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SVI™ II AP
Advanced Performance Digital Positioner

Quick Start Guide (Rev. AE)



Baker Hughes Data Classification: Public

About this Guide

This Quick Start Guide applies to the following instruments and supported software: SVI II AP and SVI II AP / AD with:

- Firmware version 3.1.1, 3.1.2, 3.2.1, 3.2.3/4.1.1, 3.2.5/5.1.1 and 3.2.7/5.1.3.
- *ValVue*™ suite version 2.40.0 or greater (including PRM Plug-In & AMS SNAP-ON)
- DTM version 1.01.0 or greater
- A handheld communicator with DD published for SVI II AP

The term “positioner” used throughout this manual refers to digital positioner.

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In no case does this manual guarantee the merchantability of the positioner or the software or its adaptability to a specific client needs.

Please report any errors or questions about the information in this manual to your local supplier or visit valves.bakerhughes.com.

DISCLAIMER

THESE INSTRUCTIONS PROVIDE THE CUSTOMER/OPERATOR WITH IMPORTANT PROJECT-SPECIFIC REFERENCE INFORMATION IN ADDITION TO THE CUSTOMER/ OPERATOR’S NORMAL OPERATION AND MAINTENANCE PROCEDURES. SINCE OPERATION AND MAINTENANCE PHILOSOPHIES VARY, BAKER HUGHES COMPANY (AND ITS SUBSIDIARIES AND AFFILIATES) DOES NOT ATTEMPT TO DICTATE SPECIFIC PROCEDURES, BUT TO PROVIDE BASIC LIMITATIONS AND REQUIREMENTS CREATED BY THE TYPE OF EQUIPMENT PROVIDED.

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Document Changes

Version/Date	Changes
H/12-2010	Changes ES-699 doc to Rev N. See Appendix A
J/03-2011	Changes ES-699 doc to Rev P. See Appendix A
K/12-2011	Added description and procedures relevant to introduction of the high throughput version. ES-699 updated.
L/10-2012	Changed the specifications to reflect single acting supply pressure of up to 100 and double-acting up to 150 psi.
M/09-2013	Added the Load Limits sections and a cross reference to it from the wiring installation. Updated ES-699 to Rev. Y.
N/10-2015	Updated the Load Limits section. Updated ES-699 to Rev. AA. Updated Disclaimer statement. Added information on position retransmit switches. Removed Remote Positioner Installation.
P/12-2015	Added section and Warning on installation in a natural gas environment. Update the ES-699 to Rev. AB. Added instructions for wiring Position Retransmit. Changed references to ValVue software to reflect ValVue 3. Added Device Identification information.
R/04-2016	Made changes to indicate upgrades for HART® 7 (Squawk command and firmware areas).
T/09-2016	Note: Rev S skipped. Changed firmware references for 3.2.7/5.1.3. Changed download site throughout.
U/03-2017	Added section on compliance voltage testing. Changed references to HART® Foundation to Field Comm. Changed software download section. Added Notes on Aggressiveness. Added note on DI and PV switch use. Updated ES-699 to Rev AC.
V/12-2017	Updated Optional Switches section. Updated Intrinsic Safety images. Added notes for PV and DI to card interface drawing. Change ES-699 to Rev AD.
W/01-2018	Updated Optional Switches section.
Y/06-2018	Note: Rev X skipped Updated Optional Switches section.Added help contacts. Amended Burst mode sections and added Tri-loop configuration.
AA/01-2020	Note: Rev Z was skipped. Updated ES-699 to Rev AE. Rebranded to Baker Hughes standards. Changed torque for cover from 50 to 55.
AB/08-2021	ES-699 instructions removed.
AC/12-2021	Added Appendix E: Customs Union Information
AD/04-2025	Appendix E : Address changes
AE/11-2025	Appendix E : Deer Park removed

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Safety Information

This section provides safety information and defines the documentation symbols.

Safety Symbols

WARNING



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

CAUTION



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

NOTE



Indicates important facts and conditions.

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SVI II AP Product Safety

The **Masoneilan**™ SVI II AP digital valve positioner is intended for use with industrial compressed air or, natural gas systems only.

NOTE



See ***Hazardous Location Installation*** on page 75 for natural gas safety information.

Ensure that an adequate pressure relief provision is installed when the application of system supply pressure could cause peripheral equipment to malfunction. Installation must be in accordance with local and national compressed air and instrumentation codes.

Limit State Parameter - do not exceed maximum air pressure indicated on the nameplate, because personal injury and equipment malfunction could result.

General installation, maintenance or replacement

- Products must be installed in compliance with all local and national codes and standards by qualified personnel using safe site work practices. Personal Protective Equipment (PPE) must be used per safe site work practices.

- Ensure proper use of fall protection when working at heights, per safe site work practices. Use appropriate safety equipment and practices to prevent the dropping of tools or equipment during installation.

- Under normal operation, compressed supply gas is vented from the SVI II AP to the surrounding area, and may require additional precautions or specialized installations.

Intrinsically Safe Installation

Products certified as explosion proof or flame proof equipment or for use in intrinsically safe installations **MUST BE**:

- Installed, put into service, used and maintained in compliance with national and local regulations and in accordance with the recommendations contained in the relevant standards concerning potentially explosive atmospheres.

- Used only in situations that comply with the certification conditions shown in this document and after verification of their compatibility with the zone of intended use and the permitted maximum ambient temperature

- Installed, put into service and maintained by qualified and competent professionals who have undergone suitable training for instrumentation used in areas with potentially explosive atmospheres.

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WARNING *Before using these products with fluids/compressed gases other than air or for non-industrial applications,consult the factory. This product is not intended for use in life support systems.*



WARNING *Under certain operating conditions, the use of damaged instruments could cause a degradation of the performance of the system which may lead to personal injury or death.*

Under certain operating conditions the SVI II AP High Flow unit can produce noise levels greater than 85 dBA. Perform proper site monitoring and testing to verify the need for engineering or administrative controls to eliminate or reduce hazardous noise levels.

Installation in poorly ventilated confined areas, with any potential of gases other than oxygen being present, can lead to a risk of personnel asphyxiation.

Use only genuine replacement parts which are provided by themanufacturer, to guarantee that the products comply with the essential safety requirements of the European Directives.

Changes to specifications, structure, and components usedmay not lead to the revision of this manual unless such changes affect the function and performance of the product.

Masoneilan Help Contacts

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

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Installation and Set Up

Introduction

The SVI II AP provides for reliable operations of control valves with utmost simplicity in setup and commissioning. It is uniquely equipped with a non-contact travel sensor allowing for accurate positioning and maintenance free operations. The pneumatic train of the SVI II AP is a dual-stage amplification system with stainless steel wetted parts for durability.

Intrinsically Safe, Flameproof and Explosion proof designs are offered as standard. The High Flow version is capable of 2.2 Cv air throughput. Some of the SVI II AP options include marine grade construction, local indicating LCD with push buttons for local calibration, position transmitter, discrete outputs, double-acting (not available for the High Flow version) and a remote mount position-sensing mechanism. Using HART® eDDL and FDT-DTM technologies, the Masoneilan SVI II AP digital valve positioner provides interoperability with leading control systems suppliers.



Figure 1 SVI II AP Digital Positioner

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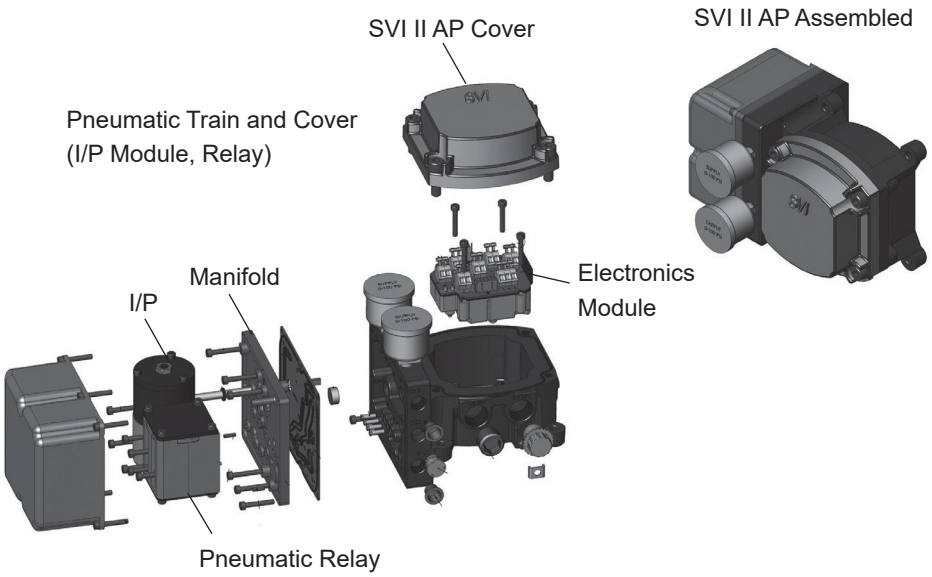


Figure 2 - SVI II AP Components

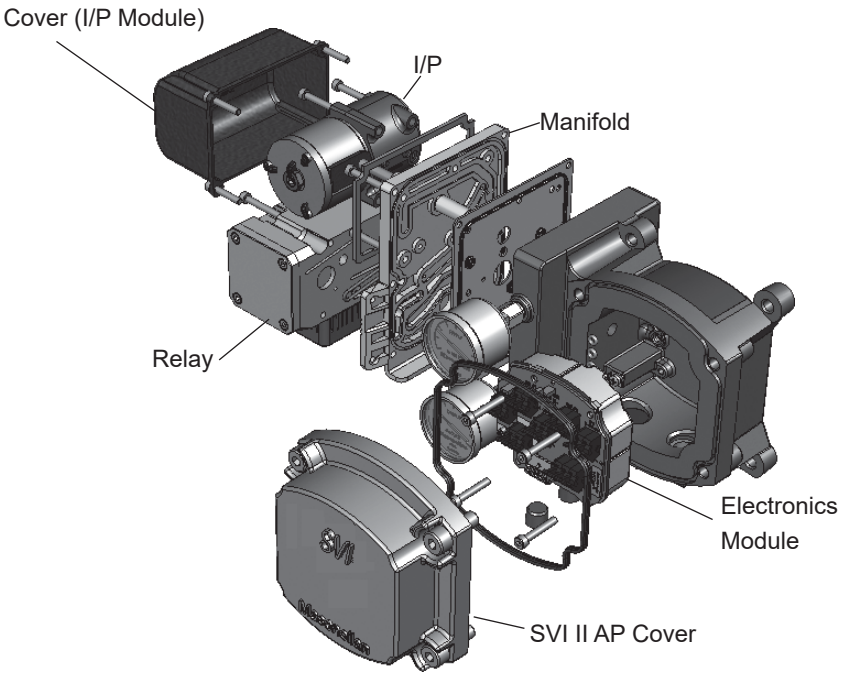


Figure 3 - SVI II AP High Flow Components

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Using the Quick Start Guide

The SVI II AP Quick Start Guide is intended to help experienced field personnel install, setup, and calibrate an SVI II AP in an efficient manner. This document provides basic installation and setup instructions and is not intended to replace the in-depth information contained in the SVI II AP Instruction Manual, downloadable at valves.bakerhughes.com/resource-center.

If you experience problems that are not documented in this guide refer to the SVI II AP Instruction Manual, or call your local Baker Hughes representative. Sales offices are listed on the last page of this document.

Compliance voltage testing is best done before installation. See ***Determining an SVI Positioner Compliance Voltage in a Control System*** on page 87.

The steps necessary to complete the SVI II AP installation and software setup are outlined in Table 1.

Table 1 - SVI II AP Installation Steps

Step No.	Procedure	Reference
1	Attach mounting bracket to the actuator.	See page 29 for rotary valve and reciprocating valve instructions.
2	Install the SVI II AP magnetic assembly (rotary valves only).	See page 29 for instructions.
3	Assemble the SVI II AP on the bracket that is mounted to the valve actuator.	See page 29 for rotary valve and reciprocating valve instructions.
4	Install the Remote Position Sensor, if necessary.	See Masoneilan Valve Solutions Remote Position Sensor Quick Start Guide for instructions.
5	Connect the pneumatic tubing to the SVI II AP.	See page 37 for instructions. See ***Natural Gas Supply Considerations*** on page 37 for notes on naturals gas installation.
6	Connect the air supply to the SVI II AP.	See page 37 for instructions.
7	Connect the positioner to the HART® Control Loop segment by installing the SVI II AP wiring.	See page 41 for instructions.
8	Configure/calibrate using ValVue™.	See page 54 and page 58 for instructions.
	Configure/calibrate using a HART® Hand Held Communicator.	See page 59 for instructions.

WARNING *Failure to adhere to the requirements listed in this manual may cause loss of life and property.*



Before installing, using, or carrying out any maintenance tasks associated with this instrument, READ THE INSTRUCTIONS CAREFULLY. Refer to ***Hazardous Location Installation*** *on page 75 of this guide for detailed instructions.*

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Single Acting Positioner

The supply and output connections for the SVI II AP, located on bottom of the pneumatic block, are tapped 1⁄4" NPT. The output port 1 is toward the front while the supply is toward the back. Two pressure gauges, output on top, supply port on bottom, are located on the front of the pneumatic block.

The supply and output connections for the SVI II AP High Flow (Figure 5 on page 16), located on bottom and leftside of the pneumatic block, are tapped 1⁄2" NPT.

Maximum allowable air supply pressure to the SVI II AP varies according to actuator, valve size, and valve type. Refer to the serial plate of the valve to know the specified supply pressure; it must never be less than the maximum spring pressure +5 psi.

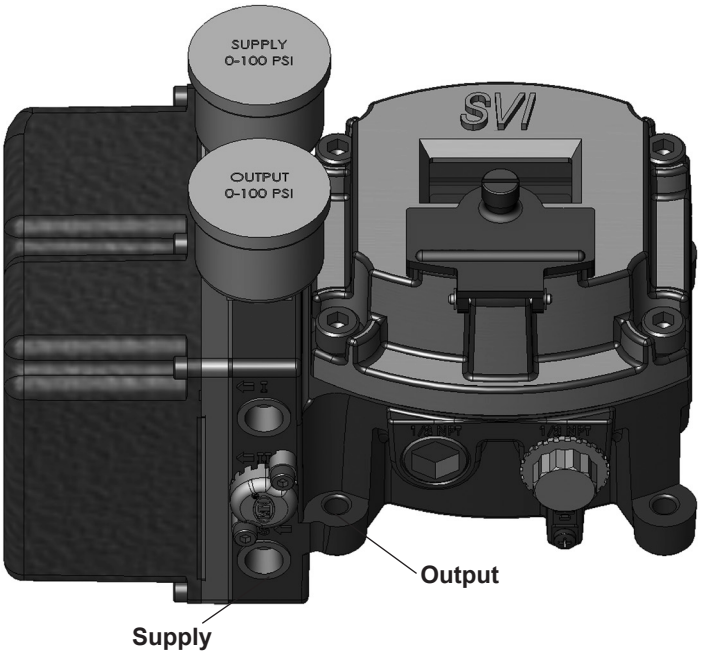


Figure 4 - Air Ports on Single Acting Positioner

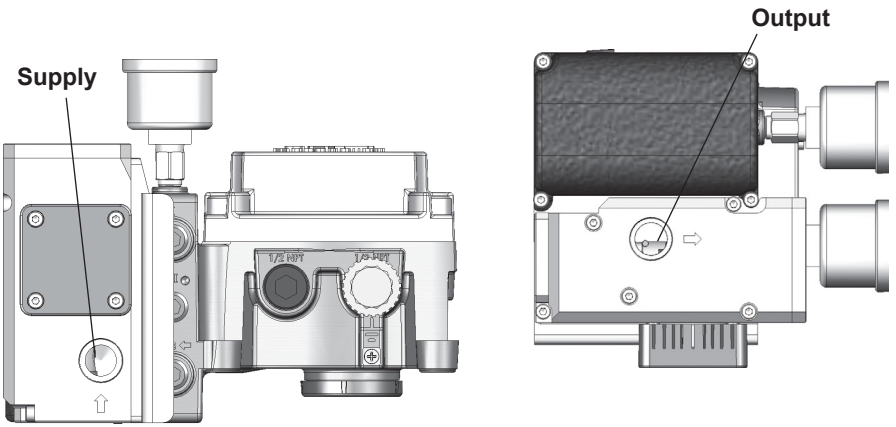


Figure 5 - SVI II AP High Flow Air Ports on Single Acting Positioner

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Double Acting Positioner

Connect Output 1, labeled (←I) to the inlet port of the actuator and Output 2, labeled (←II) to the opposing actuator port (see Figure 6).

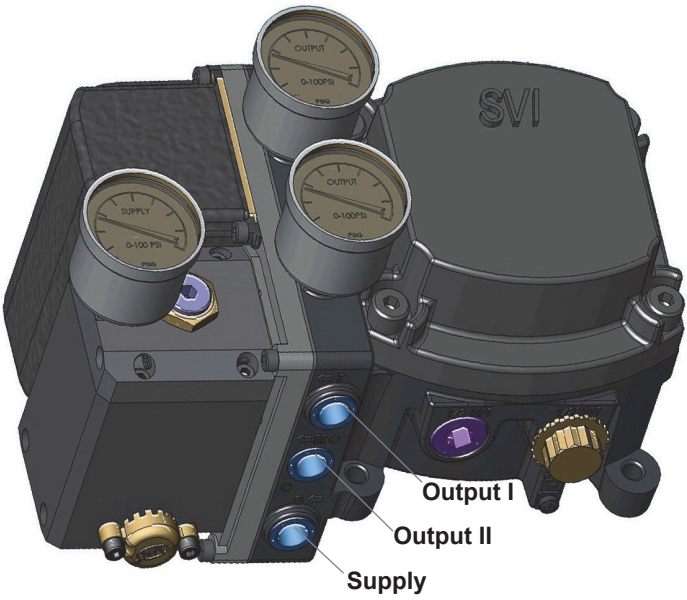


Figure 6 - Air Ports on Double Acting Positioner

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Pushbuttons and Local Display

This section covers the optional local interface consisting of the LCD alphanumeric display and pushbuttons. Operation of the SVI II AP Digital Valve Positioner as a local device is controlled through the optional device-mounted pushbuttons and digital display, shown in Figure 7 on page 17. Using the display you can read the input signal, valve position, and actuator pressure. The display sequences from one variable to the next every 1.5 seconds.

Using the pushbuttons you can exit from operating mode at any time and step through a menu structure to perform a wide range of manual operation, calibration, configuration, and monitoring functions that are described later in this section.

ValVue is used to perform all diagnostics functions. The pushbuttons do not support diagnostics functions.

The SVI II AP has two operational modes: Normal Operating mode and Manual mode and two setup modes, Configuration and Calibration. The SVI II AP also has two modes for handling of faults and power-up: Reset and Failsafe. When commissioning or checking a control valve with SVI II AP fully installed the following steps are recommended:

- Change mode to Manual mode
- Examine and adjust all CONFIGuration items
- Enter Calibration mode
- Run STOPS to automatically calibrate stroke
- Run autoTUNE to set dynamic response
- Examine the device STATUS
- Introduce manual set point changes to verify dynamic performance

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Pushbuttons

The local pushbuttons are located behind a hinged cover, directly below the display window. To open the cover loosen the screw and swing the cover down. Always re-fasten the cover after use to protect the pushbuttons from environmental contamination.

The three pushbuttons perform the following functions:

- *Left Button* - Marked with *, permits you to *select* or*accept* the value or parameter option currently displayed.

- *Middle Button* - Marked —, permits you to move back through the menu structure to the previous item in themenu or decrement the value currently shown in the digital display. When used to decrease a displayed value, holding the button down causes the value to decrease at a faster rate.

- *Right Button* - Marked +, permits you to move forward through the menu structure to the next item in the menu,or to increment the value currently shown in the digital display. When used to increase a displayed value holding this button down causes the value to increase at a faster rate.

NOTE

When an exclamation point (!) appears in the SVI II AP display window, it indicates that there is instrument status available.

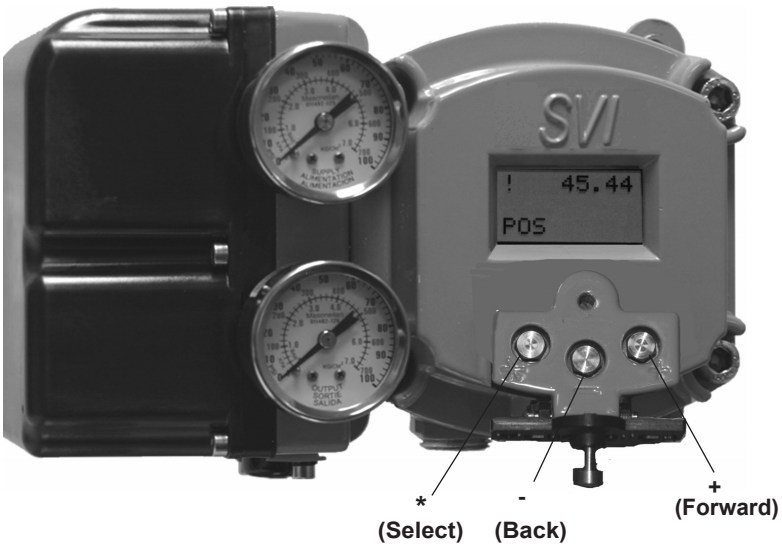


Figure 7 - SVI II AP Display Pushbuttons

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Pushbutton Locks and Configuration-Lock Jumper

Before performing any of these functions with the local display you must first ensure that the pushbuttons are placed in the unlocked mode using ValVue. The positioner is provided in the unlocked mode. See ValVue documentation for more details.

The SVI II AP offers several levels of accessibility. It may be desirable, after initial setup, to lock the pushbuttons so that the SVI II AP parameters cannot be inadvertently changed by the buttons. Several levels of pushbutton locks are provided.

Table 2 - Pushbutton Lock Security Level

Level	Access
Security Level 3	Allow Local Buttons: Buttons on the SVI II AP are fully enabled.
Security Level 2	Lock Out Local Calibration and Configuration: Use the buttons to perform operations in normal operating mode and manual mode. Do not go to configure or calibrate mode.
Security Level 1	Lock Out Local Manual: Examine variables in normal operating mode but do not put the valve in manual operating mode. Access to calibrate or configure modes is not available.
Security Level 0	Lock Out All Buttons: The buttons are disabled (level 0).

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Hardware Configuration Lock

Additional security is achieved using the hardware configuration-lock jumper shown in Figure 8. When set to the secure position, shorting the two-pin header, configuration and calibration are not permitted by the local interface or by remote communications. Pushbuttons, ValVue and handheld are locked out, except to examine configuration, calibration, and position. This is similar to Security Level 1 shown in the Pushbutton Lock Security Level table.

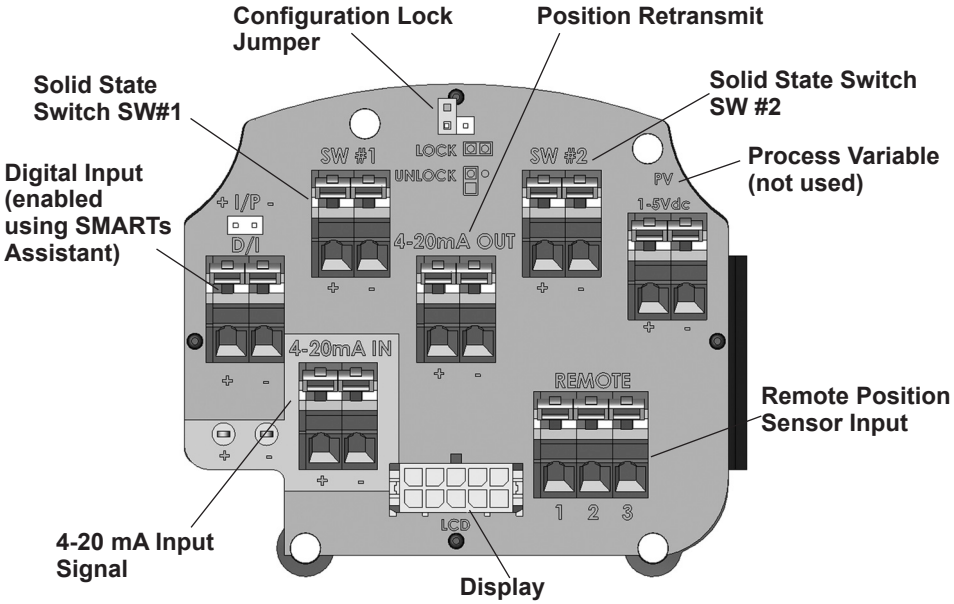


Figure 8- Connections to Electronics Module (via Terminal Board)

NOTE

The PV (Process Variable is not used for the SVI II AP. The Digital Input (DI) is activated using SMARTsAssistant, which is downloaded at:
https://valves.bakerhughes.com/resource-center

The DI switch is a dry contact switch. As an example,the switch may be utilized as a mechanical limit switchbackup. The most common way to read the switch status is via the DTM or DD. The input to the switch can be automated by sending Device Variable 8 (DI) via CMD 9 or CMD 33 from a DCS.

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ValVue Software

Not only does ValVue provide the ability to quickly and easily set up the SVI II AP you can also monitor operation and diagnose problems with ValVue's advanced diagnostic capabilities.

NOTE



You must use the ValVue3 software and the SVI II AP DTM software to support HART® 7. ValVue 2.x will not work.

System Requirements

Minimum requirements for all versions of ValVue software are Windows® 2003 Server (SP3), Windows® 2008 Server (SP2), XP, Windows® 7, Windows® 8, Windows® Server 2012, 64 MB RAM, and a serial or USB port connected to a HART® modem. For software installation, a connection to the internet to download ValVue and the SVII AP DTM.

ValVue and SV II AP DTM Trial Version

You must download the ValVue software and the SVII AP DTM software and install to configure and use the SVI II AP. For the most recent software visit our SVI II AP web site at: *https://valves.bakerhughes.com/resource-center*

The SVI II AP DTM software and the Valve software comes with a trial version of ValVue. For 60 days after the initial installation, The ValVue software provides the FDT frame capability in which the SVI II AP DTM software operates. The SVI II AP DTM software provides the capability of configuring, calibrating, diagnosing, trending and much more. After the 60 trial period ValVue must be registered for use. ValVue functionality includes:

- Setup Wizard
- Set calibration parameters
- Monitor status/error indicators
- Remote calibration of the SVI II AP
- Remote operation of the SVI II AP
- Trend setpoint, valve position, actuator pressure
- Perform diagnostic test procedures (full version only)
- Remote display of valve position, actuator pressure(s)
- Set configuration parameters
- Input/Output configuration
- Remote configuration of the SVI II AP
- Backup and restore configuration (clone device)
- Display comparative test results (full version only)

Advanced and Online Diagnostics

The SVI II AP offers various levels of control valve diagnostics. Up to five pressure sensors that detect circuit board temperature, loop current, and reference voltage, are available for diagnostics.

For more details on the use of ValVue software, refer to the ValVue User's Guide. Contact the factory or your local representative to obtain licensing information.

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Masoneilan Software Download

Download and Install ValVue3

1. Go to the Resource Library (https://valves.bakerhughes.com/ resource-center) and enter ValVue in the search field (arrow in Figure 9).

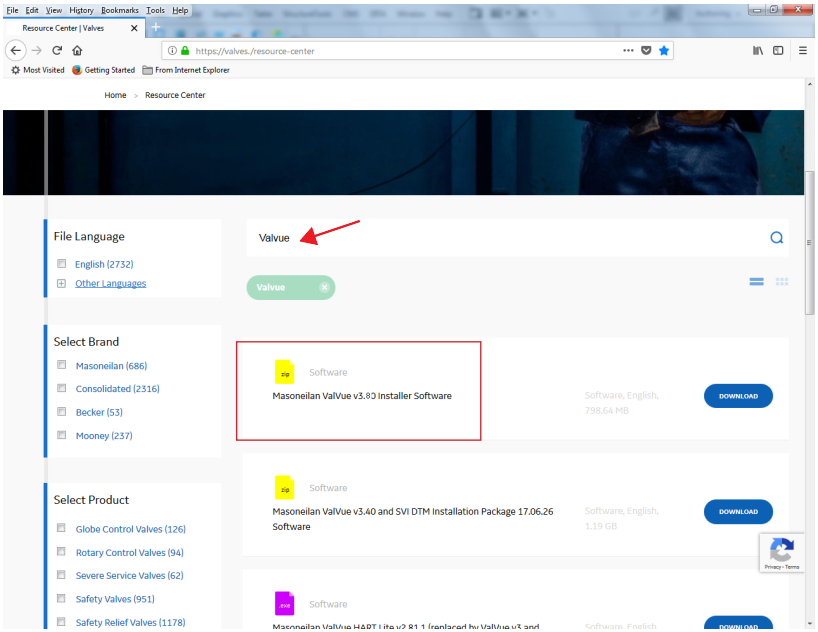


Figure 9 - Download Center: Search for ValVue

The results appear (red box in Figure 9).

2. Use the arrows to move through the selections. Select Download below ValVue and Figure 10 appears.

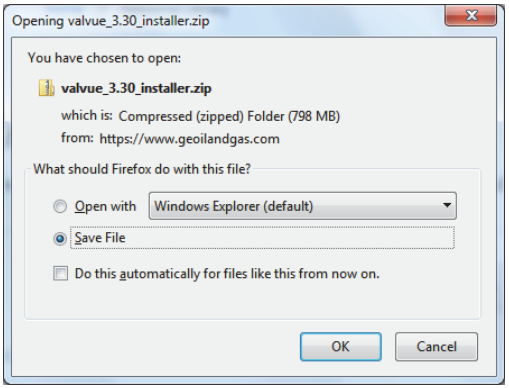


Figure 10 - Opening Dialog

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NOTE



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

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

NOTE



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

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

NOTE



If you are upgrading from ValVue 2.x you must updatethe SQL database location to match ValVue3's.

5. Double-click on the installer and follow the instructions to install.

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Download and Install the SVI II AP DTM

1. Go to the Resource Center (*https://valves.bakerhughes.com/resource-center*) and enter SVI II AP DTM in the search field (red arrow in Figure 11).

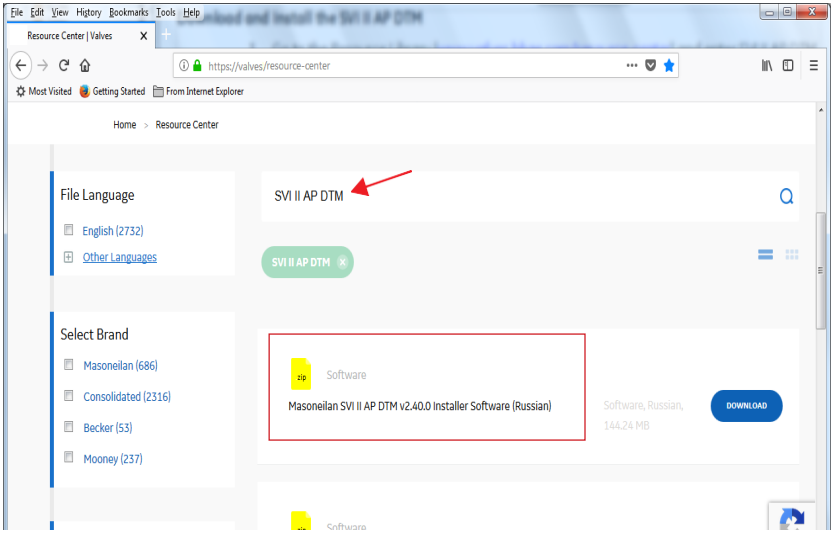


Figure 11 - Download Center: Search for SVI II AP DTM

The results appear (Figure 11).

2. Select **Download** below *SVI II AP DTM* and Figure 12 appears.

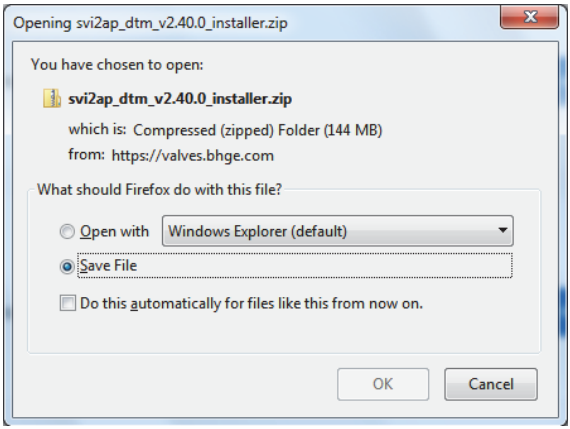


Figure 12 - Opening Dialog

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NOTE



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

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

NOTE



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

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

5. Double-click on the installer and follow the instructions to install.

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Mounting the SVI II AP

This guide provides installation instructions for mounting an SVI II AP on both rotary and reciprocating actuated valves. The mounting process can be broken down into the following:

- Attach the mounting bracket to the actuator.
- Install the magnetic assembly.
- Assemble the SVI II AP on the mounting bracket.

NOTE



The SVI II AP should be mounted with the conduit connections down in order to facilitate drainage of condensate from the conduit.

Necessary Precautions

To avoid injury or the process being affected when installing or replacing a positioner on a control valve, ensure that:

- If the valve is located in a hazardous area make sure the area has been certified as safe or that all electrical power to the area has been disconnected before removing any covers or disconnecting any leads.
- Shut off air supply to the actuator and to any valve mounted equipment.
- Ensure the valve is isolated from the process by either shutting off the process or using bypass valves for isolation. Tag shutoff or bypass valves to guard against a turn-on while work is in progress.
- Bleed air from actuator and check that valve is in its unenergized position.

It is now safe to disconnect and remove any valve mounted equipment that is being replaced.

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For the procedure to mount rotary and reciprocating valves, refer to the Mounting Instructions contained in the valve's Mounting Box kit.

Mounting the SVI II AP on Rotary Valves

This section describes the procedure for mounting the SVI II AP on rotary control valves that have less than 60° rotation, such as a Masoneilan *Camflex*™ II or a Masoneilan *Varimax*™. Figure 13 shows a side view of a Camflex actuator and the SVI II AP actuator mounting brackets.

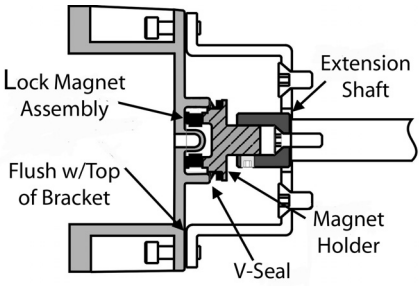


Figure 13 - Camflex with Mounting Bracket (Side View)

Mounting the SVI II AP on a Rotary Actuator

Tools required:

- 3⁄16" Hex Key
- 5⁄32" Hex Key
- 3 mm, 4 mm, 5 mm Hex Key
- 7⁄16" Wrench

To mount the SVI II AP:

1. Attach the SVI II AP rotary mounting bracket to the valve actuator using two (2) 5⁄16 - 18 UNC flat-head cap screws. In the preferred mounting position, the long end of the mounting bracket is on your left when facing the actuator, for any position of the valve and actuator.

2. Bolt the extension shaft to the valve position take-off shaft using a 1⁄4 - 28 UNF socket flathead screw. Secure the machine screw holding the extension shaft with a torque of 144 in-lbs (16.269 N-m).

3. On internal valve pressure the thrust shaft is pushed out to the mechanical stops, usually a thrust bearing. On valves where the valve position take-off is mounted directly on the end of the plug shaft, a Camflex for example, the shaft must be bearing on its stop to properly set up the SVI II AP Controller. During hydrostatic testing the shaft is thrust to its stop and a normally tightened packing retains it in that position.

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4. On vacuum service, the valve shaft may be drawn into the body by the vacuum acting on the shaft, but the magnetic coupling must be assembled flush with the mounting bracket with the shaft pulled fully out to its thrust bearing. Check that the endplay from the vacuum position to the fully extended position is less than 0.06 in. (1.524 mm).

5. Slide the magnet holder into the extension shaft. The location of the magnets is in the ring of the magnet holder. The magnetic axis is the imaginary line through the center of both magnets.

6. Rotate the magnet holder so that the magnet axis is vertical when the valve is in the closed position.

7. Align the end of the magnet holder flush with the end of the mounting bracket. Secure the magnet holder with two M6 set screws.

8. Slide the V-Seal over the magnet holder.

9. Secure the SVI II AP onto the mounting bracket using four M6 x 20 mm socket head cap screws.

10. Ensure no interference exists with the position sensor protrusion.

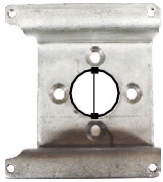
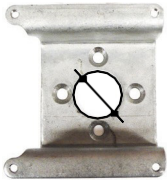
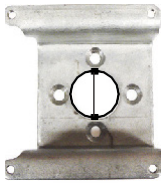
11. Ensure that the V-Seal makes contact with the skirt around the position sensor protrusion on SVI II AP housing.

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Travel Sensor Alignment

Table 3 shows the general guidelines for travel sensor alignment. Review the table prior to installing the SVI II AP on a rotary valve actuator for proper alignment of the magnet.

Table 3 - Travel Sensor Alignment

Rotary Mounting System	Stroke Direction	Magnet Orientation	Valve Position	Sensor Counts
Rotary	<60° Rotation Clockwise or counterclockwise rotation	 (0°)	Closed(0%)	0 +/- 1000
	>60° Rotation Clockwise with increasing setpoint	 (-45°)	Full Open or Full Closed	-8000 +/- 1500 or +8000 +/- 1500
	>60° Rotation Counter Clockwise rotation with increas ing setpoint	 (+45°)	Full Open or Full Closed	-8000 +/- 1500 or +8000 +/- 1500
General Rule for other configurations	Any amount of rotation Clockwise or counterclockwise	 (0°)	50% Travel (Mid-Stroke)	0 +/- 1000

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Dismantling the SVI II AP from Rotary Valves

Before carrying out any work on the device, power off the instrument or ensure that the device's location conditions for potentially explosive atmosphere permit the safe opening of the cover.

To remove the SVI II AP Controller from a rotary valve perform Steps 1 - 9 on page 29 in reverse.

Mounting the SVI II AP on Reciprocating Valves

The process of mounting the SVI II AP on a reciprocating valve consists of mounting the unit on the actuator that is attached to the valve. This section describes the procedure for mounting the SVI II AP on Reciprocating Valves (using Masoneilan's 87⁄88 Multi-Spring actuators as an example).

Mounting the SVI II AP on a Reciprocating Actuator

Tools required:

- 7⁄16" Combination Wrench (2 required)
- 3⁄8" Combination Wrench
- 1⁄2" Combination Wrench
- Phillips Head Screw Driver
- 5 mm Hex Key Wrench

1. Ensure that the lever is pinned to the magnet assembly and held securely by an M5 flat head screw to ensure that the magnet axis is vertical when the lever is in the valve closed position. Tighten the lever screw securely. Refer to Figure 14.

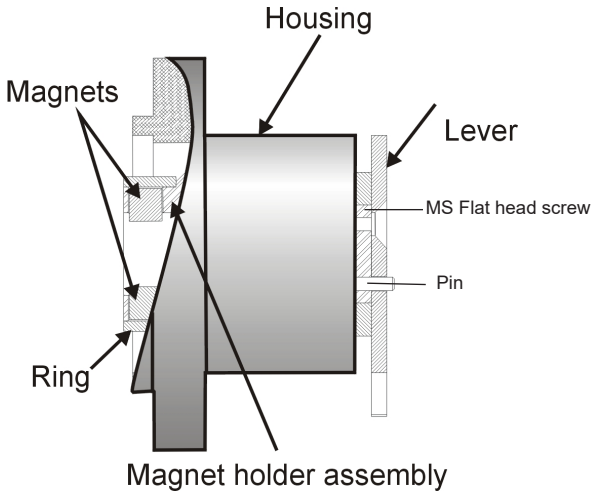


Figure 14 - Magnet Holder for Reciprocating Valves

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2. Mount the SVI II AP reciprocating mounting bracket to theactuator using two (2) 5⁄16 - 18 UNC cap screws.The mounting location of the bracket depends on the size andstroke of the actuator. Refer to Figure 15 on page 30 and Figure 4 on page 14.

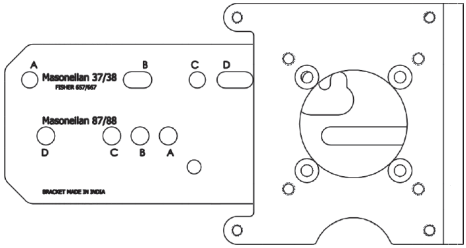


Figure 15 - Reciprocating Valve Mounting Bracket

3. Select mounting hole A, B, C or D for the stroke of the valve. For example, hole B is shown in Figure 17 on page 31 for a size 10 actuator with 1.0” stroke. Unless otherwise specified, the SVI II AP mounting assumes that the actuator is in the normal upright position. The mounting hole in the slotted opening of the mounting bracket must be left when facing the actuator, with the actuator in the upright position.

4. Move the valve to its closed position. For air to extend, this requires using air pressure in the actuator to fully stroke the actuator. For air to retract, actuators vent the actuator of air pressure.

5. Thread the take-off rod to the actuator stem connector. Refer to Figure 16 on page 31. Ensure that the travel pointer located on the coupling is correctly positioned.

6. Attach the right hand threaded rod end to the SVI II AP lever using a 1⁄4 - 20 x 1” cap screw and nut as shown. The lever hole position to be used depends upon the specific valve stroke. Refer to Figure 17 on page 31 and the Reciprocating Valve Linkage Selection, Table 4 on page 32.

7. Thread the right hand lock nut and turnbuckle onto the right hand rod end approximately two turns. Turnbuckle length is a function of actuator size. (Refer to Table 4 on page 32.)

8. Secure the magnet housing assembly, including the lever and right hand rod end, to the bracket using four M5 X 10 mm flat head screws.

9. Attach the left hand threaded rod end to the take-off rod with 1⁄4 - 20 UNC nut and thread the left hand lock nut onto the rod end.

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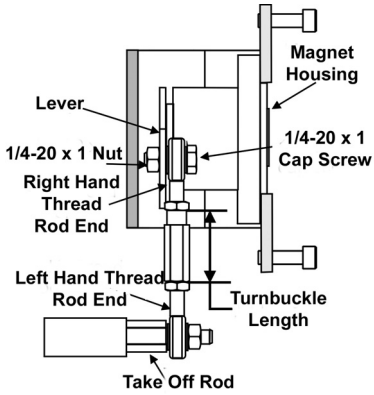


Figure 16 - Reciprocating Linkage

10. Thread the turnbuckle onto the left hand threaded rod end (Figure 16).

11. Adjust the turnbuckle until the hole in the SVI II AP lever is aligned with the indicating hole in the bracket. Tighten both turnbuckle lock nuts. Refer to Figure 15.

12. For reciprocating valves the adjustable link turnbuckle must be parallel to the valve stem. To ensure linearity in positioning, verify that the hole in the lever aligns with the indicating hole in the bracket when the valve is in the closed position. Check that the bracket is mounted using the proper holes. (Refer Table 4 on page 32.)

13. Mount the SVI II AP to the bracket and secure with four M6 socket head cap screws.

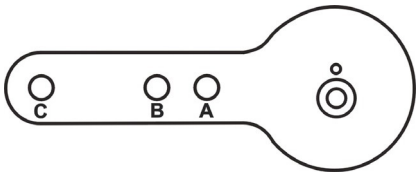


Figure 17 - Lever for Masoneilan Model 87/88 Multispring Actuator

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Table 4 - Reciprocating Valve Mounting Hole and Turnbuckle Length

Masoneilan Actuator Size	Stroke	Mounting Hole	Lever Hole	Turnbuckle Length
6 and 10	0.5 - 0.8” (12.7 - 20.32 mm)	A	A	1.25” (31.75 mm)
10	0.5 - 0.8” (12.7 - 20.32 mm)	A	A	1.25” (31.75 mm)
10	>0.8 – 1.5” (20.32 - 41.5 mm)	B	B	1.25” (31.75 mm)
16	0.5 - 0.8” (12.7 - 20.32 mm)	B	A	2.90” (73.66 mm)
16	>0.8 – 1.5” (20.32 - 41.5 mm)	C	B	2.90” (73.66 mm)
16	>1.5 – 2.5” (41.5 - 63.5 mm)	D	C	2.90” (73.66 mm)
23	0.5 - 0.8” (12.7 - 20.32 mm)	B	A	5.25” (133.35 mm)
23	>0.8 – 1.5” (20.32 - 41.5 mm)	C	B	5.25” (133.35 mm)
23	>1.5 – 2.5” (41.5 - 63.5 mm)	D	C	5.25” (133.35 mm)

Dismantling the SVI II AP from Reciprocating Valves

WARNING *Before carrying out any work on the device, power off the instrument or ensure that the local conditions for potentially explosive atmosphere permit the safe opening of the cover.*



To remove the SVI II AP Controller from a reciprocating valve perform Steps 1 - 12 on page 29-31 in the reverse order.

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Checking the Magnet

There are two methods of checking the SVI II AP magnet:

- Perform a visual inspection
- Use ValVue to check the magnet

Performing a Visual Inspection

To perform a visual inspection refer to Table 3 on page 28 and ensure that the magnet is correctly oriented for the actuator/ valve configuration.

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Installing the SVI II AP for Double- Acting Operation

This section explains how to mount the SVI II AP for the 84/85/ 86 kit for double-acting valve positioner configurations.

To mount the kit:

1. Set valve to the closed position.

2. Install the mounting assembly to the yoke (Figure 18) using helical spring washer 5/16, flat washer 5/16 and hex screw 5/16-18x44.5 [1.75] LG.

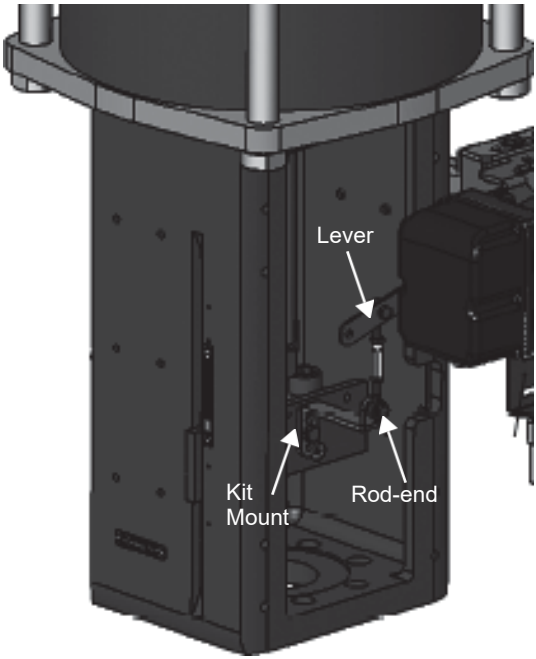


Figure 18 - 84/85/86 Actuator

NOTE

Mount all components snug enough to stay in place but loose enough to tap with rubber hammer into finalposition.

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3. Set rod-ends and brackets to stroke and size of actuator. The default setting is a 4.00” stroke. Other stroke settings are as in Figure 19.

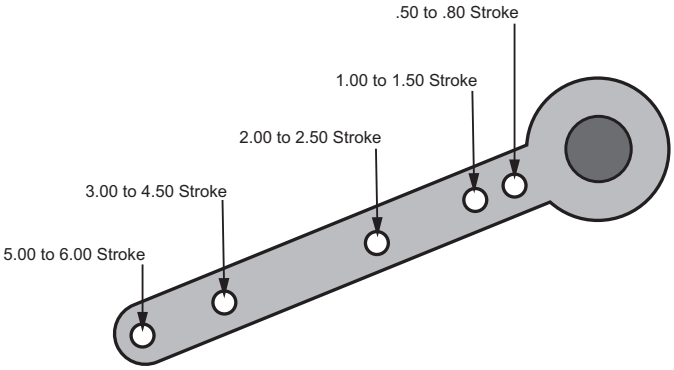


Figure 19 - Stroke Settings

4. Mount take-off bracket to stem block at angle which keeps turnbuckle assembly parallel to stem (Figure 20) using:
   a. For top: two plain 5/16 flat washers, helical spring washer 5/16, two hex nuts 5/16-18 regular.
   b. For bottom: hex nut regular 1/4-20 and hex screw 1/4-20 UNC x 22.2 [.88] LG.

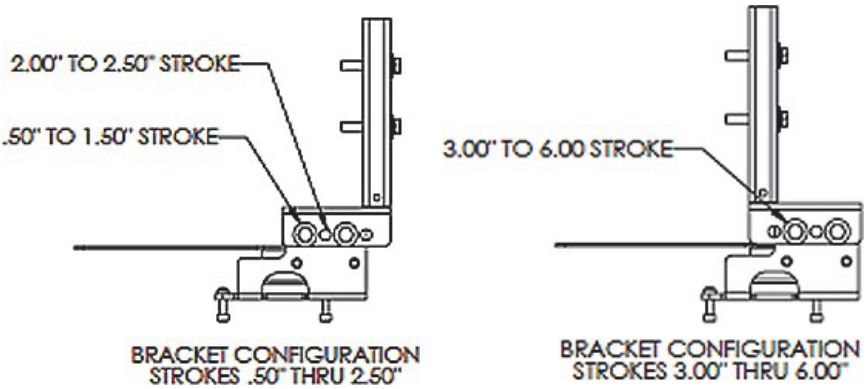


Figure 20 - Bracket Configuration Strokes .5 - 2.50” and 3-6”

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5. Ensure the turnbuckle assembly is parallel to the stem and the magnets are in the valve closed position (Figure 21) and connect to take-off bracket.

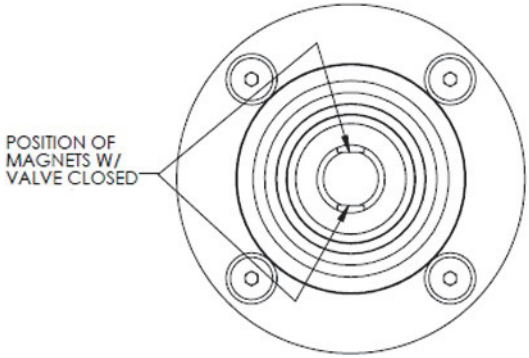


Figure 21 - Magnet Position with Valve Closed

6. Verify lever is in correct position with valve closed. Adjust rod-ends, if necessary.

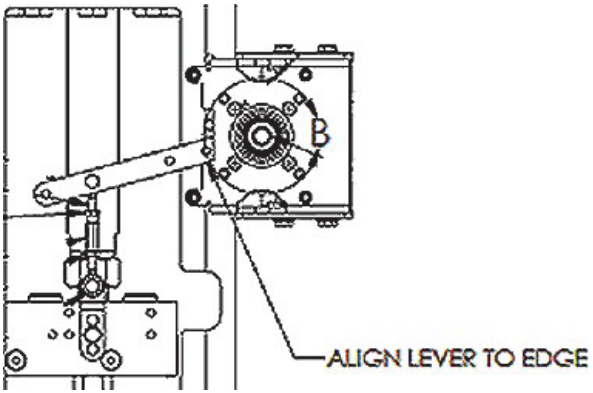


Figure 22 - Lever Alignment

7. Mount the SVI-II with M6-1 screws.

8. Cycle the valve open to close verifying proper components movement and that rod-ends move free and clear from other components.

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Connecting the Tubing and Air Supply

The last step in hardware installation for the SVI II AP is to connect the air supply to the positioner. This section describes the process for connecting the tubing and air supply to a single and double acting positioner.

Natural Gas Supply Considerations

If the pneumatic system is connected to natural gas, the pneumatic control system constantly bleeds a small amount of the natural gas into the area around the SVI II AP. Also, during a vent cycle (actuator pressure relief), natural gas from the actuator is released into the area around the SVI vent port.

Consider both sources of natural gas when evaluating the Hazardous Classification for the area (See the Masoneilan SVI II AP Installation and Maintenance Manual for further discussion on installing an SVI II AP in a natural gas environment).

Remote piping of the actuator venting is possible to reduce the amount of natural gas released into the area around the SVI II AP (See Masoneilan Valves SVI II AP Installation and Maintenance Manual for further discussion on installing an SVI II AP in a natural gas environment). Installing remote actuator vent gas piping does not capture all gas emitted. A small amount of natural gas still bleeds constantly in the area around the SVI II AP. Consider the bleeding and releasing of natural gas when evaluating the Hazardous Clarification for the area.

NOTE *Area classification is the responsibility of the end user.*



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The interior of the SVI II AP is positively pressurized with supply medium. Appropriate safety measures must be taken to handle pressurized natural gas that may enter the electrical conduit or cable system.

WARNING *Do not remove the instrument cover or connect to anelectrical circuit unless the power is disconnected.*



Natural gas will escape into the surrounding atmosphere upon disconnecting any of the pneumatic connections or removing any cover or pressure containing component.

WARNING **EXPLOSION HAZARD** - *Do not disconnect equipment or remove cover unless power has been de-energized or the area is know to be non-hazardous. Natural gas may be contained within the SVI II AP. Even after disconnecting the SVI II AP from all the pneumatic connections Natural Gas may still be present within the SVI II AP.*



WARNING **EXPLOSION HAZARD** - *Natural gas may escape from the SVI II AP upon removal of any cover or component.*



Ensure the cover is correctly installed before puttingthis unit into service.

WARNING **EXPLOSION HAZARD** - *An improperly installedcover could leak natural gas into the area.*



The interior of the SVI II AP is positively pressure withsupply medium. Appropriate safety measures must be taken to handle pressurized natural gas that may enter the electrical conduit or cable system.

WARNING **EXPLOSION HAZARD** - *A missing or improperly installed conduit seal, cable seal, or cable gland couldleak natural gas into the conduit/cable system, and/orinto any area where the conduit/cabling system is present or connected to.*



WARNING *Natural gas will constantly bleed and possibly vent from the SVI II AP if connected to a natural gas supply. Hazardous area clarification is the responsibility of the end user. area ventilation and other safety measures may be required to maintain a safe environment.*



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WARNING



Installation in poorly ventilated confined areas, with any potential of gases other than oxygen being present, can lead to a risk of personnel asphyxiation.

WARNING



Isolate the valve from the process and disconnect air tubing from the positioner. Disconnect air fully to avoid injury or process damage.

Installation Procedure

1. Install the tubing to the air supply port *S* ← (arrow only for High Flow).

2. For a:
   - Single acting actuator: Pipe the outbound air from the output pressure port ← **I** (arrow only for High Flow) to the actuator.
   - Double acting actuator: Pipe output pressure port one ← **I** for one side of the actuator and output pressure port two ← **II** for the other side of the actuator.

3. Air supply:
   - Supply pressure for single acting SVI II and AP High Flow:
     20 -100 psi (1.4 - 6.9 bar) (138 - 690 kPa)
   - Supply pressure for double acting SVI II AP:
     25 - 150 psi (1.73 - 10.4 bar) (172.4 - 1034 kPa)
   - Minimum tubing diameter 1⁄4” (6 mm x 4 mm)

NOTE



The SVI II AP Digital Valve Positioner is designed to operate with clean, dry, oil-free, instrument grade air to ANSI-ISA-57.3 1975 (R1981) or ISA-S7.3-1975

(R1981) or with clean, dry, oil-free sweet natural gas supply ((H$_2$S content not to exceed 20 ppm) (SVI II AP models SVI II AP/SD through SVI II AP/AD).

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Table 5 Air Supply Requirements

Dew Point	At least 18° F (-7° C) below minimum anticipated ambient temperature
Particulate Matter	Filtered to 5 microns
Oil Content	Less than 1 ppm w/w
Contaminants	Free of all corrosive contaminants

CAUTION



The SVI II AP High Flow digital valve positioner cannot be placed in parallel with another volume booster. Contact the factory for further instructions regarding configuration with boosters as well as other non-standard configurations.

Connecting the Air Supply

After the tubing is installed, use the following procedure to connect the air supply.

1. Supply clean, dry compressed air to the filter regulator.

2. Turn on the air supply.

3. Adjust the filter regulator.
   Supply pressure must be 5 - 10 psi greater than the spring range of the actuator but may not exceed the rated actuator pressure. Refer to the valve or actuator instruction manual.

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Wiring the SVI II AP

In order for the SVI II AP to communicate the positioner data the SVI II AP positioner must be physically connected to a HART® communication. The procedure below outlines wiring the SVI II AP.

WARNING



Comply with current national and local regulations for electrical installation work.

Comply with national and local explosive atmosphere regulations.

Before carrying out any work on the device, power off the instrument or make sure that the local conditions for potentially explosive atmosphere permit the safe opening of the cover.

CAUTION



Refer to "Optional Switch Load Limits" on page 80 for guidelines on safely wiring switch load limits.

Connecting to the Control Loop

The SVI II AP digital valve positioner **MUST BE** grounded according to local regulations. It is important to maintain correct polarity at all times, otherwise the positioner may not operate properly. Physically connect the SVI II AP to the HART® loop using a cable specified by the FieldComm™ Group. A shielded cable is recommended. To connect the Control Loop to the SVI II AP:

1. Connect one end of the cable to the control loop's 4 - 20mA output
2. Remove the threaded wiring covers on the positioner.
3. Connect the other end of the cable to the SVI II AP. There are two threaded openings on the positioner. Use the opening with the red plastic insert.
4. Maintain polarity + and - respectively.

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Wiring a Position Retransmit

CAUTION



For proper operation, maintain signal polarity + and - respectively.

To connect:

1. Strip the insulation at the end of the wires. Strip approximately 1/4” (6.35 mm) of the insulation at the end of wires (wire size 14 to 28 AWG, 2.5 mm2 to .08 mm2).

2. Connect the +/- terminals from the 4-20 mA Out to the position retransmit input signal: + to + and - to -. See Figure 8 on page 19.

To troubleshoot retransmit connections:

- Ensure that the retransmit circuit has a minimum voltage of 10 V (maximum 30 V).
- Ensure the minimum AO current is 3.2 mA. If the module loses power and the AO circuit remains powered, the AO signal will be 3.2 mA.

Wiring Guidelines

Guidelines for a successful implementation of DC current signal, DC power, and HART® communication to the SVI II AP:

- Compliance voltage at the SVI II AP is approximately 9 V at 20 mA, 11 V @ 4 mA. See ***Determining an SVI Positioner Compliance Voltage in a Control System*** on page 87.
- Signal to the SVI II AP must be a regulated current in the range 3.2 to 22 mA.
- Controller output circuit must be unaffected by the HART® tones which are in the frequency range between 1200 and 2200 Hz.
- In the frequency range of the HART® tones, the controller must have a circuit impedance of more than 220 Ohms, typically 250 Ohms.
- HART® tones may be imposed by the positioner and a communication device located anywhere on the signaling circuit.
- Cabling must be shielded to prevent electrical noise that would interfere with the HART® tones, with the shield grounded.
- Shield must be properly grounded in only one place.
- For details and calculation methods for wiring resistance, and capacitance and for calculation of cable characteristics, refer to the HART® FSK Physical Layer Specification.
- For split range installations the output voltage must be sufficient to operate two positioners (11 V @ 4 mA, 9 V @ 20 mA) and the expected voltage drop in the cable.

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- Use of a low impedance voltage source damages the SVI II AP The current source must be a true high impedance current limiting device. A proper current source explicitly enables adjustment of the current, not the voltage.

When wiring a position retransmit:

- Use the same gauge wires as the 4-20 mA control loop.
- Ensure that the position retransmit signal is connected to the control system’s analog input card.
- Ensure the control loop is powered while making make measurements with a meter.

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SVI II AP Setups

Control Systems using Explosion Proof or Conventional I/O Systems must have a compliance voltage greater than 9 V at 20 mA including wiring losses. See ***Determining an SVI Positioner Compliance Voltage in a Control System*** on page 87.

Typical Control Systems using Intrinsic Safety methods must have a compliance voltage greater than 17.64 V.

Typical system setups are shown in Figure 23 on page 46, General Purpose and Explosion Proof (EEx d) Installation Schematic and Figure 24 on page 46, Intrinsically Safe Installation Schematic. The SVI II AP digital valve positioner can be located in a general-purpose or hazardous area protected by Explosion Proof (EEx d) methods. Wiring diagrams are generalized, actual wiring must adhere to Electrical Installation section of manual and local electrical codes. The use of a Handheld Communicator or a HART® modem is not permitted in the Hazardous Area protected by Explosion Proof (EEx d) methods. In Figure 24 on page 46 the SVI II AP digital valve positioner is located in a hazardous area that is protected by Intrinsically Safe wiring practices.

The SVI II AP requires an electrical input from a 4-20 mA current source. The SVI II AP input signal can carry a HART communication protocol signal from ValVue software and a HART modem, or from a HART Hand Held Communicator. Since the process control system, the source of the input signal, is located in a non-hazardous location, setup requires an intrinsic safety barrier be placed between the process control system and the SVI II AP. If the SVI II AP is located in a hazardous area with Intrinsically Safe protection a barrier is not required for a flameproof installation. Alternatively the system can be installed as Explosion Proof/flameproof.

SVI II AP can communicate with a remote PC running ValVue software via a modem connected to the PC's serial or USB port. The PC, which is not intrinsically safe, must be connected to the circuit on the safe area side of the intrinsic safety barrier if the valve is located in a hazardous area.

The SVI II AP can be operated, calibrated, configured, and interrogated either by using local pushbutton and display, or by using a PC running ValVue software, HART® Handheld Communicator, or any registered HART® Host that supports DDs. The HART® Handheld Communicator is approved for Intrinsically Safe use in accordance with FM and ATEX standards. Read and observe all handheld labeling. The SVI II AP is polarity sensitive so the positive lead must be connected to the positive (+) terminal and the negative lead to the negative (-) terminal. Reversing the input will not cause damage but the unit will not function.

Grounding Practices

There must never be more than one ground point for the shield wiring. Normally ground is connected at the controller or at the intrinsic safety barrier.

The case grounding screws are located on the outside of the case at the lower right of the display cover and inside the cover. The case is isolated from all circuitry and can be grounded locally in accordance with applicable codes.

If noise or instability is present, set the positioner to MANUAL mode of operation and manually position the valve over its entire range. If the valve is stable in MANUAL mode then the problem can be noise in the control system. Recheck all wiring connections and ground points.

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Compliance Voltage in Single Drop Current Mode

The SVI II AP requires 9.0 V at 20 mA and 11.0 V at 4 mA. Typical HART® devices require MORE Voltage at higher current and MORE current source have LESS Voltage available at higher current. The SVI II AP is noteworthy in that it requires LESS Voltage at higher current that complements the characteristic of the source requiring only 9 V at 20 mA. See ***Determining an SVI Positioner Compliance Voltage in a Control System*** on page 87.

Verify Wiring and Connections

NOTE



For split range installations the compliance voltage must be capable of the minimum span being 5 mA; the upper range value must be 8 mA to 20 mA; the lower range values must be 4 mA to 14 mA.

Use the following procedure to ensure that the SVI II AP is properly powered:

1. Connect a DC voltmeter across the input terminals.
   - For an input current between 4 and 20 mA the voltage varies between
   - 11 V and 9 V respective. See ***Determining an SVI Positioner Compliance Voltage in a Control System*** on page 87.
   - When voltage exceeds 11 V check that polarity is correct.
   - If voltage is less than 9 V and polarity is correct, voltage compliance of current source is inadequate.
2. Connect a milliampmeter in series with the current signal.
3. Verify that source can supply 20 mA to SVI II AP input. If 20 mA is not attainable, troubleshoot the source and set up.

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NOTE

Improperly or inadequately grounded installations cancause noise or instability in the control loop. The internal electronic components are isolated from ground. Grounding the case is unnecessary for functional purposes but grounding the case may be necessary to conform to local codes.

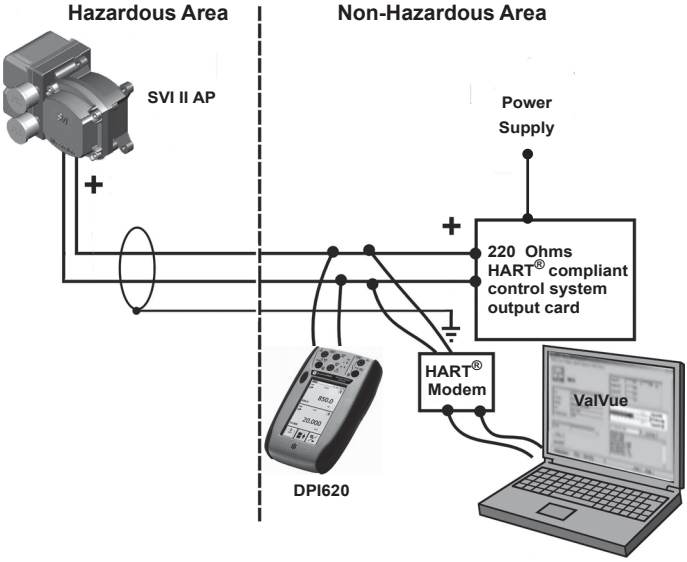


Figure 23 - General Purpose and Explosion Proof Installation

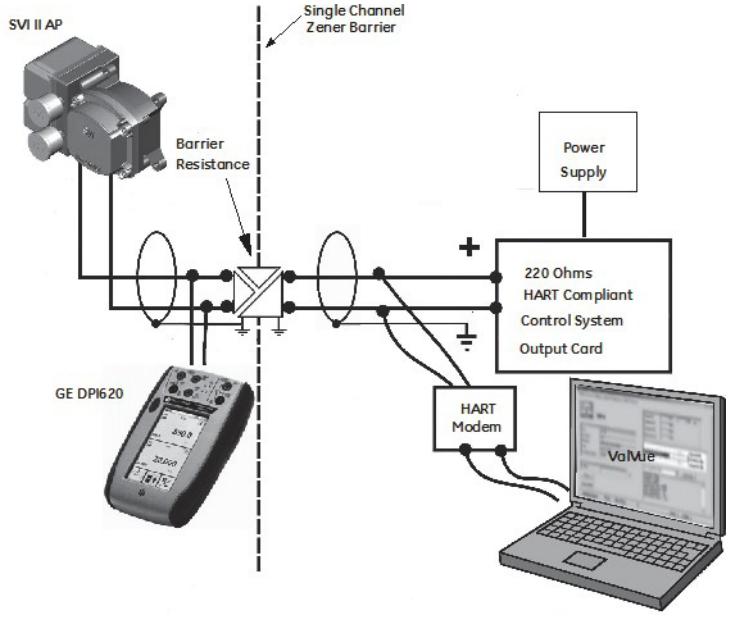


Figure 24 - Intrinsically Safe Installation

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Check Out, Configuration and Calibration

Overview

This section provides the calibration procedures to ensure proper valve positioning. Operational checkout, configuration and calibration procedures are described using an SVI II AP that has a display with pushbuttons.

NOTE



Perform all procedures in this section before putting the SVI II AP into operation.

Checkout Procedures

SVI II AP checkout consists of physical and operational checkout procedures. The physical checkout procedures include:

- “Inspecting Actuator, Linkages, or Rotary Adapter” on page 47
- “Verifying Mounting and Linkage Adjustment” on page 48
- “Checking the Magnet” on page 48
- “Checking the Air Supply” on page 50
- “Checking the Electronic Module Connections” on page 50

CAUTION



The SVI II AP cover must be in place andsecured using all four screws during operation.

Inspecting Actuator, Linkages, or Rotary Adapter

Verify that the mounting has not been damaged in shipment for a pre-mounted SVI II AP, physically inspect the actuator, linkage. Record the following information for the configuration checkout:

1. Valve Air to Open (ATO) or Air to Close (ATC)
2. Actuator pressure rating
3. Actuator bench range
4. Inherent trim characteristic of the control valve; linear, equal percentage, or other.

NOTE



Refer to the valve data sheet or model number of control valve.

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Verifying Mounting and Linkage Adjustment

Inspect the mounting and make any needed adjustments before running the positioner and checking the digital configuration.

Checking the Magnet

There are two methods of checking the SVI II AP magnet:

- Perform a visual inspection
- Use ValVue to check the magnet

Performing a Visual Inspection

You must remove the positioner from the bracket to visually inspect the magnet orientation.

For rotary valves, such as a Camflex, or for actuators with rotation of less than 60°, the magnet assembly must be aligned as shown in Figure 25.

For rotary valves with rotations greater than 60°, the magnet assembly must be aligned as shown in Figure 26 on page 49.

NOTE

For a reciprocating globe valve, it is not necessary toremove the positioner from the bracket. Details are given below.

For reciprocating valves the adjustable link turnbuckle must be parallel to the valve stem. To ensure linearity in positioning, verify that the hole in the lever aligns with the indicating hole in the bracket when the valve is in the closed position. Check that the bracket is mounted using the proper holes (refer to Table 4 on page 32).

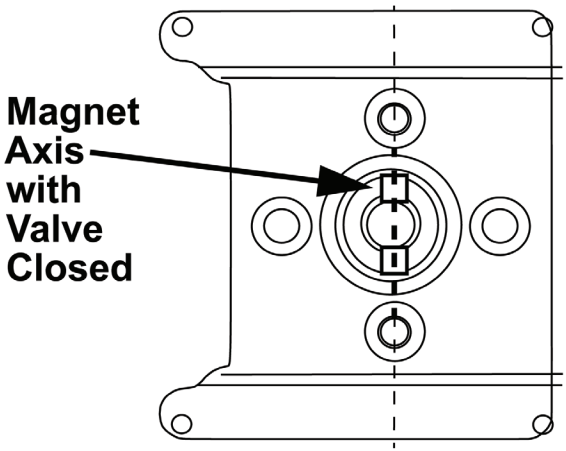


Figure 25 - Magnet Orientation for Camflex with Valve Closed

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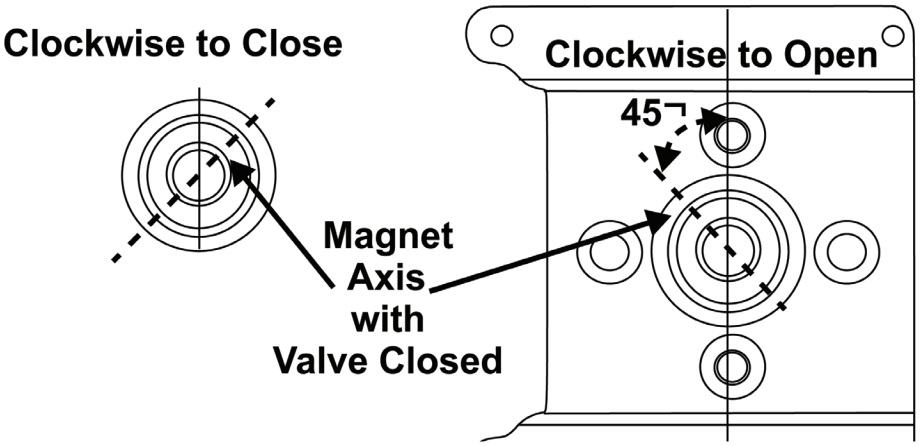


Figure 26 - Magnet Orientation for 90° Valve Rotation with Valve Closed

Using ValVue to Check Magnet Position

Use this procedure to check the magnet using ValVue.

1. Connect to the positioner in accordance with the ValVue instructions.
   a. Ensure the positioner has been installed and set up with a HART® Modem in a HART® compliant communications loop, if required, install ValVue on the computer that is connected to the HART® modem.
   b. Run ValVue.
   c. Select the installed positioner from the list of connected devices.
   d. Select the Raw Data tab to view the current operating conditions of the selected positioner.
2. Read Raw Position data. When the valve is:
   - Closed, the value should be between – 1000 and +1000for a reciprocating valve or a 60° rotation rotary valve.
   - At mid-travel, the value should be between –1000 and +1000 for a greater than 60° rotation rotary valve.

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Checking the Air Supply

Use this procedure to check the air supply:

1. Turn on the air supply.
2. Adjust the filter regulator.Supply pressure must be a minimum of 10 psi greater than the spring range of the actuator but may not exceed the rated actuator pressure. Refer to the valve or actuator instruction manual.
3. Inspect the tubing connections between the filter-regulator and the positioner for leaks.
4. Verify that the tubing is not bent or crushed.
5. Verify that all fittings are leak tight.

NOTE



Do not use Teflon pipe seal tape. The Teflon tape canshred into particles that are harmful to the pneumaticcomponents.

Checking the Electronic Module Connections

WARNING



Do not remove the instrument cover or connect to anelectrical circuit in a Hazardous Area unless the power is disconnected.

All connections to electronic module in the SVI II AP are made through the terminal board. The SVI II AP terminal board has a terminal block with cage clamp connectors. Confirm that all applicable connections to the electronics module connectors are correct. Not all options are available for every model. Refer to Table 6 for available functionality.

Table 6 - SVI II AP Models and Functionality

Available Functionality	Positioner Model Number	
	SVI II AP-2	SVI II AP-3
4 - 20 mA Input Setpoint	√	√
Display/ Pushbuttons	Optional	Optional
Remote Mount Input	√	√
Solid State Switch #1 and #2	Optional	Optional
4- 20 mA Out Position Transmit	Optional	Optional

- Confirm the correctness of all applicable connections to the electronics module.

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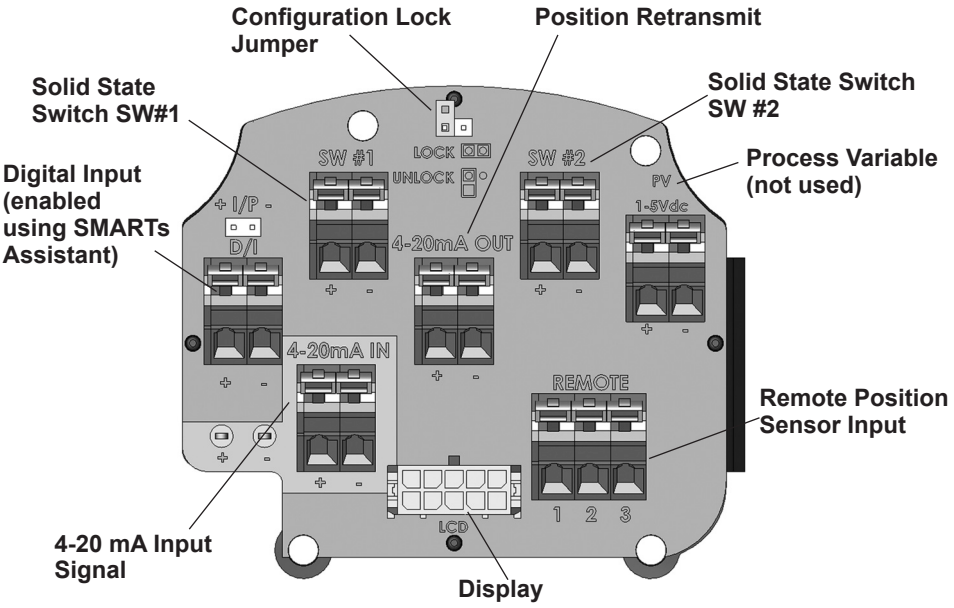


Figure 27 - Connections to Electronics Module (via Terminal Board)

NOTE

When an SVI II AP is turned on it is advisable to apply the air supply before applying the electrical input signal.

NOTE

The PV (Process Variable) is not used for the SVI II AP. The Digital Input (DI) is activated using SMARTsAssistant.

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Operational Checkout

The operational checkout of the SVI II AP consists of:

- Connecting the SVI II AP to a current source Checking the pushbutton locks
- Powering up the SVI II AP

Connecting to the Current Source

Connect to a DC mA current source then check and configure with the local display and pushbuttons, if so equipped. The following section describes configuration and calibration with the optional local display and pushbuttons. If the SVI II AP is not equipped with local display use ValVue and a PC with a HART® modem or a HART® Handheld Communicator.

NOTE



When an SVI II AP is turned on it is advisable to apply the air supply before applying the electrical input signal.

Powering Up the SVI II AP

WARNING



This process can cause the valve to move. Before proceeding be sure the valve is isolated from the process. Keep hands clear from moving parts.

NOTE



When an SVI II AP is turned on it is advisable to apply the air supply before applying the electrical input signal.

CAUTION



Use of a low impedance voltage source will damage the SVI II AP. The current source must be a true highimpedance current limiting device. A proper current source explicitly enables adjustment of the current inmA, not V.

To power up the SVI II AP:

1. Loosen the four (4) cover screws and remove the cover of the SVI II AP. Connect the +/- terminals to the current source + to + and - to -. See Figure 27 on page 51. Reinstall the cover and display.

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2. Adjust current to 12 mA. On initial power up of a newly installed SVI II AP, the positioner runs in NORMAL mode using the default instrument parameters installed at the factory. The positioner cycles through the NORMAL cycle menu and LCD displays the following values:
   - PRES: Pressure - unit of measurement and value*
   - SIGNAL
   - POS (Position)
   - An exclamation point (!) appears in the top left corner of the display window to indicate that there is further instrument status available.

3. Proceed to Configuration and Calibration.

* For firmware version 3.2.1, the supply pressure appears on the LCD. Additionally, Stops results and Autotune results, stay displayed until cleared.

NOTE



If the SVI II AP is specified without local pushbuttons and display, local operation is not available. Configureand calibrate with ValVue and a HART® modem.

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Configuration

Use the procedures that follow to: calibrate, tune, view configuration data and status messages for the SVI II AP. Observe all warnings as the valve moves during these procedures.

WARNING *These procedures can cause the valve to move.*



Before proceeding be sure the valve is isolated fromthe process. Keep hands clear from moving parts.

NOTE



All calibration and configuration procedures are described using an SVI II AP with pushbuttons anddisplay and ValVue software.

NOTE



Starting with firmware version 3.2.7/5.1.3, if Autotune is unsuccessful the message TuneERR appears on the pushbutton display or when using the DD. Previous firmware versions reported this as TuneFail.

These messages do not mean the positioner is defective but indicate a need to perform a manual tune.

Notes on Aggressiveness

Setting Aggressiveness

While the SVI II AP DTM and the DD allow you to set Aggressiveness, the pushbuttons do not. In all three methods, however, the Aggressiveness value is inherited from any previously performed tuning (Autotune or manual). Once Aggressiveness, and other tuning values are determined, they are stored in NVRAM.

The SVI II AP provides a user define Aggressiveness Level for auto-tuning, the allowable range varies from - 9 to +9 where 0 (Zero) is consider normal tuning. The Aggressiveness Level influences stroking speed and over-shoot. A negative value will SLOW stroking speed and help minimized over-shoot. A positive value will INCREASE stroking speed and may add some over-shoot. The recommended values for Aggressiveness is 0 for control valves without volume boosters.

In applications with volume boosters and/or quick exhaust valves are used the Aggressiveness Level is not as influential. For Auto-tuning it is usually between 0 and 3. Reduce the volume boosters sensitivity by opening the integral bypass needle valve about 1 to 2 turns. Use caution when adjusting the needle valve so as to not to damage the seat, close gently to seat and then open 1 or 2 turns.

Aggressiveness Dynamic

Lower values of aggressiveness lead to lower PID values and slower response and less overshoot.

Higher values lead to higher PID values and quicker response and more overshoot.

Once you have a preferred aggressiveness and you tune once, all future autotunes automatically use that same value, until user-changed.

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Configuration with Pushbuttons

Prior to changing the SVI II AP configuration, check the existing configuration.

Viewing Configuration Data

To view SVI II AP configuration data:

1. Access the VIEW DATA menu from the MANUAL menu by pressing the + button.
2. In the VIEW DATA menu, press * to examine the configuration.
3. Press + to scroll through and observe the factory configuration.
4. Press + until MANPOS appears.
5. Select with *.
6. When the adjustment screen appears stroke the valve open by holding + down. The rate of set point change is slow to begin, but increases speed while the + is pressed.
7. Stroke the valve to several values.
8. Verify the action is as desired.
9. Press + to move to the SETUP menu.
10. In the SETUP menu press the * button to access the CONFIGuration menu.
11. In the CONFIG menu set the configuration parameters.
12. When in CONFIGure or CALIBrate, pressing * changes values.
13. Return to NORMAL mode. The valve moves to the value set by the current calibrator.
14. Stroke the valve through its range to verify that the movement is as desired.

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Configuration Menu

Because calibration depends on certain configuration options you must perform Configuration before you perform Calibration when installing the SVI II AP for the first time.

If a change is made in the Air-to-Open / Air-to-Close configuration option or if you move the SVI II AP to a different valve or make any change to the valve position linkage, you must run the find STOPS calibration again.

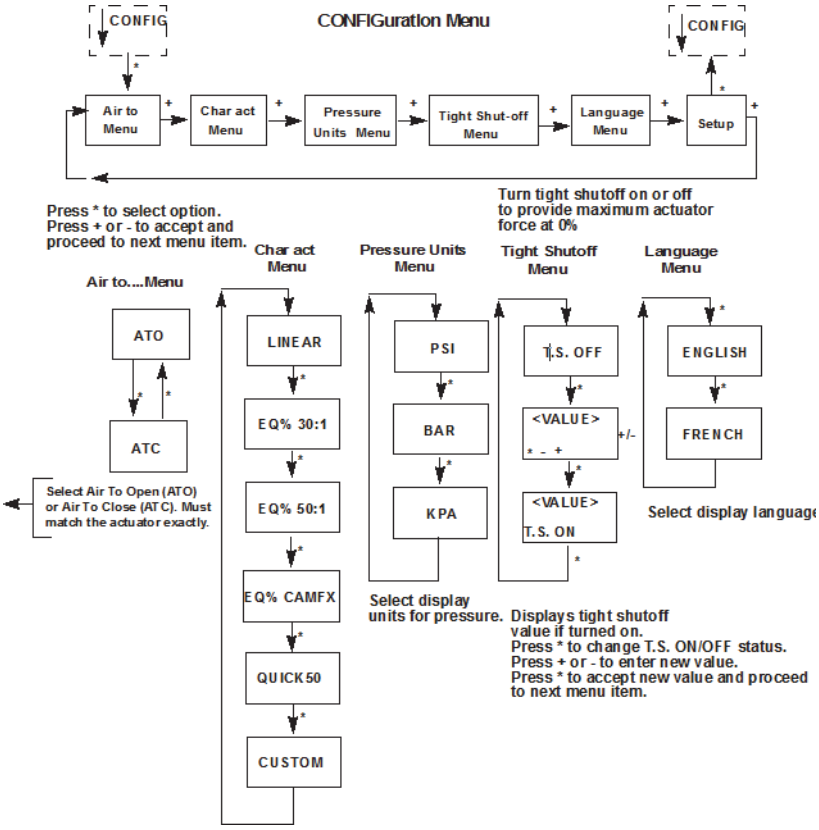


Figure 28 - CONFIGure Menu

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Viewing Status Messages

To view SVI II AP status messages:

1. Press + and * to select VIEW ERR.
2. Observe any internal errors. For example, there should be a RESET status caused by powering up. If the positioner was powered without air a Position Error or POSERR can appear.
3. Press + to view all faults.
4. Press * to return to MANual menu.
5. Press + until CLR ERR appears.
6. Press * CLR ERR. WAIT appears for a second or two.

VIEW DATA Settings

Table 7 - VIEWDATA Settings

Typical Setting	Optional Setting				
SINGLE	DOUBLE				
ATO	ATC				
LINEAR	EQUAL 30	EQUAL 50	QUICK 50	CUSTOM	CAMFXE Q
PSI	BAR	KPA			
0.00 TS OFF	2.00 TS ON				
4.00 SIG LO	4.00 SIG LO				
20.00 SIG HI	12.00 SIG HI				
English	French				

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Calibration

CAUTION



Pilot Trim Valve Applications require the use of the Manual Stop calibration procedure (refer to Configuration and Calibration of the SVI II AP Instruction Manual). Do not run Find Stops or the ValVue Setup Wizard on valves with Pilot Trim or damage to the valve will occur.

To calibrate the SVI II AP:

1. Observe the display following power-up. The SVI II AP powers up in the previously active mode either MANUAL or NORMAL (operating) mode:
   - In NORMAL mode, the display alternates between POS and SIGNAL.
   - In MANUAL, the display alternates between POS –M and SIG.
2. With MANUAL mode displayed, press * to select the MANUAL mode.
3. Press + again; ↓ CONFIG appears. Pressing + again brings ↓ CALIB.
4. Select CALIB by pressing *. STOPS appears. The valve moves full open and back to full closed. Observe all warnings.
5. Press * to cause the valve to stroke and to automatically calibrate valve travel.
6. After the STOPS procedure finishes, press + twice until TUNE appears.

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Calibration Menu

The Calibration menu shown in Figure 29 provides access to all the calibration functions for the SVI II AP. If a change is made in the Air-To-Open/Air-To-Close configuration option or if you move the SVI II AP to a different valve or make any change to the valve position linkage, you must run the find STOPS calibration again.

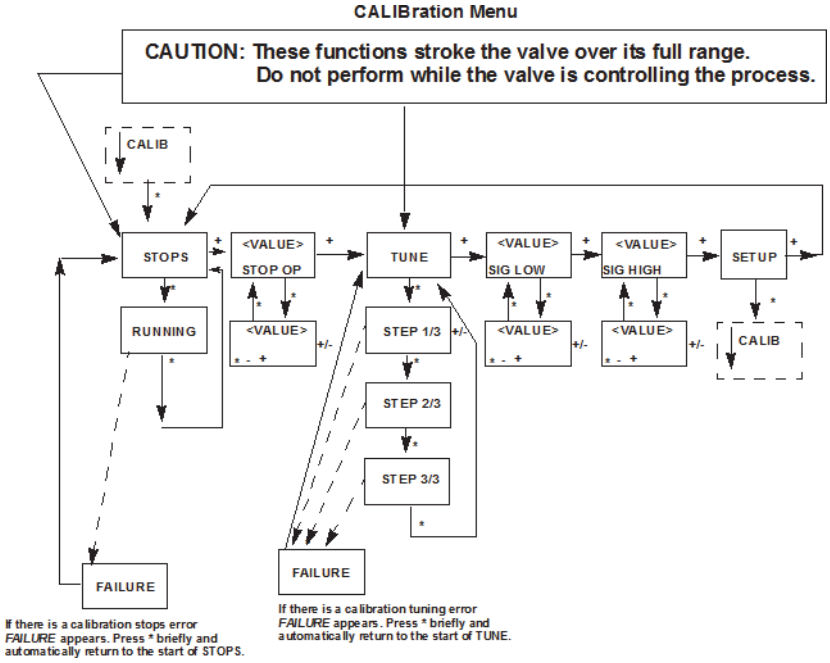


Figure 29 - CALIBration Menu

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Auto Tune

This process takes 3 to 10 minutes and strokes the valve in large and small steps to set the PID parameters for best positioning response.

WARNING *DO NOT perform STOPS while the valve is controllingthe process.*



DO NOT perform Auto Tune while the valve is controlling the process.

To auto tune the SVI II AP:

1. Press *to begin the autoTUNE procedure. As autoTUNE proceeds, numerical messages display, indicating the procedure is working.
2. When autoTUNE is complete, TUNE appears.
3. Press + repeatedly until ↑ SETUP appears.
4. Press * to return to SETUP menu; ↓ CALIB appears.

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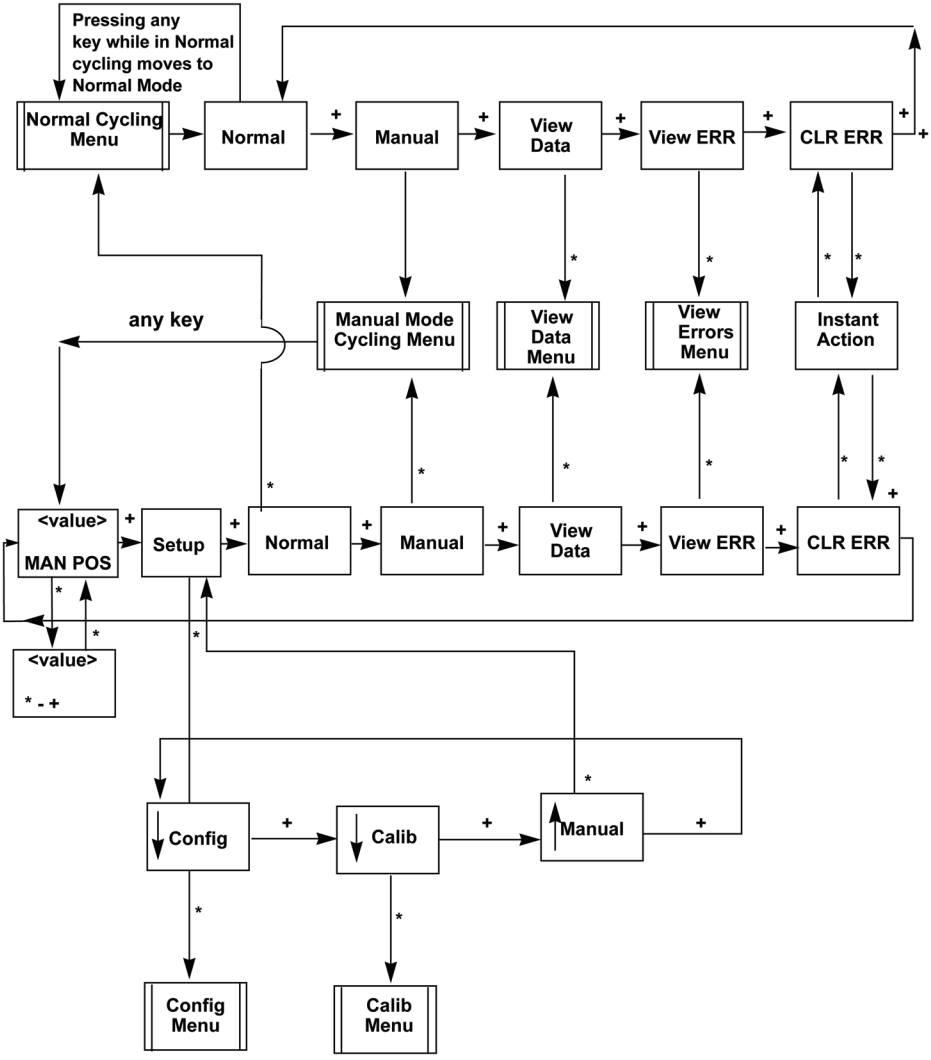


Figure 30 - NORMAL Operation and MANUAL Menu Structures

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Checkout with a HART® Handheld Communicator

If the SVI II AP is not equipped with optional push buttons and local display the checkout and configuration is performed using the standard HART® communications interface.

Connect the HART® handheld communicator to the SVI II AP as shown in Figure 31. Refer to the product manual for the HART® communicator in use.

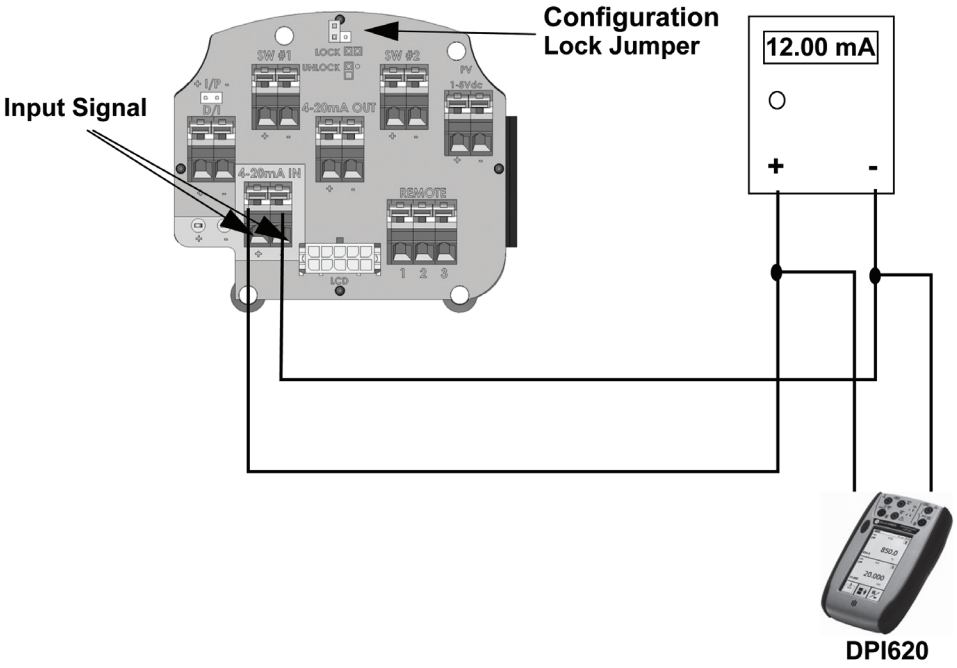


Figure 31 - SVI II AP HART® Communicator Connections

Be sure that the configuration lock jumper is in the unlock position. When the jumper is in the lock position (shorting the two-pin header) the handheld is not permitted to make any changes. However, parameters are readable. If fault messages appear, they must be handled before proceeding with HART® communications. Before communications proceeds all error messages must be cleared. For example, the following message is displayed if the instrument has been serviced and the air is not connected.

Process applied to the non-primary variable is outside the operating limits of the field device.

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Proceed with the following steps:

1. Press **NEXT.**
2. Field device has more status available
3. Press **NEXT**
4. **Ignore next 50 occurrences of** status?
5. Press **YES**
6. Change to **MANua**l mode
7. Scroll to line **6 EXAMINE**, press →
8. Scroll down to **5 read status**.
9. Read message.
10. Press **OK**.
11. Repeat **OK** to read all messages until the display returns to read status.
12. Scroll down to **6 clear status**, press →
13. If **clear fault codes not completed** appears, press **OK** and read the message (**Position Error**, for example) or go to the troubleshooting guide.
14. Correct the problem (Is the air supply on?), and then go to clear status until **Clear Fault codes Completed** appears.
15. Press **OK**.

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Maintenance

SVI II AP Maintenance

The SVI II AP was designed based on a modular concept. All components are interchangeable allowing for easy, quick component swapping.

The only maintenance procedures recommended for the SVI II AP are:

- Remove and install the cover
- Remove and install the I/P module
- Remove and install the pneumatic relay
- Upgrade to display cover

WARNING *Do not remove the instrument cover or connect to an electrical circuit in a Hazardous Area unless the power is disconnected.*



If natural gas is supplied, natural gas mayescape from the SVI II AP on removal of the cover or components.

Repair

Replacement of the Pneumatic Relay, I/P and cover (with or without display) are the only field repairs permitted.

Only qualified service personnel are permitted to make repairs.

Only factory-supplied parts are permitted. This includes not only the major assemblies but also mounting screws and O-rings. No substitutions with non-Masoneilan parts are permitted.

Detailed replacement procedures are described in the Instruction Manual. The following summary assures the integrity of the SVI II AP.

Tools Needed for Cover Replacement

- 5 mm hex key for the cover
- 3 mm hex key for the lanyard

Display Cover Removal and Installation

The cover with display (shown in Figure 32) is an option for the SVI II AP. If you have an SVI II AP with a solid cover and would like to upgrade to a display cover, follow the instructions below for removal and installation.

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Removing the SVI II AP Display Cover

To remove the SVI II AP display cover:

1. Using a 5 mm Hex key unscrew the four screws around the perimeter of the SVI II AP cover.

2. Lift the cover off the positioner.

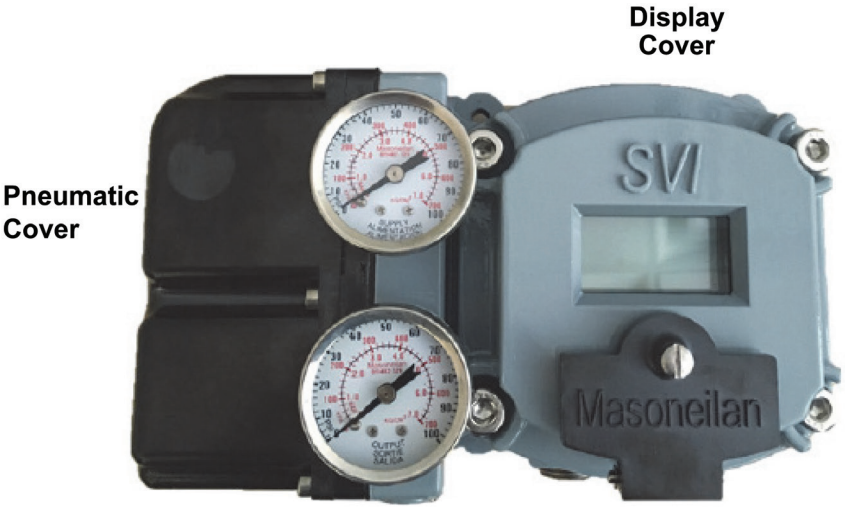


Figure 32 - SVI II AP Pneumatic and Display Covers

Installing the SVI II AP Display Cover

NOTE



After replacing the SVI II AP display cover you must power up the unit (see ***Powering Up the SVI II AP*** on page 52).

The replacement display cover is shipped with a lanyard to prevent the cable (that connects from the display to the terminal board) from breaking. The lanyard must be inserted under the screw in the lower left corner that attaches the terminal board to the SVI II AP housing.

To install the cover:

1. Install the lanyard and tighten the screw to 5 in/lb.

2. Using the 3 mm hex key, remove the screw from the lower left corner, connecting the terminal board to the SVI II AP housing.

3. Connect the cable from the display into the LCD connector on the terminal board.

4. Ensure that the gasket is in its groove in the housing.

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5. Place the cover over the screw mounts.

6. Tighten the four screws with the 5 mm hex key.

7. After installing the new display, power up the unit (refer to “Powering Up the SVI II AP” on page 52 for further information).



The cover of the SVI II AP is a critical component forsafety in Hazardous Areas. To ensure safe operationthe flat surfaces of the cover and the housing must beclean and absolutely free of particles or dents. Theremust be no gap between the housing and cover; torque spec is 55 in/lb.

Ensure that:

1. The gasket is seated in the groove in the housing flange.

2. No wires or retaining cable can be trapped under the cover flange.

3. The flange area is not corroded and the surface is not scarred.

4. The four cover bolts are securely tightened to 55 in/lb.

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Appendix A: Specifications and References

Physical and Operational Specifications

This section provides the physical and operational specifications for the SVI II AP.

Specifications are subject to change without notice.

Table 8 - Environmental Specifications

Operating Temperature Limits	-58° F to 185° F (-50° C to 85° C)
Storage Temperature Limits	-58° F to 200° F (-50° C to 93° C)
Temperature Effect	< 0.005% / °F typical; -40° F to 180° F (< 0.01% / °C typical; -40° C to 82° C)
Supply Pressure Effect	0.05% per psi (.73% per bar)
Relative Humidity	10 to 90% non-condensing
Humidity Effect	Less than 0.2% after 2 days at 104 °F (40° C), 95% Relative Humidity.
Insulation Resistance	Greater than 10 G Ohms at 50% RH.
MTBF	49 years based on MIL handbook calculation for electronic partsand field data on mechanical parts
Electromagnetic Compatibility Electrostatic	☐ Electrostatic discharge — No effect with contact discharge level of 4KV and air discharge level of 8 kV (IEC 1000-4-2) ☐ Radio frequency interference — Less than 0.2% at 10 V per meter (EN 50140)
Fast Transient Burst	No effect at 2 kV (Coupling clamp IEC 1000-4-4).
Vibration Influence Measured at SVI II AP Housing	☐ 4 mm at 5 - 15 Hz - Negligible ☐ 2 G at 15 - 150 Hz Less than 2 % of span ☐ 1 G at 150 - 2000 Hz - Less than 2% of span
Magnetic Field Influence	Negligible at 30 A/m (EN61000-4-8) CE MARK certified to EN50081-2 and EN50082-2

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Table 9 - Operational Specifications

Accuracy	+/- 0.5% (typical +/-0. 10% or less) Full Span
Hysteresis and Deadband	+/- 0.3% Full Span
Repeatability	+/- 0.3% Full Span
Conformity	+/- 0.5% Full Span
Start-Up Drift	Less than 0.02% in first hour
Long Term Drift	Less than 0.003% per month
Position Travel Limits	☐ Rotary: 18 - 140° ☐ Reciprocating: 0.25” - 2.5“ (6 mm - 64 mm) **Note:** Above 2.5” (64 mm) consult factory for mounting instructions.
Flow Characteristics Applied in addition to the control valve’s inherent characteristic.	☐ Linear ☐ Equal Percentage (of 50:1 or 30:1) ☐ Camflex ☐ Quick Opening (inverse of 50:1 equal percentage) ☐ User Configurable ☐ Tight Shut Off (0 -20% of input)
Auto Tune SVI II AP performs automatic determination of the optimal valve positioner control parameters. In addition to P, I, D, the position algorithm uses damping, symmetry for exhaust and fill time constants, dead zone and magnitude characterization parameters. Auto Tune is optimized for 5% step changes with negligible overshoot. After the Auto Tune process is completed, the user can further adjust the positioner tuning parameters to more conservative or to more responsive values.	☐ Proportional gain: 0 to 5, displayed as 0 to 5000 ☐ Integral time: 0 to 100 seconds - displayed as 0 to1000 (1/10s) ☐ Derivative time: 0 to 200 milliseconds ☐ Dead Zone: 0 to +/-5% (0 to 10% deadband) ☐ Padj: +/- 3000 (depends on P) ☐ Beta (non-linear gain factor): -9 to +9 ☐ Stroking Time: 0 to 250 seconds ☐ Position compensation coefficient: 1 to 20 ☐ Boost: 0 to 20
Full open position adjustment	60 to 100% of actual stop
Start Up Time (from no power)	Less than 200 ms
Minimum current to maintain HART®	3.0 mA
HART® Command #3 Mapping	☐ HART® 4-20 mA input signal ☐ PV = Valve Position, 0-100% ☐ SV = Actuator Pressure (P1-P2) (N/A for standard diagnostic version; units sends zero) ☐ TV = Supply Pressure ☐ QV = P2 for double acting units (N/A for standard diagnostic version; units sends zero)

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Table 10 - Input Signal, Power, and Display Specifications

Power Supply	Loop powered from 4-20 mA control signal
Compliance Voltage Rating	9.0 V at 20 mA, 11.0 V at 4.0 mA
Minimum Current Signal to Start Up	3.2 mA
Impedance Range	Low: 450 Ohms; High: 2750 Ohms
Minimum Input Span for Split Range Operation	5 mA
Upper Range Value for Split Range Operation	8 mA to 20 mA
Lower Range Value for Split Range Operation	4 mA to 14 mA
Wire Size	14/28 AWG
Strip Length	0.22 in / 6 mm
Digital Communication	HART® Communication protocol revision 5, 6 or 7
Local Display	LCD, Explosion proof with two lines of nine alpha numeric characters. Display becomes unreadable between 0 °C and -10 °C. Display is shutdown at -15 °C.
Push Buttons	External, Three Explosion Proof / Flameproof pushbuttons

Table 11 - Construction Material Specifications

Housing and Cover	☐ Aluminum ASTM B85 SG100A ☐ standardStainless Steel optional
Weight	Standard Flow Model: ☐ Aluminum - 7.4 lbs./ 3.3 kg ☐ Stainless Steel - 16 lbs/ 7.3 kg High Flow Model: ☐ With Display: 9.4 lbs./ 4.2 kg ☐ Without Display: 8.9 lbs./ 4.0 kg
Relay and Manifold	Standard Flow Model: ☐ Single Acting - PPS, 300 Series Stainless Steel, nitrile diaphragms ☐ Double Acting - 300 Series Stainless Steel, Ryton; Aluminum 6061 T6, Ryton High Flow Model: ☐ 300 Series Stainless Steel, Ryton; Aluminum 6061 T6, Ryton
I/P Motor	430 stainless steel, PPS, 300 series stainless steel
Mounting Bracket	300 series stainless steel
Magnet Holder	Corrosion Protected Anodized Aluminum 6061 T6
Pole Ring	416 stainless steel
Levers	300 Series stainless steel

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Table 12 - System Connectivity

HART® Physical Device Type	Actuator Device Type: ☐ Rev 1: HART®5: CA (202); HART®6: 65CE (206), HART®7: 65EE(238) ☐ Rev 2: HART®5: CA (202)
DD Registered with HART® Communication Foundation	Yes
Integration with HART® Host software	ValVue AMS SNAP-ON application available, Plug-In Application For Yokogawa® PRM, ValVue For Honeywell® FDM, Device Type Manager (DTM) for FDT Host
Diagnostics	**Standard:** Alarms, cycle counter, travel accumulator, time open, time close, timenear close, Step Test, Positioner Test **Advanced:** Includes Standard Diagnostics and the following: Low Air Supplyalarm, Valve Signature (Friction, spring range, seat profile)

Table 13 - Pneumatics Single Acting Standard Flow

Air Supply	Dry, oil-free, 5 micron filtered air (per ISA S7.3)
Action	Direct Acting
Supply Pressure	20-100 psi max. (1.4 to 6.9 bar) Regulate 5 to 10 psi above actuator spring range. Do notexceed actuator rating.
Air Delivery - Single Acting Relay	☐ 10.0 scf/min. (283 L/min) at 30 psi (2.1 bar) supply ☐ 16.6 scf/min. (470 L/min) at 60 psi (4.2 bar) supply ☐ 23.3 scf/min. (660 L/min) at 90 psi (6.3 bar) supply
Air Capacity (flow coefficient)	☐ Loading CV = 0.57 ☐ Venting CV = 0.53
Air Consumption	☐ 0.2 scf/min. (5.7 L/min) at 30 psi (2.1 bar) supply ☐ 0.26 scf/min. (7.4 L/min) at 45 psi (3.1 bar) supply
Air Supply Failure	Single Acting Relay On supply failure the actuator output fails to atmosphere. Some overshoot may occur when air pressure returns after a period without air supply pressure. Always set control set point to 0%, and put the process control system inmanual, for smooth recovery from air supply failure.
Loss of Input Signal	Actuator Output fails to atmosphere
Output Pressure	0-150 psi (10.3 bar) max.

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Table 14 - High Flow Pneumatics Single Acting High Flow

Air Supply	Dry, oil-free, 5 micron filtered air (See ISA S7.3)
Action	Direct Acting
Supply Pressure	20 -100 psi max. (1.4 - 6.9 bar) Regulate 5 - 10 psi (.345 bar - .69 bar) above actuatorspring range. Do not exceed actuator rating.
Air Delivery - Single Acting Relay	☐ 39.0 scf/min. (1104 L/min) at 30 psi (2.1 bar) supply ☐ 70.6 scf/min. (2000 L/min) at 60 psi (4.2 bar) supply ☐ 102.0 scf/min. (2888 L/min) at 90 psi (6.3 bar) supply
Air Capacity (flow coefficient)	☐ Loading CV = 2.2 ☐ Venting CV = 2.8
Air Consumption	☐ 0.28 scf/min. (8.0 L/min) at 30 psi (2.1 bar) supply ☐ 0.35 scf/min. (10.5 L/min) at 45 psi (3.1bar) supply
Air Supply Failure	Single Acting Relay On supply failure the actuator output drops. Some overshoot may occur when air pressure returns after a period without air supply pressure. Always set control set point to 0%, and put the process control system in manual, for smooth recovery from air supply failure.
Loss of Input Signal	Output drops to low pressure.
Output Pressure	0-150 psi (10 bar) max

Table 15 - Pneumatics Double Acting Standard Flow

Air Supply	Dry, oil-free, 5 micron filtered air see ISA S7.3
Action	☐ Output 1 increases with increasing signal ☐ Output 2 decreases with increasing signal
Supply Pressure for Double Acting	25 - 150 psi max. (1.73 to 10.3 bar) Do not exceed actuator rating.
Air Delivery for Double Acting	☐ 7.2 scf/min. (204 L/min) at 30 psi (2.1 bar) supply ☐ 12.8 scf/min. (362 L/min) at 60 psi (4.2 bar) supply ☐ 18.3 scf/min. (518 L/min) at 90 psi (6.3 bar) supply ☐ 23.8 scf/min. (674 L/min) at 120 psi (8.3 bar) supply
Air Capacity (flow coefficient)	☐ Loading CV = 0.39 ☐ Venting CV = 0.33
Air Consumption for Double Acting	☐ 0.4 scf/min. (11.3 L/min) at 30 psi (2.1 bar) supply ☐ 0.85 scf/min. (24.1 L/min) at 80 psi (5.52 bar) supply
Air Supply Failure	Positioner cannot control the failure position of an actuator without a spring. The actuator can, under different conditions, fail in place, fail open, or fail close. In cases where the valve must fail to a required position additional accessories are required. Some overshoot can occur when air pressure returns after a period without air supply pressure. Always set control set point to 0%, and put the process control system in manual, for smooth recovery from air supply failure.
Loss of Input Signal	☐ Output 1 fails to atmosphere ☐ Output 2 fails to supply pressure.

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Series Identification SVI II AP - abcdefgh

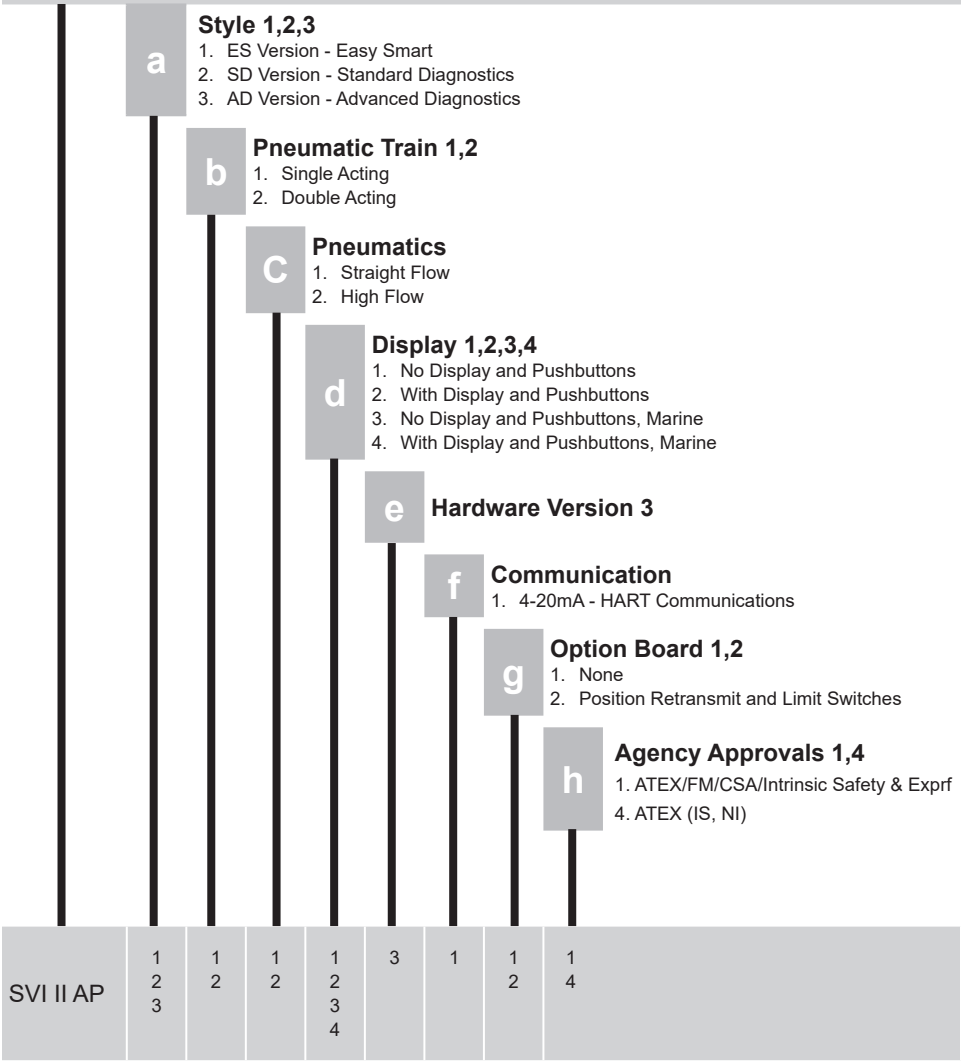


Figure 33 - SVI II AP Model Numbering

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Hazardous Location Installation

WARNING

Refer to ES-699 Safe Use Instructions for installing Masoneilan SVI II AP in areas where there is a potential risk for explosive gas atmosphere or inflammable dust.

ES-699 instructions are available in several languages on:

valves.bakerhughes.com/resource-center

Spare Parts

Circuit Board Kits (Standard and Offshore, Non-JIS)

SVI II **AP-2**,	Position Tx. & Switches **Off**	011531862-999-0000
SVI II **AP-2**	Position Tx. & Switches **On**	011531863-999-0000
SVI II **AP-3**	Position Tx. & Switches **Off**	011531864-999-0000
SVI II **AP-3**	Position Tx. & Switches **On**	011531865-999-0000
SVI II **AP-2 Double-Act.**	Position Tx. & Switches **Off**	011531866-999-0000
SVI II **AP-2 Double-Act**	Position Tx. & Switches **On**	011531867-999-0000



Push Button/Display Cover Spare Part Kit

Standard Construction, SVI II AP-**2 720003884-999-0000**

Offshore Construction, SVI II AP-**2 720003885-999-0000**

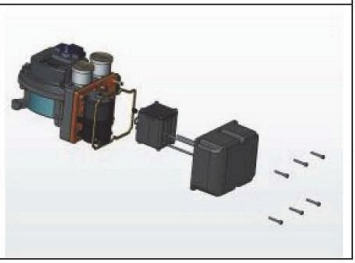
Item No.	Description	Quantity
1	ASSY, COVER WINDOW	1
2	Gasket, Cover, Electronics	1
3	Instructions	1



Relay Spare Part Kit, **Standard** and **Offshore** Construction

720003880-999-0000

Item No.	Description	Quantity
1	RELAY, Single Acting	1
2	M4 X 0.7 X 60 SHCS	3
3	Pneumatics Cover	1
4	Pneumatics Cover Gasket	1
5	M4 X 0.7 X 25 SHCS	6
6	Instructions	1

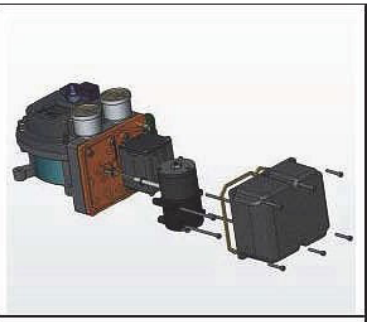


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I/P Spare Part Kit, **Single-Acting** (Standard and Offshore)

720003878-999-0000

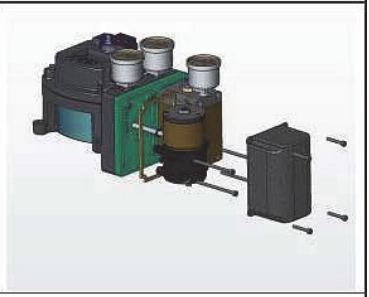
Item No.	Description	Quantity
1	**I/P Assembly**	**1**
2	O-Ring, I/P Stem	2
3	M4 X 0.7 X 60 SHCS	4
4	Pneumatics Cover	1
5	Pneumatics Cover Gasket	1
6	M4 X 0.7 X 25 SHCS	6
7	Instructions	1



I/P Spare Part Kit, **Double-Acting** (Standard and Offshore)

720003879-999-0000

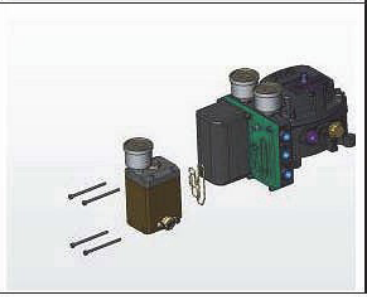
Item No.	Description	Quantity
1	I/P Assembly	1
2	O-Ring, I/P Stem	2
3	M4 X 0.7 X 60 SHCS	4
4	Pneumatics Cover	1
5	Pneumatics Cover Gasket	1
6	M4 X 0.7 X 25 SHCS	6
7	Instructions	1



Relay Spare Part Kit , **Double-Acting**,

Standard Construction **720003881-999-0000**
Offshore Construction **720003882-999-0000**

Item No.	Description	Quantity
1	Relay Double-Acting	1
2	O-RING, CONTOURED, DA 12:1 RELAY	1
3	M4 X 0.7 X 60 SHCS	4
4	Instructions	1

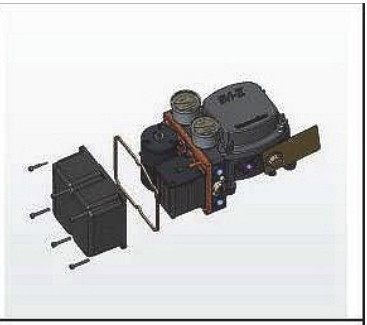


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Pneumatic Cover Kit, **Single Acting**

720002450-999-0000

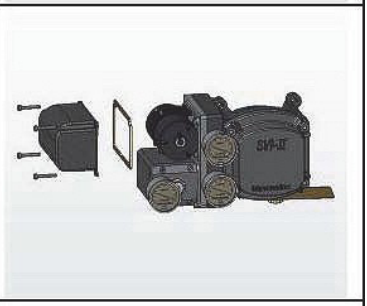
Item No.	Description	Quantity
1	LOCTITE 222MS, 0.5mL LOW STRENGTH	1
2	SCREW M4 X 0.7 X 25 SOCKET HEAD CAP	6
3	GASKET MANIFOLD S/A	1
4	PNEUMATICS COVER S/A SVI2AP	1
5	MINIVALVE 064.001 SILICONE	1



Pneumatic Cover Kit, **Double-Acting**

720002451-999-0000

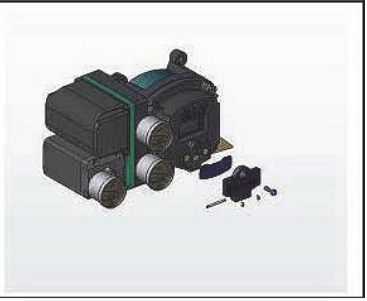
Item No.	Description	Quantity
1	LOCTITE 222MS, 0.5mL LOW STRENGTH	1
2	SCREW M4 X 0.7 X 25 SOCKET HEAD CAP	4
3	GASKET I/P COVER D/A SVI2AP	1
4	COVER PNEUMATICS DA	1
5	MINIVALVE 064.001 SILICONE	1



Pushbutton Door, Kit

720002448-999-0000

Item No.	Description	Quantity
1	SCREW CAPTIVE PANEL	1
2	PIVOT PIN PUSH BUTTON COVER SVI II	1
3	CIRCLIP SHAFT PUSH B	2
4	COVER PUSHBUTTON SVI2AP	1
5	GASKET COVER PUSHBUTTON SVI2	1

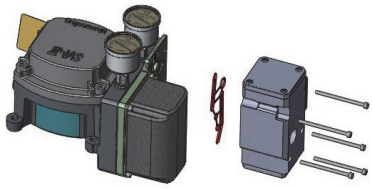


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Relay Spare Part Kit, Standard Construction

High Flow, Single Acting SVI II AP-2

720014541-999-0000



Item No.	Part Number	Description	Quantity
1	720017771-265-0000	SCR HEX SHCS M4 X 0.7 X 60 MICRO-SPHERES 593 PATCH	5
2	971886015-681-0000	O-RING ID 9.19 [0.362] WIDTH 2.62 [0.103] REF NO 2-110	3
3	971886124-681-0000	O-RING ID 29.87 [1.176] WIDTH 1.78 [0.0703] REF NO 2-025	1
4	720020224-681-0000	O-RING ID 9.137.82 [1.498] WIDTH 1.78 [0.0703] REF NO 2-029	1
5	720014540-779-0000	Instructions	1

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Appendix B: Optional Switch Load Limits

General Configuration Notes

The SVI II AP supports two identical contact outputs, SW #1 and SW #2 (Digital Output switches), that can be logically linked to status bits.

The switches are polarity sensitive and must be connected only to a DC circuit. The switch (+) terminal must be electrically positive with respect to the (–) terminal. If the (+) terminal is electrically negative with respect to the (–) terminal, then the switch will conduct, regardless of switch state.

If the switch is connected directly across the power source, the current will be limited only by the capacity of the power source and the switch can be damaged.

This section discusses the necessary precautions when configuring a system.

Without a load, when the switch is on (closed) the external voltage would be dropped across the switch. This damages the switch (Figure 34).

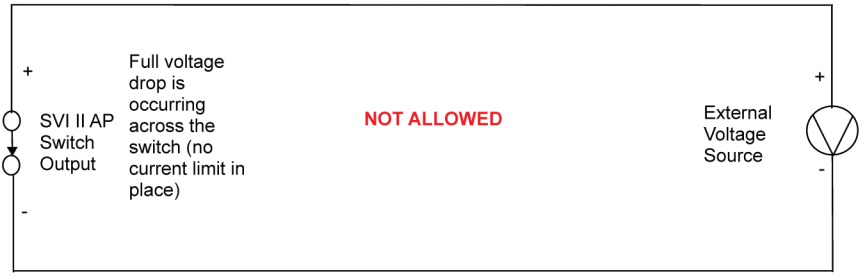


Figure 34 - Switch Installation Drawing without Load: Configuration Not Allowed

	Switch OFF	Switch ON
V_{SWITCH}	30 VDC max.	≤ 1 V (Switch saturation voltage)
I_{SWITCH}	≤ 0.200 mA (Switch leakagecurrent)	1 A max.

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CAUTION

CAUTION

Incorrect polarity connection results in aneffectively closed connection.

CAUTION

Consult with qualified personnel to ensurethat electrical requirements for the switch are met.

The maximum voltage that can be applied to the digital switch outputs is 30 VDC. This is an open circuit parameter (the digital switch is in the open state). Under open circuit conditions, the switch current will be less than 0.200 mA.

The switch maximum current rating is 1 A. When the switch is ON, the typical switch voltage is ≤1V.

When the switch is on (closed) the external voltage must be dropped across the load (Figure 35).

CAUTION

The load must be designed such that the current in the circuit is ≤ 1 A at all times. Some 3rd party devices, such as incandescent lamps or solenoids, require surgeand back EMF protection to prevent voltage spikes.

Load, Solenoid, Incandescent Lamp Configuration

Load is designed to limit current through the switch to < 1 A.

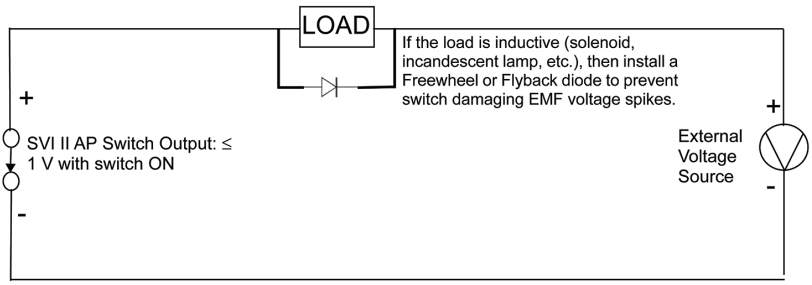


Figure 35 - Simplified Switch Installation Drawing: Correct Configuration

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Distributed Control Systems Configurations

This section gives guidance for configuration in a DCS application. Figure 36 gives two generalized drawings that cover DCS applications to ensure switch safety.

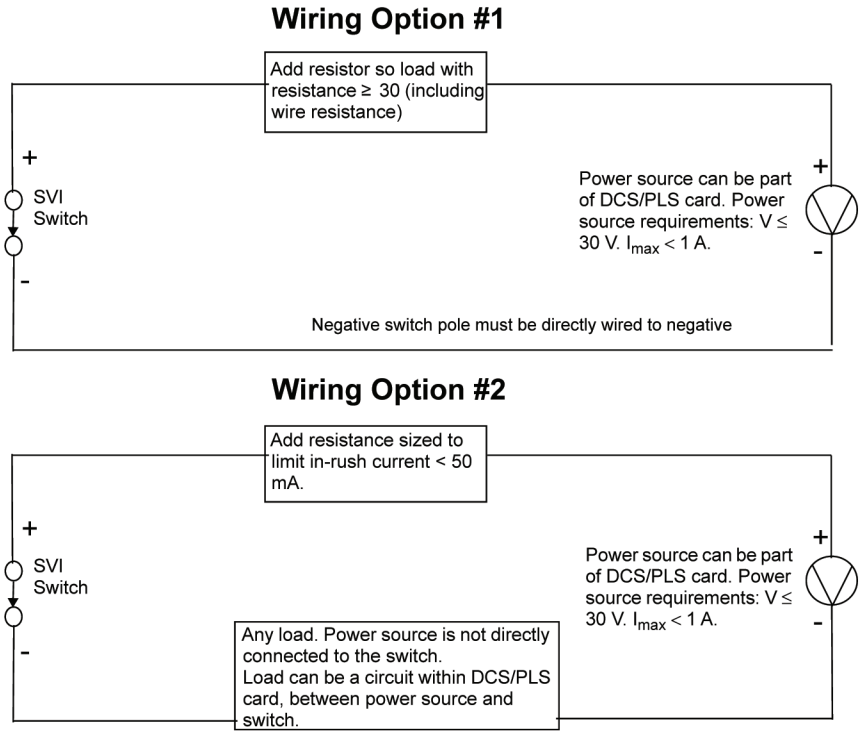


Figure 36 - DCS Switches Wiring Options

Configuration Considerations

- A typical value for 24 AWG cable about 0.025 Ohm/ft (see Wiring Option #1).
- If IS barrier is a combination of fuse, resistor and Zener diode then the connection is shown in Option #2. The barrier must have adequate resistance to limit inrush current, as the fuse cannot limit inrush current (see Wiring Option #2).

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Appendix C: Burst Mode

The Burst mode is when the HART® device continuously sends out data for a device not capable of being polled by a Master. Use this mode only for devices that are passive (i.e. not a HART® master), such as a HART® to Analog converter (SPA from Moore Industries, Tri-Loop by Rosemount). Turning on Burst mode affects the overall communication bandwidth. Burst mode is not available for SVI II AP in HART® 7.

In a DCS-controlled environment, if you are using a:

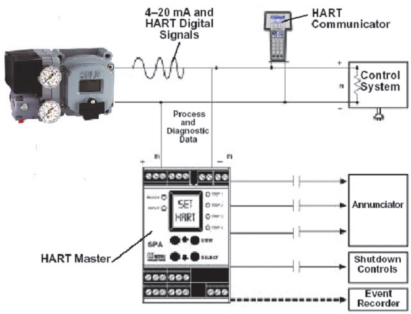
- Tri-Loop configuration: Here the DCS does not have an analog-capable card. The SVI must be in BURST mode when using Tri-Loop.
- DCS with a mix of analog output cards: Some without HART® and some with HART®. SVIs connected to cards without HART® need to use HART® to analog converter. The SVI also must be set to use Burst mode so it sends the response as requested.To see how the Burst mode is configured see the ValVue or SVI II AP DTM online help.

The Burst mode can send the following commands:

- Cmd1: PV
- Cmd2: %range/current
- Cmd3: Dyn vars/current
- Cmd9: Device vars w/status
- Cmd33: Device variables

Choose the Burst command variables to be returned by referring to list of device variables in Table 16.

Connecting the SPA with the AP



- must be set as a secondary master if the SPA is in polling mode to be able to connect.
  - PV = Position
  - SV = Actuator Pressure
  - TV = Supply Pressure
  - QV = Pressure 2

The on/off contacts can be triggered from the status bits sent with every message. The module must be configured to let it know which bit will trigger the contact.

Figure 37 - Burst Mode Configuration

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Table 16 variables are returned from HART® command 9.

Table 16 - Device Variables

Variable Code	Variable Name	Description	Unit	Availability by Firmware Revision
0	Position	Valve position	Percent	Available for both firmware 4.1.1 (in HART® 6) and 5.1.X (in HART® 7)
.1	P1-P2	Actuator pressure (if single acting) Differential pressure (if double acting)	psi	“
2	Supply Pressure	Supply pressure	psi	“
3	P2	Pressure on port 2 (for double-acting)	psi	“
4	Setpoint	Valve setpoint	Percent	“
5	Signal	Analog Input current signal	mA	“
6	SW1	Switch 1 (DO1)	Percent (0% = off, 100% = on)	“
7	SW2	Switch 2 (DO2)	Percent (0% = off, 100% = on)	“
8	DI	Digital Input	Percent (0% = off, 100% = on)	“
9	Tempera-ture	Board temperature	Celsius	“
10	Reserved	Reserved	Reserved	“
11	Raw Position	Raw valve position	Counts	“
12	Strokes	Total valve travel odometer (An accumulated value of 100% travel = 1 stroke. The travel does not need to occur in one movement.)	Counts	“

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Table 16 - Device Variables (Continued)

Variable Code	Variable Name	Description	Unit	Availability by Firmware Revision
13	Cycles	Number of direction reversals in valve travel	Counts	“
14	Position Retransmit	Position retransmit via Analog Output	Counts	“
15	I/P Current	Current to pressure transducer current	mA	Available for firmware 5.1.X (in HART® 7 only).
16	Friction	Static valve friction	psi	“
17	Position Error Band	Allowed position deviation range from setpoint; position deviation range from setpoint greater than this value results in position error.	Percent	“
18	Open Stop Adjustment	Upper limit for valve travel	Percent	“
19	Percent of Range	Analog Input current signal in percentage	Percent	“

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Sample Tri-Loop Configuration

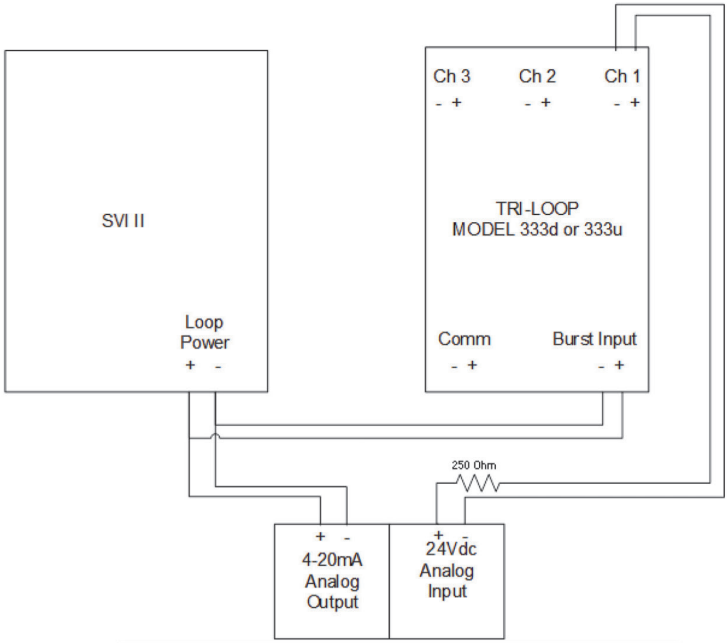
Figure 38 shows a simplified schematic showing the connection between the SVI II AP a Tri-Loop and a control system. Some considerations:

- The input channel from the control system must have an impedance of at least 250 Ohms or else the HART® signal will be attenuated.
- Channel one must be enabled and set for Primary Variable with a range of 0-100%.
- Other vendors may have the Tri-Loop set to function on another channel.
- You can enable channel 2 and 3 even if you don't connect them.

CAUTION



Consult the instruction manual of the TRI-LOOP for wring diagrams. Masoneilan is not responsible for improperly wiring the TRI-LOOP. A resistor might berequired on the positive leg of Channel 1 to limit thecurrent to the TRI-LOOP.



SVI II Configuration:
HART Address = 0
Set BURST MODE to HART cmd#3 (with ValVue) or PROCESS-VARS CURRENT (with Handheld or DD enabled Host)
PV is Valve Position (0-100%)
SV is Actuator Pressure (0-120 psi)
TV = Pressure
QV= Not Used

TRI-LOOP Setup
HART address =1
CHANNEL = ENABLE
Variable = PV
Upper Range Value = 100
Lower Range Value = 0
Units: %

Figure 38 - Sample Tri-loop Configuration

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Appendix D: Determining an SVI Positioner Compliance Voltage in a Control

This discussion explains how to determine compliance voltage for an SVI positioner. It applies to the SVI II AP, SVI II ESD, SVI II APN and SVi1000.

A definition of compliance voltage is: The voltage that must be available at the control system output in order to drive the control current through the SVI II AP and all the resistive devices in series with it.

Measuring the voltage across the SVI II AP terminals doesn't give the true available system compliance voltage as the positioner self-regulates voltage as current flows through it. Additionally, it also doesn't confirm what system voltage is available under load conditions. Therefore, if compliance testing needs to be done, it is best done before installation.

Use a 1K potentiometer as this is the maximum for most analog output cards and as at 20 mA this equals 20 VDC, which is a sufficient maximum.

Compliance Test Set-Up

Configure a test set-up as in Figure 39.

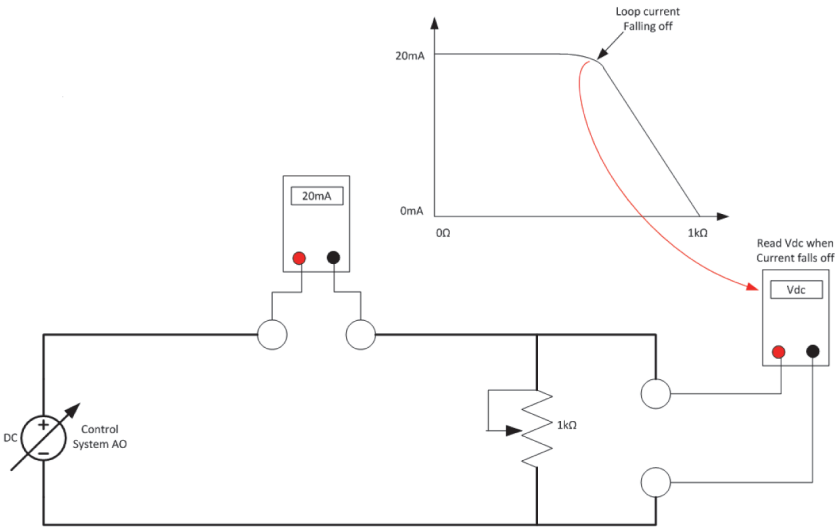


Figure 39 - Compliance Voltage Test Set-Up

1. Send 4 mA to the test set-up.
2. Increase the potentiometer value until the loop current reaches 3.95 mA.
3. Read the voltage across the potentiometer, which should be > 11 VDC. This is the available system voltage at the minimum output.
4. Send 20 mA to the test set-up.
5. Increase the potentiometer value until the loop current reaches 19.95 mA.
6. Read the voltage across the potentiometer, which should be > 9 VDC. This is the available system voltage at the maximum output.

Table 17 lists some compliance voltage readings at positioner terminals at several currents.

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Table 17 - Expected Voltage Range at Positioner Terminals

Current	Compliance Voltage Requirement at Positioner Terminals	Expected Voltage Measured at Positioner Terminals
4 mA	11 V	10 to 11 V
8 mA	10.5 V	9.5 to 10.5 V
12 mA	10 V	9 to 10 V
16 mA	9.5 V	8.5 to 9.5 V
20 mA	9 V	8 to 9 V

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Appendix E: Customs Union Information

MARKING



Ex ia IIC T6..T4 Ga X	{Intrinsically Safe, gas}
Ex ia IIIC T96°C Da X	{Intrinsically Safe, dust}
Ex db mb IIC T6..T4 Gb X	{Flameproof/Encapsulation, gas}
Ex tb IIIC T96°C Db X	{Protection by Enclosure, dust}
Ex ic IIC T6..T4 Gc X	{Intrinsically Safe, gas}
Ex tc IIIC T96°C Dc X	{Protection by Enclosure, dust}

See instructions ES-699 for all entity parameters

PROTECTION, STORAGE, HANDLING, DISPOSAL

Valves have been tested and adjusted at the factory prior to shipment. The period between leaving the manufacturing plant to installation may involve substantial exposure to degradation due to impact, impingement or corrosion. Such degradation can adversely affect the performance of valves when in service and can easily be avoided if simple guidelines are followed.

Protection

As a minimum, all positioners are dried, coated and fitted with protective measures, such as positional air connection protection and boxed for protection during shipment when shipped as individual positioner, or waterproof wrapping if installed on valve package, prior to shipment. This protection should be left in place until immediately before the positioner is to be fitted onto an assembly.

Storage and Preservation

If the SVI II AP is stored for a long duration, you must keep the housing sealed against weather, fluids, particles, and insects. To prevent damage to the SVI II AP:

- Use the plugs provided with shipment to plug the ¼ NPT air connections, on the positioner and on the air filter regulator set.
- Do not allow standing water to accumulate.
- Observe storage temperature requirements.

Transportation and Handling

Appropriate care when handling the SVI II AP should be given, roughness in handling may damage air filter and NPT connection. Care should be taken to avoid damage to any protection. Exercise care when unpacking the control valve and its mounted accessories.

Disposal

Follow instructions carefully on product labels for use and storage to prevent any accidents.

Be sure to read product labels for disposal instructions to reduce the risk of products exploding, igniting, leaking, mixing with other chemicals or posing other hazards on the way to a disposal facility.

Never store hazardous products in food containers; keep them in their original containers and never remove labels. Corroding containers, however, require special handling. Call your local hazardous materials official or fire department for instructions.

Check with your local environmental, health or solid waste agency for more information on waste management options.

AUTHORIZED CONTACTS

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Notes:

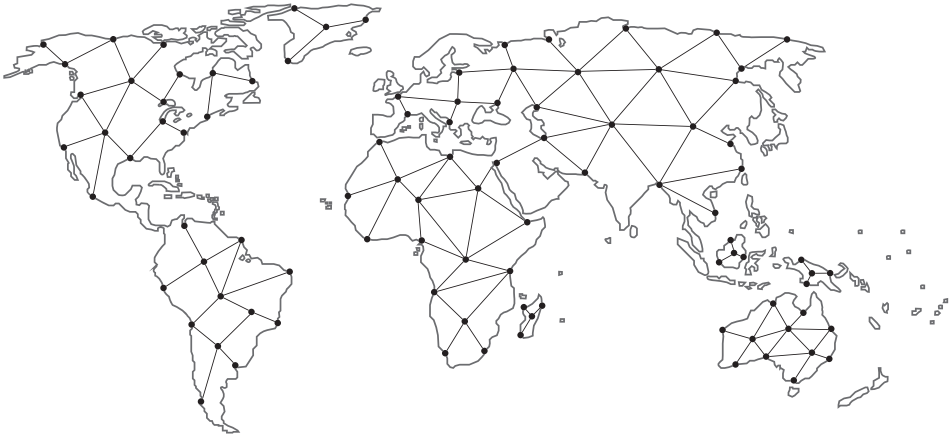
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