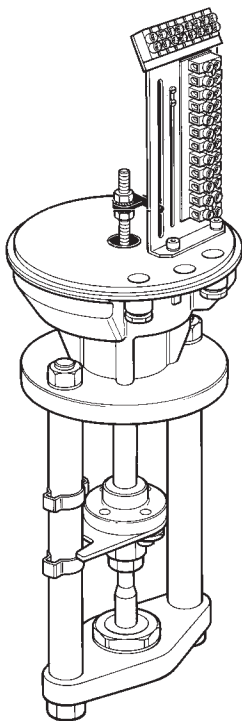

Spiratrol EL5000 Series Electric Linear Actuators

Installation and Maintenance Instructions



- 1. General*
- 2. Installation*
- 3. Commissioning*
- 4. Maintenance*

1. General

1.1 Use

Spiratrol EL5000 series electric linear actuators are intended for use with all KE, R and Q series two-port and three-port valves. Actuators will normally be supplied fitted to the control valve. When supplied separately, ensure the actuator selected is capable of giving the force necessary to close the two-port or three-port valve against the maximum expected differential pressure. See appropriate technical information sheet for full details.

EL5000 series actuators are available with either a pulsed input or with an inbuilt electronic positioner. In both cases, 220 / 240 volt and 24 Vac options are available. Also available is a special spring reserve actuator to return the valve to a safe position in the event of power failure. Full details of the actuator types, and reference numbers, are given in the table below.

1.2 Operation

The rotating motion of the motor is transmitted on to a bushing with an internal thread. The upper section of the driving rod with an appropriate external thread screws into this bushing. The driving rod moves in and out of the bushing depending on the direction of motor rotation. The threaded bushing runs against a spring unit. The motor is switched off by means of a load dependent or travel dependent switch. The load dependent switch is also activated if an obstacle becomes jammed between the plug and seat. Actuator damage is hence prevented.

1.3 Manual operation

The actuator can be switched over to manual operation when the motor is at a standstill. This is done by pulling the coupling lever and at the same time turning the handwheel to the left or right until it is felt to engage.

1.4 Available types

Actuator operation	2-port and 3-port
Power open and close 220 / 240 Vac	EL5010 - EL5050
Power open and close 24 Vac	EL5011 - EL5051
Power open and closed with electronic positioner 220 / 240 Vac	EL5010P - EL5050P
Power open and closed with electronic positioner 24 Vac	EL5011P - EL5051P
Spring Return 220 / 240 Vac	EL5060
Spring Return 24 Vac	EL5061

On all but the spring return actuators, a manual operation device is supplied as standard. See Section 1.3 for details.

2. Installation

See also separate Installation and Maintenance Instructions for the control valve.

2.1 Location

The actuator should be installed in such a position as to allow full access to both actuator and valve for maintenance purposes see Figure 1. There must be room to remove the actuator cover. The actuator can be mounted in any position **except** with the actuator under the valve.

The maximum ambient temperature which the actuator will withstand is + 60°C. Insulate valves etc. to reduce ambient temperature. If condensation is likely to occur within the actuator, models with an inbuilt heater unit are available.

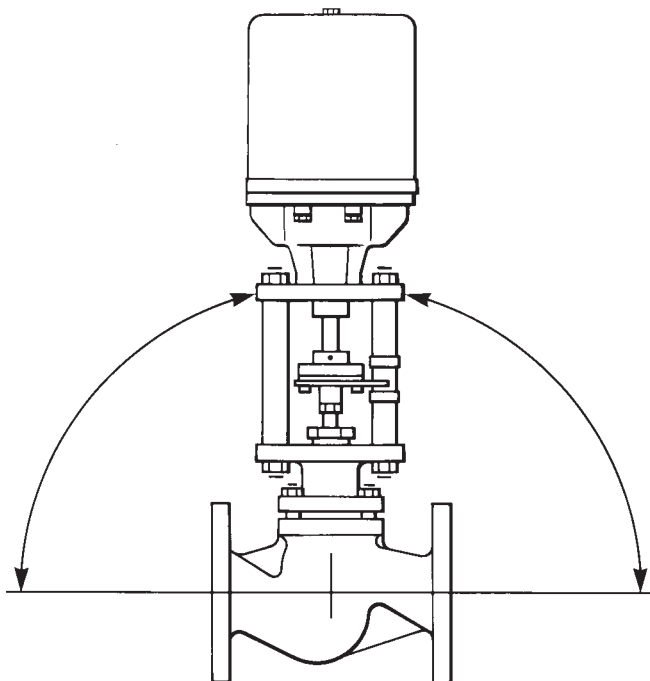


Fig. 1

Connecting actuator to valve

Normally the EL5000 actuators will be supplied already fitted to the valve. However, should it be necessary to remove or fit an actuator, the following procedure should be adopted.

2.2.1 EL501.. to EL503.. actuators

For the following instructions refer to Figure 2.

1. Fully retract the valve stem and offer the actuator to the valve.
Ensure that the threaded bushing (1) is just past the end of the valve stem. If not manually adjust the position of threaded bushing using the handwheel (see Section 1.3). Once this has been done the valve stem can be lowered so the valve plug moves on to its seat.
2. Remove the two hexagonal socket screws (2) which retain the anti-rotation plate (3) and lightly loosen the remaining two screws.
3. Slip the anti-rotation guard over the valve stem and screw the lock-nut (4) on to the valve stem.
4. Lift the actuator on to the valve and tighten the retaining nuts (5).
5. Extend the valve stem to meet the threaded bushing (1) and screw the bushing on to the valve stem, a minimum amount corresponding to 1 valve stem diameter. When fitting the actuator make sure the valve plug doesn't turn while pressing on the seat.
6. By use of the handwheel move the valve up and down its full stroke and ensure there are no encumbrances, particularly (6). If (6) stops the valve from moving to the fully closed position, the valve stem will need to be extended by unscrewing the valve stem from the bushing until the full stroke is achieved.
7. Refit the anti-rotation guard and tighten all screws. Also lock the valve stem to the threaded bushing by means of the lock-nut.
8. The valve can now be electrically driven over the full stroke and the indicators (7) can be set to show the open and closed positions.

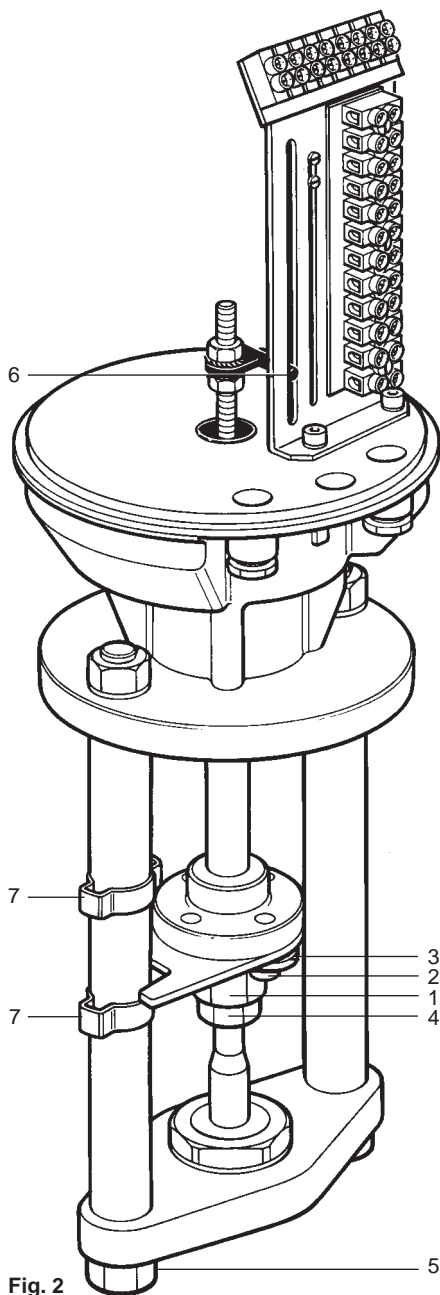


Fig. 2

2.2.2 EL505.. actuator and all positioner types.

The actuator is mounted on the valve in a similar manner to Section 2.2.1. Steps 1 to 5 only.

For the following instructions refer to Figure 3.

6. With the valve at 50 % open the lever (1) should be parallel to the actuator base. This can be achieved by adjustment to the threaded bushing.
7. Set the glider (2) to the mark which corresponds to the valve travel. The glider is then tightened in this position. Table 2 at the back of this IMI shows the travel for each valve.
8. Manually drive the actuator through its full stroke and ensure the slotted levers do not hit up against the actuator body.
9. Follow instructions from Section 2.2.1 Steps 7 and 8.

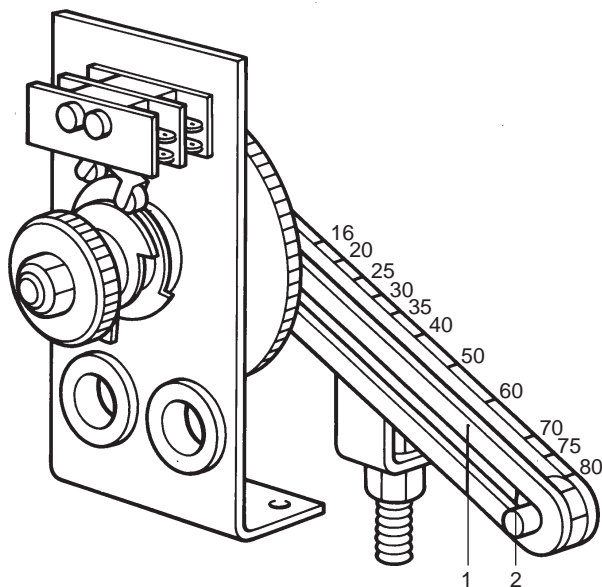


Fig. 3

2.2.3 EL560.. actuators

Because this actuator has a spring reserve facility it is necessary to disable the spring action before the actuator can be mounted to the valve.

1. Connect a live and neutral to terminals 40 and N respectively.

For the following instruction refer to Figure 4.

2. Retract the actuator spindle using the commissioning switches (1) on the underneath of the actuator body.
3. Remove the two hexagonal socket screws (2) which retain the anti-rotation plate (3) and lightly loosen the remaining two screws.
4. Slip the anti-rotation guard over the valve stem and screw the lock-nut (4) on to the valve stem.
5. Lift the actuator on to the valve and tighten the retaining nuts (5).
6. Extend the valve stem fully to meet the threaded bushing (6) and screw the bushing on to the valve stem, a minimum amount corresponding to 1 valve stem diameter. It may be necessary to lower the bushing to meet the valve stem. When fitting the actuator make sure the valve plug doesn't turn while pressing on the seat.
7. Refit the anti-rotation guard and tighten all screws. Also lock the valve stem to the threaded bushing by means of the lock-nut.

Note: Do not drive the valve continually up and down until full commissioning has taken place see Section 3.

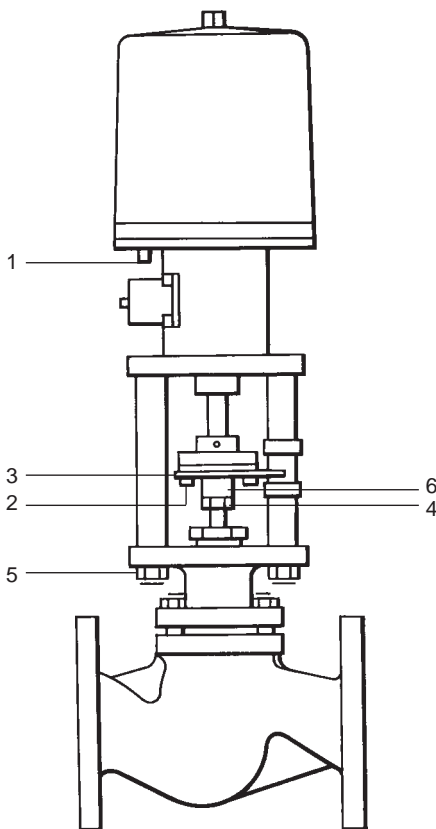


Fig. 4

2.3 Fitting accessories to actuators

Accessories will normally be fitted to the actuator. However, should it be necessary to fit or remove any of the accessories, the following procedure should be adopted.

Using the Table below, check that the accessory is compatible with the actuator which it is to be fitted.

Table 1

Actuator type	Accessory type							
	EL5801	EL5802	EL5803	EL5804	EL5805	EL5806	EL5807	EL5808
EL5010 to EL5030 and EL5011 to EL5031	*	†			
EL5050					
EL5010P to EL5050P and EL5011P to EL5051P						
EL5060 & 5061			

* Only available in conjunction with EL5801 and EL5802.

† Only available in conjunction with EL5802.

2.3.1 Fitting the EL5801 and EL5802.

For the following instructions refer to Figure 5.

1. Fit the L shaped carrier bracket (1) onto the actuator spindle.
2. Locate the gear train assembly onto the actuator and fix using the hex screws supplied.
3. With the valve at 50 % open the Glider (2) at the end, the lever (3) should be parallel to the actuator base. This can be achieved by adjustment to the threaded bushing.
4. Set the glider (2) to the mark which corresponds to the valve travel. The glider is then tightened in this position. Table 2 at the back of this IMI shows the travel for each valve.
5. Manually drive the actuator through its full stroke and ensure the slotted levers do not hit up against the actuator body.

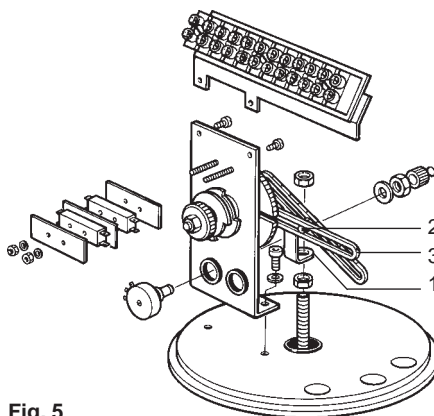


Fig. 5

2.3.2 Fitting the EL5803

The EL5803 feedback potentiometer can only be fitted where a gear train exists (see Table 1).

For the following instructions refer to Figure 6.

1. These instructions assume that Steps 3, 4 and 5 of Section 2.3.1 have been carried out.
2. Ensure the valve is in the closed position.
3. Remove the retaining circlip and gear assembly (4) from the potentiometer.
4. Rotate the potentiometer (5) to the far end of its travel, such that opening the valve moves the potentiometer in the desired direction.
5. Locate the potentiometer into the hole provided and refit the gear and circlip, ensuring the potentiometer meshes correctly with the main gear train.
6. Connect the wires in accordance with the wiring diagram Section 2.4.

2.3.3 EL5804 anti-condense heater

Fitted in accordance with wiring diagram.

2.3.4 EL5805 2 switch pack

The EL5805 auxiliary switches can only be fitted where a gear train exists (see Table 1).

For the following instructions refer to Figure 6.

1. Remove the retaining nuts item (6) and fit switches as shown in the diagram.
2. Ensure that the dividing insulator (7) is fitted between the switches and tighten the retaining nuts.
3. Connect the wires in accordance with the wiring diagram Section 2.4.
4. Drive the actuator to the fully closed position.
5. Loosen the knurled knob item (8) and adjust the cam so it operates the switch. Once the position is set the knurled knob can be tightened.
6. Drive the actuator to the fully open position and set the other switch.
7. Check for correct operation of each switch by driving the actuator fully open and closed.

Note: Switches can be set to operate anywhere along the actuators travel.

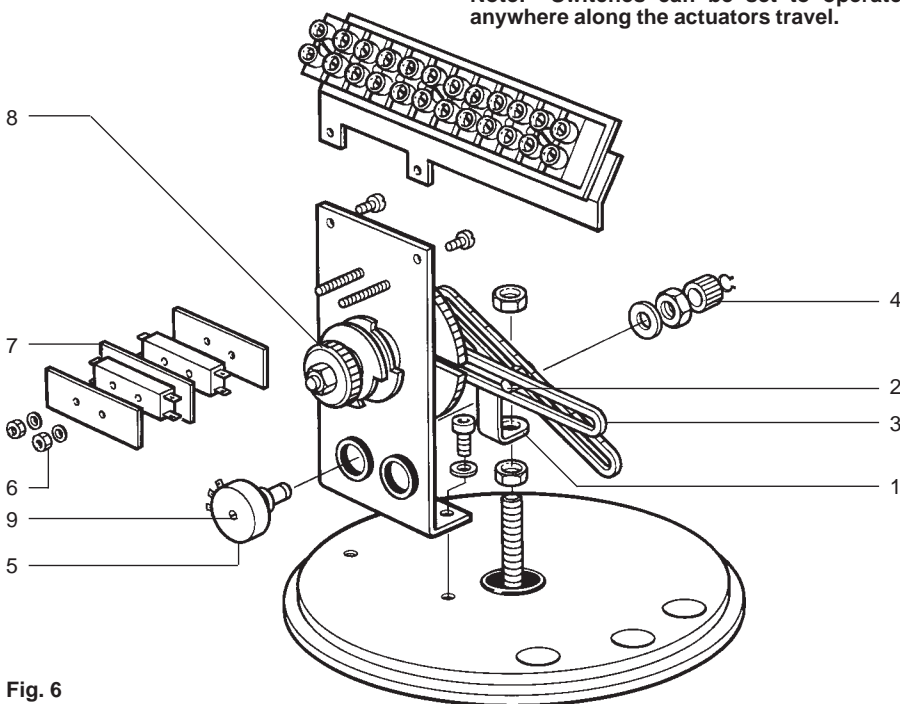


Fig. 6

2.3.5 EL5806 auxiliary switches

For the following instructions refer to Figure 7.

1. Remove the two retaining nuts (1) and slide the two auxiliary switches onto the carrier bolts. Tighten the retaining nuts.
2. Connect the wires in accordance with the wiring instructions Section 2.4.
3. Using the commissioning switches drive the actuator to the fully closed position.
4. With a suitable screw driver set the cam (3) to make the auxiliary switch.
5. Using the commissioning switches drive the actuator to the fully open position and set the cam (4) to make the other auxiliary switch.
6. Run the actuator up and down over its full stroke and check for correct operation.

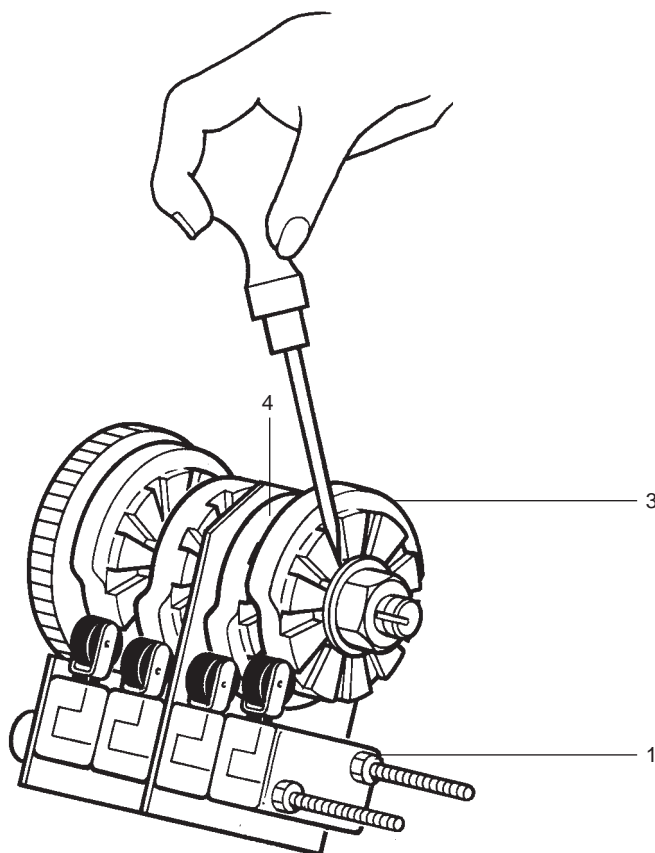


Fig. 7

2.3.6 EL5807 feedback potentiometer

For the following instructions refer to Figure 8.

1. Using the commissioning switches power the actuator closed.
2. Fit the holding studs (1) to the actuator body using the nuts provided.
3. Fit the linkage gear (2) to the potentiometer bracket (3) and turn the gear against the stop.
4. Remove the retaining circlip and gear (4) from the potentiometer (5) and rotate the potentiometer so that the wiper (6) is to the far right hand side.
5. Slip the potentiometer through the hole and refit the retaining clip and gear, ensuring the potentiometer gear meshes with the linkage gear.
6. Fix and mesh the linkage gear (7) with the main actuator gear ensuring the linkage pin corresponds in position to the slot in the linkage gear. (It may be necessary to offer the potentiometer bracket to the fixing studs).
7. Lightly fit the potentiometer bracket to the fixing studs using the screws supplied.
8. Open the valve fully.

9. Slide the potentiometer bracket to give maximum rotation of the potentiometer. Sliding the bracket to the left gives increased rotation for a given valve travel and sliding the bracket to the right reduces the rotation for a given valve travel.

10. Connect the wires in accordance with the wiring diagram Section 2.4.

11. Run the actuator up and down over its full stroke and check for correct operation.

2.3.7 EL5808 feedback potentiometer

The EL5808 feedback potentiometer can only be fitted where an EL5807 feedback potentiometer exists (see Table 1).

1. Using the commissioning switches power the actuator closed.

2. Remove the fixing screws and retract the potentiometer bracket (3) taking note of its position, as shown on the scale.

Follow instructions 4 - 11 Section 2.3.6.

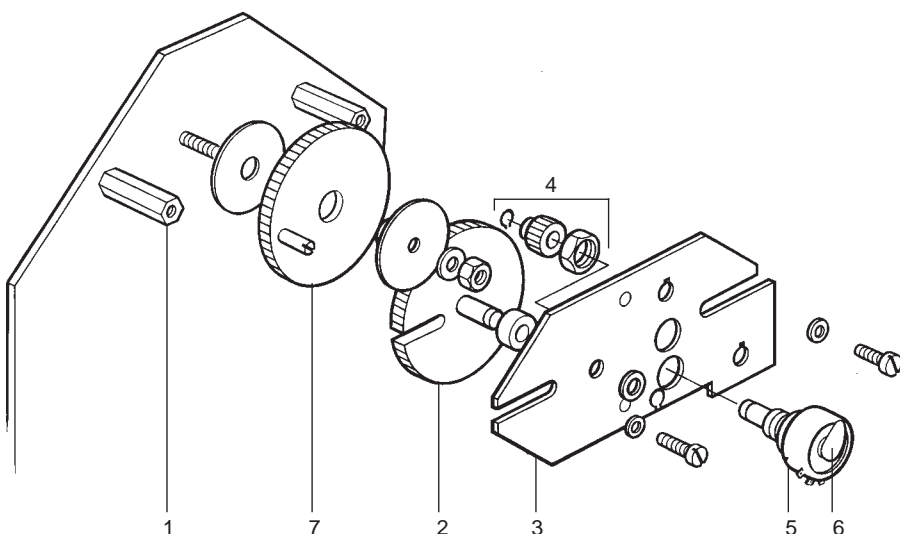
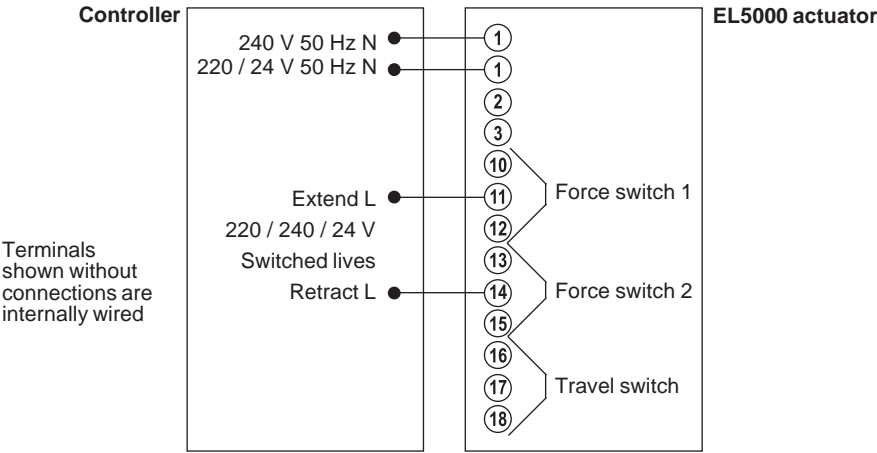


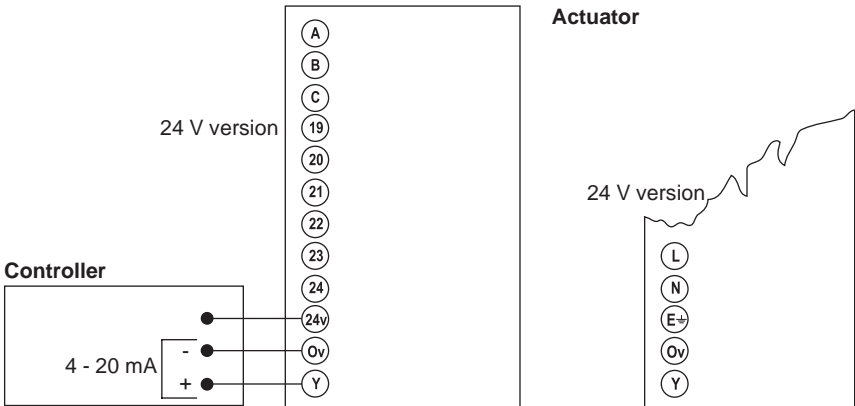
Fig. 8

2.4 Wiring details

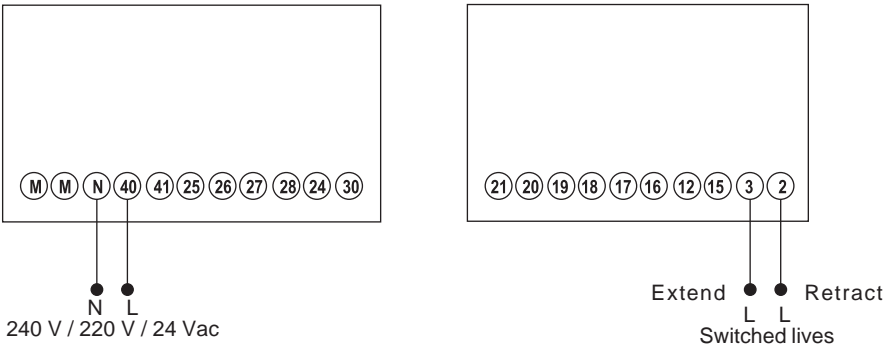
2.4.1 Actuator types EL5010 to EL5050



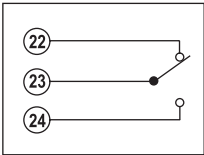
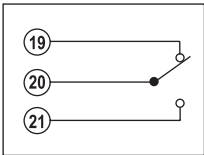
2.4.2 Actuator types EL5010P to EL5050P



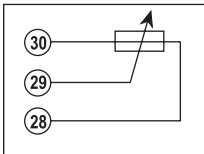
2.4.3 Actuator types EL5060 and EL5061



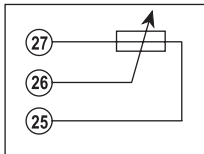
2.4.4 EL5801 and EL5805 auxiliary switches



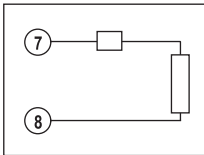
2.4.5 EL5802, EL5803, EL5806, EL5807 and EL5808 feedback potentiometers



1 000 Ω feedback
potentiometers

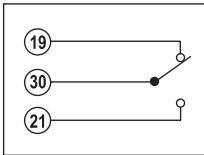
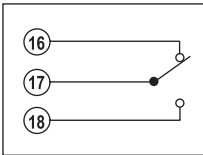


2.4.6 EL5804 anti-condense heater



Anti-condense heater

2.4.7 EL5806 auxiliary switches



3. Commissioning

Normally the EL5000 actuators will be supplied already commissioned. However, should it be necessary to commission an actuator, the following procedure should be adopted.

Note: Torque switches are factory set and should never be be adjusted.

3.1 Preliminary checks - All actuators

1. Check that the actuator voltage corresponds to that required.
2. Ensure the wiring corresponds to that outlined in Section 2.4.

3.2 EL501..to EL503..actuators

For the following instructions refer to Figure 9.

3-port valves - When actuators are fitted to 3-port valves the appropriate closing force is required in both directions.

1. Manually drive the actuator to the fully open position.
2. Ensure the travel switch (8) is above the operating pin (6). This is achieved by loosening the retaining screws and sliding the switch up.
3. The retaining screw should be tightened to hold the travel switch in place.
4. Drive the actuator electrically open and closed making sure the actuator travels through its full stroke.

2-port valves - When actuators are fitted to 2-port valves the closing force is only required in the spindle extend position. By setting the travel switch to the appropriate position, back seating of the valve plug can be avoided thus improving the life of the valve.

1. Manually drive the actuator to the fully open position.
2. Slide the travel switch (8) to the position where the operating pin (6) makes the switch. This is achieved by loosening the retaining screws and sliding the switch to the appropriate position.
3. The retaining screw should be tightened to hold the travel switch in place.
4. Drive the actuator electrically open and closed making sure the actuator travels through its full stroke and that the travel switch operates prior to the torque switch on spindle retraction.

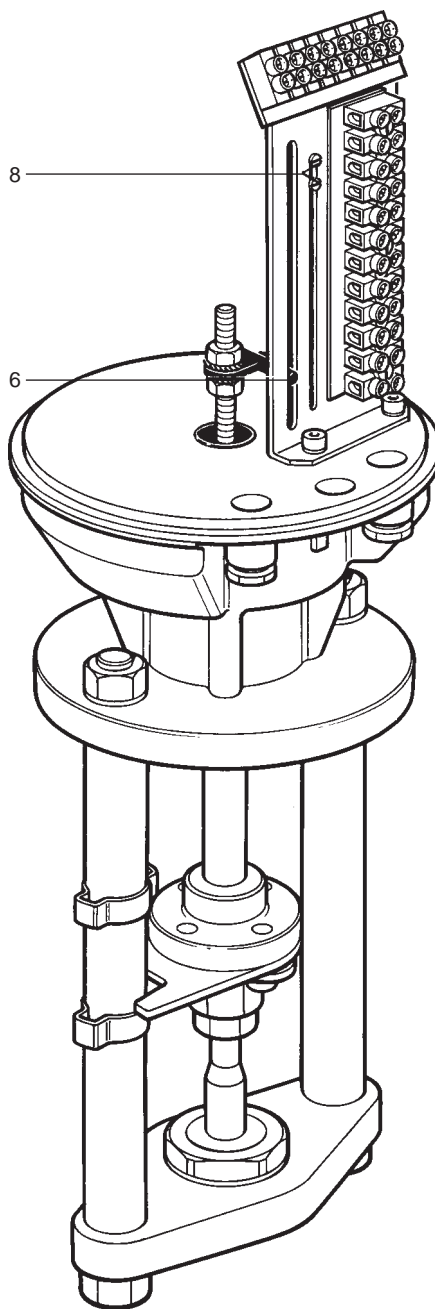


Fig. 9

3.3 EL505.. actuators

For the following instructions refer to Figure 10.

3-port valves - When actuators are fitted to 3-port valves the appropriate closing force is required in both directions.

1. Manually drive the actuator to the fully open position.
2. Loosen the knurled knob item (8) and adjust the cam so it is clear of the switch. Once the position is set the knurled knob can be tightened.
3. Drive the actuator to the fully closed position and check the travel switch is not operated.
4. Drive the actuator electrically open and closed making sure the actuator travels through its full stroke and that the travel switch does not interrupt the actuator movement.

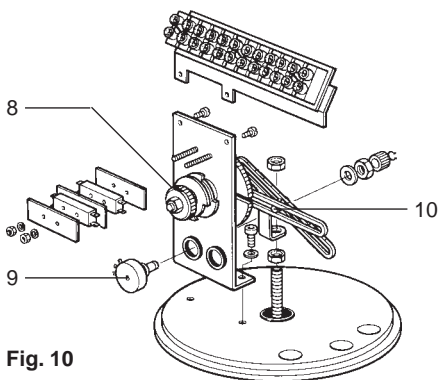


Fig. 10

2-port valves - When actuators are fitted to 2-port valves the closing force is only required in the spindle extend position. By setting the travel switch to the appropriate position, back seating of the valve plug can be avoided thus improving the life of the valve.

1. Manually drive the actuator to the fully open position.
2. Loosen the knurled knob (8) and adjust the cam so it operates the travel switch. Once the position is set the knurled knob can be tightened.
3. Drive the actuator to the fully closed position and check the travel switch is not operated.
4. Drive the actuator electrically open and closed making sure the actuator travels through its full stroke and that the travel switch operates prior to the torque switch on spindle retraction.

3.4 EL501..P to EL505..P actuators


These instructions assume that the actuator has been fitted in accordance with Section 2.2.2 and that a signal of 4 - 20 mA is to be used, although the procedure is the same irrespective of the signal chosen.

1. Set the signal selection switch to match the signal input (see Figure 11)
2. Move the direct acting/reverse acting (DA/RA) switch to the appropriate position. i.e spindle retract on low signal or spindle extend on low signal. (see Figure 12).
3. Inject a 4 mA signal. At this point the actuator may adopt a position partially through its stroke.
4. Adjust the actuator to the end position as dictated by the DA / RA switch. This is done by turning the slotted screw in the potentiometer (9) Figure 10. At this point both red and green lights should be unlit.

5. Increase the signal to 20 mA and the actuator will move to the opposite end of its travel.
6. Ensure that the actuator moves fully through its travel.

Adjustment of the glider (10) Figure 10 will increase or decrease the travel. Again both lights should be out at this stage.

7. Inject a 12 mA signal and the actuator should move to 50 % of its travel and both lights should be out.

 4 mA, actuator spindle retracted
20 mA, actuator spindle extended


 4 mA, actuator spindle extended
20 mA, actuator spindle retracted

Fig. 11


 To set input signal mode
10 V 20 mA 20 V

Fig. 12

3.5 EL5060 and EL5061 actuators

For the following instructions refer to Figure 13.

1. Using the commissioning switches drive the actuator to the fully closed position.
2. With a suitable screw driver set the cam (4) to make the limit switch.
3. Raise the spindle slightly and then run the actuator to the closed position, checking that the limit switch turns off the actuator.
4. To check that the limit switch has been set correctly, drive the actuator closed and then switch off the electrical supply. In this mode the spring reserve will try to shut the valve. If the limit switch has been set correctly then no actuator movement should occur.
5. Using the commissioning switches drive the actuator to the fully open position and set the cam (5) to make the limit switch.
6. Lower the spindle slightly and then run the actuator to the open position, checking that the limit switch turns off the actuator
7. Finally, run the actuator up and down over its full stroke, checking the actuator switches off at the fully open and fully closed positions.

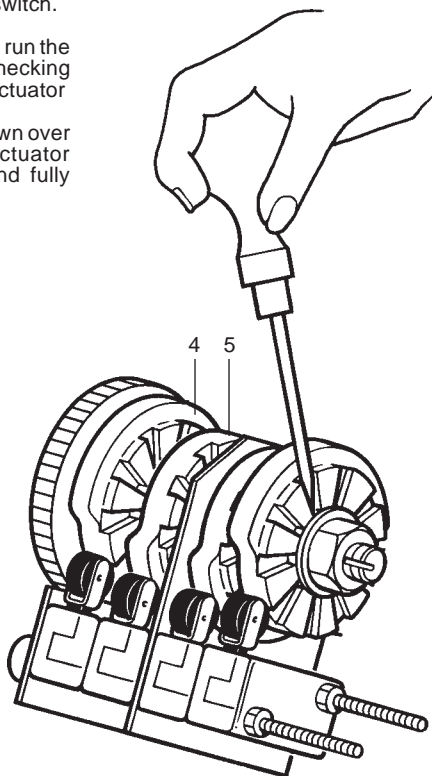


Fig. 13

4. Maintenance

Always make sure that the electrical supply is switched off when carrying out maintenance on the actuator or valve. Guard against anyone attempting to set switching devices when power is switched on the actuator.

Maintenance on the EL5000 series linear actuator amounts only to lubricating the gear. If the actuator is subject to ordinary wear, this should be carried out approximately every three years. If however, the actuator is subjected to greater stress or more frequent operation, then this lubricating process should be carried out after approximately 200,000 double strokes. The recommended lubricant is Kleubar Mikrolube GL261.

The lubricant is available from
Kleuber Lub UK,
Haugh Mills,
Halifax,
W. Yorks,
England.

Table 2

Valve Type	Valve size	Stroke
KE31, 33, 43	DN15 to DN50	20 mm
	DN65 to DN100	30 mm
R and RB33, 43, 63 and 73	DN15 to DN50	20 mm
	DN65 to DN100	30 mm
Q and QB33, 43, 63 and 73	DN15 to DN50	20 mm
	DN65 to DN100	30 mm