

Small electric part-turn actuators 2SF7

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 material.



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

2 Mounting part-turn actuator to valve

The actuator is either mounted to the valve via

- a coupling, refer to following chapter "2.1 Mounting via coupling"

or via

- a swing lever; refer to chapter "2.2 Mounting with base and lever".

The actuator can be operated without restrictions in any mounting position.



! The pulling load must not exceed 20 % of the maximum possible tripping torque.



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

2.1 Mounting via coupling

Depending on the order, the couplings for valves can be supplied unbored or e.g. with square bore, bore with two flats or bore and keyway, refer to fig. 1: Coupling variants.

Prior to mounting the part-turn actuator to the valve, unbored couplings must be machined (fig. 2, item 4) to match the valve shaft (item 5).

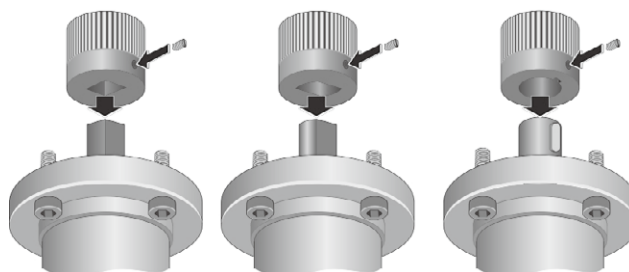


Fig. 1: Coupling variants



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. 2, 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) or spring washers and screw with spring ring (3a), while heeding dimensions X, Y, L (refer to fig. 3 and table below).
3. Place part-turn actuator (fig. 2, 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.

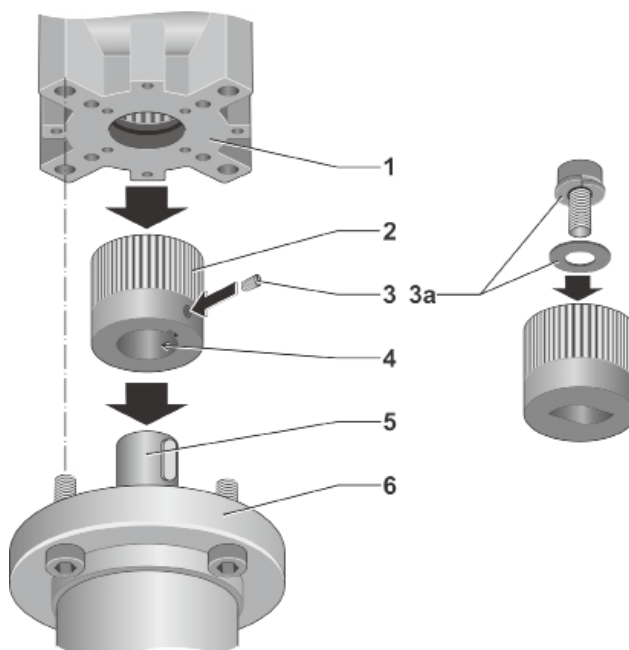


Fig. 2: Assembly with coupling

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).

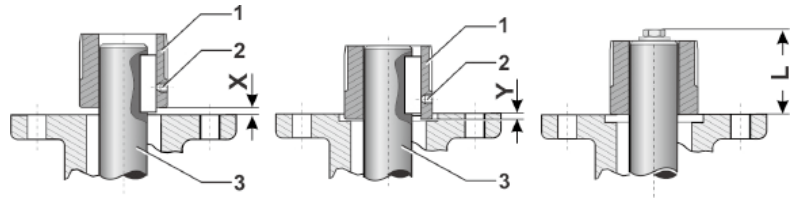


Fig. 3: Mounting positions of the couplings

Dimensions [mm] for mounting position of the coupling and tightening torques [Nm] for screws									
Actuator size	Flange F05			Flange F07			Flange F10		
	X max.	Y max.	L max.	X max.	Y max.	L max.	X max.	Y max.	L max.
2SF7.1	3	2	38/40 ¹⁾	3	2	38/40 ¹⁾	3	2	38/40 ¹⁾
2SF7.2	---	---	---	4.5	4.5	50	4.5	4.5	50
2SF7.3	---	---	---	4.5	4.5	50	4.5	4.5	50
¹⁾ Thread with grub screw									
Screws of strength class A2-80/A4-80									
Number x weight	4 x M6			4 x M8			4 x M10		
Tightening torque TA	10			24			48		

2.2 Mounting with base and lever



- Prior to mounting, check whether there is sufficient space. Ensure that neither the actuator nor 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°,
- in the same direction as 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 on the holes in the base flange, refer to fig. 2 on the right.

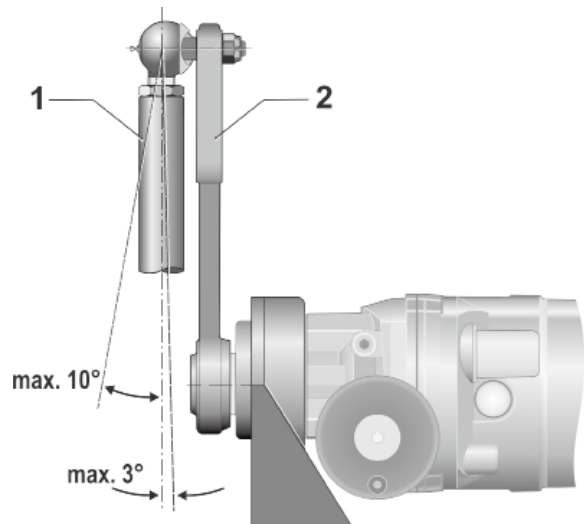


Fig. 1: Mounting position Rod to swing lever

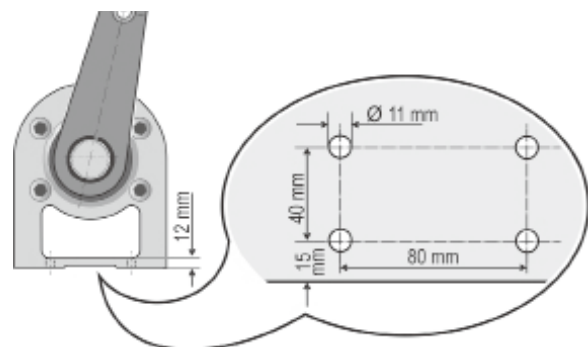


Fig. 2: Bore holes in the base flange

2.2.1 Change of lever position

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

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).



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

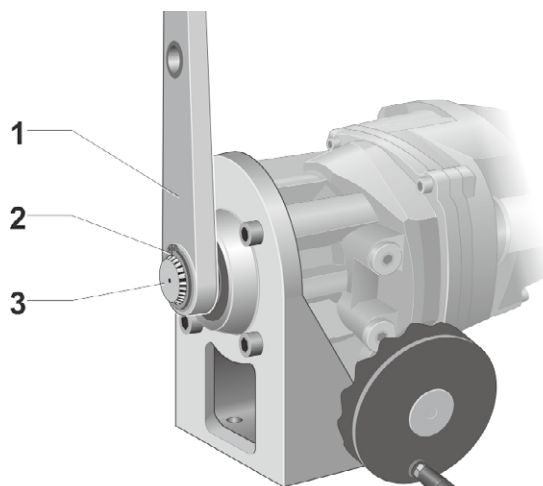


Fig.: Changing the lever position

2.2.2 Mounting the damper rods

When setting the length of the damper rods, make sure that the angle $\alpha_{min.}$ or $\alpha_{max.}$ is neither fallen short of nor exceeded (refer to fig. 1). Otherwise, excessive forces, which might damage the actuator, may occur.

Permissible limits are

- Angle α
 - $\alpha_{min.} = 30^\circ$,
 - $\alpha_{max.} = 150^\circ$.
- Angle β (refer to fig. 1) must be indicated by the valve manufacturer.

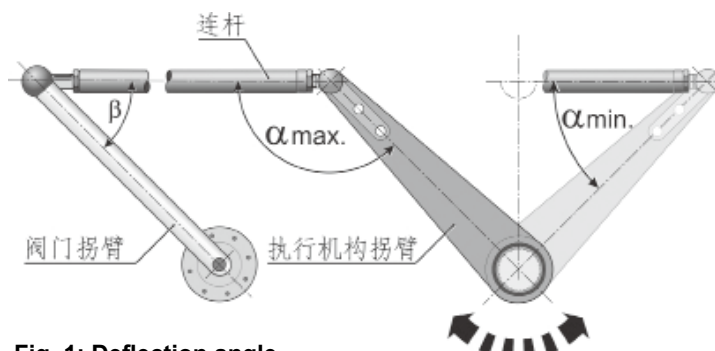


Fig. 1: Deflection angle

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:
 $x \text{ min.} = 1 \times \text{thread diameter}$

5. Measure dimension for linkage 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 linkage rod (4) with welded welding nut (3) into the ball joint at the swing lever (7). Observe minimum thread engagement $x \text{ min.}$ (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 ($x \text{ min.}$).
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 $\alpha \text{ min.}$ or $\alpha \text{ max.}$ 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.

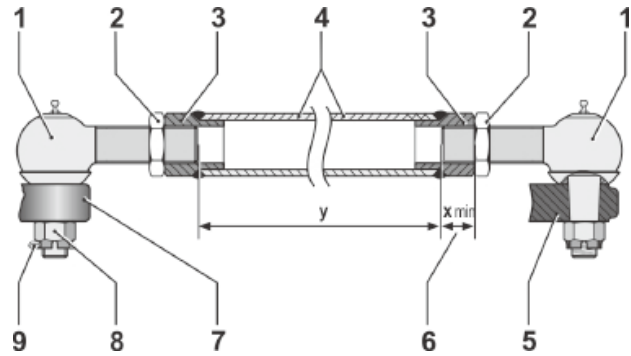


Fig. 2: Damper rod

3 Manual operation

The handwheel can be used to operate the actuator in case of power failure.

The handwheel does not rotate during motor operation. Changing over from motor operation to manual operation is not required. If the handwheel is rotated during motor operation, the positioning time is either reduced or extended, depending on the direction of rotation.

The operation below applies to the 'clockwise closing' version.

Operation

1. Turn handwheel clockwise: Valve is operated in CLOSE direction.
2. Turn handwheel counterclockwise: Valve is operated in OPEN direction.



For 'counterclockwise' version, the OPEN/ CLOSE directions are reversed.

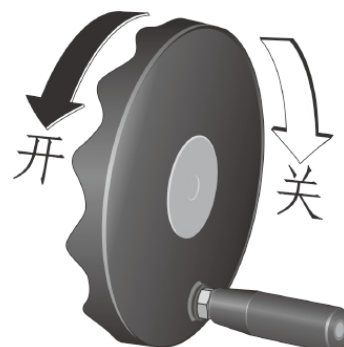


Fig.: Manual operation

4 Settings

4.1 Clockwise or counterclockwise closing version

Part-turn actuators are available in clockwise or counterclockwise closing version. The standard version is clockwise closing. For counterclockwise closing version, both end stops and torque switching heads are reversed compared to the clockwise closing version and vice versa. 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** for 'counterclockwise closing' is a label on the actuator, refer to fig, item 2.

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.

For the setting, refer to the following chapter.



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

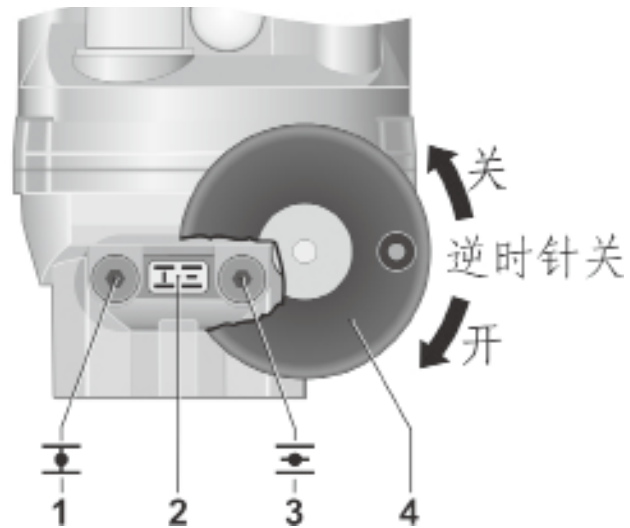


Fig.: Counterclockwise actuator version

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 plug 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 Clockwise or counterclockwise closing version" on page 8.

4.2.1 Set end stop CLOSED

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

Procedure

1. Unscrew right screw plug for end stop CLOSED (fig. 1, item 1).
2. Rotate handwheel and run valve in direction of end position CLOSED.
3. Adjust end stop: Turn right cylinder screw (fig. 2, 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 (fig. 2, item 3) completely since grease may leak.
- Heed dimension T_{min} !

4. Check O-ring (fig. 2, 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.

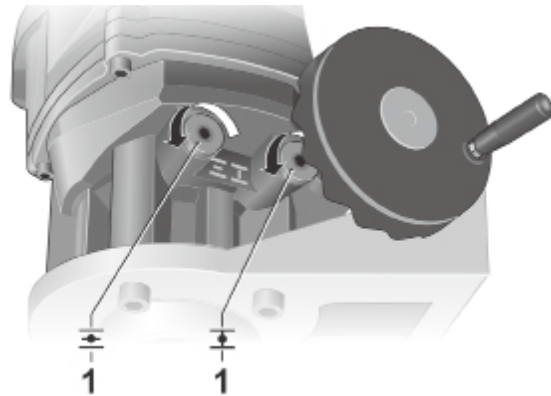


Fig. 1: Screw plugs for end stops

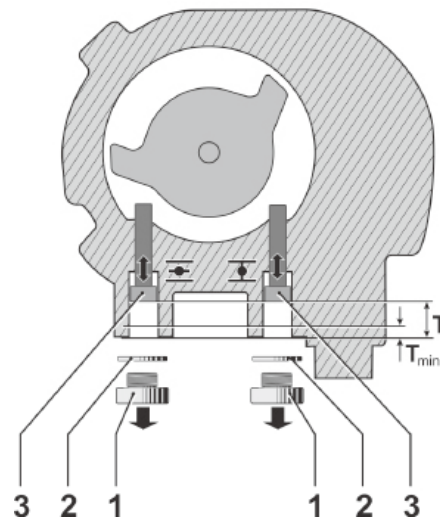


Fig. 2: Adjusting the end stops

4.2.2 Setting values

Angle and dimensions T and T_{min}

When turning the cylinder screws (fig. 2, 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.

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.

Angle and dimensions T and T_{min}			
Angle	Size	Dimension [mm]	
		T	T_{min}
90°	2SF7.1	14.5	9
	2SF7.2, 2SF7.3	18.5	11

Rotation at the cylinder screws		
Size	1 rotation	Change of swing angle by ...
2SF7.1	clockwise	2.7°
	counterclockwise	1.97°
2SF7.2, 2SF7.3	clockwise	2.5°
	counterclockwise	2.0°

4.3 Set tripping torque and positioning time

The setting determines the torque or force to be achieved in relation to the load, to cause the motor to trip. This applies to torque/force-dependent tripping in the end position as well as to a block (overload protection of the valve). For this reason, tripping torque or force also have to be set for travel-dependent cut-off mode.

The tripping torque (see table) must be adjusted to the valve to prevent valve damage in case of excessively high torque. The tripping torque can also trip during manual operation.

Tripping torques									
Tripping range [Nm]	Possible values for setting in Nm of M _{dmax}								
	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %	
Indication in the display for ECOTRON ▶	■□□□□□□□	■□□□□□□□	■□□□□□□□	■□□□□□□□	■□□□□□□□	■□□□□□□□	■□□□□□□□	■□□□□□□□	■□□□□□□□
Classes A and B and C (type of duty in compliance with EN 15714-2) – SF70.../2SF73.../2SF75...									
2SF7.1	45 – 150	45	60	75	90	105	120	135	150
2SF7.2	90 – 300	90	120	150	180	210	240	270	300
2SF7.3	180 – 600	180	240	300	360	420	480	540	600
▲ 30 % are set as standard.									

The procedure for adjusting the tripping torque is described in detail in chapter 7 of the “Electric actuators” operation instructions: “Program closing direction, speeds, cut-off modes and tripping torques”, documentation number: Y070.302/EN.

Actuator size	Positioning time ranges	Possible values for positioning time [s/90°] ECOTRON						
		■□□□□□□□	■□□□□□□□	■□□□□□□□	■□□□□□□□	■□□□□□□□	■□□□□□□□	■□□□□□□□
2SF7.1	64 – 8	8	11	16	22	32	46	64
2SF7.2	174 – 22	22	31	44	62	88	126	174
2SF7.3	360 – 45	45	64	90	129	180	257	360
▲ Level 4 is set as standard.								

Possible values for tripping torque and positioning time [s/90°] PROFITRON				
Actuator size	Tripping torque ranges [Nm]	Positioning time ranges		Standard output drive positioning time [s/90°]
		[s/90]	Adjustable in steps of	
2SF7.1	45 – 150	64 – 8	2 seconds	22
2SF7.2	90 – 300	174 – 22	4 seconds	62
2SF7.3	180 – 600	360 – 45	7 seconds	129

4.4 Position indicator

4.4.1 General information

A rotating indication shows the position of the valve. Depending on the setting angle, the position indication will vary. The table on the right shows the various position indications.

4.4.2 Set position indication for 90° and 120°

The setting procedure is identical for actuators with the setting ranges 90° and 120°. Starting with the setting of end position CLOSED is recommended.

1. Operate actuator to end position CLOSED. Red is visible in the window of the position indicator = indication is correct. If this is not the case, proceed with the following steps.
2. Remove screw plug from the position indicator (1).
3. Use a screwdriver (3) to turn shaft (4) until the red indication is visible in the window of the position indicator (2).
4. Operate actuator to end position OPEN. Green is visible in the window of the position indicator if the setting is correct. If this is not the case, repeat setting procedure.
5. Re-fit screw plug (1).

Position indicator	
90°	
In end position CLOSED red is visible in the window. In end position OPEN green is visible in the window.	
120°	
In end position CLOSED red is visible in the window. In end position OPEN green is visible in the window.	

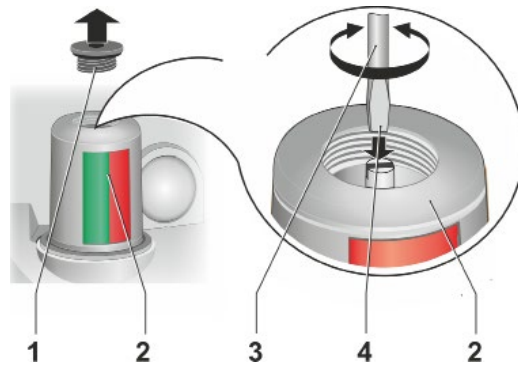


Fig. 1: Set position indication 90° and 120°

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.

