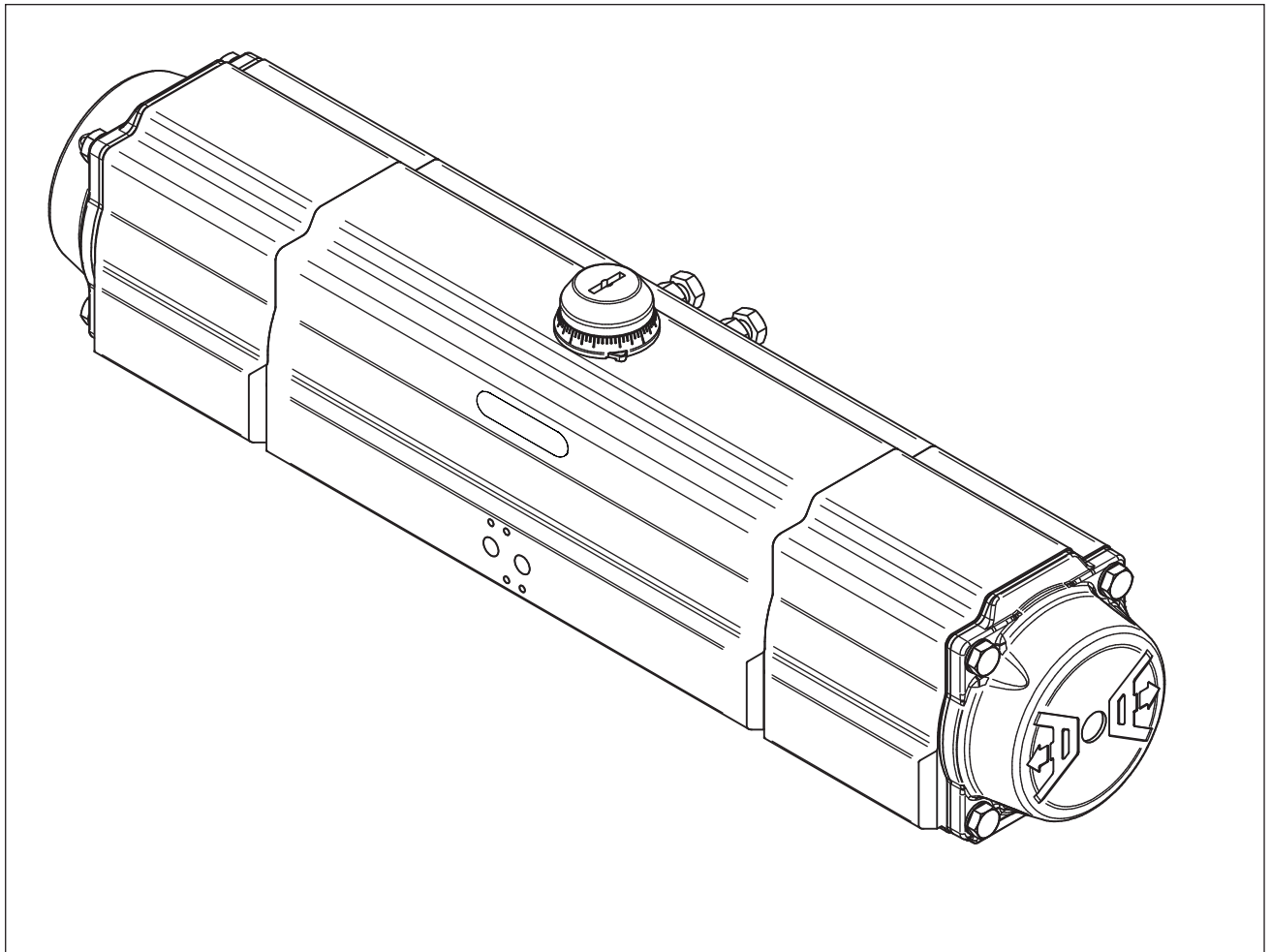


Original instructions



FAIL MID 4th Generation Upgrade Series

180° Spring Return Rack&Pinion actuators with 90° fail safety position

FM AT208U → AT658U models

Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling AIR TORQUE devices. The images shown in these instructions are for illustration purposes only. The actual product may vary.

- For the safe and proper use of these instructions, read them carefully and keep them for later reference.
- If you have any questions about these instructions, contact AIR TORQUE's After-sales Service Department (aftersales@airtorque.it).



The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website at www.airtorque.it

Definition of signal words

DANGER

Hazardous situations which, if not avoided, will result in death or serious injury

WARNING

Hazardous situations which, if not avoided, could result in death or serious injury

NOTICE

Property damage message or malfunction

Note

Additional information

Tip

Recommended action

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1 Safety instructions and measures

Intended use

The AIR TORQUE 4thGU FM actuators are designed for the automation and operation of part turn valves in both indoor and outdoor applications. The actuator can be used in process and industrial plants.

The actuator is designed to operate under exactly defined conditions (e.g. temperature, pressure, travel). Therefore, operators must ensure that the actuator is only used in operating conditions that meet the specifications used for sizing the actuator at the ordering stage. In case operators intend to use the actuator in other applications or conditions than specified, contact AIR TORQUE.

AIR TORQUE does not assume any liability for damage resulting from the failure to use the device for its intended purpose or for damage caused by external forces or any other external factors.

➔ Refer to the technical data and nameplate for limits and fields of application as well as possible uses.

Reasonably foreseeable misuse

The actuator is not suitable for the following applications:

- Use outside the limits defined during sizing and by the technical data.
- Use outside the limits defined by the accessories connected to the actuator.

Furthermore, the following activities do not comply with the intended use:

- Use of non-original spare parts.
- Performing service and repair work not described in these instructions.

Qualifications of operating personnel

The actuator must be mounted, started up, serviced and repaired by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

Personal protective equipment

- We recommend wearing the protective gloves, safety footwear, eye protection and hearing protection when mounting, service, operating, tested or removing the AIR TORQUE actuators



➔ Check with the plant operator for details on further protective equipment.

Revisions and other modifications

Revisions, conversions or other modifications of the product are not authorized by AIR TORQUE. They are performed at the user's own risk and may lead to safety hazards, for example. Furthermore, the product may no longer meet the requirements for its intended use.

Safety devices

The AIR TORQUE pneumatic actuators alone do not have any special safety equipment.

Warning against residual hazards

To avoid personal injury or property damage, plant operators and operating personnel must prevent hazards that could be caused in the actuator by the signal pressure, stored spring energy or moving parts by taking appropriate precautions. They must observe all hazard statements, warning and caution notes in these mounting and operating instructions.

Responsibilities of the operator

The operator is responsible for proper operation and compliance with the safety regulations. Operators are obliged to provide these mounting and operating instructions as well as the referenced documents to the operating personnel and to instruct them in proper operation.

Furthermore, the operator must ensure that operating personnel or third persons are not exposed to any danger.

These instructions should not supersede or replace any customer's plant safety or work procedures. If a conflict arises between these instructions and the customer's procedures, the differences should be resolved in writing between an authorized end user's representative and an authorized AIR TORQUE representative.

Responsibilities of operating personnel

Operating personnel must read and understand these mounting and operating instructions as well as the referenced documents and observe the specified hazard statements, warnings and caution notes. Furthermore, the operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

Referenced standards and regulations

- AIR TORQUE actuators are designed, produced and classified according to the European Atex directive 2014/34/EU and U.K. Regulation S.I. 2016 No. 1107 (as amended). Before using the actuators in potentially explosive atmosphere areas, verify the actuator compliance with the required ATEX classification.
- ➔ Refer to the nameplate and the ATEX / UKCA safety instructions.
- 4th Generation Upgrade Series actuators are SIL certificated.
- ➔ Refer to the SIL Certificate available from AIR TORQUE for the 4th Generation Upgrade Series actuators SIL capability.
- Referring to Machine Directive 2006/42/EC and U.K. Regulation S.I. 2008 No. 1597 (as amended), actuators are

Safety instructions and measures

- the machinery and/or the final system, where the actuator is incorporated, will be declared in compliance with the requirements of the Directive.
- The AIR TORQUE pneumatic actuators are designed according to the criteria of
 - Article 1, paragraph 2. j) ii) of the Pressure equipment directive (PED) 2014/68/EU.
 - Part 1, section 4, schedule 1, paragraph 1. j) ii) of U.K. Regulation S.I. 2016 No. 1105 (as amended).
- Therefore, according to the directive 2014/68/EU and U.K. Regulation S.I. 2016 No. 1105 (as amended) they are not to be considered pressure equipments.
- ➔ Refer to the EU Declaration of Conformity available from AIR TORQUE.
- The AIR TORQUE actuators are in compliance with the TR CU 10/2011 and TR CU 12/2011.

Referenced documentation

The further documents apply in addition to these mounting and operating instructions:

- Mounting and operating instructions for the valve, available from the valve manufacturer,
- Mounting and operating instructions for control and signal devices (positioner, solenoid valve, etc.) available from devices manufacturer,
- ATEX safety manual,
- SIL safety manual for use in safety-instrumented systems.

1.1 Notes on possible severe personal injury

DANGER

Risk of bursting due to incorrect opening of pressurized equipment or components.

Pneumatic actuators are pressure equipment that may burst when handled incorrectly. Flying projectile fragments or components can cause serious injury or even death.

- ➔ Before starting any work on the actuator disconnect all pneumatic / hydraulic / electrical supplies and discharge the pressure from the actuator.

Risk of severe personal injury due to suspended loads falling.

- ➔ Stay far from suspended or moving loads.
- ➔ Close off and secure the transport paths.

1.2 Notes on possible personal injury

WARNING

Risk of lifting equipment tipping over and risk of damage to lifting accessories due to exceeding the rated lifting capacity.

- ➔ Use only approved lifting equipment and accessories whose maximum lifting capacity is higher than the actuator

weight (including the packaging, if applicable).

Crush hazard arising from moving parts.

The actuator and the valve assembly contains moving parts, which can injure hands or fingers.

- ➔ Do not touch or insert hands or finger into moving parts.
- ➔ Before starting any work on the actuator disconnect all pneumatic / hydraulic / electrical supplies and discharge the pressure from the actuator.
- ➔ Do not block the movement of the pinion and the pistons by inserting objects into the actuator.

Risk of personal injury during actuator air exhaust.

In case of pneumatic version the actuator is operated with air. As a result, air is exhausted during operation.

- ➔ Install the air exhaust components in such a way that exhaust ports are not located at eye level and the actuator does not discharge at eye level in the working position.
- ➔ Use suitable silencers and vent plugs.
- ➔ Wear eye and hearing protection when working near the actuator.

Risk of personal injury due to preloaded and compressed springs.

End caps are under tension due to compressed springs. Furthermore incorrect spring cartridges disassembly could result in serious injury.

- ➔ Before starting any work on the actuator disconnect all pneumatic / hydraulic / electrical supplies and discharge the pressure from the actuator.
- ➔ Make sure that the actuator is in the closed position (0°) while disassembling the end caps and the stop screws have been correctly removed.
- ➔ Do not disassemble individual spring cartridges.
- ➔ For spring cartridges service contact AIR TORQUE.

Risk of personal injury through incorrect operation, use or installation as a result of information on the actuator being illegible.

Over time, markings, labels and nameplates on the actuator may become covered with dirt or become illegible in some other way. As a result, hazards may go unnoticed and the necessary instructions not followed. There is a risk of personal injury.

- ➔ Keep all relevant markings and inscriptions on the device in a constantly legible status.
- ➔ Immediately renew damaged, missing or incorrect nameplates or labels.

1.3 Notes on possible property damage

NOTICE

Risk of actuator damage due to incorrectly attached slings.

- ➔ Do not attach load-bearing slings to the travel stop.

Risk of actuator damage due to the use of inappropriate tools.

Certain tools are required to work on the actuator.

→ *Do not use damaged tools. Refer to section 15.1 'Tools'.*

Risk of actuator damage due to excessively high or low tightening torques.

Observe the specified torques on tightening actuator components (bolts and nuts). Excessive tightening torques lead to parts wearing out quicker. Parts that are not tightened enough may loosen.

→ *Refer to section 15.2 'Tightening torques'.*

Risk of actuator damage due to the use of unsuitable lubricants.

The lubricants to be used depend on the actuator material and operating temperatures. Unsuitable lubricants may corrode and damage the components.

→ *Use only lubricants approved by AIR TORQUE. Refer to section 15.3 'Lubricants'.*

2 Markings on the device

2.1 Actuator nameplate sample

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

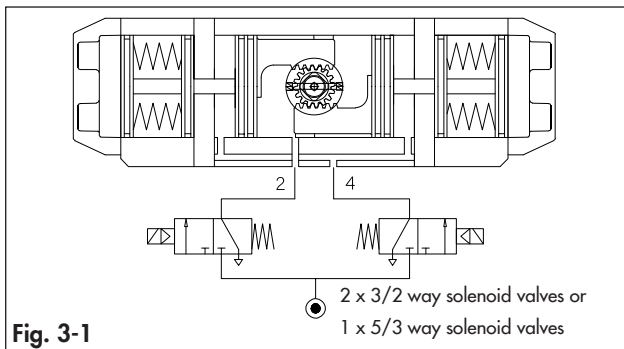
3 Design and principle of operation

At both ends of the actuator a spring set is mounted and the springs can be compressed in two directions: toward end caps or inward. Pressure supplied at port 2 forces the pistons toward actuator end caps and rotate from 90° to 180° compressing the springs, while pressure supplied at port 4 forces the pistons inward and actuator rotate from 90° to 0°.

From both fully close position (0°) or fully open position (180°) the fail-safe operation is achieved in case of air failure by extension of the compressed springs; they push the pistons to rotate the actuator from 0° or 180° position to 90° position.

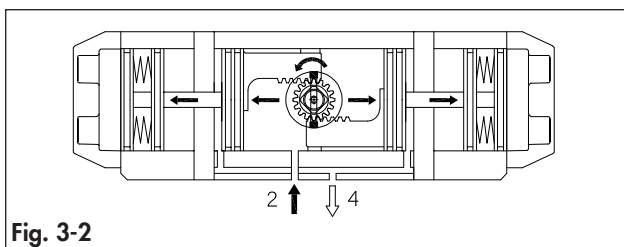
Operation (for standard assembly ST)

A system of solenoid valves that control the sequence of air supplies is required in order to operate correctly the 180° spring return actuator with 90° Fail safety position.



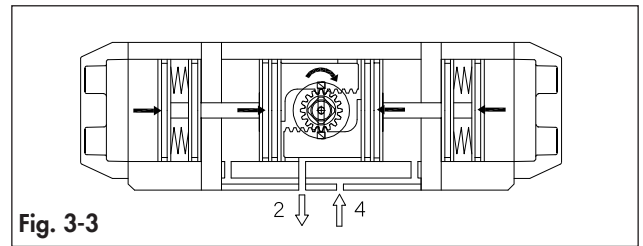
From 90° to 180°

When compressed air is supplied at port 2, air forces the pistons toward actuator end caps and compresses the springs from the center to the outside ends. A counterclockwise rotation is obtained (refer to Fig. 3-2).



From 90° to 0°

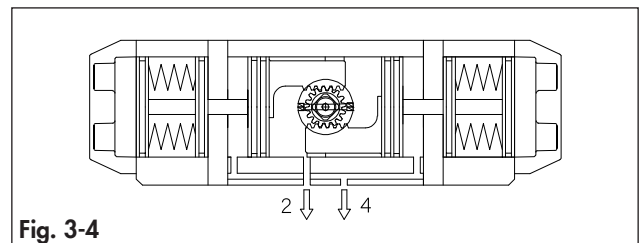
When compressed air is supplied at port 4, air forces the pistons inward and compresses the springs from their outside ends to the center. A clockwise rotation is obtained (refer to Fig. 3-3)



Air fail operation

From 180° position: the air pressure loss (air or electric failure) at port 2 allows the springs to force the pistons inward (until 90° position) with the exhaust air exiting from port 2, a clockwise rotation is achieved (refer to Fig. 3-4).

From 0° position: the air pressure loss (air or electric failure) at port 4 allows the springs to force the pistons toward the actuator (until 90° position) with the exhaust air exiting at port 4, a counterclockwise rotation is achieved (refer to Fig. 3-4).



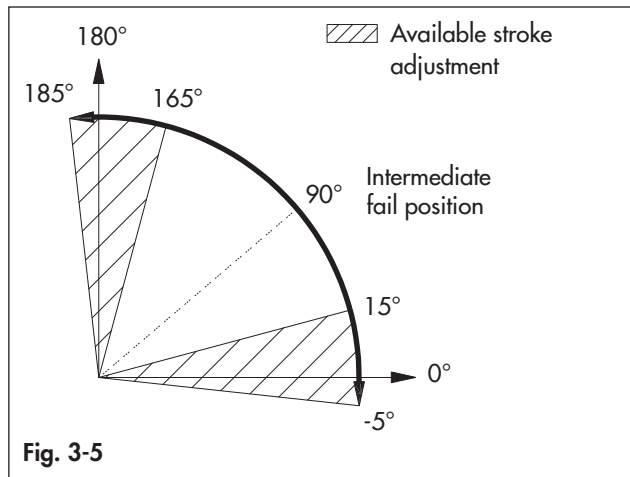
The actuators can be controlled by different options:

- direct mounting of control devices (for example a solenoid valve or a manifold) with NAMUR interface,
- threaded connections (to pressurize port “2” and “4”) with air lines from separate electro-pneumatic control system.

3.1 Direction of action and fail position

The standard rotating direction for the Fail Mid actuators is clockwise to close.

Fail Mid 4thGU actuators are designed for 180° rotating angle, with travel stop allowing adjustment (Fig. 3-5) for -5° up to +15° on the close position and for +5° up to -15° on the open position.



The intermediate position at 90° has an innate fault, due to the tolerances, of approximately +/- 1° (refer to Fig. 3-5).

In case of pressure, power or signal failure the springs drive the actuator in the intermediate fail position that can be CCW rotation or CW rotation.

i Note

If the actuator is controlled by a control system the FAIL position may be different from FAIL OPEN or FAIL CLOSE.

- ➔ Refer to the actuator model technical data for the FAIL position.
- ➔ Refer to section 2.1 'Actuator nameplate sample' (Table 2-1, position 11) for the fail action and direction of rotation available options.

3.2 Technical data

The nameplate provides information on the actuator configuration.

- ➔ Refer to section 2.1 'Actuator nameplate sample'.
- ➔ More informations are available in the actuator model technical data sheet available from AIR TORQUE.

Power operating media

- Use dry or lubricated air or inert gas.
- Make sure the operating media is compatible with the actuator internal parts and lubricant.
- In case of pressure medium different than Group 2 fluids according to the PED 2014/68/EU, contact AIR TORQUE.
- The operating media must have a dew point equal to -20°C (-4°F) or at least 10°C (18°F) below the ambient temperature.
- The maximum particle size contained into the operating media must not exceed 30 µm.

Supply pressure

- The maximum operating pressure is 8 bar (116 Psi).

- ➔ Refer to section 2.1 'Actuator nameplate sample' (Table 2-1, position 05).
- ➔ Refer to the actuator model technical data for output torque values related to the working pressure range.

Operating temperature

The nameplate provides indication on the operating temperatures.

- "ST" actuators for standard temperatures from -20°C (-4°F) to +80°C (+176°F).
 - "HT" actuators for high temperatures from -15°C (+5°F) to +150°C (+302°F).
 - "LLT2" actuators for extremely low temperatures from -60°C (-76°F) to +80°C (+176°F).
- ➔ Refer to the data sheet RP10600E for the soft spare parts material and lubricant type in relation to the different working temperature ranges.

Stroking time

The stroking time depends on several factors such as supply pressure, supply system capacity (tubing diameter, pneumatic accessories flow capacity), valve type, valve torque, applied safety factor, cycle frequency, temperatures, etc. Nevertheless, an indication of the stroking time in clearly defined conditions is available in the actuator model technical data sheet.

4 Shipment and on-site transport

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

4.1 Accepting the delivered goods

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

4.2 Removing the packaging from the actuator

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

4.3 Transporting and lifting the actuator

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

4.4 Storing the actuator

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

5 Mounting and assembly

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

5.1 Preparation for installation

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

5.2 Control and signal devices assembly

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

5.3 Mounting the actuator over the valve

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

6 Start-up

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

7 Operation

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

8 Malfunctions

The work described in this section is only to be performed by fully trained and qualified personnel.

8.1 Troubleshooting

Malfunction	Possible reasons	Recommended action
Uneven rotation	Inadequate supply	Check the supply system and make sure that the supply pressure is correct.
	Missing lubricant	Disassemble the actuator, lubricate all the sliding parts and reassemble the actuator.
	Worn components	Disassemble the actuator, inspect and replace the worn/damaged components.
	Control system	Make sure the control system components are correctly assembled. Check the control system documentation and contact the manufacturer.
	Faulty valve	In case of actuator mounted over the valve, check the valve documentation and contact the manufacturer.
Incomplete rotation	Incorrect stroke adjustment	Follow the indications in section 9.5.6 for correct stroke adjustment.
	Foreign object left inside	Disassemble the actuator, inspect and remove any foreign object.
	Incorrect assembly after maintenance	Disassemble and reassemble the actuator correctly.
	Control system	Make sure the control system components are correctly assembled. Check the control system documentation and contact the manufacturer.
	Faulty valve	In case of actuator mounted over the valve, check the valve documentation and contact the manufacturer.
	Worn or damage fail mid components inside in the extra bodies	Disassemble the actuator, inspect and replace the worn/damaged components.
Loss of power	Inadequate supply pressure	Check the control system and make sure that the supply pressure is correct.
	Supply pipe blocked, compressed or with sealing problems	Check all the tubing and fittings, remove any foreign object/damaged component.
	Actuator seals leakage	Disassemble the actuator, inspect and replace any damaged seals.
	blocked air exhaust hole	Remove plugs or foreign objects from the exhaust hole.
	Faulty valve	In case of actuator mounted over the valve, check the valve documentation and contact the manufacturer.

i Note

Contact AIR TORQUE after-sales service (aftersales@airtorque.it) for malfunctions not listed in the table.

8.2 Emergency action

The plant operator is responsible for emergency action to be taken in the plant.

9 Service

The work described in this section is only to be performed by fully trained and qualified personnel.

⚠ DANGER

Risk of bursting due to incorrect opening of pressurized equipment or components.

Pneumatic actuators are pressure equipment that may burst when handled incorrectly. Flying projectile fragments or components can cause serious injury or even death.

➔ *Before starting any work on the actuator disconnect all pneumatic / hydraulic / electrical supplies and discharge the pressure from the actuator.*

⚠ WARNING

Risk of personal injury due to preloaded and compressed springs.

End caps are under tension due to compressed springs. Furthermore incorrect spring cartridges disassembly could result in serious injury.

➔ *Before starting any work on the actuator disconnect all pneumatic / hydraulic / electrical supplies and discharge the pressure from the actuator.*

➔ *Make sure that the actuator is in the closed position (0°) while disassembling the end caps and the stop screws have been correctly removed.*

➔ *Do not disassemble individual spring cartridges.*

➔ *If spring cartridges service is necessary, contact AIR TORQUE.*

⚠ WARNING

Crush hazard arising from moving parts.

The actuator and the valve assembly contains moving parts, which can injure hands or fingers.

➔ *Do not touch or insert hands or finger into moving parts.*

➔ *Before starting any work on the actuator disconnect all pneumatic / hydraulic / electrical supplies and discharge the pressure from the actuator.*

ⓘ NOTICE

Risk of actuator damage due to excessively high or low tightening torques.

Respect the specified torques on tightening actuator components (bolts and nuts). Excessive tightening torques lead to parts wearing out quicker. Parts that are not tightened enough may loosen.

➔ *Respect the specified tightening torques in section 15.2.*

ⓘ Note

– *The product warranty becomes void if service or repair work not described in these instructions is performed without prior agreement by AIR TORQUE's After-sales Service.*

– *Only use original spare parts by AIR TORQUE, which comply with the original specifications.*

With the information given below, AIR TORQUE provides the end user with all the required information necessary for service.

Under normal conditions, the actuator requires only periodic visual inspection to ensure proper operation. However, due to critical working conditions and a natural components ageing effect even if properly stored, a preventive service program is essential to ensure good performance, safe operation and an extended life of the actuator. AIR TORQUE recommend to perform the service not later than reaching the first limit between cycles number limit and time limit. One cycle consists of nominal 180° angular travel in both directions (i.e. 180° to open + 180° to close).

➔ Spare kits are available for seals and bearing replacement. (refer to the 'Part list' in section 9.2)

➔ Refer to the Rubber products storage instructions (T3.3.3.1 EN).

Table 9-1

ACTUATOR OUTPUT TORQUE RANGE	CYCLES NUMBER LIMIT	TIME LIMIT
Up to 125 Nm	350.000	48 Months/ 4 years from installation or
125 Nm ÷ 500 Nm	350.000	
500 Nm ÷ 1000 Nm	250.000	60 Months/5 years from production date.
1000 Nm ÷ 3000 Nm	100.000	

Cycles number limit and time limit have been defined for actuators with sizing safety factor at least 1.3 and operating at specific conditions:

- Supply pressure ≤ 5,5 bar.
- Supply media: air or inert gas, not corrosive, dry or lightly lubricated, without impurity.
- Working temperature from 10°C up to 30°C.

ⓘ Note

Any deviation from these operating conditions may affect the recommended cycles number limit and time limit.

➔ *For actuators with "HT" or "LLT2" operating temperatures (refer to section 3.3 'Technical data') the recommended cycles number and time limit may be reduced by 50%.*

➔ *For actuators operating in Safety instrumented systems where a certain SIL level is required, cycles number limit and time limit may be significantly reduced.*

9.1 Preparation for servicing

1. Lay out the necessary material and tools to have them ready for the intended work.
2. Put the actuator out of operation referring to section 10 'Decommissioning'.
3. Remove the actuator from the valve referring to section 11 'Removal'.

9.2 Part list

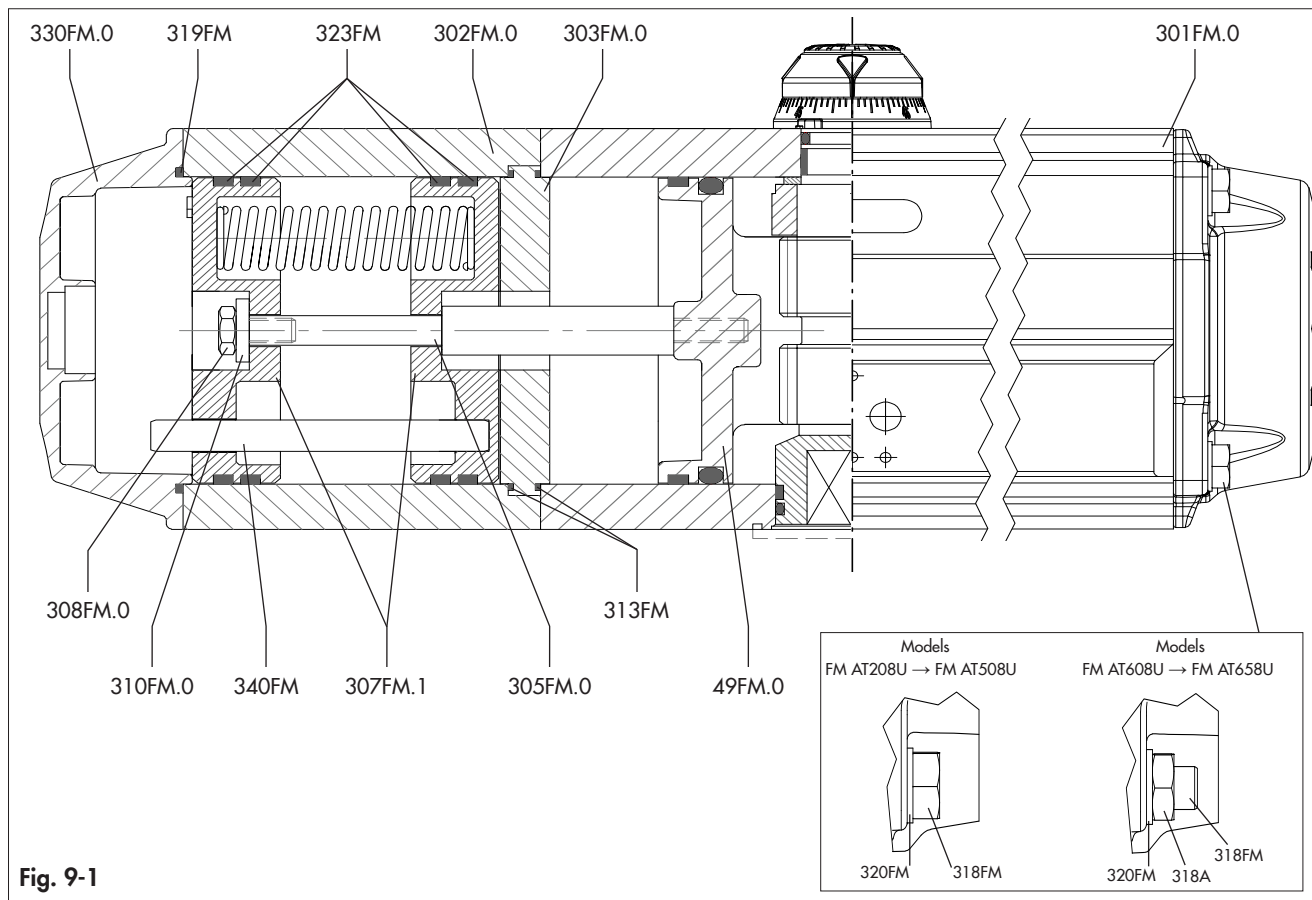


Fig. 9-1

Table 9-2

PART N°	UNIT Q.TY	NOTE	DESCRIPTION
49FM.0	2		FM PISTON 180° ROTATION
301FM.0	1		RIGHT BODY FM
302FM.0	1		LEFT BODY FM
303FM.0	2		CONNECTION DISK
305FM.0	2		FM ROD
307FM.1	4		DISK
308FM.0	2		ROD SCREW
310FM.0	2		WASHER (Rod screw)
313FM	◇ • 4		O-RING (Disk connection)
318FM	8	For model FM AT208U - FM AT508U	CAP SCREW (FM end cap)
		For model FM AT608U - FM AT658U	TIE ROD
318A	8	For model FM AT608U - FM AT658U	NUT
319FM	◇ • 2		O-RING (FM end cap)
320FM	8		WASHER (Cap screw/tie rod)
323FM	◇ 8		BEARING (Disk)
330FM.0	2		FM END CAP
340FM	4		GUIDE BAR

Note: ◇ included in complete spare parts kit

• included in "O"rings spare parts kit

i Note

For components not included in this Part List, see the instructions manual for standard actuators EB AT-RP-4GU.

9.3 Disassembly

NOTICE

Follow the operations described below, first on one side and then on the other side when required.

9.3.1 Position indicator and graduated ring removal

→ Refer to Mounting and operating instructions EB AT-RP-4GU paragraph 9.3.1.

9.3.2 Stop cap screws removal

→ Refer to Mounting and operating instructions EB AT-RP-4GU paragraph 9.3.2.

9.3.3 End caps disassembly

→ Refer to Mounting and operating instructions EB AT-RP-4GU paragraph 9.3.3.

- for models FM AT208U → FM AT508U unscrew the cap screws (318FM),
- for models FM AT608U → FM AT658U unscrew the nuts (318A).

9.3.4 180° Fail Mid components disassembly

With actuator in vertical position, remove the following components in the indicated sequence (refer to Fig. 9-2):

- right body FM (301FM.0),
- rod screw (308FM.0),
- washer (310FM.0),
- external disk (307FM.1),
- spring set,
- internal disk (307FM.1),
- connection disk (303FM.0).

Remove and replace the following soft components: bearing (323FM), o-rings (313FM).

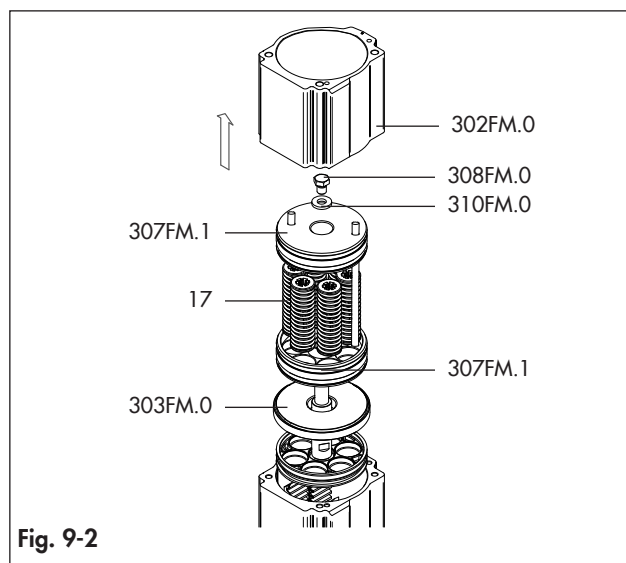


Fig. 9-2

WARNING

Do not remove the guide bars (340FM) from their housings in the internal disks (307FM.1).

Repeat points 9.3.3 and 9.3.4 on the other side of the actuator.

9.3.5 Pistons disassembly

→ Refer to Mounting and operating instructions EB AT-RP-4GU paragraph 9.3.4.

9.3.6 Drive shaft disassembly

→ Refer to Mounting and operating instructions EB AT-RP-4GU paragraph 9.3.5.

NOTICE

Risk of spring clip damage due to incorrect disassembly.

During disassembly the spring clip (18) can get overstressed if not carefully handled.

- Use proper tools to disassemble the spring clip.
- In case of spiral spring clip (18) refer to the disassembly and reassembly instructions available from AIR TORQUE.

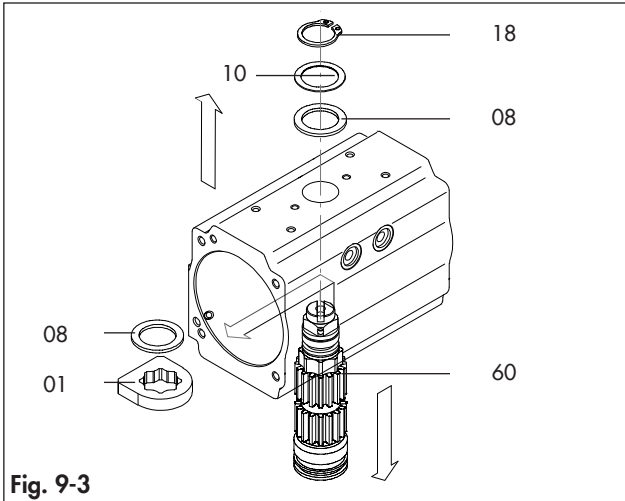


Fig. 9-3

9.4 Service operations

Inspect and clean every single component.

Inspect, clean and replace bolts and nuts, if needed.

Discard and replace the damaged soft components available in the spare parts kit.

➔ Refer to the spare parts kit data sheet [RP10600E] and to the Rubber products storage instructions [T 3.3.3.1 EN].

Clean and lubricate every o-ring housing.

➔ Refer to the section 15.3 'Lubricants'.

9.5 Reassembly

NOTICE

Follow the operations described below, first on one side and then on the other side when required.

NOTICE

Risk of actuator damage due to the use of unsuitable lubricants.

The lubricants to be used depend on the actuator material and operating temperatures. Only use lubricants approved by AIR TORQUE.

➔ Refer to section 15.3 'Lubricants'.

WARNING

If during the disassembling the FM rod (305FM.0) is unscrewed from the piston, it must be fixed again with a glue for threads (type Loxeal 8354 or equivalent).

Before the reassembly, make sure that the assembled components position guarantee the required direction of rotation.

9.5.1 Drive shaft reassembly

- Refer to Mounting and operating instructions EB AT-RP-4GU paragraph 9.5.1.

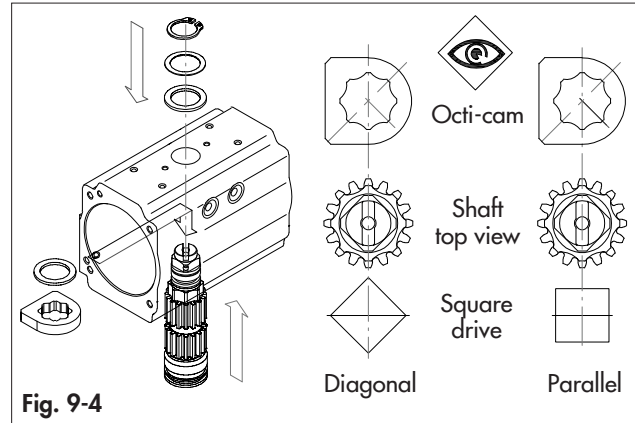


Fig. 9-4

NOTICE

Risk of components damage due to incorrect reassembly.

During reassembly the spring clip (18) can get overstressed if not carefully handled.

- ➔ Use proper tools to reassembly the spring clip.
- ➔ In case of spiral spring clip (18) refer to the reassembly instructions available from AIR TORQUE.

9.5.2 Pistons reassembly

Refer to Fig. 9-5, Fig. 9-6, Fig. 9-7 and Fig. 9-8.

Proceed as follows to reassemble Fail Mid actuator pistons with a 180° angle of rotation and clockwise to close.

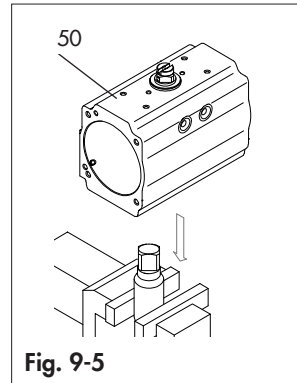


Fig. 9-5

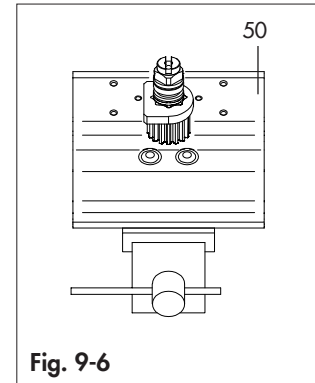


Fig. 9-6

- Lubricate and place onto the pistons (49FM.0) the o-rings (16), piston backs (05) and the head bearings (15).
- Lubricate the internal surface of the body (50) and the piston (49FM.0) rack teeth.
- Insert the female connection of the drive shaft (60/60.1) in a properly fixed coupling joint. (Fig. 9-5).
- Make sure that the octi-cam (01) is in the right position as per the Fig. 9-6.

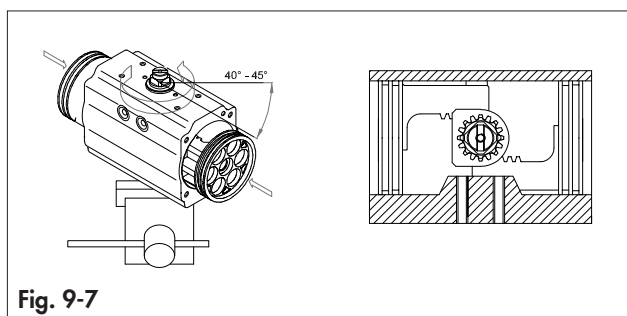


Fig. 9-7

- Rotate the body (50) about 40°-45° clockwise from top view, as shown in Fig. 9-7.

Insert and press the two pistons (49FM.0) simultaneously inside the body (50) until the pistons are engaged, then rotate the body anticlockwise from top view until the stroke is completed.

- With pistons completely closed (0° position) as per Fig. 9-8, referring to the axis of the body, the rotation obtained must be about over 0° up to 5°
- With pistons completely closed (0° position) as per Fig. 9-8 the dimension "A" must be the same on both sides.

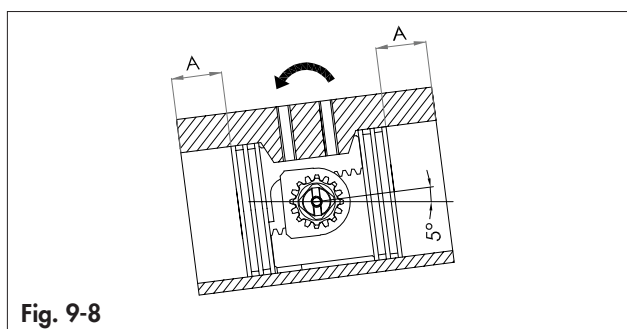


Fig. 9-8

9.5.3 Fail mid components assembly

Refer to Fig. 9-9 and 9-10:

- Lubricate the guide bars (340FM).

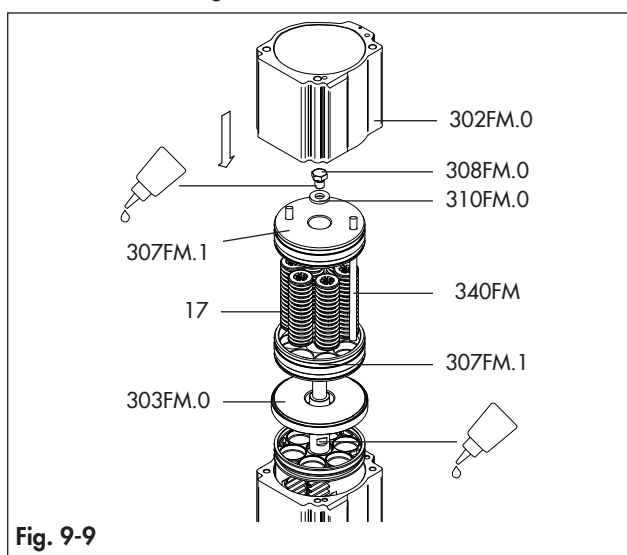


Fig. 9-9

With actuator in vertical position, insert following components in the indicated sequence:

- connection disk (303FM.0),

NOTICE

In case the disk (303FM.0) is not symmetric (A>B), it must be assembled between the right body (301FM.0) and the central body (50) oriented as shown in Fig. 9-10.

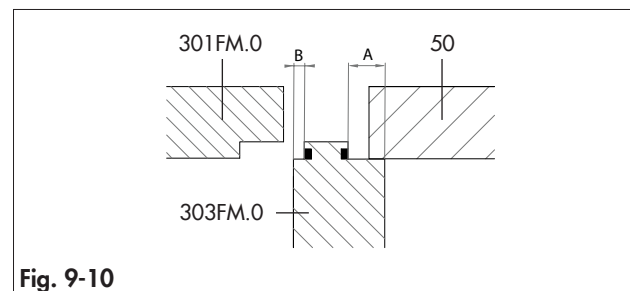


Fig. 9-10

- internal disk (307FM.1),
- spring set,
- external disk (307FM.1) centering it through the guide bars (340FM),
- washer (310FM.0),
- rod screw (308FM.0),
- right body FM (301FM.0).

NOTICE

Put threadlocker on the ROD screw thread (308FM.0) before tightening (type Loxeal 8354 or equivalent).

9.5.4 End caps reassembly

Refer to Mounting and operating instructions EB AT-RP-4GU paragraph 9.5.3 for the correct assembly of the end caps (330FM.0).

- for models FM AT208U → FM AT508U screw the cap screws (318FM),
- for models FM AT608U → FM AT658U screw the nuts (318A).

Repeat points 9.5.3 and 9.5.4 on the other side of the actuator.

9.5.5 Position indicator reassembly

➔ Refer to Mounting and operating instructions EB AT-RP-4GU paragraph 9.5.4.

9.5.6 Stop cap screws reassembly

➔ Refer to Mounting and operating instructions EB AT-RP-4GU paragraph 9.5.5.

9.5.7 Stroke adjustment

⚠ WARNING

Risk of personal injury due to pneumatic supply.

Stop screws are not still properly tightened. Any pneumatic supply can eject the stop screws out from the actuator body.

- ➔ *Before starting pressurizing the actuator, make sure the stop screws are screwed at least for a length equal to the screw diameter. Refer to the 'Tightening torques' (Table 15.3) for the screw dimensions.*

Refer to Fig 9-1.

Close position

- With the actuator in middle position (90° position), screw or unscrew the right stop screw (02) 1 turn at a time until the desired stop position is achieved. A pneumatic supply through Port 4 may be necessary.
- Holding the stop screw (02) in position, tighten the stop adjustment nut (04) to lock the stop screw (02).
- ➔ Refer to the section 15.2 'Tightening torques'. (Table 15.3).

Open position

- With the actuator in middle position (90° position), screw or unscrew the left stop screw (02) 1 turn at a time until the desired stop position is achieved. A pneumatic supply through Port 2 may be necessary.
- Holding the stop screw (02) in position, tighten the stop adjustment nut (04) to lock the stop screw (02).
- ➔ Refer to the section 15.2 'Tightening torques'. (Table 15.3)

9.5.8 Mounting the actuator over the valve

Refer to Mounting and operating instructions EB AT-RP-4GU paragraph 9.5.7.

10 Decommissioning

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

11 Removal

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

12 Repairs

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

13 Disposal

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

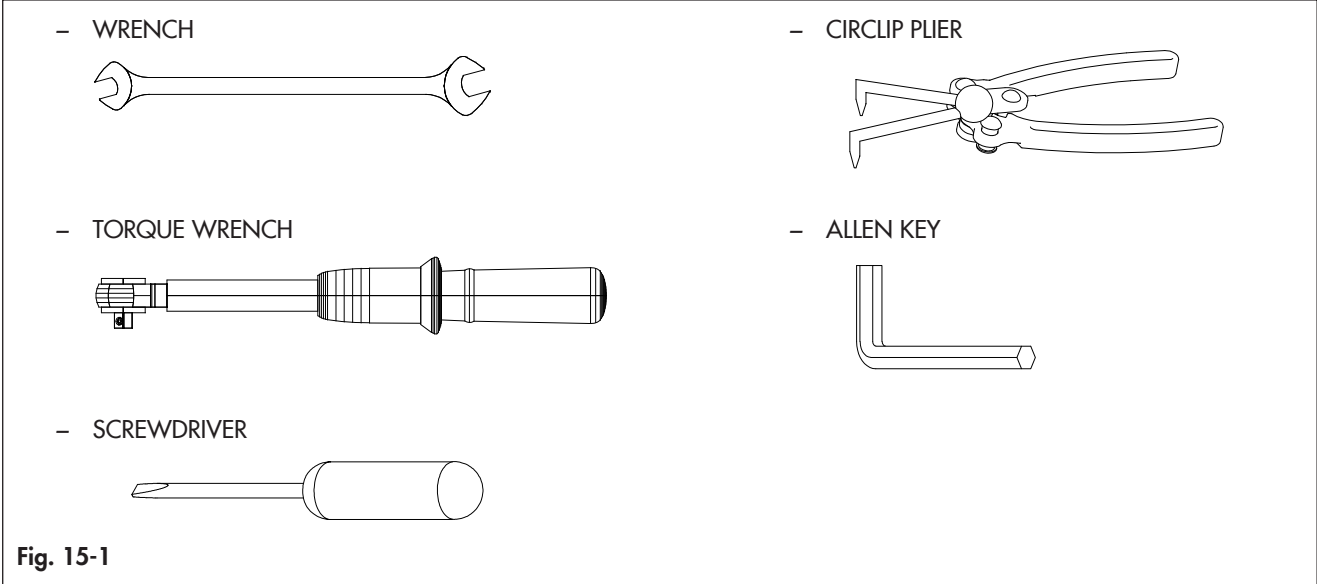
14 Certificates

→ Refer to Mounting and operating instructions EB AT-RP-4GU.

15 Annex

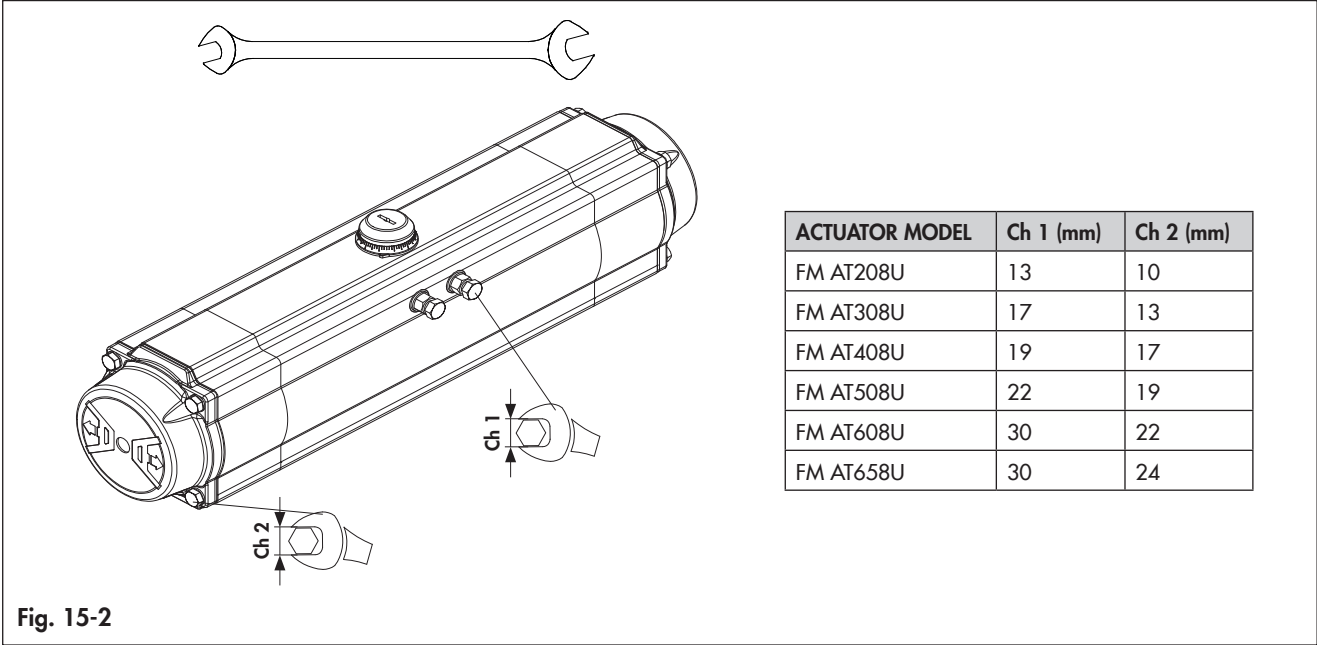
15.1 Tools

15.1.1 Tools list

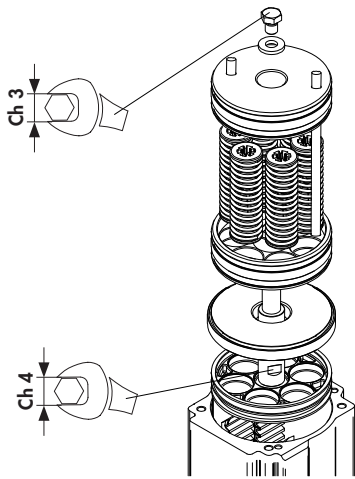


15.1.2 Tools dimensions

- Stop screws (02) and nuts (04); end cap screws (318FM) and tie rod nut (318A) tools.



– Road Screw (308FM.0) and FM Road tools (305FM.0)



ACTUATOR MODEL	Ch 3 (mm)	Ch 4 (mm)
FM AT208U	13	17
FM AT308U	19	20
FM AT408U	12	24
FM AT508U	24	30
FM AT608U	30	36
FM AT658U	36	40

Fig. 15-3

15.2 Tightening torque

- All the tightening torques are intended in Nm.
- Tightening torque tolerance: $\pm 10\%$.
- The tightening torques are based on a friction coefficient of 0.12 with a lubricated fixing elements (bolts or nuts) threads.
- After long operating times or use at temperatures above 80°C, the breakaway torque may be significantly higher.

Table 15-1: End cap screws (318FM) or tie rod nut (318A)

ACTUATOR MODEL	THREAD	TIGHTENING TORQUE (Nm)
FM AT208U	M6	7 ÷ 8
FM AT308U	M8	18 ÷ 20
FM AT408U	M10	34 ÷ 36
FM AT508U	M12	60 ÷ 64
FM AT608U	M14	52 ÷ 56
FM AT658U	M16	80 ÷ 86

Table 15-2: Rod screw (308FM.0)

ACTUATOR MODEL	THREAD	TIGHTENING TORQUE (Nm)
FM AT208U	M8	18 ÷ 20
FM AT308U	M12	32 ÷ 36
FM AT408U	M14	52 ÷ 56
FM AT508U	M16	80 ÷ 86
FM AT608U	M24	160 ÷ 170
FM AT658U		270 ÷ 290

Table 15-3: Stop screws nuts (04)

ACTUATOR MODEL	THREAD	TIGHTENING TORQUE (Nm)
FM AT208U	M8	18 ÷ 20
FM AT308U	M10	34 ÷ 36
FM AT408U	M12	60 ÷ 64
FM AT508U	M14	96 ÷ 102
FM AT608U	M20	290 ÷ 310
FM AT658U		

Table 15-4: Pressure connection

ACTUATOR MODEL	THREAD	TIGHTENING TORQUE (Nm)
FM AT208U	M5	4 ÷ 5
FM AT308U		
FM AT408U		
FM AT508U		
FM AT608U		
FM AT658U	M6	8 ÷ 9

Table 15-5: Ancillary attachments

SIZE ¹	THREAD	TIGHTENING TORQUE (Nm)
AA 0	M5	4 ÷ 5
AA 1		
AA 2		
AA 3		
AA 4		
AA 5	M6	8 ÷ 9

i Note

Refer to section 2.1 'Actuator nameplate sample'.

15.3 Lubricants

The 4thGU FM actuators are factory lubricated for the life of the actuator in normal working conditions.

➔ Refer to the data sheet [RP10600E] for Lubricant type in relation to the different working temperature ranges.



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