INSTALLATION,MAINTENANCE AND OPERATING INSTRUCTION MANUAL FOR 4th GENERATION ACTUATORS

For ACTUATOR Model/Type:
–PR030 →PR400
–Double acting "D" and spring return "S"
–90° →180° Stroke

GB

CONTENTS

1)GENERAL

This instruction manual contains important information regarding the installation, operation,maintenance and storage for rack and pinion pneumatic actuators. Please read these instructions carefully and save them for future reference. It is important that only properly trained personnel disassemble/assemble the actuator.

2)WARNING

- Do not operate the actuator by using inflammable,oxidating and corrosive,explosive or instable gases.
- It is important that the actuator should only be used within pressure limits indicated in our technical specifications.
- Operating the actuator over pressure limits will damage internal parts as well as cause damage to the housing.
- Operating the actuator over temperature limits will damage internal and external components (disassembly of spring return actuator may become danderous).
- Operating the actuator in corrosive environments with incorrect protection may damage the internal and external parts.
- Do not disassemble individual spring cartridges.Disassembly may result in personal injury For further information contact.
- Isolate all air lines and make sure that actuator air conection is vented before installation or servicing of the actuator.
- Do not remove end caps or disassemble the actuator while the actuator is pressurized.
- Before installing onto a valve make sure that the rotation of the valve and the actuator are the same and that the position indicator orientation is also correct.
- If the actuator is incorporated in a system or used within safety devices or circuits,the customer shallensure that the national and local safety laws and reaulations are observed.

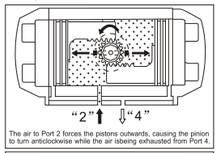
3)WORDING CONDITIONS AND TECHNICAL DATA

- Operating media:
  Dry or lubricated air or inert/non-corrosive gases provided they are compatible with internal actuator parts and lubricant.The operating media must have a dew point equal to -20 ℃（-4° F）or at least 10℃below the ambient temperature. The maximum particle size must not exceed 30 μm.
- Supply pressure:
  The maximum supply pressure is 8 Bar(116PSI),7 Bar(101, 5 PSI)for ACT330.
  Generally for Double Acting and Sping Return actuator the supply pressure is: from 2.5 Bar(36PSI)minimum to 8 Bar(116PSI)maximum.
- Operating Temperature:
  Standard product from-20℃(-4 F)to+80℃(+176° F)
  Low temperature LT actuator with silicon"O"rings from–40℃ (40° F)to+80℃(+176° F)
  High temperature HT actuator with FRM"O"rings from–15℃(+5° F)to+150℃(+300° F)
  Caution:For low and high temperature service,special grease is required.Please contact ACT for each application.High and low temperature will vary the output torque of the actuator.
- Operating Time:
  See Technical Data Sheet.
  Caution:The operating speeds depend on several factors such as:supply pressure/supply capacity (i.e.pipe diameter/flow capacity or pneumatic accessory),valve type,valve torque and characteristics, what safety factor is to be applied, frequency of operation and temperature.
- Storke:
  The stroke for actuators is as follows(see technical data):
  Standard construction:90° rotation with stroke adjustment at0° and90° +or-4°
  Type120° stroke:120° rotation with stroke adjustment at0° and 120° +or-4°
  Type180° stroke:180° rotation with stroke adjustment at0° and 180° +or-4°
- Lubrication:
  The actuators are factory lubricated for the life of the actuator in normal working conditions.
  The standard lubricant is suitable for use from-20 ℃ (-4° F)to+80℃(+176° F).For low (LT) and high (HT) temperature service, where special grease is required please contact.
  Recommended actuator lubricants for standard working conditions:
  -XG/U4 SUPER GREASE
  -EP-MOLY EXTREME PRESSURE MOLYBDENUM GREASE

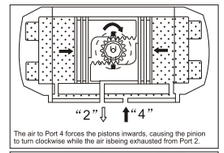
- Construction:
  Rack and pinion actuator design suitable for both indoor or outdoor installations.
  Protection and Corrosion resistance:
  Ensure actuators are supplied with corrosion protections for normal environments.For severe duties select the protection required for corrosion. Protection See technical data sheet before installing actuators.
- Actuator designation and Marking:
  The actuator type, size operating pressure,output torque, direction of rotation, orientation of failure mode, operating temperature and drive type are determined by actuator designation.
  Actuators are supplied with a label showing all of this information:type,model(including protection and if applicable the LT or HT for operating temperature),stroke,maximum permissible supply pressure, direction of rotation,output torque,ancillary attachment,pressure connection,valve actuator attachment and serial number.

4)OPERATING FUNCTION AND DIRECTION OF ROTATION

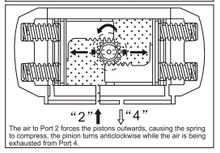
The actuator is a pneumatic operator for remote actuation of valves.The operation(90÷120 °or180roation) may be connected by different methods:
-Direct mounting of solenoid valves(5/2for double acting ,3/2for spring return)to pressure connections 2and 4.
-Screwed connection(to pressure connections 2 and 4)with air lines From separate control cabinet.The standard rotation is clockwise to close counter-clockwise rotation is obtained when port 2 is pressurized. For actuator marked LF the rotation is counter-clockwise to close,clockwise rotation is obtained when port 2 is pressurised.



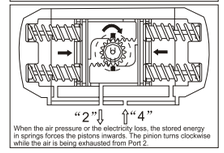
The air to Port 2 forces the pistons outwards, causing the pinion to turn anticlockwise while the air isbeing exhausted from Port 4.



The air to Port 4 forces the pistons inwards, causing the pinion to turn clockwise while the air isbeing exhausted from Port 2.



The air to Port 2 forces the pistons outwards, causing the spring to compress, the pinion turns anticlockwise while the air is being exhausted from Port 4.



When the air pressure or the electricity loss, the stored energy in springs forces the pistons inwards. The pinion turns clockwise while the air is being exhausted from Port 2.

5)ACTUATOR INSTALLATION INSTRUCTIONS

The actuator is a pneumatic device for the remote operation of industrial valves.The actuator will operate through90° the option is available for 120 ° or 180° of rotation permitting the opening and closing of many types of 1/4 turn valves.
All the necessary technical information to install the actuator correctly and safely onto a valve i.e . Dimensions,Output torque.Air vclume,Stroke Adjustment Operating time.Operating temperature, Direction of rotation and weight is stated clearly on the Actuator label on the catalogue and technical data sheets. Please read this technical information carefully before proceeding with the actuator installation.

5.1)Important Safety Notice:
- The actuator must not be pressurized at any time during installation as jnjury may result.
- The utmost cleanliness is required during air supply connection to the actuator i.e.the connecting pipe thread,fittings and seals must be clean and dirt-free.
- When fitting accessories onto the actuator assemble them in such a way that the top of the drive shaft is easily accessible should manual operation of the actuator be required.
- Before fitting onto the valve make sure that the actuator /valve are correctly orientated,depending upon which direction of rotation is required.

5.2)Controls and connections,Figure A:

5.3)Assembly of accessories:Solenoid valves and Switchboxes Figure B:
- Solenld valve mounting:
  Before mounting a Solenoid valve ensure that the actuator is in its normal position (closed position)
  Pistons together:
  -For Standard assembly and rotation (Clockwise to close): the groove on the indicator 2 must be diagonal to the longitudinal axis of the actuator in the closed position.
  Fit the solenoid valve 4 onto the actuator 3 using the screws provided(max.tightening torque see the table below).
- Switchbox mounting:
  Fit the swichbox and bracket 1 onto the actuator 3,using the screws provided(max.tightining torque see the table below).

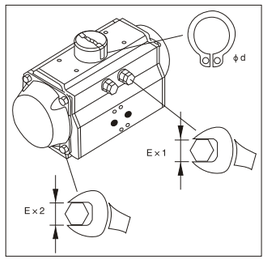
5.4)Assembly of Valve Figure C:
Before proceeding with the assembly of a valve onto an actuator be sure that the actuator operates in the desired direction of rotation and both actuator/valve are correctly orientated.
Important:When using a spring return actuator for a fail safe operation,ensure that when air or electricity failure occurs the direction of rotation is correct for your application.
Fit the valve 5 onto the actuator 3 Ensure that the actuator is in normal position(closed position).
There are two types of valve assembly onto the actuator:
Direct-mount:Fit the square of the valve 5 directly into the square of the actuator 3 and bolt together through the valve ISO pad (max.tightening torque see table above).
-Bracket-mount:Mouting with a bracket 6 and coupling 7, the bracket is bolted to the actuator/valve to join them together and the coupliong is used to connect the actuator output drive to the valve stem(max. Tightening torque see table).

5.4.1)Mounting alternatives:
5.4.2)valve mounting with Actuator Type STANDARD(Clockwise to close)Figure D:
5.4.3)Valve mounting with Actuator Type LF(Clockwise to open)Figure E:

6）MAINTENANCE INSTRUCTION

With the information given below,provides the end user with all the reqired information necessary for maintenance.Under normal operating conditions the actuator requires only periodic observation to ensure proper adjustment.
Rebuilding of the actuators is allowed only to the personnel of
Or to personnel which are properly instructed.By contravention the guarantees expires!
Spare kits for maintenance are available to replace all seals and bearings(Soft Components listed in table)that may be necessary between 300,000and 1,000,000cycles depending on operating and/or environmental conditions and actuator size.

6.1)Drawing with itemised componet and recommended spare parts



Model	EX1 mm	EX2 mm	ϕdmm
50	10	8	14
63	10	10	16
75	13	10	22
88	13	10	25
100	17	13	26
115	19	13	36
125	19	17	38
145	22	17	45
160	22	19	48
180	24	19	52
200	30	22	58
240	30	24	68
265	36	22	80
330	46	24	90

6.2)Disassembly
When disassembly of actuator is required for maintenance,firstly remove the actuator from the valve.
Before performing any disassembly operations it is important to verify that the actuator is not pressurised. Always use caution and double check that the ports 2 and 4 are vented and are free from any accessory and/or device.When the actuator is a spring return unit,make sure that the actuator is in the failed position before disassembling.

A)Removal of position indicator (Part No. 19),figure01:
- Remove cap screw(39)if fitted
- Lift position indicator(19)off shaft,it may be necessary to pry gently with a screwdriver.

B)Removal of stop cap screws(Part No.02),figure02:
- Remove both stop cap screws together with nut (04)and washer(03)
- Remove stop screw O-rings(11)and discard if replacing all soft parts.

C)End Caps disassembly (Part No30 right and 31 left)For model180tlo 330the 2 end caps(30)are symmetric, figure03:
- Remove cap screw(End cap 13)in the sequence shown in the figure 03.Caution:when disassembling a spring return actuator,the end cap (30 and 31)should be loose after unscrewing end cap bolts(13)4-5 turns. If there is still force on the end cap after4-5 turns of the end cap bolts,this may indicate a damaged may result in jury-Return actuator to for further maintenance.
- For spring return actuators always remove spring cartridge.
- Remove end cap O-rings(14) and discard if replacing all soft components.

D)Pistons disassembly (Part No 40),figure04:
- Holding the body(50)in a vice or similar device,rotate the drive shaft(60)until the pistons(40)are released. Caution:Air pressure should not be used to remove the pistons from the body.
- Remove piston ‘O’ rings(16)using a small screwdriver,remove the piston back(05)and piston head(15) bearings.Discard bearings when replacing all soft components.

E)Pinon shaft disassembling (Part No 60)figure05:
- Remove spring clip(18)carefully,using nap-ring pliers,remove external thrust bearing(08)and thrust washer(10).
- Apply downward force to top of drive shaft (60)until it is partially out of the bottom of the body when it is possible to remove the octi-cam(01)and internal thrust bearing (08),then push the pinion (60) completely out of the bottom of the body.if pinion does not remove freely gently tap the top of the shaft with a plastic mallet.
- Remove top and bottompinion bearings(06)and (07)and top and bottom pinion O-rings(20)and(21).
- Discard bearings (06)and (07) and top and bottom pinion O-rings(20)and (21)if replacing all soft componects.

When all component are disassembled ,those not being replaced should be properly cleaned and inspected for wear prior to being greased and re-assembled.

6.3)Assembly:
Prior to assembly,ensure all components are perfectly clean and free from damage.Please see point 3 for recommended lubricants.
A)Drive shaft assembly(Part No.60)figures 06and07:
- Insall top and bottom pinion bearings(06)and(07)and top and bottom pinion O-rings(20)and(21) onto the shaft.
- Grease the outside surface of the drive shaft on top and bottom as shown in figure06.
- Insert partially the drive shaft (60)in the body (50),install octi-cam(01) in the correct position as shown in figure07 related to the bottom and top of the drive shaft and the rotation of the actuator when energized and install internal thrust bearing(08),Insert completely the drive shaft in the body.
- Fit external thrust bearing(08),thrust washer(10)and then external ciclip(18) using snap ring pliers.

B)Pistons assembly(Part No 40),figures 08.09.10and 11:
- Install piston O-rings(16)， the piston skirt (05)and piston head(15) bearings.
- Grease the internal surface of the body (50)and the piston(40)tack teeth.
- Hold the body (50) in a horizontal position by inserting the top of the shaft into a vice or the bottom of the shaft connection into a male drive fitted in a vice as shown in figure 08.
- Ensure that the octi-cam is in the right position as shown in figure 09.
- For standard rotation assembly (clockwise to close)rotate the body (50) about40-45cdunterclockw isef rom bottom View or clockwise from top view depending on which way the shaft has been linked as shown in figure10.
- Press the two pistons(40)simultaneously inside the body (50)until the pistons are engaged and rotate the body clockwise from bottom view or counter clockwise from top View until the stroke is completed.
- Ensure that when the pistons are inserted that they both mesh at the same time .Check fully closed and open positions as shown in figure 11.

C)End cap(Part 30 right and 31 left)and spring cartridge (17)assembly(For modle 180 to 330 the 2 end caps 30 are symmetric), figures 12.13and 14:
- Lubricate the body.
- For spring return actuator insert the proper quantity of spring cartridge(17) as shown in figure13.
- Fit end cap O-ring seal(14)into the groove in the end cap,on both end caps.
- Fit end caps onto the body (50),verifying that the O-ring remains in thed groove.
- Insert all the cap screws(13)and tighten each only partially.Complete tightening by following the sequence idicated infigure14

D)Assembly of stop cap screws(Parts 02),and stroke adjustment figure 15:
- Insert on both the stop cap screw(02),the nut (04),the washer(03),and the O-ring in (11)
- Fit the stop cap screw (02)in the body.

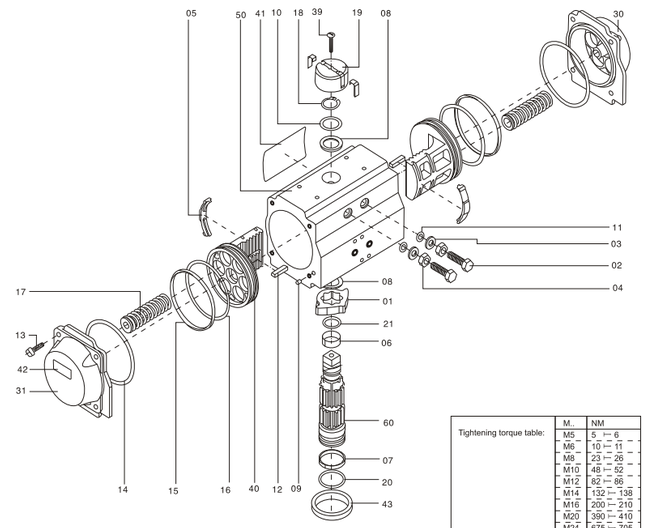
Storke adjustment for standard rotation actuator(Clockwise to close)，
- 0°（Close)position stroke adjustment with actuator in close plsition screw or unscrew the right(from top view)stop cap screw(02)until the desired stop position is achieved.Then tighten the stop adjustment nut (04)to lock it in place
- 90°（open)position stroke adjustment with actuator in open position,screw or unscrew the left (from top view)stop cap screw(02)until the desired stop position is achieved,then tighten the stop adjustment nut (04)and lock it in place.

E)Assembly of position indicator(Parts No19and 39),figure16:
- Fit position indicator(19)on the shaft verifying that it indicates the correct actuator position.
- Then fit cap screw(39)where fitted.

7)STORAGE INSTRUCTIONS

If the actuators are not for immediate use the following precaution must be taken for storge:
- Store in a dry environment at ambient temperature.
- It is recommended that the actuator be stured in its original box.
- Do not remove the plastic plugs on air supply ports.

PART N°	UNIT Q.TY	GB PART DESCRIPTION
01	1	OCTI-CAM(Stop arrangement)
02	2	STOP CAP SCREW
03	2	WASHER
04	2	NUT (Stop screw)
05*	2	BEARING(Piston back)
06*	1	BEARING(Pinion top)
07*	1	BEARING(Pinion bottom)
08*	2	THRUST BEARING(Pinion)
09*	2	PLUG
10	1	THRUST WASHER(Pinion)
11*	2	"O"RING(Stop screw)
12	2	PISTON GUIDE
13	8/12/16/(A)	CAP SCREW(End cap)
14*	2	"O"RING(End cap)
15*	2	BEARING(Piston head)
16*	2	"O"RING(Piston)
17	min.5/max.12	SPRING(Cartridge)
18	1	SPRING CLIP(Pinion)
19	1	POSITION INDICATOR
20*	1	"O"RING(Pinion bottom)
21*	1	"O"RING(Pinion top)
30(B)	1	RIGHT END CAP
31(B)	1	LEFT END CAP
39	1	CAP SCREW(Indicator)
40	2	PISTON
41	1	ACTUATOR IDENTIFICATION LABEL
42	2	END CAP LABEL
43	1	SPIGOT(Only on request)
50	1	BODY
60	1	DRIVE SHAFT



Tightening torque table:	M..	NM
	M5	5 ⊢ 6
	M6	10 ⊢ 11
	M8	23 ⊢ 26
	M10	48 ⊢ 52
	M12	82 ⊢ 86
	M14	132 ⊢ 138
	M16	200 ⊢ 210
	M20	390 ⊢ 410
	M24	675 ⊢ 705
	M30	1340⊢1400

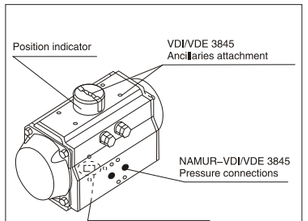


Fig.A

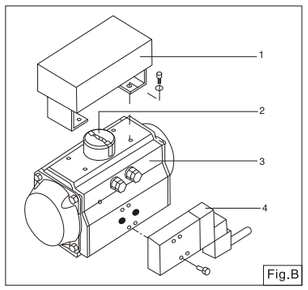


Fig.B

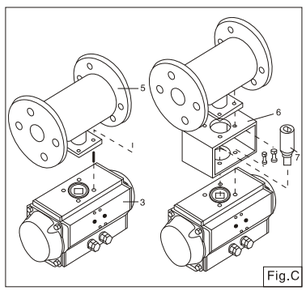


Fig.C

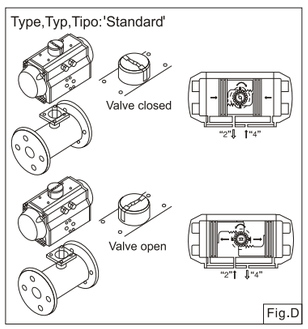


Fig.D

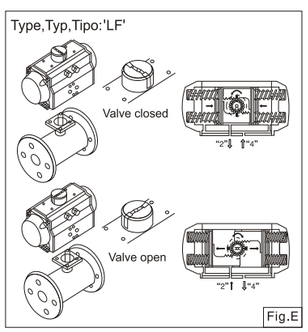


Fig.E

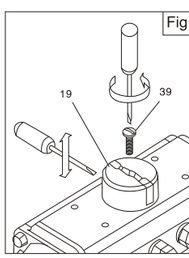


Fig.01

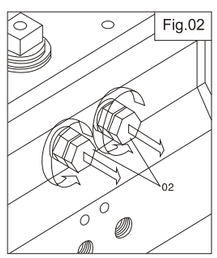


Fig.02

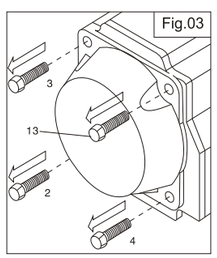


Fig.03

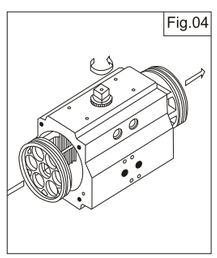


Fig.04

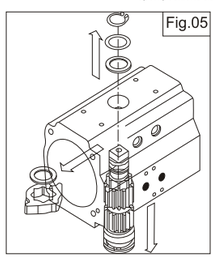


Fig.05

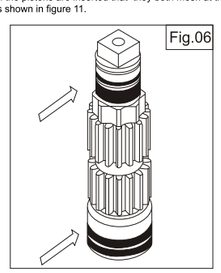


Fig.06

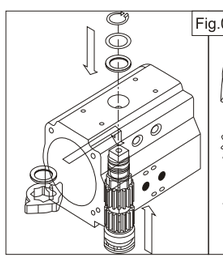


Fig.07

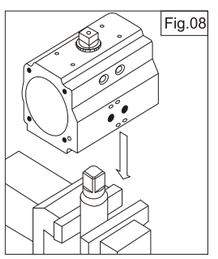


Fig.08

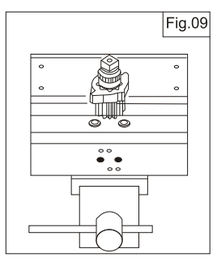


Fig.09

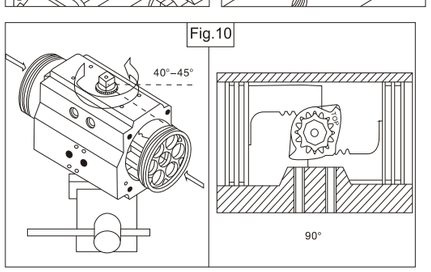


Fig.10

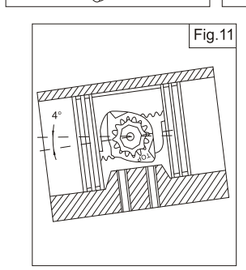


Fig.11

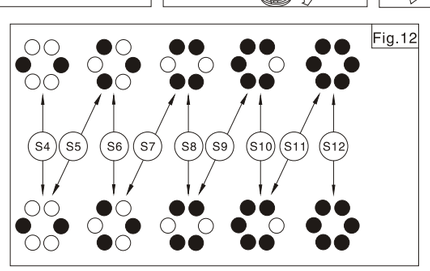


Fig.12

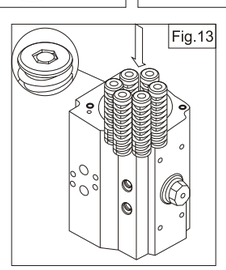


Fig.13

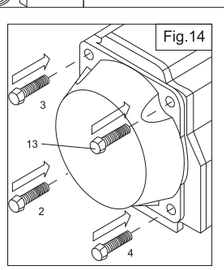


Fig.14

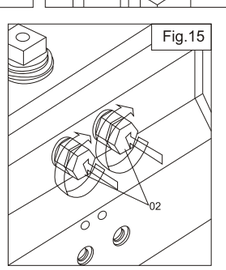


Fig.15

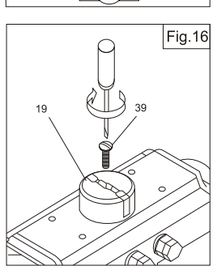


Fig.16

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