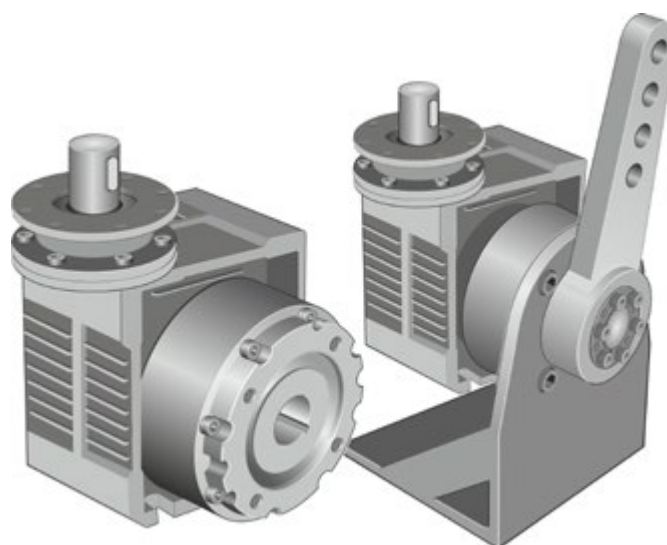


Part-turn gearboxes 2SP78.

Supplement to
Operation instructions
SEVEN HiMod



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1 General information

1.1 Notes to the operation instructions

These supplementary instructions describe the assembly of the part-turn gearbox and are complete only in combination with the main operation instructions of the respective SEVEN PROFITRON or HiMod actuators.

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 gearbox to valve

The part-turn gearbox 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 gearboxes can be mounted in any position.
- After working on the unit, touch up damage to 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 gearbox to the valve, unbored couplings must be 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. Clean contact surfaces at part-turn gearboxes (fig. 1, item 1) and valve (item 6).
2. Slightly grease valve shaft (item 5) and splines of the coupling (item 2).
3. Fit coupling (item 4) onto valve shaft (item 5) and secure against axial shifting with grub screw (item 3) while heeding dimensions x, y (refer to fig. 2 and table below).
4. Place part-turn gearbox (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, shift part-turn gearbox by one spline on the coupling if required.
5. Fasten part-turn gearbox with screws (item 7):
 - 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).

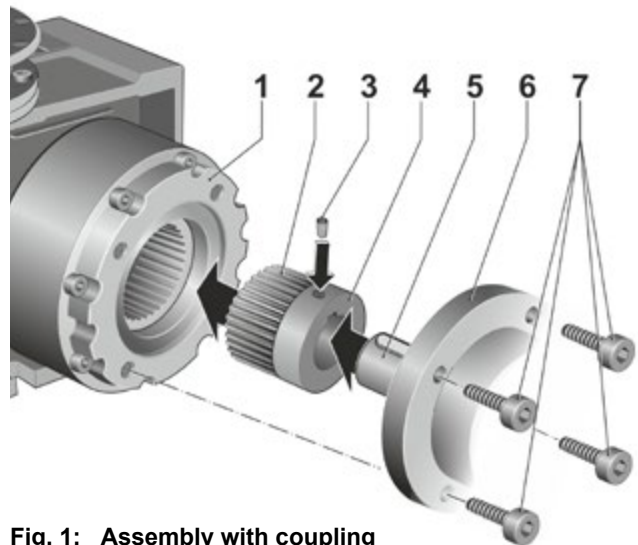


Fig. 1: Assembly with coupling

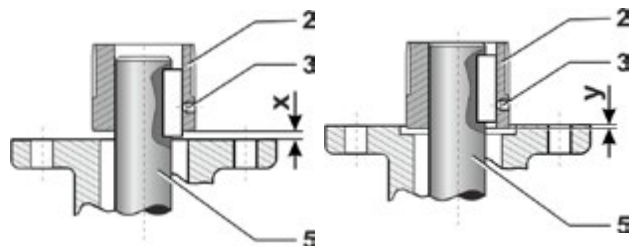


Fig. 2: Mounting position of the coupling

Dimensions for mounting position of the coupling and tightening torques for screws of different strength classes					
Flange	Dimensions [mm]		Screws	Tightening torque TA [Nm] strength classes	
	x max.	y max.		A2-70/A4-70	A2-80/A4-80
F07	6	3	4 x M8	15	21
F10	1	3	4 x M10	30	41
F12	1	3	4 x M12	53	71
F14	1	4	4 x M16	131	175
F16	1	4	4 x M20	256	341

2.2 Mount with base and lever



Prior to mounting, make sure the space available is sufficient. Lever and damper rods must move in parallel and the swivel range must be free of obstacles.

2.2.1 Change base position

Depending on the place of installation, modifying the position of the part-turn gearbox base might be required.

1. If the base has been pre-assembled to the part-turn gearbox, unscrew the four screws (fig., item 1).
2. Rotate base (item 2) as required, see arrow in illustration.
3. Slightly screw in four screws and tighten them crosswise.
Heed tightening torque, refer to table below:

Tightening torque for connection at part-turn gearbox base		
Part-turn gearbox	Screw	Torque
2SP781 / 2SP782 / 2SP783	M10	41 Nm
2SP784 / 2SP785	M16	175 Nm

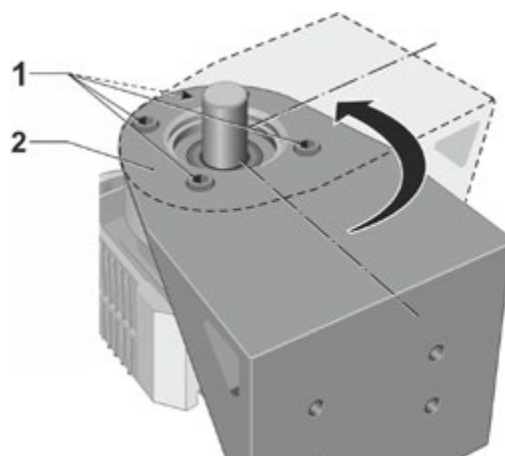


Fig.: Change base position

2.2.2 Mount part-turn gearbox



The mounting support of the base must be solid, rigid and low in vibration.

Procedure

1. Align mounting positions so that the motion planes of the damper rod (item 1) and the valve levers (item 2) are in parallel.
The permissible angle deviation amounts to
 - in the opposite direction of the swing lever (item 2): max. 10°,
 - in the same direction as the swing lever: max. 3°.
2. Clean contact surfaces of base flange.
3. Tighten part-turn gearbox base with four screws (at least strength class 8.8).

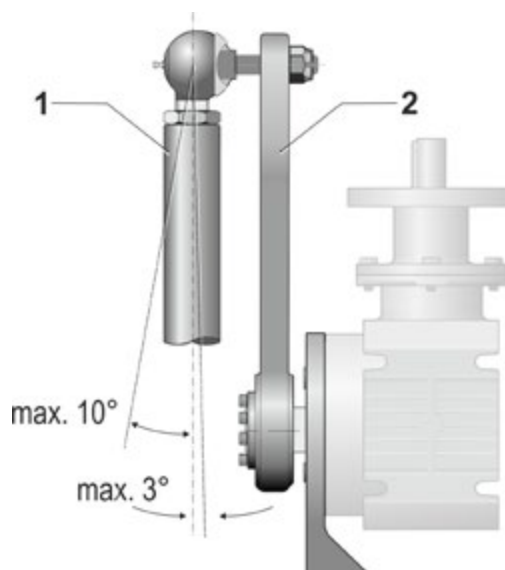


Fig.: Mounting position Rod to swing lever

2.2.3 Mount swing lever with cone clamping element to gearbox

Function of cone clamping element

Cone clamping elements are internal clamping connections for backlash-free fastening of hubs on shafts. Torques are transmitted from the shaft via the cone clamping element to the hub.

The cone clamping element consists of a slotted outer ring (fig., item 1) with inside cone and a slotted inner ring (item 2) with outside cone as well as several clamping screws (item 3).

Fastening the clamping screws will fit the outer ring to the outer ring. The tightening torque of the clamping screws, the cone angle as well as the friction coefficients of the screws and conical surfaces determine the intensity of radial clamping forces generated by the conical surface. The radial clamping forces press the outer ring into the hub bore and the inner ring onto the shaft, resulting in friction-based connection at the respective contact surfaces.

Thus, torque can be transmitted between shaft and hub.

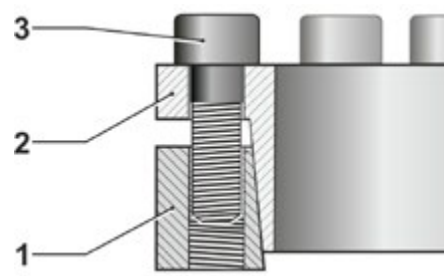


Fig.: Cross section of cone clamping element

Mount swing lever with cone clamping element

1. Carefully clean contact surfaces at both shaft and swing lever.
2. Apply thin layer of oil to cone clamping element.
Neither use oil with molybdenum disulfide or extreme pressure additives nor grease!
3. Fit cone clamping element (fig. 1, item 1) into the swing lever (item 2) (a) and slide onto the shaft (item 3) (b).
4. Align swing lever (fig. 2, item 1) and heed distance between cone clamping element (item 2) and shaft (item 3).
5. Tighten clamping screws as follows, refer to fig. 3, sequence shown in A, B and C:
 - First use torque spanner to tighten all clamping screws **crosswise at half the tightening torque** (see table), refer to A in illustration 3 (sequence 1 – 6).
 - Tighten all clamping screws **clockwise one after the other at half the tightening torque** (see table), refer to B in fig. 3, (sequence 1 – 6).
 - After that, tightening all clamping screw **clockwise one after the other and several times at full tightening torque**, refer to C in fig. 3.

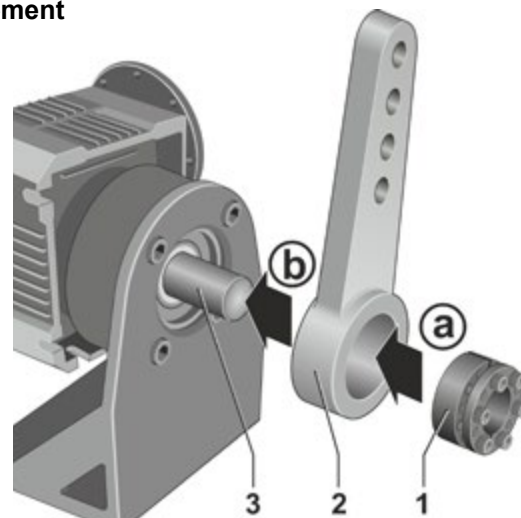


Fig. 1: Place cone clamping element and swing lever

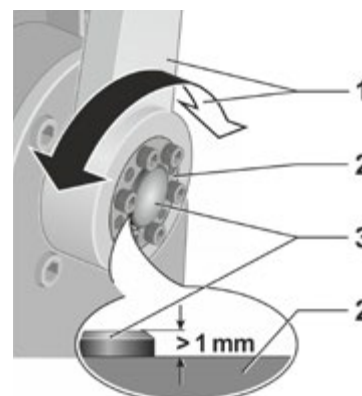


Fig. 2: Align swing lever and cone clamping element

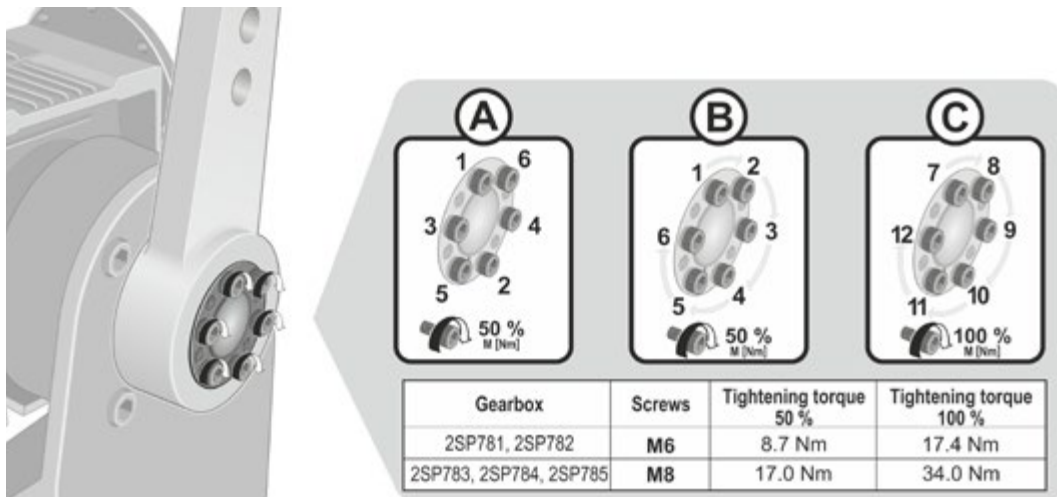


Fig. 3: Tighten cone clamping element



- The tightening procedure is not complete until no screw turns after fastening at full tightening torque.
- Only replace missing or damaged clamping screws by identical screws of grade 12.9!

2.2.4 Notes on mounting damper rods



When setting the length of the damper rods, make sure that the angle $\alpha_{min.}$ or $\alpha_{max.}$ is not fallen short of or exceeded (refer to fig.). Otherwise, excessive forces, which might damage the actuator or the part-turn gearbox, may occur.

Permissible limits are

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

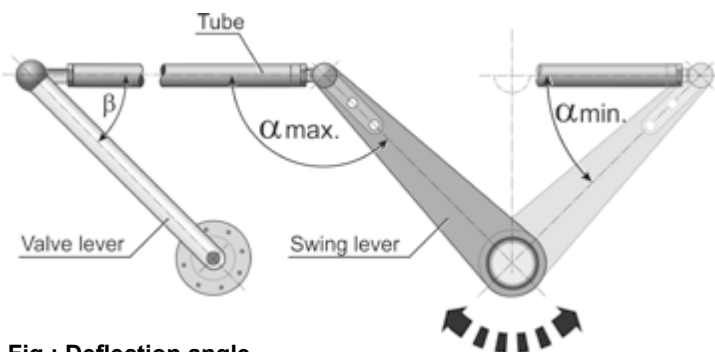


Fig.: Deflection angle

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**.

2.3 Mount actuator to part-turn gearbox

1. Clean contact surfaces at actuator and part-turn gearbox.
2. Screw part-turn gearbox to actuator:
Fasten screws with washers (fig.1, item 1) evenly crosswise.
Heed tightening torque, refer to table below:

Tightening torque for connection between actuator and part-turn gearbox		
Part-turn gearbox	Screw	Torque
2SP781 / 2SP782	M10	41 Nm
2SP783	M10	30 Nm
2SP784 / 2SP785	M16	175 Nm

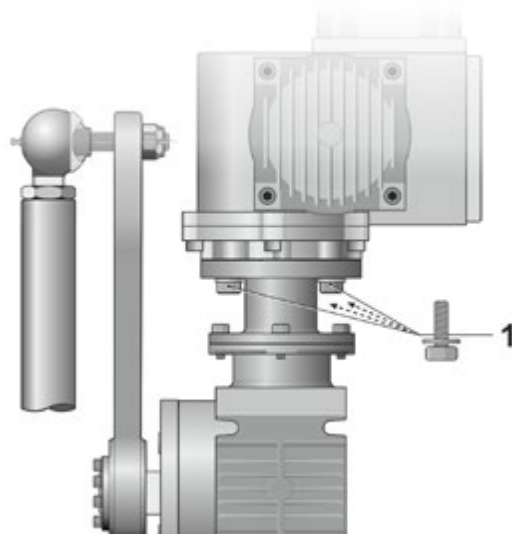


Fig.: Mount actuator to part-turn gearbox

3 Maintenance

3.1 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, part-turn gearbox 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 and gearbox visually for oil leakage.
- Every 8 years, submit the actuator and the mounted gearbox to a detailed functional test. Record results for later reference.

3.2 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.