Instruction

MI EVE0108
November 2021

SRD998 Intelligent Positioner with HART Communication

Schneider Electric™

Contents

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Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER
DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING
WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION
CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE
NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

1. Introduction

The Intelligent positioner SRD998 is designed to operate pneumatic valve actuators and can be operated from control systems (for example, the I/A Series System and Evo™), controllers or PC-based configuration and operation tools such as the FDT/DTMs VALcare™. The positioner is available with HART 7 communication protocol. The multi-lingual full text graphical LCD, in conjunction with the rotary selector, allows a comfortable and easy local configuration and operation. For installations in contact with explosive atmospheres certificates are available.

Main Features

- Autostart with self-calibration
- Self diagnostics, status- and diagnostic messages
- Easy local operation with the rotary selector
- Multilingual full text graphical LCD
- With HART 7 communication
- Stroke 8 to 260 mm (0.3 to 10.2 in) with standard lever; larger stroke with special lever
- Angle range up to 95° angle
- Mounting onto any linear or rotary actuator
- Supply air pressure up to 10 bar (145 psig)
- Single or double acting
- Protection class IP 66
- Explosion protection: Intrinsic Safety according to ATEX/IECEx, INMETRO, NEPSI, PESO, CNS, EAC

Labels

Figure 1. Location of Nameplate (A)

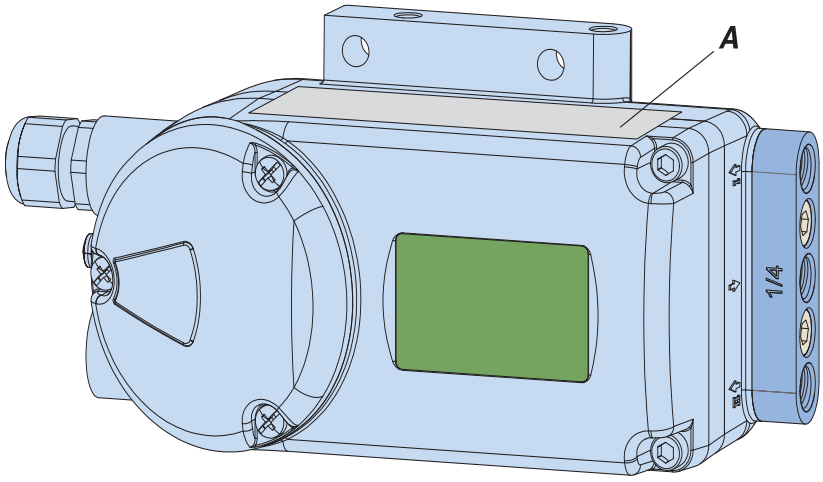
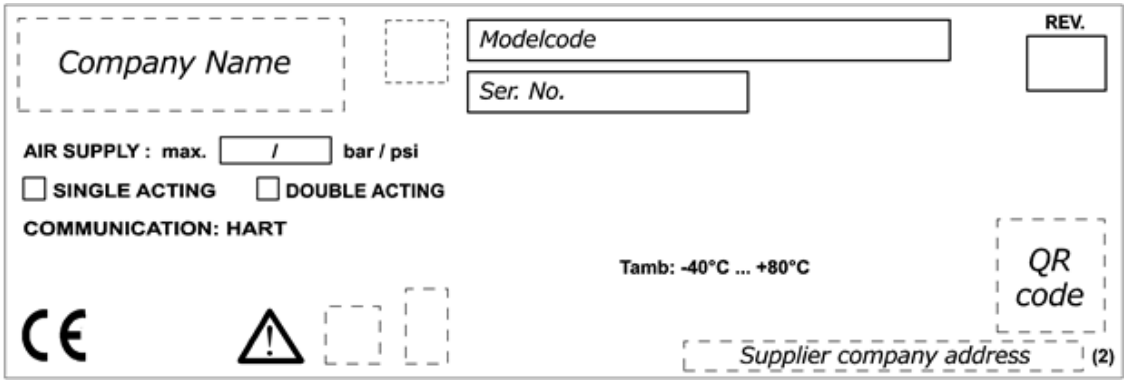


Figure 2. Sample Nameplate (A) without Ex Protection



SRD [Device specification, Model Code]

SER.No [Serial number]

ECEP [Number for special engineered version]

Figure 3. Sample Nameplate (A) with Ex Protection according to ATEX/IECEx for SRD998-HBD

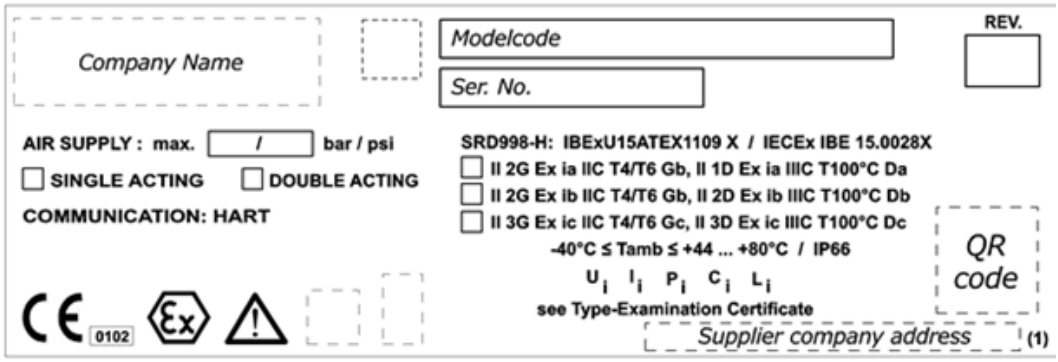
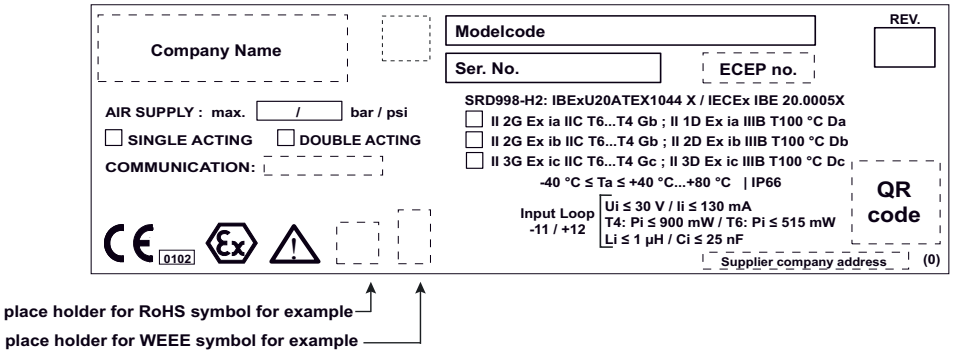
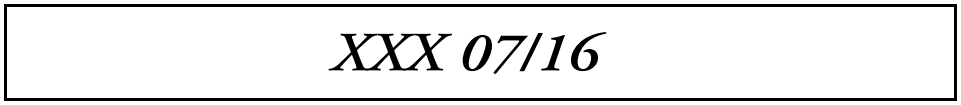


Figure 4. Sample Nameplate (A) with Ex Protection according to ATEX/IECEx for SRD998-HAD



Additional manufacturing data are stored in the software and are read via communication interface.

Figure 5. Measurement Point Label - Directly Fixed or Attached



⚠ DANGER

EQUIPMENT OPERATION HAZARD

Accident Prevention

The connected instrument contains mechanical moved parts, for example, feedback lever, which could cause injuries. The operators must be instructed accordingly.

Electrical Safety

This instrument satisfies the conditions for safety class III, over-voltage category I according to EN 61010-1 or IEC1010-1.

Any work on electrical parts is done by a qualified personnel if any supply is connected to the instrument. The instrument is used for its designated purpose and connected in accordance with its connection diagram. Locally applicable installation regulations for electrical equipment is observed, for example, in the Federal Republic of Germany DIN VDE 0100 respectively DIN VDE 0800. The instrument is operated with safety extra low voltage SELV or SELV-E. Safety precautions taken in the instrument may be rendered ineffectual if the instrument is not operated in accordance with the Master Instructions. Limitation of power supplies for fire protection must be observed due to EN 61010-1, appendix F or IEC 1010-1.

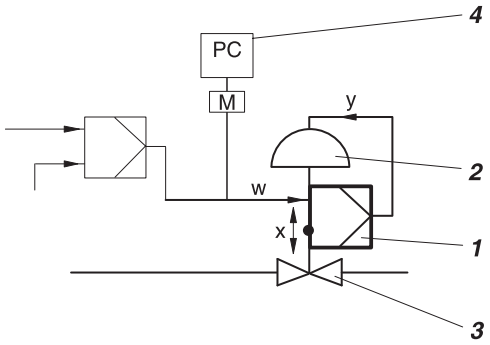
Failure to follow these instructions can result in death or serious injury.

2. Method of Operation

General

The intelligent positioner SRD998 **1** and the pneumatic actuator **2** form a control loop with the set point value **w** (from master controller or control system), the output pressure **y** and the position **x** of the actuator on valve **3**.

Figure 6. Intelligent Positioner SRD998 - HART Version



For the supply air, we recommend the FRS** filter regulator.

The positioner can be attached to both linear and rotary actuators. Actuators with spring force are controlled by a single acting positioner. Actuators without spring force are controlled by a double acting positioner.

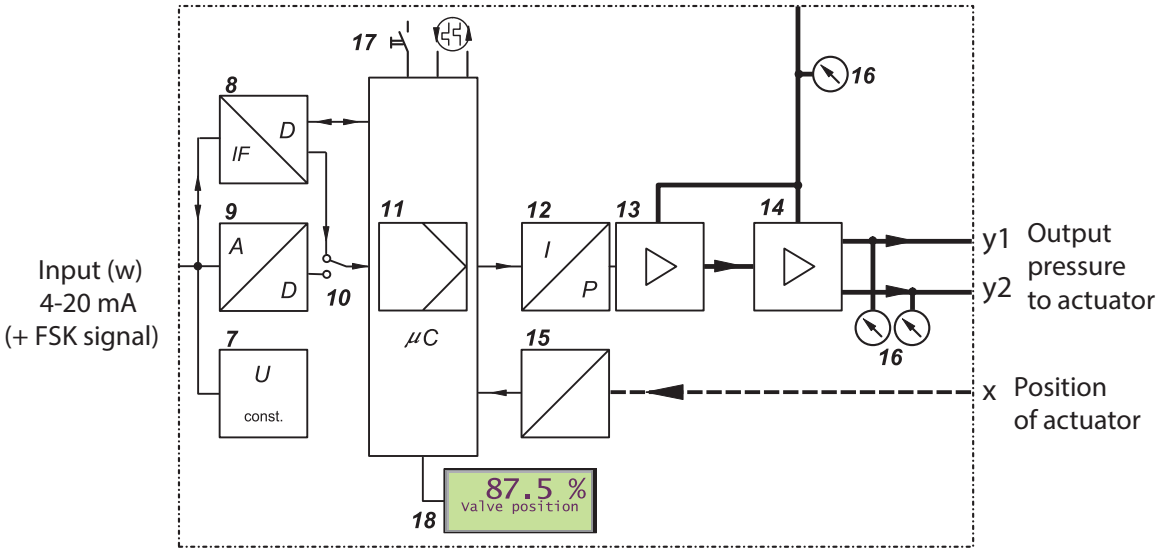
Using HART, the positioner can be operated locally by means of Rotary Selector and LCD, Hand Held Terminal, remotely via PC-based configuration like FDT/DTM or a corresponding control system, for example, I/A Series System

⚠ WARNING
RISK OF IMPROPER INSTALLATION
For the supply air, we recommend the FRS** filter regulator.
Failure to follow these instructions can result in death or serious injury.

Operation

With the intelligent positioner with input signal 4-20 mA and superimposed HART signal, the supply takes place via the power signal adjacent to the input as shown in Figure 7. By means of voltage converter **7**, derivation of the internal supply of the electronics takes place. The current value is measured, in A/D transformer **9** converted, and directed via switch **10** to digital controller **11**. The output of controller **11** drives the electro-pneumatic converter (IP-module) **12**, controlling a pre-amplifier **13**, the single acting (or double acting) pneumatic power amplifier **14**. The output of the amplifier **14** is the output pressure y to the actuator.

Figure 7. Block Diagram

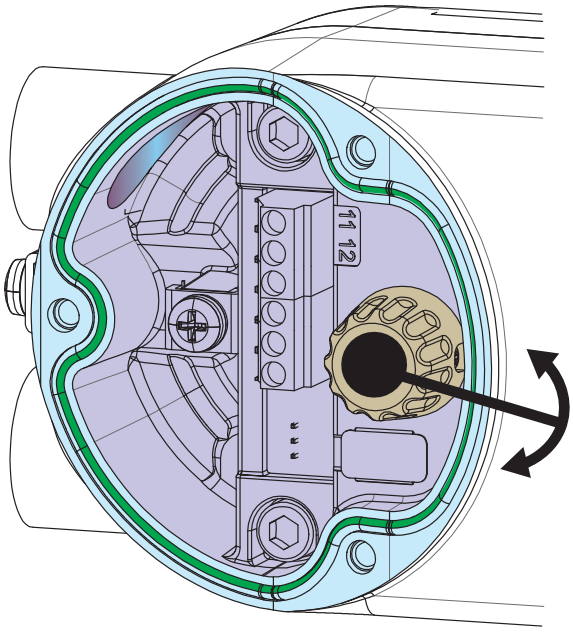


The pneumatic amplifiers are supplied with supply air 1.4 to 6 bar (20 to 90 psig) or 1.4 to 10 bar (20 to 145 psi). The position x of the actuator is sent to the control unit **11** by the position sensor (conductive plastic potentiometer) **15**. Optional gauges **16** enable additional diagnostic indications. Adjusting, start-up of the positioner as well as the demand for internal information can be made using the Rotary Selector **17**, with indication given by LCD **18**.

Figure 8. Information/Value read on SRD998 LCD display by rotating the Turn and Push Selector

Position [%]	Valve position read by potentiometer
Input SP [%]	This is the setpoint derived from the input signal, before application of any characteristics
Work SP [%]	This is the setpoint after application of any characteristics, the one the controller actually works with.
Current [mA]	Input value in mA
Angle [°]	Angle position read must be between -60° and +60°. 0° must be flat side of the shaft directly agianst the triangle mark. When out of range symbol +++++ or -----. This value can be read at anytime even if Autostart is not done
Position [mm or in]	Position in mm calculate base on max stroke information given
Temperat [°C or °F]	Electronic temperature
Tags	Short and long HART tags
Firmware Revision	

Figure 9. Rotation of Turn and Push Selector



Usability

SRD998 Pneumatic Type		SRD998 Pneumatic Technique	Recommended Filter Regulator	Booster, if required
Single Acting	B0S	Diaphragm Amplifier	FRS923/FRS02/FRS04	VBS200/VBS300 Series
Double Acting	C0S	Diaphragm Amplifier	FRS923/FRS02/FRS04	VBS200/VBS300 Series
Single Acting	B1S	Diaphragm Amplifier	FRS923/FRS02/FRS04	VBS200/VBS300 Series
Single Acting	B2S	Diaphragm Amplifier	FRS04	VBS200/VBS300 Series
Double Acting	C1S	Spool Valve	FRS04	Booster not recommended
Double Acting	C3S	Spool Valve	FRS04	Booster not recommended

3. Operating Modes

Operation of the positioner is divided into individual operating modes. Operating modes may change depending on, for example, key commands or internal calculations.

Initialize

Upon power-up, several self-tests are conducted.

- If no error is detected the device moves to OUT OF SERVICE. If it is still in a delivery condition, perform AUTOSTART.
- If AUTOSTART is performed successfully, the device moves to IN OPERATION.
- If issues are detected, the devices will remain in OUT OF SERVICE.
- If an error is detected after reset, see Chapter 11, “Troubleshooting” or contact Global Customer Support.

Device Inoperable

If the LCD shows a message, a device issue is signaled. These issues are detected during cyclical self test.

The device can no longer be operated. This could be caused by a jammed Rotary Selector, invalid program memory, etc. (see Chapter 11, “Troubleshooting”). If a device error is detected continuously, contact Global Customer Support.

In Operation

After performing an AUTOSTART the devices will be IN OPERATION and will always follow the setpoint provided by the analog signal. If setpoint is fed via communication it will always, even after restarting or resetting, move back to the safety position (de-energized valve position) or FAILSAFE. In this case as soon as setpoint values are fed via communication, the SRD will go to IN OPERATION.

Out of Service

The SRD in delivered condition is configured in such a way that it will remain OUT OF SERVICE after power-up until moving to IN OPERATION via the manually initiated function AUTOSTART. In the device state OUT OF SERVICE, the menu entering mode remains active at all times. If a device has been IN OPERATION already and is removed from an actuator and mounted to another, we recommend taking the device out of operation via “M 10.1 Reset Configuration to Ex Factory Settings” prior to disconnecting the device from the first actuator. This enables the next actuator to be started in the delivered condition. For more information, see “M 10.1 Reset Configuration to Ex Factory Settings”.

Calibrate

During an AUTOSTART function the device is in condition CALIBRATION. The actuator is moved up and downward several times, and the device could be busy for a few minutes. Subsequently, the device moves to IN OPERATION.

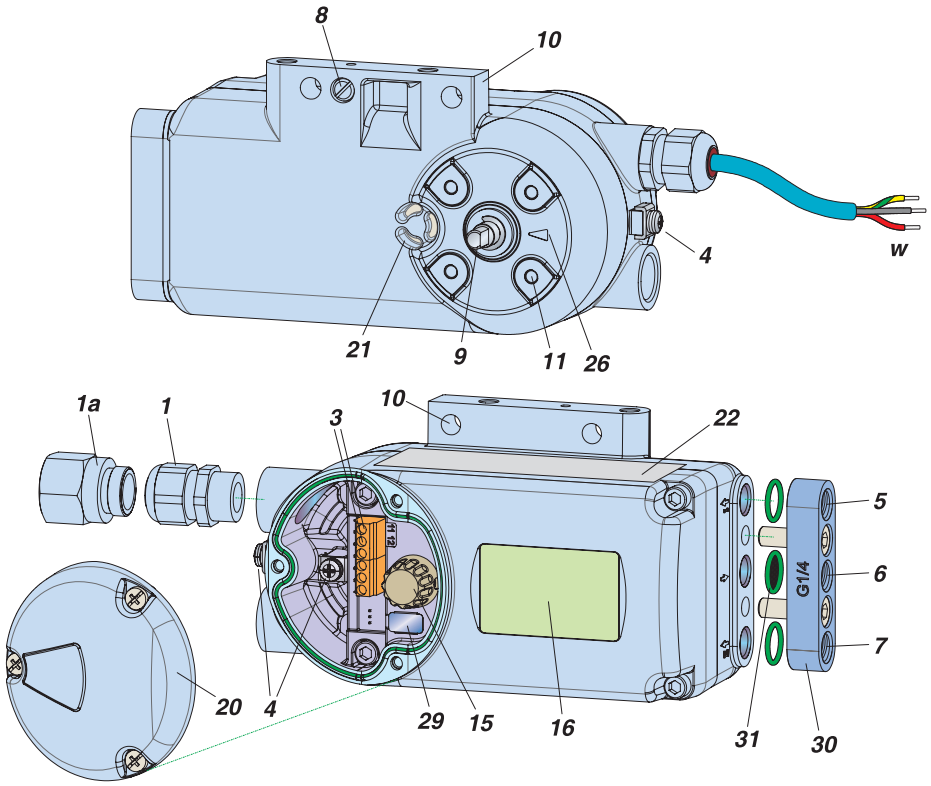
Messages

The SRD continuously supervises important device functions. In the case that limit values are exceeded or operational problems occur, messages are signaled via the LCD. The message with the highest priority will be indicated first. With rotary selector other messages can be called up.

For more information, see Chapter 11, “Troubleshooting”. LCD description and possible operator interventions are described in Chapter 8, “Start Up”.

4. Functional Designations

Figure 10. Functional Designations



1	Cable gland (a)	**11**	Connection base for attachment to rotary actuators
1a	Adapter for example, 1/2”-14 NPT	**15**	Turn Rotary Selector for Menu selection and press to confirm
3	Terminal Block (a) (see Figure 11 for screw terminals: +11 and -12 for input loop and +13, -14, +15, and -16 for Universal In-Out Option Code 1)	**16**	LCD with full text in different languages
4	Ground connection (inner and outer)	**20**	Cover for electrical connection compartment
5	Output I (y1)	**21**	Air vent, dust and water protected
6	Air supply (s)	**22**	Data label
7	Output II (y2)	**26**	Arrow is perpendicular to shaft 9 at angle 0 degree
8	Direct attachment hole for output I (y1)	**29**	Plug for service connector under the lid (factory only)
9	Feedback shaft	**30**	Connecting manifold, G 1/4 or 1/4 NPT Not required when mounting a gauge manifold, or a direct mounted volume booster
10	Connection manifold for attachment to stroke actuators	**31**	O-ring with filter, for air supply connection

a. Device is shipped with a closing sticker. Remove sticker and mount a cable gland.

Figure 11. Details of Terminal Block for Model SRD998 HAD

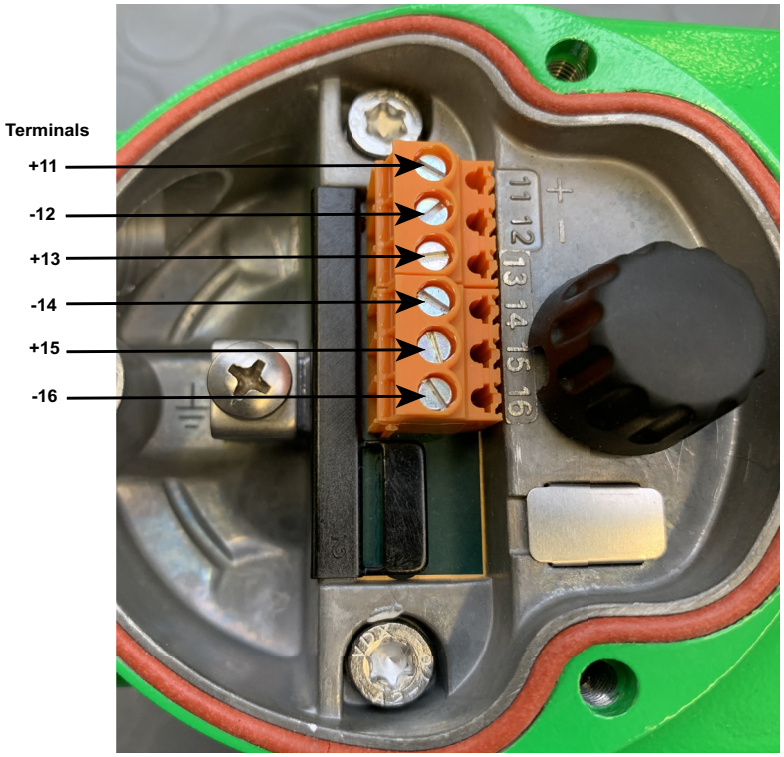
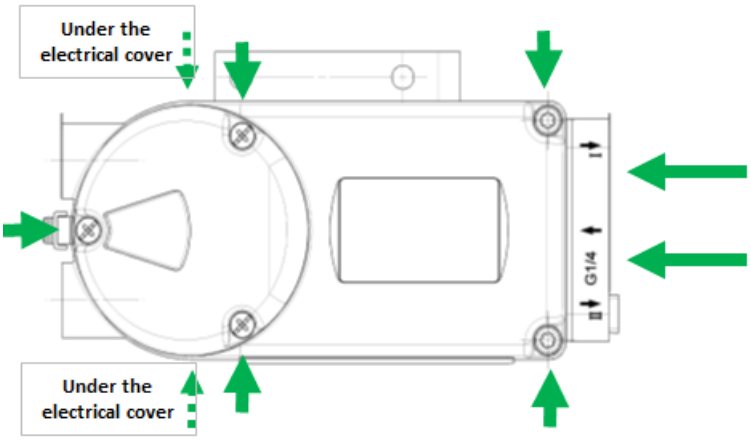


Figure 12. Torque Definition for Model SRD998

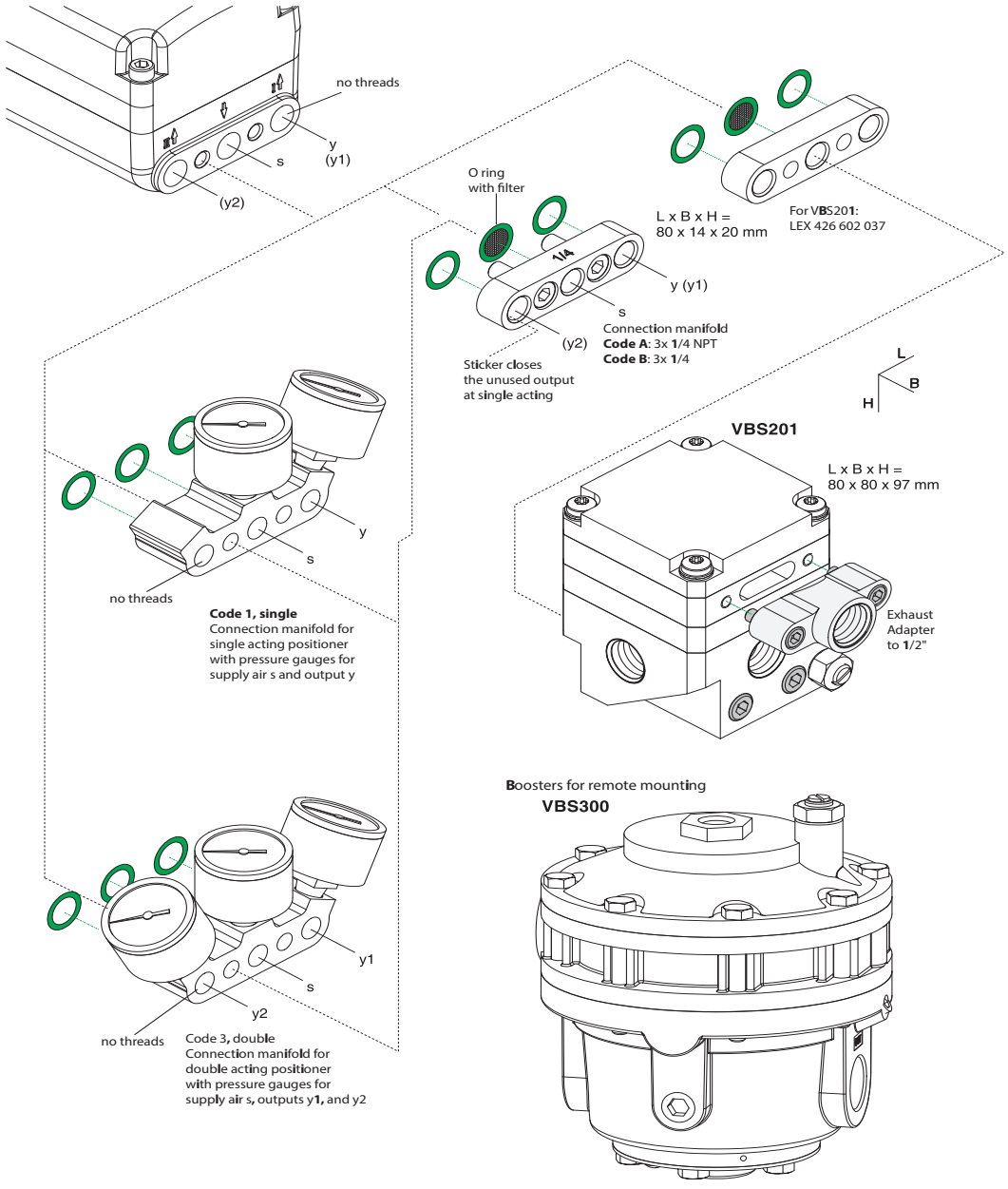


10 Nm for Manifold screw (2x)
7 Nm for Main Cover screw (4x): go kitty-corner
2 Nm for Electrical cover screw (3x)
2 Nm for Grounding screw (2x)
0.6 Nm for Terminal Block screws

Accessories for Basic Devices

When mounting, check the proper seating of the O rings and bolt on the accessories with the two M8 bolts. Tightening torque is 20 Nm.

Figure 13. Accessories for Basic devices

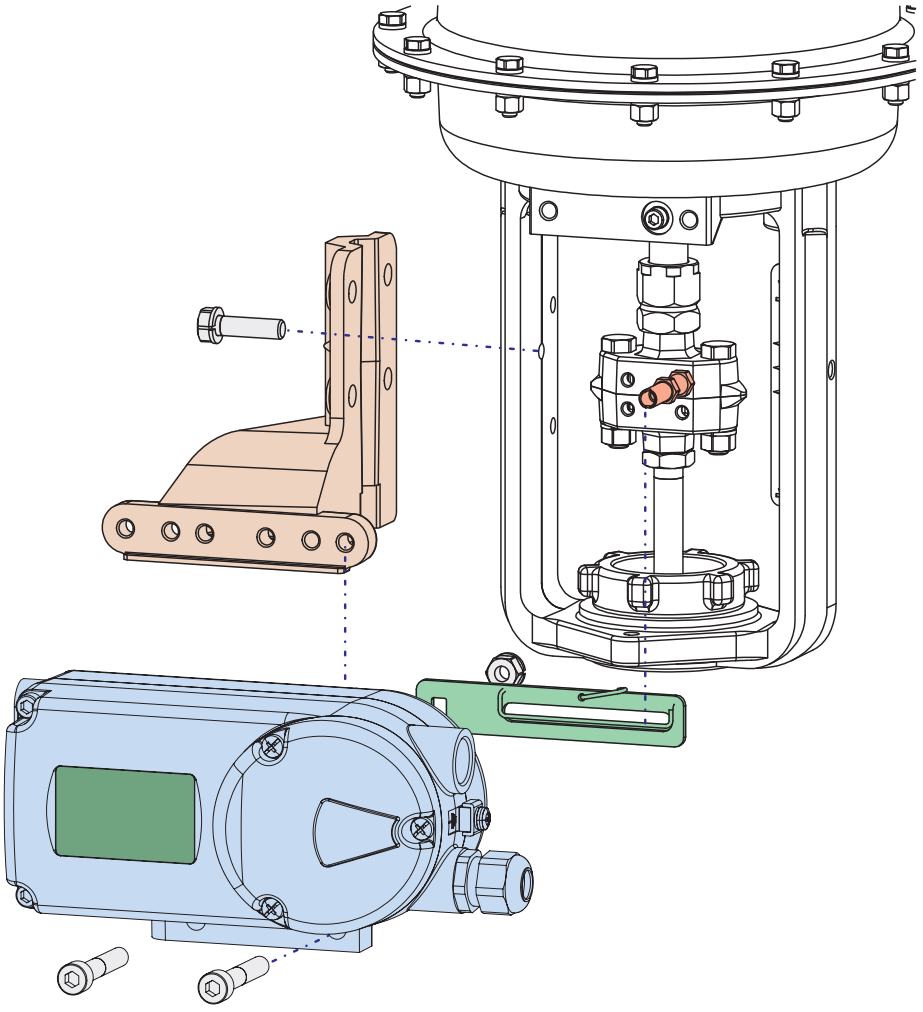


5. Mounting to Actuators

NAMUR Mounting Linear Actuator, Left Hand

Applicable to actuators with cast yoke or pillar yoke according to NAMUR (DIN IEC 534-6). Mount the positioner with pneumatic connections on the left side and electrical connections on the lower right side.

Figure 14. NAMUR Mounting Linear Actuator - Left Hand



Attachment of the positioner to the actuator is made to the left using the mounting bracket and feedback lever for a NAMUR mount.

Use:

- attachment kit EBZG -H for a cast yoke, or
- attachment kit EBZG -K for a pillar yoke
- pneumatic outputs I (or I and II) are used for operating the actuator

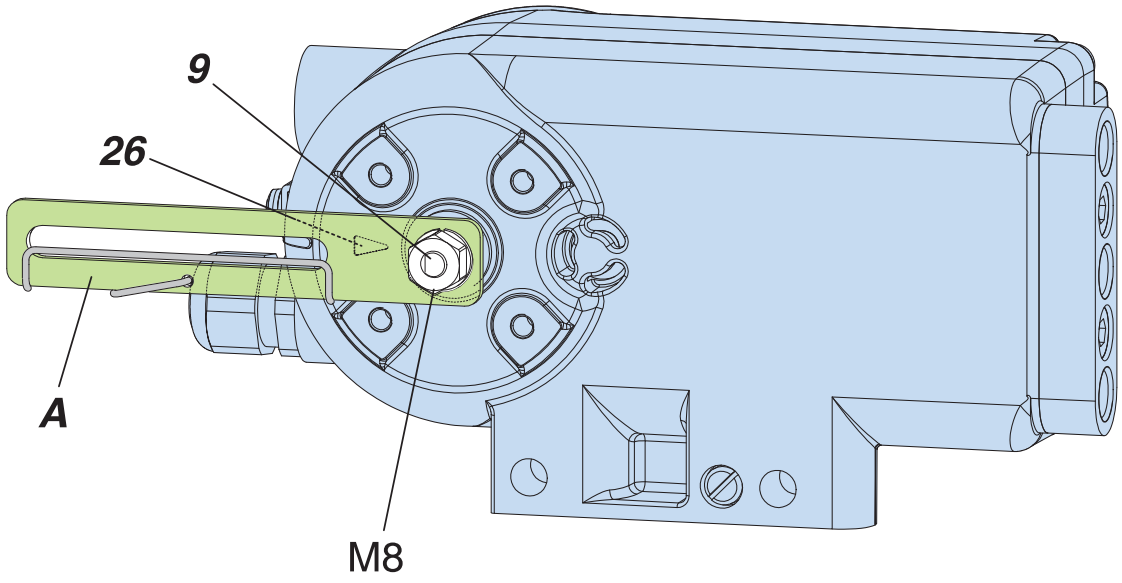
NOTICE
HAZARD OF EQUIPMENT DAMAGE Pneumatic connections: Do not use Teflon tape for sealant. The fine fibers could disturb the function of the SRD. Use only Loctite® #243 for sealant (apply only to male thread). Allow sealant to dry before applying supply air. **Failure to follow these instructions can result in equipment damage.**

Screw-type glands for electrical connections are positioned on the side. Device is shipped with a closing sticker; remove sticker and mount a cable gland or, if unused, a closing plug.

Preparation of the Positioner

Rotate the shaft stub of shaft **9** so that the flat on the shaft stub is perpendicular to the arrow **26** on the housing at mid travel range. Fasten the feedback lever **A** to the shaft by means of spring washer and nut M8.

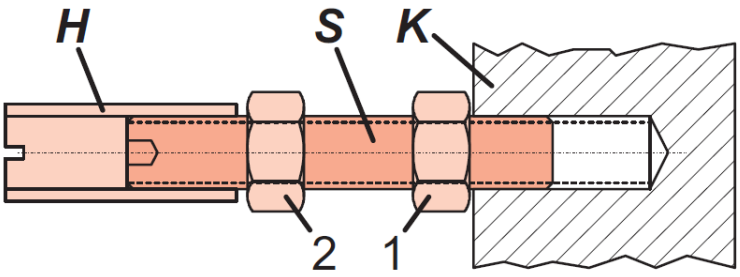
Figure 15. Preparation of Positioner - Left Hand



Preparation of the Actuator

Screw the carrier bolt to the stem connector and lock it by means of a counter nut. A carrier bolt with an adjustable length is used to be able to screw on various coupling pieces.

Figure 16. Preparation of the Actuator - Left Hand



It consists of a stud **S** (size M6), which is screwed into the coupling piece **K** (with 3 mm Allen key) and locked with a lock nut **1**. The threaded sleeve **H** is screwed onto it and locked with a lock nut **2**. Ensure that the bolt is adjusted to a suitable length. Fasten the mounting bracket to the left side of the yoke.

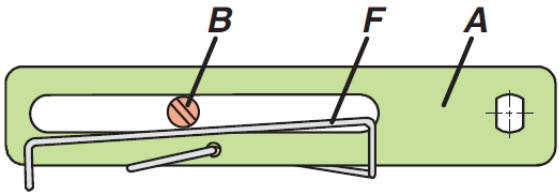
Remember:

- for a cast yoke use a screw M8 x 30
- for a pillar yoke use two U-bolts and four nuts

Mounting of the Positioner

Fasten the positioner to the mounting bracket using two spring washers and two screws M8 x 80. Note the carrier bolt **B** is in the slot of the feedback lever **A** and the compensating spring **F** touches the carrier bolt.

Figure 17. Feedback Lever

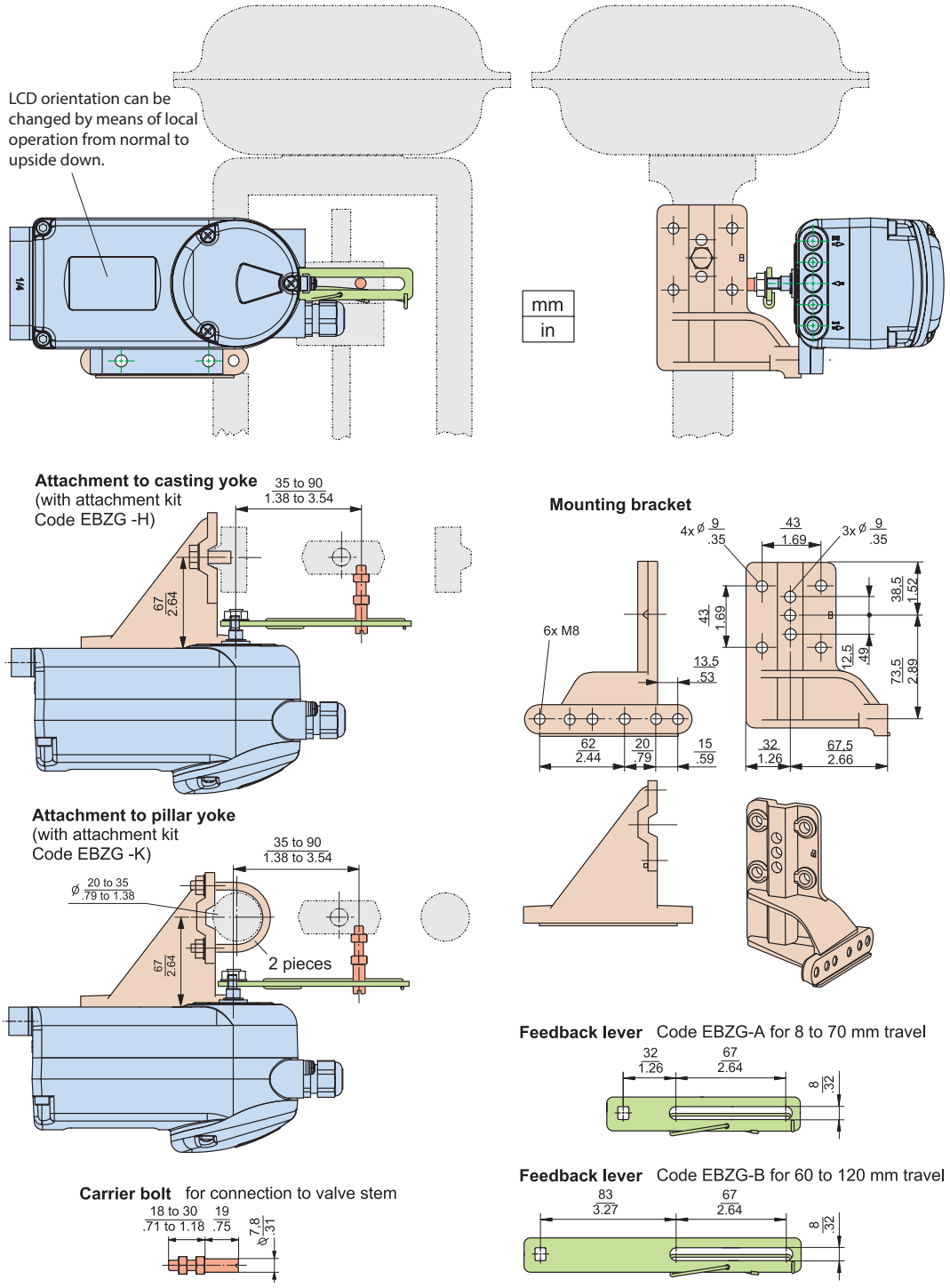


For optimum utilization of the positioner operating range, we recommend that the arrangement is adjusted according to the following procedure before fixing.

At an actuator position in the middle of travel range, the feedback lever position must be perpendicular to the actuator stem and the angle range must be between ±10° and ±45°.

Fasten the positioner to the mounting bracket so that a suitable angle range is selected. We recommend that the pneumatic and electrical connections are made after adjusting the position.

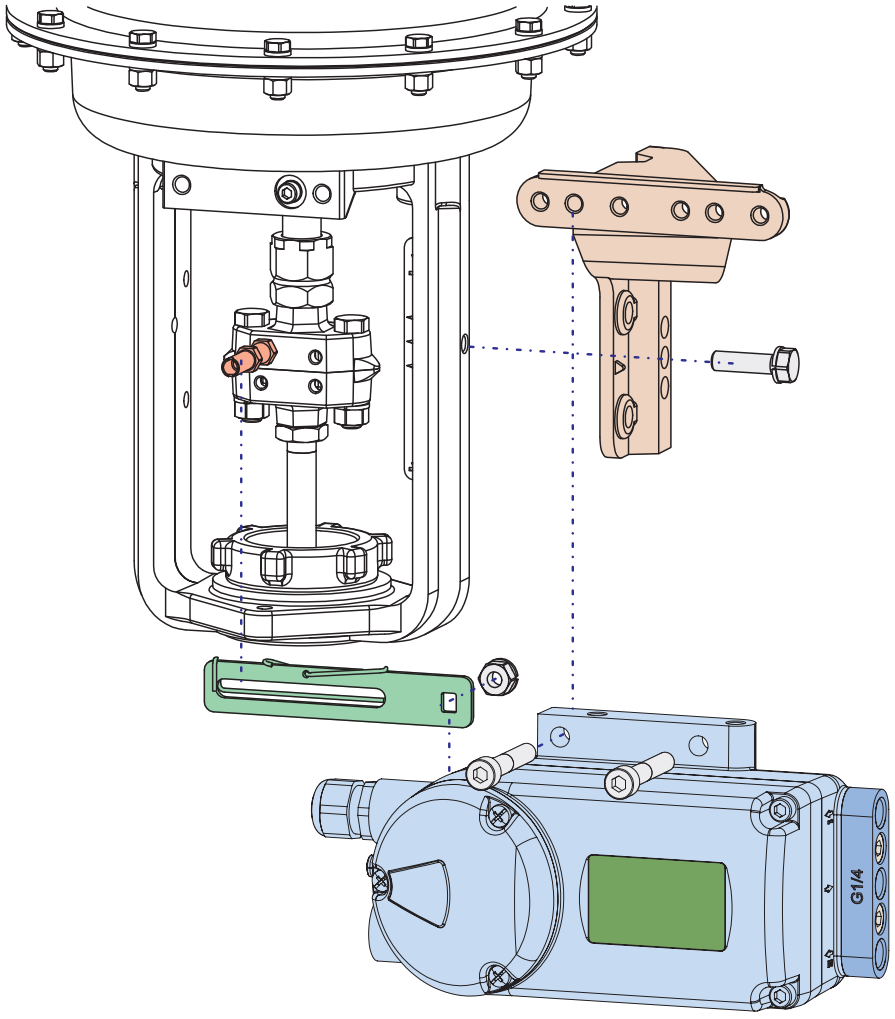
Figure 18. NAMUR Mounting Dimensions - Left hand



NAMUR Mounting Linear Actuator, Right Hand

Right-hand mounting is done if for instance left-hand mounting is not possible for structural reasons. Applicable to actuators with cast yoke or pillar yoke according to NAMUR (DIN IEC 534-6). Mount the positioner with pneumatic connections on the right side and electrical connections on the left side.

Figure 19. NAMUR Mounting Linear Actuator - Right Hand



Attachment of the positioner to the actuator is made to the right using the mounting bracket and feedback lever for a NAMUR mount.

Use:

- the attachment kit EBZG -H for a cast yoke
- the attachment kit EBZG -K for a pillar yoke
- the pneumatic outputs I (or I and II) are used for operating the actuator

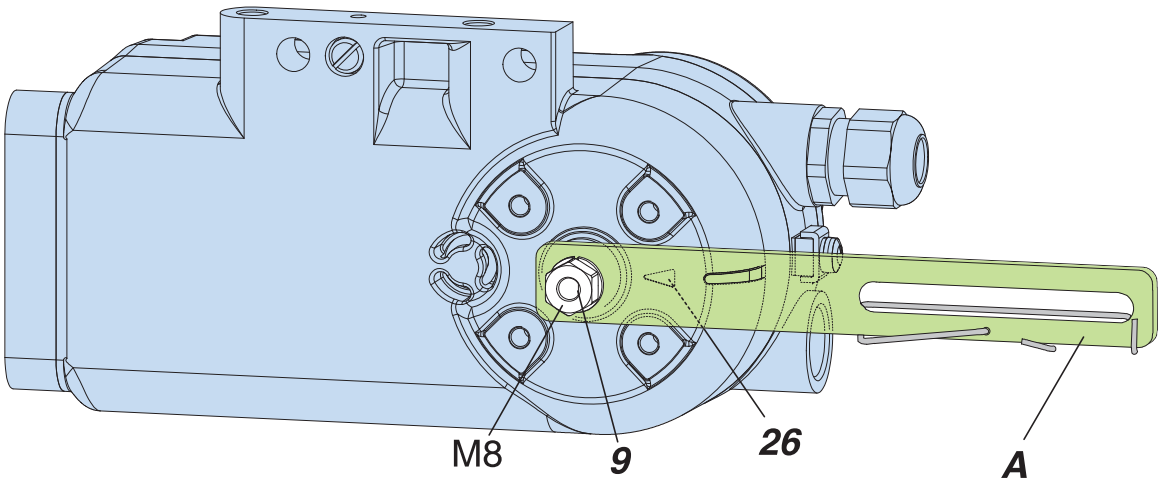
NOTICE
HAZARD OF EQUIPMENT DAMAGE Pneumatic connections: Do not use Teflon tape for sealant. The fine fibers could disturb the function of the SRD. Use only Loctite® #243 for sealant (apply only to male thread). Allow sealant to dry before applying supply air. **Failure to follow these instructions can result in equipment damage.**

Screw-type glands for electrical connections are positioned on the side. Device is shipped with a closing sticker; remove sticker and mount a cable gland or, if unused, a closing plug.

Preparation of the Positioner

Rotate the shaft stub of shaft **9** so that the flat on the shaft stub is perpendicular to the arrow **26** on the housing at mid travel range. Fasten the feedback lever **A** to the shaft by means of spring washer and nut M8.

Figure 20. Preparation of the Positioner - Right Hand

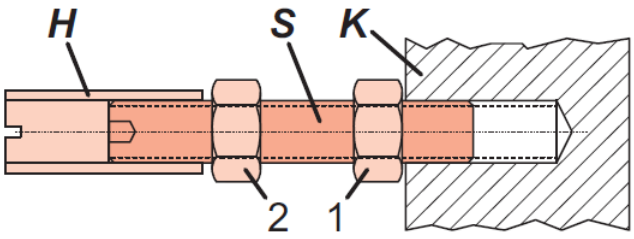


Preparation of the Actuator

Screw the carrier bolt to the stem connector and lock it by means of a counter nut. A carrier bolt with an adjustable length is used to be able to screw on various coupling pieces.

It consists of a stud **S** (size M6), which is screwed into the coupling piece **K** (with 3 mm Allen key) and locked with a lock nut **1**. The threaded sleeve **H** is screwed onto it and locked with a lock nut **2**. Ensure that the bolt is adjusted to the right length. Fasten the mounting bracket to the left side of the yoke. For a cast yoke use a screw M8 x 30, for a pillar yoke use two U-bolts and four nuts.

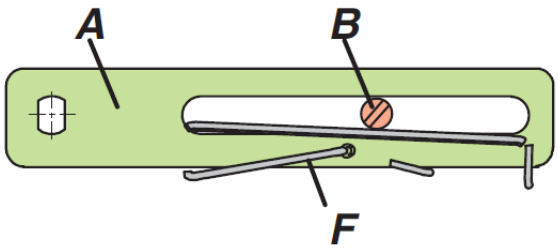
Figure 21. Preparation of the actuator - Right Hand



Mounting of the Positioner

Fasten the positioner to the mounting bracket using two spring washers and two screws M8 x 80. Note the carrier bolt B is in the slot of the feedback lever A and the compensating spring F touches the carrier bolt.

Figure 22. Feedback Lever - Right Hand



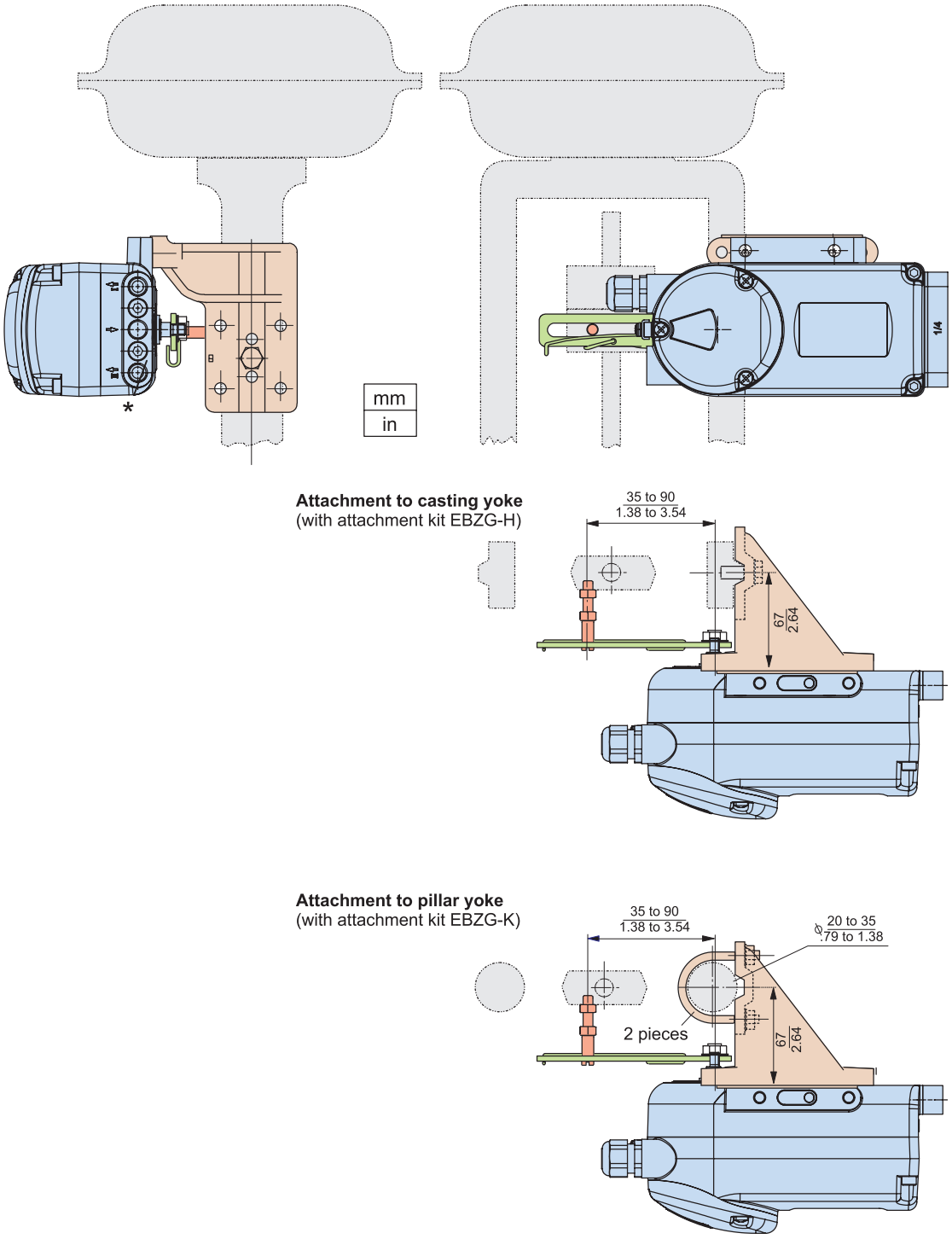
For optimum utilization of the positioner operating range, we recommend the arrangement be adjusted according to the following procedure before fixing.

At an actuator position in the middle of travel range, the feedback lever position must be perpendicular to the actuator stem and the angle range must be between ±10° and ±45°.

Fasten the positioner to the mounting bracket so that a suitable angle range is selected.

We recommend that the pneumatic and electrical connections are made after adjusting the position.

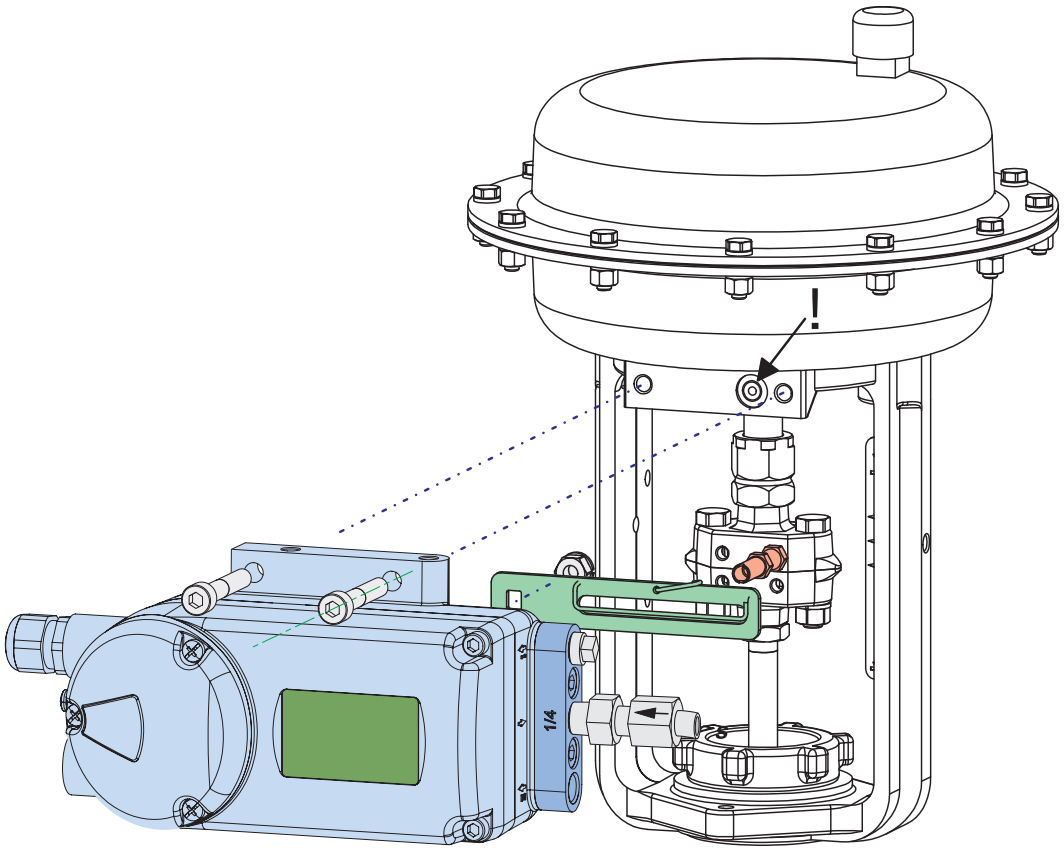
Figure 23. NAMUR Mounting Dimensions - Right Hand



Linear Actuator, Direct Mounting

Actuators with appropriately prepared yoke enable mounting of the SRD directly to the actuator yoke.

Figure 24. Linear Actuator - Direct Mounting



The attachment of the positioner is accomplished by bolting it directly to the actuator yoke using the feedback lever for a direct mount (with attachment kit EBZG -E1). The rear output I and the side outputs I and II are used as follows:

- Actuator single acting, spring force closes:
  - The rear output I is used (remove lock screw in hole D).
  - The side output I is closed by means of a lock screw.
- Actuator single acting, spring force opens:
  - The side output I is used.
  - The rear output I is closed by means of a lock screw.
- Actuator double acting:
  - The rear output I and the side output II are used.
  - The side output I is closed by means of a lock screw.

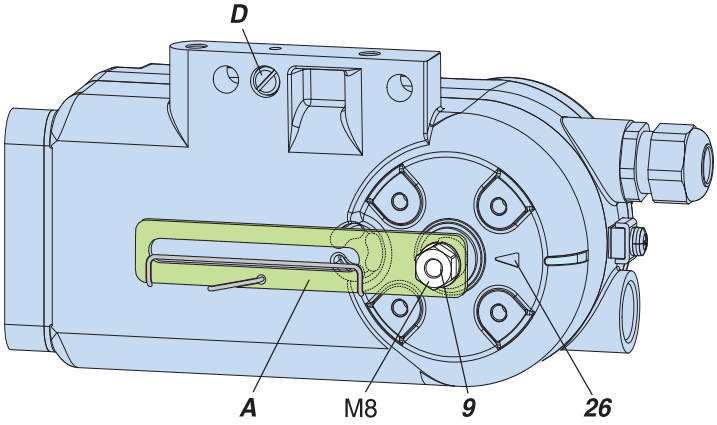
NOTICE
HAZARD OF EQUIPMENT DAMAGE Pneumatic connections: Do not use Teflon tape for sealant. The fine fibers could disturb the function of the SRD. Use only Loctite® #243 for sealant (apply only to male thread). Allow sealant to dry before applying supply air. **Failure to follow these instructions can result in equipment damage.**

Screw-type glands for electrical connections are positioned on the side. Any idle female threads are closed by means of plugs.

Preparation of the Positioner

Rotate the shaft stub of shaft **9** so that the flat on the shaft stub is perpendicular to the arrow **26** on the housing at mid travel range. Fasten the feedback lever **A** to the shaft by means of spring washer and nut **M8**.

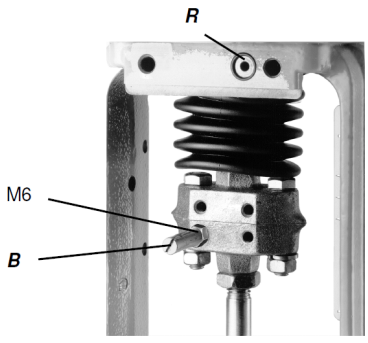
Figure 25. Preparation of the positioner - Direct Mount



Preparation of the Actuator

Screw in the carrier bolt **B** on the coupling piece on the drive spindle at the lower left and lock it by means of a nut **M6** as shown in Figure 26.

Figure 26. Preparation of Actuator - Direct Mount



Mounting of the Positioner

Fasten the positioner to the upper part of the yoke using 2 spring washers and 2 screws M8 x 80, as shown in Figure 26. The rear output I of positioner has contact to the air duct R in the yoke.

NOTE

Note the correct position of the O-ring on the yoke for the rear connection I.

Note the carrier bolt **B** is in the slot of the feedback lever **A** and the compensating spring F touches the carrier bolt as shown in Figure 27.

Figure 27. Feedback Lever - Direct Mount

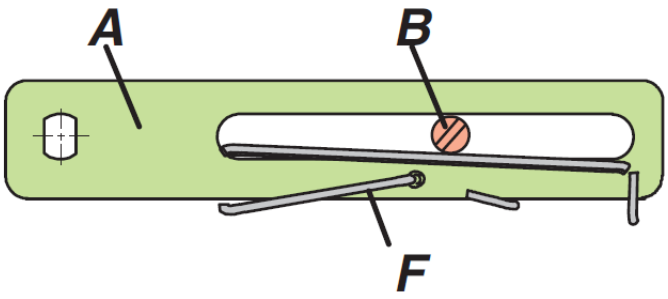
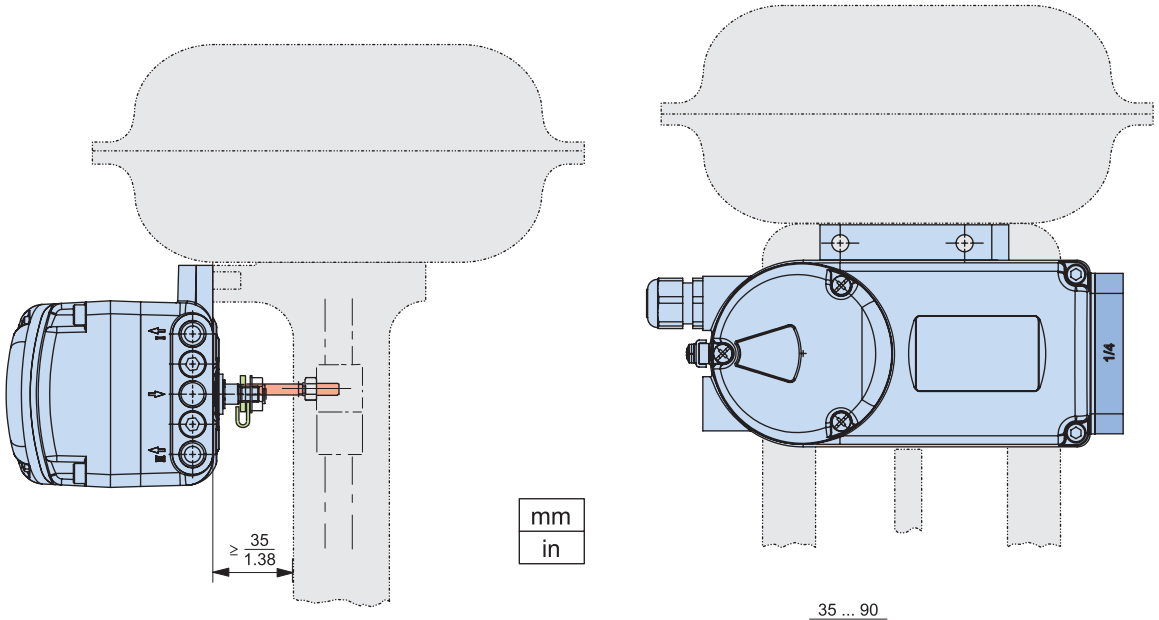
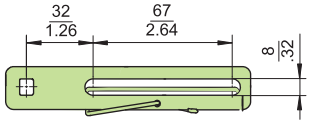


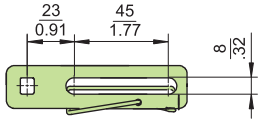
Figure 28. Mounting Dimensions - Direct Mounting



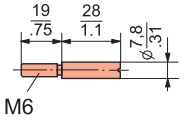
Feedback lever Code EBZG-A for 8 to 70 mm travel



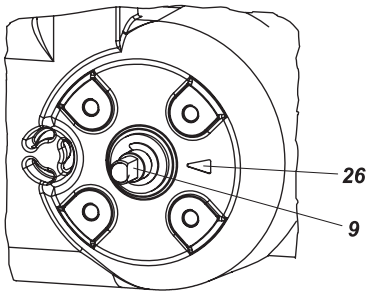
Feedback lever FoxPak/FoxTop in Code EBZG-E1

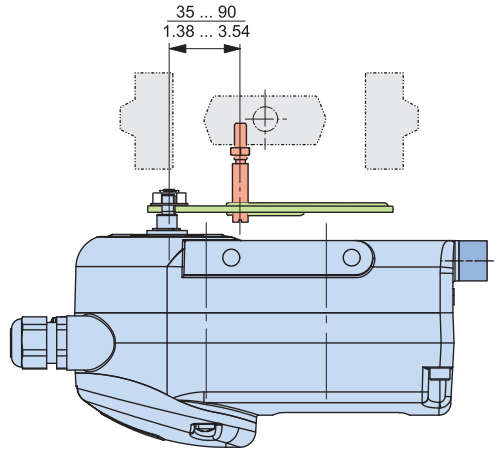


Carrier bolt for connection to valve stem

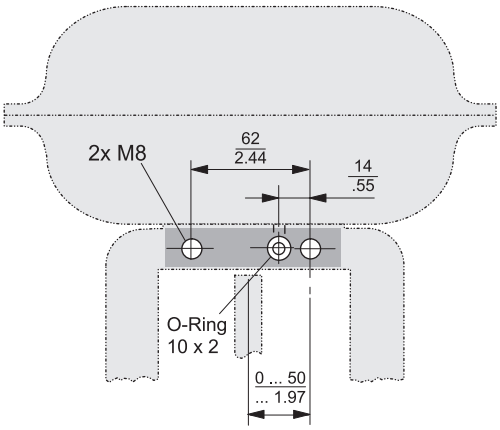


Detail: shaft stub ***9*** is perpendicular to the arrow ***26*** on the housing (at mid travel range)





Connection to yoke using the direct connection hole for rear output I (y/y1)



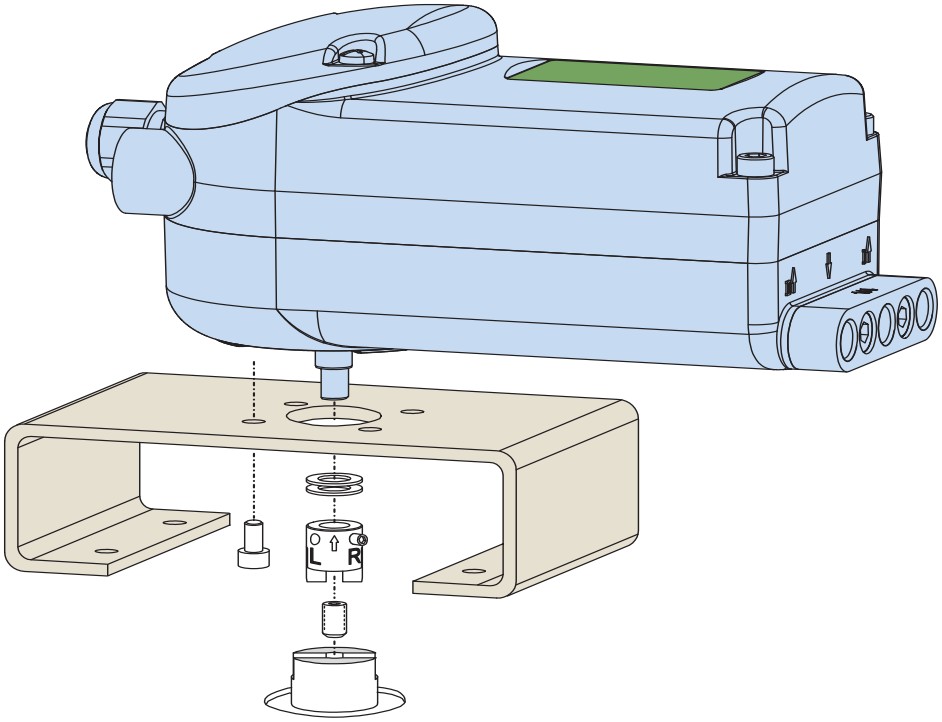
Mounting to Rotary Actuators

Applicable to rotary actuators that meet the VDI/VDE 3845 standard for mounting.

NOTE

Installation position of positioner: Mount the positioner so that the pneumatic connections are in the same direction as the longitudinal drive axis of the actuator as shown in the Figure 29.

Figure 29. Mounting Rotary Actuators



The feedback shaft **9** of the SRD has no mechanical stop resulting in a 360 degrees spin. The permissible rotation angle range is between +50 and –50 degrees around the arrow at the housing concerning the flat area of the feedback shaft. Since a rotary actuator has a rotary angle of about 90 degrees the mounting as described in the following will be carried out precisely. Attachment of the positioner to the actuator is made by using the rotary adaptor kit EBZG -R. The side outputs I (or I and II) are used.

NOTICE
HAZARD OF EQUIPMENT DAMAGE Pneumatic connections: Do not use Teflon tape for sealant. The fine fibers could disturb the function of the SRD. Use only Loctite® #243 for sealant (apply only to male thread). Allow sealant to dry before applying supply air. **Failure to follow these instructions can result in equipment damage.**

Screw-type glands for electrical connections are used as needed. Any unused threaded holes are closed by plugs.

NOTICE
HAZARD OF EQUIPMENT DAMAGE Help prevent accumulation of water in the instrument in this mounting position by sealing cable entry against water. Provide a continuous supply of dry instrument air. **Failure to follow these instructions can result in equipment damage.**

Preparation of Positioner

NOTE

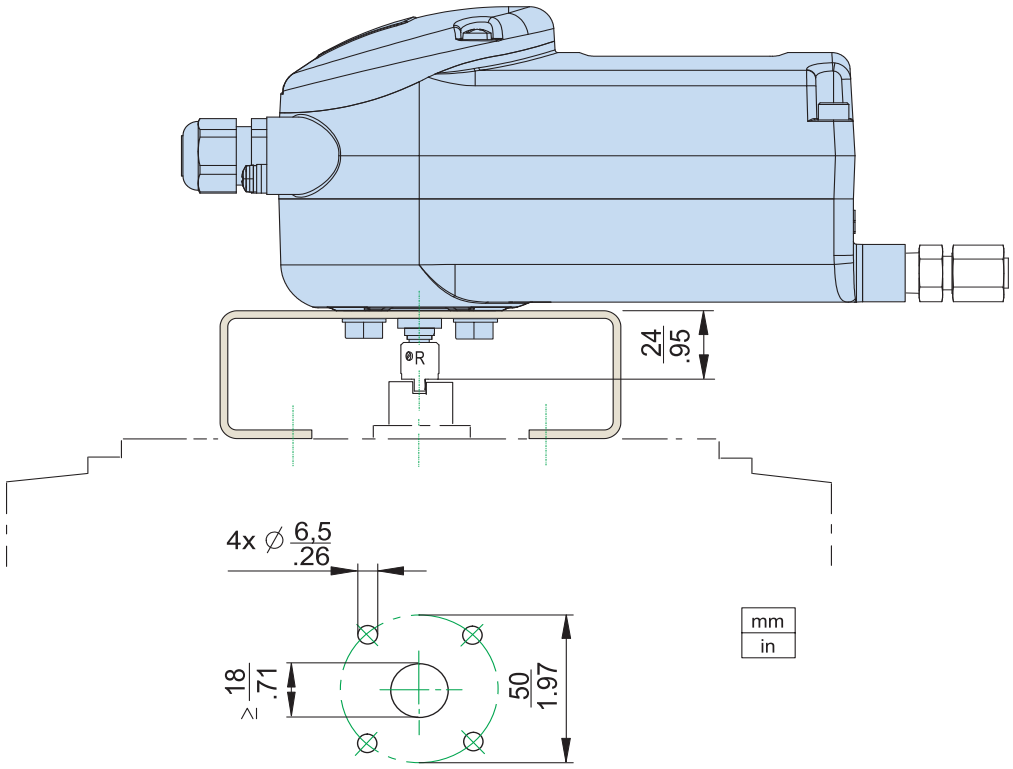
Valve must be in failsafe position and the direction of rotation of the actuator drive shaft is known. These items are important to ensure proper functioning.

In the single acting actuator, the force of the installed spring closes. The pressure-less actuator is in failsafe position. Through manually feeding compressed air it can be seen whether the actuator drive shaft rotates to the left or to the right.

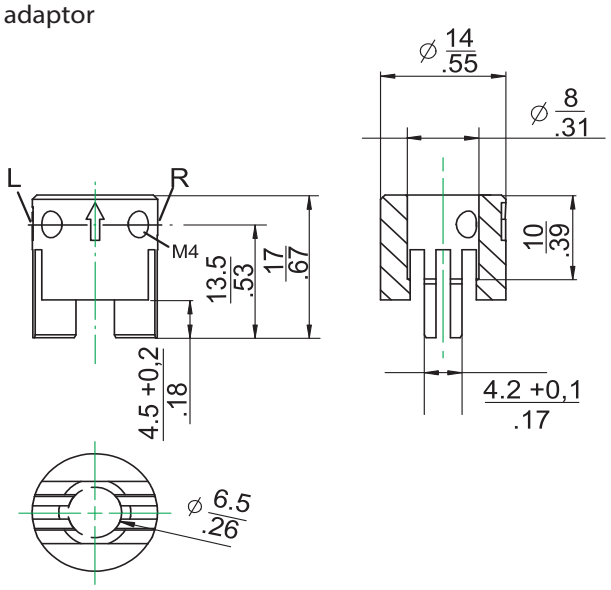
In the double acting actuator (without spring reset) both air chambers are basically equal. Failsafe position can be either open or close. Therefore, indication of the failsafe position must be determined by engineering. Then the direction of rotation may be determined by manual feeding of compressed air.

Bolt **2** is screwed into actuator drive shaft **1** for subsequent centering of the rotary adaptor **3**. The attachment console is mounted to the rotary actuator.

Figure 30. Attachment Diagram for Bracket and Rotary Adaptor



Rotary adaptor



Preparation of the Actuator

Preparing the rotary adaptor:

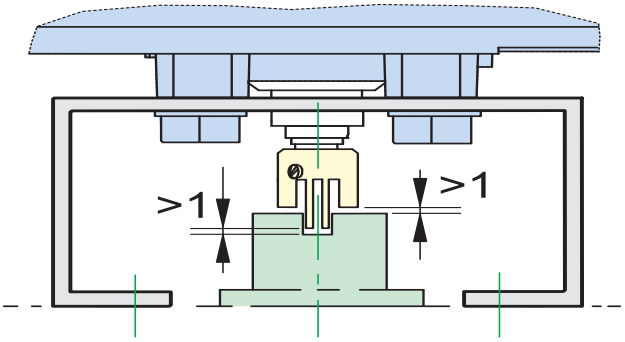
For attachment to a counter-clockwise or left turning actuator secure the stud screw **4** in the threaded hole **L** of the rotary adaptor; hole **R** remains open as shown in Figure 32.

For attachment to a clockwise or right turning actuator secure the stud screw 4 in the threaded hole **R** of the rotary adaptor; hole **L** remains open as shown in Figure 33.

Now place the rotary adaptor **3** with two washers **5** on the feedback shaft **9** of the positioner against the stop.

When the product temperature rises, the drive shaft 1 becomes longer. Therefore, the rotary adaptor **3** is mounted so that approximately 1 mm (0.04 in.) of clearance results between the drive shaft 1 and the rotary adaptor 3. This is achieved by placing an appropriate number of washers 5 on the feedback shaft stub 9 before attaching the rotary adaptor. Two washers must result in a clearance of 1 mm.

Figure 31. Clearance of 1 mm for coupling mounting



⚠ CAUTION
RISK OF EQUIPMENT DAMAGE Ensure at mounting a clearance of 1 mm to avoid damage. **Failure to follow these instructions can result in injury or equipment damage.**

Now screw and tighten the bolt in the coupling against the flat part of the feedback shaft (do not screw against thread). Finally turn the feedback shaft in such a way that the arrow of the coupling points to the arrow of the SRD housing. Beginning and end positions of the actuator drive shaft 1 and feedback shaft 9 are marked in Figure 32 (left-rotating actuator) and in Figure 33 (right-rotating actuator) by arrows for the respective direction of rotation. The feedback shaft is now in the normal position corresponding to the failsafe position of the actuator.

Figure 32. Mounting Actuator - Left Rotating

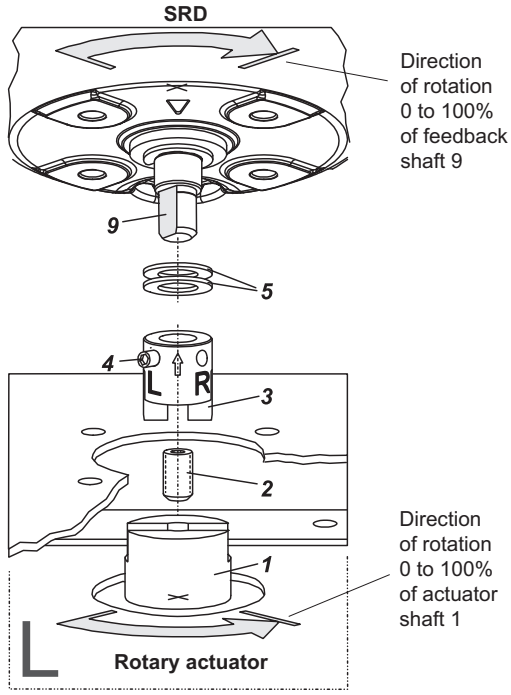
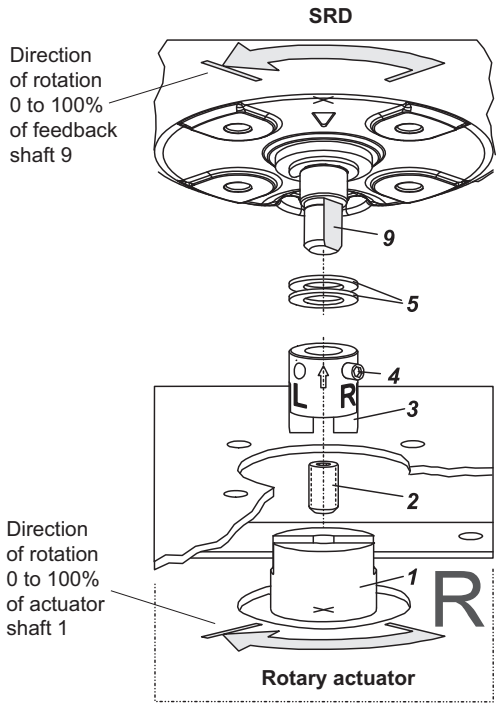


Figure 33. Mounting Actuator - Right Rotating



Mounting of Positioner

SRD and actuator are in failsafe position. Attach the SRD on the console so that the catch of coupling **3** is guided into the groove of shaft **1**. Use bolt **2** to center and align the positioner to the actuator. Be careful not to shift shafts **1** and **9** and that both shafts are exactly flush. Fasten the positioner to the bracket by means of 4 lock washers and 4 screws M6 x 12.

6. Pneumatic Connections

⚠ WARNING

SAFETY HAZARD

- To avoid any personal injury resulting from bursting of parts, do not exceed maximum supply pressure of positioner and actuator.
- To avoid any personal injury or equipment damage from sudden or fast movement, during air connection:
  - Do not put your finger or other part at any time inside the valve or in any moving part of the actuator.
  - Do not put your finger or other part at any time in the feedback lever mechanism.
- Do not touch the rear part of the positioner at any time.

Failure to follow these instructions can result in death or serious injury.

NOTE

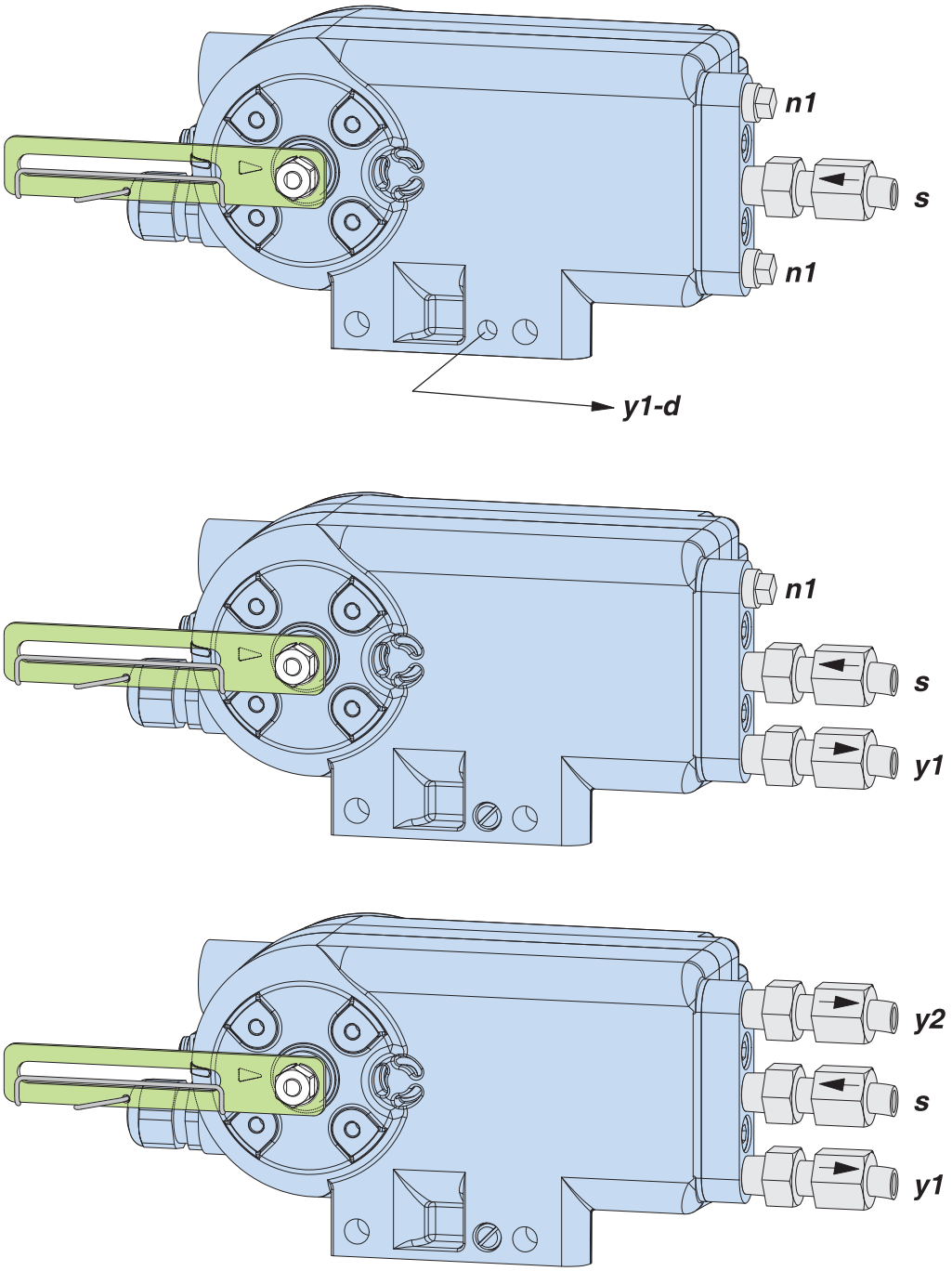
Connect air supply only after connection y1 (and y2 for double acting) are done as shown in Figure 34.

Following alignment and mounting of the positioner to the valve, pneumatic tubing must be provided:

s	Supply air
y1	Output 1, depressurized at currentless electronics. When using this output y1 must be closed by means of sealing screw and O-ring.
y2	Output 2 for double-acting actuator. Full pressure at currentless electronics. Closed at single-acting actuator.
n1	Hex. screw Part No. 522 588 013 (NPT, stainless steel) Part No. 556 446 016 (NPT, plastic)

Unused pneumatic connections will be closed off. See Figure 34 for more information.

Figure 34. Pneumatic Connections



Fail Safe Position for Double Acting Actuator

Fail safe position of the double acting actuator is given by the fail safe action of the pneumatic of the positioner itself. In case positioner is de-energized (or OUT OF SERVICE or DEVICE INOPERABLE):

- Output y1 is 0
- Output y2 is 100% of air supply pressure

Therefore, do pneumatic piping of y2 to the chamber of the actuator that must be pressurized to do the expected fail safe. In any case put air supply only when the output y2 is connected.

Supply

- Supply air: 1.4 to 6 bar (20 to 90 psig) or 1.4 to 10 bar (20 to 145 psi) depending on the pneumatic unit
- Air supply according to ISO 8573-1
  - Solid particle size and density class 2
  - Oil rate: class 3
  - Pressure dew point 10 K under ambient temperature

For air supply, we recommend a FRSxx filter regulator.

7. Electrical Connection

⚠ WARNING

SAFETY HAZARD

- To avoid any personal injury resulting from bursting of parts, do not exceed maximum supply pressure of positioner and actuator.
- To avoid any personal injury or equipment damage from sudden or fast movement, during air connection:
  - Do not put your finger or other part at any time inside the valve or in any moving part of the actuator.
  - Do not put your finger or other part at any time in the feedback lever mechanism.
- Do not touch the rear part of the positioner at any time.

Failure to follow these instructions can result in death or serious injury.

Connection

Device is shipped with one or two closing sticker in function of the version; remove sticker and mount cable gland **1** as required for proper installation concerning the certification requirements. Feed in the input cable through the gland. The gland is suitable for cable diameters of 6 to 12 mm (0.24 to 0.47 in). Check the tightness of the cable entry.

The second cable entry comes with a M12 Round Connector when ordered with mounting code V, W or Y (Remote Mounting). The M12 connector is prepared to connect a remote potentiometer (side or top mounting). If the second cable entry is not used please plug accordingly to avoid water and moister entry.

Make the electrical connection of the input line at the screw terminals **3**. The terminals are suitable for wire cross sections of 0.3 to 2.5 mm² (22 -14 AWG) screwed with a maximum torque of 0.5 Nm.

The shield of the cable connection is

- with conductive cable glands (recommended) directly connected with the housing
- with non-conductive cable glands to be placed onto the inner screw terminal **4**.

NOTE

When connecting shielded cable connect the cable shield on both sides (on the positioner side as well as on the system side). For selection of cable, see recommendation for cable types according to IEC 1158-2.

For connection to a local ground the internal and external ground terminal 4 can be used. Tightening torque is 2 Nm.

To Open Cover

To open or remove cover from housing, loosen the three screws (**A**) as shown in Figure 35. See Figure 36 for electrical connection in detail.

Figure 35. Electrical Connection 1

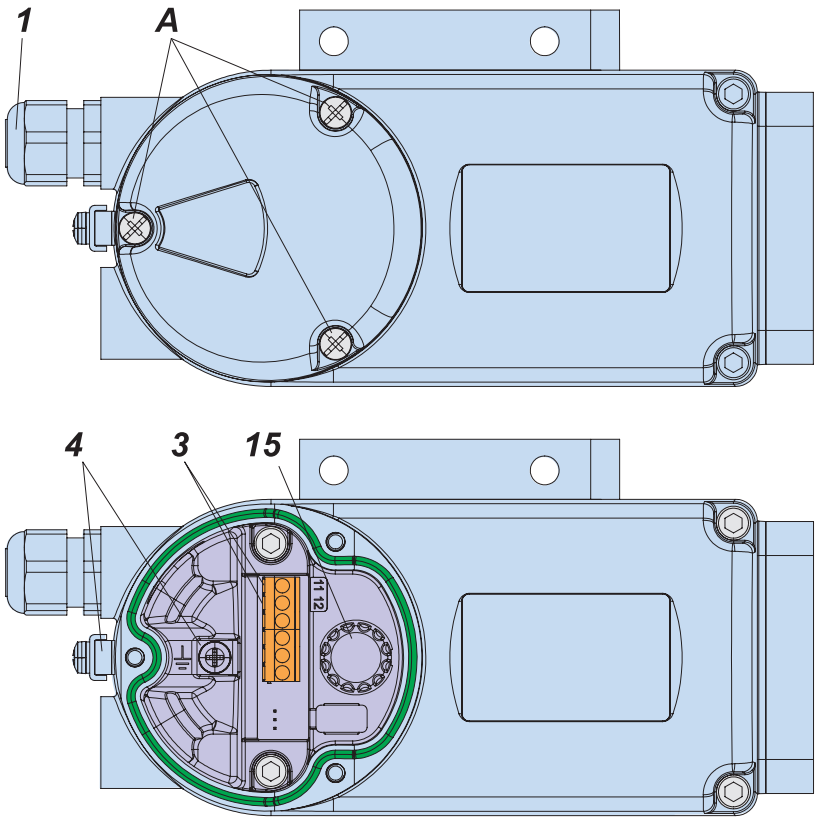
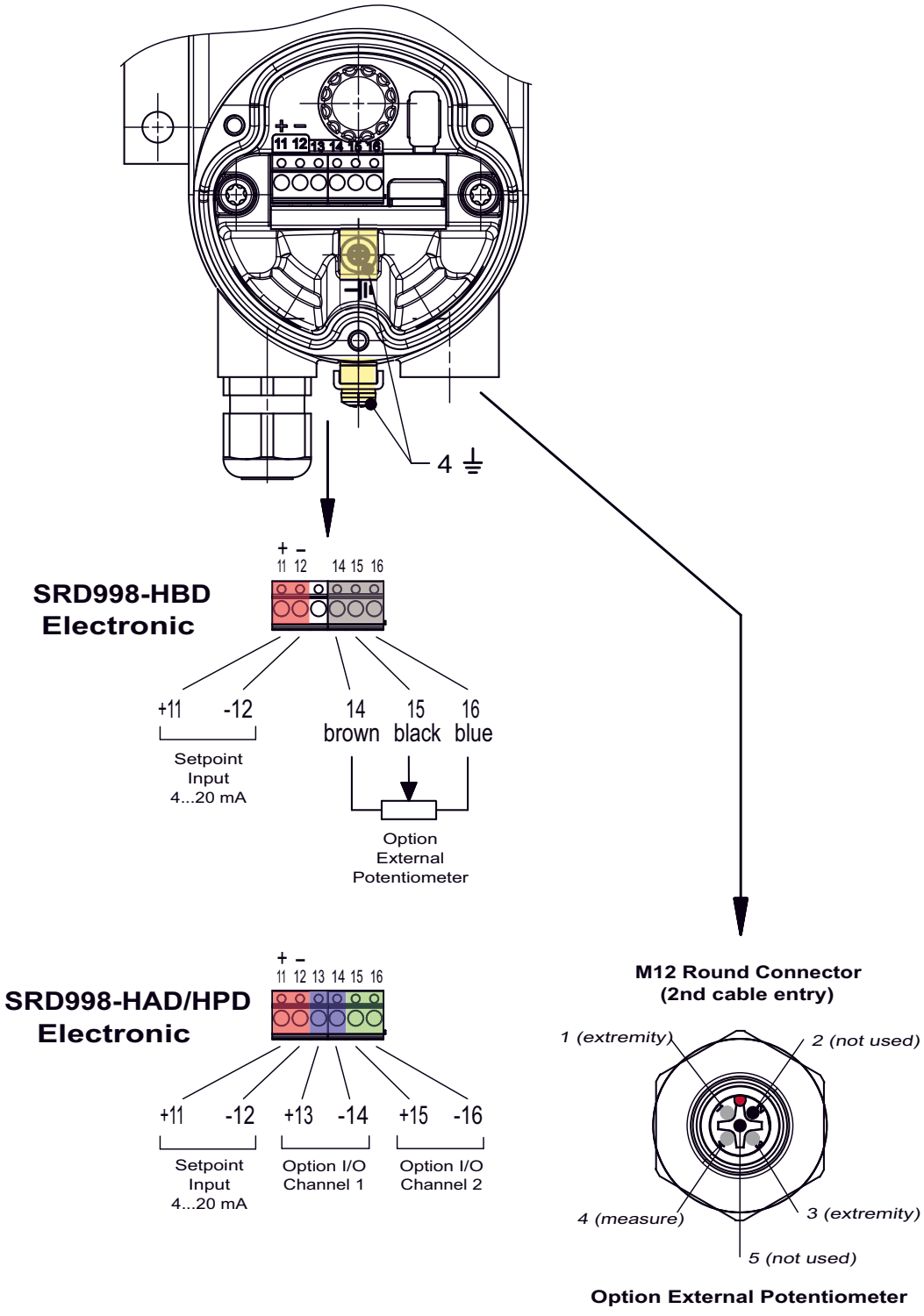


Figure 36. Electrical Connection 2



Terminals used for Setpoint Input 4...20mA: 11(+), 12(-)

Terminals used for Position Feedback (only with Universal In-Out Option): 15(+), 16(-)

See PSS EVE0108 for more detailed technical specifications. For intrinsically safe circuits, refer to data label or safety instructions for maximum operating voltages etc.

8. Start Up

⚠ CAUTION
SAFETY HAZARD To avoid any personal injury or equipment damage from sudden or fast movement, during Configuration and Autostart: ♦ Do not put your finger or other part at any time inside the valve or in any moving part of the actuator. ♦ Do not put your finger or other part at any time in the feedback lever mechanism. ♦ Do not touch the rear part of the positioner at any time. **Failure to follow these instructions can result in death or serious injury.**

General

Check the nameplate, especially with respect to indications referring to Ex/non- Ex, input signal, communication, output signal, single/double acting, etc. Before starting the positioner, mount the SRD positioner to the actuator and connect power and air supply. The supply air connection will have sufficient capacity and pressure of 1.4 to 6 bar (20 to 90 psig), or 1.4 to 10 bar (20 to 145 psi) depending on the pneumatic unit and will not exceed the maximum operating pressure of the actuator.

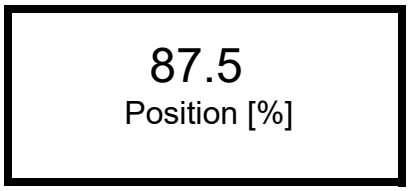
Power On

After power-on of the input signal, the SRD positioner initializes for a few seconds, while the various components of the electronics are checked and started. After power off/on cycle the stored data of the positioner is not affected and remains unchanged.

After that, the SRD positioner goes `IN OPERATION` or you can configure, if no Autostart has already been done.

Operation

After initiating Autostart, the SRD positioner automatically goes `IN OPERATION`. The process variable is indicated on the LCD display.



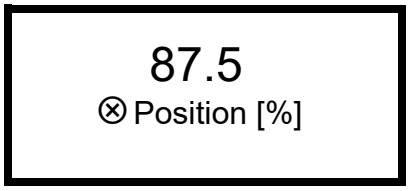
Through turning the Rotary Selector **15**, additional information can be retrieved from the SRD positioner:

Position [%]
Input SP [%]
Work SP [%]
Current [mA]
Angle [°] (a)
Position [mm]/[in] (a)
Temperat [°C]/[°F]
Tags
Version

a. Depends on mounted version

Diagnostics during Operation

If the diagnostics determines an occurrence, it is indicated at the Status field in the bottom line:



() - Status Field

Configuration

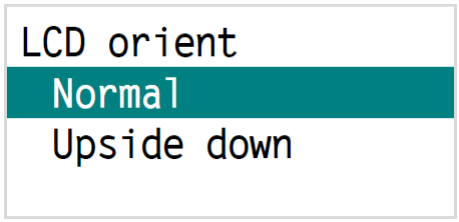
NOTICE
POTENTIAL EQUIPMENT DAMAGE Configuration may interfere with operation of the actual process. During configuration we recommend that there is no flow through the valve. **Failure to follow these instructions can result in equipment damage.**

Configuration of SRD positioner can be carried out via PC, HART communicator and FDT/DTM software, or local with the Rotary Selector and LCD.

To configure the SRD Positioner

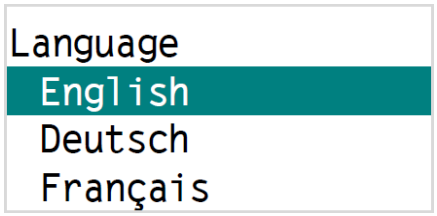
After power ON, the SRD positioner goes to configuration, if no Autostart has already been done. The LCD orientation screen appears.

Figure 37. Sample LCD orient Menu Screen 1



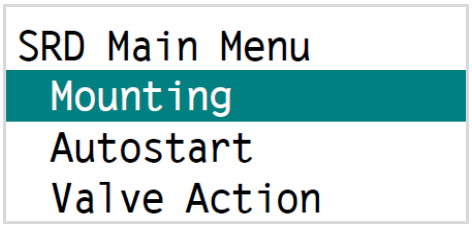
Select with Rotary Selector and confirm by pushing it down to select the LCD text language.

Figure 38. Sample LCD Language Screen



The default language is set to English. When you select the language the positioner automatically switches to the next menu.

Figure 39. Sample LCD Menu Screen

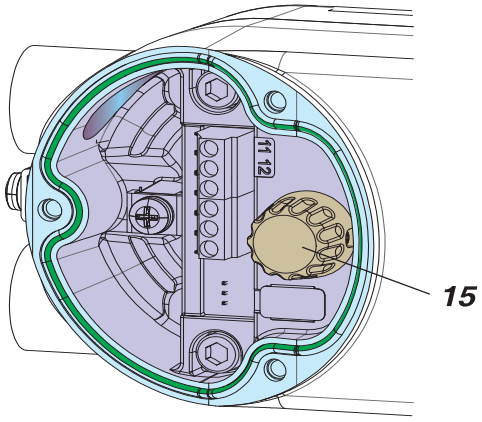


Configuration menus can always be reached by pushing down the Rotary Selector **15** as shown in Figure 40. To leave any menu, select Exit and confirm by pushing down the Rotary Selector 15.

Setting by means of Rotary Selector and LCD

The SRD positioner can be adjusted when the cover is off. To configure the various items, select the relevant menu by turning the Rotary Selector **15** and confirm by pushing it down as shown in Figure 40.

Figure 40. Rotatory Selector



Most menus have sub-menus or parameters. Select the relevant menu by turning the Rotary Selector and confirm by pushing it down. To leave any menu, select `Exit` and confirm. If a menu was selected and no further entries are made thereafter, the SRD positioner switches automatically back to operation after some time.

NOTE

If there is no response using the Rotary Selector and LCD (a message appears) ensure that the Write Protection is not set. Remove the write protection using the FDT/DTM configuration software or HART field communicator.

Menu Structure

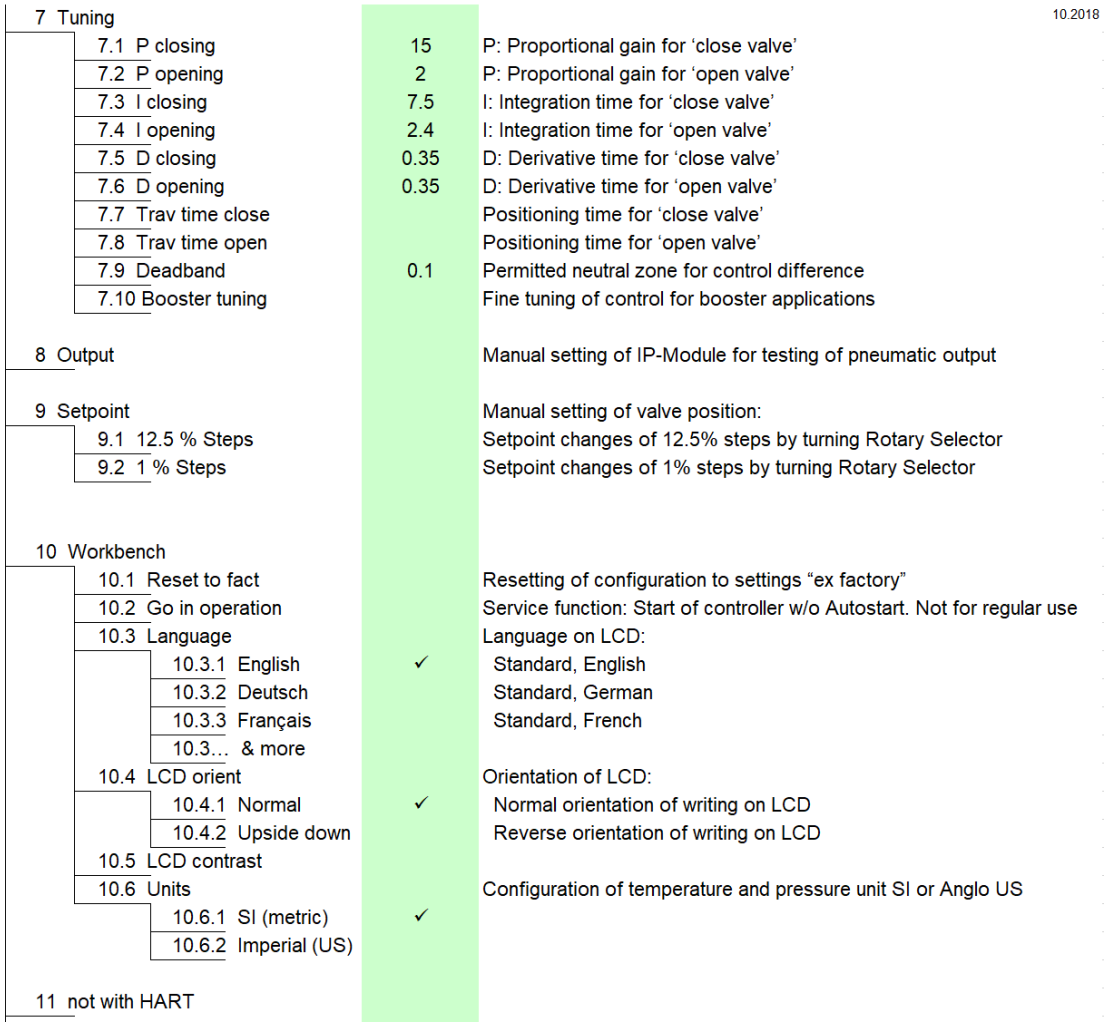
Figure 41. Menu Structure 1

Menu structure for SRD998

SRD Main Menu

Menu	Factory configuration	Description
		08.2018
1 Mounting		
1.1 Stroke left	✓	Stroke actuator, left-hand or direct mounting
1.2 Stroke right		Stroke actuator, right-hand mounting
1.3 Rotary ccw		Rotary actuator, opening counter-clockwise
1.4 Rotary clockw		Rotary actuator, opening clockwise
1.5 Linear Pot.		Mounting with external linear potentiometer
2 Autostart		
2.1 Endpoints		Adaptation of the mechanical stops only
2.2 Standard		Autostart recommended for standard application
2.3 Enhanced		Enhanced Autostart. Optimized control behaviour compared to Standard Autostart
2.4 Smooth response		Smooth Autostart. Damped control behaviour for smaller actuators
2.5 Fast response		Fast Response Autostart. Undamped control behaviour for larger actuators
2.6 PI Only		Controller with P and I term, without D term
3 Action menu		
3.1 Valve action		Action of Positioner:
3.1.1 Direct	✓	Valve opens with increasing setpoint value
3.1.2 Reverse		Valve closes with increasing setpoint value
3.2 Feedback action		Action of Feedback unit:
3.2.1 Direct	✓	Increasing Current with increasing valve position
3.2.2 Reverse		Decreasing Current with increasing valve position
4 Accessories		
4.1 None		No accessories mounted
4.2 Booster		Booster mounted
5 Valve character		
5.1 Linear	✓	Linear characteristic
5.2 Equal % 1:50		Equal percentage characteristic 1:50
5.3 Quick open		Inverse equal percentage characteristic 1:50 (quick opening)
5.4 Custom		Custom characteristic (configuration via DTM)
6 Limits/Alarms		
6.1 Lower limit	0 %	Closing limit is set to input value
6.2 Cutoff low	1 %	0%-tight sealing point is set to input value
6.3 Cutoff high	100 %	100%-tight sealing point is set to input value
6.4 Upper limit	100 %	Opening limit is set to input value
6.5 Split-range 0 %	4 mA	Split range 0 %: input value corresponds to 0 %
6.6 Split-rng 100 %	20 mA	Split range 100 %: input value corresponds to 100 %
6.7 Lower Alarm	-10 %	Lower position alarm on output 1 is set to input value
6.8 Upper Alarm	110 %	Upper position alarm on output 2 is set to input value
6.9 Valve 0 %	4 mA	Configuration of rated-stroke of 0% at 4 mA
6.10 Valve 100%	20 mA	Configuration of rated-stroke of 100% at 20 mA
6.11 Pos Tuning		Tuning of position for mounting adaption
6.12 Stroke	x° / 20mm	Configuration of nominal travel

Figure 42. Menu Structure 2



			10.2018
7	Tuning		
7.1	P closing	15	P: Proportional gain for ‘close valve’
7.2	P opening	2	P: Proportional gain for ‘open valve’
7.3	I closing	7.5	I: Integration time for ‘close valve’
7.4	I opening	2.4	I: Integration time for ‘open valve’
7.5	D closing	0.35	D: Derivative time for ‘close valve’
7.6	D opening	0.35	D: Derivative time for ‘open valve’
7.7	Trav time close		Positioning time for ‘close valve’
7.8	Trav time open		Positioning time for ‘open valve’
7.9	Deadband	0.1	Permitted neutral zone for control difference
7.10	Booster tuning		Fine tuning of control for booster applications
8	Output		Manual setting of IP-Module for testing of pneumatic output
9	Setpoint		Manual setting of valve position:
9.1	12.5 % Steps		Setpoint changes of 12.5% steps by turning Rotary Selector
9.2	1 % Steps		Setpoint changes of 1% steps by turning Rotary Selector
10	Workbench		
10.1	Reset to fact		Resetting of configuration to settings “ex factory”
10.2	Go in operation		Service function: Start of controller w/o Autostart. Not for regular use
10.3	Language		Language on LCD:
10.3.1	English	✓	Standard, English
10.3.2	Deutsch		Standard, German
10.3.3	Français		Standard, French
10.3…	& more		
10.4	LCD orient		Orientation of LCD:
10.4.1	Normal	✓	Normal orientation of writing on LCD
10.4.2	Upside down		Reverse orientation of writing on LCD
10.5	LCD contrast		
10.6	Units		Configuration of temperature and pressure unit SI or Anglo US
10.6.1	SI (metric)	✓	
10.6.2	Imperial (US)		
11	not with HART		

Description of Menus

Because of optimized local operation, for configuration neither PC nor control system is required.

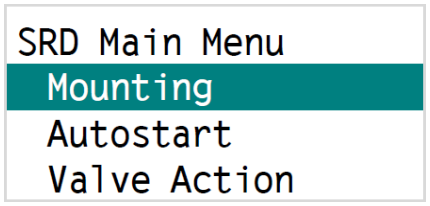
Menu 1: Actuator System, Mounting Side

NOTE

In case operation via Rotary Selector is not possible check if write protection is set. Change via FDT/DTM software.

To start the operation, select with Rotary Selector and confirm by pushing it down.

Figure 43. Sample SRD Main Menu Screen



For an optimal actuator adaptation, the SRD positioner must be configured whether it is a rotary or a linear stroke actuator.

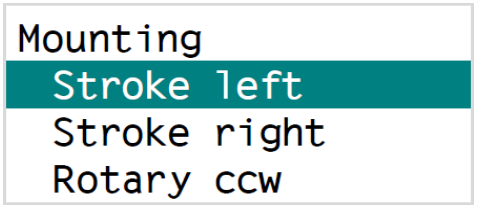
The positioner of the rotary actuator can work directly with the linear position sensor value. In case of a stroke actuator an error tan (α) arises due to the angle of the resulting in 1% non-linearity at travel of 30°. The SRD positioner can correct the travel via the tan function and thus avoid bigger linearity errors detection.

The rotation direction of the adapter shaft for the tap changes depending on the mounting side of the stroke actuator. Valve closed in one case means Valve open in another one.

There are rotary actuator types opening in the counter clockwise direction and others opening in the clockwise direction. This also must be signaled to the SRD positioner so that 0% “Valve closed” and 100% “Valve open” are correctly assigned.

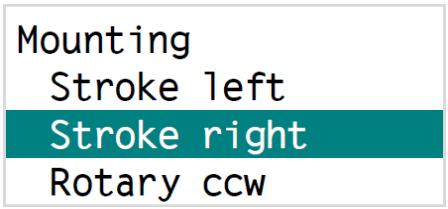
For stroke actuators mounted left of the spindle respectively are directly mounted. Select `Stroke left` with Rotary Selector and confirm by pushing it down as shown in Figure 44.

Figure 44. Sample Mounting Screen - Stroke left



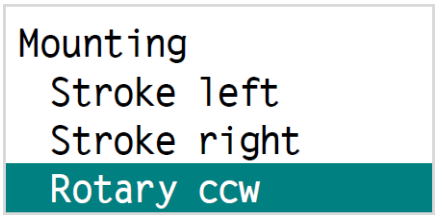
For stroke actuators mounted right of the spindle select `Stroke right` as shown in Figure 45.

Figure 45. Sample Mounting Screen - Stroke right



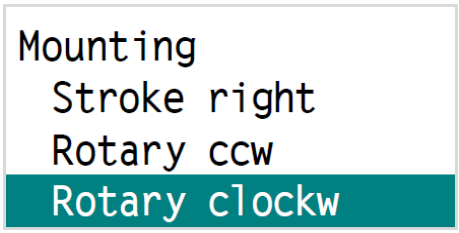
You must select the `Rotary ccw` to open the valve during counter clockwise (left) rotation.

Figure 46. Sample Mounting Screen - Rotary ccw



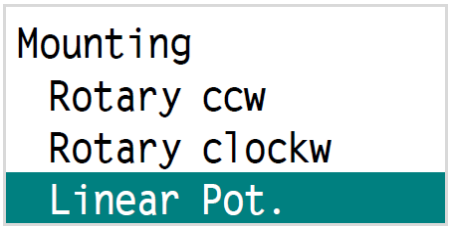
You must select `Rotary clockw` to open the valve during clockwise (right) rotation.

Figure 47. Sample Mounting Screen - Rotary clockw



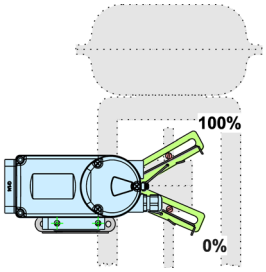
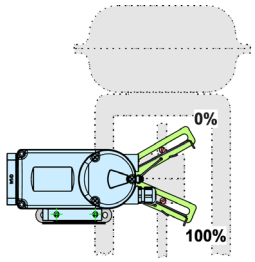
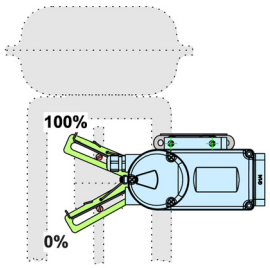
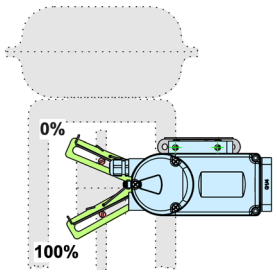
For positioners with an external linear potentiometer instead of the rotary potentiometer you must select the `Linear Pot.`as shown in Figure 48.

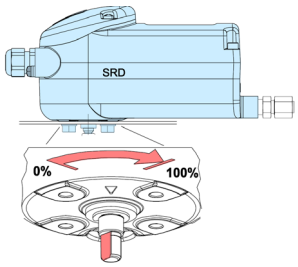
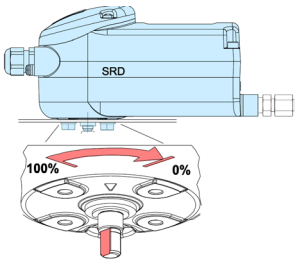
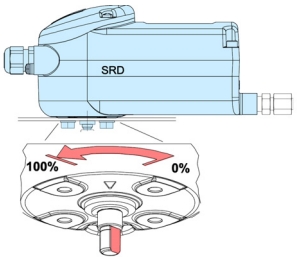
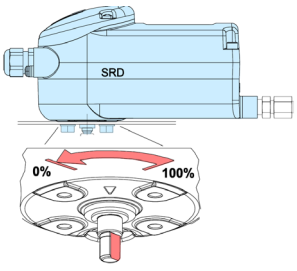
Figure 48. Sample Mounting Screen - Linear Pot.



Configuration of 0 and 100%

Valid for single and double acting:

		Configuration requested					
		MENU 1: Mounting				MENU 3.1: Valve Action	
		1.1	1.2	1.3	1.4	3.1.1	3.1.2
Configuration of 0% and 100%	Input Signal Range	Stroke Left	Stroke Right	Rotary cclockw.	Rotary clockwise	Direct	Reverse
	4 mA = 0% 20 mA = 100%	Yes				Yes	
	4 mA = 100% 20 mA = 0%	Yes					Yes
	4 mA = 0% 20 mA = 100%		Yes			Yes	
	4 mA = 100% 20 mA = 0%		Yes				Yes
	4 mA = 0% 20 mA = 100%		Yes			Yes	
	4 mA = 100% 20 mA = 0%		Yes				Yes
	4 mA = 0% 20 mA = 100%	Yes				Yes	
	4 mA = 100% 20 mA = 0%	Yes					Yes

		Configuration requested					
		MENU 1: Mounting				MENU 3.1: Valve Action	
		1.1	1.2	1.3	1.4	3.1.1	3.1.2
Configuration of 0% and 100%	Input Signal Range	Stroke Left	Stroke Right	Rotary cclockw.	Rotary clockwise	Direct	Reverse
	4 mA = 0% 20 mA = 100%			Yes		Yes	
	4 mA = 100% 20 mA = 0%			Yes			Yes
	4 mA = 0% 20 mA = 100%				Yes	Yes	
	4 mA = 100% 20 mA = 0%				Yes		Yes
	4 mA = 0% 20 mA = 100%				Yes	Yes	
	4 mA = 100% 20 mA = 0%				Yes		Yes
	4 mA = 0% 20 mA = 100%			Yes		Yes	
	4 mA = 100% 20 mA = 0%			Yes			Yes

Menu 2: Autostart

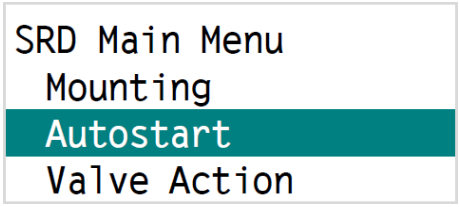
Selection between different Autostart modes change by turning Rotary Selector and confirm by pushing it down.

Autostart

Use `Autostart` to automatically adapt the positioner to the valve as shown Figure 49. Geometric data of the actuator is determined and optimally assigned to control parameters. If the `Standard Autostart` does not result in stable control, another autostart mode depending upon actuator must be selected. For initial start-up, an autostart operation must always be performed.

NOTICE
RISK OF DATA LOSS AND REDUCED PERFORMANCE ♦ Autostart overwrites previous control parameters. ♦ When using a Volume Booster in combination with the smart positioners and to reach optimal control behavior, the Volume Booster must be declared to the positioner via the “Menu 4: Accessories”, before launching the Autostart. **Failure to follow these instructions can result in reduced performance.**

Figure 49. Sample SRD Main Menu Screen - Autostart



Types of Autostart

End points	Serves for reduced automatic adjustment of the SRD positioner to only the mechanical end points as shown in Figure 50.
Standard	Serves for automatic adjustment of the SRD positioner to the mechanical end points and to the optimization of the controller parameters as shown in Figure 50.
Enhanced	To the optimization of the controller parameters in relation to standard mode as shown in Figure 50.
Smooth response	Enhanced, damped controller parameters for smaller actuators as shown in Figure 51.
Fast response	Enhanced, undamped controller parameters for larger actuators as shown in Figure 51.
PI only	Controller with P and I term, without D term

Figure 50. Sample Autostart Menu Screen - Standard

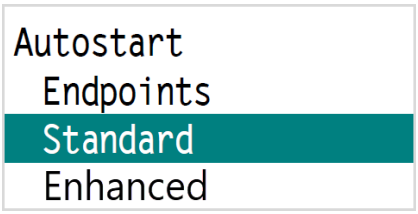
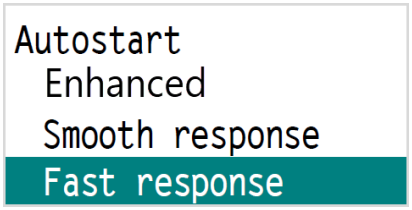


Figure 51. Sample Autostart Menu Screen - Fast response



Select the type of Autostart and follow the steps as shown in Figure 52 to 55. Duration on a valve position can take some time depending on actuator volume, air supply, pressure, etc.

Moving direction, mechanical starting and ending positions are determined by one or several passages of valve position range as shown in Figure 52.

Ramps are entered and control system parameter is determined (ratio position/valve size). Steps are entered for determination of control parameters as shown in Figure 54.

Determination of positioning speeds as shown in Figure 55.

After execution of Autostart Extended, Smooth response or Fast response, the SRD positioner automatically moves to Position tuning. For more information see “Types of Autostart”.

Figure 52. Sample Autostart Screen - Get end points

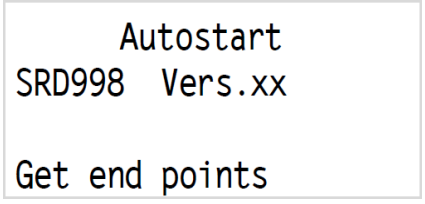


Figure 53. Sample Autostart Screen - Get motor gain

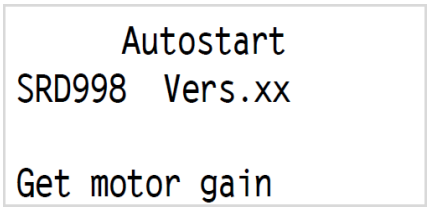


Figure 54. Sample Autostart Screen - Control parameters

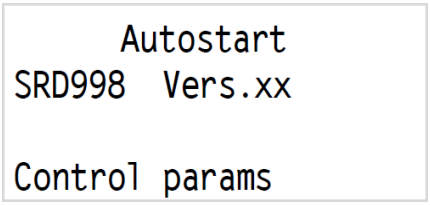
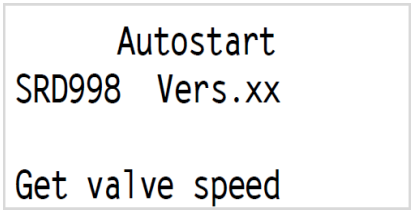


Figure 55. Sample Autostart Screen - Get valve speed

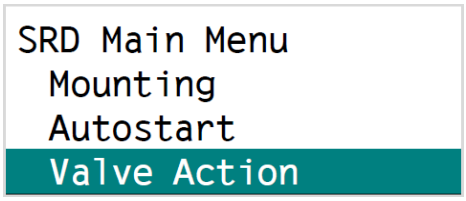


Determined values are saved and previous values are superscribed. The SRD positioner is IN OPERATION state again with the detected new parameters. It will set the mode of action of the positioner. At the end of autostart Enhanced/Fast/smooth/PI only positioner jumps automatically at function Menu 6.11 Position tuning at Stroke actuators.

Menu 3: Mode of Action of SRD Positioner

`Valve Action` sets the mode of action of the positioner as shown in Figure 56.

Figure 56. Sample SRD Main Menu Screen - Valve Action

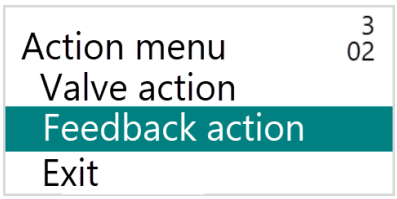


Select `Direct` if increasing input signal is to initiate increasing output signal and `Reverse` if increasing input signal is to initiate decreasing output signal as shown in Figure 57.

Figure 57. Sample SRD Valve Action Screen

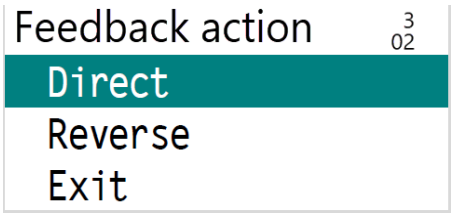
`Feedback Action` sets the mode of the position feedback of the positioner as shown in Figure 58.

Figure 58. Sample SRD Main Menu Screen - Feedback Action



Select `Direct` if increasing valve position is to initiate increase the position feedback output signal and `Reverse` if increasing valve position is to initiate decreasing position feedback output signal as shown in Figure 59.

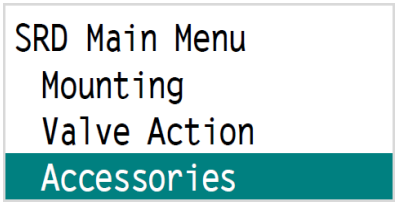
Figure 59. Sample SRD Feedback Action Menu Screen



Menu 4: Accessories

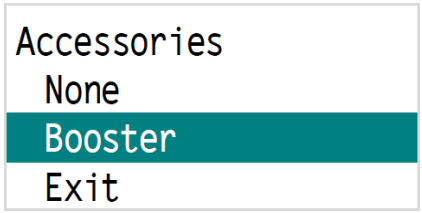
Accessories of the SRD Main Menu can also be configured. The options include None, Booster and Exit as shown in Figure 60.

Figure 60. Sample SRD Main Menu Screen - Accessories



If a volume booster is present, select this point and confirm as shown in Figure 61. After that, launch the Autostart. The control algorithm of SRD positioner will be adjusted automatically.

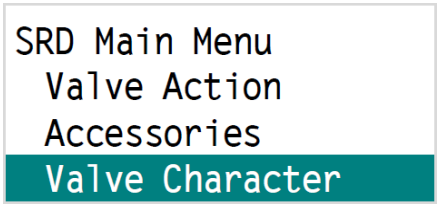
Figure 61. Sample Accessories Menu Screen



Menu 5: Characteristic of Setpoint

A relationship between the input signal and valve position is set using the Valve Character SRD menu option. See Figure 62 for the Valve Character menu option.

Figure 62. Sample SRD Main Menu Screen - Valve Character



Types of Valve Characters

- **Linear**: See Figure 63 and Figure 64.
- **Equal% 1:50**: Results in an equal percentage characteristic line with a position ratio of 1:50 for a valve of linear characteristic. See Figure 65.
- **Quick open (Inverse equal percentage)**: Results in an inversely equal percentage characteristic line with a position ratio of 50:1 for a valve of linear characteristic.
- **Custom (User defined characteristic)**: A characteristic line entered via communication with 2 or 22 supporting points is activated. Ex-factory a linear characteristic is set.
- **Exit**: Exit from the menu.

Figure 63. Sample Valve Character Menu Screen - Linear

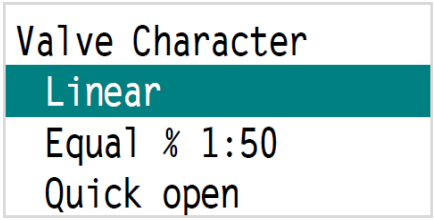


Figure 64. Valve Character Linear Graph

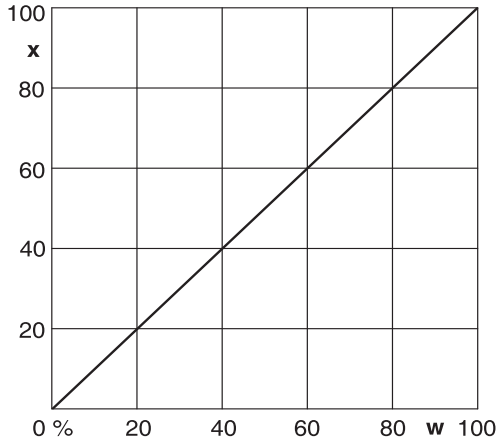


Figure 65. Valve Character Equal % 1:50 Graph

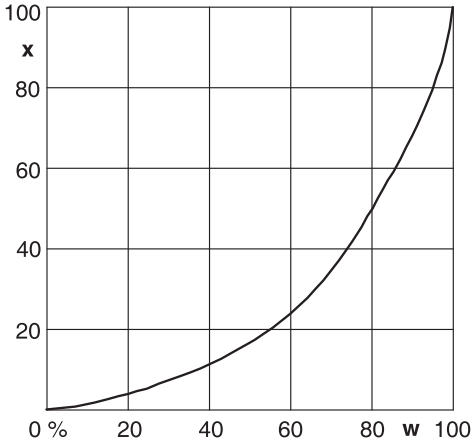


Figure 66. Sample Valve Character Menu Screen - Quick open

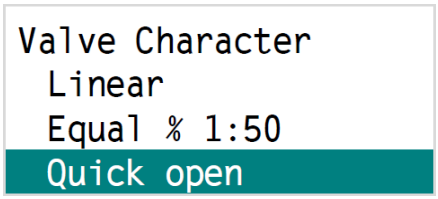


Figure 67. Valve Character Quick Open Graph

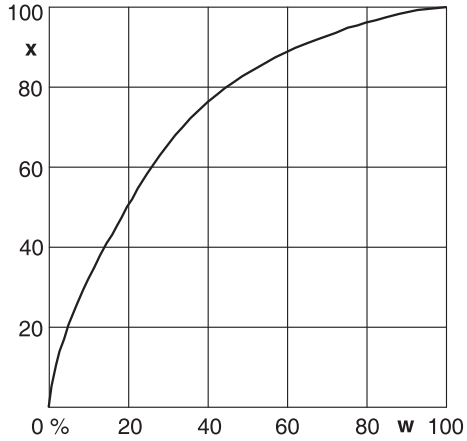


Figure 68. Sample Valve Character Menu Screen - Custom

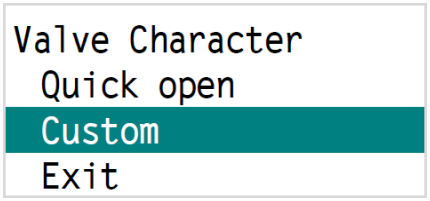
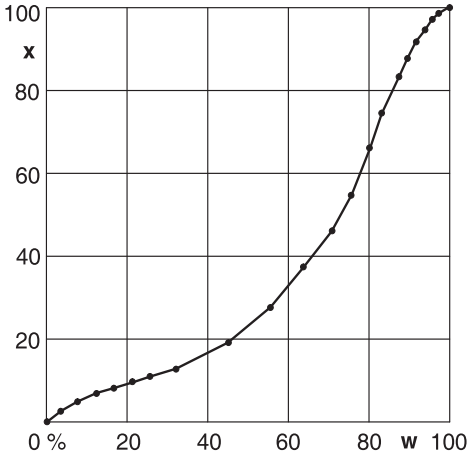


Figure 69. Valve Character Custom Graph



Menu 6: Limit and Alarms of Valve

The values can be adjusted stepwise locally with Rotary Selector or can also be configured via PC with DTM software.

Definitions

- Stroke, stroke range of the membrane actuator is defined for rotary actuator as angle, angle range.
- 0% position is the mechanical impact at closed valve (be careful, if using handwheel and mechanically adjustable stroke limitation.)
- 100% position is the mechanical impact at open valve.
- Closing limit is a lower limit set via software. In normal operation the valve will not close more than set here.

NOTE

In the event of failure of the auxiliary energy no controlling is possible, therefore the springs in the actuator will move the valve into safety position (for single acting actuator).

- Opening limit is an upper limit set via software. In normal operation the valve will not close more than set here.

NOTE

In the event of failure of the auxiliary energy no controlling is possible, therefore the springs in the actuator will move the valve into safety position (for single acting actuator).

- Normal operation (= IN OPERATION) means that the position is controlled to the 4-20 mA input signal.

M 6.1Setting Lower limit (closing limit; cL)

The positioner provides that IN OPERATION the valve position does not close any further than defined by the closing limit.

If the set point value is lower than this limit, message 12, see Chapter 11, “Troubleshooting”, is produced. Select Limits/Alarms menu by pushing down Rotary Selector, then turn to adjust value, and confirm as shown in Figure 70 and Figure 71 where the lower limit is set to 2%.

Figure 70. Sample Limits/Alarms Menu Screen - Lower limit

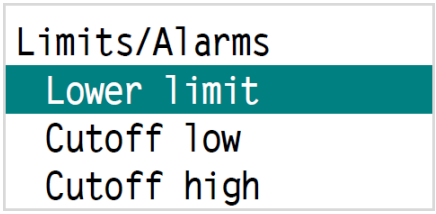
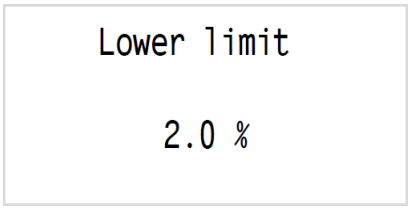


Figure 71. Sample Limits/Alarms Screen - Lower limit example



M 6.2 Setting Cutoff low (0% Seal-tight Point; CO-L)

If a 0% seal-tight point is given, in case the set point is deviated lower (for example, 3%), the SRD provides the pneumatic output to press the valve into its seat with full force in order to tightly seal valve. As soon as the command value is 0.5% higher than this seal-tight value, the position again follows the command value as shown in Figure 72 and Figure 73 where the Cutoff low value is set to 3%.

NOTE

The Seal-tight hysteresis factory set at 0.5%. The value may be changed via communication.

Figure 72. Sample Limits/Alarms Menu Screen - Cutoff low

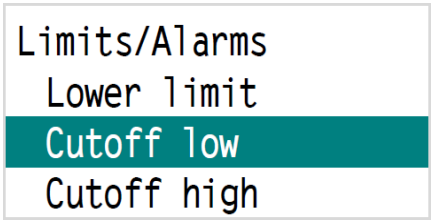
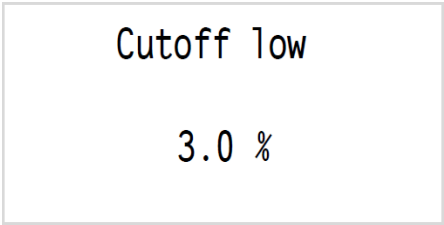


Figure 73. Sample Limits/Alarms Screen - Cutoff low Example



M 6.3 Setting Cutoff high (100% Seal-tight Point; CO-H)

If a 100% seal-tight point is pre-set and in case a certain set value is exceeded, the SRD ensures that the pneumatic output presses the valve 100% into its seat with force. As soon as the command value is 0.5% lower than this seal-tight value, the position again follows the command value. This function makes sense for 3-way valves. Also both seal-tight points can be used in order to tightly close the respective shut-off path during partial operation as shown in Figure 74 and Figure 75 where the Cuttoff high value is set to 97%.

Figure 74. Sample Limits/Alarms Menu Screen - Cutoff high

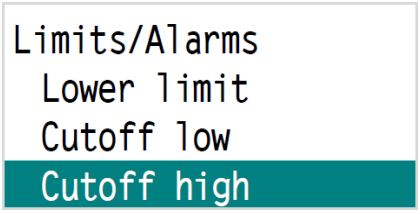
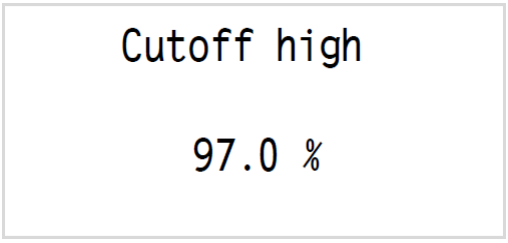


Figure 75. Sample Limits/Alarms Screen - Cutoff high Example



M 6.4 Setting Upper limit (Opening Limit; oL)

The SRD provides that IN OPERATION the valve position does not open any further than defined by the opening limit. If the set value is exceeded, a message appears. The Figure 76 shows the Limits/Alarms Menu.

Figure 76. Sample Limits/Alarms Menu Screen - Upper limit

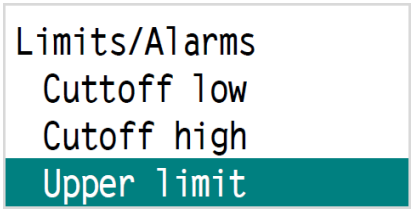


Figure 77. Sealing Tightly, Linear Characteristic

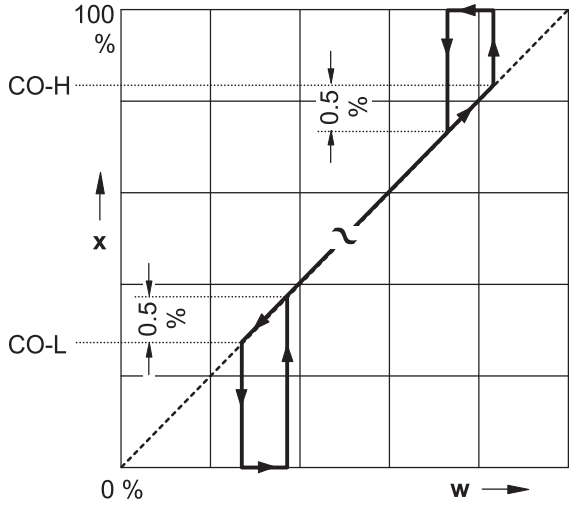


Figure 78. Sealing Tightly, Inversely Equal Percentage

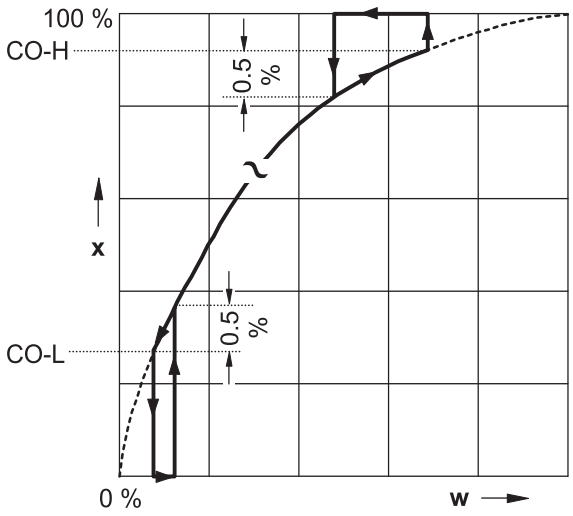


Figure 79. Opening and Closing Limits, Linear Characteristic

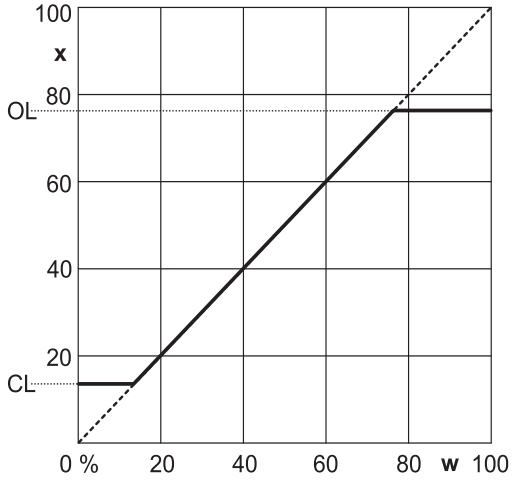
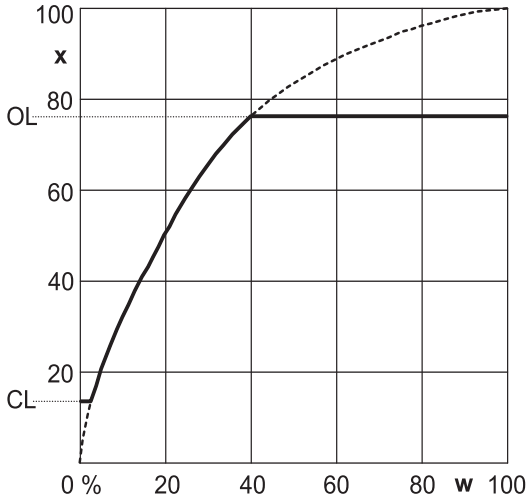


Figure 80. Opening and Closing Limits, Inversely Equal Percentage Characteristic

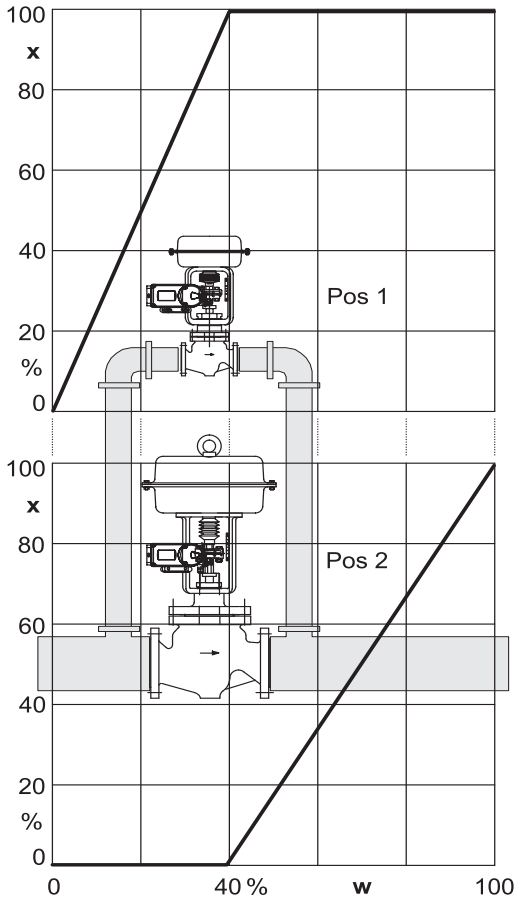


Split Range, PV_SCALE Splitting

Split Range is useful if an additional control range is demanded which cannot be covered by one valve only. A valve of smaller nominal size can be applied overtaking the smallest quantities; a parallel mounted valve of bigger nominal size takes on the larger quantities.

With conventional positioners, this function is realized through serial connection of the instruments and allocation of individual regulating ranges as shown in Figure 81. With SRD with analog setpoint value (version HART), this can be adjusted with menus 6.5 and 6.6. Other versions of the SRD receive the set value via digital means; the input data signal cannot be split. The function can be realized either in the primary control system, in which setpoint values are calculated for each valve, or via the variables PV_SCALE. With PV_Scale the digital input set point value can be assigned to the valve span.

Figure 81. Split Range



Example:

At low current, only the smaller valve positions from approximately 40% the large valve is added. Refer to Figure 81 to understand Split Range.

Pos. 1: Split Range 0 % is 4 mA; Split Range 100 % is 10.4 mA

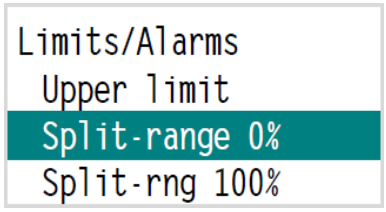
Pos. 2: Split Range 0% is 10.4 mA; Split Range 100% is 20 mA

SRD with HART Communication

M 6.5 Split Range 0%

Select menu by pushing down Rotary Selector, then turn to adjust value, and confirm.

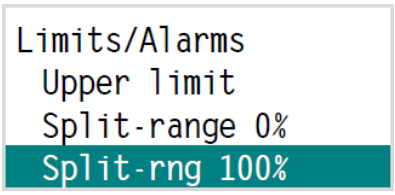
Figure 82. Sample Limits/Alarms Menu Screen - Split-range 0%



M 6.6 Split Range 100%

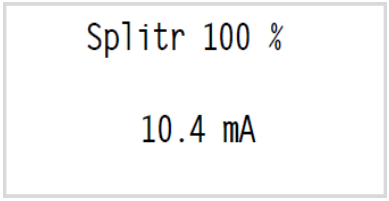
Select menu by pushing down Rotary Selector, then turn to adjust value, and confirm.

Figure 83. Sample Limits/Alarms Menu Screen - Split-range 100%



Example: An input current of 10.4 mA must correspond to a valve position of 100% as shown Figure 84.

Figure 84. Sample Limits/Alarms Menu Screen - Split-range Example

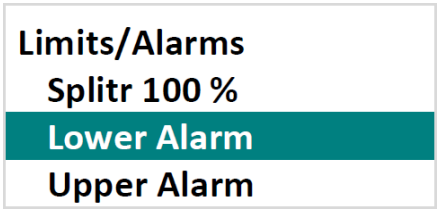


Alarms

M 6.7 Setting Lower Alarm

When falling below the set value underneath the entered alarm limit, an alarm is activated, and a message appears. To switch off the alarm setting, enter the value –10%.

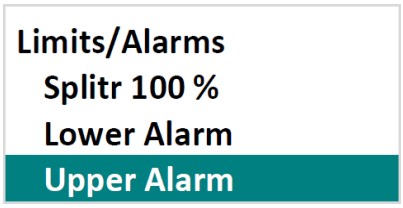
Figure 85. Sample Limits/Alarms Menu Screen - Lower Alarm



M 6.8 Setting Upper Alarm

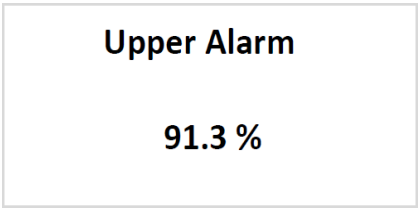
When surpassing the set value above the entered alarm limit, an alarm is activated, and a message appears. To switch off the alarm setting, enter the value +110%. Select menu by pushing down Rotary Selector, then turn to adjust value, and confirm.

Figure 86. Sample Limits/Alarms Menu Screen - Upper Alarm



Example: Upper Alarm set to 91.3%. See Figure 87.

Figure 87. Sample Limits/Alarms Menu Screen - Upper Alarm Example



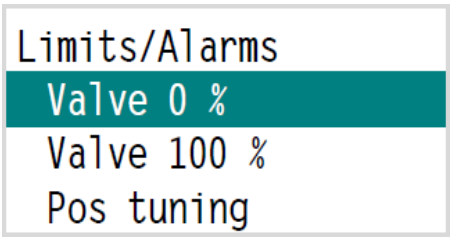
Setting of Valve Limits

At Autostart the SRD determines the real limits of the actuator (which are mostly a little larger then specified on the specification sheet). An actuator with 30 mm stroke could display a real stroke of 33 mm. In order to produce a precise relationship between the input signal and the stroke, the tolerances of the actuator can be compensated with menus Setting Valve 0% and Setting Valve 100%. At unchanged 0%, the actuator could be moved until exactly 30 mm are reached. Through execution of function 6.10, the current position can be declared as 100%, and at a set point value of 50% the actuator will run on exactly 15 mm. For new configuration of the strokes at 0% or 100%, the valve must be run in the corresponding position and then must be confirmed.

M 6.9 Setting Valve 0%

The actual position of the actuator is declared as 0% as shown in Figure 88.

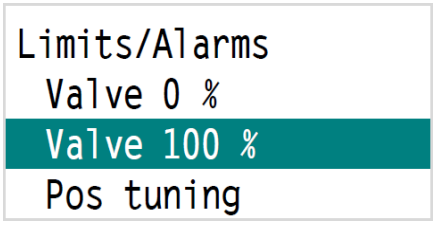
Figure 88. Sample Limits/Alarms Menu Screen - Valve 0%



M 6.10 Setting Valve 100%

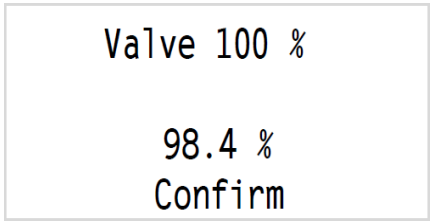
The actual position of the actuator is declared as 100%. Select menu by pushing down Rotary Selector, then confirm.

Figure 89. Sample Limits/Alarms Menu Screen - Valve 100%



Example: The actual valve position 98.4% is to be counted as 100%.

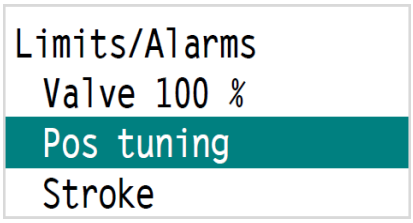
Figure 90. Sample Limits/Alarms Menu Screen Example



M 6.11 Position Tuning

Because of inaccuracies at mounting, it may be possible that at input value 50% (= 12 mA) the stroke valve is not exactly at half of stroke, regarding scale at valve. To correct this, apply 12 mA and select this function. Move valve position to half of stroke by turning Rotary Selector and confirm. End points of stroke and tan (α) values are automatically adapted and makes positioning even more precisely.

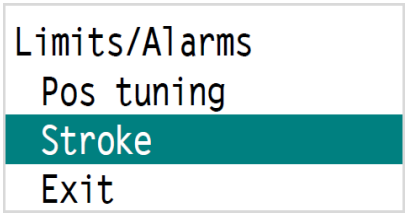
Figure 91. Sample Limits/Alarms Menu Screen - Pos tuning



M 6.12 Setting Stroke with Stroke Actuators

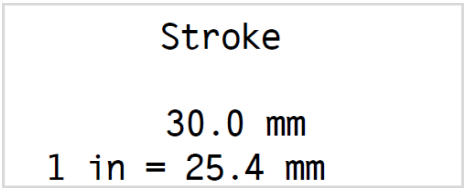
The SRD measures with its feedback lever always an angle and by means of its tangent function, a linear stroke of 0 to 100% is calculated therefrom. In order to indicate a real stroke in mm, the full stroke at 100% can be entered in this menu. The LCD display will then indicate the actual position in mm (or inch). Select menu by pushing down Rotary Selector, then turn to adjust value, and confirm.

Figure 92. Sample Limits/Alarms Menu Screen - Stroke



Example: Stroke range of valve is to be 30 mm as shown in Figure 93.

Figure 93. Sample Limits/Alarms Menu Screen - Stroke Example



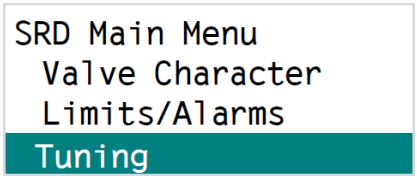
Menu 7: Parameter for Tuning the Position Controller

Along with the determination of the actuator geometry and control parameters the suitable setting parameters for the position controller are determined via function AUTOSTART in Menu 2. Assessment of a control behavior generally is very subjective. Partially a quick response is requested without consideration of the overshoot width, partially a very smooth swinging is

requested with minor overshoot. We recommend performing the execution of the automatic setting via AUTOSTART in Menu 2 in order to achieve a stable control behavior. Corrections may then be made from the determined values. In rare cases AUTOSTART cannot find the optimal setting for the respective application. For small actuators an improvement of the control behavior can be achieved also by increasing damping at the pneumatic output. A further optimization may follow by repeating AUTOSTART.

Several control parameters are combined in Menu 7 each having a submenu. Controller type is a PID controller.

Figure 94. Sample LCD Menu Screen -Tuning



Selection of Tuning Parameters

Select sub-menu by turning Rotary Selector and confirm. Listed are the tuning parameters:

Tuning	Parameter-Description	Valve is opening	Valve is closing	Value	Unit
P closing P opening	Proportionate amplification KP	P↑	P↓	0 to100	-
I closing I opening	Integration time constant	Tn↑	Tn↓	0 to100	sec
D closing D opening	Derivative time constant	Tv↑	Tv↓	0 to100	sec
Trav time close Trav time open	Positioning time	T63↑	T63↓	0 to100	sec
Deadband	Dead band for control diff.	GAP	GAP	0 to10	% of span
Booster tuning	Fine tuning			0 to 2 (a)	-

a. Booster tuning is for booster applications. If unsatisfactory behavior occurs with small set point jumps, the value can be increased successively from 0 to 1 or 2.

The dead band helps prevent (at the expense of accuracy) that the valve in the controlled condition constantly moves around the set point. This reduces harm to the mechanical parts of the actuator and the valve packing.

Method for Fine Tuning of the Positioner

Depending on issue, select one or more of the following submenus where the recommended action is increase ↑, or decrease ↓ current value and 1st to priority 1 and 2nd for priority 2.

Figure 95. Method for Fine Tuning of the Positioner

Issue / Parameters	Slow response		Hunting (oscillations)		Overshoot (> 3%)		Overshoot (< 3%)		Too much time to stabilize	
	to open	to close	to open	to close	to open	to close	to open	to close	to open	to close
7.1 Gain closing (**Proportional**)		↑		↓		↓		2nd ↓		
7.2 Gain opening (**Proportional**)	↑		↓		↓		2nd ↓			
7.3 Res time closing (**Integral**)				↓		↓		2nd ↓		1st ↓
7.4 Res time opening (**Integral**)			↓		↓		2nd ↓		1st ↓	
7.5 Rate time closing (**Derivative**)								1st ↑ (a)		
7.6 Rate time opening (**Derivative**)							1st ↑ (a)			
7.9 Control Gap (**Deadband**)									2nd ↑	2nd ↑

In case of using a booster, or using upper table was not successful

4.1 or 4.2 Accessories Booster	Select Booster	Select None or Booster	Select None	Select None or Booster	Select None
7.10 Booster Tuning	↑	↓		↓	
Bypass screw at booster	Close bypass screw a little bit more		Open bypass screw a little bit more		Open bypass screw a little bit more

a. value up to 0.4 seconds

Remarks to Controller Tuning

If AUTOSTART does not find the optimum setting the following may be the result:

- Behavior A: slow response to set point, long positioning time or long neutral time
- Behavior B: continuous oscillation following set point jump
- Behavior C: wide and high overshoot

For the assessment of the control 12.5% jumps in both directions may be performed in Menu 9. The valve dynamics may be observed at LCD or the mechanics. Prior to changing parameters for valve dynamics, a number of items are to be checked. The pneumatic output can be operated directly without controller via Menu 8 and the valve movement may be assessed.

For Behavior A check:

- Is the Proportionate gain P↑ (Menu 7.1) or P↓ (Menu 7.2) too small? For more information on tuning, see “Method for Fine Tuning of the Positioner”.

  Remedy: Increase parameters.
- Is the air pressure high enough to possibly overcome the actuator spring force and friction?

Remedy through increasing air pressure.

- Is the actuator volume high, possibly requiring an increased air capacity for fast valve movement?

  Remedy: through booster, see accessories, or spool valve option.

- Was AUTOSTART performed in Menu 2 and did messages 8 respectively 9 occur?

  Remedy: “AUTOSTART” in Menu 2 resp. observe information in Chapter 11, “Troubleshooting”.

- Has the parameter for the positioning time been set at a value too high?

  Remedy: decrease both parameters Setting Time in Menu 7.5 or 7.6.

- Is valve packing too tight resulting in a very high friction?

- Is the supply air filter clogged?

  Remedy: see Chapter 10, “Maintenance”.

- Has the supply air been contaminated by small oil drops, particulate or are pneumatic parts possibly blocked?

  Remedy: exchange pneumatic parts; possibly use a suitable air supply station.

For Behaviors B and C check:

- Is the air capacity possibly too high, for example, through spool valve or booster?

  Remedy: Work, if necessary, without booster or use version without spool valve.

- Has the air supply pressure been set too high?

  Remedy: Reduce pressure or install pressure reducer.

Changing valve dynamics during Behavior A:

If valve has a high friction (for example, often the case in small rotary actuators due to low air supply pressure or due to a valve seat packing which is too tight) then the valve position gets stuck after a set point jump and possibly is re-controlled via the resetting time Tn, possibly after quite some time has elapsed.

Basically, the following is possible:

- Alternative 1: to accept a remaining deviation
- Alternative 2: to accept some response procedures (such as remaining in over-response for a short time, and remaining below set point and trailing).

When deciding Alternative 1, “Tn” must become ineffective, set value to “-off-”. Compensating “P(kp)” must be increased until the set point jumps reach the set point within a short period of time and without significant overresponse (adapt to both movement directions).

When deciding Alternative 2 start as in Alternative 1. Thereafter “Tn” is re-switched and decreased until the set point deviation has been re-controlled within a short period of time and without long after-response (adapt in both movement directions). We recommend maintaining the Tn’s for both directions about the same. If a post oscillation occurs after a set point jump, “Tn” is selected too small, possibly “P(kp)” was selected too large.

The positioning time Travel Time, also called valve damping, does not have an effect during AUTOSTART in Menu 2, however, set point jumps in Menu 9 reach the position controller in a

damped condition which then is not easily stimulated to oscillation. This behavior is also true for the set point input.

This enables setting the controller to higher “P(kp)” values without producing oscillations in the process. On one side this helps the position control to level disturbances due to friction, changes in load or air supply pressure changes faster. On the other hand, it helps the superimposed valve control circuit that neutral times in the valve control route don’t have such a big effect (stability in valve control circuit).

Changing valve dynamics during behavior B: Increase “Tn” for both movement directions, possibly turnoff and proceed as described in Behavior A Alternative 2.

Menu 8: Pneumatic Output (for Troubleshooting only)

Figure 96. Sample SRD Main Menu Screen - Output

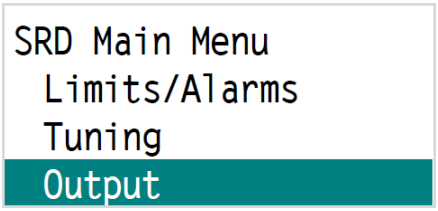


Figure 97. Sample SRD Main Menu Screen - Output 1

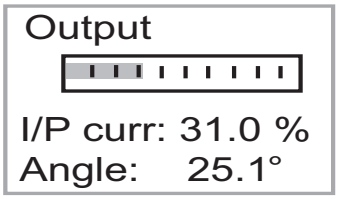
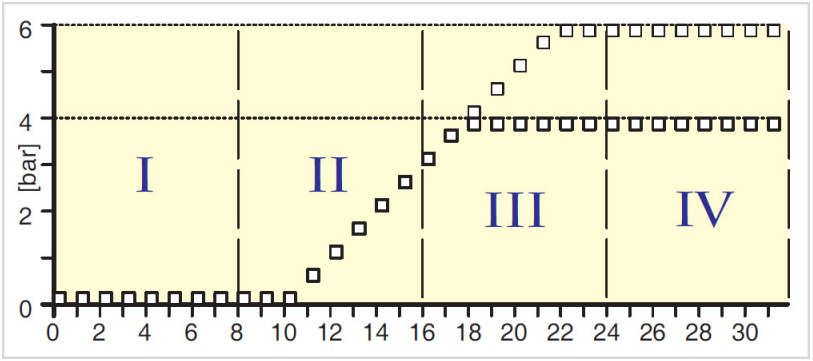


Figure 98. Pneumatic Output Graph



Serves to check the pneumatic parts of the positioner and the right valve piping by directly applying current to the IP module by turning the Rotary Selector (no control; software limit values such as “stroke limits” or “tight closing” are not considered).

The current value of the IP module is increased by 3% in 32 steps. By measuring the output pressure generally, the following characteristic line of the IP module is achieved. The ramp is more steep or flat depending on the air supply pressure.

The pneumatic works precisely, if the actuator begins movement in section II and runs latest in section IV into the end position. If no reaction is own, check:

- Does air supply exist?
- Is plug connected to IP module?

If these items are okay, possibly is there an issue at the electronics or pneumatics. For more information see Chapter 11, “Troubleshooting”. After leaving this menu (by pushing down Rotary Selector) the positioner continues to control with present set point at input.

Menu 9: Manual Setting of the Valve Position

For the purpose of checking the control reaction of the actuator to a set point jump can be observed. As far as the device is IN OPERATION jumps of 12.5% (or 1%) each are initiated by turning Rotary Selector.

Figure 99. Sample SRD Main Menu Screen - Setpoint

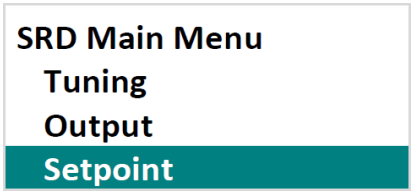


Figure 100. Sample SRD Main Menu Screen - Setpoint 1

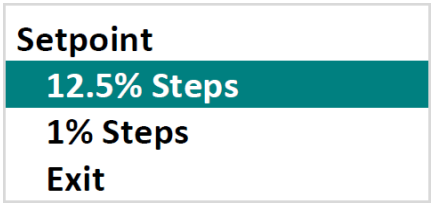
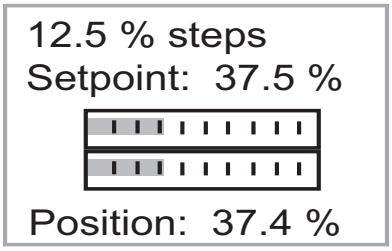


Figure 101. Sample SRD Main Menu Screen - Setpoint 2



The starting value for Menu 9 is always the current set point value.

If the control behavior is to be improved, this can be reached by performing a complete Autostart (see Menu 2) or through manual tuning (see Menu 7).

After leaving this menu the positioner continues to control with present set point at input.

Menu 10: Workbench (Miscellaneous functions)

M 10.1 Reset Configuration to Ex Factory Settings

Resets all entries made in all menus to the standard values present at delivery. This may become necessary if it is unclear what had been changed per menu or in the event that a positioner was taken from one actuator and mounted to another actuator.

After these functions the device is turned to condition OUT OF SERVICE. Therefore, an Autostart must be carried out after configuration of menus 1 to 6. Tuning with menus 7, if necessary.

Figure 102. Sample SRD Main Menu Screen - Workbench

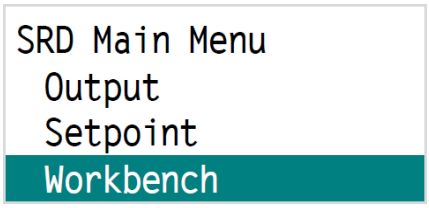
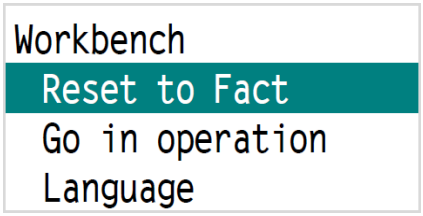


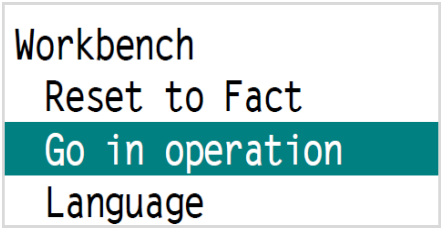
Figure 103. Workbench Menu Screen - Reset to Fact



M 10.2 Go IN OPERATION without Autostart

In principle, the first startup runs an Autostart in which the SRD is optimally adapted to the actuator, then the SRD goes `IN OPERATION` and begins to control. This service function sets the SRD directly IN OPERATION, without an Autostart. Use only for test purposes. Not recommended for regular use.

Figure 104. Workbench Menu Screen - Go in Operation



M 10.3 Selection of Menu Language

One of the programmed languages can be selected. Ex-factory the active language is always English. Changing to one of the other languages can also be done during operation. Select menu by pushing down Rotary Selector, then turn to select language, and confirm by pushing it down.

Figure 105. Workbench Menu Screen - Language

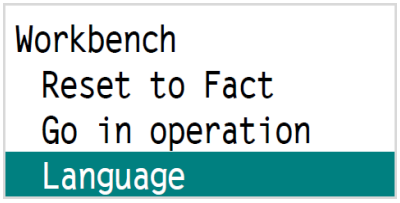
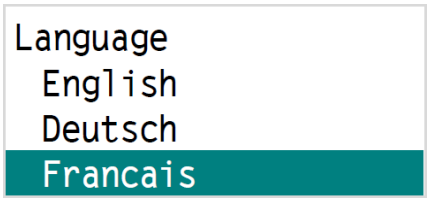


Figure 106. Workbench Menu Screen - Language Example



M 10.4 LCD Orientation

Display normal or turned by 180°.

Figure 107. Workbench Menu Screen - LCD orient

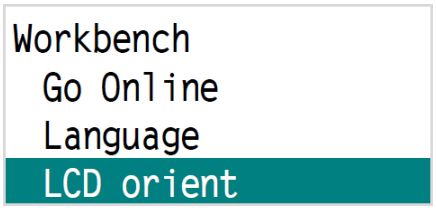


Figure 108. Workbench Menu Screen - LCD Orient Normal

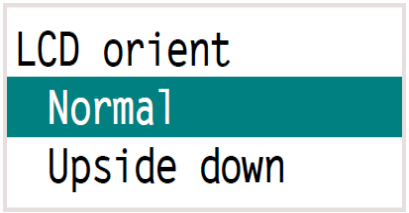
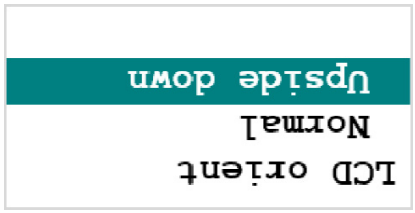


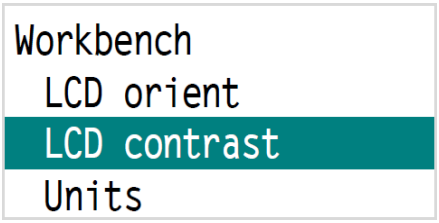
Figure 109. Workbench Menu Screen - LCD Orient - Upside Down



M 10.5 LCD Contrast

For adjustment of contrast/brightness of display.

Figure 110. Workbench Menu Screen - LCD Contrast

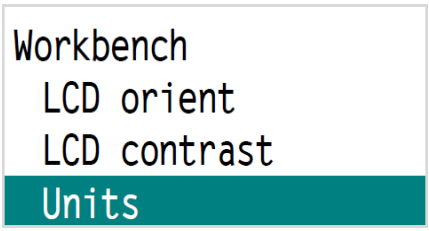


M 10.6 Selection of SI or Imperial units

SI: Dimensions in mm, and temperatures in °C

Imperial: Dimensions in inch, and temperatures in °F

Figure 111. Workbench Menu Screen - Units



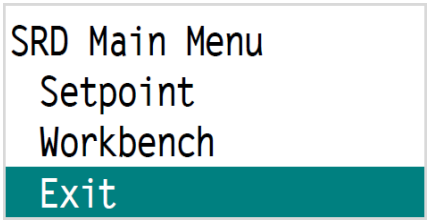
Menu 11: Exit

M 11 Exit

End of configuration and back to operation.

Confirm by pushing down the Rotary Selector.

Figure 112. Sample SRD Main Menu Screen - Exit



Additional Parameters

The following parameters are accessible via communication only:

Parameter	ex factory
Control difference limit value	5%
Control difference response time	1 min
Cutoff hysteresis	0.5%
Failsafe action	OFF
Power-up action	OUT OF SERVICE
Parameter write protection	OFF
Alarm limit for total strokes	90 Mio.
Alarm limit for total cycles	90 Mio.
Dead band for valve cycles	1%
Upper pre-alarm	100%
Lower pre-alarm	0%
Hysteresis for position alarms	0.5%

For complete parameter list, see FDT/DTM software.

9. Decommissioning

Before decommissioning the unit, disconnect the supply air and the electrical input signal. After disconnecting the electrical input signal, the last confirmed configuration of the positioner is preserved in the memory.

Exchange of Device

If a temporary decommissioning of the SRD and a later mounting to another actuator must be carried out, before disconnecting, we recommend using the “M 10.1 Reset Configuration to Ex Factory Settings”. So the default settings “ex factory” are reactivated. This facilitates a later re-commissioning.

10. Maintenance

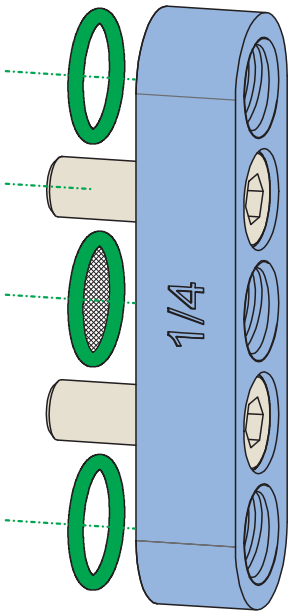
General

The SRD requires no periodical maintenance. When replacing components during repair work, refer to the safety requirements document EX EVE0108. For more information about maintenance process, spare parts list, and steps on how to exchange, see Technical Information, TI EVE0108.

Supply Filter Replacement

An obstructed supply filter **31** can be replaced. Unscrew the tubes and connection manifold, remove the filter and exchange the filter with a new one.

Figure 113. Supply Filter Replacement

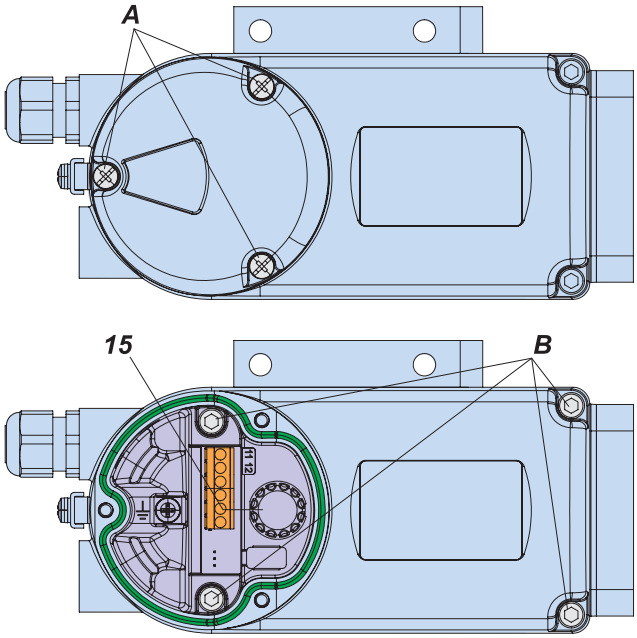


Separate Upper from Lower Housing

⚠ CAUTION
EQUIPMENT OPERATION HAZARD Separating upper and lower housing will damage the sealing and after re-assembly the EMV and IP66 protection is no longer guaranteed. To avoid any personal injury resulting from bursting of parts, take off air supply before any removal of electronic board. Do not touch the rear part of the positioner at any time. Use proper ESD precautions when opening this device for any servicing. **Failure to follow these instructions can result in injury or equipment damage.**

To remove cover from housing, loosen 3 screws **A**. Unscrew knob **15** and remove. Then loose the 4 screws **B** to separate upper from lower housing.

Figure 114. Separate Upper and Lower Housing

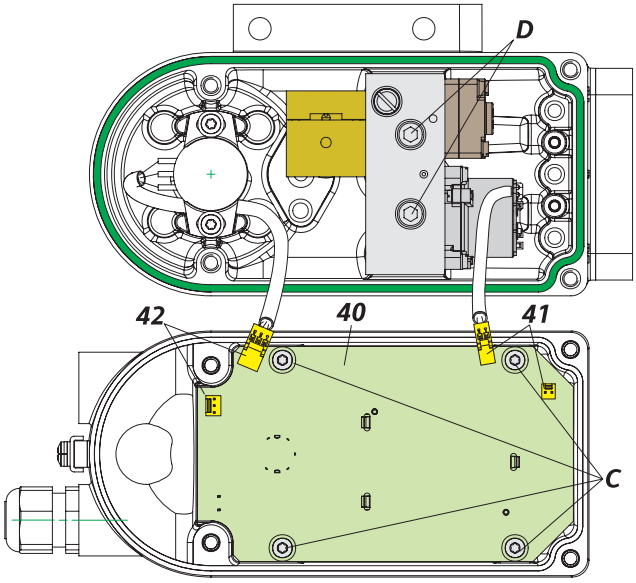


Tightening torque for screws A: 5 Nm, B: 8 Nm, C: 2.5 Nm, D: 8 Nm.

Removal of the Electronic Unit

Disconnect the plugs 41 and 42 from the board. Do not use tools to remove plugs, because components could be damaged. Tight-fitting plugs can be easily removed by tilting them diagonally inward before pulling them off. To remove the electronics unit 40, loosen the 4 screws C.

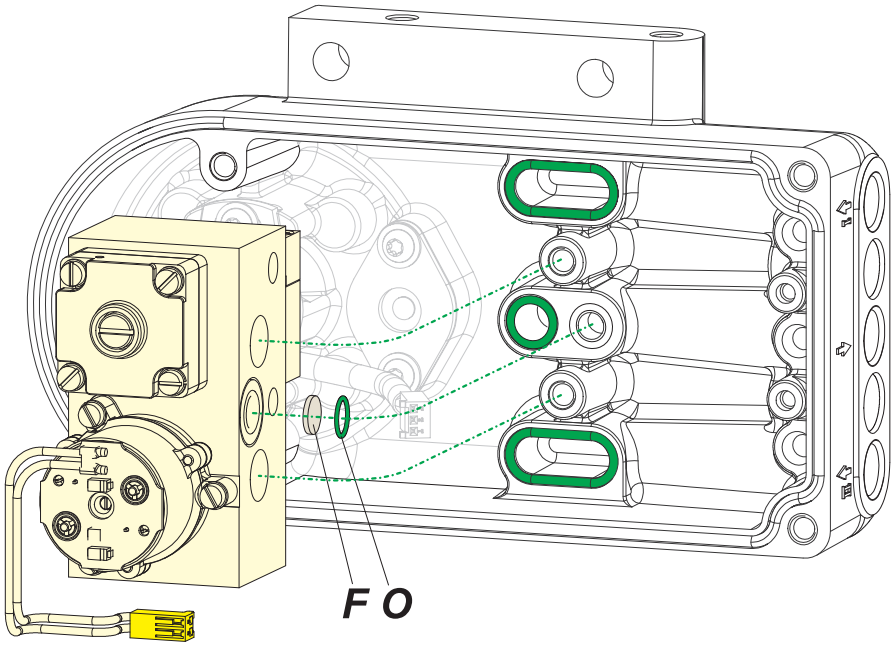
Figure 115. Removal of Electronic Unit



Removal of the Pneumatic Assembly

To replace the fine filter fleece in the pneumatic assembly, it is necessary to remove the pneumatic unit.

Figure 116. Removal of Pneumatic Assembly



Unscrew the 2 screws D and lift up the pneumatic unit. At the bottom is the fine filter fleece F, kept by O-Ring O. Remove O-Ring carefully using screwdriver and replace file filter fleece F. Reassembly in reverse order.

11. Troubleshooting

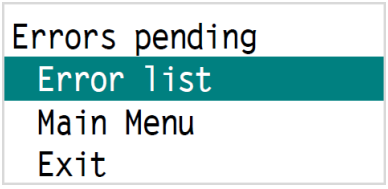
The components of the positioner are under constant surveillance by the installed micro controller. If an error is detected, symbols listed in Table 1 will appear in Status line on LCD.

Table 1. Symbol (according to NE 107)

	Maintenance required
	Out of specification
	Check function
	Failure

Activate error handler by pressing the Rotary Selector as shown in Figure 117.

Figure 117. Activating Error Handler



The detected error will be displayed, with possible cause. Connected to a system with DTM, the remedy is more detailed. Remove the detected error from list by pressing the Rotary Selector. Select Main Menu and go to configuration or select Exit and go to operation.

Diagnosis without LCD information

Detected Fault	Possible cause	Solution
Positioner not operational using key pads	No input signal at 11, 12	Connect input signal
	Local operation blocked (write protection)	Remove blockage via communication
	No automatic power up (Reset)	Reset SRD with keys
	A key got jammed	Release cover screws, check menu functions, retighten cover
	Failure in the positioner	Contact Global Customer Support
Autostart not completed (> 45 min)	Actuator volume too large	stop Autostart and carry out extended Autostart, Menu 2 or apply booster
	Failure in the positioner, otherwise Message	carry out Autostart again, Menu 2 carry out Reset configuration
		Contact Global Customer Support
	Autostart remains stagnant for a longer time (>10 min) in step 1 or 2, otherwise message	Feedback lever (at stroke actuator) incorrectly mounted. Verify installation of feedback lever; flat part points to arrow on housing
		Coupling piece (at rotary actuator) incorrectly turned (R and L mixed up): Verify direction of rotation; flat part points to arrow on housing
	Autostart remains stagnant for a longer time (>10 min) in step 3 (LCD: shows Control params)	At large volume actuators the Autostart can possibly remain stagnant for a longer time (>10 min) in step 3, prior to continuing in step 4
Actuator does not react to a change in the input signal	No Autostart performed.	Perform Autostart.
	Positioner is not IN OPERATION	Switch positioner IN OPERATION, Autostart or via Configurator
	Set point source is configured wrong	Correct configuration via Configurator
Actuator does not attain the closed or opened position	Autostart not carried out	carry out Autostart
	Supply pressure too low	check supply air pressure
	Travel limit is set	check settings, Menu 5
	Angle position linearization, positioner action or characteristic curve is set incorrectly (for example, ‘Custom’, but values are missing)	check settings, Menus 1, 3, 4
Unstable behavior, position control circuit oscillates	Autostart incomplete, therefore, control parameters not suitable	carry out complete Autostart
	Small actuator volume but high air capacity	increase damping at pneumatic output, Menu 6 reduce gain (P parameters)
	Friction on valve packing too high	loosen packing gland slightly or replace
	IP module or Pneumatic amplifier	change module, pneumatic amp
Actuator leakage		Check the actuator and repoint
Actuator reacts too sluggishly	Air capacity insufficient	attach booster
	Gain set too low	increase damping at pneumatic output, Menu 6
	Positioning time T63 set too high	reduce positioning time, Menu 6

Detected Fault	Possible cause	Solution
No communication possible	Input voltage too low	Eliminate voltage drop
	Faulty protocol, communicator and device type do not match	Check configuration of devices
	Wrong electronics unit	change device

12. Safety Requirements

EMC and CE

For notes regarding Electromagnetic compatibility EMC and CE labels see Product Specifications Sheet PSS EVE0108.

Electrical Certification

To know more about technical data for Electrical Certification, see Product Specifications Sheet PSS EVE0108.

⚠ DANGER

HAZARD OF ELECTRICAL SHOCK

- For installations located in explosive atmospheres, all relevant national regulations and installation conditions will be observed, for example, in the Federal Republic of Germany ElexV and DIN VDE 0165.
- When repairing equipment with Electrical Certification, observe the national regulations.
- For repairs use only original parts from the manufacturer.
- The following applies to the Federal Republic of Germany:

  Repairs involving parts required for Electrical Certification will either be carried out by the manufacturer or by authorized personnel and confirmed by certificate.

Failure to follow these instructions will result in death or serious injury.

13. System Configuration

The safety requirements must be observed.

HART Communication

When using the 'communication' (an alternating current signal, which is modulated onto the 4-20 mA signal), it will be observed that the connected outputs are suitable for the used frequency ranges. Apart from the load, also the alternating current impedances have to be observed. We recommend using only suitable instruments. To help eliminate crosstalk between leads and to reduce disturbances through electromagnetic influences, we recommend using twisted paired shielded leads (0.3 to 2.5 mm2, max. 100 pF/m). The capacities of the leads and the connected instruments will not exceed the maximum values for HART.

⚠ DANGER

HAZARD OF ELECTRICAL SHOCK

All components which are connected to the SRD in an explosion hazardous area, require an Ex Approval. The applicable limit values shall not be exceeded concerning the maximum defined capacitance Ci, inductance Li, voltage Ui and current Ii.

Failure to follow these instructions will result in death or serious injury.

Measuring HART Communication Signal

If a reliable communication signal cannot be received, it is advisable to check the level with an oscilloscope. The first data block always comes from the Configurator and the second block is the reply from the SRD.

HART	Measured at configurator	Measured at SRD
Configurator transmits	at least 350 mVpp	at least 120 mVpp
SRD transmits	at least 120 mVpp	at least 400 mVpp

For higher temperatures (above 70°C) it might become necessary to increase the communication signal level when Configurator transmits, by increasing the value of communication resistor.

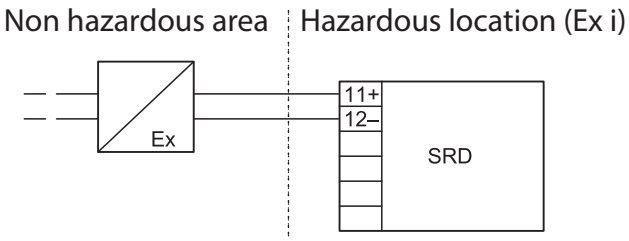
System Configuration

Electrical Connection

Connection compartment see Chapter 7, "Electrical Connection".

Electrical connection for SRD in intrinsic safe (Ex i) version.

Figure 118. Electrical Connection for SRD



Terminals

Figure 119. Terminals

	Input					
	11	12				
Input signal / Set point value						
HART 4-20 mA	11+	12–				

Connection Values

HART/4-20 mA

Terminals	:11+ / 12–
Signal range	:4 to 20 mA
Input voltage	:DC 12 to 36 V (unloaded)

When used in hazardous areas, the maximum supply voltages, etc. on nameplate respectively certificate of conformity, have to be observed.

14. Dimensions

Figure 120. Dimensions with Manifold

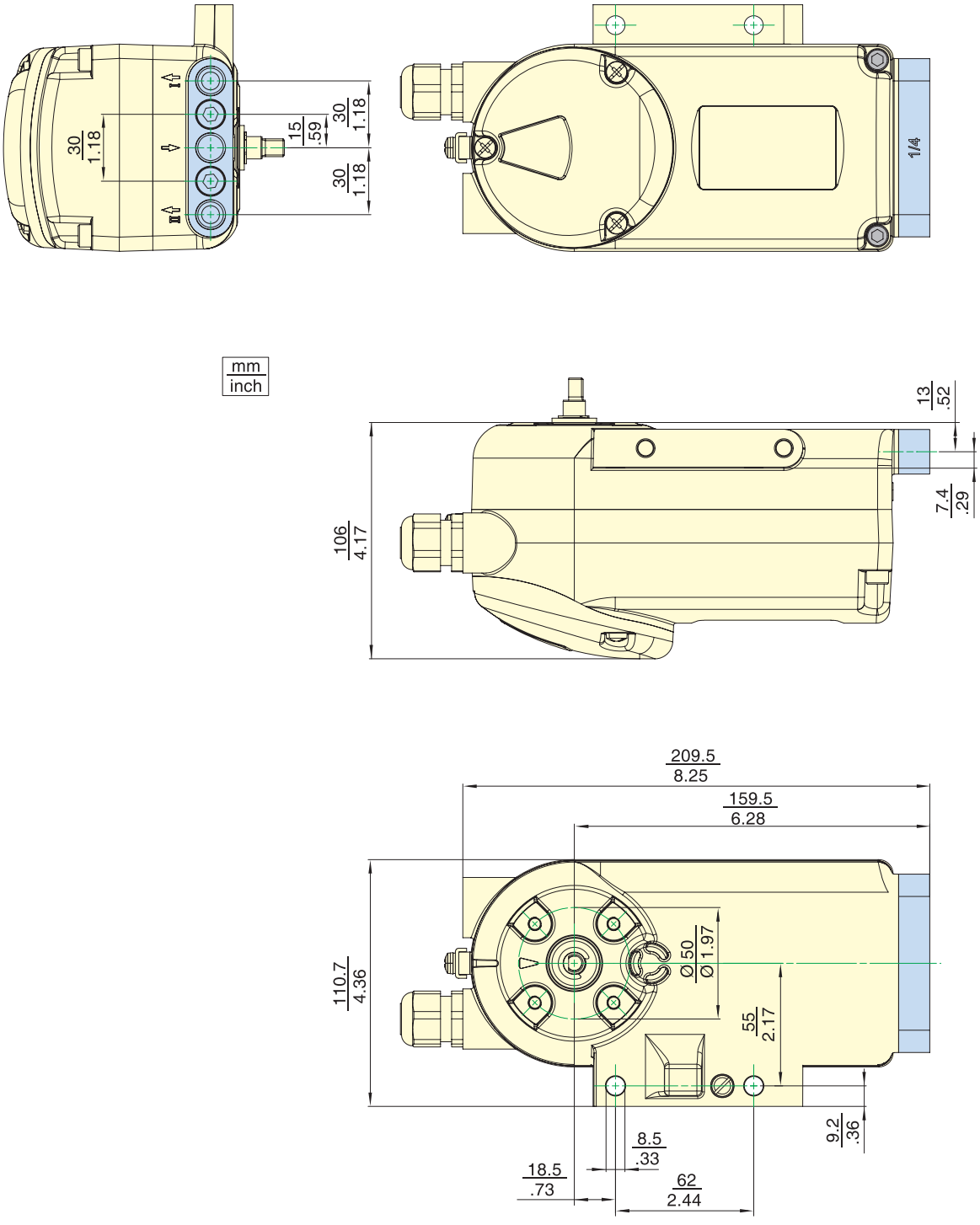
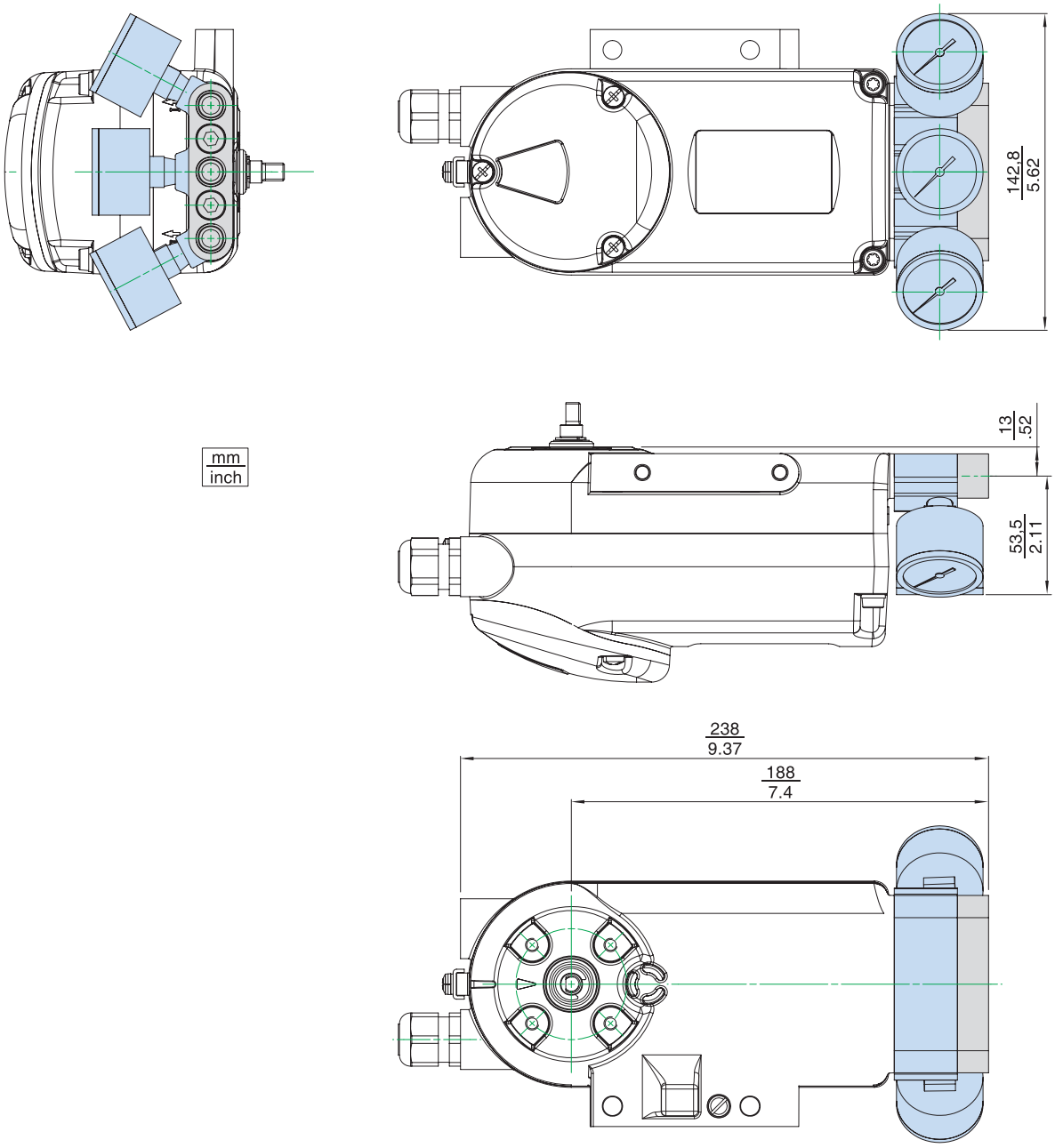
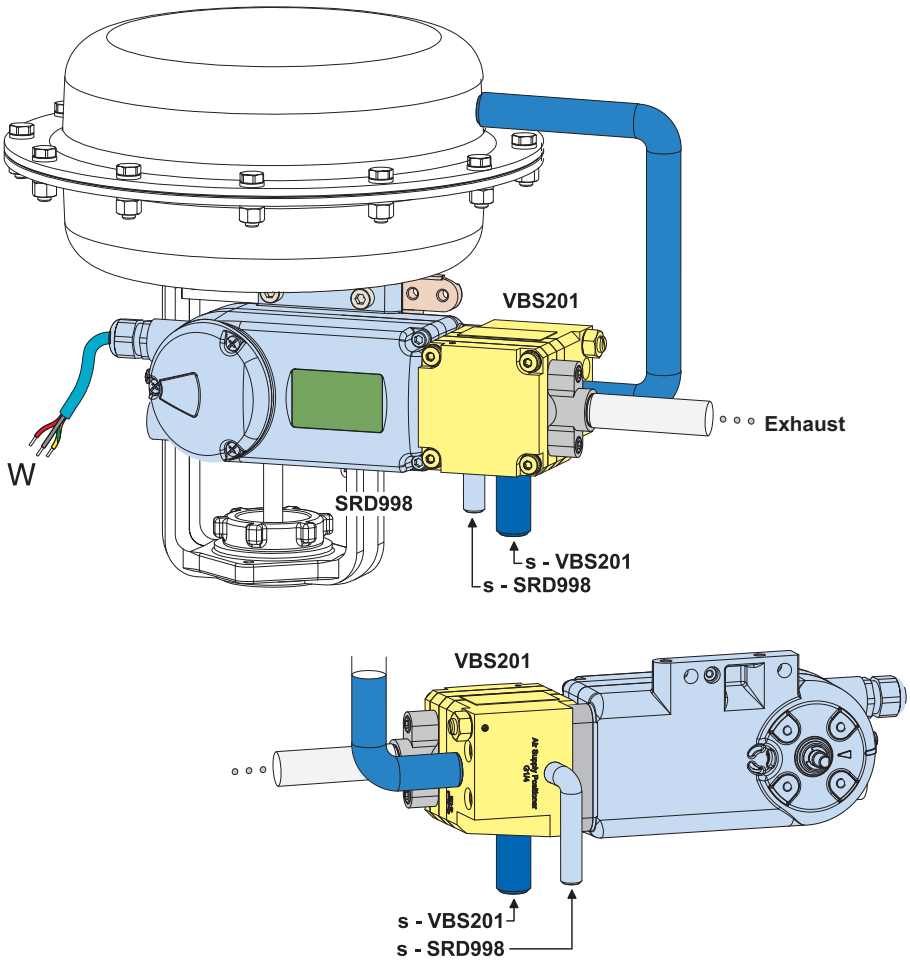


Figure 121. Dimensions with Gauges and Manifold



Typical Mounting

Figure 122. SRD998 with Booster VBS201, directly flanged to SRD998 with connection to an Exhaust Collecting System



Schneider Electric Systems USA, Inc.
70 Mechanic Street
Foxboro, MA 02035
United States of America
http://www.se.com

Global Customer Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424
https://pasupport.schneider-electric.com