

**Small electric
part-turn actuators
2SQ7**

Supplement to
Operation instructions
SIPOS SEVEN



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1 General information

1.1 Notes to the operation instructions

These supplementary instructions are complete only in combination with the main operation instructions of the respective SEVEN PROFITRON or ECOTRON actuator.

The safety information contained in the main operation instructions must be heeded at all times when working with the actuators.

For the sake of clarity, not all details of all versions of the product are described in these operation instructions, nor can they cover all conceivable cases regarding installation, operation and maintenance. For this reason, the operation instructions only contain instructions for qualified personnel that are necessary when the equipment is used for the purpose for which it is intended or in industrial applications.

In case of any questions, and especially where detailed product information is not available, contact the SIPOS Aktorik sales representative in charge. Always state the type designation and the serial number of the respective actuator (see name plate).

1.2 Safety instructions: Used symbols and their meanings

The following symbols, which have different meanings, are used in the operation instructions. **Non-observance** of safety instructions may lead to serious injuries or damage.



Warning marks activities which, if not carried out correctly, can affect the safety of persons or property.



Notice marks activities which have major influence on the correct operation. Non-observance of these notes may lead to consequential damage.

2 Mount part-turn actuator to valve

The actuator is either mounted to the valve via

- a coupling, refer to following chapter „2.1 Mount via coupling“
- or via
- a swing lever; refer to chapter „2.2 Mount with base and lever“.



- The work below must only be performed by expert personnel!
- The part-turn actuators can be mounted in any position.
- Touch up damaged paint to avoid corrosion on the device.

2.1 Mount via coupling

Depending on the order, the couplings for valves (fig.1, item 2) will be supplied unbored or e.g. with bore and keyway, square bore or bore with two flats.

Prior to mounting the part-turn actuator to the valve, unbored couplings must be finish-machined (item 4) to match the valve shaft (item 5).



Mount valve and actuator in the same end position:

- For butterfly valves – end position CLOSED.
- For ball valves – end position OPEN.

Procedure

1. Slightly grease valve shaft (fig. 1, item 5) and splines of the coupling (item 2).
2. Fit coupling (item 2) onto valve shaft (5) and secure against axial shifting with grub screw (3) while heeding dimensions x, y (refer to fig. 2 and table below).
3. Place part-turn actuator (fig. 1, item 1) onto valve (item 6):
 - Make sure the flanges are centered and flush against the actuator.
 - If the flange holes do not match the threaded holes:
 - Slightly turn handwheel until the holes align.
 - Shift actuator by one spline on the coupling if required.
4. Fasten actuator with screws:
 - We recommend gluing the screws with liquid thread sealing material to avoid contact corrosion.
 - Tighten screws crosswise with the required tightening torque (refer to table below).

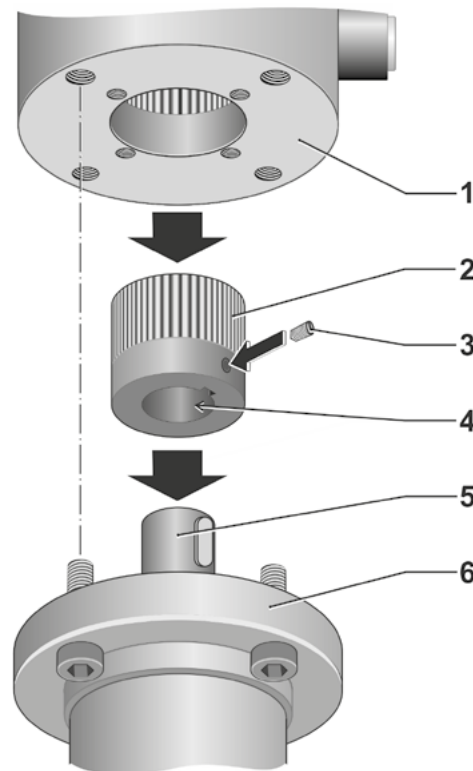


Fig. 1: Assembly with coupling

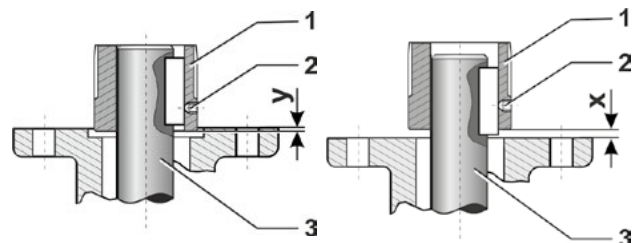


Fig. 2: Mounting position of the coupling

Dimensions for mounting position of the coupling and tightening torques for screws of different strength classes				
Flange	Dimensions [mm]		Screws	Strength class A2-80/A4-80
	x max.	y max.	Qty x wt.	Tightening torque TA [Nm]
F05	3	2	4 x M6	10
F07	3	2	4 x M8	24

2.2 Mount with base and lever



- Prior to mounting, check whether there is sufficient space. Ensure that the actuator or other parts are not in the swivel range of the lever.
- The mounting support of the part-turn actuator must be solid, rigid and low in vibration.
- The corrosion protection for the weld nut and the tube must be provided by the customer.

Procedure

1. Align mounting positions so that the motion planes of the damper rod (fig. 1, item 1) and the valve levers (item 2) are parallel.

The permissible angle deviation amounts to

- from the swing lever (2):
max. 10°,
- towards the swing lever:
max. 3°.

2. Clean contact surfaces of base flange.
3. Tighten actuator with four screws (at least strength class 8.8).

For indications to the holes in the base flange, refer to illustration on the right.

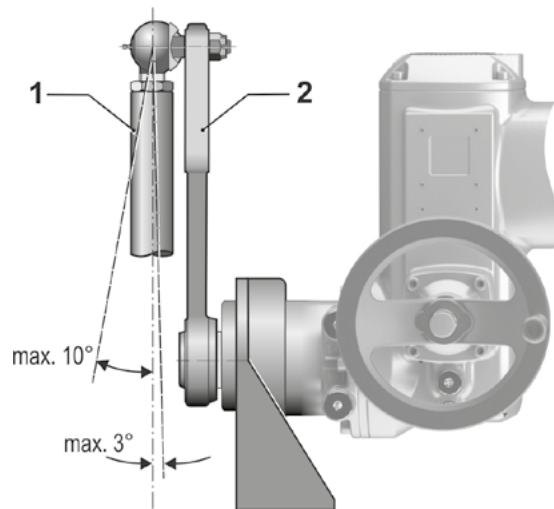


Fig. 1: Mounting position Pipeline to swing lever

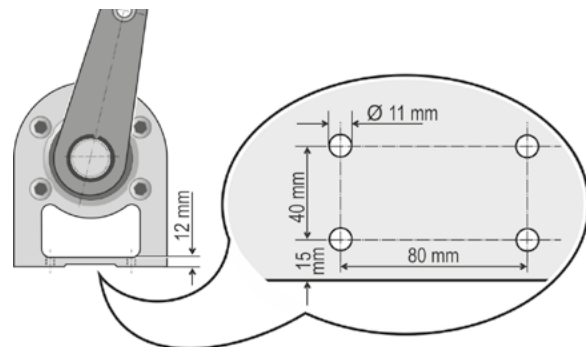


Fig. 2: Bore holes in the base flange

2.2.1 Change of lever position

If necessary, the position of the lever arm can be changed. Adjustment of the lever by one spline corresponds to 15° at the output drive shaft.

Procedure

1. Remove retaining ring (fig., item 2) from the output drive shaft (item 3).
2. Pull off swing lever (item 1) from the output drive shaft (item 3).
Re-place swing lever at desired position on the output drive shaft.
3. Secure swing lever with retaining ring (2)

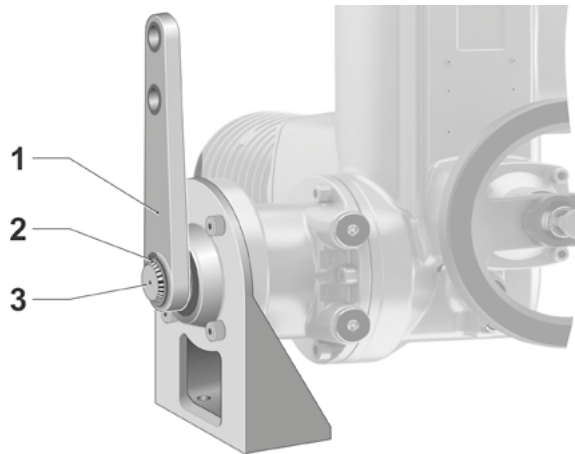


Fig.: Changing the lever position



Heed permissible deflection angle for α (refer to next chapter).

2.2.2 Mounting the damper rods

When setting the length, make sure that the angle α_{min} or α_{max} is not fallen short of or exceeded (refer to fig. 1). Otherwise, excessive forces, which might damage the actuator, may occur.



Permissible limits are

- Angle α
 - α_{min} . = 30°
 - α_{max} . = 150°
- Angle β (refer to fig. 1) must be indicated by the valve manufacturer.

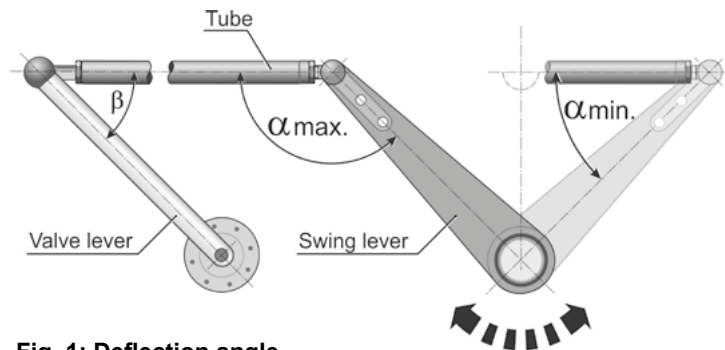
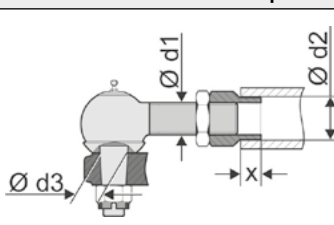


Fig. 1: Deflection angle

Suitable damper rods (ball joints with lever) or ball joints are subject to separate order from SIPOS Aktorik.

One of the supplied **ball joints** has a **right-hand thread**, the other one a **left-hand thread**.

The table on the right shows the dimensions for the different versions.

Dimensions: Ball joints 2SX7304-0GE00 and damper rods 2SX7304-0KG00		
	Max. transmissible force [kN]	7.5
	\varnothing d1 RH/LH	M16x1.5 M20x1.5*
	\varnothing d2 [mm]	27; 25*
	X [mm]	8; 5*
	\varnothing d3 taper 1:10	16 ^{H8}
	* for damper rod	

Procedure

1. Insert ball joint (fig. 2, item 1) into cone hole at the swing lever (item 7), tighten with castellated nut (8) and secure castellated nut against loosening by means of a split pin (9).
2. Insert the other ball joint into the cone hole of the valve lever (5) and fasten using a castellated nut. Use a splint to secure castellated nut against loosening.
3. Align valve lever (5) and swing lever (7) until they are in parallel.
4. Screw both weld nuts (3) on the ball joints (1) up to the middle of the thread length.



Heed minimum thread engagement, refer to fig. 2, item. 6:
 x min. = 1 x thread diameter

5. Measure dimension for damper rod length (y) and cut pipe to suitable length.

6. Unscrew weld nuts (3) from both ball joints and weld to pipe.



Ensure undamaged corrosion protection once the welding is finished!

7. Screw counter nut (2) and damper rod (4) with welded welding nut (3) into the ball joint at the swing lever. Observe minimum thread engagement x min. (6).

8. Remove second ball joint from valve lever (5), unscrew lock nut and screw ball joint into damper rod. Also observe the minimum thread engagement (x min.).

9. Move part-turn actuator and valve to the same end position.

10. Insert second ball joint into the valve lever, fasten with castellated nut and secure with split pin. Adjust the length by turning the pipe; when using the supplied ball joints, one of them has a **right-hand thread**, the other one a **left-hand thread**.



When adjusting the length, make sure that the angle α min. or α max is not fallen short of or exceeded (refer to note in the previous chapter).

11. Fasten both counter nuts (2) tightly at the pipe.



- Before commissioning the part-turn actuator, make sure that no persons or objects are within the swivel range of the lever arrangement.
- Fix protective equipment if there is a danger of crushing from moving parts.

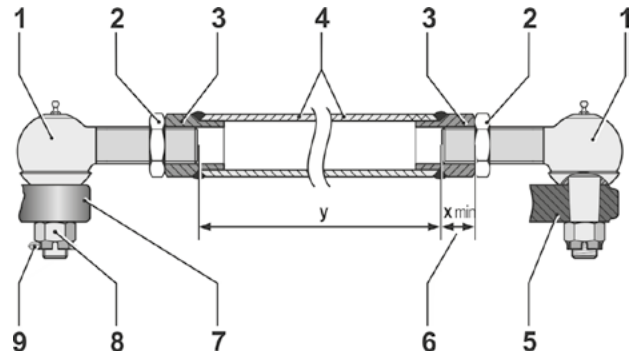


Fig. 2: Damper rod

3 Manual operation



Only engage manual operation while actuator is at standstill!

Operation

1. Press push button (refer to illustration) and release. Manual operation is engaged.

2. Turn handwheel.

Manual operation remains engaged until motor is started again.

Manual operation is automatically disengaged when switching on the motor.

The handwheel does not rotate during motor operation!

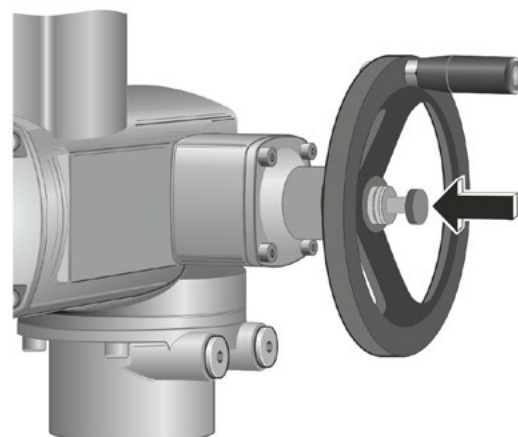


Fig.: Engaging manual operation

4 Settings

4.1 Version (clockwise or counterclockwise closing)

Part-turn actuators are available in clockwise or counterclockwise closing version. The standard version is clockwise closing. For counterclockwise version, both end stops and torque switching heads are reversed compared to the clockwise closing version; refer to table below. For this reason, the closing direction of the actuator has to be determined prior to adjustment and, as a consequence, which of the end stops and which of the torque switching heads is used for OPEN and CLOSE directions.

One **indication** is the print on the face plate. Refer to 'Face plate print' figure.

A Clockwise closing	B Counterclockwise closing
Left section of the face plate applies to End position CLOSED: A1 = Black	End position OPEN: B1 = Red
Right section of the face plate applies to End position OPEN A2 = White	End position CLOSED B2 = Black

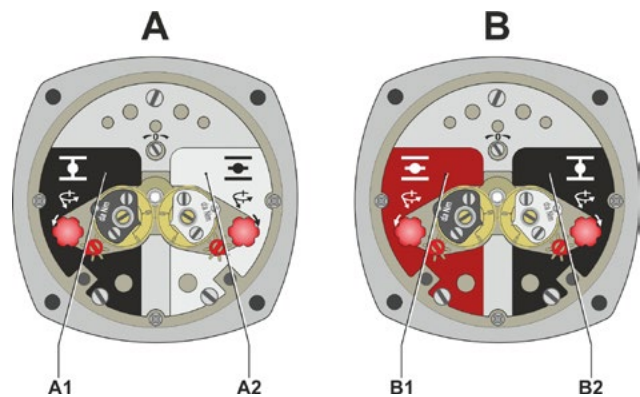


Fig.: Face plate print
A = clockwise closing
B = counterclockwise closing

The **differences** between clockwise or counterclockwise closing version are as follows:

- Clockwise rotation at handwheel:
 - Clockwise closing: Actuator operates in CLOSE direction,
 - Counterclockwise closing: Actuator operates in OPEN direction.
- End stops:
 - Clockwise closing: Left cylinder screw is used for end stop OPEN,
 - Counterclockwise closing: Right cylinder screw is for end stop OPEN.
- Torque switching head:
 - Clockwise: Left torque switching head is used for tripping torque in CLOSE direction,
 - Counterclockwise: Left torque switching head is used for tripping torque in OPEN direction.



The description below in these operation instructions applies to a clockwise closing part-turn actuator. For counterclockwise closing actuators, heed the features listed above.


4.2 Mechanical end stops

Both travel recording and travel limitation in both end positions is performed by a precision film potentiometer.

Mechanical end stops are **not** required for standard device operation; they only function as "secondary protection" against **manual operation** beyond the desired adjustment range. For this reason, the mechanical end stops of the actuator have to be adjusted to a slightly larger swing angle than the swing angle actually required by the valve.

The mechanical end stop adjustment performed in the factory corresponds to the maximum swing angle of the actuator. For most applications, the default settings remain unchanged!


Rotate handwheel to check end stops. The check can only be performed with a valve not yet integrated into a pipeline.

 The following description applies both to end stop OPEN and end stop CLOSED. Which of the screw plugs and cylinder screws (refer to fig. items 1 and 3) applies for which end position (OPEN or CLOSED) depends on the part-turn actuator version (clockwise or counterclockwise closing). See above „4.1 Version (clockwise or counterclockwise closing)“ on page 8.

4.2.1 Adjust end stop

The following description illustrates the adjustment of end stop CLOSED for clockwise closing version. End stop OPEN is adjusted accordingly. When looking at the handwheel, the right end stop is end stop CLOSED for clockwise closing actuators.

1. Unscrew right screw plug for end stop CLOSED (fig. item 1).
2. Rotate handwheel and run valve in direction of end position CLOSED.
3. Adjust end stop: Turn cylinder screw (item 3) (refer also to "Setting values" below);
 - clockwise turning results in smaller swing angles,
 - counterclockwise turning results in larger swing angles

-  **■ Never remove cylinder screws (item 3) completely since grease may leak.**
■ Heed dimension T_{min} !

4. Check O-ring (item 2) in screw plug, replace if damaged.
5. Re-fit screw plug (item 1) and tighten.

After modification of end stop adjustment (e.g. CLOSED), the respective end position (CLOSED) can immediately be set.

6. Check whether adjustment of the opposite end position (OPEN) is required.
In general, adjustment of end stop OPEN is no longer required once end stop CLOSED has been adjusted.

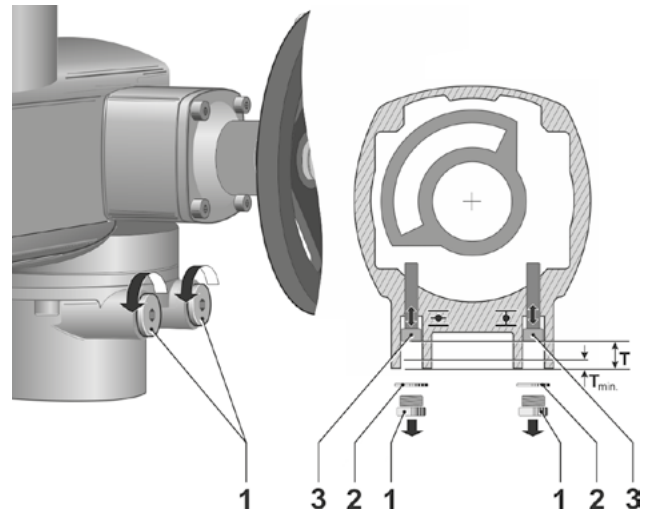



Fig.: Adjusting the end stops

4.2.2 Setting values

Angle and dimensions T and T_{min}

When turning the cylinder screws (fig., item 3) end stops CLOSED or OPEN change accordingly. The swing angle can be checked or adjusted via dimension T.

 Falling short of T_{min} . might result in gear damage.

Angle	Dimension [mm]	
	T	T_{min}
90°	17	11
105° *	12.7	
120°	17	11
135° *	12.7	

* Factory setting

Rotation at the cylinder screws

Turning the cylinder screws (item 3) changes the end stop adjustment. The adjacent table shows by how many degrees the setting is changed for one rotation.

	for cw rotation	for ccw rotation
1 rotation	approx. 2.7°	approx. 2.2°

4.2.3 Set tripping torque

Once the tripping torque set here has been achieved, the torque switches are tripped (valve over-load protection). The tripping torque must be adjusted to the valve to prevent valve damage in case of excessively high torque

The torque switches can also trip during manual operation. The following procedure refers to part-turn actuator version clockwise closing, tripping torque in end position CLOSED.

Procedure

1. Loosen the four screws (fig. 1, item 1) and remove cover (2). Pay attention to seal.
2. Pull off position indicator with both hands (fig. 2).
3. Loosen but do not remove both lock screws (item 1) of the left torque switching head (refer to fig. 3, section A).
4. Turn torque dial (fig. 3, item 3) until pointer (6) points to the figure of the required tripping torque. The set figure corresponds to 10 times the tripping torque (15 ± 150 Nm) and adjustment between two figures will have an impact on the tripping torque setting.

Example:

- The pointer (6) of the black torque dial (2) points to 15; this corresponds to a tripping torque of approx. 150 Nm.
- The pointer of the white torque dial (refer to fig. 3 section B) points to the middle between 10 and 15: This corresponds to a tripping torque of approx. 125 Nm.

5. Tighten lock screws (fig. 3, item 1) again; Tightening torque: 0.3 – 0.4 Nm.
6. The setting of the tripping torque in end position OPEN is performed using the white torque switching head (refer fig. section B) according to the procedure when setting the tripping torque in end position CLOSED.
7. Fit position indicator and adjust.
8. Screw on cover (fig. 1, item 2) ensuring proper fit of the seals.

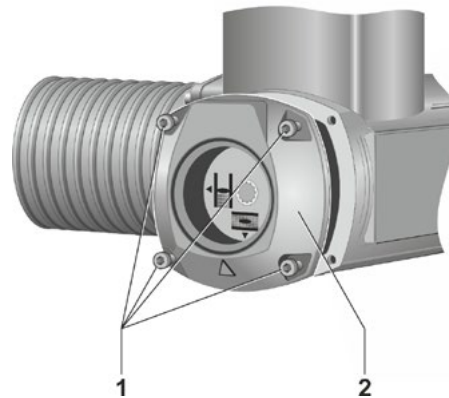


Fig. 1: Removing the cover

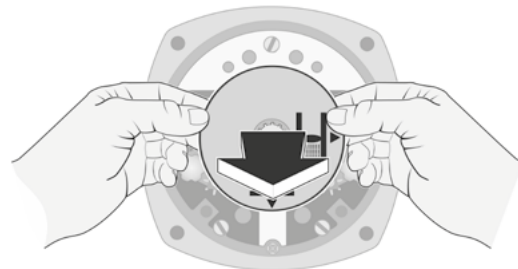


Fig. 2: Pulling off the position indicator

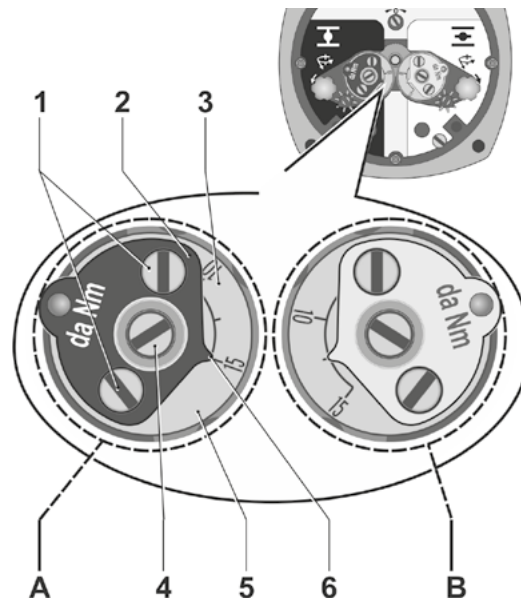


Fig. 3: A = Torque switching head CLOSE
B = Torque switching head OPEN

5 Maintenance

5.1 General remarks

After commissioning, check part-turn actuator for damage to paint finish. Thoroughly touch up damaged spots to prevent damage by corrosion.

The part-turn actuator requires very little maintenance. To ensure permanent operability, we recommend the following measures:

- Approximately six months after commissioning and then once a year, check fixing screws between actuator and valve for tightness. If required, tighten the screws with the torques corresponding to the strength class of the screws used.
- Every 2 years, check each actuator visually for leakage of grease.
- Every 8 years, submit the actuator to a detailed functional test. Record results for later reference.

5.2 Service

SIPOS Aktorik provides comprehensive services such as assembly, commissioning, maintenance and revision as well as inspection of actuators. For contact addresses, please visit us at www.sipos.de.

