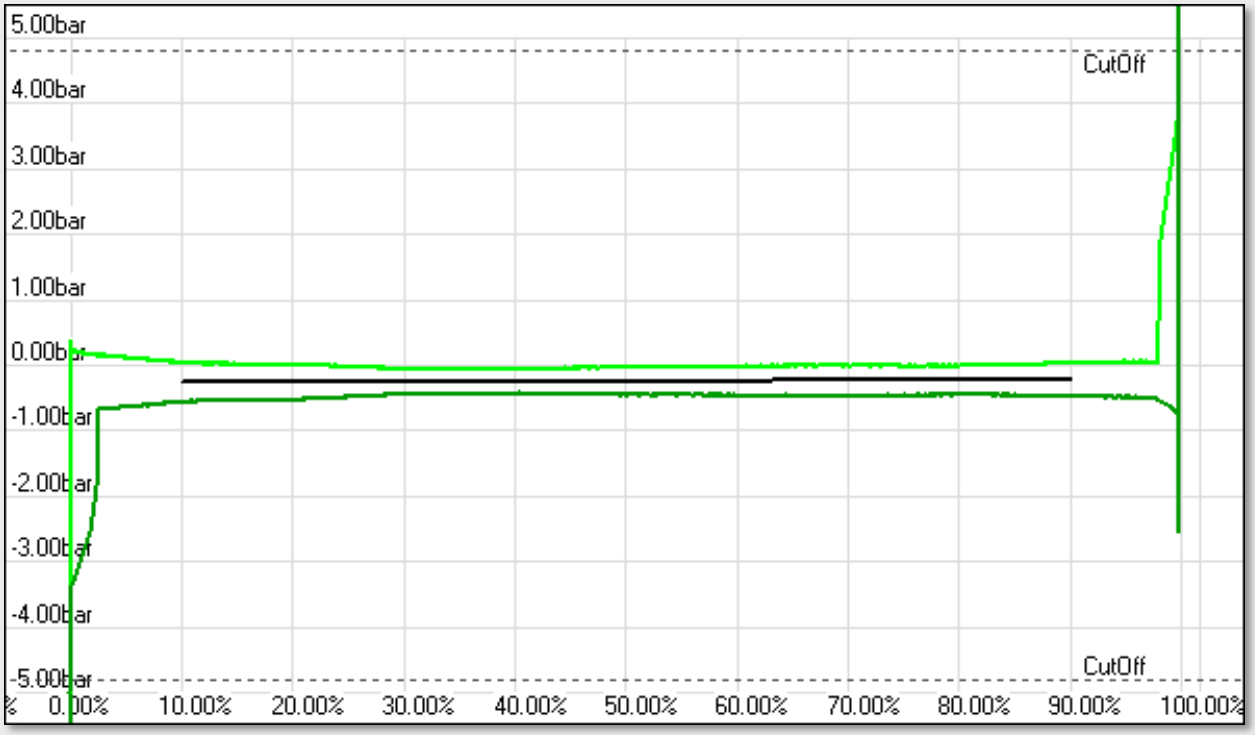
The additional data fields are described below.

Actuator Diameter	Min: 0 [mm] Max: 2000 [mm]	Defines the actuator diameter.
Stroke *Stroke Size*	Min: 0 [mm] Max: 2000 [mm]	Defines the stroke size.
Analysis Range Start	Min: -5.0 [%] 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 [%] 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)



8.4 STEP RESPONSE TEST (OP1)

8.4.1 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.

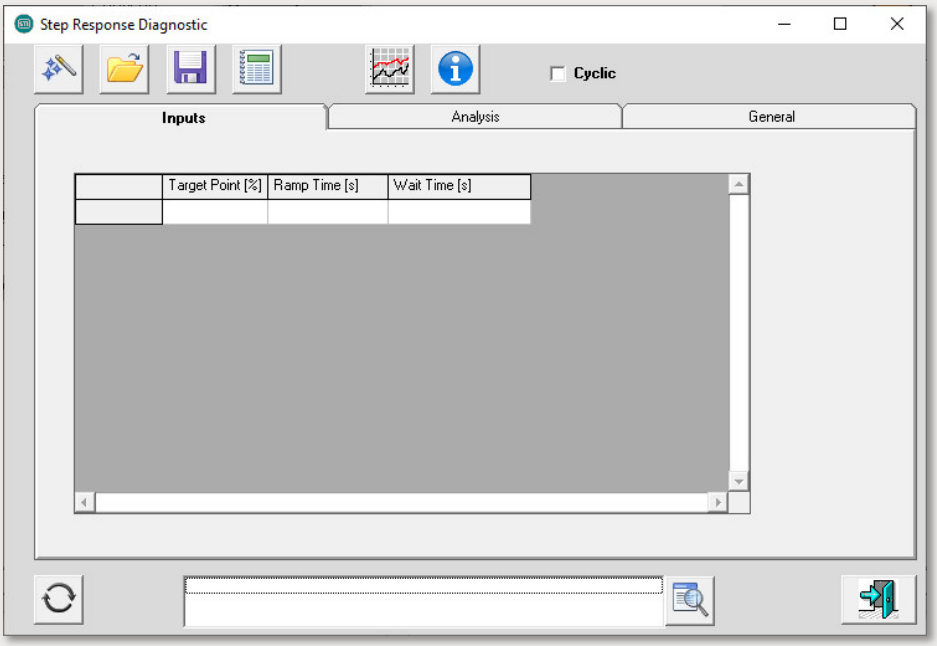
	Please note that this offline test is only available with the Option Pack 1.

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

8.4.2 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.

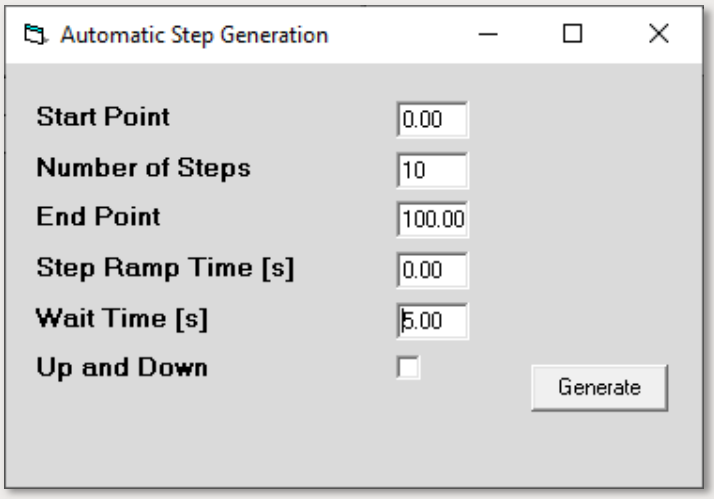
INFO button
Opens a window with help.

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.

8.4.3 MANDATORY INPUTS

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

Mandatory Inputs Panel



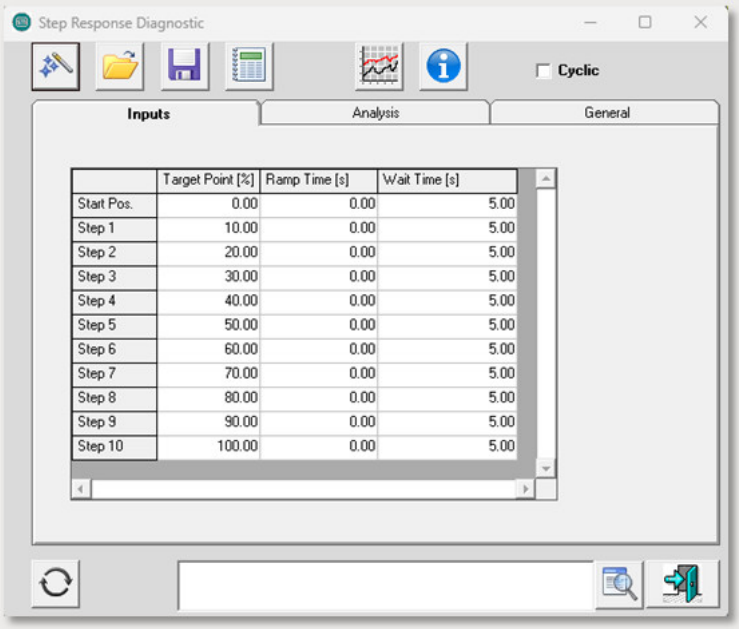
The inputs fields are described below.

Start Point	Min: 0.00 [%] 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] Max: 100 [steps]	Specifies the number of steps to perform.
End Point	Min: 0.00 [%] Max: 100.00 [%]	Specifies the actuator's final position.
Step Ramp Time	Min: 0.00 [s] Max: 32.77 [s]	Refers to the ramp time required to reach the step's target position.

Wait Time	Min: 0.00 [s] 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. If the "Ramp Time" is not zero, the "Wait time" begins following the "Ramp Time".
Up and Down	Enabled 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



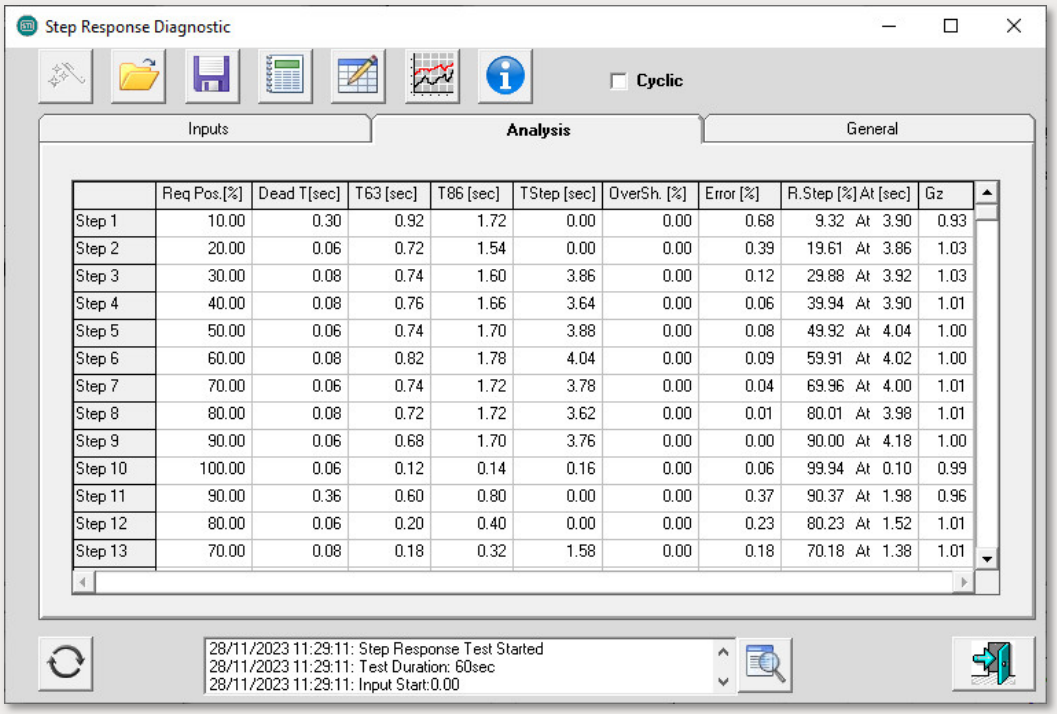
- Click on "Start" to initiate the test.
- To view the graph, click on "Graph".
- To generate a detailed report, click on "Create Report".

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).

8.4.4 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

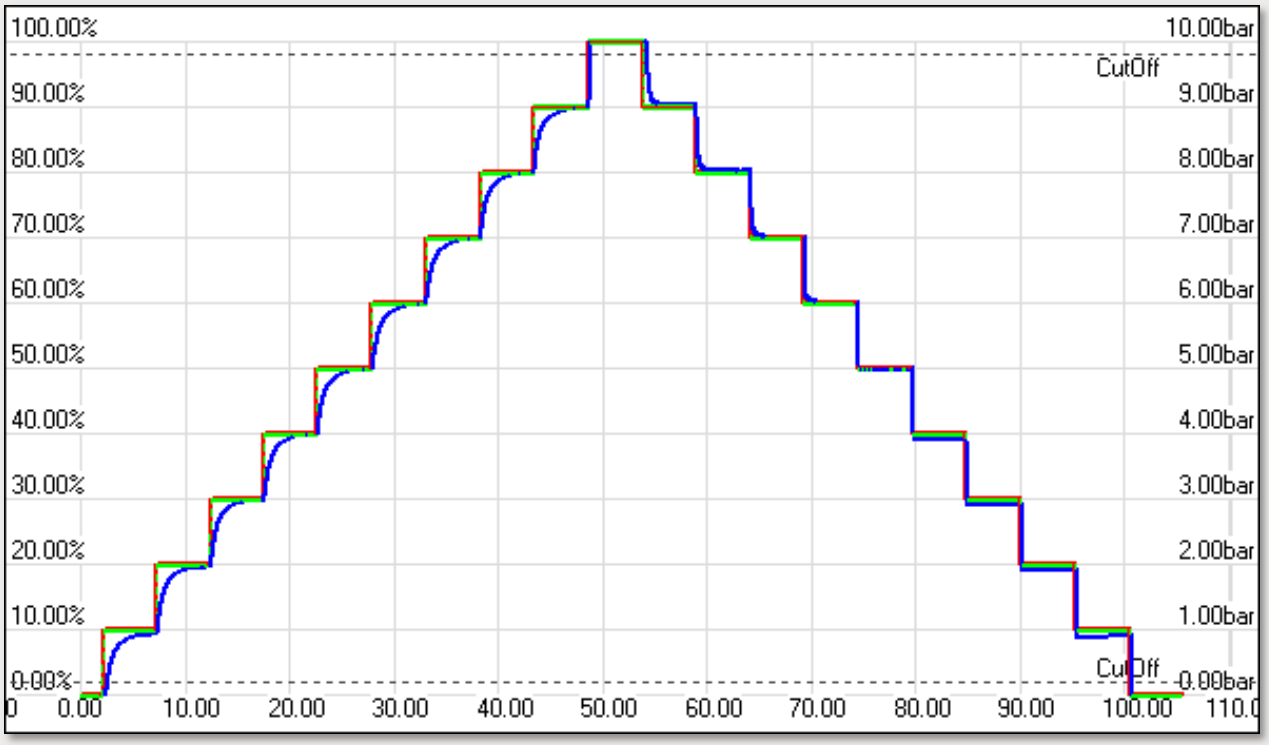
The quick overview of each analyzed parameter is detailed below.

ReqPos *Required Position*	[%]	It indicates the target position requested at each step. This does not represent an actual analysis value.
Dead T *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 *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 *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 *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 *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



8.5 FREQUENCY RESPONSE TEST (OP2)

8.5.1 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.)

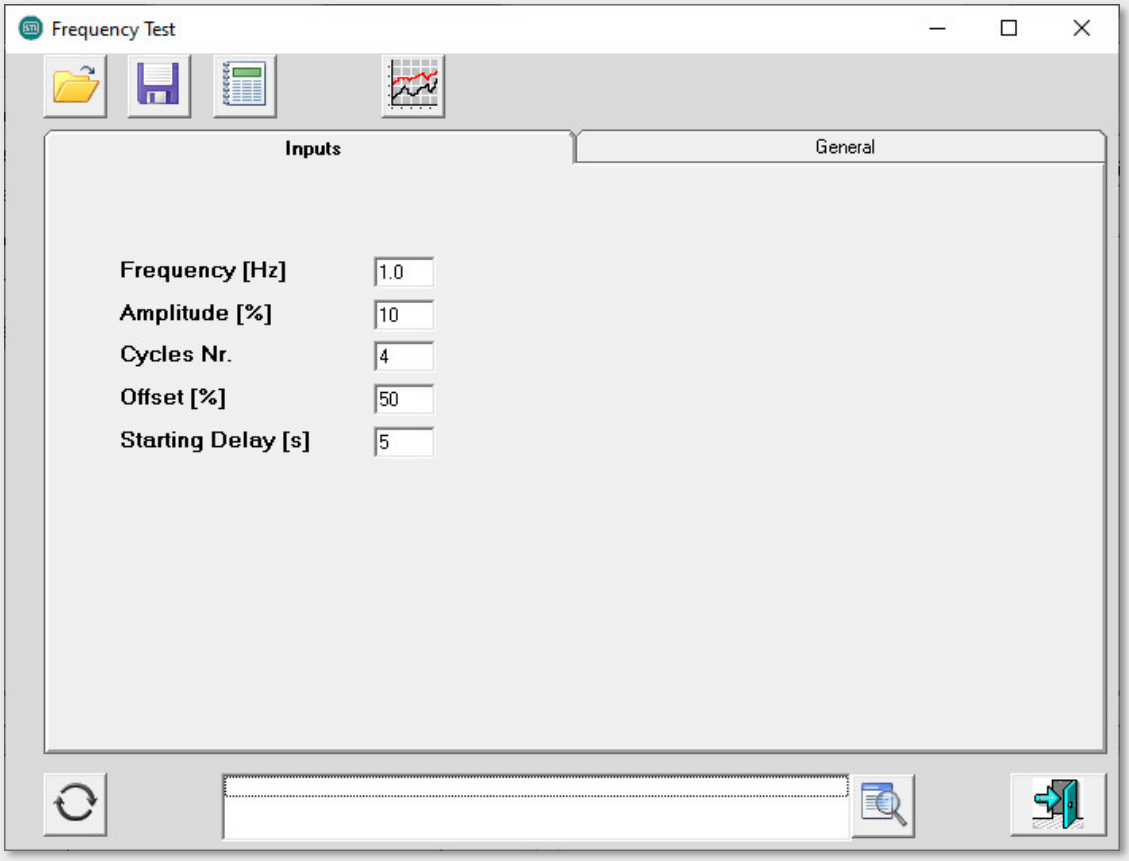
	Please note that this offline test is only available with the Option Pack 2

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

8.5.2 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.

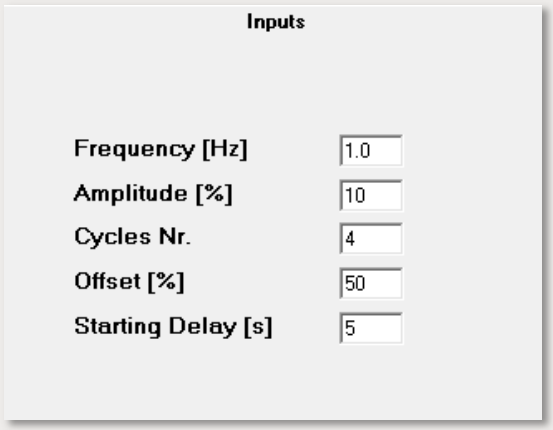
DETAILS button
Shows the details of the step response test process status.

EXIT button
Closes the frequency response test window

8.5.3 MANDATORY INPUTS

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

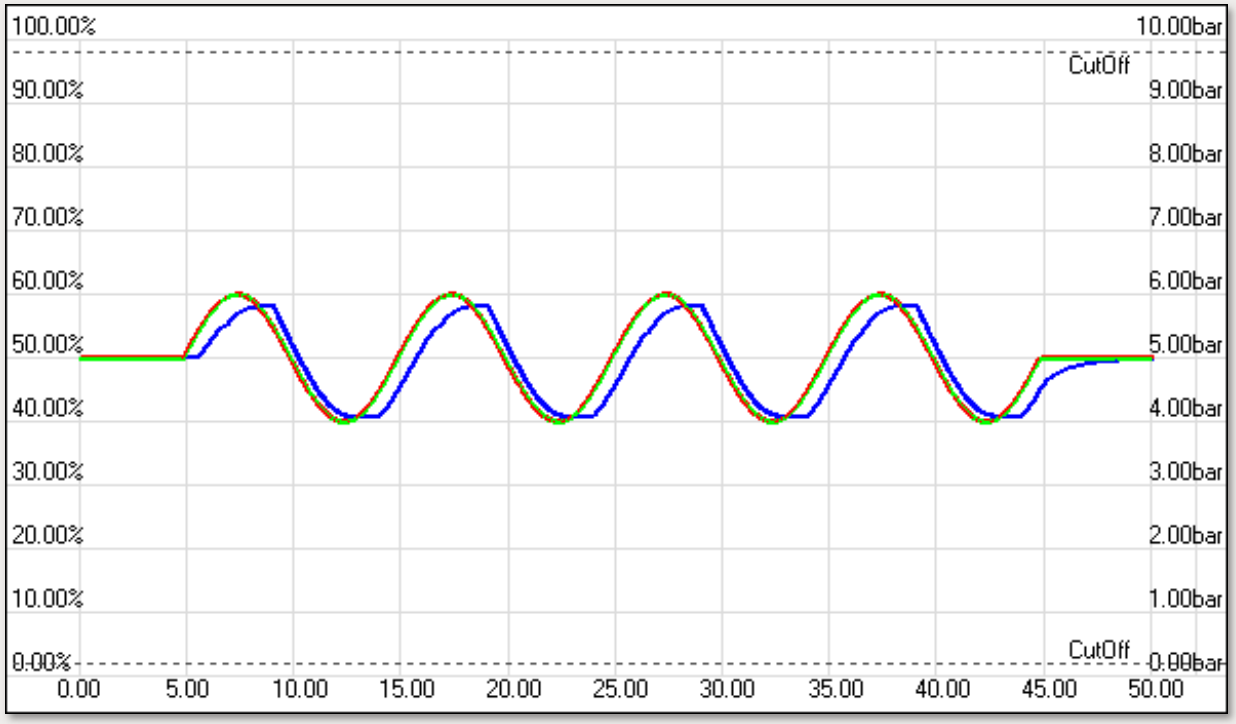
Mandatory Inputs Panel



Frequency	Min: 0.1 [Hz] Max: 10.0 [Hz]	Frequency of the required position sinusoid.
Amplitude	Min: 1 [%] Max: 10 [%]	The amplitude of the sinusoid.
Cycles Nr *Number of Cycles*	Min: 1 [cycles] Max: 255 [cycles]	The number of sinusoid cycles.
Offset	Min: 0 [%] Max: 100 [%]	The offset of the sinusoid.
Starting Delay	Min: 0 [s] 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.

9 LOCAL USER INTERFACE (LUI)

9.1 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.

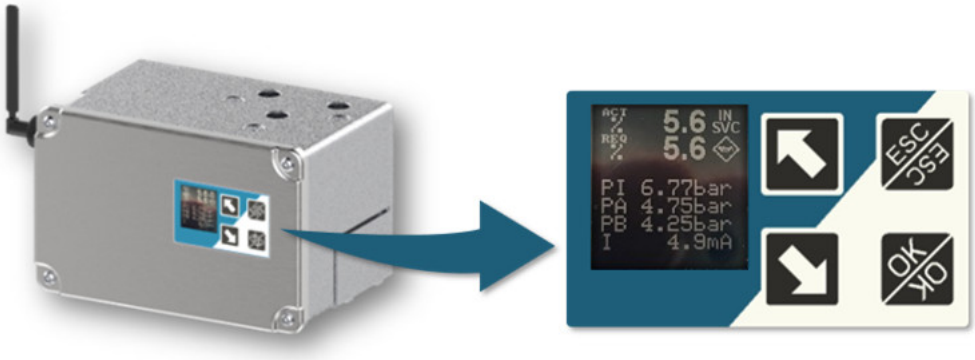


Figure 5 - Local User Interface Panel

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.

9.2 CONTROLS & LCD DISPLAY

9.2.1 BUTTONS

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

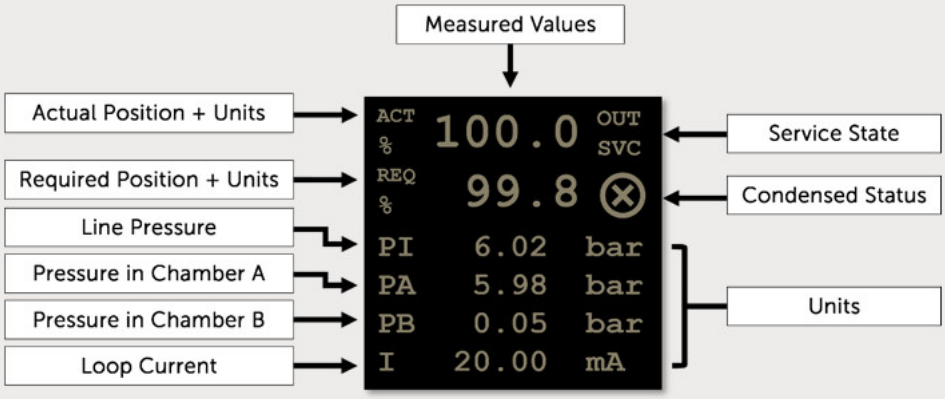
UP *Navigate Up or Increase*		ESC *Escape*	
DOWN *Navigate Down or Decrease*		OK Enter or Validate	

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

9.2.2 DISPLAY

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

Main Panel



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

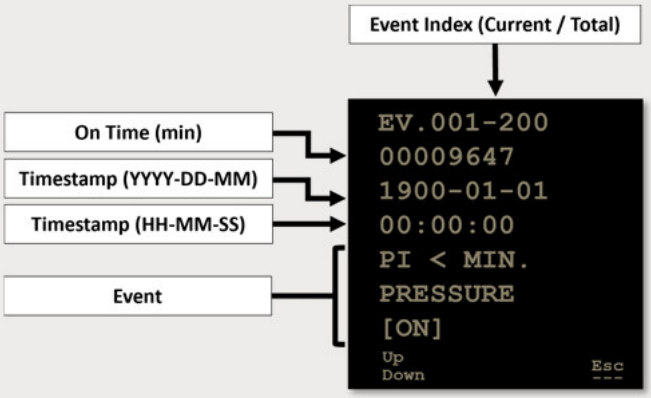
9.2.3 EVENTS

i	Available from FW version **1.1.005**

To view the list of recorded events, make sure to be on the main panel and press "UP" (or "DOWN").
You will see the latest recorded event, together with its timestamp. To view older events, press "DOWN", to view younger events, press "UP". You can always leave this view by pressing "ESC".

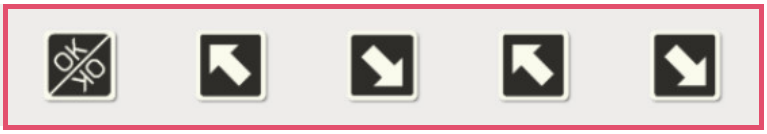
For more information about the meaning of the events, please refer to the chapter 4.6.1 EVENT LOGS.

Events



9.2.4 PASSWORD

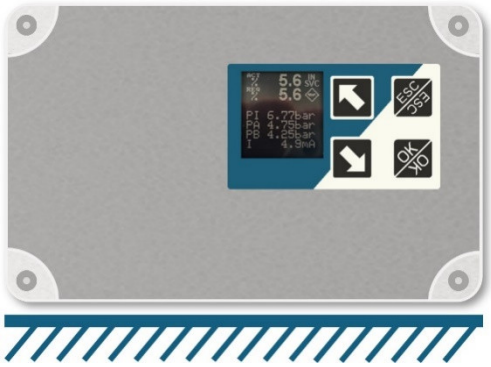
To access the menus, a 5 digit pin code is requested. To enter the pin code, press "OK" and then type the sequence shown below.

PIN CODE 

9.2.5 DISPLAY ORIENTATION

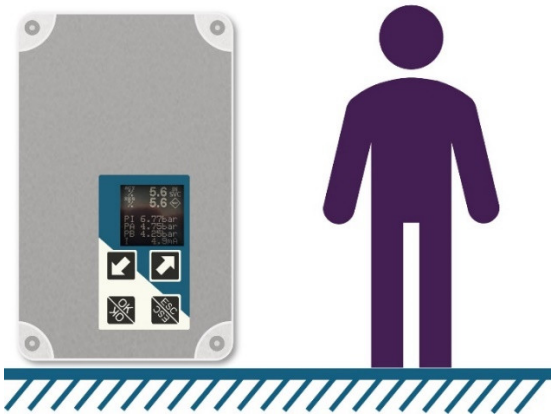
Depending on the actuator, the positioner can be mounted either vertically or horizontally. This in turn requires the adjustment of the Local User Interface (LUI) orientation to ensure optimal readability and user experience.

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.

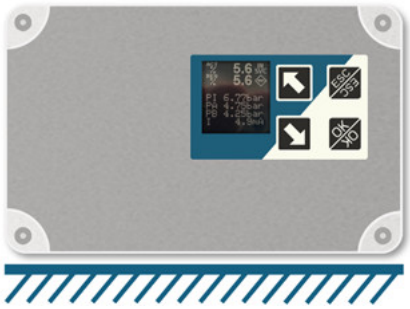


LUI CORRECT ORIENTATION

LUI WRONG ORIENTATION

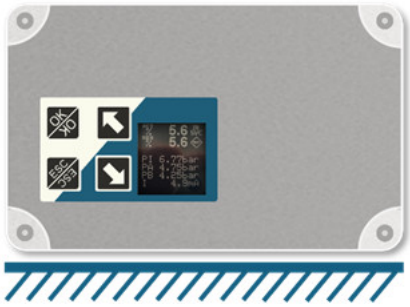
To adjust the display orientation, follow the steps below.

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

9.3 MENU STRUCTURE

9.3.1 ROOT MENUS

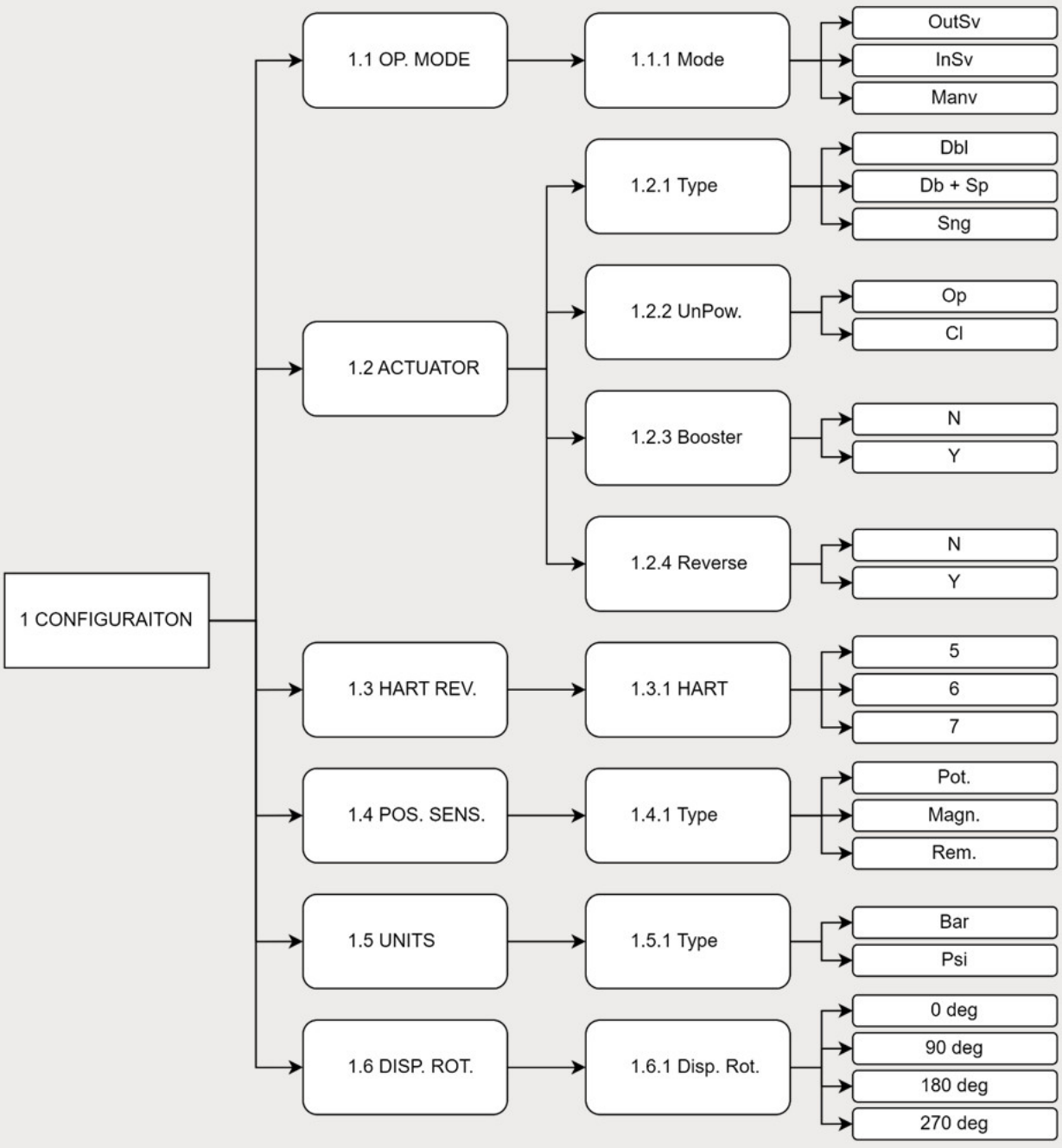
The Local User Interface (LUI) is organized into seven root menus, each providing access to different items of the positioner's configuration and information.

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. (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.

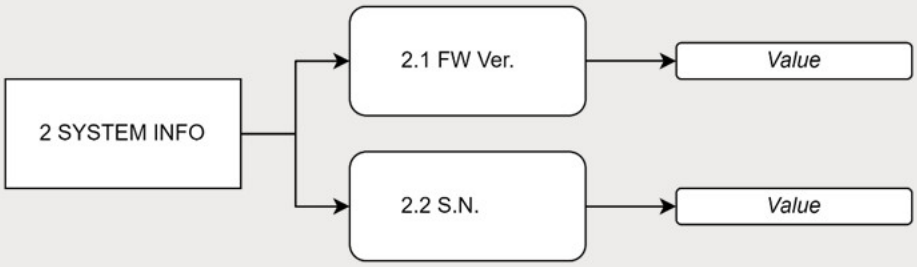
9.3.2 HIERARCHICAL MENU LAYOUT

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.

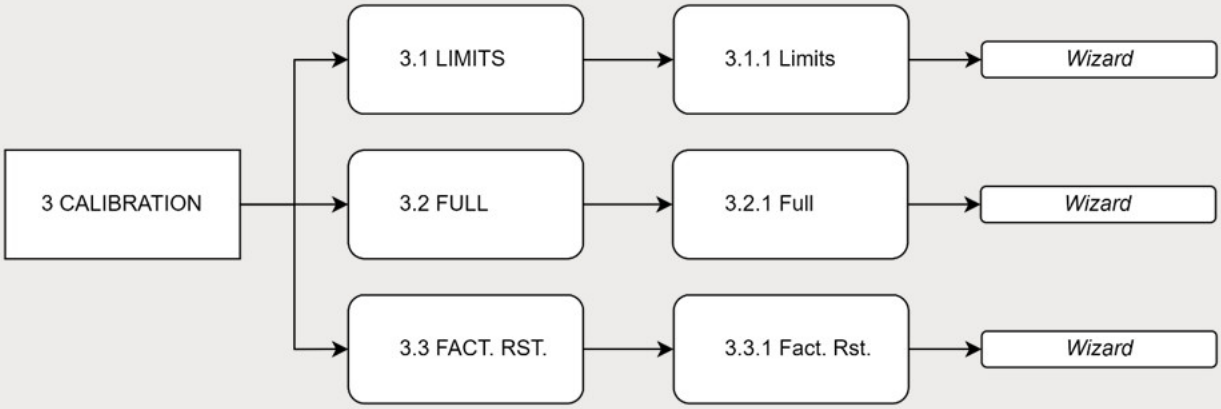
1 CONFIGURATION



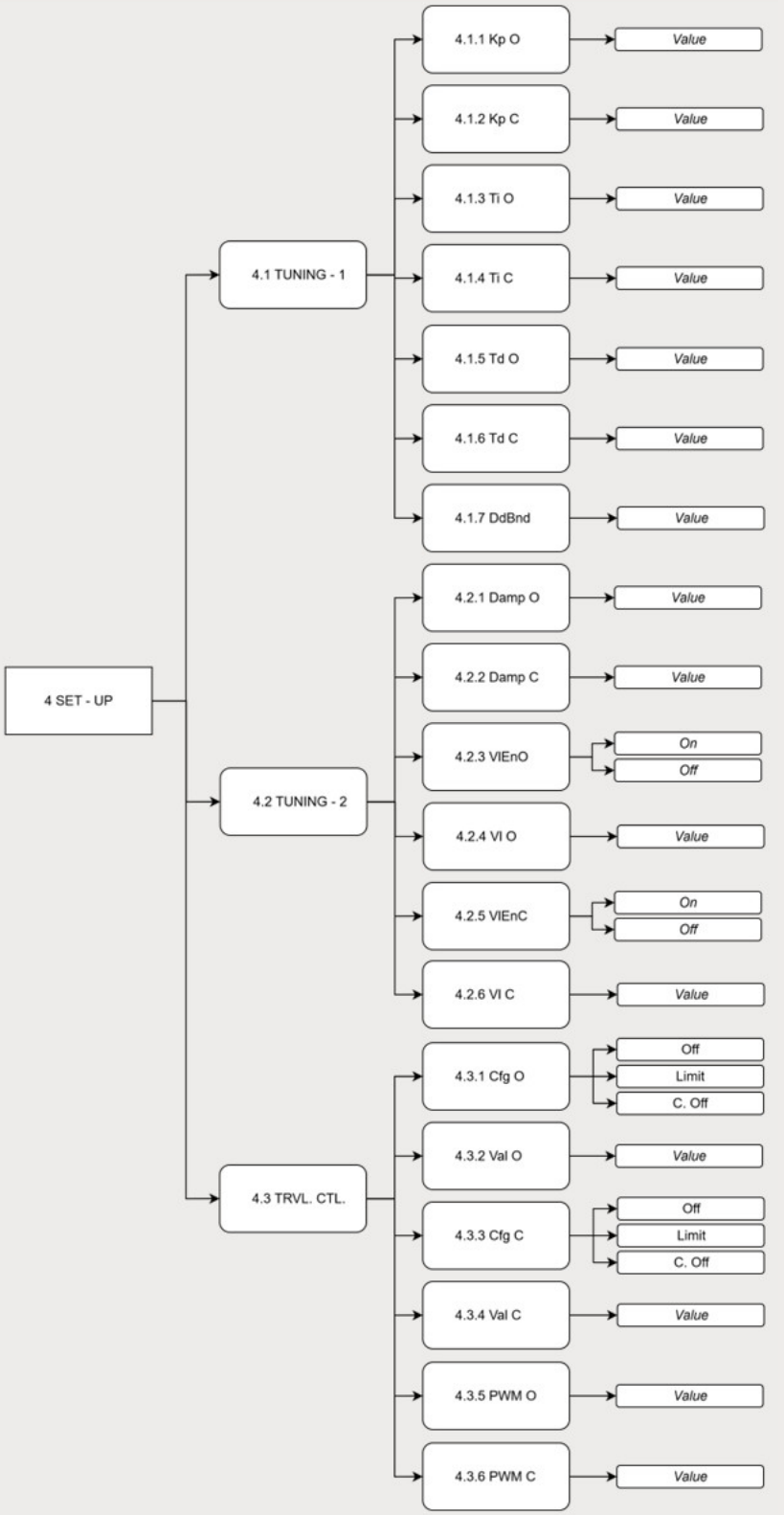
2 SYSTEM INFO



3 CALIBRATION



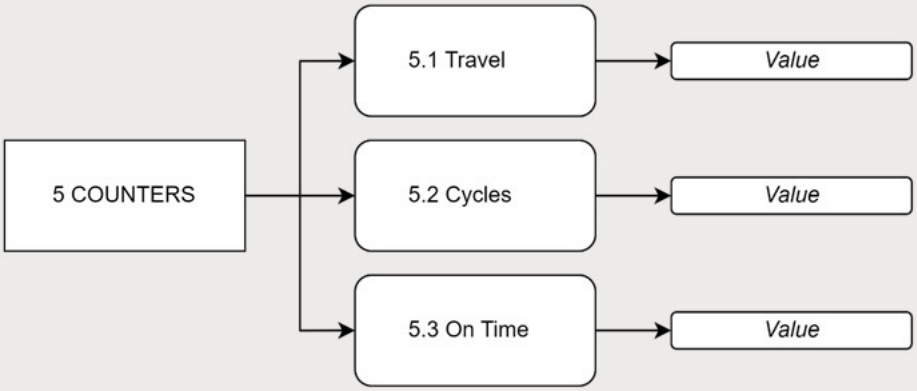
4 SET-UP



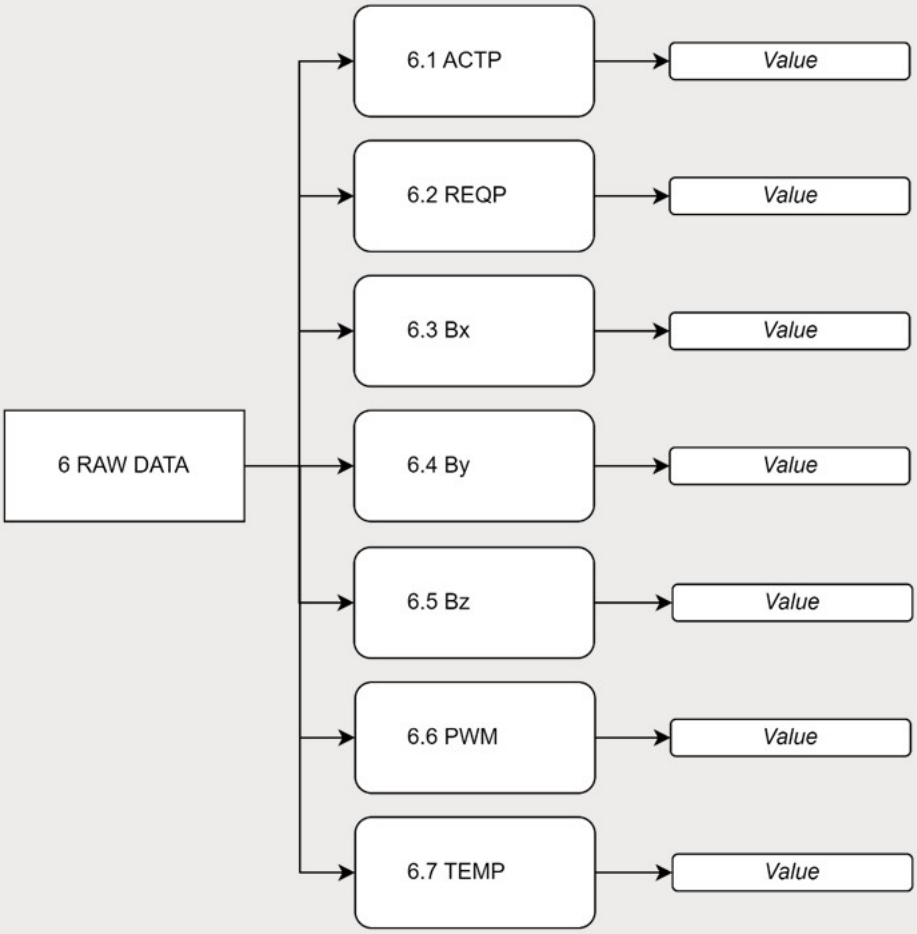
From FW version **1.1.006**

Updated Menu: 4.2 Tuning 2
Updated Menu: 4.3 Trvl. Ctl.

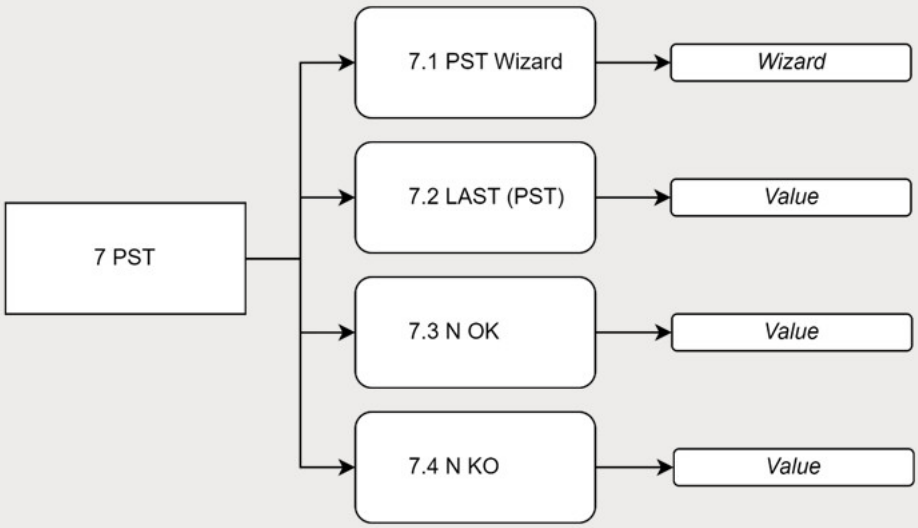
5 COUNTERS



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

10 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.

10.1 OPTION PACK FEATURES

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

10.2 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.

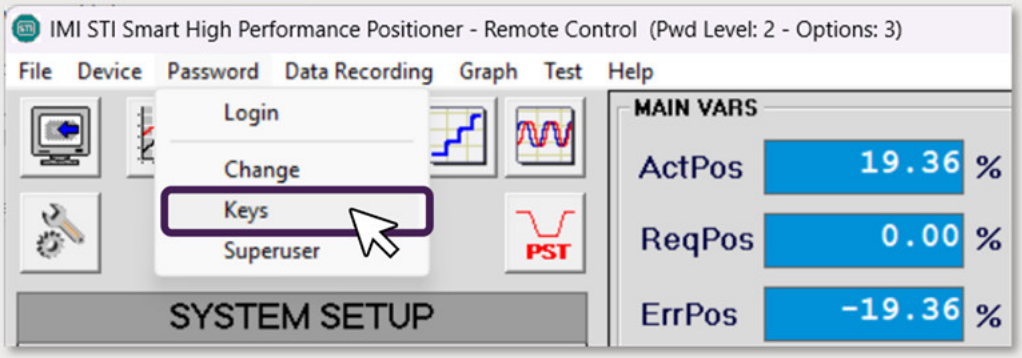
When the trial license expires, only the option packs that had been enabled previously remain active. If a code is sent to enable option packs while the license is active, the code is evaluated only upon the expiration of the license.

10.3 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.

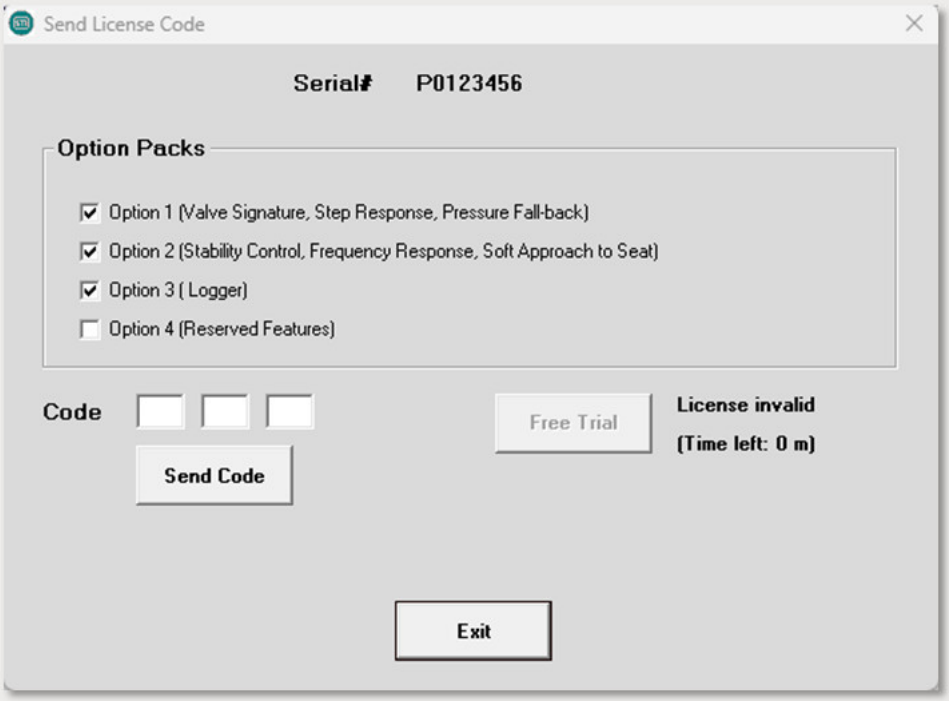
To do this, navigate to the interface ribbon bar, select Password → Keys, and enter the Key.

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 ! In the event of an incorrect key entry leading to the deactivation of a validly licensed option pack, please contact IMI STI. Assistance can be provided in retrieving your key if it has been misplaced or forgotten.

IMI STI - Headquarters
Via Dei Caravaggi 15
24040 Levate (BG) Italy

Tel. +39 035 2928.2
Fax +39 035 2928.247

IMI Critical Engineering
Lakeside, Solihull Parkway
Birmingham Business Park
Birmingham B37 7XZ
United Kingdom

Tel. +44 (0)121 717 3700
Fax +44 (0)121 717 3701

www.stiactuation.com
www.imi-critical.com
imisti.sales@imicritical.com