

Twin Power

Manual

Pneumatic Multiturn actuator in Standard and ATEX design

Mounting

The Twin Power actuator works beyond reproach in all positions. Valves with fluid media should if possible be fitted in such a way that fluid leakage from the packing box is not led from the packing box, through the stem, into the stem nut and the actuator. It is desirable that the valve stem should be assembled in an upright position. If this cannot be done care should be taken to tighten the gland regularly and change the box packing when necessary.

Grease the drive bush carefully and ensure that there is no radial or axial diffraction between the drive bush and hub. Check that the numbers of turns not exceed the permitted turns on the chosen indicating bridge.

The last three numbers in the type denomination inside the actuator cover, specifies the type of Indicator Bridge.

Indicator Bridge	Maximum turns
175	3,5 - 18
100	18 - 32
050	32 - 65
175S	65 - 155
100S	155 - 275
050S	275 - 550

In cases where the Twin Power actuator will be assembled on valves with rising stem and rising hand wheel, the length of the hub must be minimum the length of the drive bush axially movement.

WARNING!

Hand wheel must only be mounted during manual operation.

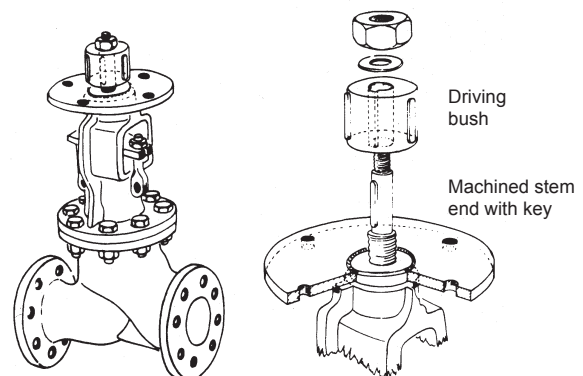
Some practical advice

Ensure that the 3/8" air connections are positioned so as to prevent dirt and liquids entering the motor. If necessary, a short length of pipe should be fitted into each port, with the end pointing downwards.

WARNING!

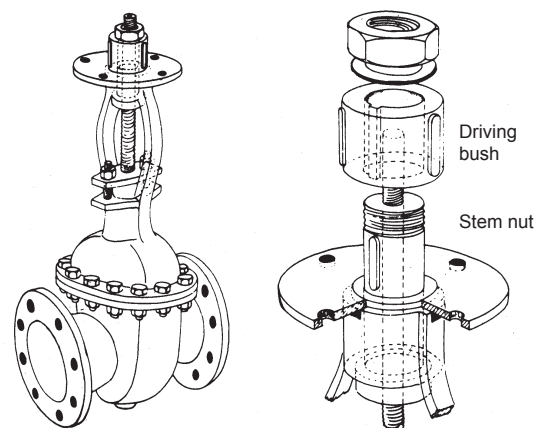
Twin Power should be handled and operated by skilled personnel.

Assembly example



Valve designed with rising stem and hand wheel.

Instead of the hand wheel a driving bush with keys is fitted on the stem end. The driving bush rises axially corresponding to the valve rise. In this case an actuator must be chosen with a hub length corresponding to the rise of the bush.



Valve with rising stem and non rising hand wheel.

A flange is mounted on the valve, and a driving bush with keys fitted in the place of the hand wheel for transmission of the turning movement to the stem unit.

Installation

Pressure control

The Remote Control Twin Power Actuator is designed for a normal working pressure of 7 bar (100 psi), but it can be satisfactorily operated between 4-8 bar (60-140 psi). The supply air shall be dust and oil free. The air dew point shall be -20 °C or 10 °C below the ambient temperature. The maximum particle size must not exceed 40 µm.

The Twin Power actuator specified torque is direct depending on the air supply pressure. In order to produce a constant power output from the motor, an even air pressure is required. The starting torque of the Twin Power is approx. 50 % higher than the tightening torque. If the tightening of the valve takes place at an air pressure of 6 bar and the air pressure at opening is 5 bar, gives a decreasing of the starting torque at a given relation to the decreasing air pressure. If the air supply pressure fluctuates, a constant pressure regulator should be fitted in the system. The regulator should be set so it gives a pressure output equivalent to the lowest incoming pressure.

Oil mist lubrication

To increase the reliability of the Twin Power actuator, an oil mist lubricator should be fitted as close as possible to the actuator. For lubrication of the diaphragm motor, control valve, and the moving parts of the operating cylinder, an oil mist unit should be fitted not more than one meter under the Twin Power actuator. At pneumatic operation where the distance between the actuator and control panel sideways and at falling pipe exceeding 10 meters, an oil mist lubricator shall be fitted on the air supply pipe for clockwise operation. The oil mist lubricator should be filled with low viscosity oil. The guideline value for adjustment of the oil mist lubricator is 1-2 drops/minute. Before the air pipes connects to the actuator they should be cleaned by air, so that no particles will cause operational disturbance. To entirely avoid this risk an air cleaner can be fitted.

WARNING!

By new installations all of the air supply pipes shall carefully be cleaned by air before connection to the actuator and accessories.

Indicator bridge

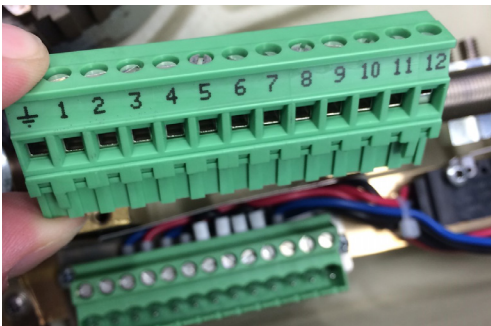


Figure 1

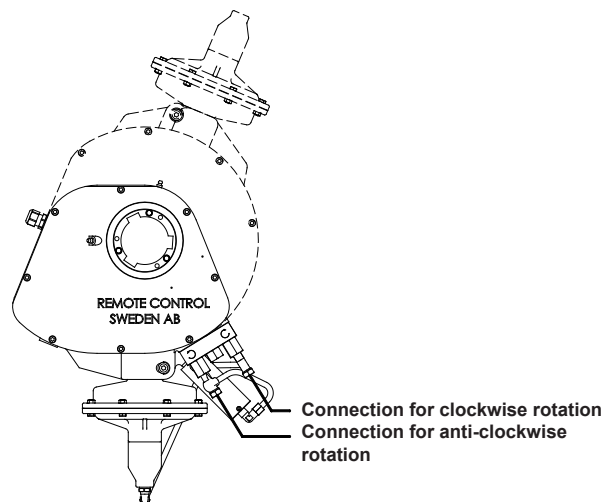
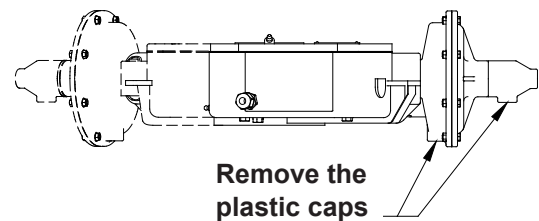
WARNING!

Risk for injuries caused by crushing/squeezing and electrical shocks when the actuator is energized by air pressure and electricity with its cover off. Before opening, check that the compressed air and possible power supply are disconnected. The cover should be mounted when the actuator operates.

1. Remove the cover.
2. Disconnect the top part of the terminal block, see figure 1.
3. Pull the cable through the cable gland and connect according to desired wiring diagram.
4. Reconnect the terminal block. Make sure no cables are close to any moving parts in the actuator.
5. Put the cover back and tighten the screws.
6. Connect the actuator pneumatically and electrically.
7. Verify the function of the actuator.

Before testing of the actuator:

Remove the two plastic caps that covers the breathing and exhaust hole on the air motor.



Air connections for clockwise and anti-clockwise rotation

Operating

Check that the connection for incoming air supplies is correct when the actuator operates with auxiliary valves, e.g. solenoid valves.

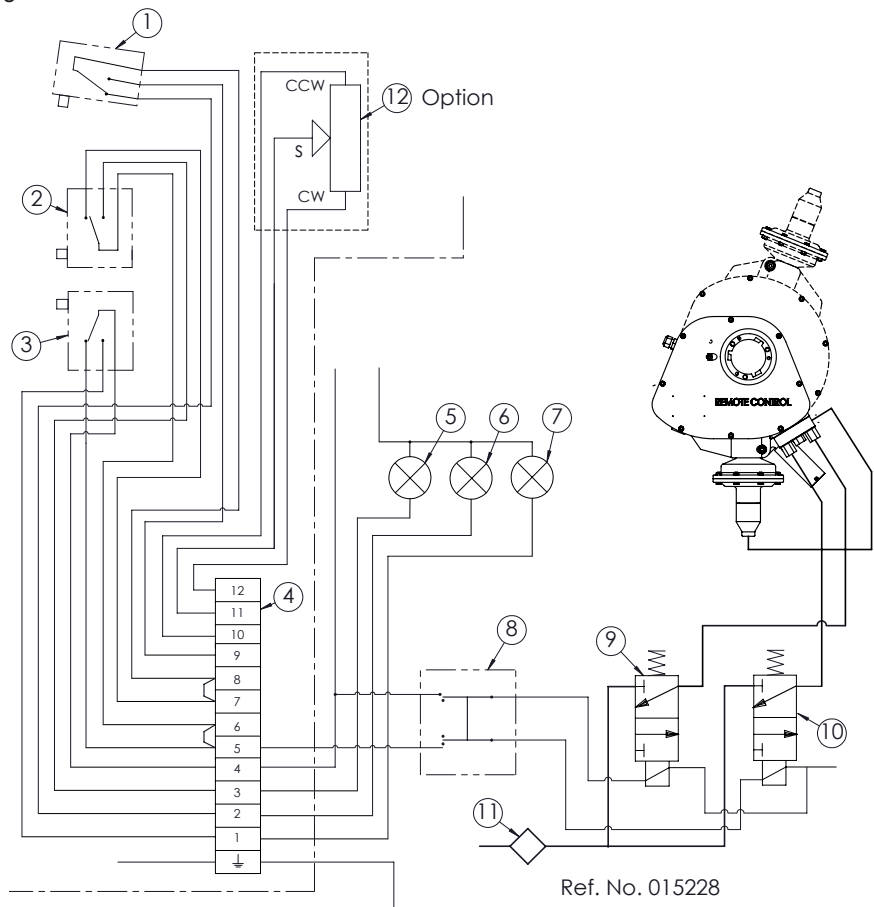
When choosing auxiliary valve, i.e. pneumatic 3-way valves, solenoid valves or hand operated valves, shall these always be vented after completed operation. When changing operation direction, the air pipe between the auxiliary valve and operating unit must be vented before a new operation starts.

When manually operating with 3-way solenoid valves, these shall be operated with 3-position switches with neutral centrality. If other equipment is used, the same function shall be obtained. At momentary impulse changes, i.e. when the rotation direction must be changed rapidly, it is recommended to use the connection according to alternative on page 3.

Alternative 1. Connection example with solenoid valve and standard indicator bridge

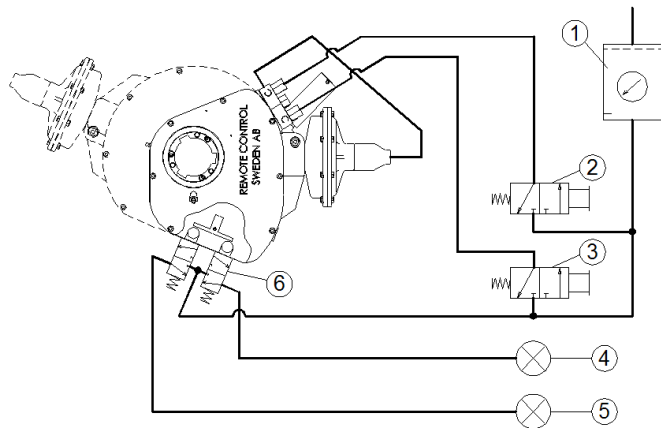
Terminal No. 5 has breaking function at open valve. The solenoid valve for opening position shall be connected to terminal 5 for travel limit function in open position.

1. Microswitch, travel control
2. Microswitch, closed valve
3. Microswitch, open valve
4. Connection terminal
5. Signal lamp, closed valve
6. Signal lamp, travel control
7. Signal lamp, open valve
8. Switch
9. Solenoid valve, for closing
10. Solenoid valve, for opening
11. Oil mist lubricator
12. Potentiometer, optional

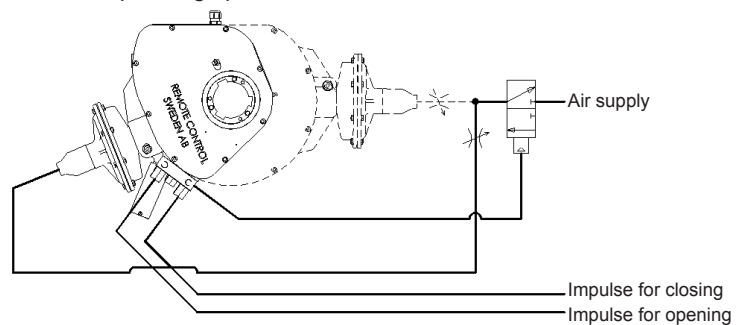


Alternative 2. Pneumatic operating and indicating

1. Filter, regulator and oil mist lubricator
2. Manually operated pneumatic 3-way valve with spring return for closing NC
3. Manually operated pneumatic 3-way valve with spring return for opening NC
4. Pneumatic signal lamp for open valve
5. Pneumatic signal lamp for closed valve
6. Mechanical operated 3-way valve (2x)



Alternative 3. Piston operated 3-way valve for increased operating speed



The function of the Indicator Bridge

The indicator bridge has several functions. First, the latches (3:S1/26) accomplish the by 50 % increased starting torque in both end positions. Secondly, the micro switches of the bridge give signals which, when coupled up to signal lamps, indicate "open", "closed" and "running" condition. Further, it is possible to fit, as options, pneumatic switches for open and closed position as well as pneumatic or electric continuous indication.

The increased starting torque is obtained by a restriction of the console movement (2:S1) when changing the rotary direction, figure 2. By support of the catch (2:S1/12) in the console this is kept in such a position of the latch (3:S1/26) on the indicator bridge, that the effect will be the increased starting torque in relation to the normal torque.

The latch (3:S1/26) is connected to the slide rod (3:S1/41), figure 3. This slide rod is sliding in an axial direction by the slide-block (3:S1/9-10), figure 3, in the last stage of the valve operation.

Both the adjustable stops No. 1 and 2 are fastened by screws in such a position of the slide rod, that they will be affected by the slide block about 3 mm before this one has reached its final position.

When the valve now is driven from the end positions the latch will return into the neutral position by support of the centering springs. When the latch has released the catch, the operating cylinder (5:S1) will complete its stroke, and the normal torque will be connected. The increased starting torque will be obtained by the fact that the motor shaft (6:S1/5) changes point of attack on the operating levers (2:S1/5).

Figure 4 shows the position of the levers at the "Starting" Torque and figure 5 shows the position at the normal or a "Running" Torque. The increased starting torque will be obtained only during the initial spindle revolutions counting from each end position.

To make sure that the setting are sufficient it is recommended to operate the actuator a few times.

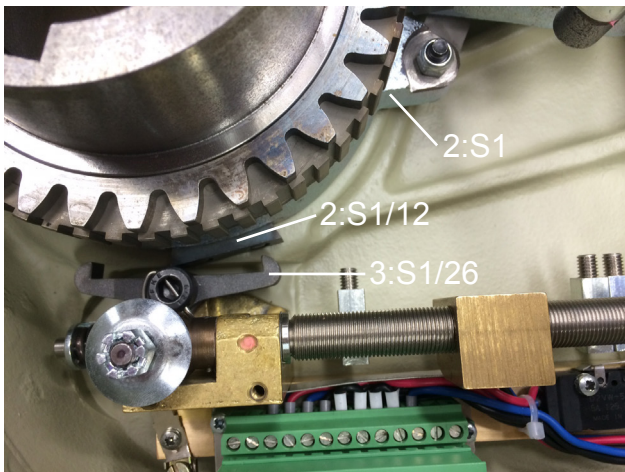


Figure 2

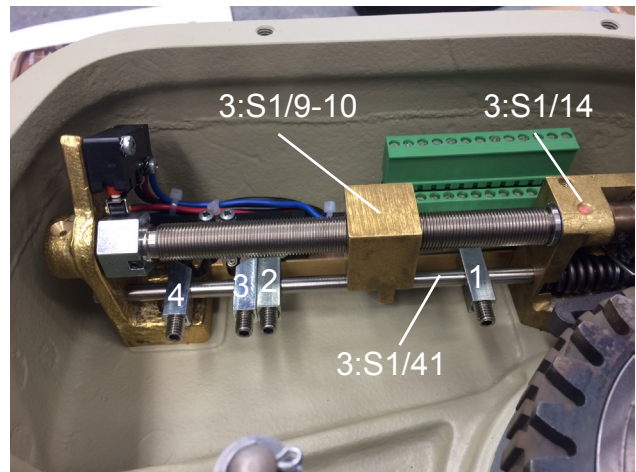


Figure 3

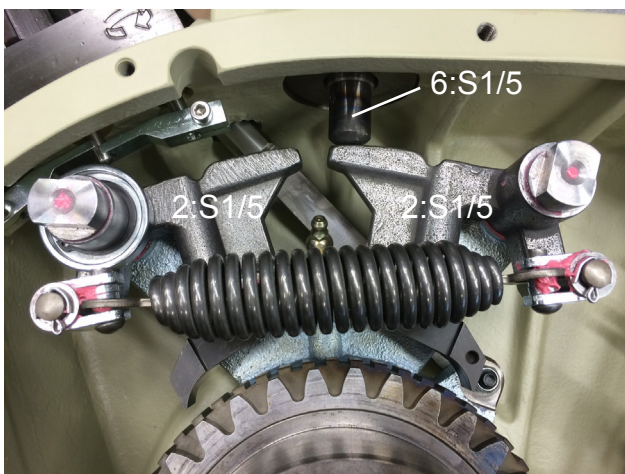


Figure 4

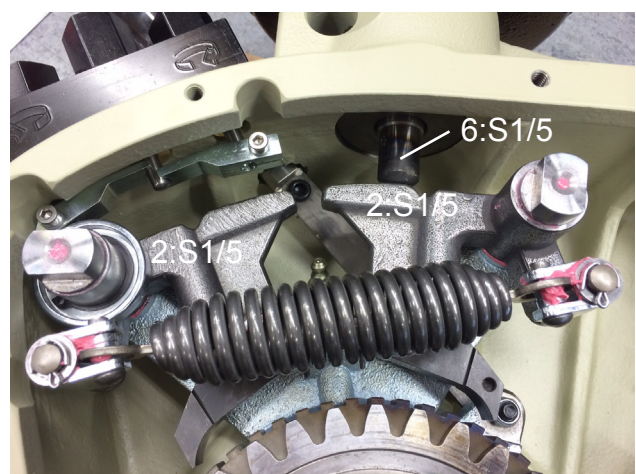


Figure 5

Adjustment of the Indicator Bridge

After the actuator has been mounted on the valve, the indicator bridge must be synchronized to the valve ends, not only to get the latches to mesh and get indications of signals, but also in order to prevent damages to the bridge.

The actuator is normally delivered with the gear wheel (3:S1/52) unmounted, see figure 6. If the actuator is delivered mounted on a valve, the bridge mechanism and indicating switches will be preset before dispatch.

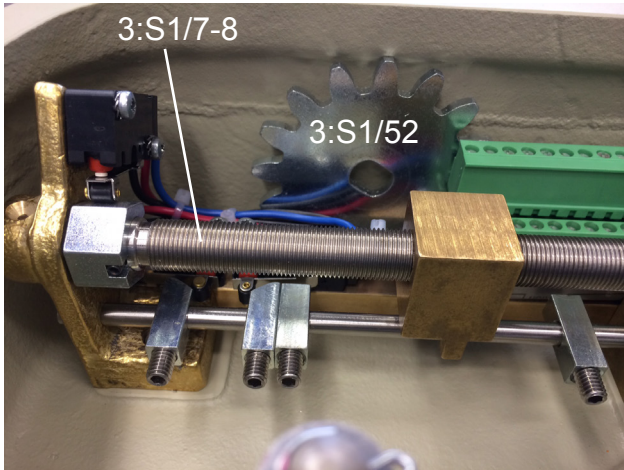


Figure 6

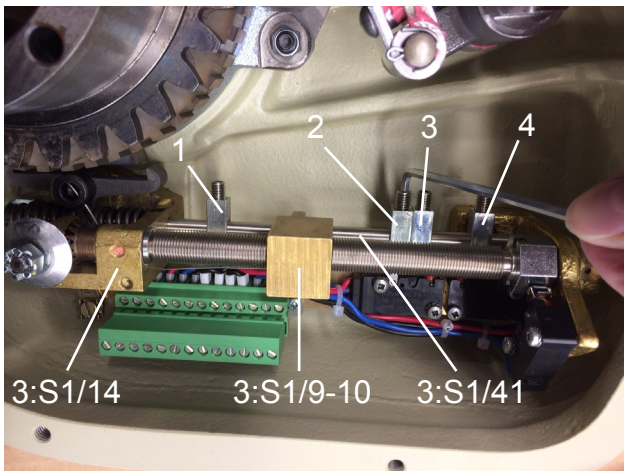


Figure 7

Indicator bridge 175, 100 and 050

WARNING!

Risk for injuries caused by crushing/squeezing and electrical shocks when the actuator is energized by air pressure and electricity with its cover off. Before opening, check that the compressed air and possible power supply are disconnected. The cover should be mounted when the actuator operates.

1. Remove the cover.
2. Close the valve entirely.
3. Undo the two stops No. 1 & 2 closed to the slide block (3:S1/9-10), so that it can move freely within the whole range. Figure 6 shows the adjustment of the stops. Damage could occur if the slide block runs against the stops 1 & 2 moving them more than 3,2 mm.
4. Make sure that the slide block stands close to the bracket (3:S1/14), so that there is space enough on bridge spindle for valve to open, figure 7.
5. Bring over the shaft (3:S1/41) about 3 mm against bracket (3:S1/14), so that the latch (3:S1/26) figure 2, is turned in a suitable position to grasp the catch (2:S1/12). Suitable tool: Seeger circlip pliers.
6. Bring the stop No.1 between the slide block and the bracket (3:S1/14) towards the slide block and screw on tightly.
7. Put the bridge gear (3:S1/52) in place.
8. Open the valve entirely, and check that the slide block can move freely within the whole range, figure 3 shows the slide-block (3:S1/9-10) in open valve position.
9. Bring over the shaft (3:S1/41) in the opposite direction (about 3 mm) and fasten the stop No.2 by screws after having been brought towards the slide block.
10. Adjust the other two stops, (3 & 4), so that the micro-switches are actuated at the end positions of the valve.
11. Fit the cover and tighten the screws.

Indicator Bridges 175S, 100S and 050S

These indicator bridges will be delivered without the screw (3:S1/31), and the bridge turned so that the bridge gears (3:S1/48 and GDS1:1+GDD2:1/5) do not mesh. The bridge is fastened by screws in place, after the valve is closed entirely and the instructions given for the types 175, 100 and 050 above have been carefully observed.

The actuator is now synchronized to the valve. Should the actuator ever be removed from the valve, synchronization must be checked after re-installation.

The bridge is just an indicating and control device and is not intended to "stall out" the actuator.

Maintenance

The actuator is provided with two lubrication nipples for a grease gun. When the actuator is in regularly daily operation, lubrication should be performed at intervals of some weeks. It is to be borne in mind however that the intervals of lubrication are dependent on local conditions, for example, the frequency of operation, the temperature and surrounding atmosphere etc.

If the actuator is used only infrequently, it should be lubricated with grease which doesn't get hard, or change viscosity when in contact with the surrounding atmosphere. The lubrication of the actuators in this case could be carried out during normal maintenance on the other equipment. It is recommended that the actuator is inspected at regular intervals for preventative purposes.

It is not possible to give general instructions as to the intervals of inspection, as these are dependent on local conditions. We would suggest the following points could be checked, and if necessary, lubricated with some drops of oil.

- 1) Spindle thread and axle journals of the indicator bridge.
- 2) The oil holes of the axle journals, 2:S1/ 4+20
- 3) The pin for the draw-spring, 2:S1/6
- 4) The case for the ratchet spring, 2:S1/2
- 5) The stop shoulder, 2:S1/18

Transport and storage

Keep the actuator in the original packaging until use. The actuators shall be stored at room temperature and protected from dirt and humidity. Air connections must be plugged. For long storage, exercise actuators annually.

Trouble shooting

WARNING!

Risk for injuries caused by crushing/squeezing and electrical shocks when the actuator is energized by air pressure and electricity with its cover off.

1. Check that air supply is available at the actuator and that the pressure does not vary too much (See Page 2, Installation).
2. Check the actuator for functional faults. Remove the cover and make an ocular inspection. Open and close the valve. It is very important that the increased starting torque is correctly adjusted. Check that the console (2:S1) operates accordingly to the torque diagram (see technical data sheet).

The motor shaft shall actuate outer part of the operating lever. If not, see Adjustment of Indicator Bridge (Page 5).

3. If the motor (6:S1, 7:S) does not operate: Disconnect the air pipe between motor and steering valve (4:S).

If air flow to the motor is blocked: Check the steering valve. Push the levers (4:S/10 & 13) and at the same time pressurize the inlet port (4:S/9). The shafts (4:S/3) should be pushed in about 1,5 mm when the turning direction changes. If not, then the setting position of the levers on the shafts should be adjusted with screw 4:S/7.

4. If the levers (2:S1/5) hook up on the motor shaft (6:S1/5 or 7:S/5) by a change over operation, this depends on an instantaneously change over operation. The operating cylinder (GDS1:1/12) has started to change over the turning direction from open to close or vice versa, before the motor has vented and the shaft fully returned to its outer position. This can be cured like this:
 - a) Try to avoid instantaneously change over operations, by allowing a mean time of 1 to 2 seconds to vent the control valves.
 - b) Fit the motor with a quick exhausting valve.
 - c) Introduce some kind of a change over signal time delay.

5. If air blows through the front port of the diaphragm casing (6:S1/1), the diaphragm is bursted. Change diaphragm according to instruction.

6. If the motor operates very quick but with short strokes: Close the needle valve (GDS1:1/19). Then slowly open until the motor operates normal. If this doesn't help, there is probably dirt in the valve mechanism (6:S1/ and 7:S/17-30).

Unscrew the valve casing (6:S1 and 7:S/31). Carefully take out and clean the valve mechanism. Be careful when cleaning the rubberized valve seats. If the motor does not operate and air blows through the rear exhaust port, carry out the same procedure as described above for cleaning the valve mechanism.

7. Try to manually operate the valve and make sure it does not seize or jam. Eventually the valve stem might have seized or the stem gland is over tightened.

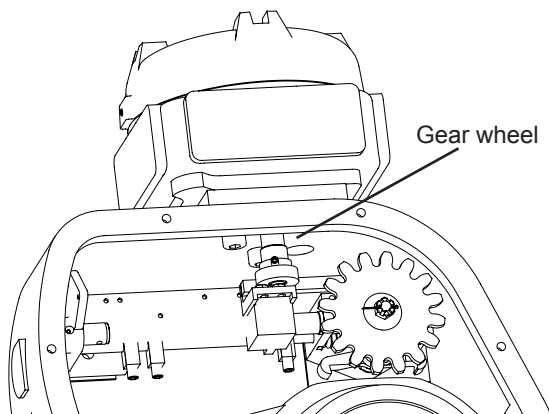
Twin Power actuators in ATEX executions

CE 0575  II 2 GD

Twin Power is ATEX certified in two executions. One with mechanic indicator bridge and switch box 1990 and one without indicator bridge but with gearbox and switch box 1990.

Surface temperature	
Ambient temperature °C	Temperature class
70	T6
90	T5
125	T4
150	T3

Twin Power with mechanic indicator bridge and switch box 1990



Adjustment of switch box 1990

1. Dismount the lid.
2. Move the small gear wheel (see Fig above) sideways.
3. Follow point 2 to 9, page 5.
4. Close the valve.
5. Adjust the limit switch (for closed position) of the switch box according to the instruction for the 1990 box.
6. Move the small gear wheel back.
7. Open the valve.
8. Adjust the limit switch (for open position) of the switch box according to the instruction for the 1990 box.
9. Remount the lid.

Twin Power with gearbox and switch box 1990

Switch box 1990

When the actuator is mounted on the valve, possible limit switches of the switch box, position transmitter and visual indication shall be synchronised with the open and closed valve position.

If the customer, at the registration of the order, has specified the number of turns of the valve, this will be factory preset. Only control and fine adjustment has to be done in this case.

If the number of turns is not specified, or if factory preset is unwanted, the equipment will be delivered with only a functional test done. A complete adjustment has to be done.

Control and fine adjustment of box 1990

The limit switches are the primary indication of the box. In cases where limit switches are not used, the position transmitter of the box is the primary indication.

In cases where visual indication is used, caution shall be taken to avoid the hand to exceed the endpoints of the scale in any occasion. If this happens the hand and the through shaft can be damaged.

Fine adjustment of box **with** limit switches:

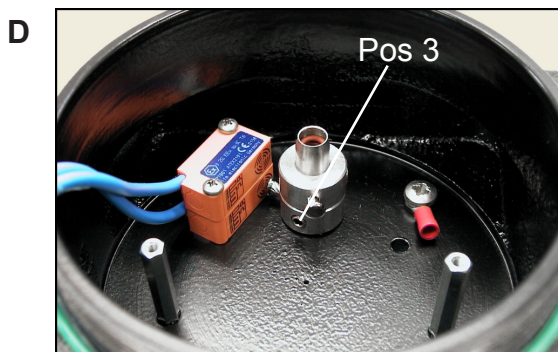
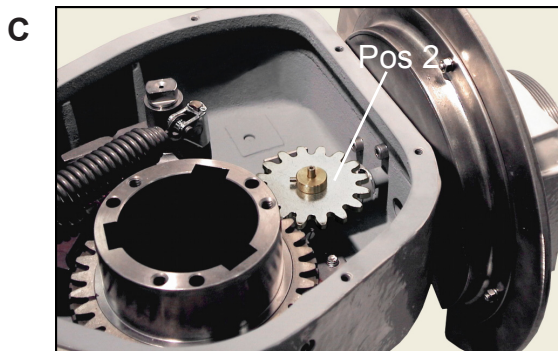
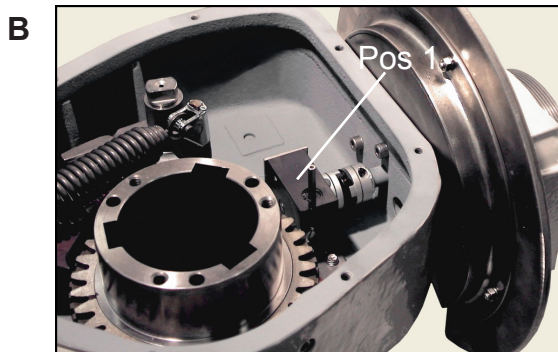
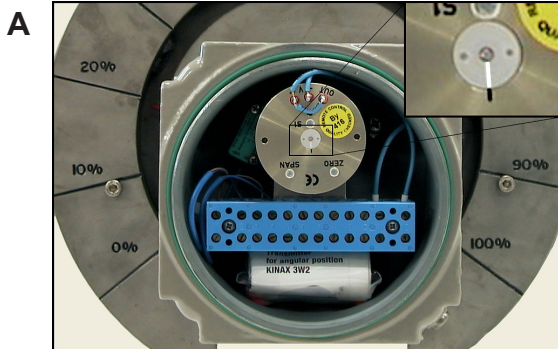
1. Make sure the valve is fully closed.
2. Attach suitable indication equipment to the limit switch in the box indicating the closed position (view wiring diagram sent with the box).
3. Turn the input shaft of the gearbox anticlockwise to the position where the limit switch start to indicate. View Figure B, pos. 1.
4. Mount the gear on the input shaft of the gearbox. View Figure C, pos. 2.

Fine adjustment of box **without** limit switches:

1. Make sure the valve is fully closed.
2. Attach suitable indication equipment to the position transmitter (view wiring diagram sent with the box).
3. Turn the input shaft of the gearbox anticlockwise to the position where the position transmitter starts to indicate closed position (normally 4.00 mA). View Figure B pos. 1.
4. Mount the gear on the input shaft of the gearbox. View Figure C pos. 2.

Complete adjustment of box 1990

The limit switches are the primary indication of the box. In cases where limit switches are not used, the position transmitter of the box is the primary indication. In cases where visual indication is used, caution shall be taken to avoid the indicator to exceed the endpoints of the scale in any occasion. If this happens the indicator and the through shaft can be damaged.



1. Make sure that the valve is fully closed.
2. To adjust the limit switches, the position transmitter need to be dismounted. If limit switches are not used, please continue at point 13.
3. Dismount the position transmitter by unscrewing the two screws holding the connection terminal in the box. Move the connection terminal sideways with the cables still attached. Pull the position transmitter carefully straight out until it is released.
4. Attach suitable indication equipment to the limit switches in the box indicating the closed and open position (view wiring diagram sent with the box).
5. In cases where visual indication is used, turn the input shaft of the gearbox (Figure B) to the position where the red indicator points at closed position, i.e. 0%.
6. Adjust the cam of the limit switch indicating closed position by loosening the socket head cap screw (Figure D pos. 3) and turning the cam anti-clockwise to the position where the limit switch starts to indicate. Fasten the cam in this position.
7. Mount the gear on the input shaft of the gearbox in the way that it is free to rotate without touching the hub of the actuator. Mark the position of the gear with a marker.
8. Rotate the gear clockwise the number of turns the valve need to open, times two. 10.25 turns of the valve gives 20.5 turns of the gear etc.
9. Adjust the cam of the limit switch indicating open position by loosening the socket head cap screw (Figure D pos. 3) and turning the cam clockwise to the position where the limit switch start to indicate. Fasten the cam in this position.
10. In cases where visual indication is used, the hand should now be pointing at open position, i.e. 100%.
11. Rotate the gear anti-clockwise back to the exact closed position and check the number of turns of the valve.
12. Make sure that the marks on the backside of the position transmitter are lined up (Figure A). Put the position transmitter back into the box by pushing its shaft into the O-ring provided hole in the shaft of the box. Remount the terminal block and check that the position of the position transmitter has not changed.
13. The position transmitter shall be adjusted with its marks lined up (Figure A) and possible limit switches and visual indication shall show closed position.
14. Attach suitable indication equipment to the position transmitter and possible limit switches (view wiring diagram sent with the box).
15. Adjust the output signal from the position transmitter for closed position (i.e. 4.00 mA) by turning the screw underneath the protection plug marked with "ZERO" on the position transmitter (Figure A). Use a small flat screwdriver.
16. See point 7.
17. Rotate the gear clockwise to the position where the limit switch indicate open position. In cases where limit switches are not used, see point 8.
18. Adjust the output signal from the position transmitter for open position (i.e. 20.00 mA) by turning the screw underneath the protection plug marked with "SPAN" on the position transmitter (Figure A).
19. Repeat point 15 and 18 a couple of times until a stable output signal is received from the position transmitter.
20. Rotate the gear to closed position and mount it according to Figure C.
21. Try to manually operate the actuator and check the signals.

We reserve the right to
make changes without notice

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Ref No 661C / Art No 980661



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