



# Hydraulic actuator CENTORK 4H0 and 4H1 Series



**Installation and maintenance  
user's manual**



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### CAUTION

**CENTORK Hydraulic actuators are a high value devices. In order to prevent damage in their handling, setting and use it is essential to follow and observe all the points in this user manual, operate under actuators' designated use, and observe health and safety rules, standards and directives, as other national regulations as well.**

**CENTORK hydraulic actuators must be handled with care and caution.**

### IMPORTANT NOTE

**The contents in this manual is subject to change due to the quality improvement without individual notice**



## **1. CENTORK HYDRAULIC ACTUATORS**

The hydraulic actuator is a device designed to be coupled to a general purpose industrial valve to carry out its movement. The movement is stopped by limit switching or by torque (thrust) switching.

## **2. SAFETY INSTRUCTIONS**

The scope of this manual is to enable a competent user to install, operate, adjust and inspect a CENTORK hydraulic actuator. These instructions must be observed, otherwise a safe operation of the actuator in no longer warrantee.



**As electric device, during electrical operation certain parts inevitably carry lethal voltages and currents (ELECTRICAL RISKS). Work on the electrical system or equipment must only be carried out by a skilled electrician himself or by specially instructed personnel, in accordance with the applicable electrical engineering rules, health and safety Directives and any other national legislation applicable.**



**Hydraulic devices are a high powerful apparatus. A negligence handling might cause severe damages to valves, people, and actuator as well. Under no circumstances should any modification or alteration be carried out on the actuator as this could very well invalidate the conditions which the device was designed.**

## **3. TRANSPORT AND STORAGE**

### **3.1 Transport**

- CENTORK hydraulic actuators must be transported in sturdy packing. During transport measures should be adopt in order to prevent impacts, hits. CENTORK delivers its actuators ex-work.
- Hits or impacts against wall, surfaces or objects might cause severe damage on hydraulic actuator. In this cases, after such events, a technical inspection must be done by CENTORK technicians.
- Do not attach to the handwheel ropes or hooks to lift by hoist.

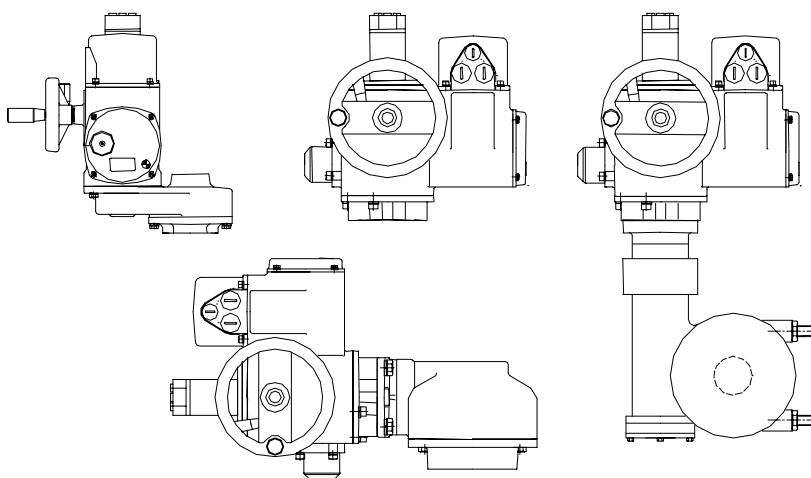
### **3.2 Storage**

- **Store in a clean, cool, dry and ventilated place. For other storage conditions or, and long time periods (More than 5 months) contact to manufacturer.**
- Check that electrical connection cover and switching and signalling unit cover and are correctly closed ant tight.
- Cable entries on electrical connection cover must be sealed. Protection plug supplied by CENTORK are only adequate for storing in dry and ventilated places, for short period of time. In other conditions **protection plug must be replaced with metallic plug sealed with PTFE tape.**
- Do not store the actuator directly on the ground!
- Cover it to protect it from dust and dirt. Cover the machined parts with suitable protection against corrosion.
- Do not handle it by picking it up by the handwheel.
- **Just when commissioning, CENTORK recommend a visual inspection in order to detect any anomaly caused during the transport, and during the storage as well. Checking should include a visual inspection of electric compartment, and switching and signalling unit .**
- For further details, consult the technical sheet 'Conditions for Transport and Storage'.

## 4. CONDITIONS OF SERVICE FOR HYDRAULIC ACTUATORS

### 4.1 Hydraulic actuator: Main description and purpose

- Hydraulic actuator is an apparatus or device formed by a hydraulic motor, coupled to a main gearbox unit, which transmits motion and torque to valves.
- A switching and signalling unit, inside of hydraulic actuator, allows to provide torque and limit switching operation. **Limit and torque switches must be included on the hydraulic manoeuvre in order to prevent overloads on valve and actuator which might cause a fatal damage on valve and actuator, Hydraulic motor are powerful devices.**
- Hydraulic actuators are provided with a declutchable manual override system in order to operate manually in case of emergency or fail of oil supply.
- Hydraulic actuator can be coupled directly to valve, or maybe, through gearbox units (Bevel, spur and worm gearboxes)



### 4.2 Temperature range

CENTORK hydraulic actuators work in a temperature range from  $-25^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ .

### 4.3 Actuator and motor duty service

- Hydraulic actuator has been designed for valve motorization which requires ON-OFF and inching (Modulating) duty service.
- Hydraulic actuator can run continuously at nominal torque. Nominal torque is rated to 50% of max tripping torque (100%), value marked on actuator nameplates. Higher nominal torques can reduce the actuator's service life.
- Max torque is only recommended for short period of time, not exceeding 10% of total operation time.
- Hydraulic motor has been designed to operate under severe conditions, **for technical graphs (Oil flow-Pressure-torque-speed) consult CENTORK.**

### 4.4 IP protection degree

- CENTORK hydraulic actuators are designed in their standard version with IP67 (acc. EN 60.529) environmental protection although IP68 protection may be supplied on request. **IP67 and IP68 protection degree is only guarantee employing proper protection plug and cable gland (For cable entries)**, according to IP degree (See chapter) . It is necessary to observe storing and maintenance rules written on chapter as well.

### 4.5 Painting and protection against corrosion

- As standard, CENTORK has designed three protection degree: Standard protection, P1 and P2. For technical details, consult CENTORK.
- Hydraulic actuator are coated with a epoxy- two components primer (Film thickness depends on protection class selected, actuators are coated with intermediates primers) followed by a polyurethane component paint coat. The standard colour is a centork special green grey. Other colours are possible (Option). Other film thickness under request.

## **5. MOUNTING TO THE VALVE**

### **5.1 Pre-Installation Inspection**

- Verify the actuators nameplate to insure correct model number, torque, operating speed, voltage and enclosure type before installation or use.
- It is important to verify that the output torque of the actuator is appropriate for the torque requirements of the valve and that the actuator duty cycle is appropriate of the intended application

### **5.2 Output size**

Check whether actuator output flange suits the flange of the valve to be driven. The latter should have been designed following the ISO5210 or ISO5211 standard, for standard application, or following the customer's specifications, for special application.

### **5.3 Output type**

Check that the type of flange-coupling of the actuator suits the valve to be driven (diameters and lengths). Those manufactured as Standard at CENTORK follow the ISO5210/5211 standards. Types of output drive:

- Output type A: If not otherwise specified in the order, it is supplied blank. The thread must be machined according to the stem of the valve to be driven. For the dismounting and machining of this type of output, see Appendix . Output type A models can withstand axial loads and torque
- Output type B1, B2, C: It is supplied machined to the dimensions stated in the ISO 5210/5211 or DIN 3338 standard. Output type B and C models cannot withstand axial loads.
- Output type B3, B4: It is supplied blank. For the dismounting and machining of this type of output, see Appendix .

### **5.4 Mounting:**

- Once the size and the type of output match the valve to be driven, we can go on to the following step.
- Degrease the mounting surfaces at actuator and valve thoroughly.
- Slightly grease the input shaft of the valve to be driven.
- Fit the actuator into the valve. In the event of a threaded output (type A), use the handwheel for turning the nut over the threaded stem.
- Do not lift the actuator by the handwheel
- The actuator may be mounted in any position
- Using ISO Class 8.8 quality bolts, fasten crosswise controlling the applied torque according to the table in Appendix

## 6. ELECTRIC AND HYDRAULIC CONNECTIONS



### CAUTION:

When handling electric equipment, take into account the health and safety standards (EN 60204, Direc. 73/23/EEC) and any other national legislation applicable.

Check that the hydraulic motor technical data (pressure drop, power, speed, oil flow...) included in hydraulic actuator datasheet.

When dismantling the electric connection cover, user will find, inside this cover, the electric connection diagram (Label) for this actuator.

- Open the electrical cover
- Feed the cable(s) through the cable glands . Fix proper cable glands according to IP67 or IP68 protection degree.



Figure 6.1



Figure 6.2



Figure 6.3

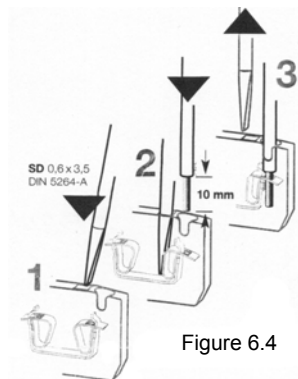



Figure 6.4

### Hydraulic actuator with Plug-socket connectors with screws

- Unscrew the attachment plate from the connection cover.
- With a suitable screwdriver, connect the cables for the control signals according to the electric connection diagram. (Figure 6.1)

### Hydraulic actuator with Terminals connection

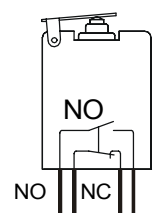
- With a suitable screwdriver (SD 0,6x3,5 DIN 5264-A), connect the cables for the control signals according to the electric connection diagram. (Figure 6.2 and Figure 6.4)

- Connect the earth cable terminal  to the earth connection located inside of electric connection cover (M5 screw hole). Hydraulic actuator has a external bolt in order to connect an external earth terminal.
- Once you have checked that the connections have been properly carried out, close the connection cover and check the proper connection, the state of the o-ring seal and the proper installation of the latter, greasing it slightly. Fasten the 4 screws crosswise.
- Fix proper cable glands according to IP67 or IP68 protection degree. **Replace the protection plug with suitable metallic protection plug sealed with PTFE** . (Figure 6.3) Tighten cable glands and protection plugs to ensure enclosure IP67 (IP68 if applicable).



### CAUTION

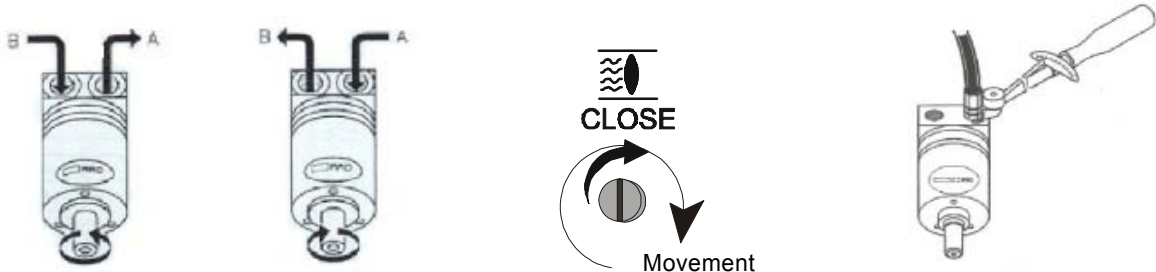
- We recommend to switch off the corresponding contactor/relay always directly by the limit or torque switch (opening and closing). **Torque switches must be included on hydraulic/electric manoeuvre in order to protect actuator and valve from undesired overloads.** Hydraulic motor are powerful devices. Each valve manufacturer decides whether the switching off at both ends is made by torque switching or by limit switching.
- **The maximum delay for switching off the motor with the signal of the torque or limit microswitch cannot exceed 40 ms.**
- Torque and limit microswitches have 1NO+1NC contacts, only the same potential can be connected through both circuits. **For different potentials, two double microswitches must be used.**
- Features of electric and electronic components listed on appendix.





## 6.1 Hydraulic motor connection (oil flow sense)

- Use proper connection devices according to motor screwed connection and motor technical data (See Hydraulic actuator datasheet). **Hydraulic side port have 2 x 1/8" G threw**
- **Check direction of HYDRAULIC MOTOR shaft rotation (Oil flow sense):** When actuator runs to CLOSE direction, U spindle (Switching and signalling unit, see chapter 8) should turn/spin to counter-clock sense and valve should move to close direction too. If shaft rotation is not correct, stop immediately and check it again, maybe hydraulic side port must be reversed.



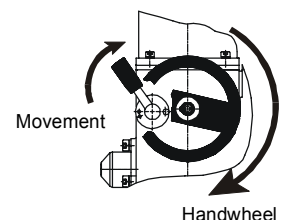
## 7. MANUAL OPERATION

- CENTORK actuators are fitted with a handwheel for the manual actuation of the valve.
- In the case of simultaneous motorised and manual working, the motorised one will always be the preferential one.
- Once the handwheel has been engaged is not possible to disengaged, **the override engagement lever returns automatically to motor position when the motor is operated.**



Engagement of manual operation:

- Turn the change-over lever 20° clockwise while slightly turning the handwheel.
- When you notice an increase in the resistance of the wheel, the manual control is engaged.
- Run the valve in the desired direction. Standard sense of rotation is clockwise to close. For greater operating speed you can connect any powertool, pneumatic or electric, to the hand-wheel shaft. The maximum speed is 150 rpm.



## 8. SETTING AND PRELIMINARY TEST

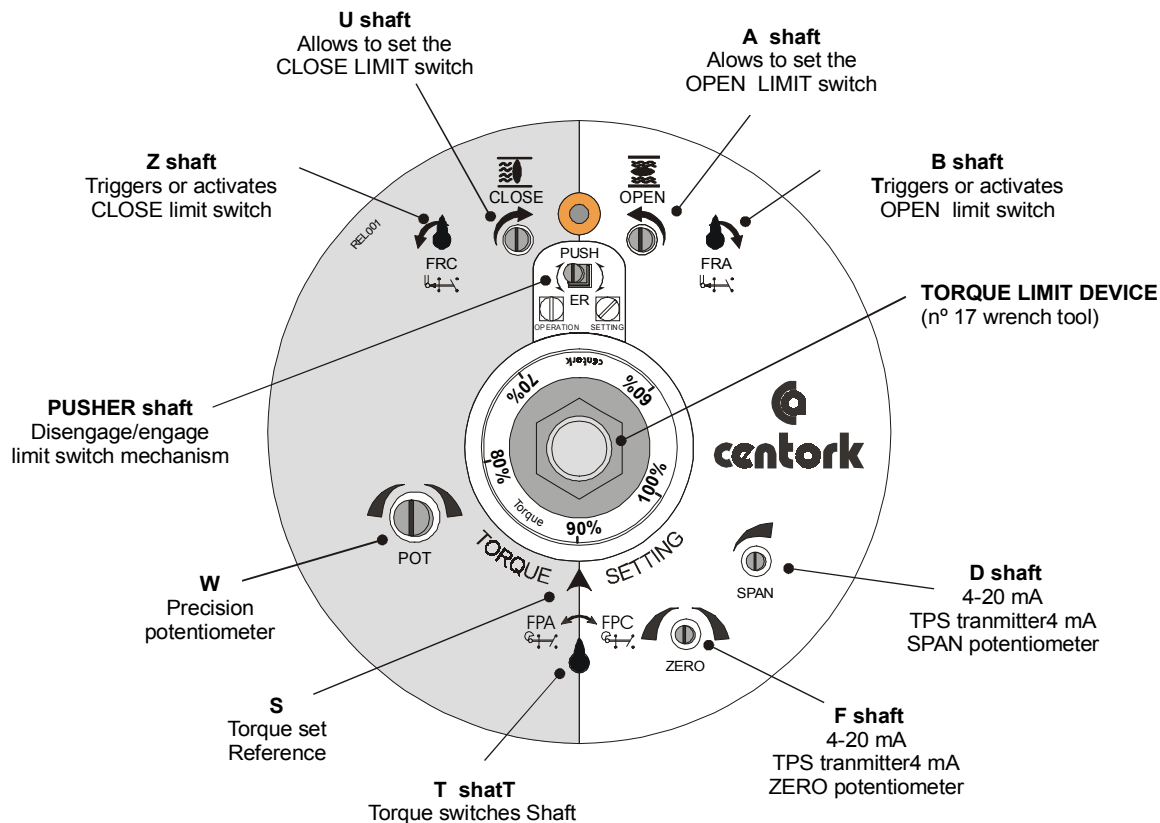
- **Safety rules and standard should be observed (See SAFETY INSTRUCTIONS chapter)**
- Setting and preliminary test can only be done when finished the wiring and mounting on valve. Electric and hydraulic manoeuvre and devices should be ready and checked.
- Both the torque and the limit switches setting must be carried out in accordance with the characteristics of the valve to be driven. **Each valve manufacturer decides whether the switching off at both ends is made by torque switching or by limit switching.**
- **If actuator has been supplied already assembled onto the valve by valve manufacturer, the settings made originally by the manufacturer should NOT be modified on site without the authorisation of the latter, otherwise, serious damage may be caused both to the valve and to the actuator.**



CENTORK recommend to move the valve to an intermediate position manually, -via handwheel device- (according to section 6) in order to execute the test routines described below, avoiding problems due to incorrect routines or user's mistakes.

Just when user finishes a setting routine, covers must be closed, checking their O-ring (Sealing)

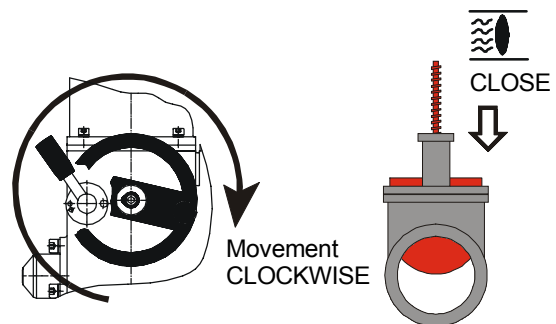
### 8.1 Switching and signalling unit



### 8.2 Sense of rotation actuator and valve

Hydraulic actuator and valve sense of rotation must be the same. Hydraulic actuator sense of rotation criteria is CLOCKWISE TO CLOSE. Sense of rotation is critical for many components (Microswitches, potentiometer, 4-20 mA transmitter). A correct operation cannot be warranty in case of different sense of rotation valve/actuator)

- Operate the hydraulic actuator via handwheel (See Manual operation chapter).
- Check that running the handwheel clockwise, valve moves to close. If the turn direction is not correct, stop immediately and verify.



### 8.3 Sense of rotation actuator and valve

Check hydraulic motor connection: Motor port side should be connected to proper oil flow sense. (See chapter Hydraulic motor connection). Supply oil flow to hydraulic actuator (Close) and verify that valve closes.

### 8.4 Closed position limit switch setting

- Manually turn the valve to the desired CLOSED position.
- Disengaged PUSHER SHAFT: With a suitable screwdriver press the 'PUSHER' selector 3 mm and turn it 45°, ensure that it does not return to its original height (See figure 8.4.1)
- Note: Pusher shaft allow to engage/disengage the switching and signalling unit from hydraulic actuator gears. (Figures 8.4.1 and 8.4.2)

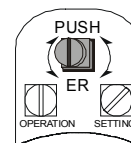


Fig. 8.4.1

Switching and signalling unit engaged to actuator.

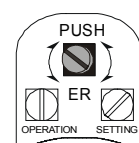


Fig. 8.4.2

Switching and signalling unit disengaged

- Turn U spindle clockwise (Figure 8.4.3) until Z spindle turns Counter-clockwise (At this moment FRC microswitch triggers). Just before FRC microswitch was tripped, Z red arrow should be pointed to vertical: When Z spindle (Red arrow) turns to left the FRC microswitch is tripped.
- If, by accident, it has been carried on turning past the tripping of the FRC microswitch, turn spindle U in the opposite direction (counter-clockwise) until the Z spindle returns vertical (Figure 8.4.5)

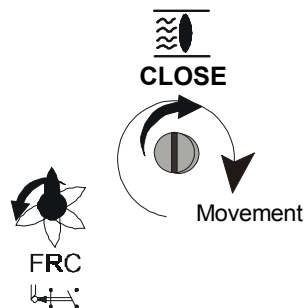


Fig. 8.4.1

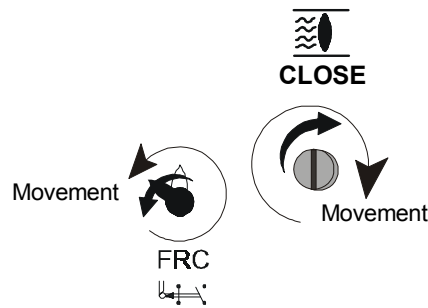


Fig. 8.4.2

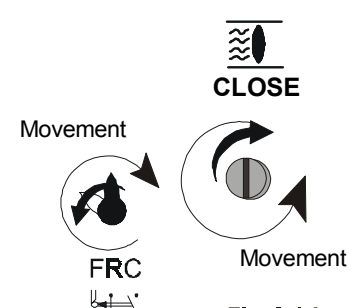


Fig. 8.4.3



- ENGAGE PUSHER SHAFT: Turn back selector 'PUSHER'. Check that go back to its initial position (Figure 8.4.2). **This point is fundamental for the correct setting of the limit switches: Ensure that PUSHER shaft is correctly engaged.**

NOTE: For greater speed in long runs, small electric or pneumatic screwdriver can be used.

### 8.5 Open position limit switch setting

- Manually turn the valve to the desired OPEN position.
- Disengaged PUSHER SHAFT: With a suitable screwdriver press the 'PUSHER' selector 3 mm and turn it 45°, ensure that it does not return to its original height (See figure 8.4.1)
- Turn A spindle Counter-clockwise (Figure 8.5.1) until B spindle turns clockwise (At this moment FRA microswitch triggers). Just before FRA microswitch was tripped, B red arrow should be pointed to vertical: When B spindle (Red arrow) turns to right the FRA microswitch is tripped.
- If, by accident, it has been carried on turning past the tripping of the FRA microswitch, turn spindle A in the opposite direction (clockwise) until the B spindle returns to vertical. Figure 8.5.3)
- ENGAGE PUSHER SHAFT: Turn back selector 'PUSHER'. Check that go back to its initial position (Figure 8.4.2). **This point is fundamental for the correct setting of the limit switches: Ensure that PUSHER shaft is correctly engaged.**

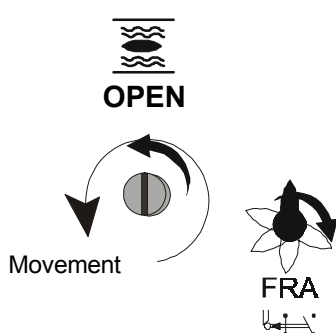


Fig. 8.5.1

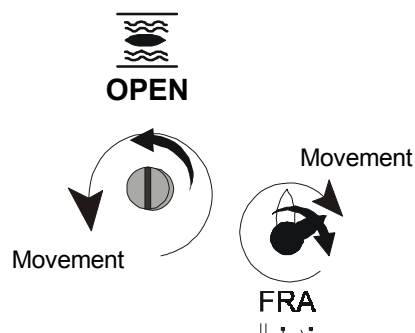


Fig. 8.5.2

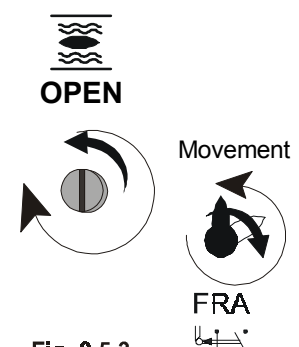


Fig. 8.5.3

### 8.6 Torque switching setting

CENTORK hydraulic actuators leave the factory tested and set for its Max. Torque (100%), as standard. Adjustment torque range is 60% up to 100% of Max. Torque rated on nameplates.



**Guarantee is not valid if the user exceeds this range (60%-100%), or if torque microswitches are not employed.**

### Torque mechanism design

Torque mechanism always acts as soon as actuator output torque exceeds the value set (Torque setting) It is used as protection throughout the whole valve travel and during the limit switch tripping. It also remains active during manual operation, thereby protecting the valve from any torque excess caused by the handwheel.

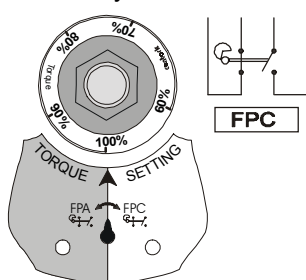


Fig. 8.6.1

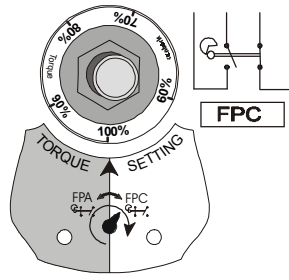


Fig. 8.6.2  
(OverTORQUE)

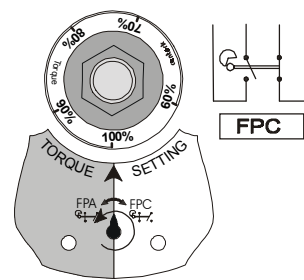


Fig. 8.6.3

- When torque on valve shaft exceeds the value set, e.g. running to close, shaft T turns to the right (Pointing to FPC), at the same time central SHAFT releases (See figures 8.6.1 and 8.6.2). FPC microswitch is tripped.
- Automatically, or when actuator starts running to opposite direction, mechanism returns or resets. Notice that central SHAFT latches again. (Figure 8.6.3)

### Torque setting Procedure

- Using a No.17 wrench, turn the P Torque regulator or Torque Limit Device until the desired torque matches with the arrow S on the dial. (Figures 8.6.4 and 8.6.5)

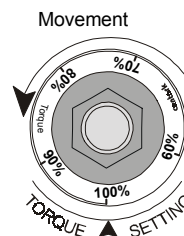


Fig. 8.6.4

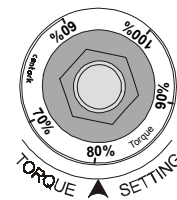
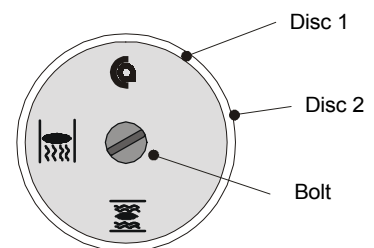


Fig. 8.6.5

### 8.7 Mechanical position indicator setting (optional)

Mechanical Position Indication dial turns between CLOSE and OPEN position depending on the model and valve stroke. This is achieved with the addition of a suitable gearing according to the number of turns per valve stroke. If the latter varies, the gearing must be changed.

- Run actuator to the CLOSED position.
- Unscrew the bolt and turn the dial with the symbol (CLOSED) until it matches with the mark on cover.
- Run actuator to the OPEN position, and proceed exactly with disc containing OPEN symbol.

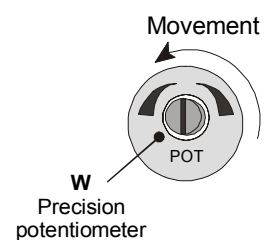


### 8.8 Potentiometer POT setting (optional)

Limit switches must be set before.

Potentiometer is selected according to valve stroke. A suitable gearing unit reduce valve stroke (Number of turns) to less than one turn, this movement is measured by potentiometer located on switching and signalling unit.

- Run the actuator to the CLOSED position.
- With a suitable screwdriver, turn the spindle (W) of the potentiometer POT, counter-clockwise, to its top end.
- Check that potentiometer value is 0 Ohms.
- Run the actuator to the OPEN position.
- Check that potentiometer value reaches its maximum (Ohms)

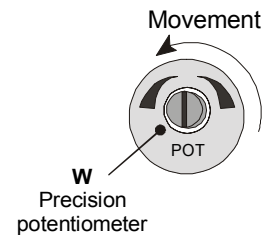


**CAUTION: The potentiometer is a high precision electromechanical device and should be handled carefully. It is necessary to use a suitable screwdriver for its setting.**

### 8.9 4-20 mA transmitter TPS setting (optional)

Limit switches must be set before.

4-20 mA transmitter are selected according to valve stroke. A suitable gearing unit reduce valve stroke (Number of turns) to less than one turn, this movement is measured by potentiometer, and converted to current signal by TPS transmitter. If valve stroke changes, TPS may not work properly.



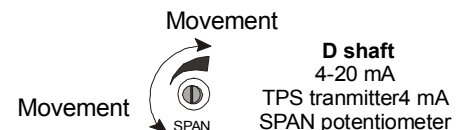
Two type of versions are available:

- 4-20 mA TPS for standard versions: Different configurations are possible: Two wires, three wires and four wires modes.
- 4-20 mA TPS for Hazardous areas versions (EEx). Only two wires mode.



Procedure:

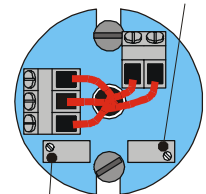
- Run the actuator to the CLOSED position (sensor in minimum signal).
- With a suitable screwdriver, turn the spindle (W) of the potentiometer POT, counter-clockwise, to its top end.
- Adjust the output current with the ZERO (F) trimmer potentiometer until its reading is close to 4 mA
- Run the actuator to the OPEN position (sensor in maximum signal).
- Adjust the output current with the SPAN (D) trimmer potentiometer until its reading is close to the maximum current of 20mA.
- Run the actuator back to the CLOSED position and check that the minimum current is 4 mA. If this is not the case, repeat points 2, 3, 4 and 5 until optimum adjustment values are reached.



### **CAUTION**

**The TPS electronic position transmitter is a high precision electronic device and should be handled carefully. It is necessary to use a suitable screwdriver for its setting.**

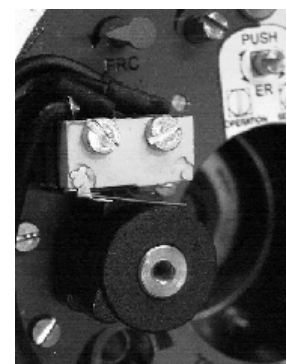
**D shaft : set SPAN**



**FShaft: set ZERO**

### 8.10 Auxiliary microswitches setting (optional)

- When actuator is fitted with a mechanical position indicator, remove its discs with a screwdriver.
- Run the actuator to the position needed to set auxiliary microswitch AUX1
- With a No. 2 Allen key loosen the bolt in the cam corresponding to the auxiliary microswitch AUX1. Turn it cam triggers or trips the microswitch
- Work the actuator in both directions, checking that the microswitch AUX1 correctly switches.
- Repeat points 2 to 4 for auxiliary microswitch AUX2, and AUX3.
- Check that the bolts in each cam are tightened and do not allow the shift of the cam over the cam spindle.
- If the actuator was fitted with a mechanical position indicator, reinstall it.



## **9. MAINTENANCE**

CENTORK actuators are supplied greased from the factory for their lifetime, needing practically no maintenance.

### **9.1 After commissioning**

- Check for damage on paint caused by transport, assembly or handling and repair the damage carefully in order to ensure complete protection against corrosion.
- Make sure that all the o-ring seals are correctly mounted and that the cable glands are firmly fastened, and protection plug for cable entry not used have been replaced with metallic protection plug sealed with PTFE tape, in order to ensure the IP67, IP68 protection.
- The most important condition for reliable service of the CENTORK actuators is the fact of having carried out a correct commissioning and set-up procedure.

### **9.2 Maintenance for service**

CENTORK recommends for a preventive maintenance programme:

Approximately 3 months after commissioning and then every 9/12 months:

- Check the correct tightening of the bolts between the actuator and the valve. Retighten according to section 2 if required.
- Take advantage of each revision to check the proper tightening of the covers, of the handwheel lock and the external electric connection.
- Check cable entries
- Visual inspection inside of switching and signalling, and electrical compartments.
- Contact with valve manufacturer in order to know about maintenance routines of valve.

In the event of infrequent service, perform a test run every 6 months in order to ensure the availability of service of the actuator.

### **9.3 Hydraulic actuator's service life**

- Hydraulic actuator service life is rated to 20.000 cycles.
- Each cycle is formed by an opening manoeuvre (Valve close position to valve open position) and a closing manoeuvre (Valve open position to valve close position).
- 50 turns has been considered as standard valve stroke reference.

## **10. TECHNICAL SUPPORT**

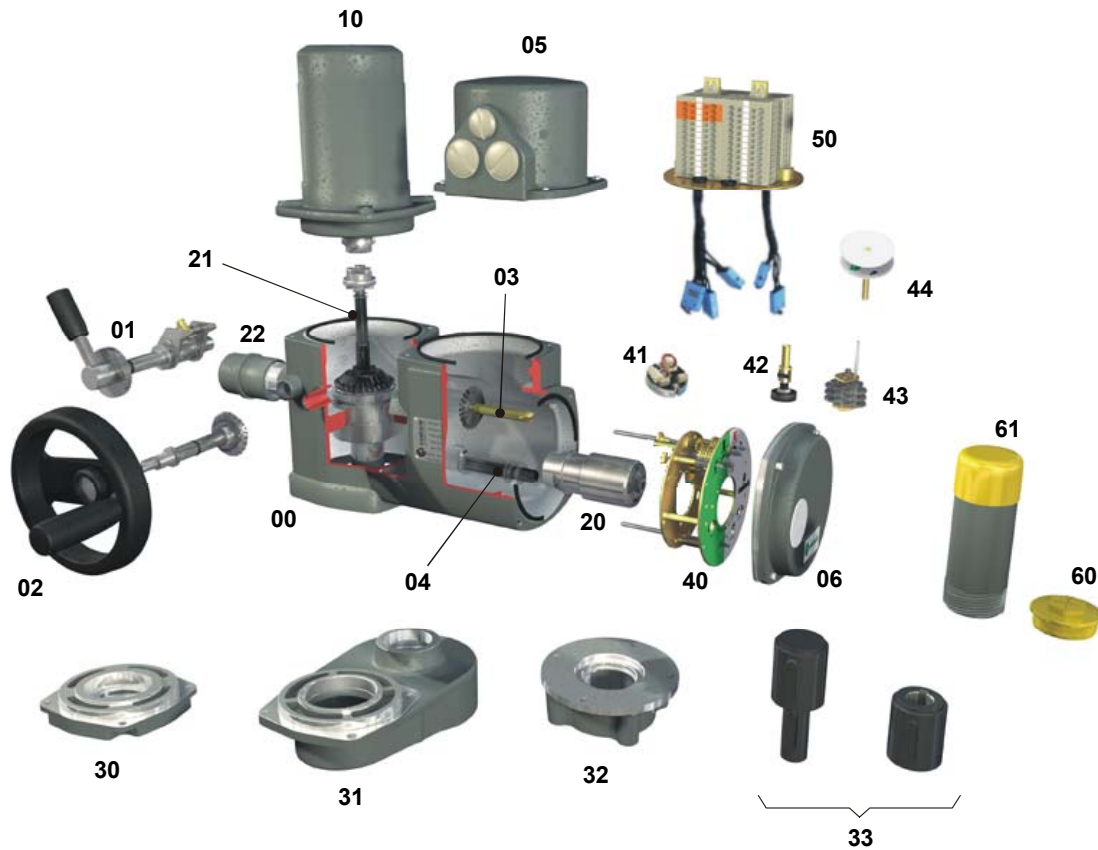
Each actuator is supplied with a datasheet on A4 format. The following is included:

- The nameplates attached to the actuator.
- The electric connection diagram for each actuator (also stuck inside the connections cover of the actuator).

For any claim or information request, the SERIAL NUMBER included on this datasheet or on the hydraulic actuator nameplates should be used.

Hydraulic actuator manufacturer address: See on Manual covers.

## 11. SPARE LIST



Code	Description
00	Actuator gearcase
01	Declutch lever subassembly
02	Handwheel subassembly
03	Motion measuring shaft subassembly
04	Torque switching shaft subassembly
05	Electrical cover
06	Switching and signalling cover
10	Hydraulic motor
20	Torque regulator device
21	Main planetary gear (PTCS)
22	Spring absorber subassembly

Código	Descripción
30	Output flange
31	Spur gearbox
32	Output type A unit
33	Removable bush and shafts
40	Switching and signalling unit
41	4-20 mA transmitter TPS
42	Potentiometer
43	Gearing unit
44	Mechanical position indicator
50	Terminal and switches subassembly.
60	Plug cover
61	Rising stem protection cover tube

## APPENDIX

### OUTPUT TYPES

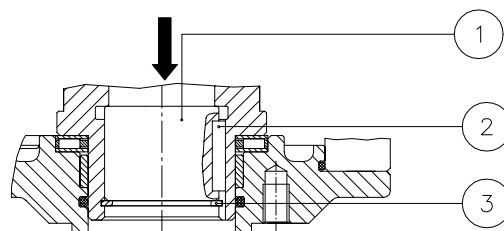
#### **OUTPUT TYPE A Size F-07 (ISO 5210)**

##### Disassembly:

Employing a suitable tool, remove the retaining ring (3) which fix the removable bronze bush (1).  
Push in order to extract this piece.

##### Assembly:

Having machined the removable bush according to valve stem dimensions, refit the drive bus (1) into the output shaft bore, align the keyway (2) in its output shaft shape.  
Refit the retaining ring (3).



**Figure 1**

#### **OUTPUT TYPE A Size F-10/F-16/F-25 (ISO 5210)**

##### Disassembly:

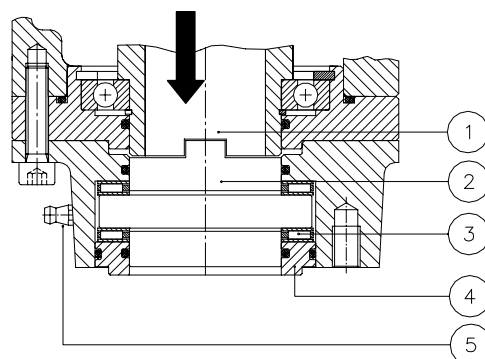
Push and press the removable bronze bush (2) in order to extract the cover (4), axial bearings (3) and removable bronze bush (2)

##### Assembly:

Having machined the removable bronze bush according to valve shaft, clean thoroughly this piece. Apply grease on axial bearings and discs (3). Assemble axial disc on removable bush (2), finally insert the cover (4). Check O-rings on cover.

Apply grease on. Insert the removable bush on output type A base casting unit and output shaft, notice that dog coupling (Tooth) on bushing should match with actuator hollow output shaft (1). Verify O-ring (4).

For maintenance, grease can be supply thought grease nipple (5).



**Figure 2**



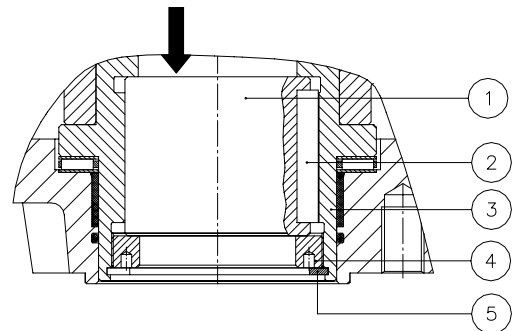
**OUTPUT TYPE A Size F-14 (ISO 5210)**

Disassembly

- Remove retaining ring (5) and unscrew the stop ring (4) employing a suitable tool.
- Push and press the removable bronze bush (1) in order to extract it.

Assembly:

- Having machined the removable bush according to valve stem dimensions, refit the drive bus (1) into the output shaft bore (3), align the keyway (2) in its output shaft shape.
- Screw the stop ring (4) employing a suitable tool.
- Refit the retaining ring (5).



**Figure 3**

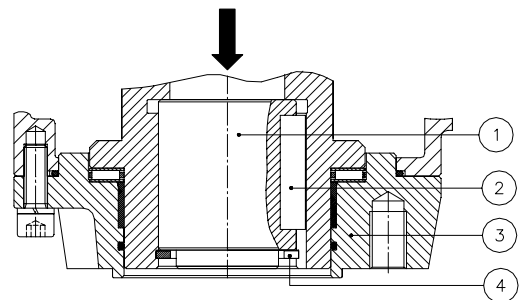
**OUTPUT TYPE B3 Size F-07/F-10/F-14/F-16/F-25 (ISO 5210)**

Disassembly:

- Employing a suitable tool, remove the retaining ring (4) which fix the removable steel bush (1).
- Push in order to extract this piece.

Assembly:

- Having machined the removable steel bush according to valve stem dimensions, refit the drive bus (1) into the output shaft bore, align the keyway (2) in its output shaft shape.
- Refit the retaining ring (4).



**Figure 4**

**OUTPUT TYPE B0 Size F-10 / F-14**

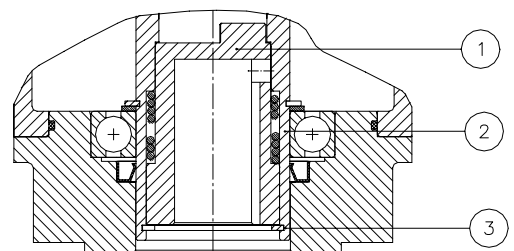
B0 output type is supplied, already machined, according to dimensions published in technical datasheets.

Disassembly:

- Employing a suitable tool, remove the retaining ring (3) which fix the removable steel bush (1). Removable bush is located inside of output shaft (2)
- Push in order to extract this piece.

Assembly:

- Having machined the removable steel bush according to valve stem dimensions, refit the drive bus (1) into the output shaft bore
- Refit the retaining ring (3).










**Figure 5**

### FASTEN BOLTS (CLASS 8.8)

BOLT	FRICTION FACTOR		
	LOW	MEDIUM	HIGH
<b>M4</b>	4.2	6	8
<b>M6</b>	6.2	8.2	10
<b>M8</b>	15	21	24
<b>M10</b>	30	41	48
<b>M12</b>	49	68	85
<b>M14</b>	85	108	130
<b>M16</b>	130	165	200
<b>M18</b>	170	240	280
<b>M20</b>	240	340	410
<b>M30</b>	800	1150	1350
<b>M36</b>	1450	2050	2400

Torque values in N.m  
Steel bolts class 8.8

## WIRING DIAGRAMS, TERMINAL PLANS, LEGENDS AND SYMBOLS.

SYMBOL	DESCRIPTION	TECHNICAL FEATURES																				
 <b>FPC 1</b>	<b>FPC:</b> CLOSE torque microswitch	<ul style="list-style-type: none"> <li>- Microswitch with silver contacts</li> <li>- Type of contact: 1 NA / 1 NC</li> <li>- Protection degree: IP67</li> <li>- Contacts:</li> <li>- Mech. Life: 5.10<sup>6</sup></li> <li>- Electr. live: 5.10<sup>6</sup></li> <li>- Microswitch circuits NO+NC contacts, only the same potential can be connected through both circuits. For different potentials, two double microswitches must be used.</li> </ul> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td rowspan="2" style="text-align: center;">Silver contacts</td> <td colspan="3" style="text-align: center;">AC</td> <td colspan="3" style="text-align: center;">DC</td> </tr> <tr> <td style="text-align: center;">30V</td> <td style="text-align: center;">125V</td> <td style="text-align: center;">250V</td> <td style="text-align: center;">30V</td> <td style="text-align: center;">125V</td> <td style="text-align: center;">250V</td> </tr> <tr> <td style="text-align: center;">Resistance</td> <td style="text-align: center;">8A</td> <td style="text-align: center;">6A</td> <td style="text-align: center;">5A</td> <td style="text-align: center;">2A</td> <td style="text-align: center;">0.6A</td> <td style="text-align: center;">0.4A</td> </tr> </table> <p>For Hazardous areas, microswitch can be used as EEx i (intrinsically safe) device when microswitch is connected to suitable isolation barrier. For more details, contact with CENTORK.</p>	Silver contacts	AC			DC			30V	125V	250V	30V	125V	250V	Resistance	8A	6A	5A	2A	0.6A	0.4A
Silver contacts	AC			DC																		
	30V		125V	250V	30V	125V	250V															
Resistance	8A		6A	5A	2A	0.6A	0.4A															
 <b>FPA 1</b>	<b>FPA:</b> OPEN torque microswitch																					
 <b>FRC 1</b>	<b>FRC:</b> CLOSE limit microswitch (CLOSE end position)																					
 <b>FRA 1</b>	<b>FRA:</b> OPEN limit microswitch (OPEN end position)																					
 <b>BLK</b>	<b>BLK:</b> Movement signalling microswitch. As actuator output shaft rotates or moves, a cam acts and switches ON-OFF this BLK microswitch.	For Hazardous areas, Electric features should accomplish with:																				
 <b>POT 1</b>	<b>POT:</b> Precision Potentiometer	Pi: 804 mW, for T4 classification Pi: 314 mW, for T5 classification																				
 <b>TPS</b>	<b>TPS:</b> 4-20 mA transmitter (2 wires)	Electric features of Intrinsically safe voltage source can not exceed: U: 30 V i.e. PU ≤ 0,82 W U: 27 V i.e. PU ≤ 0,98 W U: 24 V i.e. PU ≤ 0,99 W U: 21 V i.e. PU ≤ 0,87 W U: 18 V i.e. PU ≤ 0,75 W Temperature classification (Only for EEX ia Transmitter) T6, Tamb<50°C T5, Tamb<65°C T4, Tamb<80°C																				

For further technical information, consult CENTORK technical datasheet or contact directly with CENTORK. CENTORK address can be found printed on manual covers.



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