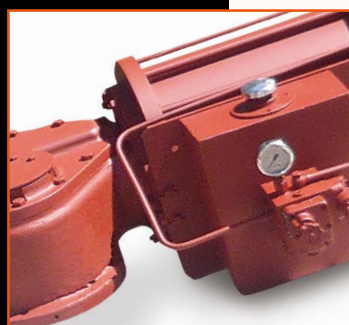


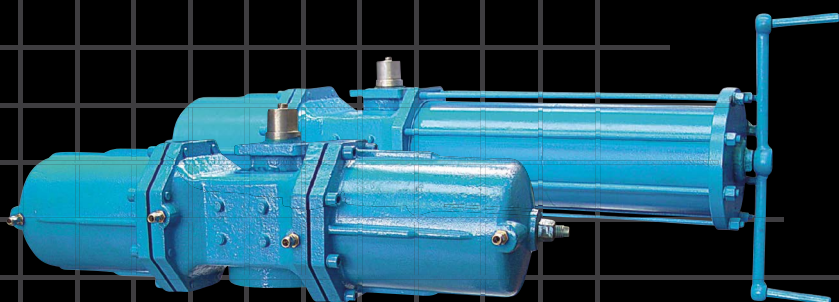
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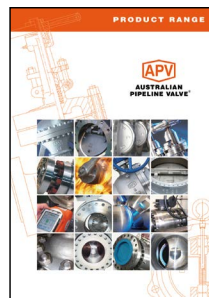
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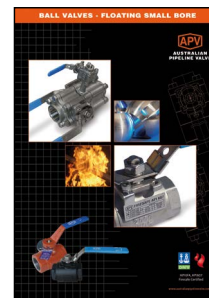
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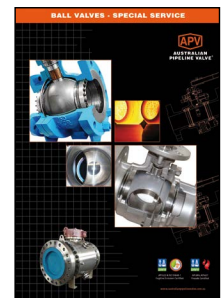
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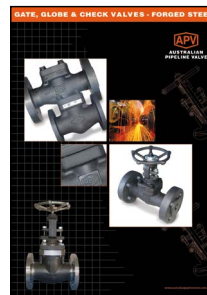
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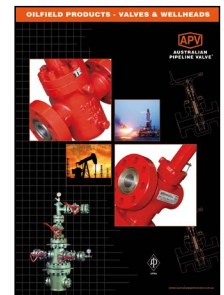
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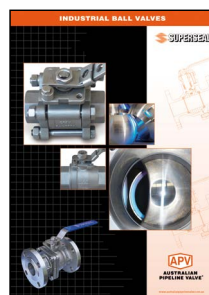
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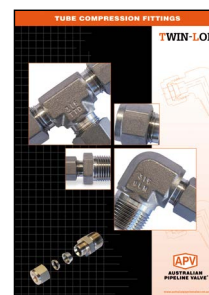
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INTRODUCTION

APV-Torqturn actuators are extremely strong, compact and can be specified for services with a wide range of pressures, temperatures and environments, for use in various valve sizes and types.

The majority of this information is common knowledge to experienced valve & actuator users. When properly installed in applications for which they were designed, Australian Pipeline Valve (APV) - Torqturn actuators will give long reliable service. This instruction is only a guide for installation and operation on standard service and covers general maintenance and minor repairs. A professional APV approved actuator engineering facility should be utilised for reconditioning or major repairs.



Note

We recommend that this entire document be read prior to proceeding with any installation. Do not attempt to repair this actuator, send it to APV or an APV approved repair facility. Australian Pipeline Valve and its parent company take no responsibility for damage or injury to people, property or equipment. It is the sole responsibility of the user to ensure only specially trained actuator repair experts perform repairs under the supervision of a qualified supervisor.

RESPONSIBILITY FOR VALVE & ACTUATOR APPLICATION

The User is responsible for ordering the correct valves & actuators. The user is responsible for ensuring APV Valves & Actuators are selected and installed in conformance with the current pressure rating and design temperature requirements. Prior to installation, the nameplates and drawings should be checked for proper identification to ensure the valve & actuator is of the proper type, material and is of a suitable pressure class and temperature rating to satisfy the requirements of the service application.



Caution

Do not use valves & actuators in applications where either the pressure or temperature is higher than the allowable working values. Also, actuators should not be used in service media if not compatible with the material of construction, as this will cause chemical attacks, leakage and failure.

RECEIVING INSPECTION AND HANDLING

Valves & Actuators should be inspected upon receipt to ensure:

- Conformance with all purchase order requirements.
- Correct type, rating, size, body and materials and end connections.
- Any damage caused during shipping.

**Caution**

The User is advised that specifying an incorrect valve or actuator for the application may result in injuries or property damage. Selecting the correct valve and actuator type, rating, material and connections, in conformance with the required performance requirements is important for proper application and is the sole responsibility of the user.

SAFETY INFORMATION

The following general safety information should be taken in account in addition to the specific warnings and cautions specified in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered in this I.O.M.

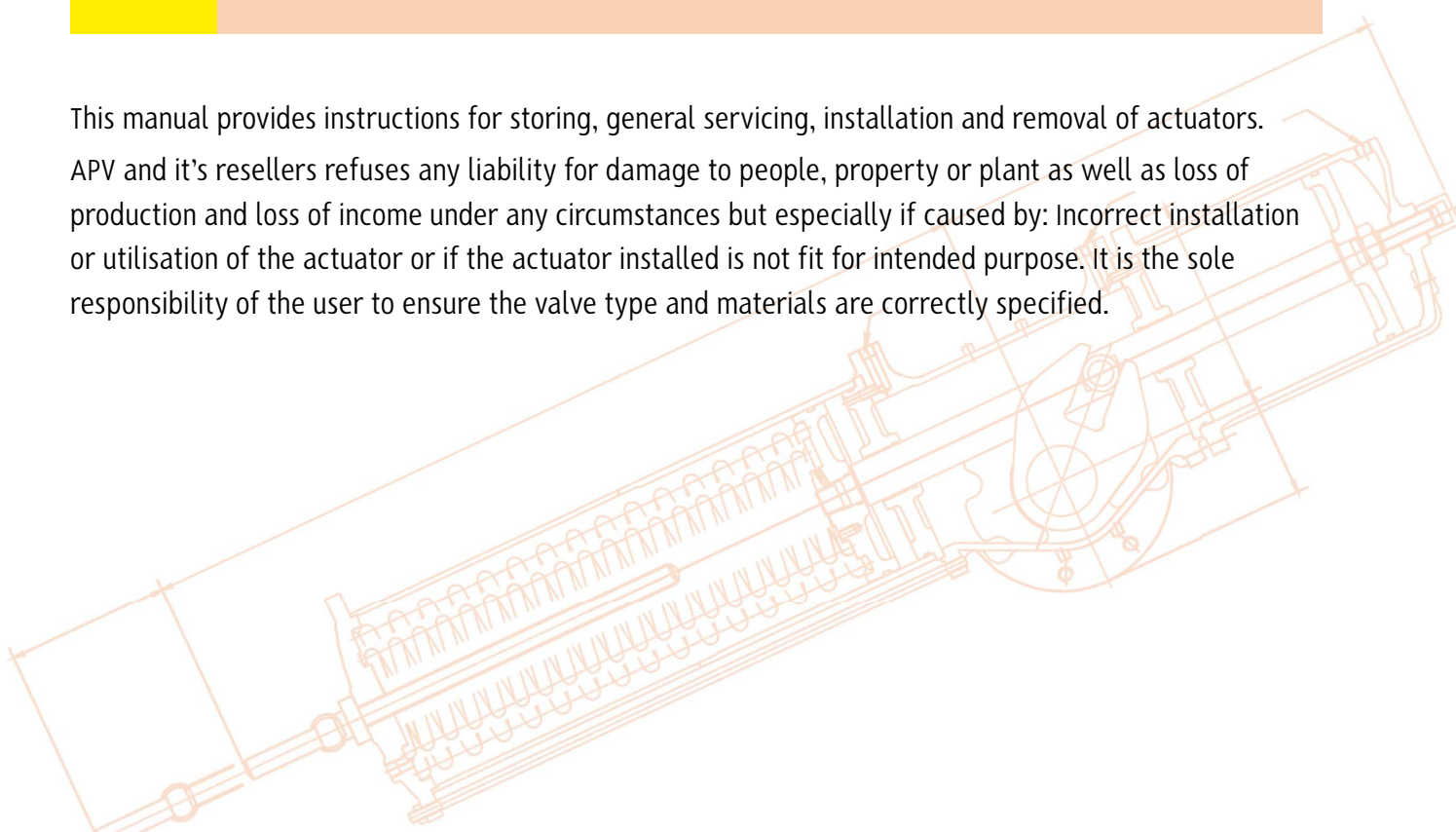
**Caution**

To avoid injury, never attempt disassembly while there are pressures either upstream or downstream. Furthermore, actuators with spring packs can rapidly close or open the valve on failure of air supply with extreme force.

**Caution**

Spring packs are factory sealed and can be dangerous. Don not attempt to disassemble spring pack, send to an APV approved repairer. Never put your hand inside the valve bore while the actuator spring is energised.

This manual provides instructions for storing, general servicing, installation and removal of actuators. APV and it's resellers refuses any liability for damage to people, property or plant as well as loss of production and loss of income under any circumstances but especially if caused by: Incorrect installation or utilisation of the actuator or if the actuator installed is not fit for intended purpose. It is the sole responsibility of the user to ensure the valve type and materials are correctly specified.



1.0 STORAGE & HANDLING

To ensure the seals remain flexible, and the actuator itself free moving during times of storage or intermediate services, air or nitrogen pressure should be cycled through the actuator at a minimum of three (3) times a month. Indoor storage is recommended for actuators in an environment where resilient seals can be preserved. To help keep out foreign particles and moisture; cylinder ports, control valve parts and body parts should be kept sealed.

2.0 INSTALLATION NOTES

Remove any existing manual gearing from the valve and move into the same position as the actuator (either both open or both closed). Inspect the stem adapter, valve stem, valve and actuator mounting surfaces for proper direction and any inconsistencies. In cases where the valve includes a lubricator fitting, this should be removed and a lubricator extension nipple installed. Refit the lubricator fitting into the extension nipple. If furnished loose, install the bushing for the stem adaptor over the valve stem, correctly position the set screw and mount actuator over bushing (parallel to the pipe). All nuts and bolts should be fastened evenly, ensuring the actuator is centred on the valve stem. Note: whilst the mounting bolts are loose the actuator can be cycled to help centre itself.

There are many actuator and valve variations, therefore it's not practical to list instructions for all kinds. The design of the mountings are kept simple for ease of installation. Actuators are factory shipped with the travel stops regulated for 90° revolution. However once the actuator is installed on the valve it will still require further stop adjustments. Reference should be made back to the valve manufacturer's recommendations for particular requirements. For valves that contain internal stops, the actuator must be adjusted at the same points. The "stopping" should be performed by the actuator itself. For valve without internal stops, adjust the actuator to the full open setting. Using this as a reference point, position the valve closed and adjust to the specifications recommended by the valve manufacturer for total rotation. High strength grades of steel like 410, F6, F51, 303, S31803, XM-19, Nitronic 50, 4140 and 17-4 PH are preferred for stem adaptors.



Caution

All factors shown in section 2.1.1 to 2.1.3 are an estimating guide only and are based on more common smaller size valves. It is impossible to accurately estimate the effect on torque all the below factors will have. However, sections 2.1.1 to 2.1.3 provide a rough guide and serve as a warning to ensure users are aware of the dramatic effect all the given factors can have on torque.

2.1 ACTUATOR SIZING

2.1.1 General Sizing Rules for Soft Seated Ball Valves

Valve and actuator torque values published are theoretical, however where required APV will perform a torque test prior to despatch. The real valve torque value can be higher depending upon the following listed factors as these factors can drastically increase (or decrease) the torque of soft seated ball valves. These factors will have a similar effect on soft seated butterfly valves. Metal to metal seated ball, butterfly and plug valves will also be effected but the torque implications will vary.

- 1) Fluid carrying dust, powder, abrasive particles (+50% to 125%). In extreme cases can be higher. i.e. Up to 200%.
- 1a) Slurry, pulp, resins, paste (+50%) can be much higher in some cases.
- 2) Dry service (Dry Gas) (+30%).
- 3) High or low temperature (consult us).
- 4) Infrequent use (+30-50%) *1 - *2.
- 5) If a higher minimum air supply than used in the calculation is available more torque will be produced in the air operation phase, (do not exceed maximum air capacity of the actuator).
- 6) Torque is based on a maximum Delta P for class. If your actual working pressure is lower please advise as a smaller actuator may be possible.
- 7) Lubricated service (clean oil or other high lubricity fluid) (+15%).

*1 PTFE/RPTFE seats can require more torque to unseat after a period of time due to it's fluidity & memory. For Devlon/Nylon Seat the valve torque is higher and PEEK® is even higher (of course this should be factored into torque of valve where applicable), however as these are harder materials (especially PEEK®) infrequent use has a lesser effect on the increase in torque.

*2 Where set fail closed, additional infrequent use safety factor only needs to be applied to spring stroke torques. Allow additional 50% safety factor if valve is being operated less than once per month.

2.1.2 Actuator Sizing for Ball Valves

The following 'ready reckoner' is only a rough estimating guide* to calculate the torque values required to turn a ball valve through it's 90° travel. Consider torque requirements at these five basic positions:

- BTO - Break open torque: the torque required to unseat the closed valve. 100% of the stated torque.
- RTO - Opening torque: the torque needed to move the valve to the fully open position. Average 70% of stated BTO torque*.
- ETO - Open breakout torque: the torque required to move the valve from the fully open position. 70% of stated BTO torque*.
- ETC - Closing torque: the torque required to reseat a closing valve. 85% of stated BTO torque*.
- RTC - Running torque: the torque needed to keep the ball moving through it's travel. 50% of stated BTO torque*.
- MAST- Maximum stem torque - refer to manufacturer.

*Average guide based on floating ball and smaller size trunnion ball valves. Large trunnion ball valves have slightly different ratios. Butterfly and plug valves have totally different ratios.

2.1.3 Elements that Affect Soft Seated Ball Valve Operating Torque

The below factors are only for use as a rough estimating guide only and apply to smaller diameter ball valves. Furthermore, the effects the following factors have will vary for trunnion ball valves, even in smaller sizes. For trunnion ball valves it is impossible to provide accurate multipliers however, the below factors will affect all types of soft seated valves in all sizes to a certain degree and should be taken into account when specifying safety factors.

For a particular size and differential pressure, the torque of soft seated ball valves depend on many factors. Use the torque multipliers stated below with the selected valve's stated 'break', 'end to close' and 'end to open' torques as needed for your application.

Seat Material: The friction force or degree of holding force depends on the seat material type.

Seat Material	Seat Type Multiplier* ¹
15% - 25% Glass RPTFE	1.0
Virgin PTFE	0.8
Carbon Graphite RPTFE	1.0
PEEK	2.3
Delrin	2.0

*1 - For floating ball valves up to 175 NM. For larger valves consult us.

Fluid Type: Torque values depend on media type. Torque will become higher with dry, gasses or liquids with solids and lower with oils. Torque multipliers are shown in the table (based on normal temperatures).

Fluid	Fluid Type Multiplier
Gas or superheated steam, clean / dry	1.2 - 1.3
Viscous fluid	1.4 - 1.6
Liquids containing abrasive solids	1.3 - 2.0* ²
Clean / non-lubricating	1.0
Clean / lubricating	0.8

*2 - Can be higher.

Frequency of Operation: When a valve remains in closed position for extended periods of time, the breakout torque increases.

Frequency	Frequency Multiplier
Once per day or greater	1.0
Once per week or greater	1.3
Once per month or greater	1.4
Once per 4 months or greater	1.5
Critical ESD services	1.8

Temperature Effect: For operating temperature from 100°C to 218°C, use the torque multiplier given. For 0°C to 99°C no temperature multiplier is required. For operating temperatures less than 0°C and above 218°C consult Australian Pipeline Valve.

$$\text{Temperature Multiplier} = \text{Temp } ^\circ\text{C} \div 100$$

The above is an approximate guide only, for estimating purposes.

3.0 COMMISSIONING

If the unit has been left in the same position for long periods, the packings and seals may have set. This means that when the actuator is again operated, possible leakage may come from the piston seals or rod packings. Cycling the unit several times will activate the packings and seals to work efficiently.

Many factors will effect the rate of operation:

- a) how far away it is from the source of pressure
- b) the diameter and pressure of the supply line
- c) the size of the airline supply valve orifice
- d) the torque requirements of the valve
- e) the actuator size
- f) impurities in the valve stem seat
- g) temperature and viscosity of media

As any one of these factors effects the other, a typical operating time is difficult to forecast. However, operating time can be reduced as follows:

- a) larger diameter and higher pressure of the supply line
- b) larger airline control valve orifice size
- c) high speed exhaust valves

Flow control valves may be used to indicate the flow of exhaust however this will reduce running time. We do not recommend measuring the incoming source or exhaust flow to great lengths as this may cause inconsistent operation.

4.0 MAINTENANCE INSTRUCTIONS

Once the APV-Torqturn actuator has been correctly assembled and installed it is ready for operation. Lubricants used at the time of adjustment along with the durable design of the actuator mean routine maintenance is not usually required.

To ensure long service life, trouble free operation and minimal maintenance, components of actuators both pneumatic & hydraulic are lubricated. These include the gearing surfaces and bearings which are commonly covered with a teflon dry-film lubricant and corrosion inhibitor. Major internal components such as piston rods and tie bars are usually coated in electroless nickel or are stainless steel. All threaded fasteners, rollers, tracks, yoke bores, pins, gaskets and seals are coated with petroleum grease.

In addition to lubricants, correct instrument practices are also important. Foreign particles and debris can damage components such as seals, the solenoid and control valves, etc. Clean, dry air, gas or hydraulic fluid should be of high priority for acceptable operation and longevity. To assist with unit protection an in-line filter may be fitted to help prevent particles penetrating the cylinders of the actuator.

4.1 REPAIRS

Only a specialist actuator repairer should attempt repairs, if doing so take note of the following:

- a- The actuator's internal parts and external fitments shall be handled with care avoiding scratches or surface damage.
- b- All tools and equipment for handling the internal parts shall be soft coated.
- c- Actuators can be fitted with gaskets or seals in PTFE, Buna, Viton, etc., hence high temperatures will damage sealing components.

For all operations make reference to position number on part list of the applicable drawing listed.

5.0 OPERATION NOTES

Typical operation of the actuator involves applying pressure to the appropriate pressure inlet(s) of a double acting or spring return cylinder by means of a suitable control valve. APV-Torqturn actuators are sized to ensure the required valve torque is produced at the supply pressure selected by the customer.

All APV-Torqturn actuators feature a fully enclosed body cavity which ensures protection for all moving parts and eliminates the possibility of injury to operating personnel. If required, this enclosure may also be used as an optional oil bath. During usual circumstances APV-Torqturn pneumatic actuators do not require additional lubricants, however an air-line lubricator may be installed. Lubricated air improves performance of most control valves and solenoids (with the exception of positioners). Only lubricants compatible with the seals in the actuator and control valves should be used.

When using APV-Torqturn actuators manually, the supply pressure is required to be vented or equalised on either side of the power piston (with some provision for handling the minor difference in displacement of opposing sides of the cylinder position).

- a) When operation is a 'declutchable' gearbox, move the lever until the mechanism is engaged. With this done, the gearbox then operates actuator and valve.
- b) When manual operation is through a hydraulic override, energise the hydraulic supply and then rotate the handwheel in the appropriate direction to operate actuator and valve.
- c) When manual operation is through a hydraulic override on a spring return actuator, fully close block/by-pass valve and operate hand pump in order to override actuator spring and operate actuator and valve.
- d) When manual operation is through a jackscrew handwheel, simply turn appropriate jackscrew handwheel to operate actuator and valve.

5.1 OPERATION TYPES

5.1.1 Auto-Operation on/off

On/off operation for pneumatic & hydraulic actuated valve:

- A) The valve is open when solenoid valve is energised (fail close type)

- B) The valve is close when solenoid valve is de-energised (fail close type)
- C) The valve is close when solenoid valve is energised (fail open type)
- D) The valve is open when solenoid valve is de-energised (fail open type)

5.1.2 Modulating-Control Operation

Modulating control pneumatic & hydraulic actuated control valve:

- a) Input 4~20mA electric signals to the electro-pneumatic positioner, valve's open degree is proportionally regulated in 0°~90° stroke through different current size the positioner achieves.
- b) Input 0.02~0.1MPa air signals to the pneumatic-pneumatic positioner, valve's open degree is proportionally regulated on 0,~90° stroke through different air pressures the positioner supplies.

5.2 MANUAL OVER-RIDE OPERATION

5.2.1 Manual Over-ride for Pneumatic & Hydraulic Actuators

The following manual types of over-rides are available for pneumatic & hydraulic actuators depending on the model/size.

a. **Declutchable Worm Gear Manual Over-ride - DA Actuators**

Double acting actuators 'JA' 110~280 and all 'ASK' and 'JC' models are optionally available with a declutchable worm gear manual over-ride (refer Figure 1 & 2). Manual operating steps: firstly open the equalising valve on the pneumatic actuator, draw out the pull pin of the gear operator with one hand, simultaneously, use another hand to turn the clutch lever counter clockwise, until the worm and the worm gear engages, then release the pull pin. After the pin has returned into the eccentric sleeve, you can then operate the valve manually. Turn the handwheel clockwise to close the valve, turn the handwheel counter clockwise to open the valve. To return to automatic mode, first draw out the pull pin in the gear operator with one hand, simultaneously use another hand to turn the clutch lever clockwise until the worm and worm gear engages, then release the pull pin. After the pin has returned into the eccentric sleeve, close the equalising valve.

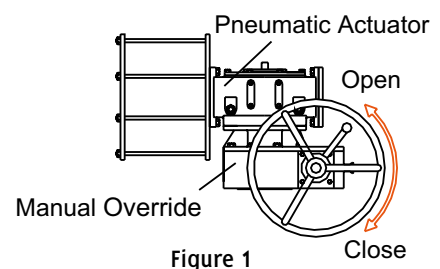


Figure 1

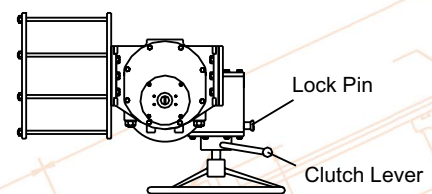


Figure 2

b. **Hydraulic Manual Over-ride - DA Actuators**

The hydraulic manual over-ride is optionally available for model JA350 double acting pneumatic & hydraulic actuators (refer Figure 3 & 3A) the manual operating device is a hydraulic over-ride with a hand pump. When manual operating is required, firstly open the equalising valve (2) mounted on the pneumatic actuator, close ball valve (2) by operating the hand pilot valve to

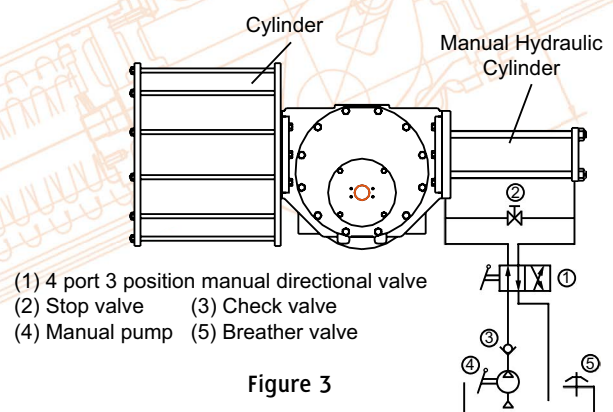
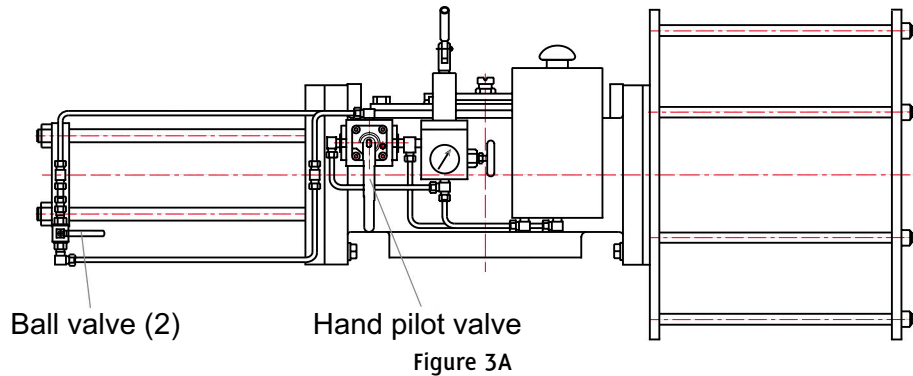


Figure 3

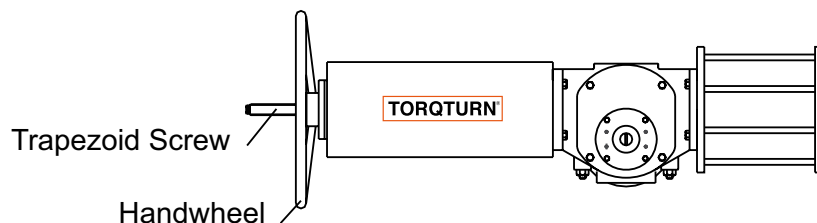
control the hydraulic cylinder's oil supply/exhaust, and operate the hand pump to energise opening or closing the valve manually. To return to automatic operation, set the handle of the 4 port 3 position manual direction valve (1) to the middle position and open ball valve (2), Manual over-ride is then disengaged.

Refer to section 5.2.1-e for operation of hydraulic manual over-ride.



c. Jackscrew Operator Manual Over-ride - SR Actuators

The jackscrew operator (Figure 4) is only available to suit models JA110S & JA280S single acting (spring return) pneumatic or hydraulic actuators. The jackscrew operator (Figure 4) is a side mounted operator. Turning the handwheel, controls the valve position by screwing the trapezoid screw into and out of the spring case (by compressing & decompressing the spring). To turn the valve, turn the jackscrew handwheel clockwise to compress the spring and move the valve one direction, counter-clockwise to decompress the spring and the valve will move in the other direction. If the actuator is set 'fail close' then compressing the spring will open the valve.



After manual operation, screw out the trapezoid screw until the spring is disengaged toward the actuator to return to auto-operation, check to ensure the spring can open fully and the spring is totally disengaged from the jackscrew. Avoid fully screwing out integral the trapezoid screw, as the screws also act as a position stop to ensure the valve is correctly returned to the full open or close position.

d. Hydraulic Manual Over-ride - SR Actuators

The hydraulic manual over-ride is available for JA280S and JA350S hydraulic and pneumatic spring return actuators. The hydraulic manual over-ride is a system which consists of manual pump, tank, globe valve, check valve and other parts, and is easy to operate and maintain (see Figures 5, 6 & 7). See section e. for operation.

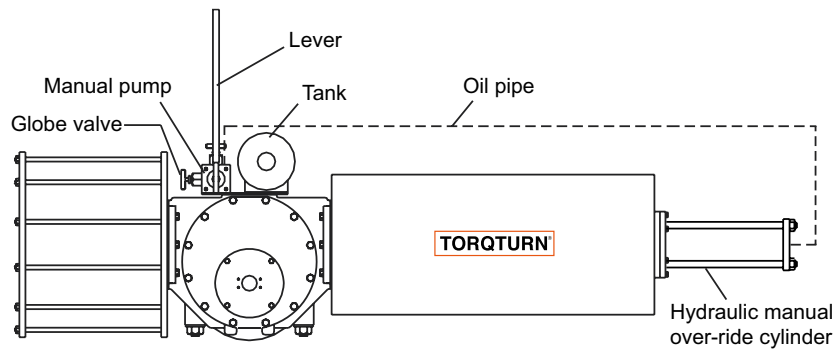


Figure 5

e. Operation of Hydraulic Manual Over-ride System

- 1) Close globe valve (1), open globe valve (2);
- 2) Inject oil to the oil cylinder by operating manual pump with lever handle (which will then activate the hydraulic cylinder which will in turn compress the spring in the case of spring return - fail close actuator) to open the valve (assuming the actuator is set 'fail closed').
- 3) To deactivate, close globe valve (2).
- 4) Once the valve is closed, open the globe valve (1) to revert to normal operation with no over-ride.

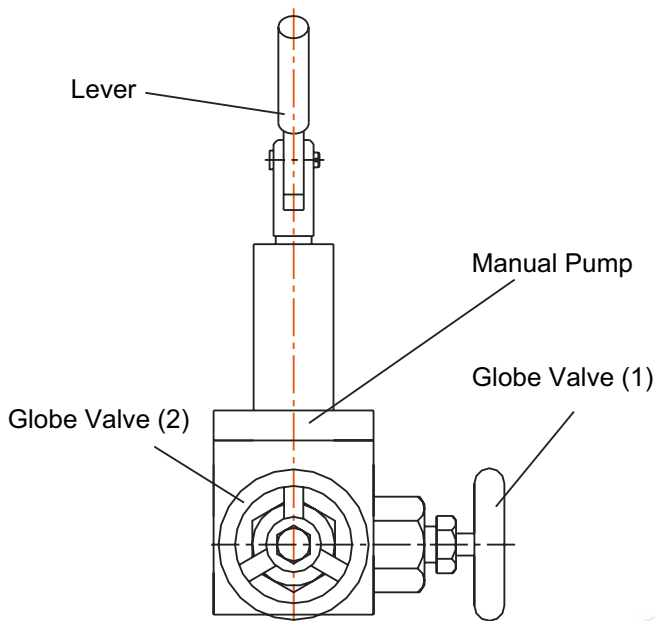
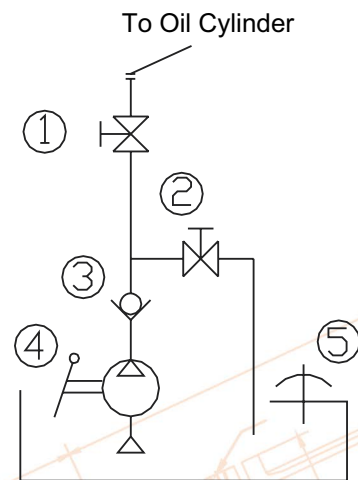


Figure 6



Hydraulic System Schematic
(Also refer Figure 3)

Figure 7

5.3 STROKE ADJUSTMENTS

The stroke adjustment (travel stop adjustment) can be made for hydraulic and pneumatic double acting and spring return actuators from 80° to 100° as follows:

Loosen the stroke nut then:

- Screw out the open position stroke bolt to increase the open position, screw in the open direction to decrease the open position.
- Screw out the close position stroke bolt to increase the closed position, screw in the close direction to decrease the closed position.

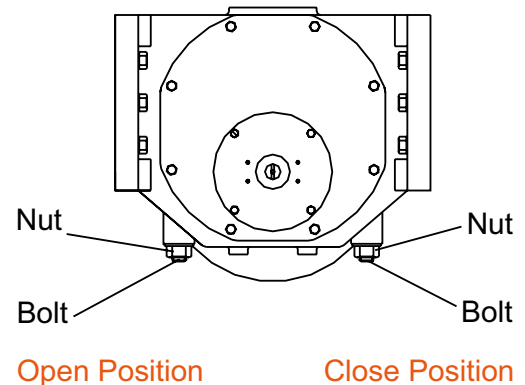


Figure 8

Note: Tighten the lock nut after adjusting the appropriate on/off position.

Different models & sizes will have adjusting nuts located in different positions.

6.0 SPARE PARTS SUPPLY

Replacement parts are available for all APV-Torqturn actuators. Published parts list drawings include recommended spare parts. It should be remembered that these parts are of resilient material and have a limited shelf life. Other parts are generally not required as spares.



Caution

The spring pack is energised. Do not attempt to open the outer casing while spring is compressed. Only an APV approved repair facility should attempt repairs.

When ordering replacement parts, it is important to include the complete actuator model number and serial number along with the part numbers required.

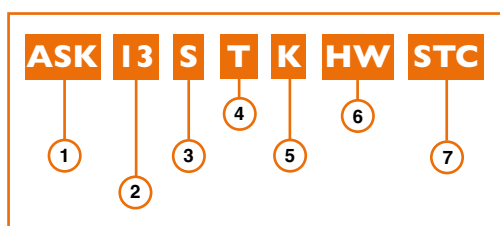
APPENDIX 1

ASK SERIES BILL OF MATERIALS

Features and benefits

- Scotch yoke design using precision bearings eliminates the usual dead zone present in other yoke mechanisms, providing the maximum torque output at beginning and end of stroke.
- Travel stops located at the centre of the piston rod eliminates side loading to the output shaft.
- ISO5211 standard mounting.
- Top of the actuators have NAMUR mounting design, for ease of mounting limit switch and positioner.
- ASK series actuators are available with different shafts on request (male or female).

Model code system



- 1. Type:**
ASK - yoke structure model prefix
- 2. Model Suffix:**
ASK 07, ASK 09, ASK 10, ASK 12, ASK 13
- 3. Features:**
D - Double acting, pressure: 0.3 ~ 0.7MPa
S - Spring Return pressure: 0.4 ~ 0.7MPa
L - Spring Return (low pressure) pressure: 0.29 ~ 0.39MPa
- 4. Special specification:**
A - Standard
B - Stainless steel nut and bolt
C - Control
F - High frequency
K - High temperature (0 ~ 120°C)
M - Manual over-ride
T - Low temperature (-45 ~ 60°C)
Q - High speed

Technical data

- Maximum supply pressure: 0.7MPa
- Rated supply pressure: 0.4 ~ 0.7MPa
- Temperature:
Standard: 20°C to 80°C
- Optional: 45°C to 120°C mounting
- Angular rotation: 90 degrees ± 10 degrees

General application

ASK series actuators are normally used for remote control of any quarter-turn application: ball, butterfly, rotary plug or damper style valves, etc. Used in oil and gas, chemical process, food and beverage, iron and steel, off-shore marine, pharmaceutical, power, pulp and paper, and textile industries.



- 5. Output type**
S - Shaft output (male)
K - Hole output (female)
- 6. Manual over-ride (option)**
H - for double acting with manual lever
HG - for double acting with manual gear
HW - for spring return with outside wheel
- 7. Position when air fails**
STC - air fall valve close
STO - air fall valve open

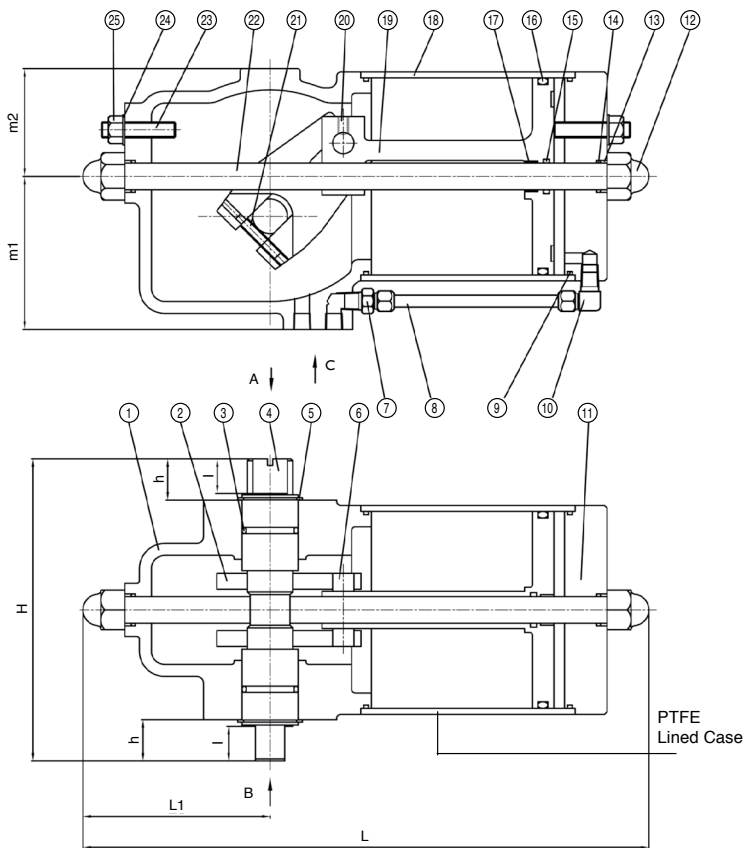


API 622 & ISO 15848-1
Endurance Test Certified

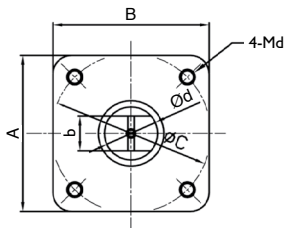
Range of Supply (ASK series)

TYPE	MODEL					
	DOUBLE ACTING			SINGLE ACTING		
	STANDARD	LOW TEMP.	HIGH TEMP.	STANDARD	LOW TEMP.	HIGH TEMP.
SCOTCH YOE	ASK07	ASK07T	ASK07K	ASK07S	ASK07ST	ASK07SK
	ASK10	ASK10T	ASK10K	ASK10S	ASK10ST	ASK10SK
	ASK12	ASK12T	ASK12K	ASK12S	ASK12ST	ASK12SK
	ASK15	ASK15T	ASK15K	ASK15S	ASK15ST	ASK15SK

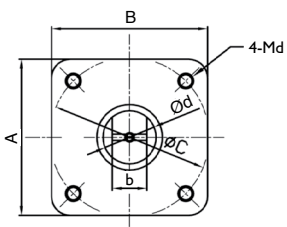
ASK SERIES BILL OF MATERIALS (CONTINUED)

ASK SERIES
DOUBLE ACTING

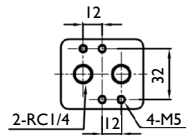
Direction A



Direction B



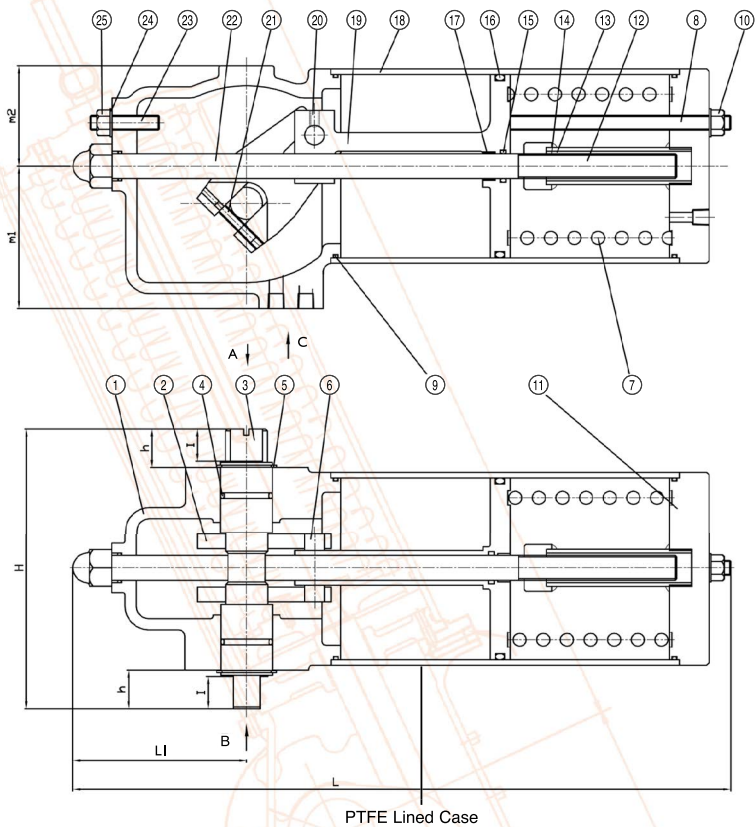
Direction C



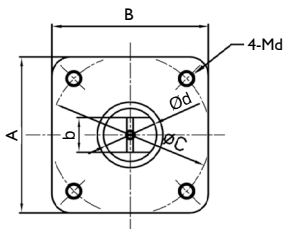
TORQUE CYLINDER	L	L1	I	H	h	d	b	C	A	B	m1	m2	Md
ASK07	310	100	18	171	23.5	20	12	70	100	70	53	75	M8
ASK10	310	100	22	147	25.5	27	17	70	100	70	68	90	M8
ASK12	424	140	26	202	31	34	22	202	100	100	71	113	M10
ASK15	424	140	26	227	31	34	22	202	100	100	85	113	M10

NO.	PART NAME	MATERIAL
1	BODY	HT200
2	PARA ARM	QT450-10
3	STEM	45 HCr
4	O-RING	VITON
5	SNAP RING	65Mn
6	PIN	45
7	CONNECTOR	304
8	PIPE	304
9	O-RING	VITON
10	CONNECTOR	304
11	CYLINDER CAP	25
12	CAP NUT	Q235
13	WASHER	304
14	O-RING	VITON
15	O-RING	VITON
16	O-RING	VITON
17	BEARING	304+PTFE
18	CYLINDER	20
19	PISTON	QT450-10
20	SCREW	45
21	PIN	45
22	PISTON ROD	304
23	STOPPER BOLT	45
24	GASKET	304+VITON
25	NUT	2H
NOTE		
TITLE	SK07-SK17 TORQUE CYLINDER <DOUBLE ACTING>	
DWG NO.	SK-10001	

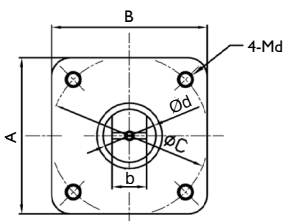
ASK SERIES BILL OF MATERIALS (CONTINUED)

ASK SERIES
SPRING RETURN

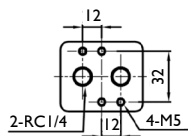
Direction A



Direction B



Direction C



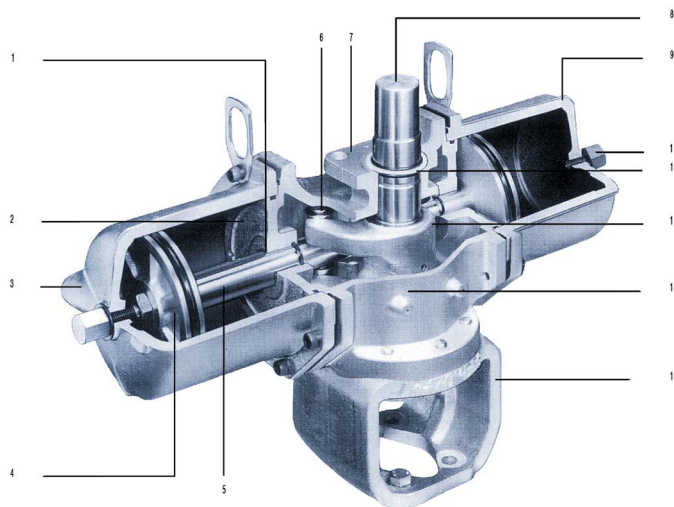
TORQUE CYLINDER	L	LI	I	H	h	d	b	C	A	B	m1	m2	Md
ASK07	410	100	18	171	23.5	20	12	70	70	70	53	75	M8
ASK10	410	100	22	147	25.5	27	17	70	70	70	68	90	M8
ASK12	560	140	26	202	31	34	22	202	100	100	71	113	M10
ASK15	560	140	26	227	31	34	22	202	100	100	85	113	M10

NO.	PART NAME	MATERIAL
1	BODY	HT200
2	PARA ARM	QT450-10
3	STEM	45 HCr
4	O-RING	VITON
5	SNAP RING	65Mn
6	PIN	45
7	SPRING	60Si2Mn
8	STOPPER BOLT	45
9	O-RING	VITON
10	NUT	2H
11	CYLINDER CAP	25
12	CAP NUT	Q235
13	WASHER	304
14	O-RING	VITON
15	O-RING	VITON
16	O-RING	VITON
17	BEARING	304+PTFE
18	CYLINDER	ALLOY STEEL+PTFE
19	PISTON	QT450-10
20	SCREW	45
21	PIN	45
22	PISTON ROD	304
23	STOPPER BOLT	45
24	GASKET	304+VITON
25	NUT	2H
NOTE		
TITLE	SK07S-SK17S TORQUE CYLINDER <SPRING RETURN>	
DWG NO.	SK-10002	

APPENDIX 2

JA SERIES BILL OF MATERIALS

With larger size valves, the required torque is highest at “break to open” and “end to close” positions. The design of the JA series optimise this requirement. The SW series is also available for higher torque requirements. The piston linear motion is converted into rotary motion using a Para Arm to obtain output characteristics suitable for operating large size valves.



API 622 & ISO 15848-1
Fugitive Emission Certified

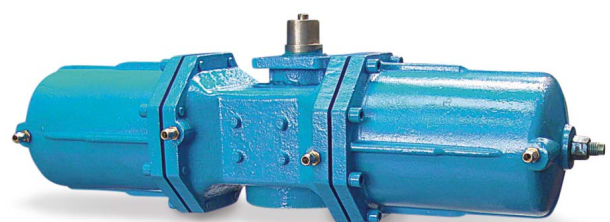


AS 4629



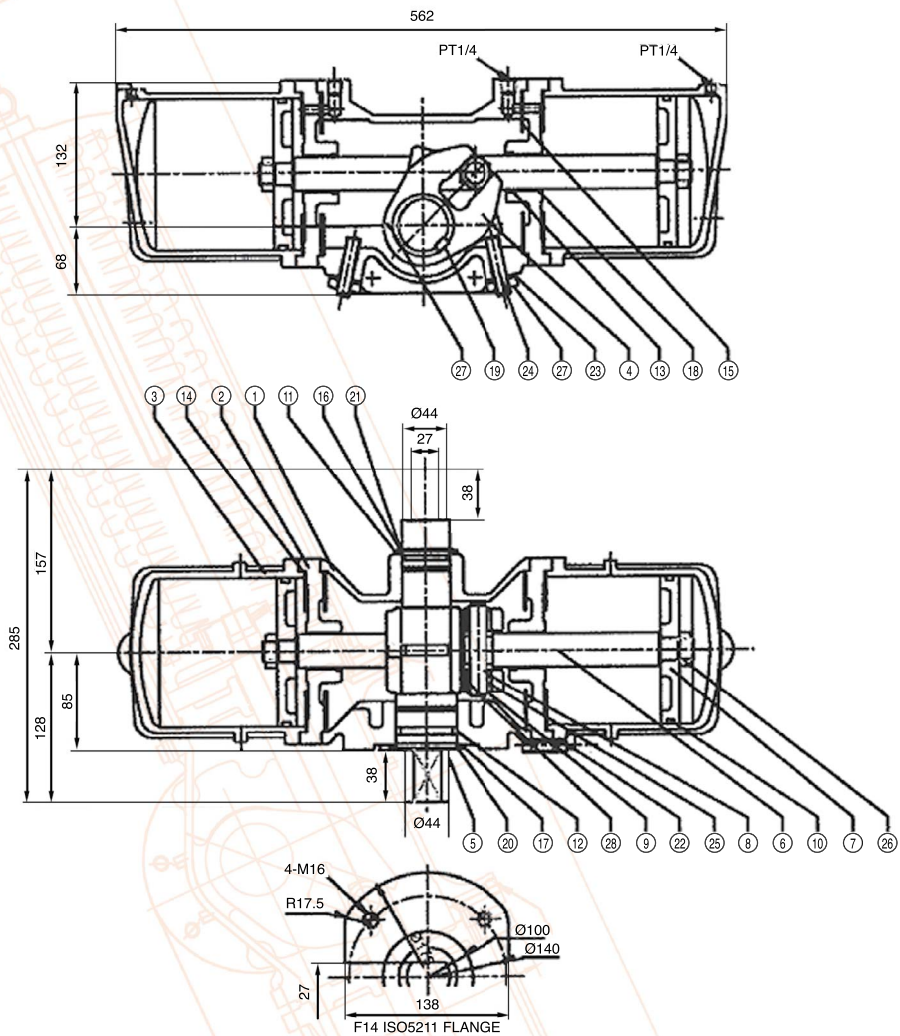
API 622 & ISO 15848-1
Endurance Test Certified

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Bearing: Low friction 2. Adaptor: Dual Air chambers for standard on double-acting units, which increase torque output and suppress piston eccentricity caused by uneven loading. 3. Air Supply Port: Size: RC 1/4 to RC 1/4 depending on the pipe size. 4. Piston Assembly: Design geometry and seal technology that promote a smoother stroke and maximises the amount of torque delivered to the valve. 5. Piston Rod: Hard Chrome plated for low friction, longer life and increased sealing capability. 6. Pin: Hard Chrome plated for low friction, longer life and increased sealing capability. 7. Mounting Plate for manual gear. | <ol style="list-style-type: none"> 8. Stem: The shaft rotating part is hard-chromium plated to improve wear resistance. 9. Air Cylinder: Rugged Ductile iron construction. PTFE lined. 9a. Piston Cylinder: Carbon Steel, ENP lined. 10. Adjustable Stops: Opening and closing stops adjustable to or - 5° to accommodate close seating devices. 11. O-Ring Viton to provide a weather proof seal. 12. Para Arm: High strength ductile iron construction, providing high frequency operation and superior wear resistance. 13. Body: A robust, compact construction. 14. Yoke (option). |
|--|---|

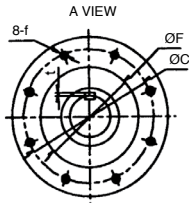
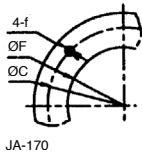
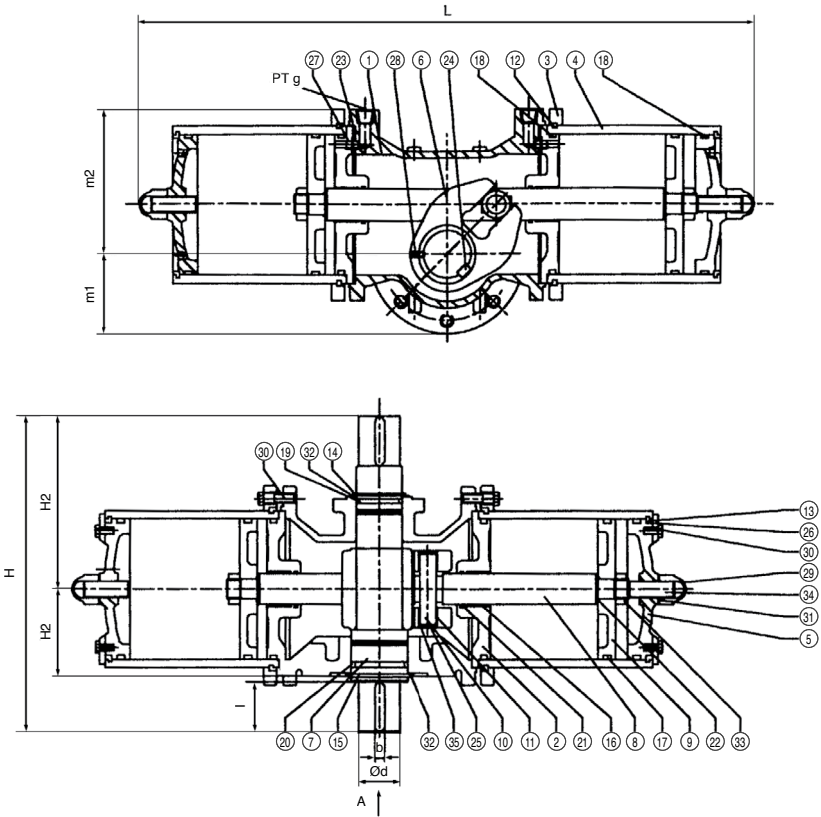


JA SERIES BILL OF MATERIALS (CONTINUED)

NO.	PART NAME	MATERIAL
1	BODY	A48 NO25 (DI)
2	ADAPTOR	A48 NO25
3	CYLINDER	885 ALLOY-SCII4A + PTFE LINED
4	PARA ARM	A536 (G) 65-45-12
5	STEM	A576 (G) I045
6	PISTON ROD	A576 (G) I045
7	PISTON	Zn ALLOY
8	ROLLER	AISI (T) 329
9	PIN	A576 (G) I045 HCr
10	O-RING	VITON
11	O-RING	VITON
12	O-RING	VITON
13	O-RING	VITON
14	O-RING	VITON
15	GASKET	CNAF
16	THRUST BEARING	NYLON
17	THRUST BEARING	NYLON
18	BEARING	REINFORCED PTFE
19	KEY	A576 (G) I045
20	SNAP RING	AISI W1
21	SNAP RING	AISI W1
22	SNAP RING	AISI W1
23	FASTENER SEAL	VITON
24	NUT	A36
25	SOCKET HEAD BOLT	A576 Gr I045
26	NUT	A36
27	SET SCREW	A576 Gr I015
28	BEARING	REINFORCED PTFE
29		
NOTE		
TITLE	JA130 TORQUE CYLINDER (ISO5211 FLANGE)	
DWG NO.	JE-1007-JA130	

JA SERIES
DOUBLE ACTING
JA130

JA SERIES
DOUBLE ACTING
JA170, JA200, JA280

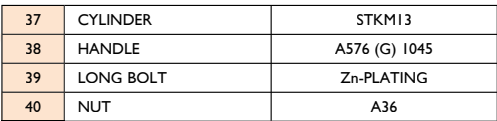


CYLINDER SIZE	m1	M2	L	H	H1	Wt (Kg)
JA-170	95	176	755	381	209	80
JA-200	115	232	1060	457	244	130
JA-280	158	302	1360	578	305	250

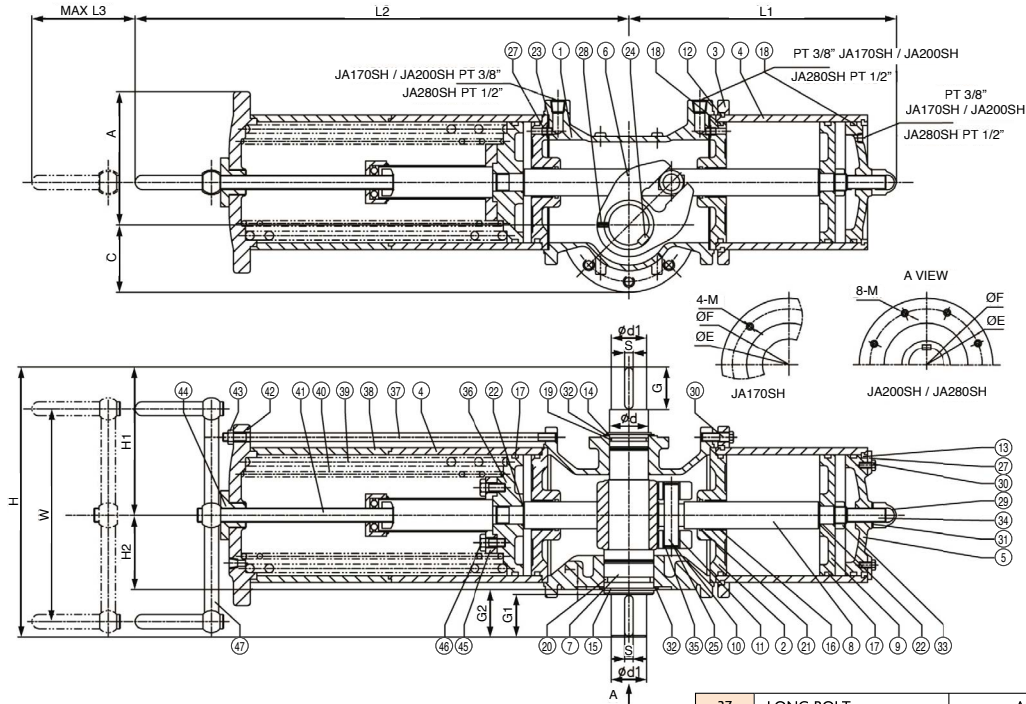
H2	C	F	f	g	ød	l	b	t	Flange ISO5211
105	165	130	M20	3/8"	50	60	12	3.5	516
130	254	200	M16	3/8"	64	75	18	6	F25
165	298	230	M20	1/2"	85	100	24	80	F30

NO.	PART NAME	MATERIAL
1	BODY	A48 NO25 (DI)
2	ADAPTOR	A48 NO25
3	FLANGE	A536 (G) 65-45-12
4	CYLINDER	A53 (G) A (DI) + PTFE LINED
5	CYLINDER COVER	A536 (G) 65-45-12
6	PARA ARM	A536 (G) 65-45-12
7	STEM	A536 (G) 1045
8	PISTON ROD	A536 (G) 1045
9	PISTON	A48 NO25
10	PIN	A536 (G) 1045
11	ROLLER	AISI (T) 329
12	SET RING	A53 (G) A
13	SNAP RING	A53 (G) A
14	SNAP RING	AISI W1
15	BEARING	ANSI W1
16	O-RING	REINFORCED PTFE
17	O-RING	VITON
18	O-RING	VITON
19	O-RING	VITON
20	O-RING	VITON
21	O-RING	VITON
22	O-RING	VITON
23	GASKET	CNAF
24	KEY	A576 (G) 1045
25	SNAP RING	AISI W1
26	ROCKING PLATE	A36
27	PIPE PIECE	O ST
28	SET SCREW	A576 (G) 1045
29	NUT	A36
30	BOLT	A36
31	GASKET	ASBESTOS
32	THRUST BEARING	NYLON
33	NUT	A36
34	SET SCREW	A576 (G) 1015
35	BEARING	REINFORCED PTFE
NOTE		
TITLE		JA170-JA280 TORQUE CYLINDER (ISO5211 FLANGE)
DWG NO.		JE-1010-JA170, J200, JA280

**JA SERIES
SPRING RETURN MANUAL OVERRIDE
JA130SH
C/W Handwheel - Manual Over-Ride**



**JA SERIES
SPRING RETURN MANUAL OVER-RIDE
JA170SH, JA200SH, JA280SH
C/W Handwheel - Manual Over-ride**



CYLINDER SIZE	ød	ød1	G	G1	G2	T	S	M	F
JA170SH	50	50	60	60	67	4	12	m20	130
JA200SH	70	64	75	75	83	4	18	m16	200
JA280SH	90	85	100	100	108	4	24	m20	230

E	L1	L2	L3	A	C	H	H1	H2	g	w	Flange ISO5211
165	378	700	150	176	95	381	209	105	1/4"	260	F16
254	530	960	240	232	115	457	244	130	3/8"	440	F25
298	680	1250	300	302	158	578	305	165	1/2"	760	F30

37	LONG BOLT	A576 (G) 1045
38	SPRING CASE	A53 (G) A CARBON STEEL + ENP
39	SPRING	AISI 6150
40	SPRING	AISI 6150
41	STOPPER BOLT	A576 (G) 1045
42	SPRING COVER	A536 (G) 65-45-12
43	NUT	A576 (G) 1045
44	NUT	A36
45	CYLINDER	CARBON STEEL + ENP
46	NUT	A576 (G) 1045
47	HANDLE	A576 (G) 1045

NO.	PART NAME	MATERIAL
1	BODY	A48 NO25 (DI)
2	ADAPTOR	A48 NO25
3	FLANGE	A536 (G) 65-45-12
4	CYLINDER	DUCTILE IRON + ENP
5	CYLINDER COVER	A536 (G) 65-45-12
6	PARA ARM	A536 (G) 65-45-12
7	STEM	A536 (G) 1045
8	PISTON ROD	A536 (G) 1045
9	PISTON	A48 NO25 (PISTON BORE TO BE ENP)
10	PIN	A536 (G) 1045
11	ROLLER	AISI (T) 329
12	SET RING	A53 (G) A
13	SET RING	A53 (G) A
14	SNAP RING	AISI W1
15	SNAP RING	AISI W1
16	BEARING	REINFORCED PTFE
17	O-RING	VITON
18	O-RING	VITON
19	O-RING	VITON
20	O-RING	VITON
21	O-RING	VITON
22	O-RING	VITON
23	GASKET	NON ASBESTOS
24	KEY	A576 (G) 1045
25	SNAP RING	AISI W1
26	ROCKING PLATE	A36
27	PIPE PIECE	O ST
28	SET SCREW	A576 (G) 1015
29	NUT	A36
30	BOLT	A36
31	GASKET	CNAF
32	THRUST BEARING	NYLON
33	NUT	A36
34	SET SCREW	A576 (G) 1015
35	BEARING	REINFORCED PTFE
36	SPRING PISTON	A48 NO25
NOTE		
TITLE	JA170SH-JA280SH TORQUE CYLINDER (ISO5211 FLANGE)	
DWG NO.	JE-1012-HW-JA170SH, JA200SH, JA280SH	

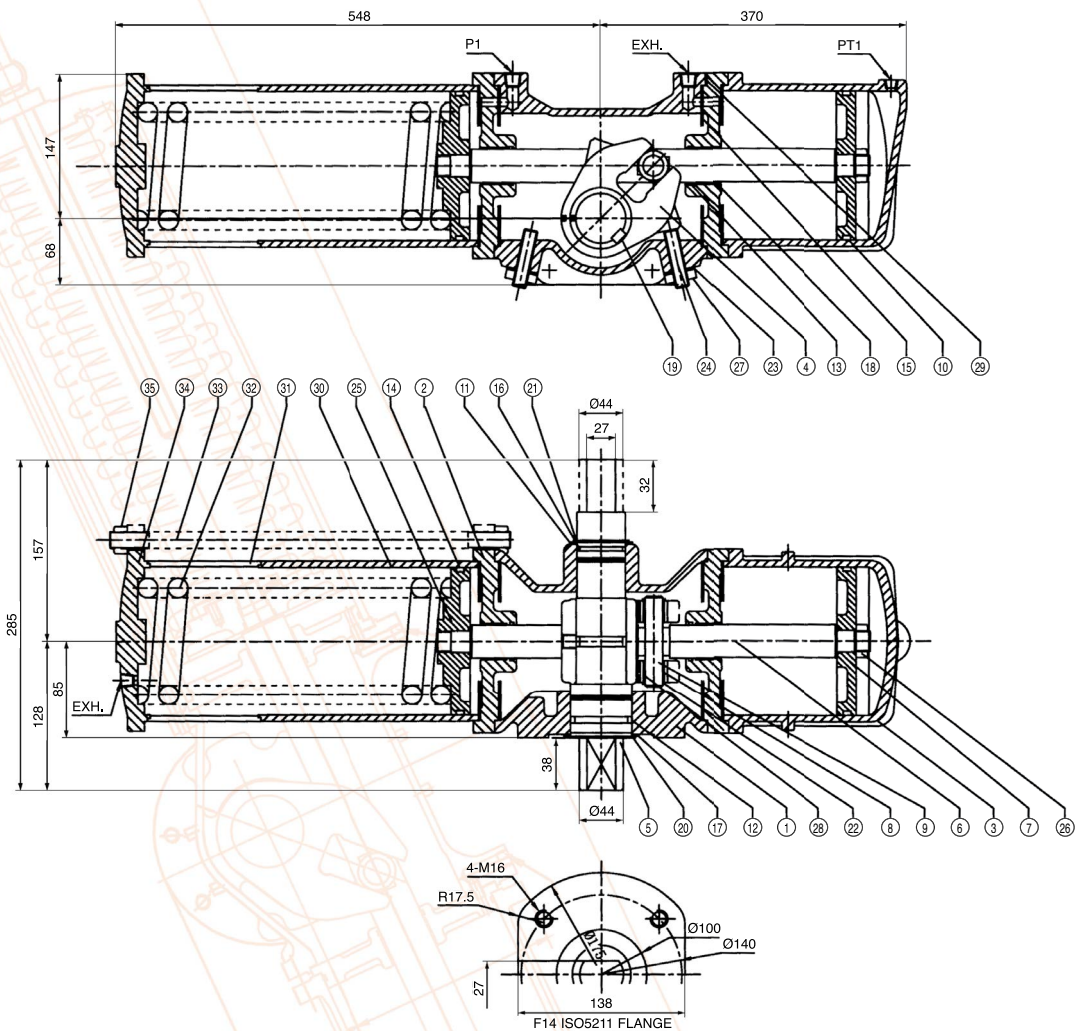
JA SERIES BILL OF MATERIALS (CONTINUED)

TORQTURN®

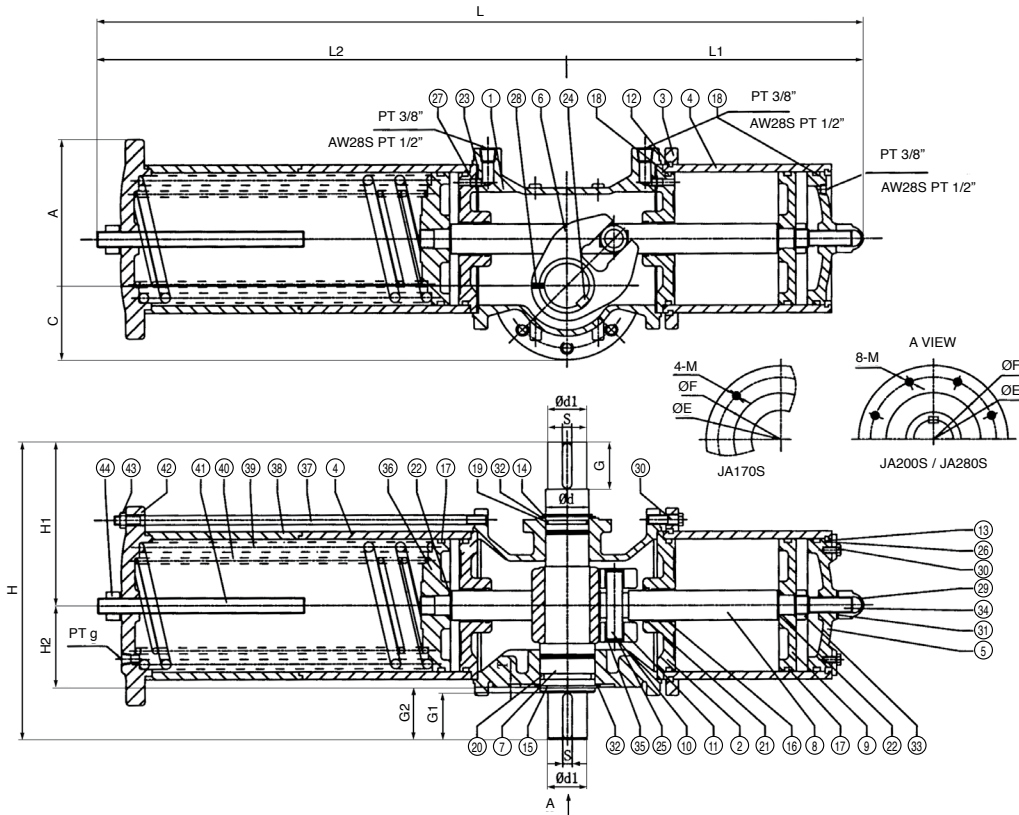
ACTUATORS - SERIES A-SK, JA, JC SERIES

JA SERIES BILL OF MATERIALS (CONTINUED)

NO.	PART NAME	MATERIAL
1	BODY	A48 NO25 (DI)
2	ADAPTOR	A48 NO25
3	CYLINDER	885 ALLOY-SCI4A + PTFE
4	PARA ARM	A536 (G) 65-45-12
5	STEM	A576 (G) 1045
6	PISTON ROD	A576 (G) 1045
7	PISTON	A48 NO25 (PISTON BORE PTFE LINED)
8	ROLLER	AISI (T) 329
9	PIN	A576 (G) 1045 HCr
10	O-RING	VITON
11	O-RING	VITON
12	O-RING	VITON
13	O-RING	VITON
14	O-RING	VITON
15	GASKET	CNAF
16	THRUST BEARING	NYLON
17	THRUST BEARING	NYLON
18	BEARING	REINFORCED PTFE
19	KEY	A576 (G) 1045
20	SNAP RING	AISI W1
21	SNAP RING	AISI W1
22	SNAP RING	AISI W1
23	FASTENER SEAL	NBR
24	NUT	A36
25	SPRING PISTON	FCD450
26	NUT	A36
27	SET SCREW	A576 Gr 1015
28	BEARING	REINFORCED PTFE
29	O-RING	VITON
30	CYLINDER	CARBON STEEL
31	SPRING CASE	CARBON STEEL + ENP
32	SPRING	SUP10
33	LONG BOLT	Zn-PLATING
34	SPRING COVER	FCD450
35	NUT	Zn-PLATING
NOTE		
TITLE	JA130 TORQUE CYLINDER (ISO5211 FLANGE)	
DWG NO.	JE-1008-JA130S	

JA SERIES
SPRING RETURN
JA130S

JA SERIES SPRING RETURN JA170S, JA200S, JA280S



CYLINDER SIZE	Ød	ød1	G	G1	G2	T	S	M	F
JA-170S	55	50	60	60	67	4	12	M20	130
JA-200S	70	64	75	75	83	4	18	M16	200
JA-280S	90	85	100	108	108	4	24	B20	230

E	L	L1	L2	A	C	H	H1	H2	g	Flange ISO5211
165	988	378	610	176	95	381	209	105	1/4"	F16
254	1415	530	885	232	115	457	244	130	3/8"	F25
298	1840	680	1160	302	158	578	305	165	1/2"	F30

37	LONG BOLT	A576 (G) 1045
38	SPRING CASE	A53 (G) A CARBON STEEL + ENP
39	SPRING	AISI 6150
40	SPRING	AISI 6150
41	STOPPER BOLT	A576 (G) 1045
42	SPRING COVER	A536 (G) 65-45-12 CARBON STEEL
43	NUT	A576 (G) 1045
44	NUT	A36

NO.	PART NAME	MATERIAL
1	BODY	A48 NO25 (DI)
2	ADAPTOR	A48 NO25
3	FLANGE	A536 (G) 65-45-12
4	CYLINDER	A53 (G) A
5	CYLINDER COVER	A536 (G) 65-45-12 + PTFE
6	PARA ARM	A536 (G) 65-45-12
7	STEM	A536 (G) 1045
8	PISTON ROD	A536 (G) 1045
9	PISTON	A48 NO25 (PISTON BORE ENP)
10	PIN	A536 (G) 1045
11	ROLLER	AISI (T) 329
12	SNAP RING	A53 (G) A
13	SNAP RING	A53 (G) A
14	SNAP RING	AISI W1
15	BEARING	AISI W1
16	O-RING	REINFORCED PTFE
17	O-RING	VITON
18	O-RING	VITON
19	O-RING	VITON
20	O-RING	VITON
21	O-RING	VITON
22	O-RING	VITON
23	GASKET	CNAF
24	KEY	A576 (G) 1045
25	SNAP RING	AISI W1
26	ROCKING PLATE	A36
27	PIPE PIECE	O ST
28	SET SCREW	A576 (G) 1015
29	NUT	A36
30	BOLT	A36
31	GASKET	ASBESTOS
32	THRUST BEARING	NYLON
33	NUT	A36
34	SET SCREW	A576 (G) 1015
35	BEARING	REINFORCED PTFE
36	SPRING PISTON	A48 NO25
NOTE		
TITLE	JA170S/JA200S/JA280S TORQUE CYLINDER (ISO5211 FLANGE)	
DWG NO.	JE-1011-JA170S, JA200S, JA280S	

JA SERIES BILL OF MATERIALS (CONTINUED)

TORQTURN®

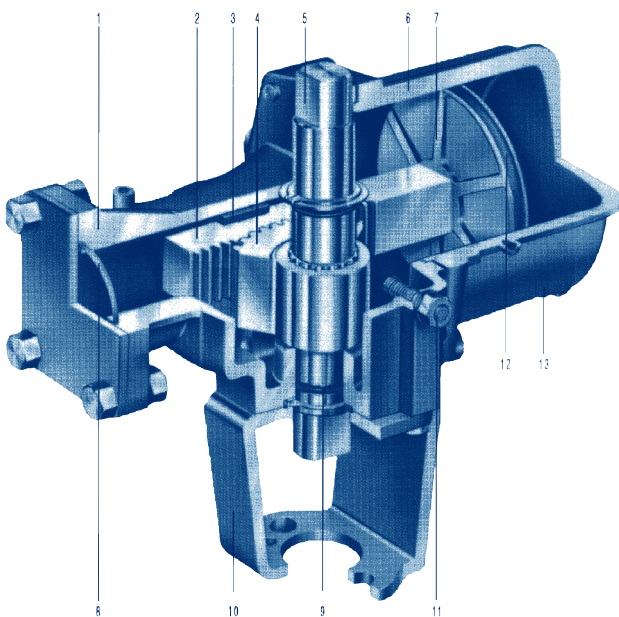
ACTUATORS - SERIES A-SK, JA, JC SERIES

APPENDIX 3

JC SERIES BILL OF MATERIALS

The JC Series is available in double acting and spring return to suit 0.4 to 0.7mpa from -20°C to 100°C. It is a very efficient, compact, light weight style. The spring return until still has a separate cassette just like the JA series which is ENP plated. The piston bore is PTFE coated for low friction and to resist corrosion.

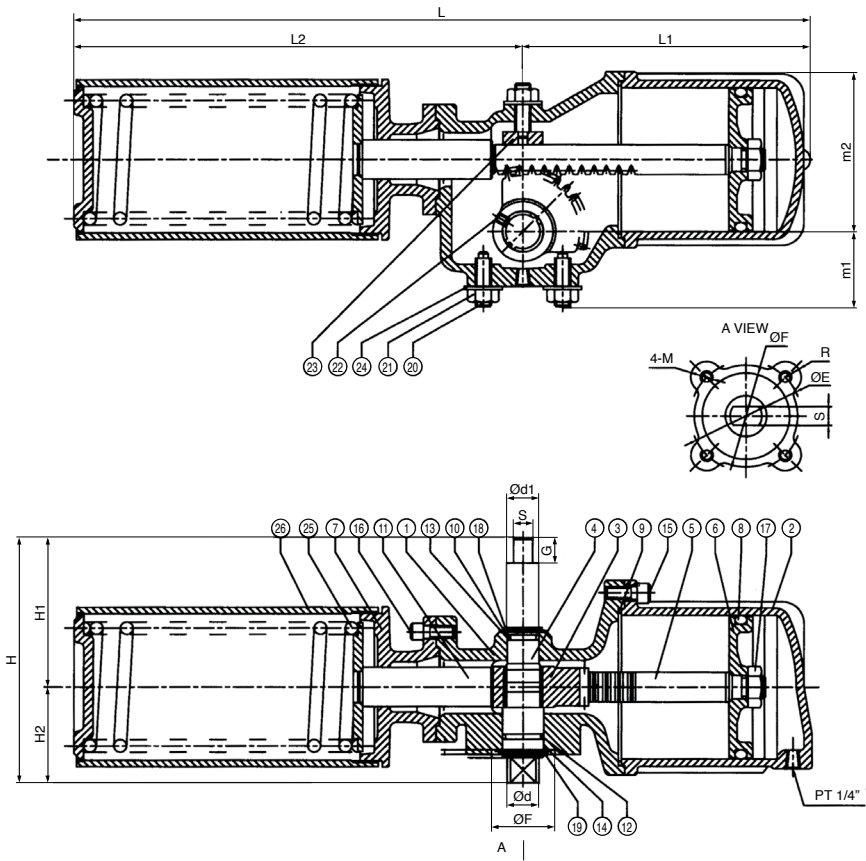
1. Compact, rugged Ductile iron body (Carbon steel spring cylinder)



API 622 & ISO 15848-1, CL CO2
Endurance Test Certified

2. Rack gear, converts linear motion to rotary motion in connection with a pinion.
3. Lubricating metal with low friction.
4. Rugged, sintered metal pinion. Connected firmly to the stem.
5. Carbon steel stem transmits rotary movement to valve's stem.
6. Air cylinder has a compact design and tough construction with PTFE lining for low friction and to resist corrosion.
7. Light-weight, rugged Aluminium Alloy piston.
- 8, 9 & 12. O-Ring Viton.
10. Yoke (optional).
11. Tamper-proof externally adjustable stop bolt.
13. Air connection Rc1/4".

JC SERIES
SPRING RETURN
JC60S, JC90S



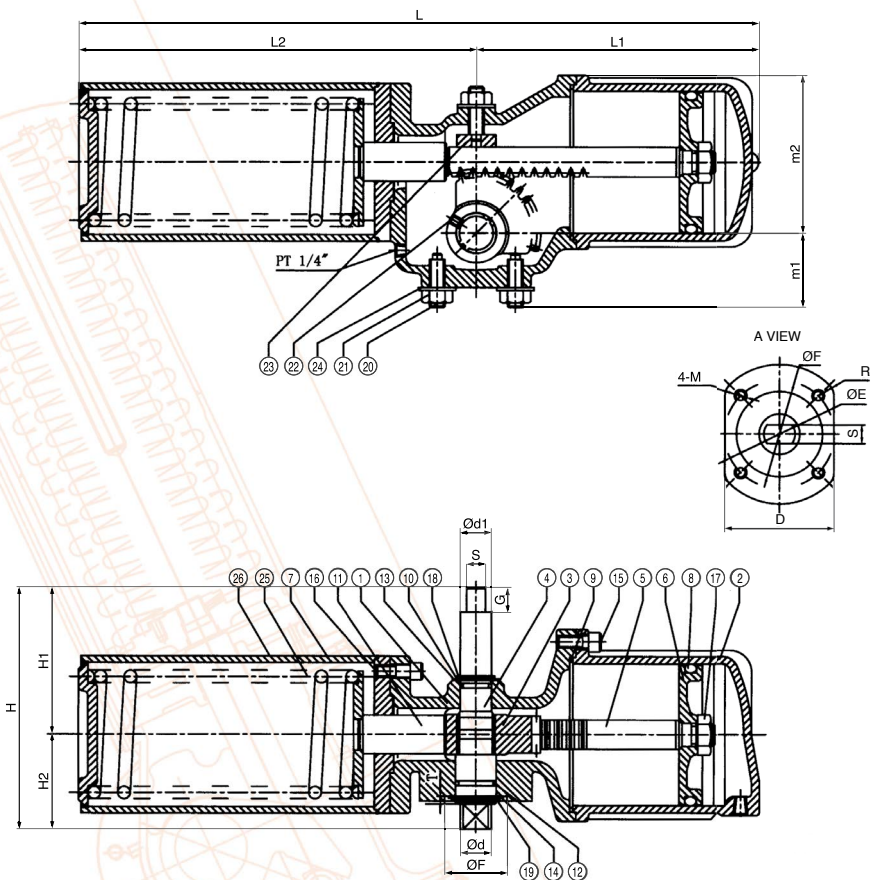
CYLINDER SIZE	Ød	ød1	G	T	S	L	L1	L2	H	H1	H2	m1	m2	øF	øE	M	R
JC60S	14	16	13	3	8	329	136	193	131	78	53	42	78	35	50	M6	7.5
JC90S	20	30	16	3	12	463	181	282	156	95	61	47	105	55	70	M8	10

NO.	PART NAME	MATERIAL
1	BODY	A48 NO25
2	CYLINDER	885 ALLOY-SCII4A & PTFE LINED
3	SECTOR GEAR	STEEL
4	STEM	A536 (G) 1045
5	RACK	A536 (G) 1045
6	PISTON	A48 NO 25
7	FLANGE	A48 NO25
8	O-RING	VITON
9	O-RING	VITON
10	O-RING	VITON
11	SPRING PISTON	STEEL
12	O-RING	VITON
13	THRUST BEARING	NYLON
14	THRUST BEARING	NYLON
15	BOLT	A36
16	BOLT	A36
17	NUT	A36
18	SNAP RING	AISI W I
19	SNAP RING	AISI W I
20	BOLT	A36
21	NUT	A36
22	SET SCREW	A576 (G) 1015
23	RACK GUIDE	STEEL
24	FASTENER SEAL	VITON + A36
25	SPRING	AISI 6150
26	SPRING CYLINDER	CARBON STEEL + ENP
27		
28		
29		
NOTE		
TITLE	JC60S/JC90S TORQUE CYLINDER (ISO5211 FLANGE)	
DWG NO.	JE-1014-JC60S, JC90S	

JC SERIES BILL OF MATERIALS (CONTINUED)

JC SERIES BILL OF MATERIALS (CONTINUED)

NO.	PART NAME	MATERIAL
1	BODY	A48 NO25
2	CYLINDER	885 ALLOY-SC114A & PTFE LINED
3	SECTOR GEAR	STEEL
4	STEM	A536 (G) 1045
5	RACK	A536 (G) 1045
6	PISTON	A48 NO 25
7	SPRING CYLINDER	STKM13
8	O-RING	VITON
9	O-RING	VITON
10	O-RING	VITON
11	SPRING PISTON	STEEL
12	O-RING	VITON
13	THRUST BEARING	NYLON
14	THRUST BEARING	NYLON
15	BOLT	A36
16	BOLT	A36
17	NUT	A36
18	SNAP RING	AISI W1
19	SNAP RING	AISI W1
20	BOLT	A36
21	NUT	A36
22	SET SCREW	A576 (G) 1015
23	RACK GUIDE	STEEL
24	FASTENER SEAL	VITON + A36
25	SPRING	AISI 6150
26	SPRING CYLINDER	CARBON STEEL + ENP
27		
28		
29		
NOTE		
TITLE	JC130S TORQUE CYLINDER (ISO5211 FLANGE)	
DWG NO.	JE-1015-JC130S	

JC SERIES
SPRING RETURN
JC130S

CYLINDER SIZE	Ød	ød1	G	T	S	L	L1	L2	H	H1	H2	m1	m2	øF	øE	M	D	R
JC130S	34	35	28	3	22	683	257	426	224	131	93	70	155	70	102	M10	100	11.5



AUSTRALIAN PIPELINE VALVE®

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IOM Torqturn Actuator A-SK JA JC

