SIEMENS

Troubleshooting Guide

Electropneumatic positioners

SIPART PS2 4/20 mA (6DR50...6DR51...6DR52...6DR53...)

Edition 08/2017

SIEMENS

SIPART PS2

Smart Valve Positioner PS2 Troubleshooting Guide

Service Manual

03/2017

A5E36661550-AA

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Siemens AG
Division Process Industries and Drives
Postfach 48 48
90026 NÜRNBERG
GERMANY

Document order number: A5E36661550
℗ 08/2017 Subject to change

Table of contents

Introduction 1

1.1 Purpose of this documentation

The purpose of this document is to aid with troubleshooting, installation and commissioning of valve assemblies equipped with the SIPART PS2 valve positioner. Many valve related issues can be discovered using the numerous SIPART PS2 features. This guide is intended to direct a qualified technician to a specific troubleshooting procedure so the root-cause failure of a valve assembly can be revealed. Since numerous symptoms can arise, the attached Valve Symptom Guide (Page 13) will guide you to the appropriate troubleshooting steps. The Appendix section contains useful documents that are referenced in many of the following troubleshooting procedures. The "NOINI (P-Manual Mode) Troubleshooting" document, found in Appendix A, can be considered a "catch-all" procedure that should uncover all issues that will prevent successful PS2 initialization. For mechanical installation of positioner to actuator, refer to the specific mounting kit instructions.

1.2 Requirements for special applications

Due to the large number of possible applications, each detail of the described device versions for each possible scenario during commissioning, operation, maintenance or operation in systems cannot be considered in the instructions. If you need additional information not covered by these instructions, contact your local Siemens office or company representative.

Submit a Tech Support Request Online: http://www.usa.siemens.com/support-request

Siemens Valve Instrumentation Website: www.siemens.com/positioner

1.3 Improper commissioning in hazardous areas

⚠ WARNING

Improper commissioning in hazardous areas

Device failure or risk of explosion in hazardous areas.

- Do not commission the device until it has been mounted completely and connected in accordance with the information in Chapter "Technical data" in Operating Instructions A5E00074631.
- Before commissioning take the effect on other devices in the system into account.

1.4 Loss of explosion protection

WARNING

Loss of explosion protection

Danger of explosion in hazardous areas if the device is open or not properly closed.

- Close the device as described in Chapter "Technical data" in Operating Instructions A5E00074631.

1.5 Opening device in energized state

WARNING

Opening device in energized state

Danger of explosion in areas subject to explosion hazard.

- Only open the device in a de-energized state.
- Check prior to commissioning that the cover, cover locks, and cable inlets are assembled in accordance with the directives.

Exception: Devices having the type of protection "Intrinsic safety Ex i" may also be opened in energized state in hazardous areas.

1.6 Water in compressed air line

WARNING

Water in compressed air line

Device damage and possibly loss of type of protection. The factory setting for the purging air selector is "IN". In the "IN" position, water from the compressed air line may enter the device from the pneumatics during initial commissioning.

- Before commissioning, make sure no water is present in the compressed air line.

If you cannot be sure that there is no water in the compressed air line:

- Set the purging air selector to "OUT". In this way, you prevent water from the compressed air line from penetrating the device.
- Only set the purging air selector to "IN" again when all water has been discharged from the compressed air line.

1.7 Loss of degree of protection

Note

Loss of degree of protection

Damage to device if the enclosure is open or not properly closed. The degree of protection specified on the nameplate or in Chapter "Technical data" in Operating Instructions A5E00074631 is no longer guaranteed.

- Make sure that the device is securely closed.

1.8 Commissioning and operation with error message

WARNING

Commissioning and operation with pending error

If an error message appears, correct operation in the process is no longer guaranteed.

- Check the gravity of the error.
- Correct the error.
- If the error still exists:
  - Take the device out of operation.
  - Prevent renewed commissioning.

1.9 Basic safety instructions

Qualified personnel for hazardous area applications

Persons who install, connect, commission, operate, and service the device in a hazardous area must have the following specific qualifications:

- They are authorized, trained or instructed in operating and maintaining devices and systems according to the safety regulations for electrical circuits, high pressures, aggressive, and hazardous media.
- They are authorized, trained, or instructed in carrying out work on electrical circuits for hazardous systems.
- They are trained or instructed in maintenance and use of appropriate safety equipment according to the pertinent safety regulations.

1.10 Customer and Product Support

Customer/Product Support

For support and the location of your local Siemens representative, refer to the table below for the URL of the Process Instrumentation portion of the Siemens public Internet site. Once at the site, click **Support** in the right column and then **Product Support**. Next select the type of support desired: sales, technical (see the table below), documentation, or software.

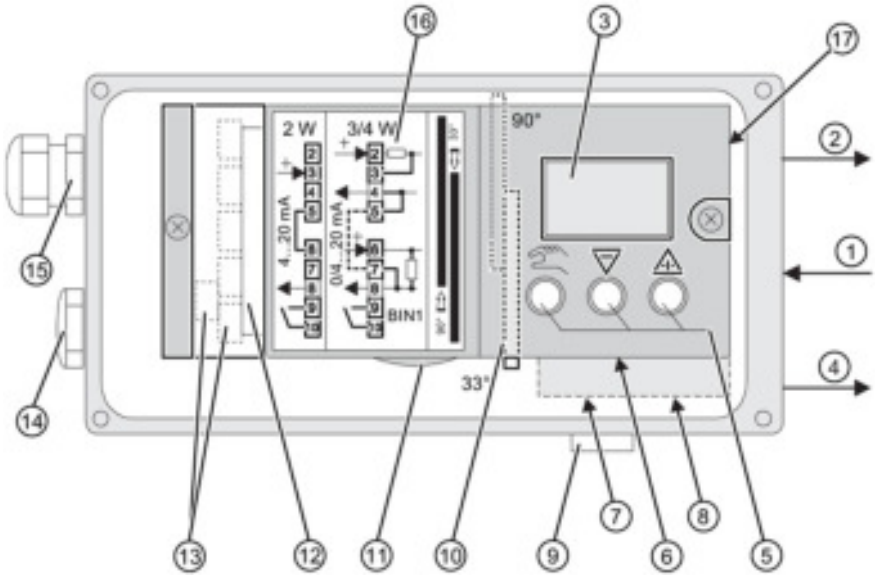
Online Support Request	http://www.siemens.com/automation/support-request
Technical Support	1-800-333-7421; 8 a.m. to 4:45 p.m. eastern standard time, Monday through Friday (except holidays)
Customer Service & Returns	1-800-365-8766 (warranty and non-warranty)
Public Internet Site	http://www.usa.siemens.com/pi
Technical Publications in PDF	Click the above link to go to the Siemens Internet site and then click **Process Instrumentation**. In the column to the right, click **Support>Manuals**. In the column to the left, select the product line (e.g. Pressure or Temperature or Controllers) to open navigation and search panes.

1.11 Device Overview

How to gain access to the configuration buttons and mechanical settings

Markrolon (Gray Plastic) Housing

- Loosen the four screws on the outside cover.



① Input: Supply air PZ
② Output: Actuating pressure Y1
③ Display
④ Output: Actuating pressure Y2 [1)]
⑤ Buttons
⑥ Restrictor Y1 for single-acting actuators
⑦ Restrictor Y1 for double-acting actuators
⑧ Restrictor Y2 for double-acting actuators
⑨ Exhaust air outlet with a sound absorber
⑩ Transmission ratio selector [2)]
⑪ Friction clutch adjustment wheel
⑫ Basic electronics
⑬ Connecting terminals of option modules
⑭ Dummy plug
⑮ Cable gland
⑯ Wiring diagram on module cover
⑰ Purging air selector

1) for double-acting actuators
2) only possible when positioner is open

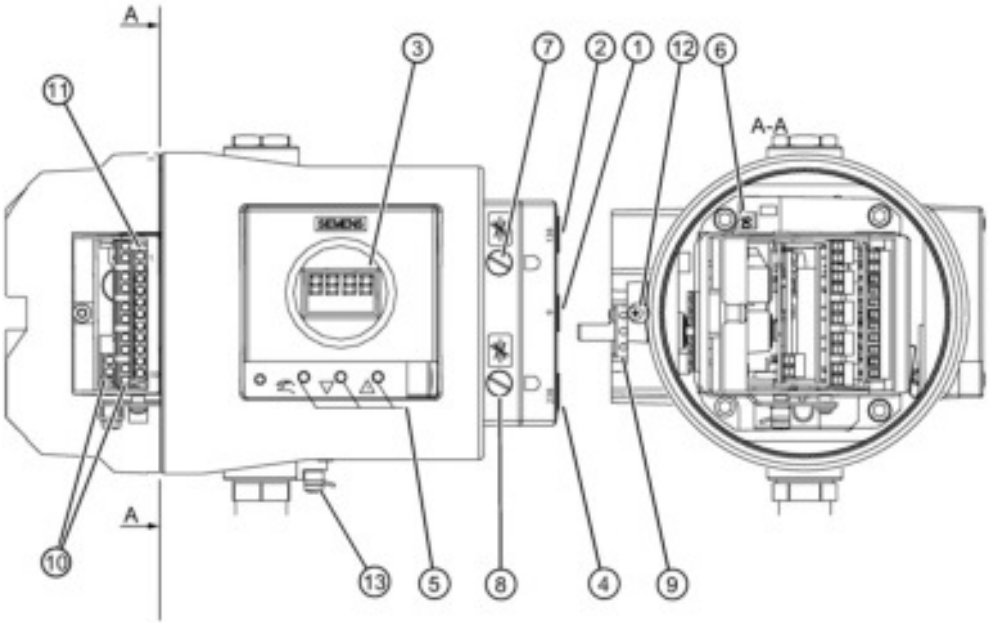
Figure 1-1 View of basic positioner with cover open

Buttons

① Display
② Operating mode button
③ Decrement button
④ Increment button

Flameproof Enclosure

- Loosen the screw below the display and flip open the cover to access the push buttons.



① Input: Supply air PZ
② Output: Actuating pressure Y1
③ Display
④ Output: Actuating pressure Y2 [1)]
⑤ Buttons
⑥ Transmission ratio selector [2)]
⑦ Restrictor Y1
⑧ Restrictor Y2 [1)]
⑨ Friction clutch adjustment wheel
⑩ Connecting terminals of option modules
⑪ Connecting terminals of basic electronics
⑫ Safety catch
⑬ Ground terminal

[1)] for double-acting actuators
[2)] only possible when positioner is open

Figure 1-2 View of the positioner in the flameproof enclosure, cover opened

Note

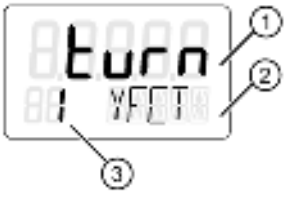
The friction clutch is black in color.

See also

Initialization Procedure (Page 50)

The chart below shows the PS2's operating modes and functions

Operating Mode	Function
Flashing "noini" (P Manual)	No Initialization - Unit needs to be calibrated • See Initialization Procedure (Page 50)
Initialization Mode	Automatic Commissioning • Parameter 4 in Configuration menu
Configuration	Contains all setup parameters including positioner features
MAN##	Manual Mode – Manually move valve with ▲ and ▽ • Does not follow command signal
AUT##	Automatic Mode - Unit follows command signal
Diagnostics	Contains: • Read-only/Resettable maintenance data • Tuning parameters • Leak and current detection

Operating Mode	Representation in the display	Pos.	Legend
P manual mode		①	Potentiometer setting [%]
		②	Blinking indicator for the non-initialized status.
Initialization mode		①	Potentiometer setting [%]
		②	Display of the current status of initialization or a fault message.
		③	Indicator for ongoing initialization or a fault message.
Configuring		①	Parameter value
		②	Parameter name
		③	Parameter number
Manual mode (MAN)		①	Position [%]
		②	Setpoint [%]
		③	Fault message

Operating Mode	Representation in the display	Pos.	Legend
Automatic (AUT)		①	Position [%]
		②	Setpoint [%]
		③	Fault message
Diagnostics		①	Diagnostic value
		②	Diagnostic name
		③	Diagnostic number

Valve Symptom Guide

2

Possible Causes	Symptoms																		
	No display	No 4/20 mA feedback	Valve too slow	Valve too fast	Actual valve position does not match PS2 display	Valve position deviation	Does not get to setpoint	Error Code 1	Valve goes to 20% position with 4 mA setpoint	Does not fully open/close	Not responding input	Always going to alarm	Overshoot/undershoot	Drifts off setpoint	Oscillation/hunting	Valve is not repeatable	NOINI on display	Won't calibrate	Valve action is backwards
Actuator Blow-By (double-acting only) (Page 15)			•			•	•	•					•		•			•	
Actuator End-Stops (Page 15)							•			•									
Air Leak (Page 16)			•			•	•	•		•	•	•		•	•				
Alarm Parameters (Page 17)												•							
Booster(s) Not Properly Tuned (Page 18)			•	•									•		•				
Change in Valve Stroke (Page 20)										•						•			
Change in Tuning Parameters (Page 22)			•	•									•		•				
Deadband Too Large (Page 23)											•		•	•					
Deadband Too Small (Page 24)															•				
Erratic Feedback (Page 25)						•	•	•											
Erratic Input Signal (Page 26)															•				
High Vibration (Page 27)						•	•	•											
Initialization Incomplete (Page 27)																		•	
Insufficient Supply Air (Page 28)			•			•	•	•		•	•	•							
Loose or Worn Linkage (Page 29)					•	•	•	•		•			•	•	•	•		•	
Manual Mode (Page 31)											•								
Mechanical Blockage (Page 31)						•	•	•											
Parameter 1.YFCT (Page 31)					•	•							•		•				•
Parameter 6.SCUR (Page 33)									•										
Re-Initialization Positioner (Page 33)					•														
Reversing the Action (Page 34)																			•
Setpoint Ramping (Page 35)			•																
Stays at 20 mA Position (Page 35)											•								
Stiction (Page 36)			•			•	•	•		•	•	•	•		•	•			
Supply Air Too High (Page 36)				•											•				
Too Much Restriction (Page 37)			•																
Tubing Lines Configuration (Page 38)																			•
Unit Not Initialized (Page 38)																	•		
Valve Block Failure (Page 38)			•				•	•		•				•				•	
Valve Does Not Go Fully Closed/Open (Page 42)										•									
Wiring (Page 43)	•	•																	

Troubleshooting Procedures

3

3.1 Actuator Blow-By (double-acting only)

This issue is found only with double acting applications that are utilizing both Y1 and Y2 output ports.

- One output increases air pressure while the other exhausts air pressure
- This creates the necessary differential pressure in the actuator to move the valve.
- The two air chambers in the actuator must be isolated from each other; otherwise the differential pressure cannot increase.
- The actuator has an internal leak, and requires servicing if:
  - When trying to move the valve to a new position, air is continuously blowing out from the exhaust port.
  - When trying to move the valve to a new position, the two output pressures gauges, Y1 & Y2, are relatively equal in pressure value.

3.2 Actuator End-Stops

Actuator end-stops are adjustable, and must be set correctly for each valve application. If not set correctly the actuator will drive the valve too far into the valve seat, or over rotate the valve in the opening position. This can damage the valve and cause poor process performance.

To identify improper end-stop settings:

- Review actuator/valve manual and determine proper end-stops settings for valve.
- Put PS2 in manual mode:
  - From Auto press  button once.
  - Use  and/or  to change valve position
- Using  and/or  buttons move valve to both end-stop positions, and determine if valve is seating properly.
- If necessary make adjustments to actuator end-stops, refer to actuator's service manual for details.
- Re-initialize PS2, see Initialization Procedure (Page 50) (see Appendix A).

3.3 Air Leak

Note

For firmware 5.00.00 or greater only:
Verify parameter "PNEUM" is set correctly:

- "Std" = Standard Valve Block or
- "FIP" = Fail In Place Valve Block ("F10" at the end of the model code indicates FIP option.)

Perform a leak test. Any number greater than 1.0 % will need to be corrected to prevent premature wear of pneumatic valve block.

- From Manual or "noini" mode, drive the valve to a mid-stroke position using the ⚠ and/or ▽ buttons.
- Press and hold all three buttons down for at least 2 seconds.
  - PS2 will now be in Diagnostic mode, with diagnostic number in lower left hand corner of display.
- Press button to advance through the diagnostic menu.
- Go to diagnostic: "LEAK".Press and hold ⚠ button for at least 5 seconds.
  - Display will flash between "test" and actual position.
  - After one minute, the screen will display the leak rate in percent of travel from original positon.
- To return to Automatic mode, press and hold the button for 5 seconds.
  - The unit will now be in Manual mode.

    Press button one time to return to Automatic mode.
- If leak is detected, check pneumatic fittings, air lines and actuator.
  - Use some form of leak detection or soap and water around the pneumatic connections taking care not to wet the internals of the unit.
  - Identify leak and use appropriate method(s) for leak correction.

3.4 Alarm Parameters

If the unit is always going in to alarm, verify configuration settings.

- Parameter "AFCT" (Default is OFF)
  - From AUT or MAN mode, press button for 5 seconds. Now observe the number in the lower left hand corner.
  - Continue to press the button until Parameter "AFCT" is reached.
  - This parameter should be set to "OFF".

    Use and/or to change option.
- Parameters "TIM" & "LIM"

Note

These parameters should never be set to zero.

  - Continue to press the button until Parameter "TIM" is reached.

  If unit does not display "Auto", then use the button to go downward until "Auto" is reached.

  Repeat same steps with Parameter "LIM"
- Parameter "XDIAG"
  - Continue to press the button until "XDIAG" is reached.
  - This parameter should be set to "OFF".

    Use and/or to change option.
  - To return to Automatic mode, press and hold the button for 5 seconds.
  - The unit will now be in Manual mode.
  - Press the button one time to return to Automatic mode.

3.5 Booster(s) Not Properly Tuned

Pneumatic volume boosters should always be equipped with a bypass needle valve. This needle valve can be external or integral to the booster housing. Needle valve adjustments are necessary to achieve proper valve response.

- If PS2 is in Auto and currently operating the valve:
  - Rotate the needle valve counter-clockwise to slowdown response and reduce overshoots.
  - Rotate the needle valve clockwise to increase valve response
  - Re-initialize PS2 after any needle valve adjustments; see Initialization Procedure (Page 50)(see Appendix).
- A volume booster must be setup BEFORE initializing a valve positioner. The P-manual mode ("NOINI" flashing), see display example below, can be used to perform this setup. The P-manual mode will appear once proper electrical power is applied to a new PS2 valve positioner.

- If PS2 is currently initialized, activate "NOINI" mode:
  - Press and hold button to enter configuration mode
  - Configuration parameter number appears in lower left corner of display.
  - Use button to reach parameter: "4 INITA".Press and hold button until "no" appears on top of display.
  - Press and hold button to exit configuration mode
  - Display will be similar to the following (numerical value will vary).

- Once all pneumatic connections are made, and the appropriate supply pressure is applied, moving the valve assembly throughout the entire valve stroke can be accomplished using the ▲ and/or ▽ button/s.
  - Pressing one button delivers air slowly to the actuator.
  - Pressing and holding one button and then pressing and holding the other button will deliver air quickly to the actuator.
  - To move valve assembly in the opposite direction, reverse the two push button sequence.
- If the valve assembly does not move, it may be possible that the valve assembly is at the actuator end-stop position. Therefore, alternate push button sequence to deliver air in the opposite direction.
  - Using ▲ and ▽ buttons, move valve assembly to each end-stop position.

    Since numerical value on display is an un-calibrated value, use a mechanical indicator on valve assembly to determine actual valve position.
  - Move valve assembly to a mid-travel position and release pushbuttons.

    Once push buttons are released valve assembly should immediately stop.

    If valve assembly continues to move, adjust needle valve/s a quarter turn counter-clockwise.
  - Repeat above procedure until valve assembly stops when push buttons are released at any travel position.

    If this cannot be accomplished, check for air leaks and/or replace volume boosters.

    Note

    When volume booster is at rest, neither loading nor exhausting pressure, actuator pressure should be isolated from supply and exhaust sources. If volume booster cannot accomplish this, valve will continue to drift after it reaches target setpoint position. The following procedure can help identify this issue:
    - While in NOINI mode move valve assembly to mid-travel position and release pushbuttons.
    - If valve continues to drift, check PS2's pressure gauges for an:
      - Increase of pressure - this indicates a leak from supply to actuator
      - Decrease of pressure - this indicates a leak from actuator to exhaust
    - To check for both leak possibilities move valve to mid-travel position from both directions- from fully closed and from fully open.
    - To eliminate PS2 as a possible source, use the built-in flow restrictors to isolate the PS2 from the rest of the pneumatic circuit while valve continues to drift, see location of flow restrictors below.
  - Volume booster tuning is complete once valve assembly stops at any travel position when push buttons are released.
  - Perform PS2 initialization; see Initialization Procedure (Page 50)(see Appendix A).

3.6 Change in Valve Stroke

Process Build Up

Process materials can build-up on valves and valve seats. This can prevent a valve from fully closing, and cause the process to leak through the valve. Additionally process build-up can prevent the valve from fully opening.

To identify this:

- Put PS2 in Manual mode- from Auto, press button once.
- While pressing and holding button, press and hold button. This will move the valve to an end-stop position. To move valve in opposite direction, reverse push button sequence; while pressing and holding button, press and hold .
- Use this two-push button method to drive valve fully open and fully closed.
- Utilize pressure gauges to determine if PS2 is outputting full supply pressure and exhausting all output pressure.
  - **For single-acting (one airline to actuator)**

    One end-stop position should show full supply pressure. The other end-stop position will show zero pressure.
  - **For double-acting (two airlines to actuator)**

    One end-stop position should show full supply pressure, while the other gauge should show zero pressure. Output pressures will be reversed when driving valve to other end-stop position, see following example of double-acting pressure gauges at each end-stop position.

    
- If PS2 can output full supply and exhaust in both directions, then something else is preventing actuator from fully closing or opening.
- Verify supply pressure is properly set, see Insufficient Supply Air.
- If valve is still not able to fully close or open, then check actuator/valve for:
  - Mechanical binding
  - Valve seat wear

Valve Seat Wear

Valve and valve seat wear can cause over-travel and process leaks.

To Identify this:

- Put PS2 in Manual mode- from Auto, press button once.
- While pressing and holding button, press and hold button. This will move the valve to an end-stop position. To move valve in opposite direction, reverse push button sequence; while pressing and holding button, press and hold .
- Use this two-push button method to drive valve fully open and fully closed.
- Utilize pressure gauges to determine if PS2 is outputting full supply pressure and exhausting all output pressure.
  - **For single-acting (one airline to actuator)**

    One end-stop position should show full supply pressure. The other end-stop position will show zero pressure.
  - **For double-acting (two airlines to actuator)**

    One end-stop position should show full supply pressure, while the other gauge should show zero pressure. Output pressures will be reversed when driving valve to other end-stop position, see following example of double-acting pressure gauges at each end-stop position.

    
- If PS2 can output full supply and exhaust in both directions, then something else is preventing actuator from fully sealing to valve seat.
- Verify supply pressure is properly set, see Insufficient Supply Air (Page 28).
- If process is still leaking through valve, check actuator/valve for:
  - Mechanical binding
  - Process build-up

3.7 Change in Tuning Parameters

The SIPART PS2 uses a control method called "pulse width modulation". This is a true digital control method, where piezo valves, similar to very small solenoid valves, are used to control loading and exhausting air, to and from the positioner. As such, tuning parameters listed below are based upon this control method.

Note

Adversely Affected Valve Performance

The need to customize tuning parameters is likely compensating for another valve related issue. Therefore it is recommended to resolve the root-cause valve issue instead. Additionally, improper tuning values can severely affect valve performance, and thus adversely affect the process.

It is recommended to make small tuning changes to prevent process upsets.

Adjustable Tuning Parameters Descriptions:

- [IMPUP] & [IMPDN]: Impulse Length UP and DOWN
  - These tuning parameters are similar to gain. They represent the minimum time the piezo valves will cycle; units are in milli seconds- ms. For example; if the value is 10 ms, the fastest the piezo valves will cycle is 10 ms, not any faster. Therefore, an increase in these values will increase the gain response. Range is: 2.0 to 160 ms.
- [SSUP] & [SSDN]: Short Step Zone
  - These tuning parameters are similar to integral action. Essentially there are two actions of the piezo valves- long pulses and quick/short pulses. The values are in percent of total stroke. When the position of the valve is within this Short Step Zone of the setpoint value, the positioner will begin the short pulses of the piezo valves. For example, if the current short step zone is 10 % and the positioner is given a step change from 0 to 50 %, the piezo valves are held wide open (long pulse) until the valve gets to within 10 % of setpoint. Therefore, once the valve is at 40 %, the piezo valves will produce short/quick pulses, to prevent overshoots. The smaller the value, the faster the response.
- [PRUP] & [PRDN]: Prediction Up and Down
  - These tuning parameters are similar to derivative. This predicts the movement of the valve. The smaller the number, the less prediction is used, thus faster response. Range is 1 to 40.

Note

Adjusting tuning parameters will overwrite the initialization values. To undo customized tuning values, run initialization. See Initialization Procedure (Page 50).

How to customize tuning parameters:

- Enter Diagnostic Mode:
  - When device is in Auto mode, press and hold all three buttons down at the same time: , , .
  - Diagnostic name is shown in lower right of display.
- Edit Tuning Value:
  - Go to desired diagnostic parameter by pressing and releasing button. This will advance through the diagnostic menu.
    - To go backwards in the menu: While pressing and holding button, press and release button.
  - Once at the desired tuning parameter: Press and hold button until number starts to change.
  - Use and/or buttons to achieve desired tuning value.
- Exit Diagnostic Mode:
  - Press and hold button until display changes.
  - If unit is in Manual mode, press button once to go to Auto mode.

3.8 Deadband Too Large

The deadband of the PS2 is the area around setpoint when the PS2 stops working to get closer to setpoint. For example, if the deadband value is 0.5 %, and the setpoint is 70 %, the PS2 will work the piezo valves to get within the following position range: 69.5 to 70.5 %. If the deadband is too large, the PS2 may not achieve a desired position.

There are two settings for the PS2 deadband: **Auto or a fixed numerical value.**

- When configuration parameter "DEBA" = "Auto", the deadband value is dynamic and changes per process conditions.
- When configuration parameter "DEBA" is a fixed numerical value, the PS2 will always move the valve to get within this range of the setpoint.
- The current deadband value can be viewed in diagnostic mode:
  - While in automatic mode, press all three buttons down at the same time for 5 seconds.
  - Press button until diagnostic parameter "DBUP" or "DBDN" is shown.
  - These diagnostic parameters show the current deadband value for up and down valve directions.

- If deadband value is too large for the application, the PS2 is compensating to prevent valve oscillations. These valve oscillations could be:
  - Too much stiction; see Stiction (Page 36).
  - Too many step changes from process controller. This is a process control loop issue. Discuss issue with operator and/or plant process engineer.
  - Loose linkage, see Loose Linkage (Page 29).

NOTICE
Valve Oscillations Too small a fixed deadband value can cause valve oscillations, see Dead Band Too Small (Page 24).

Change Deadband Setting:

- From AUT or MAN mode, press button for 5 seconds. Now observe the parameter name in the lower right corner.
- Continue to press the button until "DEBA" parameter is reached.
- Use and/or buttons to decrease deadband value.
- To return to Automatic mode, press and hold the button for 5 seconds.
- The unit will now be in Manual mode.
- Press the button one time to return to Automatic mode.

3.9 Deadband Too Small

The deadband of the PS2 is the area around setpoint when the PS2 stops working to get closer to setpoint. For example, if the deadband value is 0.1 %, and the setpoint is 70 %, the PS2 will work the piezo valves to get within the following position range: 69.9 % to 70.1 %. Thus, the PS2 will continuously work to get within this deadband range. However, if the mechanics of the actuator and/or valve cannot achieve this precise position, the PS2 will continuously hunt or oscillate around the setpoint position.

There are two settings for the PS2 deadband: **"Auto" or a fixed numerical value.**

- When configuration parameter "DEBA" = "Auto", the deadband value is dynamic and changes per the process conditions. In other words, the deadband value changes if stiction or oscillation is detected. For example, the deadband value will increase when mechanical issues are detected. Additionally, the PS2 will periodically decrease the deadband value to try and achieve precise valve positioning. The deadband value changes in 0.1 % increments.
- Thus, only a fixed deadband value can be too small.
- Too small a deadband can cause valve oscillation and indicate:
  - Too much stiction; see Stiction (Page 36).
  - Loose linkage; see Loose Linkage (Page 29).

Change Deadband Setting:

- From AUT or MAN mode, press button for 5 seconds. Now observe the parameter name in the lower right corner.
- Continue to press the button until "DEBA" parameter is reached.
- Use and/or buttons to decrease deadband value or change to "Auto".
- To return to Automatic mode, press and hold the button for 5 seconds.
- The unit will now be in Manual mode.
- Press the button one time to return to Automatic mode.

3.10 Erratic Feedback

The PS2 is providing a false and jumpy feedback signal, but the actual valve position is not moving.

First, rule out field wiring and power supply:

Does the large number on the local display represent the jumpy and false signal read on the 4/20 mA feedback?

If No:

- Use an independent power source and current meter to isolate the field wiring by powering up the feedback card locally.
  - 24 V DC positive connected to terminal 61.
  - Put meter in current mode and connect positive to terminal 62.
  - Connect wire of current meter to 24 V DC negative, according to Wiring (Page 43).
- If erratic feedback is gone, then issue is with field wiring or original power source.

If Yes:

- Put PS2 in Manual mode: from Auto, press button.
- Move valve with or buttons.
- If false feedback signal is corrected by moving the valve, consider Non-Contacting technology. Contact Siemens technical support for assistance: 1-800-333-7421.
- If false feedback is still present when moving the valve, verify:
- Slide bar is in proper location:

  First, unlock slide bar: see Transmission Ratio/Slide (Page 49).

  Move slide bar back and forth twice, then move slide bar to proper setup position (see following):

  – For rotary, slide bar = 90°.

  – For linear valves with travel at 25 mm (1.0 inch) or less; slide bar = 33°.

  – For linear valves with travel at 25 mm (1.0 inch) or more; slide bar = 90°
- Reinitialize PS2. See Initialization Procedure (Page 50).

3.11 Erratic Input Signal

There are two ways to identify if the input signal is causing the valve behavior. One is placing a current meter in series of the 4 to 20 mA loop. The other is using the PS2's display as a current meter. This is found in diagnostic parameter "mA".

- While the positioner is exhibiting the problem, verify unit is in Automatic mode.
- Press and hold all three buttons for at least 5 seconds.

  – The diagnostic parameter name can be found in the lower right corner.
- Press the to advance through the menu.
- Go to Diagnostic parameter "mA".

  – Observe the movement of the actuator/valve and compare it to what is displayed on the PS2, or current meter. If the display is changing with the valve assembly, then the input signal is the cause. An investigation of the control system/loop tuning is suggested.

3.12 High Vibration

Too much vibration can cause erroneous feedback and damage positioner. The SIPART PS2 vibration specifications are:

- Harmonic oscillations (sine-wave) according to EN 60068-2-6/10.2008
  - 3.5 mm (0.14"), 2 ... 27 Hz, 3 cycles/axis, 98.1 m/s² (321.84 ft/s²), 27 ... 300 Hz, 3 cycles/axis
- Bumping (half-sine) according to EN 60068-2-27/02.2010
  - 150 m/s² (492 ft/s²), 6 ms, 1000 shocks/axis
- Noise (digitally controlled) according to EN 60068-2-64/04.2009
  - 10 ... 200 Hz; 1 $(m/s^2)^2/Hz$ (3.28 $(ft/s^2)^2/Hz$)
  - 200 ... 500 Hz; 0.3 $(m/s^2)^2/Hz$ (0.98 $(ft/s^2)^2/Hz$)4 hours/axis
- Recommended continuous duty range of the complete fitting
  - <= 30 m/s² (98.4 ft/s²) without resonance sharpness
- If excessive vibration cannot be avoided, consider Non-Contacting technology. Contact Siemens technical support for assistance: 1-800-333-7421.

3.13 Initialization Incomplete

Fault Profile (symptoms)	Possible Cause(s)	Corrective Measures
Positioner remains in "RUN 1"	• Waiting time of 1 minute not accomplished. • Loose or Worn Linkage (Page 29) • Supply air not connected or Insufficient Supply Air (Page 28) • Valve Block Failure (Page 38)	• A waiting time of 2 minutes is essential. Start initialization from a mid-stroke position. • See Loose or Worn Linkage (Page 29) • See Insufficient Supply Air (Page 28)
Positioner remains in "RUN 2"	• Transmission ratio selector and parameter "2. YAGL" not set correctly and/or real stroke does not match. • Incorrectly set stroke on the lever. • Valve Block issue, see Valve Block Failure (Page 38)	• Initialization Procedure (Page 50) • See "Possible Messages" table of Leaflet. • If "Tolerance Band Down Violated" message, adjust slip-clutch as instructed in leaflets

Fault Profile (symptoms)	Possible Cause(s)	Corrective Measures
Positioner remains in "RUN 3"	• Actuator travel time is too high. • Air Leak (Page 16) • Non-active zone is in the valve stroke*. Non-active zone is in the valve stroke*, see Valve Block Failure (Page 38)	• Open the restrictor completely and/or set the supply air to the highest permissible value see Insufficient Supply Air (Page 28) • See Air Leak (Page 16) • See star notation below. • Use a booster if faster stroke times are desired.
Positioner remains in "RUN 4"	• Air Leak (Page 16) • Booster(s) Not Properly Tuned (Page 18) • Loose or Worn Linkage (Page 29)	• See Air Leak (Page 16) • See Booster(s) Not Properly Tuned (Page 18) • See Loose or Worn Linkage (Page 29)
Positioner remains in "RUN5", does not go up to "FINISH" (waiting time> 7 min).	• Loose or Worn Linkage (Page 29) • Booster(s) Not Properly Tuned (Page 18) • Air Leak (Page 16)	• Part-turn actuator: verify coupling set screw is secure. • Linear actuator: verify lever arm is secure to input shaft. • Correct any slack between the actuator and valve. • Loose or Worn Linkage (Page 29)

* Non-active zone is in the valve stroke, see NOINI (P-Manual Mode) Troubleshooting (Page 58)

3.14 Insufficient Supply Air

Maximum air pressure ratings are displayed on the actuator’s name plate/stamp. Using too little air pressure will slow down the stroke times of the valve assembly. The PS2 positioner can handle up to 100 psi as long as the recommended actuator pressure is not exceeded.

- Adjust supply pressure according to the application.
- If pressure adjustments are made, run initialization. See Initialization Procedure (Page 50).

3.15 Loose or Worn Linkage

CAUTION

Pinch Hazard

Use caution when inspecting linkage during operation.

A valve positioner's performance is directly dependent upon its mechanical connection to the actuator. For example, if the mechanical coupling is loose or worn on the positioner's input shaft, valve performance will suffer.

- Identify loose or worn linkage as follows:
  - A loose input shaft can quickly be determined by moving the PS2's slip clutch. See item #6 of Transmission Ratio/Slide Bar (Page 49). The slip clutch should not rotate without clicking. The flameproof enclosure should rotate easily.
  - Put PS2 in Manual mode from Auto press button.
    - Note: NOINI mode can also be used.
  - Using the and/or buttons, move the valve back and forth in both directions.
  - While the valve is moving back and forth inspect the movements of:
    - For Rotary: Actuator shaft, Positioner coupling and Positioner input shaft.
    - For Linear: Actuator shaft, Actuator stem coupling, Feedback pin, Feedback arm and Positioner input shaft.

    Note

    Inspect all parts, especially the feedback arm, for wear. Lesser quality feedback arms have been seen with worn pin slots.

  - All of these components must move in unison- all together.
    - Several back and forth movements will be necessary to identify the loose component.
- If a mechanical component does not move together with the other components, secure component with the supplied hardware, i.e. set-screw for rotary couplers.
  - Re-initialize PS2 if any adjustments are made; see Initialization Procedure (Page 50).
- For Flameproof units only (Ex d area classification), further steps may be required to identify loose linkage.

WARNING

Removal of Positioner Enclosure Cap

The following procedure requires the removal of the positioner's enclosure cap.

Before continuing, follow your area's purging safety procedures.

- Flameproof enclosures on rotary actuators require the black-wheel coupler design, not the SST coupler.

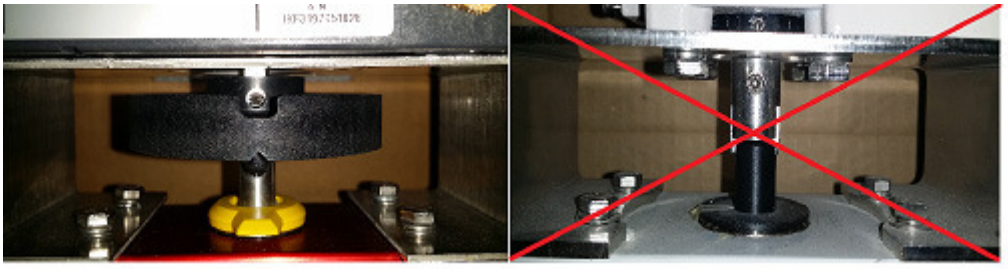


Figure 3-1 FlameProof coupler and SST coupler

- Unscrew cap from PS2 enclosure.
- Locate the internal input shaft, see image below.

- Put PS2 in Manual mode- from Auto mode press button once.
- Using the and/or buttons move the valve back and forth in both directions.
- While the valve is moving back and forth inspect the movements of:
  - For Rotary: Actuator shaft, Positioner coupling, Positioner input shaft, and Internal Star Linkage.
  - For Linear: Actuator shaft, Actuator stem coupling, Feedback pin, Feedback arm, Positioner input shaft and Internal Star Linkage.
- All of these components must move in unison, all together.
  - Several back and forth movements will be necessary to identify the loose component.
- If a mechanical component does not move together with the other components, secure component with the supplied hardware, i. e. set-screw for rotary couplers.
- Re-initialize PS2 if any adjustments are made; see Initialization Procedure (Page 50).

3.16 Manual Mode

When bottom section of display shows: "MANxx" (xx = input signal), the unit is in Manual mode. In Manual mode, the unit ignores setpoint command signal. It is possible to use the and/or buttons to manually drive the actuator.

- To exit manual mode and allow control using a setpoint, press button one time.
  - Unit will display: "AUTxx" (xx = input signal), in the lower right-hand corner when in Automatic mode.

3.17 Mechanical Blockage

While position deviation exists, determine which output pressure gauge is used to move valve and eliminate current deviation.

- If the output pressure is equal to supply pressure, then:
  - Issue is not the PS2, check for mechanical blockage that is preventing valve movement. This could occur in the actuator and/or valve, refer to actuator/valve service manual.
- If the output pressure is unable to reach full supply pressure, then:
  - Issue is an air leak somewhere in the output; see Air Leak (Page 16).
- If output pressure is unable to exhaust, check exhaust port for blockage; otherwise, replace piezo block.
- If PS2 is satisfied with current position deviation, the deadband could be too large; see Dead Band Too Large (Page 23).

3.18 Parameter 1.YFCT

The two most common options for parameter 1 are WAY and TURN. "WAY" is for linear actuators which will have feedback arm/linkage connecting the positioner to the actuator. "TURN" is for rotary actuators which have a direct coupling connecting the positioner to the actuator.

Firmware version 5.00.00 and newer will have a normal and inverted actuator type for all Parameter 1 options. Inverted selections are identified with a minus sign. Normal and inverted refers to the rotation of the PS2's input shaft when the valve or damper closes.

Use Normal:

- Part-turn actuator closes when the positioner shaft or NCS rotates in the clockwise direction.
- Linear actuator closes when the actuator spindle moves downwards and the positioner shaft or NCS rotates in the anti-clockwise direction.

Use Inverted, indicated with the minus symbol if valve moves in opposite direction as described above.

- turn/-turn: For a part-turn actuator with a directly mounted positioner.
- WAY/-WAY: For a linear actuator with a carrier pin mounted on the lever.
- FWAY/-FWAY: For a linear actuator with a carrier pin mounted on the actuator spindle.
- LWAY/-LWAY: For an external linear potentiometer on a linear actuator.
- ncSt/-ncSt: For an NCS sensor (6DR4004-.N.10 and -.N.40) on a part-turn actuator, and for an internal NCS module.
- ncSL/-ncSL: For an NCS sensor (6DR4004-.N.20) on a linear actuator for strokes < 14 mm (0.55 inch).
- ncSLL/-ncLL: For an NCS sensor (6DR4004-.N.30) on a linear actuator for strokes > 14 mm (0.55 inch) and for an internal NCS module.

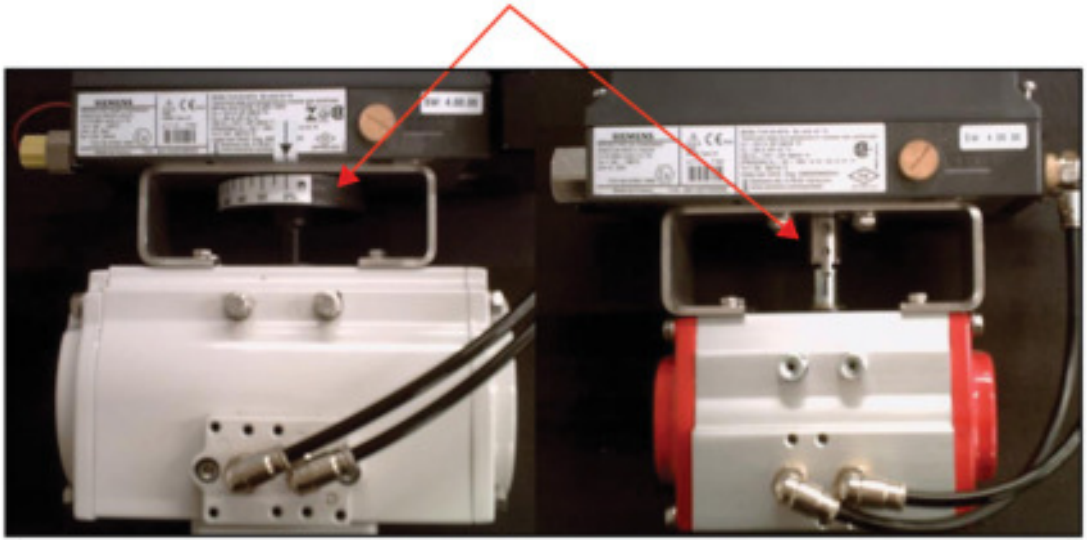


Figure 3-2 Rotary Application

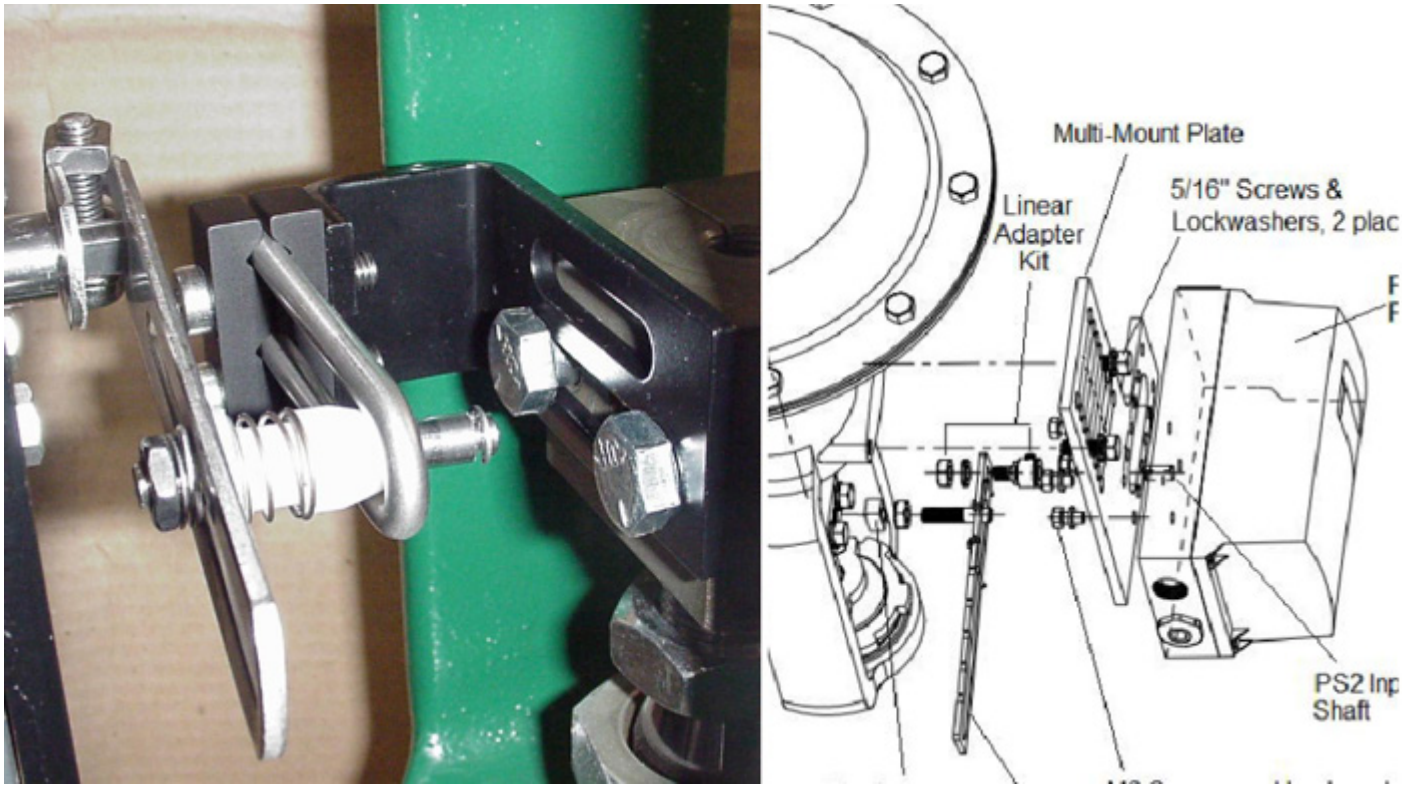


Figure 3-3 Linear Application

Linear Applications, see Initialization Procedure (Page 50)

3.19 Parameter 6.SCUR

Default setting is: "4 mA".

- From AUT or MAN mode, press button for 5 seconds.
  Now observe the parameter name in the lower right corner.
- Continue to press the button until "SCUR" parameter is reached.
- If it says "0 mA", press the button to change this to "4 mA".
- To return to Automatic mode, press and hold the button for 5 seconds.
- The unit will now be in Manual mode.
- Press the button one time to return to Automatic mode.

3.20 Re-Initialization Positioner

See Initialization Procedure (Page 50)

3.21 Reversing the Action

There are two ways to invert the action and display, one requires re-initialization.

No re-initialization procedure

This procedure inverts the physical action and display of the positioner.

- Parameter "SDIR" reverses the physical action
  - From AUT or MAN mode, press button for 5 seconds. Observe parameter name in the lower right corner.
  - Continue to press button until "SDIR" Parameter is reached.
  - If "SDIR" Parameter displays "riSE" change to "FALL" or vice versa.

    Use and/or buttons to change option.
- "YDIR" Parameter reverses the display and feedback signal.
  - Continue to press button until "YDIR" Parameter is reached.
  - If "YDIR" Parameter displays "riSE" change to "FALL" or vice versa.

    Use and/or buttons to change option.
  - To return to Automatic mode, press and hold button for 5 seconds. The unit will now be in Manual mode.
  - Press button one time to return to Automatic mode.
- Note: If using the alarm card and/or advance diagnostics, the alarm thresholds values may not match actual valve position. To correct this, use the following procedure to reverse the action.

Re-initialization Procedure (Firmware 5.00.00 or greater)

Firmware number is printed on PS2 nameplate. Also, the display flashes firmware number when exiting configuration mode.

Change Parameter 1 to the inverse functions:

- From AUT or MAN mode, press button for 5 seconds. Observe number in the lower left hand corner.
- Continue to press button until Parameter 1 is reached.
- Change parameter 1 value to its inverse. For example: change "turn" to "-turn".
- When Parameter 1 is changed, the unit must be re-initialized. See Intialization procedure (Page 50)for more details.

3.22 Setpoint Ramping

The setpoint ramp is only effective in Automatic mode. This parameter changes the positioner's speed of response. Essentially, this slows down the valve travel times. To achieve the fastest times, these parameters should be set to a value of zero.

- From Manual or Automatic mode press and hold button for 5 seconds to enter configuration menu.
  - Pressing the will advance through the parameters.
- Go to parameter "TSUP" and "TSDO".
  - Use the and/or button to change the values.
- To return to Automatic mode, press and hold button for 5 seconds.
  - The unit will now be in Manual mode.
- Press button once to return to Automatic mode.

3.23 Stays at 20 mA Position

When PS2 is in automatic or manual mode, the input signal is shown in the lower right corner of display. This value is in percent, and should change with a change of input signal.

Use PS2 diagnostic number "mA" to convert display to current meter.

- From automatic mode or manual mode, press all three buttons down at the same time for 5 seconds.
- Press and release button and go to diagnostic parameter "mA."
- The display will show input signal in milliamps.

If milliamp is approximately fixed to 22.0 mA, this indicates the board was or still is improperly powered.

- To exit Diagnostic mode press and hold button until display changes.

For 2-wire loop power the power supply must be a regulated current source. A current source regulates current; see Wiring (Page 43) section.

Note

A voltage source does not regulate current, the circuit's resistance does. Therefore if the circuit's resistance is low, the current can be too high and damage the PS2 board.

- Resolve power issue and replace PS2 circuit board. Board part numbers can be found in PS2 Operating Instructions P/N#: A5E00074631, or contact Siemens.

If milliamp changes with input signal, check PS2 configuration.

- To restore all PS2 parameters to factory setting:
  - From Auto/Manual mode, press and hold button until display changes.
  - Press and release button and go to "PRST" parameter.
  - Press and hold button until display shows: "OCAY"
- Set configuration parameters as per application and re-initialize PS2, see Initialization Procedure (Page 50)

3.24 Stiction

This term is used to identify the friction that exists in a valve assembly which prevents smooth stem motion. An example is the initial friction that exists when pushing a heavy box across the floor- first the pushing force must overcome the friction before the box will move. If stiction is too great in a valve assembly, then the valve is unable to achieve small valve movements, such as 0.1 %.

To identify this symptom:

- Put PS2 in Manual mode- from Auto press button once.
- While using the and/or buttons try to move valve assembly in the smallest movements, for example 0.2 % movements.
- If the valve assembly cannot achieve these small movements manually, then there is too much stiction.
- The way to quantify how much stiction exists is by how little the valve can move. For example, if the smallest movement that can be achieved is 0.8 %, then this is the best the valve assembly can move- in 0.8% increments. Therefore trying to achieve smaller movements is impossible and will result in oscillations.
- Oscillations can be reduced by setting DeadBand value to "Auto".

3.25 Supply Air Too High

Maximum air pressure ratings are indicated on the actuator's name plate/stamp. Using too much air pressure can inhibit performance and could damage actuator and/or positioner. The PS2 positioner can handle up to 100 psi as long as the recommended actuator pressure is not exceeded.

- Adjust supply pressure according to the application.
- If adjustments are made, run initialization process, see Initialization Procedure (Page 50).

High supply pressure can cause quick valve responses, and lead to overshoots, oscillations, and incomplete initialization. If high supply pressure is required for application, the minimum travel time may not be met. The PS2 requires at least 1.0 second of travel time for each valve direction. If PS2 has been initialized, travel times can be found in Diagnostic menu:

- From Auto or Manual modes, press all three buttons down for 5 seconds.
- Diagnostic name will be shown in lower right of display.
- Press button until "TUP" and TDOWN" are shown.

If travel times are faster than 1 second, reduce valve travel speed with built-in flow restrictor/s see Device Identification section 1.4, items 6, 7 and 8:

- During RUN 3 of initialization process, the display will flash with valve travel times.
- Press button while times are flashing on display.
- Display will show "NOZZL". Adjust built-in flow restrictor/s in clockwise direction with appropriate Allen key.
- Press button again and PS2 will fully stroke the valve and update the display with the current travel times.
- If minimum travel times are not met, at least 1 second for both directions, then press button again while display is flashing travel times.
- Adjust built-in flow restrictor/s clockwise to restrict more flow to and from actuator.
- Press button and repeat as necessary. If desired travel times are met, do not push any buttons and PS2 will complete initialization process.

3.26 Too Much Restriction

To achieve the fastest possible stroke times, verify the restrictor screws are in their factory position which is all the way open. See photo for actual position.

- If there are any issues with response/stroke times, then open the restrictor(s) by turning counter-clockwise until factory position is reached.
  - If restrictor screws were adjusted, a new initialization needs to be performed, see Initialization Procedure (Page 50).

Note

Stroking times should not be faster than 1 second.

- Stroking times flash on display during RUN 3.
- Stroking times are found in Diagnostic menu, parameter "TUP" and "TDOWN".

3.27 Tubing Lines Configuration

See Fail Position Chart.

3.28 Unit Not Initialized

See Initialization Procedure (Page 50).

3.29 Valve Block Failure

Valve block failure can occur for several reasons. The most common failure is a result of poor air quality, which can include moisture. In addition to an air drying system, it is recommended to install a coalescent filter on the supply line, directly upstream of the positioner. Siemens offers an Air Coalescing Filter, Model 2306, which removes dirt, oil, moisture, and other impurities from instrument-air supply.

In addition, exceeding the recommended supply pressure will damage the valve block. The maximum pressure rating for the PS2 is: 101 psi (7 bar), see Supply Air Too High (Page 50). It is recommended to install a regulator on the supply line, upstream from the positioner, and to regulate supply pressure so it does not exceed the maximum pressure rating of the PS2 and the actuator. Siemens offers a filter regulator, Model 91H, which regulates pressure and removes debris.

Note

The 91H filter regulator does not remove moisture.

Valve Block Testing

The following tests will refer to gauges on the supply and output(s) pneumatic lines. If the PS2 does not have a gauge block, consider temporary gauge installation (in line) for diagnostic purposes. Pipe plugs may also be needed; either ¼ inch NPT or G¼ thread. Verify pneumatic port thread type before inserting pipe plugs - refer to model code and SIPART PS2 catalog sheet.

Activate NOINI Mode (if not already activated)

- Enter configuration mode and go to parameter: "4.INITA".
  - From AUT or MAN mode, press button for 5 seconds.
  - Parameter number will be displayed in lower left hand corner.
  - Press and release button and go to parameter "4.INITA".
  - Once at parameter "4.INITA", press and hold button until display changes to: "no".
  - Press and hold button for 5 seconds to exit configuration mode.
  - Display should flash "noini" in the lower right.

Use Two-Button Method to Simulate Movement

- While pressing and holding the button, press and hold the button.
- To move valve assembly in the opposite direction, reverse the two push-button sequence.

Use the two-button method and observe pressure changes on each output gauge.

- **Single-acting -** In one direction the output gauge should reach full supply pressure and hold when the buttons are released. When going in the opposite direction, the output gauge should go to zero psi. While it is going to zero, air pressure should be blowing out of the exhaust port.
- **Double-acting –** The two output gauges will indicate opposite pressures from each other, when at each end-stop position. While the top gauge is pressurizing the bottom gauge should be exhausting. The gauge that is pressurizing should reach full supply and hold when the buttons are released. Device should only exhaust while the unit is moving. At rest, no air should be blowing out of the exhaust port.

Makrolon Enclosure & Flameproof Enclosure

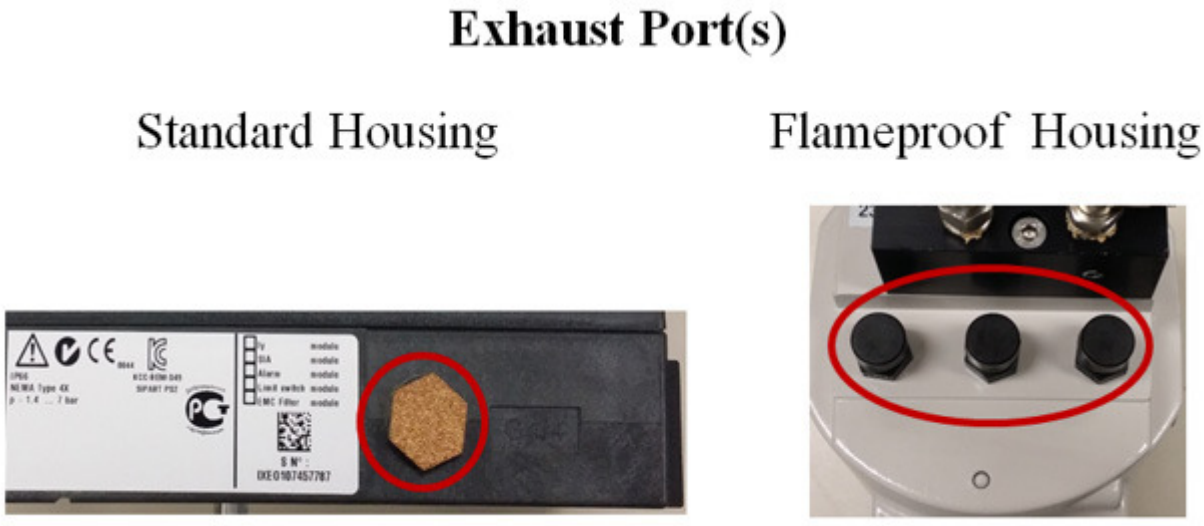


Figure 3-4 Exhaust ports photo

Possible Outcomes

If PS2 can output full supply pressure and fully exhaust, then something else is preventing actuator from fully closing or opening. Check valve assembly for mechanical blockage and air leaks. Also verify supply is at required pressure for application.

- If possible, drive actuator/valve to a mid-travel position (50 %). **Does air pressure hold when the buttons are released?**
  - If yes, the valve block/PS2 is working correctly.
  - If not, check for leaks and perform the Pipe Plug Test at the end of this section.
- **Does the unit exhaust?**
  - For double-acting, the unit should always exhaust during movement. For single-acting, the unit will only exhaust in one direction.
  - If one of the output ports does not exhaust, check exhaust port for blockage.
    - If exhaust port is free from blockage, go to Pipe Plug Test at the end of this section.
  - If unit always exhausts, verify parameter "PNEUM" is set correctly.
    - "Std" = Standard Valve Block or "FIP" = Fail in Place Valve Block ("F01" at end of the model code indicates FIP option).
    - If this is set correctly, go to the Pipe Plug Test.

Pipe Plug Test

- Turn off supply air to PS2.

WARNING
High Pressure High pressure output port(s) may still contain air pressure and can cause injury. Use caution when removing pneumatic connections.

- Slowly remove pneumatic connections from output port(s) on the positioner.

- Install appropriate thread type pipe plug into each output port(s).The only pneumatic line connected to the PS2 should be supply. See photo below.

Note

Single-acting only has one output.

- Use two-button method to pressurize the output chamber.
  - Repeat this in both directions.

If PS2 can output full supply and fully exhaust, then something else is preventing actuator from fully closing or opening. Check valve assembly for mechanical blockage and air leaks. Also verify supply is at required pressure for application.

- If PS2 does not exhaust pressure from one of the output ports, replace valve block.
- If unit does not hold pressure when buttons are released, check for leaks around pipe plug(s), gauge manifold block and PS2 pneumatic connection block (this is a black anodized aluminum block directly against PS2 enclosure).
  - If no leaks are found, replace valve block.

Replacement Part Numbers

Pneumatic single-acting piezo block kit: C73451-A430-D80

Pneumatic double-acting piezo block kit: C73451-A430-D81

Each kit includes: Valve block, O-ring and Screws.

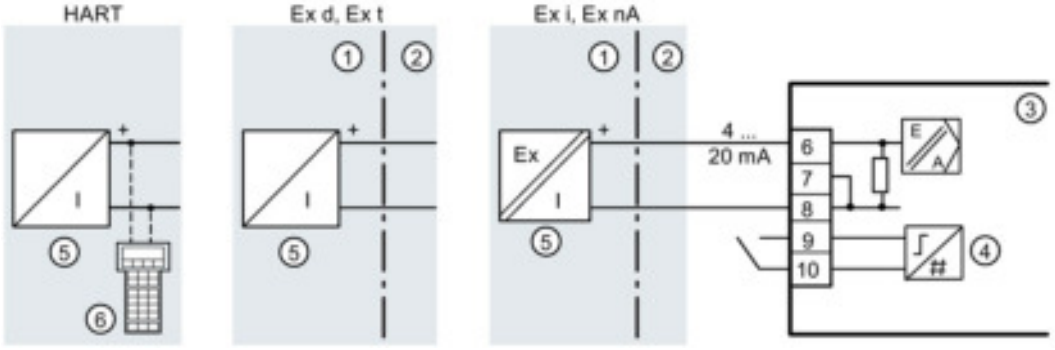
3.30 Valve Does Not Go Fully Closed/Open

- From AUT or MAN mode, press button for 5 seconds.
  - Observer parameter name in the lower left hand corner.
- Continue to press button until "YCLS" Parameter is reached.
  - Note: While in configuration mode, the positioner is NOT controlling the valve.
- Use and buttons to change Parameter values:
  - *Set Parameter YCLS to "Up do" (Tight Closing Up and Down*)
- To exit configuration mode, press and hold button for 5 seconds.
  - Unit should be in Manual Mode.
- Press and release button once to enter AUTO mode.
- Verify the valve assembly goes to the fully open and/or closed position with a 0 or 100% command signal.
- If not:
  - The problem may be the input signal. Use the PS2's display as a current meter. This is found in Diagnostic parameter "mA".
  - Verify unit is in Automatic mode.
  - Provide a 4 mA input signal.
  - Press all three buttons down until display changes.
    - Diagnostic menu will be displayed. The diagnostic name can be found in the lower right corner.
- Press the button to advance through the menu.
  - While pressing and holding button, press the button to go backwards in menu.
- Go to option "mA".
- Observe display and verify if the positioner is actually displaying ≈ 4 mA. If not, then the input signal is the cause.
- To exit diagnostic mode, press and hold button for 5 seconds.

Wiring

4

4.1 2-Wire Connection, with terminals 6 through 10



① Non-hazardous area
② Hazardous area
③ Basic electronics
③ Binary input 1
④ Signal source
⑤ HART communicator

✓ **Requires a regulated current source NOT a voltage source**

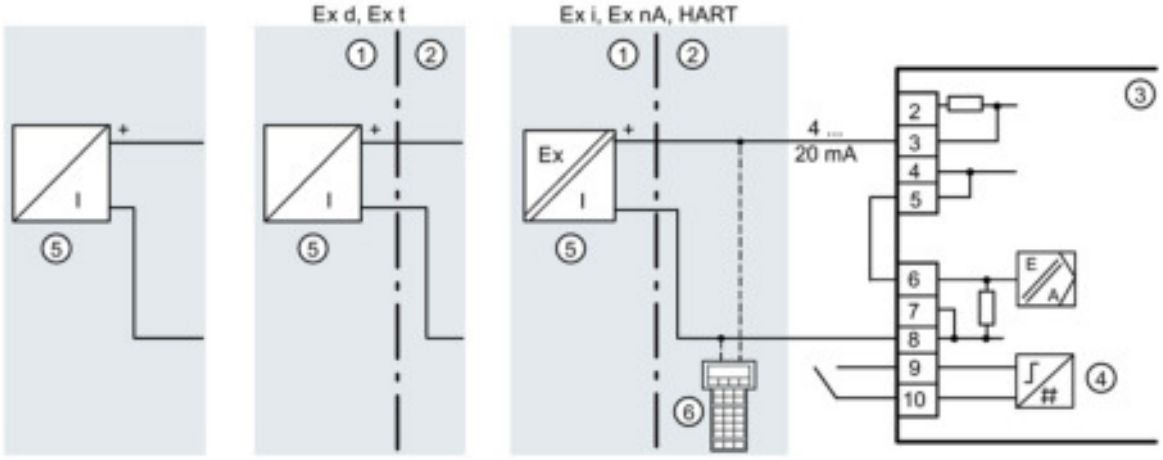
✓ Unit requires at least 3.6 milliamps to power on

✓ Do NOT use the 24 volt pair of wires for the feedback card on terminals 6 and 8 (if equipped)

✓ For hazardous areas, consult Power Specifications (Page 44) and local safety guidelines

Connect positive wire for 4 to 20 mA to terminal 6, negative wire to terminal 8.

4.2 2-Wire Connection, terminals 2 through 10



① Non-hazardous area
② Hazardous area
③ Basic electronics
④ Binary input 1
⑤ Signal source
⑥ HART communicator

✓ **Requires a regulated current source NOT a voltage source**

✓ Unit requires at least 3.6 milliamps to power on

✓ Do NOT use the 24 volt pair of wires for the feedback card on terminals 3 and 8 (if equipped)

✓ Verify jumper wire is installed on terminals 5 & 6

✓For hazardous areas, consult Power Specifications (Page 44) and local safety guidelines

Connect positive wire for 4 to 20 mA to terminal 6, negative wire to terminal 8.

4.3 Power Specifications

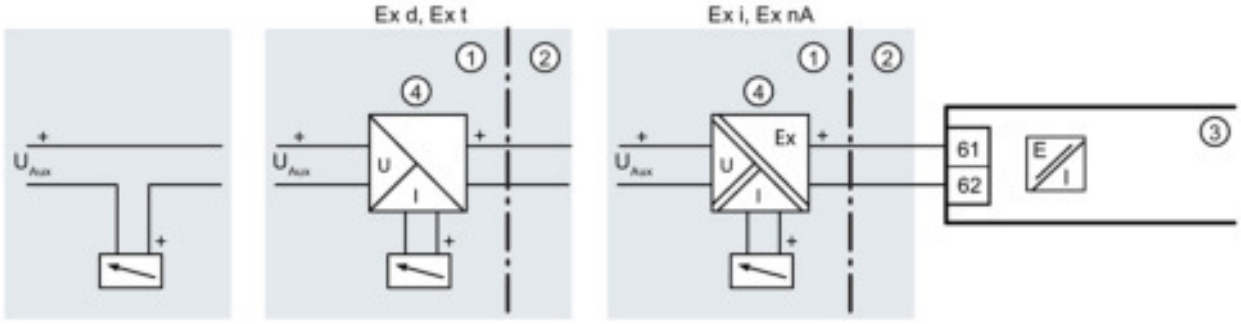
6DR50.. and 6DR53.. without HART

6DR51.. and 6DR52.. with HART

	Basic device without Ex protection	**Basic device with Ex d explosion protection**	**Basic device with "ia" explosion protection**	**Basic device with explosion protection "ic", "na", "t"**
Current to maintain the auxiliary power supply	≥3.6 mA			
Required load voltage U_B (corresponds to Ω at 20 mA)				

	Basic device without Ex protection	**Basic device with Ex d explosion protection**	**Basic device with "ia" explosion protection**	**Basic device with explosion protection "ic", "na", "t"**
• Without Hart (6DR50..) – Typical – max.	6.36 V (=318 Ω) 6.48 V (324 Ω)	6.36 V (=318 Ω) 6.48 V (324 Ω)	7.8 V (=390 Ω) 8.3 V (=415 Ω)	7.8 V (=390 Ω) 8.3 V (=415 Ω)
• With HART (6DR53..) – Typical – max.	7.9 V (=395 Ω) 8.4 V (=420 Ω)	-	-	-
• With HART (6DR51 – Typical – max.	6.6 V (=330 Ω) 6.72 V (=336 Ω)	6.6 V (=330 Ω) 6.72 V (=336 Ω)	-	-
• With HART (6DR52..) – Typical – max.	-	8.4 V (=420 Ω) 8.8 V (=440 Ω)	8.4 V (=420 Ω) 8.8 V (=440 Ω)	8.4 V (=420 Ω) 8.8 V (=440 Ω)
• Static destruction limit	±40 mA	±4 mA	-	-
Effective internal capacitance C_i				
• Without HART	-	-	11 nF	"ic": 11 nF
• With HART	-	-	11 nF	"ic": 11 nF
Effective internal inductance L_i				
• Without HART	-	-	207 µH	"ic": 207 µH
• With HART	-	-	304 µH	"ic": 310 µH
For connecting to circuits with the following peak values	-	-	U_i = 30 V I_i = 100 mA P_i = 1 W	"ic": U_i = 30 V / I_i = 100 mA "ec"/"t"/"nA": $U_n \leq$ 30 V / $I_n \leq$ 100mA

4.4 4 to 20 mA Feedback Module (Iy Module)



① Non-hazardous area
② Hazardous area
③ Position feedback module
④ Feed splitter

✓ Typically requires a 24 V DC source

✓ For hazardous areas, consult following Feedback Module Power Specifications Chart and local safety guidelines

✓ Unit must be initialized to transmit feedback signal

✓ Do NOT use the 4 to 20 mA MPU pair of wires for the feedback card

Connect the positive wire from the voltage source to terminal 61. Connect the positive wire from the analog input card to terminal 62. Connect the negative of the analog input to the negative side of the voltage source.

Feedback Module Power Specification Chart

	Basic device without Ex protection	**Basic device with Ex d explosion protection**	**Basic device with "ia" explosion protection**	**Basic device with explosion protection "ic", "nA", "t"**
Position feedback module	**6DR4004-8J**	**6DR4004-6J**		**6DR4004-6J**
DC output for position feedback				
1 current output: Terminals 61 and 62		2-wire connection		
Rated signal range		4 ... 20 mA, short -circuit proof		
Total operating range		3.6 ... 20.5 mA		
Power supply U_H	+12...+35 V	+12...+35 V		+12 ... +35 V
External loads R_β [kΩ]		≤ (U_H [V] - 12 V) / I [mA]		
Transmission error		≤ 0.3 %		
Temperature influence effect		≤ 0.1 % / 10 K (≤ 0.1 % / 18 °F		
Resolution		≤ 0.1 %		
Residual ripple		≤ 1 %		

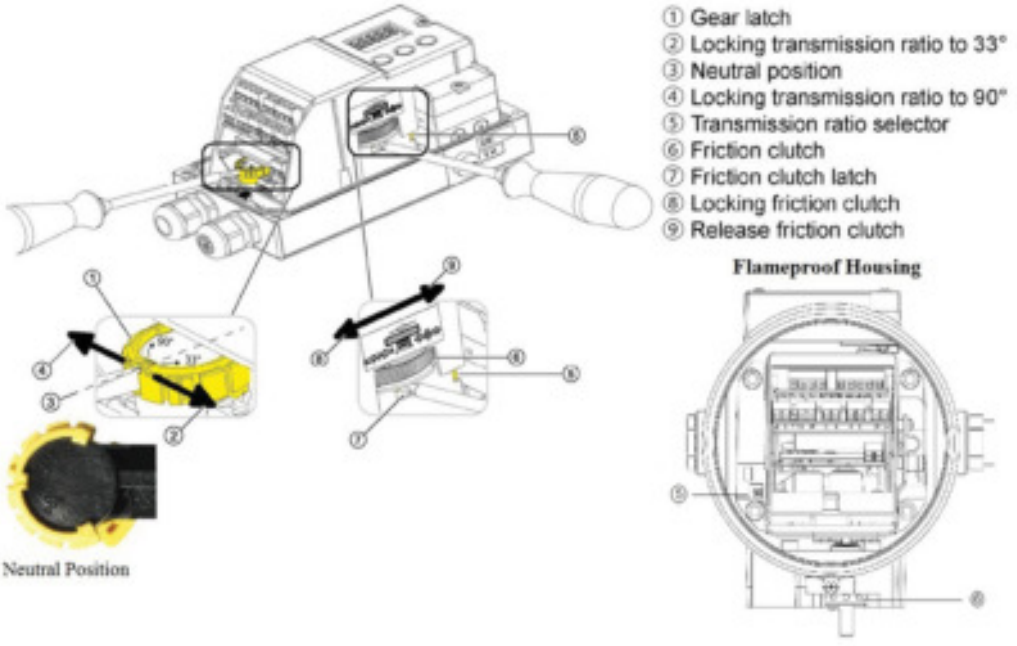
	Basic device without Ex protection	**Basic device with Ex d explosion protection**	**Basic device with "ia" explosion protection**	**Basic device with explosion protection "ic", "nA", "t"**
• For connecting to circuits with the following peak values	-	U_i = 30 V I_i = 100 mA P_i = 1 W		"ic": U_i = 30 V I_i = 100 mA "nA" / "t": $U_n \leq 30$ V, $I_n \leq 100$ mA $P_n \leq 1$ W
Effective internal capacitance	-	C_i = 11 nF		C_i = 11 nF
Effective internal inductance	-	L_i = negligibly small		L_i = negligibly small
Electrical isolation	Electrically isolated from the alarm option and safely isolated from the basic device			
Test Voltage		840 V DC, 1 s		

Appendix A

A

A.1 Transmission Ratio/Slide Bar

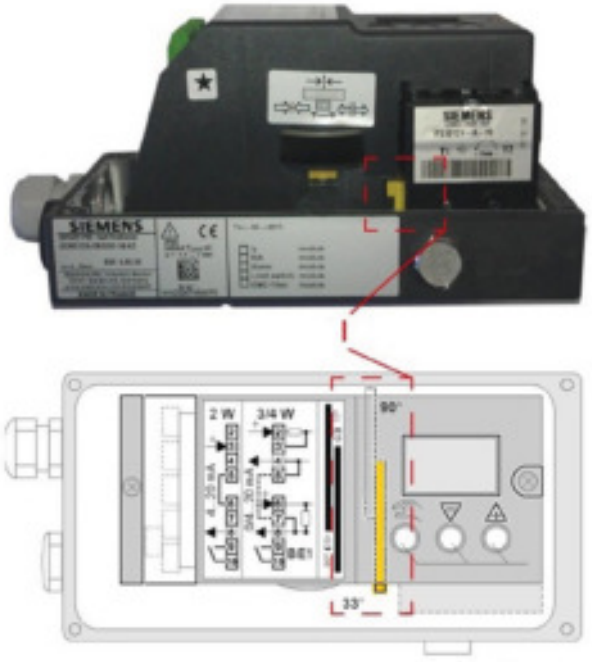
There are two mechanical adjustments for 33 and 90 degrees on the positioner.



The important information to remember is the order of which the adjustments are completed.

- Verify the Gear Latch ① is in the neutral positon which is shown with number ③.
- If not, use a flat head screwdriver to move the latch back to neutral as shown above.

- Set Transmission Ratio Selector (Slide Bar) according to the actuator's requirements.
  - **Rotary** - Always 90°
  - **Linear** less than 25 mm/1 inch 33°
  - **Linear** greater than 25 mm/1 inch 90°



- Proceed to adjust the gear latch to match the Transmission Ratio/Slide Bar.

A.2 Initialization Procedure

PS2 Positioner Calibration Procedure Rotary Linear Actuators

6DR5x1, 6DR5x2 (x = 0,1,2,3,5,6)

Verify the positioner is mounted correctly using factory couplings to ensure there is NO BACKLASH between the positioner input shaft and the actuator output shaft. Check that there is sufficient supply pressure to operate the actuator/valve configuration. This is critical on spring return (single-acting) actuators. Insufficient air pressure will result in a calibration error. **Confirm a 4 – 20 mA source is properly connected to the 2-wire positioner (x = 0 or 1), or a 2-, 3- or 4-wire positioner (x = 2 or 3).** Connect a 24 VDC power supply for Profibus (6DR55) or Foundation Fieldbus (6DR56) for bench top configuration. For complete details on the above, please refer to the "Operating Instructions" manual supplied on the CD in the positioner's box. Under the Navigation tab, expand "electropneumatic positioners" and then "SIPART PS2". Choose input source, i.e. 4-20 mA = "SIPART PS2 with and without HART.

Positioner Calibration

Remove the cover,

The PS2 has an LCD display and three (3) input buttons;

1. When the positioner is powered up for the first time, the display will flash **NOINI** (no initialization) on the bottom right of the screen.

2. Verify the valve/actuator moves freely from full closed to full open. Push and hold the △ button, then push and hold the ▽ button. With both buttons pushed in this sequence, the actuator will **rapidly** move to one end position. *(If no movement occurs, reverse the button sequence. Push and hold the ▽ button, then push and hold the △ button.)* Once the actuator has reached the end position, reverse the push button sequence to **rapidly** move the actuator to its opposite position. To move the actuator **slowly**, push the △ or ▽ only. Place the actuator anywhere around mid-stroke by using one of the methods described above.

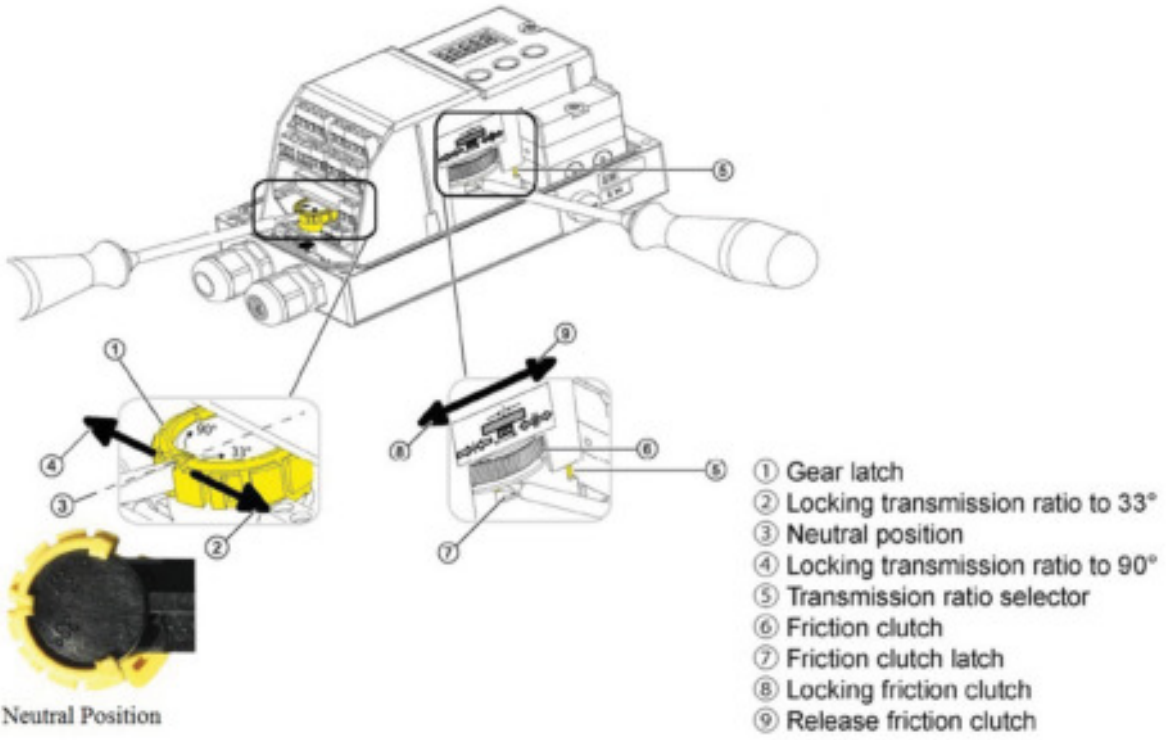
   There are two mechanical adjustments for 33° and 90° degrees. One is the locking mechanism called the "Gear latch", see ①. The other is the transmission ratio selector, ⑤.

Note

Important

The gear latch must be set to the neutral position **BEFORE** changing the transmission ratio selector. Otherwise the actual gear will not engage.

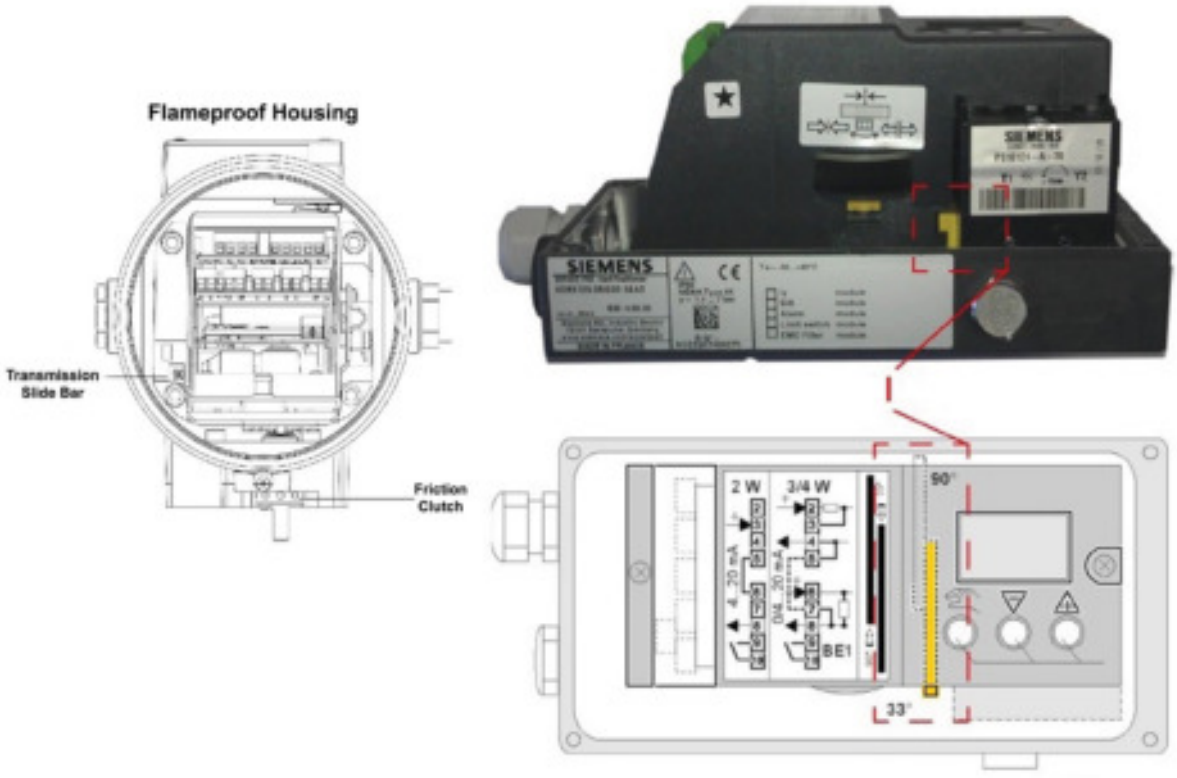
3. Verify the Gear Latch ① is in the neutral positon which is shown by the number ③ in the following illustration.



Neutral Position

4. Set Transmission Ratio Selector (Slide Bar) according to the actuator's requirements:
   - **Rotary** - Always 90° (Step 4A)
   - **Linear** less than 25 mm/1 inch = 33° (Step 4B)
   - **Linear** greater than or equal to 25 mm/1 inch = 90° (Step 4B)

   Proceed to adjust the gear latch to match the Transmission Ratio/Slide Bar.



4A. Rotary Actuators

Check and ensure the transmission bar is set to 90°. Using a small screw driver, push the end of the yellow bar so it shows its yellow end on the opposite side from the "clutch wheel".

OR

4B. Linear Actuators

Verify the transmission bar is set to 33° for a stroke less than or equal to 1 inch/25 mm. Confirm the transmission bar is set to 90° for strokes greater than 1 inch/25 mm. Using a small screw driver, push the end of the yellow bar in to the correct position. See previous illustration for position details.

5. Push and hold the button until the display changes to setup mode. Subsequent starts **may** display a different menu parameter. The number in the lower left corner is the parameter number. Ensure the parameter number is 1 by pushing and releasing the button until Parameter 1 is reached.

6. Using the ▲ and ▼ buttons, scroll to appropriate actuator type. See description below.
   - turn/-turn: Use this setting for a part-turn actuator with a directly mounted positioner.
   - WAY/-WAY: Use this setting for a linear actuator with a carrier pin mounted on the lever.
   - FWAY/-FWAY: Use this setting for a linear actuator with a carrier pin mounted on the actuator spindle. (Available with Profibus and Foundation Fieldbus, 2016).
   - LWAY/-LWAY: Use this setting for an external linear potentiometer on a linear actuator.
   - ncSt/-ncSt: Use this setting for an NCS sensor (6DR4004-.N.10 and -.N.40) on a part-time actuator and for internal NCS module.
   - ncSL/-ncSL: Use this setting for an NCS sensor (6DR4004-.N.20) on a linear actuator for strokes < 14 mm (0.55 inch).
   - ncSLL/-ncLL: Use this setting for an NCS sensor (6DR4004-.N.30) on a linear actuator for strokes > 14 mm (0.55 inch) and for an internal NCS module.

   In the case of actuators with inverted direction of action, use the settings with the minus sign, e. g. -turn.

   Meaning of actuator with normal direction of action:
   - Part-turn/rotary actuator closes when the drive shaft, positioner shaft or magnet of the NCS sensor rotates in the clockwise direction.
   - Linear actuator closes when the actuator spindle rotates downwards and the positioner shaft or magnet of the NCS sensor rotates in the anti-clockwise direction.

   Meaning for actuator with inverted direction of action:
   - Part-turn/rotary actuator closes when the drive shaft, positioner shaft or magnet of the NCS sensor rotates in the anti-clockwise direction.
   - Linear actuator closes when the actuator spindle rotates downwards and the positioner shaft or magnet of the NCS sensor rotates in the clockwise direction.
7. Push the ▭ button once to move to parameter 2. Set appropriate value as per actuator;

   FOR ROTARY ACTUATORS AND FOR LINEAR ACTUATORS greater than 1inch/25 mm

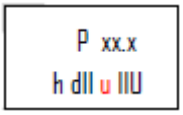
   

   FOR LINEAR ACTUATORS with strokes less than 1inch/25 mm

   
8. Push the ▭ button until parameter 4 is reached. The display will read;

   
9. Hold the ▲ button until the calibration starts, then release.

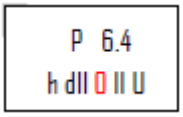
10. If the actuator strokes and stops, and the display reads; the red colour in this description is for recognition only);



The down tolerance has been exceeded.

(A) Confirm the transmission bar is properly set for actuator stoke. See step 4.

(B) Adjust the Friction Clutch so the P number is 6.4 or as close as possible. The red character should change to a large 0.

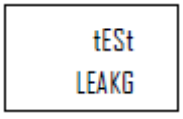


Note

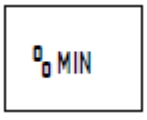
The friction clutch should rotate easily with thumb pressure. If not, adjust the yellow wheel (located just below the knurled thumb wheel – **inside the housing**, **except Flameproof version**) with a small screw driver, by rotating it TO THE RIGHT. This will loosen the friction clutch and allow rotation of the thumb wheel. Refer to the diagram in step 4 to locate the thumb wheel, Item 6.

(C) Push the ⚠ button to continue.

11. At the end of RUN 3, the display will show the opening and closing speed of the actuator. During this display, hold the ⚠ button for 2 seconds. This will initiate the **LEAK**age test. Display reads:

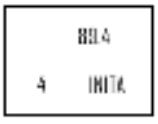


12. At the end of the **LEAK**age test, the display will show the leak rate in % of stroke per minute.



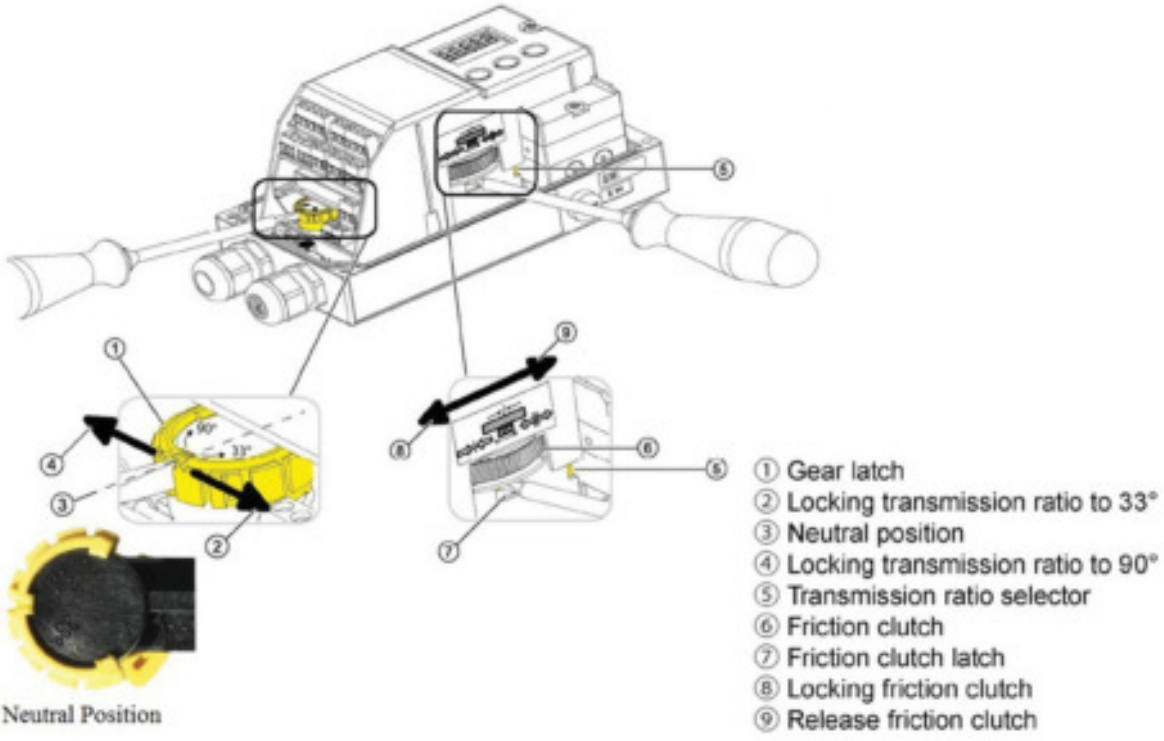
13. Push the ⚠ button to continue with auto calibration. There are a total of 5 Runs. At the completion of RUN 5, the display will read:

14. Push the ▭ button once. The display reads:



15. At this point the positioner is calibrated for the valve assembly. The next task is to go to "AUTOMATIC OPERATION" or any of the remaining parameters.
16. To return to automatic mode, press and **hold** the button for 5 seconds.

17.



18. Neutral Position

19. Lock the Friction Clutch; Move the slots left to lock (see ⑦ on image above)

Digital Communication

Manual mode can be used for bench testing various positions without the need for a digital network.

- A Profibus unit will also need to have the address set. The address can be changed in the configuration menu. Factory default is 126.
  - This parameter is Station Number, **STNR**. The parameter number is different depending on firmware revision. Check Leaflet provided inside the housing for parameter number.
- Foundation Fieldbus requires a special process for configuring the function blocks in order to control the valve. For help with the communication step, contact Siemens Technical Support.

How to reverse the action:

If it is found that the valve action is backwards for the application, there are two ways to address this but one requires re-initialization.

One (Requires re-calibration procedure):

The **best choice** is to change Parameter 1 to the inverse function and then run the Auto-calibration again. For example, if Parameter 1 is set to "turn", then change it to read "- turn" via the ▲ and ▼ buttons. Repeat calibration.

Two (No re-calibration procedure):

This procedure inverts the physical action and display of the positioner for 4-20 mA and Profibus units. Foundation Fieldbus requires a configuration change within one of the function blocks. It cannot be done with the push buttons.

4-20 mA PS2/Profibus

Parameter 7(4-20mA) reverses the physical action. Profibus=Parameter 6

- From AUT or MAN mode, press button for 5 seconds. Observe number in the lower left hand corner.
- Continue to press button until Parameter 7/6 is reached.
- If Parameter 7/6 displays "rise" change to "fall" or vice versa. Use ▲ and/or ▼ to change option.

Parameter 38 reverses the display and feedback. Not needed in Profibus.

- Continue to press button until Parameter 38 is reached.
- If Parameter 38 displays "rise" change to "fall" or vice versa. Use ▲ and/or ▼ to change option.
- To return to Automatic mode, press and hold button for 5 seconds.

The unit will now be in Manual mode.

- Press button one time to return to Automatic mode.

Note

If using the alarm card, tight closing, or advance diagnostics, the values may not match actual valve position. Recommend *Option One* for reversing action when possible.

See also

Instructions and manuals (http://www.siemens.com/processinstrumentation/documentation)

A.3 NOINI (P-Manual Mode) Troubleshooting

This document can be considered as a 'catch-all' procedure that can uncover all issues that will prevent successful PS2 initialization. For mechanical installation of positioner to actuator, refer to the specific mounting kit instructions.

Note

This procedure will move the valve throughout the entire valve stroke. Therefore, valve should be bypassed so movements do not adversely affect process.

Activate NOINI Mode (if not active already):

- Enter configuration mode and go to parameter: "4.INITA"
  - From AUT or MAN mode, press button for 5 seconds.
  - Parameter number will be displayed in lower left hand corner.
  - Press and release button until parameter "4.INITA" is reached.
  - Once at parameter "4.INITA", press and hold button until display changes to: "no".
  - Press and hold button to exit configuration mode.

Move the Valve:

While the display is flashing "NOINI" the valve can be moved with the or buttons.

- To move the valve slowly press either the or button. The longer the button is pressed the more air gets delivered.

  Note

  If the valve is currently at one of the end-stops the valve will not move, so press the other button.

- To move the valve quickly press both the and buttons:
  - To move in one direction, press and hold the button, and while holding the press and hold the button. If the valve does not move it may be at an end-stop, see following step.
  - To move in the other direction press and hold the button. While holding the press and hold the button.
- If valve does not move, verify supply pressure is adequate for application.

Verify a Secure Input Shaft Connection:

Any movement of the valve should be seen by a change with the large number on the display.

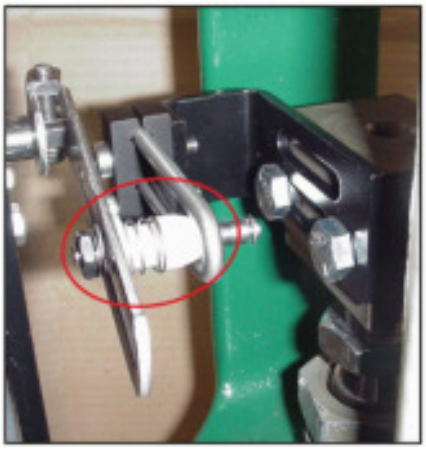
- Move the valve back and forth using the single button method.
- Look for a consistent change with the number in relation to valve movement.

- If there is no change with the large number on the display:
  - Verify feedback connection is installed on positioner's input shaft; see photos below for rotary and linear coupling examples.
  - Verify potentiometer's ribbon cable is plugged into MPU board.
    - Remove top cover to gain access to MPU board.

- If movement is detected:
  - Verify shaft linkage is secure to positioner's input shaft, see Loose or Worn Linkage (Page 29) section for more details

Rotary Applications - Verify the coupling setscrew is tight.

Linear Applications – Verify all hardware is tight. If feedback solution has a *white cone style pin*, verify pin is compressed throughout all positons of the valve stroke.



- The large number should be repeatable at each end-stop.
  - To check for loose linkage, move valve to fully closed position.
    - Take note of the numerical value on display.
- Move valve to fully open position.
  - Take note of the numerical value on display.
- Move valve back to fully closed position. Is the numerical value within 0.5 of previous value?
  - If no; check for loose mechanical feedback linkage, see Loose or Worn Linkage (Page 29) section.
  - If yes; move valve to fully open position. Is the numerical value the same?
  - If no; check for loose mechanical feedback linkage, see Loose or Worn Linkage (Page 29) section.
  - If yes; linkage is most likely secure. Run the last few steps again just to be sure.

Check For An Air Leak:

- Using the above push button procedure to move the valve, move valve to the mid-travel position.

Note

Do not use the large number on the display to determine mid-travel position, use the mechanical indicator on the actuator.

- Once at the mid-travel position, release push-buttons.
  - The valve should stay at that position, if not:
    - Check for air leaks. If equipped, use pressure gauges to determine which port is losing air pressure.
    - Check pneumatic fittings, air lines and actuator.
    - Use some form of leak detection or soap and water around the pneumatic connections, taking care not to wet the internals of the unit.
    - Identify leak and use appropriate method(s) for leak correction.
    - Repeat leak check to confirm corrective action was successful.
    - If valve assembly is equipped with volume boosters, be sure they are properly tuned before initialization. See Booster(s) Not Properly Tuned (Page 18)

Determine Proper Slide Bar Setting:

- Using the above push button procedure to move valve, move valve to the mid-travel position.

Note

Do not use the large number on the display to determine mid-travel position, use the mechanical indicator on the actuator.

- Once at the mid-travel position, release push-buttons.
- Adjust slip clutch, until number in display is within a range of: 48-52.

Figure A-1 Slip Clutch

- Move valve by pressing ⚠ button only until it reaches actuator's end-stop, and verify if:
  - Numerical value goes through zero, for example:
    - Number increments from: 98, 99, 100, ---, 0, 1, 2, or
    - Number decrements from: 3, 2, 1, 0, ---, 100, 99, 98
  - If numerical value goes through zero then check slide bar setting and slide bar locking mechanism, see Transmission Ratio/Slide Bar (see Appendix A). If adjustment was made to the slide bar, repeat previous step.
- For linear applications, it is possible slide bar is set correctly but feedback pin is too close to positioner's input shaft. Therefore secure feedback pin further away from positioner's input shaft.

Adjust Potentiometer

- Using the above push button procedure to move valve, move the valve to the mid-travel position.

Note

Do not use the large number on the display to determine mid-travel position, use the mechanical indicator on the actuator.

- Once at the mid-travel position, release the push-buttons.

- Adjust slip clutch until number in display is within a range of: 48-52.

Figure A-2 Slip Clutch

- Move valve so the numerical number decreases, either by pressing the ▲ or ▼ button.
- Once the numerical value begins to decrease, keep button pressed to go to end-stop position.
  - If numerical value goes through zero before reaching end-stop position, see "Determine Proper Slide Bar Setting" procedure above.
- Once at end-stop position adjust slip clutch so numerical value is within the following numerical range: 5.8 to 6.8.
- Using other push button drive valve to other end-stop position.
  - Numerical value should be less than 95, if not:
    - See "Determine Proper Slide Bar Setting" section above, or…
    - For linear valves, there can be too much mechanical travel on feedback arm. Mechanical feedback travel should not exceed 100° rotation. If necessary secure feedback pin further away from positioner's input shaft or…
    - Actuator end-stops are set too wide, narrow actuator end-stop travel.

  Unit is now ready for intiialization procedure. See Initialization Procedure.

A.4 SIPART PS2 Valve Positioner Fail-Safe Positions

When designing a process loop containing a valve and valve positioner, it is wise to consider the position the valve should go to, i. e., the valve's fail-safe position, in response to each potential system failure. Often valve position during a system failure is not considered until an actual failure occurs and the valve goes to an unexpected position. This can result in a hazardous situation for plant personnel, damage to process equipment, or loss of product or product constituents. Valve fail-safe position is implemented when piping a positioner to a valve actuator.

Figure A-3 Reaction to failure of auxiliary powers below shows the resulting actuator/valve positions for various positioner-to-actuator piping connections and with loss of input signal and/or supply air.

SIPART PS2 Attributes

- Separate models for single and double-acting applications.
- Single-acting units vent output pressure upon loss of control signal and supply air.
- Double-acting units: Y1 goes to maximum pressure & Y2 vents upon loss of control signal.
- Double-acting units block and trap output pressure in actuator upon loss of supply air.
- Double-acting units: If venting an output port upon loss of air is desired, we offer a venting gauge block to exhaust output port Y2.
- Units with "F01" in the model code (Fail-in-Place) block and trap output pressure in actuator upon loss of control signal. See **Figure A-4 Reaction to failure of auxiliary power with fail in place** below.

Part Number	Description
6DR4004-2RF	Venting gauge block, Aluminum
A6X30005128	Venting gauge block, SST

Digital Communications

In addition to electric and pneumatic power, digital positioners require continuous digital communication for proper operation. Both Foundation Fieldbus and Profibus power and communicate with the PS2 using a single pair of wires. Therefore, it is possible to lose digital communication and have device power.

The following Profibus and Foundation Fieldbus parameters will help you predict actuator position upon loss of digital fieldbus communications only; for loss of electrical and pneumatic power, see **Figure A-3 Reaction to failure of auxiliary powers** and **Figure A-4 Reaction to failure of auxiliary power with fail in place** below.

The following overview diagram shows the pneumatic connection variations for different acutator types, regulating action and safety position after an auxiliary supply failure.

CAUTION

Before working on the control valve

Note that before working on the control valve, you must first move it to the safety position. Make sure that the control valve has reached the safety position. If you only interrupt the pneumatic auxiliary power supply to the positioner, the safety position may in some cases only be attained after a certain delay period.

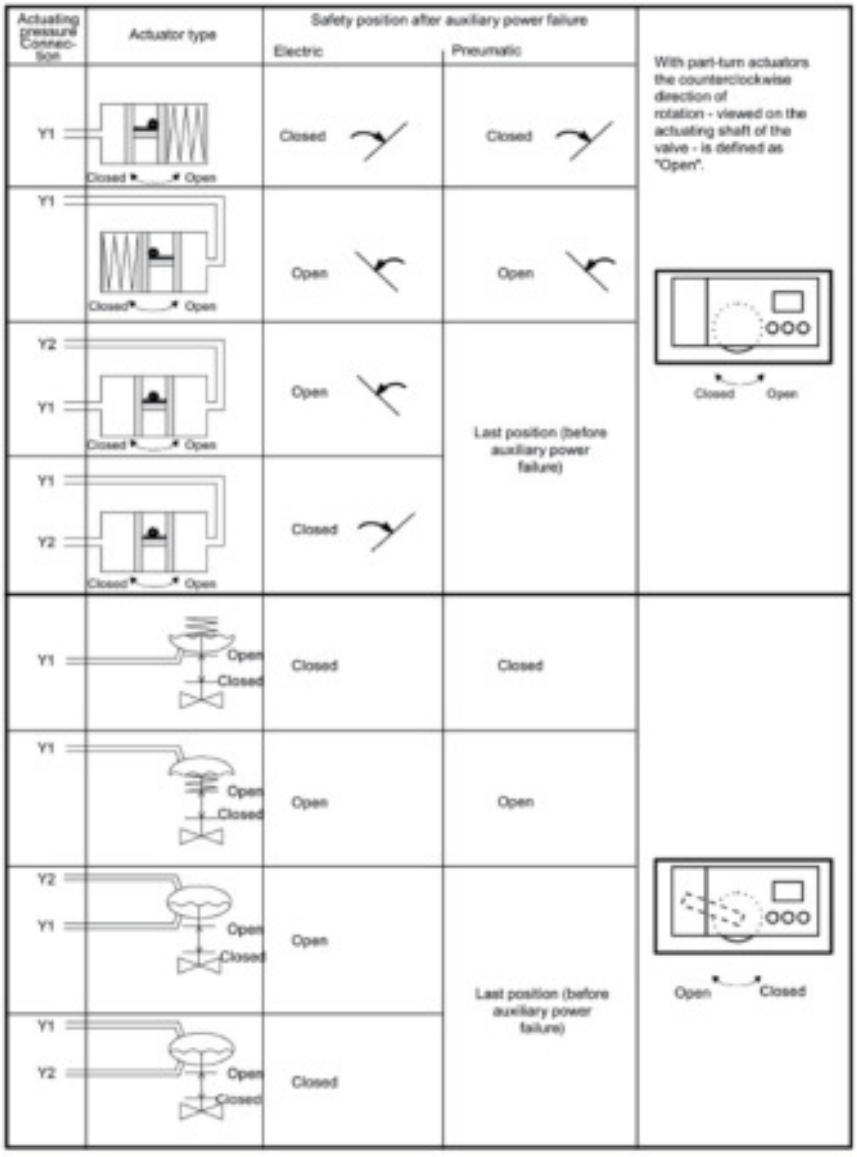


Figure A-3 Figure A-3 Reaction to failure of auxiliary powers

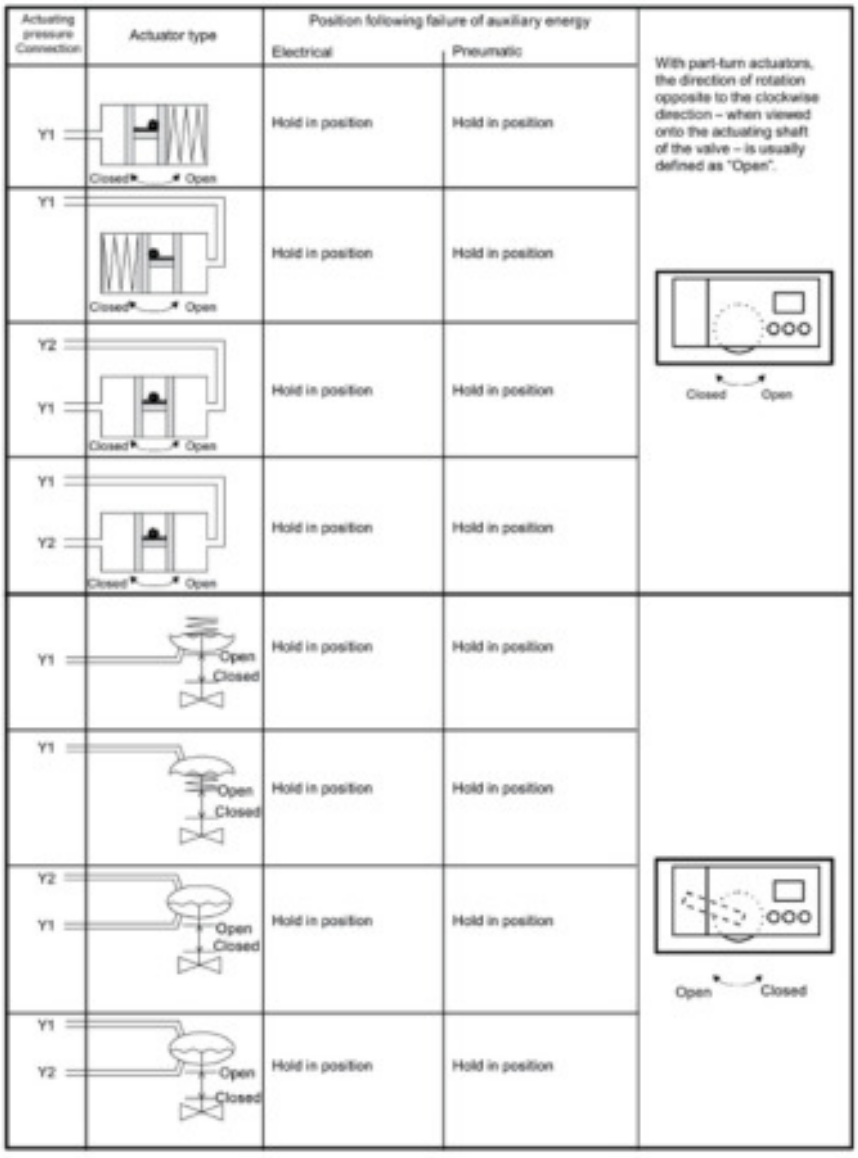


Figure A-4 Figure A-4 Reaction to failure of auxiliary power with fail in place

Profibus Parameters

The following safety parameters are accessible using the local pushbuttons or Siemens' SIMATIC PDM[1] software.

FSTY, Fail Safe Type: Determines position of actuator upon loss of digital communication. This parameter has three choices:

FSVL, Fail Safe Value: Positioner will drive actuator to "FSVL" position, see FSVL parameter.

FSSP, Fail Safe Setpoint: Positioner will stay at last known setpoint before communication loss.

FSAC, Fail Safe factory: As per power failure modes indicated in above table:

- Single-acting models - Y1 exhaust to zero pressure.
- Double-acting models- Y2 exhaust to zero and Y1 increases to supply pressure.

FSTI, Fail Safe Time: Elapsed time after communication loss before going to safety position.

FSVL, Fail Safe Valve: Safety position upon communication loss, pre-requisite: FSTY=FSVL

Foundation Fieldbus Parameters

The following Analog Output Block safety parameters are accessible only via Foundation Fieldbus configuration software, i. e.: National Configurator.

IO_OPTS:

Faultstate Type (bit 6) = 0 or unchecked will hold last position upon loss of communication.

Faultstate Type (bit 6) = 1 or checked will position actuator as per "FSTATE_VAL" parameter.

FSTATE_VAL:

Desired actuator position upon loss of digital communication, Faultstate Type must = 1.

FSTATE_TIME:

Elapsed time after communication loss before going to safety position.

Safety Shutdown

Profibus only positioners are equipped with an additional input to drive an actuator to the PS2's factory safety position; see **Figure A-3 Reaction to failure of auxiliary powers** above. See **Figure A-4 Reaction to failure of auxiliary power with fail in place** above if unit has Fail-in-Place option.

To activate this feature, change position of 'Shut Down' jumper located underneath secondary cover.

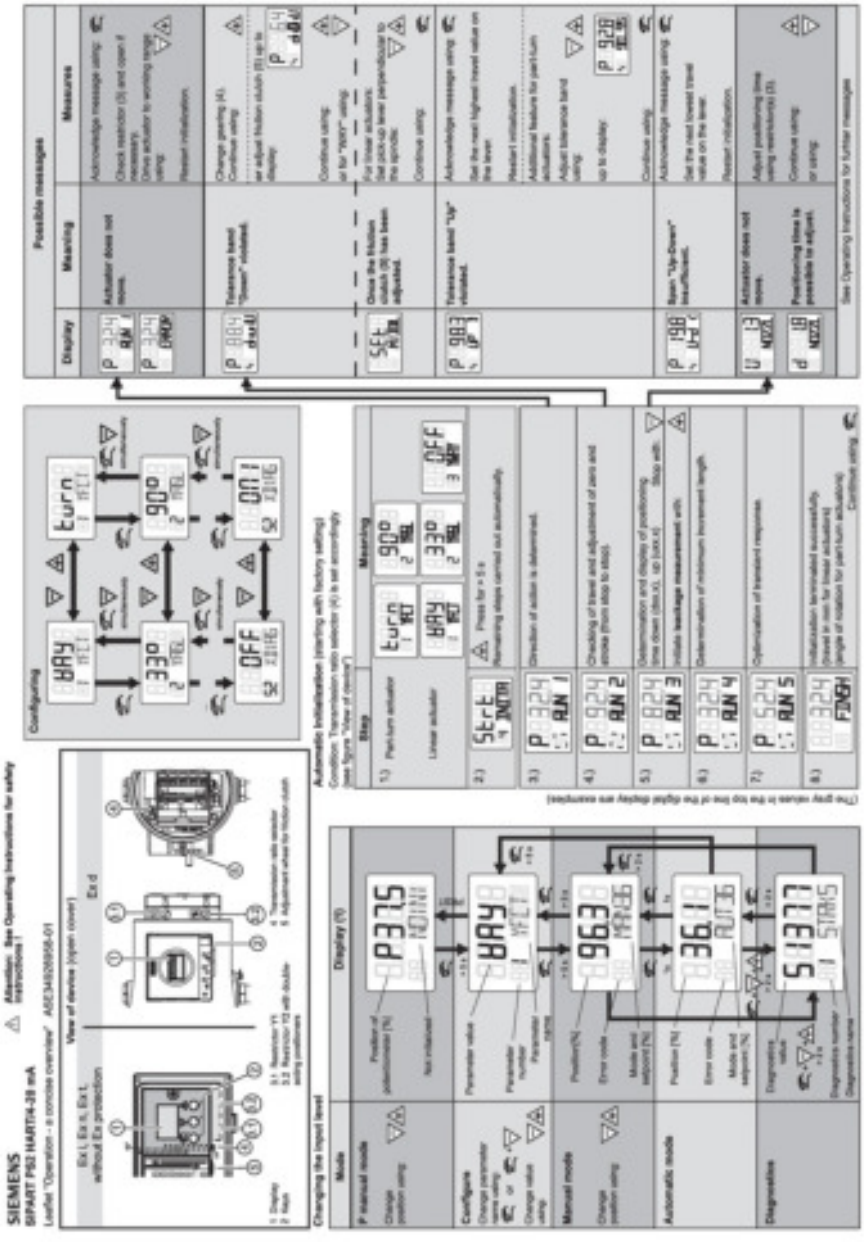
Once enabled, 24Vdc must be maintain on terminals 81 and 82. Otherwise, the positioner will drive the actuator as shown in **Figure A-3 Reaction to failure of auxiliary powers** above. See **Figure A-4 Reaction to failure of auxiliary power with fail in place** above if unit has Fail-in-Place option.

- Single-acting models - Y1 exhausts to zero pressure.
- Double-acting models- Y2 exhausts to zero and Y1 increases to supply pressure.

Once enabled, this feature will override any soft parameter settings as mentioned above.

A.5 Leaflet "Operation - a concise overview" Firmware 4.00

A.6 Leaflet "Operation - a concise overview" Firmware 5.00



Siemens Industry, Inc., Industry Automation
Process Instrumentation
1201 Sumneytown Pike
Spring House, PA
United States 19477-0900

Subject to change without prior notice
A5E36661550 Rev. AA

www.siemens.com/automation/support-request