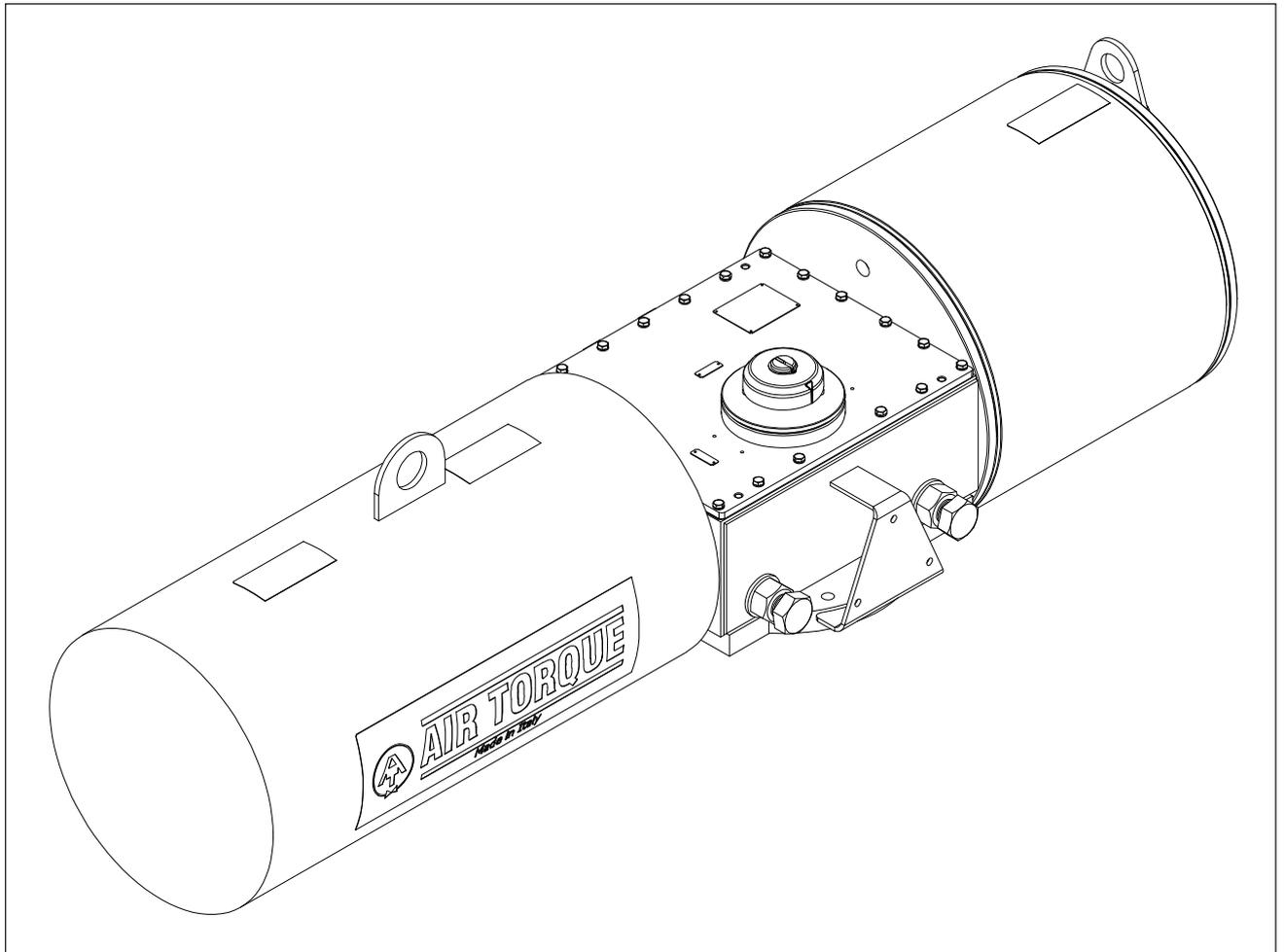


Original instructions



**AT-HD series**

Scotch yoke pneumatic actuators

## 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](http://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 AT-HD Series actuators are intended for the automation and operation of quarter-turn valves such as butterfly valves, ball valves and plug valves in both indoor and outdoor applications. Depending on the configuration, the actuator is suitable for on/off or modulating duties. The actuator can be used in processing 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 following personal protective equipment when handling the AIR TORQUE actuators:

- Protective gloves and safety footwear when mounting or removing the actuator
- Eye protection and hearing protection while the actuator is operating.
- ➔ 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 actuators 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 customer'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 and UKCA classification.
- ➔ Refer to the nameplate and the ATEX / UKCA safety instructions.
- AT-HD Series actuators are SIL certificated.
- ➔ Refer to the SIL Certificate available from AIR TORQUE for the AT-HD Series actuators SIL capability.
- Referring to Machine Directive 2006/42/EC and U.K. Regulation S.I. 2008 No. 1597 (as amended), actuators are classified as "partly machinery" (see Declaration of incorporation).

Therefore, the actuator cannot to be put into service until 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 touch or insert hands or finger into the yoke while the power supply is connected to the actuator.

#### **Risk of personal injury during actuator air exhaust.**

In case of pneumatic power cylinder configuration 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 compressed springs.**

Spring modules are under tension due to compressed springs. Consequently, the 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.
- ➔ The actuator must be in the fail position while removing the Spring module from the Central module.
- ➔ If Spring module service is necessary, 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 handwheel or 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). Tightening torques above the limits lead to parts wearing out quicker. Parts that are not tightened enough may loosen.

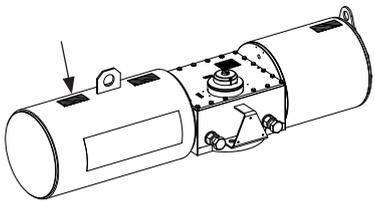
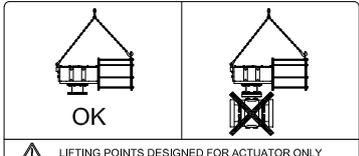
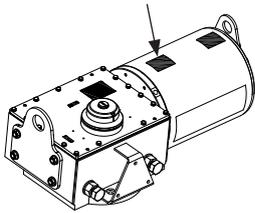
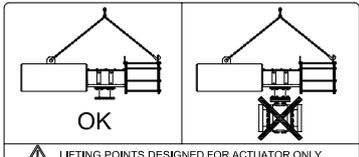
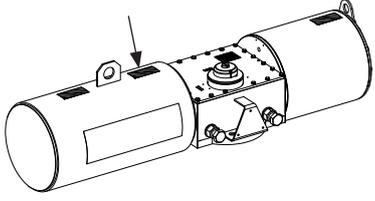
→ Refer to section 15.2 'Tightening torques and sequences'.

**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'.

### 1.4 Warnings on the device

Warning	Meaning of the warning	Location on the device
<p>Single acting actuators</p> 	<p>Warning against the incorrect actions on the Spring module for single acting actuators. Spring module must not be dismantled or cut in any way. In case the dismantling is necessary, contact AIR TORQUE.</p>	
<p>Double acting actuators</p>  <p>⚠ LIFTING POINTS DESIGNED FOR ACTUATOR ONLY</p>	<p>Warning against the incorrect use of the lifting brackets on AIRTORQUE actuators. Only attach load-bearing slings to them to vertically lift the actuator on its own (without the valve). The lifting brackets must not be used to vertically lift simultaneously the valve and the actuator.</p>	
<p>Single acting actuators</p>  <p>⚠ LIFTING POINTS DESIGNED FOR ACTUATOR ONLY</p>		



## 2 Markings on the device

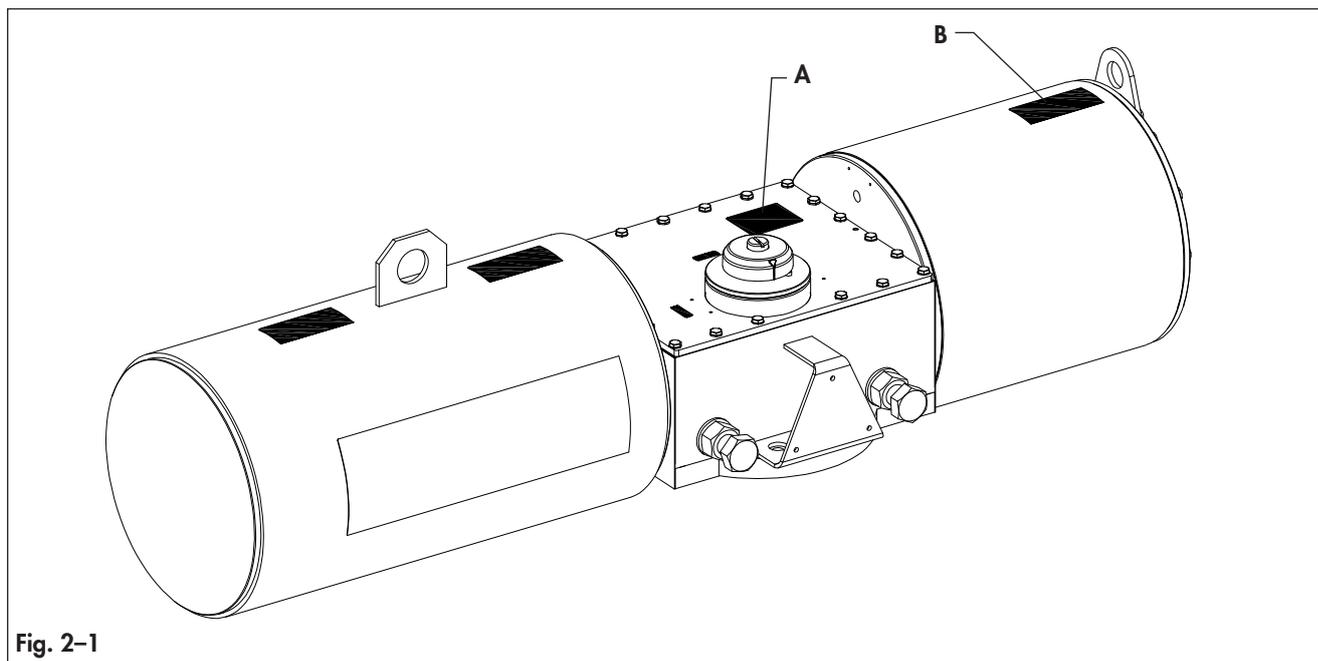


Fig. 2-1

### 2.1 Actuator nameplate

#### 2.1.1 Standard nameplate sample

Refer to Fig. 2-1 (Position A) for the nameplate position over the actuator.

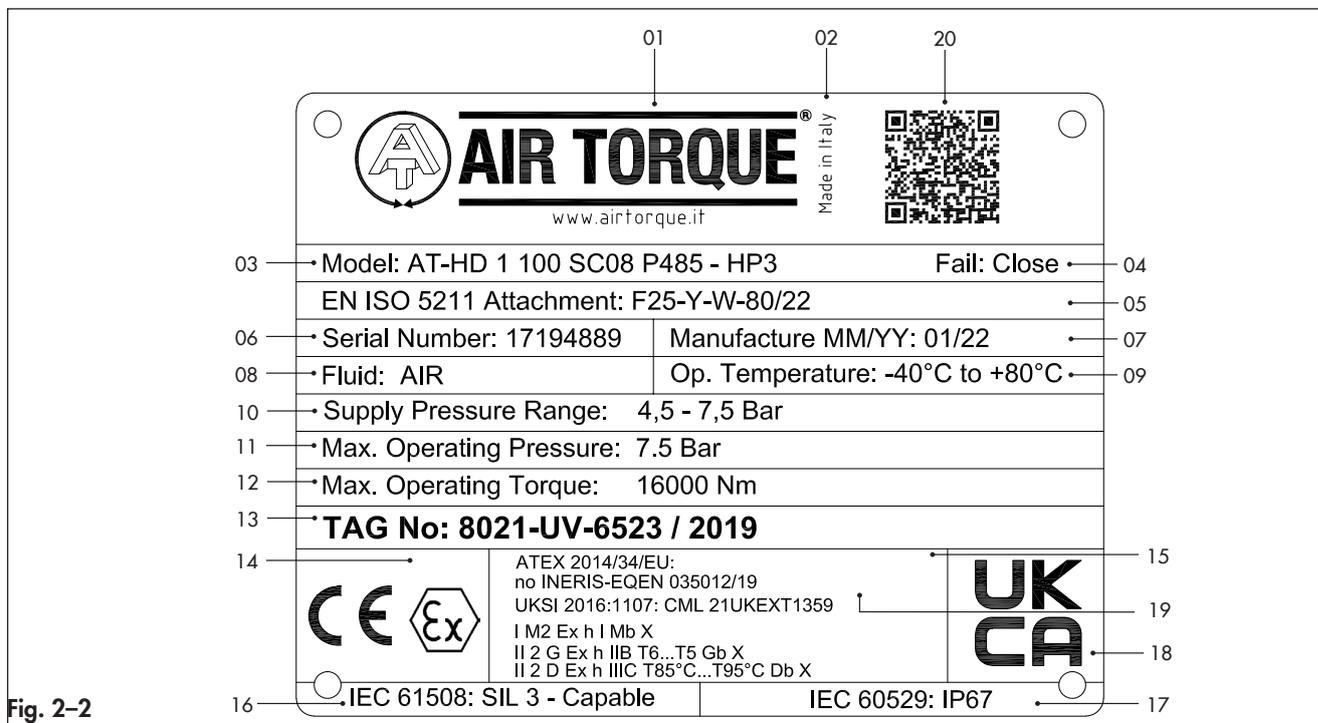


Fig. 2-2

Table 2-1

Position	Description
01	Manufacturer name and trade mark
02	Country of origin

## Markings on the device

Position	Description					
03	Actuator model					
04	Fail action: - Close - Open - Last					
05	Actuator interface: AAA-B-C-DD/EE	AAA	B	C	DD	EE
	ex.: F30-Y-W-80/22 AAA - ISO flange 5211 (F30) B - With spigot (Y) C - Drive designation (W= two key drive) DD - Drive dimension in mm (Diam. = 80 mm) EE - Key dimension in mm (22 mm)	see ISO flange 5211	Y = with spigot N = without spigot	W = Double keys at 90° X = Double keys at 180° L = parallel square D = Diagonal square H = Flat head T = Double square XW = Four keys at 90°	Drive dimension / Square size	Key dimension (If necessary)
06	Actuator serial number					
07	Actuator production date: month/year					
08	Fluid (Supply medium): - P = Pneumatic (air) - H = Hydraulic (oil)					
09	Operating temperature (- 40°C /+ 80°C) / (- 40°F /+ 176°F) = STANDARD temp. "S" (- 15°C /+ 150°C) / (- 5°F /+ 302°F) = HIGH temp. "H" (- 60°C /+ 80°C) / (- 76°F /+ 176°F) = LOW temp. "L"					
10	Supply pressure range (if available - marked on request) [bar/psi/kPa]					
11	Maximum operating pressure (MOP) [bar/psi/kPa]					
12	Actuator maximum output torque at MOP [Nm/Lb•in]					
13	Tag number (customer tag number if requested)					
14	CE marking					
15	ATEX marking - 2014/34/EU directive					
16	SIL marking - IEC 61508					
17	IP marking - IEC 60529					
18	UKCA marking					
19	UKSI 2016:1107 marking					
20	QR Code					

### **i** Note

Refer to the Catalogue HD-E-02 for actuators available options and ordering codes.

### 2.1.2 PED marked nameplate sample

Refer to Fig. 2-1 (Position A) for the nameplate position over the actuator.

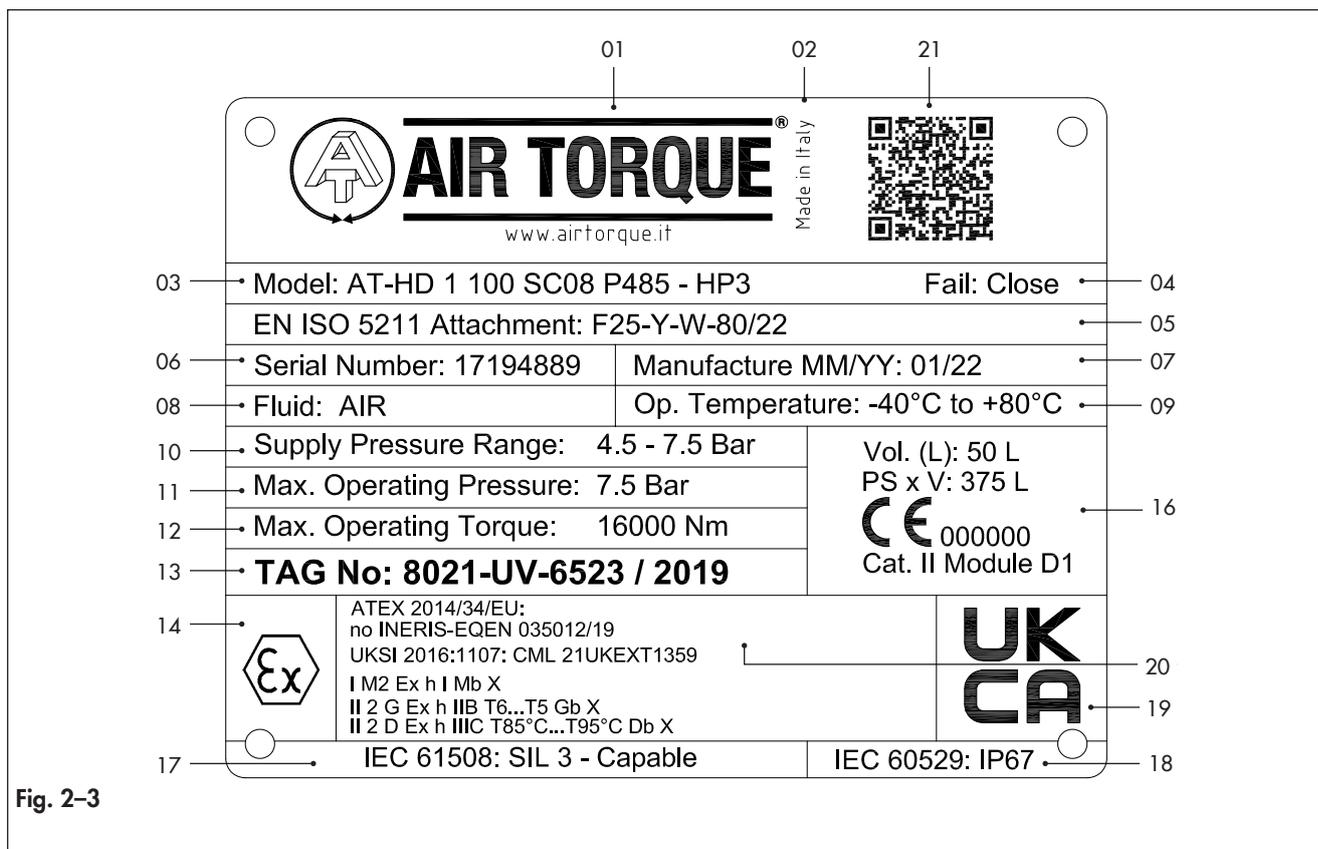


Fig. 2-3

Table 2-2

Position	Description												
01	Manufacturer name and trade mark												
02	Country of origin												
03	Actuator model												
04	Fail action: - Close - Open - Last												
05	<table border="1"> <thead> <tr> <th>Actuator interface: AAA-B-C-DD/EE</th> <th>AAA</th> <th>B</th> <th>C</th> <th>DD</th> <th>EE</th> </tr> </thead> <tbody> <tr> <td>                     ex.:F30-Y-W-80/22                      AAA - ISO flange 5211 (F30)                      B - With spigot (Y)                      C - Drive designation (W= two key drive)                      DD - Drive dimension in mm (Diam. = 80 mm)                      EE - Key dimension in mm (22 mm)                 </td> <td>see ISO flange 5211</td> <td>Y = with spigot N = without spigot</td> <td>W = Double keys at 90° X = Double keys at 180° L = parallel square D = Diagonal square H = Flat head T = Double square XW = Four keys at 90°</td> <td>Drive dimension / Square size</td> <td>Key dimension (If necessary)</td> </tr> </tbody> </table>	Actuator interface: AAA-B-C-DD/EE	AAA	B	C	DD	EE	ex.:F30-Y-W-80/22 AAA - ISO flange 5211 (F30) B - With spigot (Y) C - Drive designation (W= two key drive) DD - Drive dimension in mm (Diam. = 80 mm) EE - Key dimension in mm (22 mm)	see ISO flange 5211	Y = with spigot N = without spigot	W = Double keys at 90° X = Double keys at 180° L = parallel square D = Diagonal square H = Flat head T = Double square XW = Four keys at 90°	Drive dimension / Square size	Key dimension (If necessary)
Actuator interface: AAA-B-C-DD/EE	AAA	B	C	DD	EE								
ex.:F30-Y-W-80/22 AAA - ISO flange 5211 (F30) B - With spigot (Y) C - Drive designation (W= two key drive) DD - Drive dimension in mm (Diam. = 80 mm) EE - Key dimension in mm (22 mm)	see ISO flange 5211	Y = with spigot N = without spigot	W = Double keys at 90° X = Double keys at 180° L = parallel square D = Diagonal square H = Flat head T = Double square XW = Four keys at 90°	Drive dimension / Square size	Key dimension (If necessary)								
06	Actuator serial number												
07	Actuator production date: month/year												
08	Fluid (Supply medium): - P = Pneumatic (air) - H = Hydraulic (oil)												

## Markings on the device

Position	Description
09	Operating temperature (- 40°C /+ 80°C) / (- 40°F /+ 176°F) = STANDARD temp. "S" (- 15°C /+ 150°C) / (- 5°F /+ 302°F) = HIGH temp. "H" (- 60°C /+ 80°C) / (- 76°F /+ 176°F) = LOW temp. "L"
10	Supply pressure range (if available - marked on request) [bar/psi/kPa]
11	Maximum operating pressure (MOP) [bar/psi/kPa]
12	Actuator maximum output torque at MOP [Nm/Lb•in]
13	Tag number (customer tag number if requested)
14	CE marking
15	ATEX marking - 2014/34/EU directive
16	PED marking - 2014/68/EU directive
17	SIL marking - IEC 61508
18	IP marking - IEC 60529
19	UKCA marking
20	UKSI 2016:1107 marking
21	QR Code

### **i** Note

Refer to the Catalogue HD-E-02 for actuators available options and ordering codes.

## 2.2 Functioning label sample

The functioning label is placed in Position B (Fig. 2-1) over the Power module.

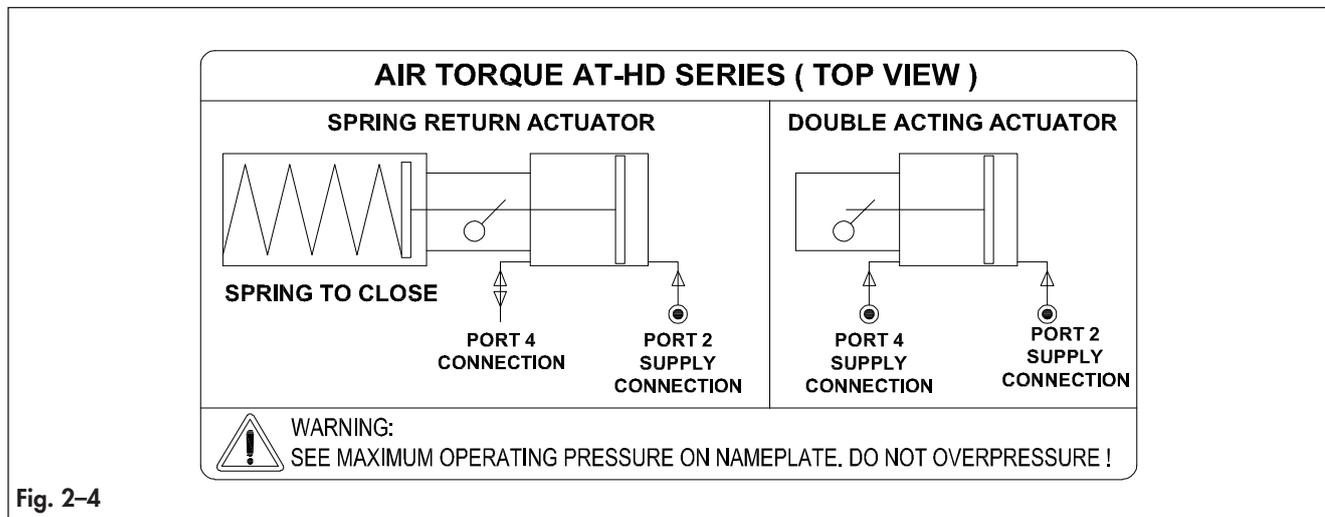


Fig. 2-4

### **i** Note

Refer to section 1.4 for warning labels content and position over the actuator.

### 3 Design and principle of operation

The AT-HD actuators are devices for remote operation (on/off or modulating duties) of different industrial valves such as ball valves, butterfly valves and plug valves.

The actuators are available in two configurations: double acting and single acting.

#### 1. DOUBLE ACTING

Refer to Fig. 3-1.

In case of double acting, air pressure is necessary to stroke the actuator in both opening and closing directions (A and B).

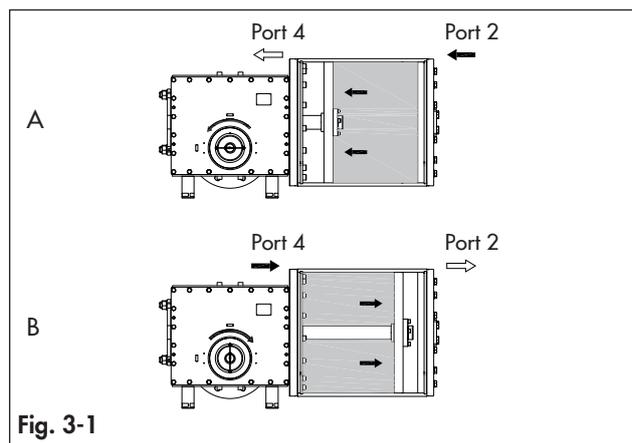


Fig. 3-1

#### 2. SINGLE ACTING

Refer to Fig. 3-2.

Air supplied through Port 2 (A') applies a linear force on the piston surface generating the yoke rotation and driving the valve to a defined position. At the same time the actuator spring is compressed exhausting the air through Port 4.

When air pressure is discharged through Port 2 (B'), the spring is automatically released, driving the yoke and the piston back to the original position and thus the valve to the fail-safe position.

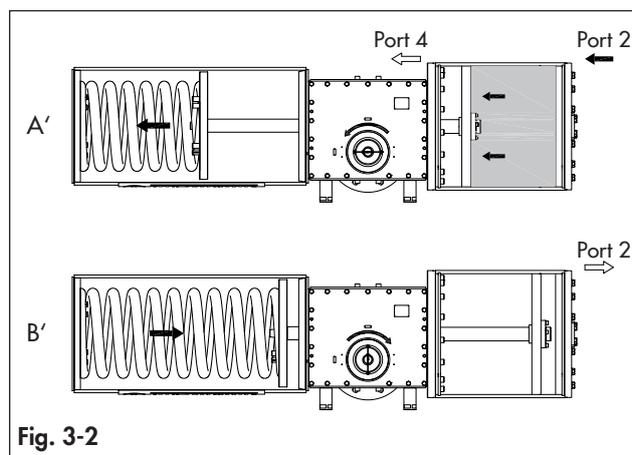


Fig. 3-2

The AT-HD actuators can be controlled by directly mounted devices or remote control systems.

➔ Refer to section 5.2 'Control and signal devices assembly'.

### 3.1 Direction of action and fail positions

The standard rotating direction for the AT-HD actuators is clockwise to close.

Standard AT-HD actuators are designed for 90° rotating angle, with travel stop allowing adjustment (Fig. 3-3) for  $\pm 5^\circ$  on both the close (0°) and open (90°) position.

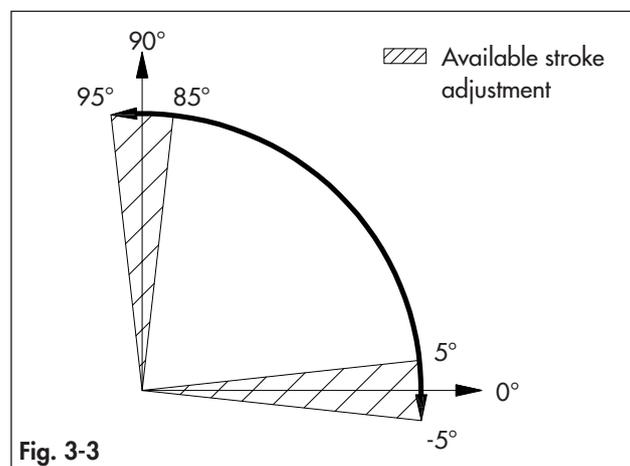


Fig. 3-3

For single acting actuator in case of pressure, power or signal failure the springs drive the actuator in the fail position that can be FAIL OPEN or FAIL CLOSE.

Standard AT-HD actuators are FAIL CLOSE.

#### **i** Note

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

- ➔ Refer to the actuator model technical data for the FAIL position.
- ➔ Refer to section 2.1 'Actuator nameplate' for the fail action and direction of rotation available options.

### 3.2 Complementary parts

#### Manual override systems

Manual override systems are designed to provide manual operation to drive the actuator and the valve in the safe position, in case of any emergency situation, when the supply pressure is not available.

#### **!** NOTICE

**Risk of actuator damage due to incorrect stroke adjustment.**

- Make sure that the actuator and the manual override are correctly oriented, with reference to the rotation direction required.
- Make sure that the stroke of the manual override does not exceed the stroke allowed by the actuator.

- In case of a Bevel gear the actuator and the valve are operated rotating a handwheel.(Fig. 3-4)
- ➔ Refer to the EB AT-HD-BG instructions.

## Design and principle of operation

- In case of a Hydraulic override the actuator and the valve are operated by means of a hand pump.(Fig. 3-4)
- ➔ Refer to the EB AT-HD-HP instructions.

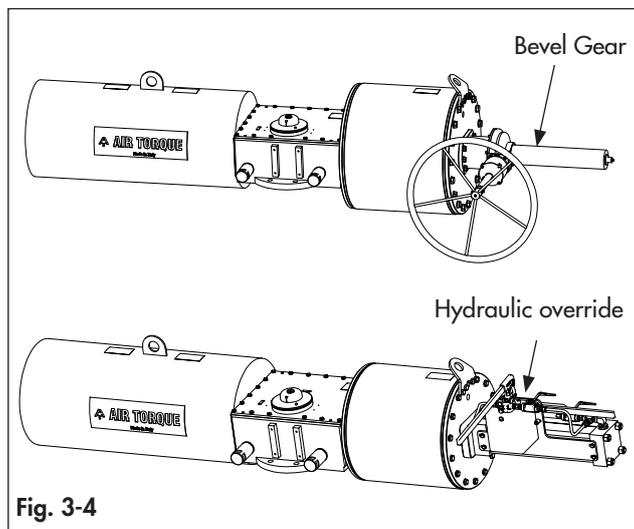


Fig. 3-4

### Quick&Damper

The Q&D system is designed for the AT-HD double acting and single acting actuators in order to achieve different stroking time in one direction:

- for fail last action in case of Double acting actuators
- for fail safe action in case of Single acting actuators.

The maneuver with the Q&D provides a quick exhausting in the starting of the stroke and a dampened effect in the ending part of the stroke.

- ➔ Refer to the EB AT-HD-QD instructions.

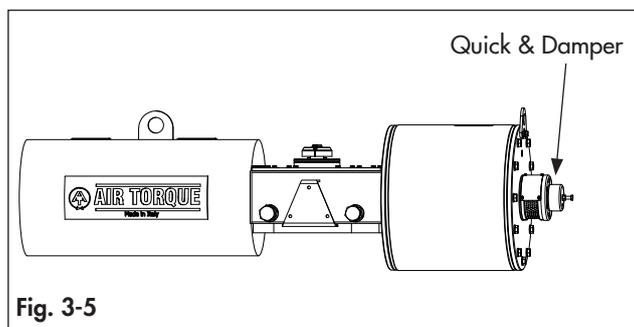


Fig. 3-5

## 3.3 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, inert gas or sweet dry natural gas.

### ⚠ WARNING

**Risk of bursting due to flammable or dangerous fluid exhausting.**

The actuator may contain flammable or dangerous fluids which can lead to bursting or poisoning if exhausted carelessly.

- ➔ Convey exhausted fluids in a safe area by means of proper equipment.

### i Note

Contact AIR TORQUE for natural gas and any other power operating media's compatibility with AT-HD actuators.

- 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  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) or at least  $10^{\circ}\text{C}$  ( $18^{\circ}\text{F}$ ) below the ambient temperature.
- The maximum particle size contained into the operating media must not exceed  $40\ \mu\text{m}$ .

### Supply pressure

- The maximum operating pressure is indicated on the actuator nameplate (section 2.1).
- For double acting and single acting actuators the working pressure is from 2.5 bar (36 Psi) to 10 bar (116 Psi).
- ➔ 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.

- "S" actuators for standard temperatures from  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) to  $+80^{\circ}\text{C}$  ( $+176^{\circ}\text{F}$ ).
- "H" actuators for high temperatures from  $-15^{\circ}\text{C}$  ( $+5^{\circ}\text{F}$ ) to  $+150^{\circ}\text{C}$  ( $+302^{\circ}\text{F}$ ).
- "L" actuators for extremely low temperatures from  $-60^{\circ}\text{C}$  ( $-76^{\circ}\text{F}$ ) to  $+80^{\circ}\text{C}$  ( $+176^{\circ}\text{F}$ ).
- ➔ Refer to the data sheet HD50900E for the soft spare parts material.
- ➔ Refer to section 15.3 for the 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

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

### 4.1 Accepting the delivered goods

After receiving the shipment, proceed as follows:

1. Check the scope of delivery. Check that the specifications on the actuator nameplate match the specifications in the delivery note. Refer to section 2 for nameplate details.
2. Check the shipment for transportation damage. Report any damage to AIR TORQUE and the forwarding agent (refer to delivery note).
3. Determine the weight and dimensions of the units to be lifted and transported in order to select the appropriate lifting equipment and lifting accessories. Refer to the transport documents and the [Technical data section].

### 4.2 Removing the packaging from the actuator

Observe the following sequence:

- Do not open or remove the packaging until immediately before mounting the actuator.
- Leave the actuator in its transport container or on the pallet to transport it on site.
- Dispose and recycle the packaging in accordance with the local regulations.

### 4.3 Transporting and lifting the actuator

#### **⚠ DANGER**

**Risk due to suspended loads falling.**

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

#### **⚠ WARNING**

**Risk due to suspended components falling.**

Due to the heavy weight of the components and different mounting configurations available of the valve and actuator in the pipeline, suspended components may fall and cause serious injury.

- If necessary, use proper extra supporting components.
- Contact AIR TORQUE in case of additional lifting points needed due to non standard lifting direction.

#### **⚠ 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).

#### **ⓘ NOTICE**

**Risk of actuator damage due to incorrectly attached slings.**

Only attach load slings to vertically lift the actuator on its own. The lifting points must not be used to lift the entire actuator and valve assembly.

- Do not attach load-bearing slings to the complementary or accessory components.
- Do not use damaged or defective slings.
- Do not shorten the slings with knots or bolts or other makeshift devices.
- Observe lifting instructions (see section 4.3.2).

#### **💡 Tip**

Our aftersales service ([aftersales@airtorque.it](mailto:aftersales@airtorque.it)) can provide more detailed transport and lifting instructions on request.

### 4.3.1 Transporting the actuator

The actuator can be transported using proper lifting equipment (e.g. crane or forklift).

- Leave the actuator in its transport container or on the pallet to transport it.
- Observe the transport instructions.

#### **Transport instructions**

- Protect the actuator against external influences (e.g. impact).
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the actuator against moisture and dirt.
- Observe permissible temperatures (refer to the section 3.3 'Technical data').

### 4.3.2 Lifting the actuator

Observe the ruling regulations concerning the lifting operations.

To mount the actuators onto the valve, use lifting equipment (e.g. crane or forklift) to lift it.

Do not drill extra holes into the actuator.

#### **ⓘ Note**

In case of additional lifting points needed due to non standard lifting direction, contact AIR TORQUE.

Do not use the actuator lifting points to lift the entire actuator and valve assembly.

- Refer to the warning labels over the actuator (section 1.4)
- Use appropriate tackles and slings to lift the actuator.
- Refer to technical data sheet of the actuator for the weight.

#### **Lifting instructions**

- Secure slings on the object to be transported against slipping.

## Shipment and on-site transport

- Make sure the slings can be removed from the actuator once it has been mounted on the valve.
- Prevent the actuator from tilting or tipping.
- Do not leave loads suspended when interrupting work for longer periods of time.
- Use a hook with safety latch to secure the slings from slipping during lifting and transporting.

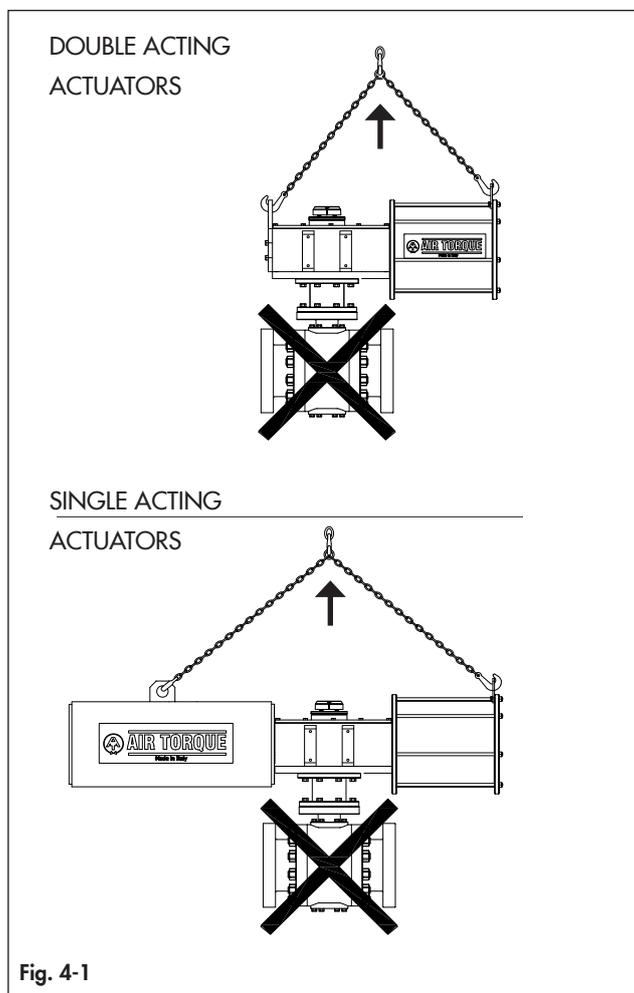


Fig. 4-1

## Storage instructions

- Store the actuator in a clean and dry place.
- Temperature limits are defined by the rubber components material.
- ➔ Refer to the 'Rubber components storage instruction' (T 3.3.3.1 EN).
- When the valve and actuator are already assembled, also observe the valve storage conditions. Refer to the valve documentation.
- Protect the actuator against external influences (e.g. impact).
- Secure the actuator in the stored position against slipping or tipping over.
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the actuator against moisture and dirt.
- Make sure that the ambient air is free of acids or other corrosive media.
- Do not place any objects on the actuator.
- Keep for future references the relevant technical documentation of the actuator.
- Do not remove the plastic plugs from the air connections.

### Tip

Our after-sales service ([aftersales@airtorque.it](mailto:aftersales@airtorque.it)) can provide more detailed storage instructions on request.

## 4.4 Storing the actuator

### NOTICE

**Risk of actuator damage due to improper storage.**

- ➔ Observe the storage instructions.
- ➔ Observe the rubber components storage instructions (T 3.3.3.1 EN).
- ➔ Avoid long storage times. Contact AIR TORQUE in case of different storage conditions or long storage periods.

### Note

We recommend regularly checking the actuator and the prevailing storage conditions during long storage times.

## 5 Mounting and assembly

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

### 5.1 Preparation for installation

If the actuator was shipped already assembled over the valve, the setting of the actuator and control system (if available) should have been already done by the valve manufacturer or automation center.

If the actuator was shipped separately from the valve, the setting of the actuator and control system must be done while assembling the actuator on top of the valve.

### 5.2 Control and signal devices assembly

The AT-HD actuators can be controlled by directly mounted devices or remote control systems. Therefore AIR TORQUE actuators are designed with:

- Ancillary attachment to mount control and signal devices by means of a bracket.
  - Threaded supply/exhaust connections according to EN 15714-3 and VDI/VDE 3845-1 which permit the standardized attachment of remote control systems.
- Refer to the documentation available from control and signal devices manufacturers for mounting and operating instructions.

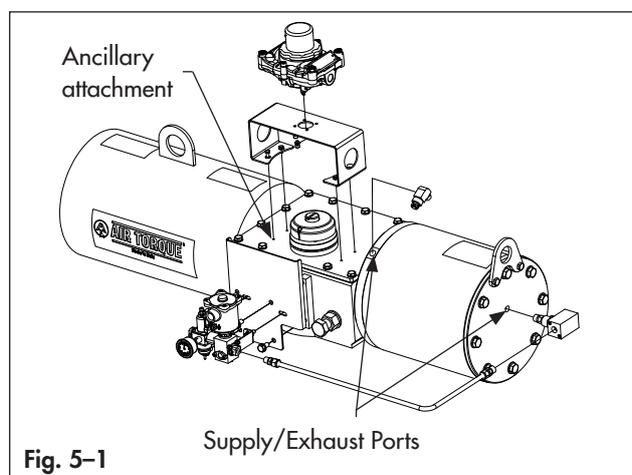


Fig. 5-1

### 5.3 Mounting the actuator over the valve

#### **⚠ DANGER**

##### **Risk of bursting in the actuator**

*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**

##### **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 impede the movement of the yoke by inserting objects into the actuator.

#### **⚠ WARNING**

##### **Risk of damage and malfunction due to torque limit violation.**

*Considering the maximum actuator output torque, the maximum air supply pressure and the maximum valve torque, according to ISO 5211, the actuator maximum transmissible output torque must not exceed the torque limit in relation to the available ISO flange and the drive shaft connection.*

- Refer to section 2 'Markings on the device' for nameplate details.

#### **ⓘ NOTICE**

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

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

- Refer to section 15.2 'Tightening torques'.

Before mounting the actuator over the valve, make sure the following conditions are met:

- The actuator is not damaged.
- The type designation, material and temperature range of the actuator match the ambient conditions (temperatures etc.). Refer to 'Markings on the device' in section 2 for nameplate details.
- Check compatibility of the valve stem to the actuator bore. The length, size and configurations must match.
- Check compatibility of actuator, valve and bracket bolting pattern.
- Before fitting the actuator over the valve, make sure that the actuator and the valve are correctly oriented, with reference to the rotation direction and fail action required.
- Make sure that the tubing, fittings and seals connected to the actuator are cleaned to prevent foreign matter/objects entering into the actuator's chambers.
- When fitting accessories over the actuators, assemble them in such a way that the emergency controls are easily accessible for emergency manual operation.
- Check that the exhaust ports are not obstructed.

## Mounting and assembly

- Remove the plugs from the actuator air connections during installation and operation, protect and close the air connections which may not be used immediately.
- Make sure that the operating pressure media composition used for the actuator operation meets the operating conditions given in this manual and corresponds to what the actuator was manufactured for. Refer to section 3 'Design and principles'.
- It is the user responsibility to ensure that actuator and control components must be protected from electrical spikes, surge and lightning strikes as well as all magnetic fields.
- Prevent any dangerous and/or corrosive substances in the working environment enter into the internal chambers by using adequate filters and/or solenoid valves and/or any other appropriate system.

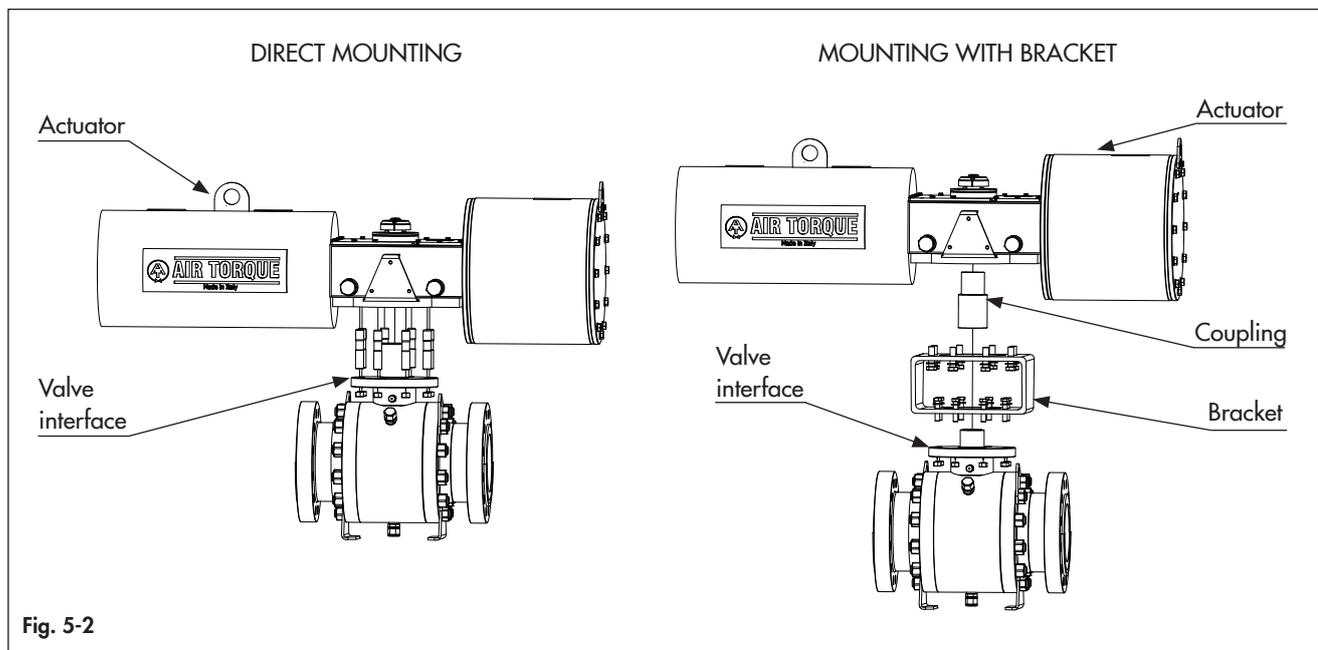


Fig. 5-2

The actuator mounting on valve can be performed by:

- Mounting directly the actuator over the valve interface
- Assembling a bracket and a coupling between the actuator and the valve.

Refer to Fig. 5-2 and proceed as follows to mount the actuator over the valve:

1. Disconnect any electrical/pneumatic/hydraulic power supply.
2. Lay out the necessary material and tools to have them ready during mounting.
3. The actuator is supplied in the fail position (for single-acting), so drive the valve in the right position as per the actuator fail position.
4. Clean the actuator's bore and the bottom flange.
5. Clean the valve and the actuator interface to remove completely any lubricant.
6. Place the bracket, if any, over the valve flange, tighten all bolts and nuts and apply the correct tightening torque.

### **⚠ WARNING**

#### **Risk of damage due to incorrect alignment**

- ➔ Support the actuator with the lifting equipment until the connection bolts are completely tightened.
- ➔ Make sure to align correctly the dowel pins or the spigot, if any.

7. Assemble the coupling at first into the valve stem before the assembly of the actuator.
  8. Lift the actuator.
  9. Align the valve stem/coupling to the actuator's bore.
  10. Carefully lower the actuator and engage the valve stem/coupling into the actuator's bore without forcing and driving the actuator into the position only with the weight of the actuator itself.
  11. Fix the actuator over the valve flange/bracket with the connection bolts.
  12. Tighten the connection bolts at the correct tightening torque.
- ➔ Refer to ISO 5211 for correct tightening torques.

### **⚠ WARNING**

#### **Risk due to suspended components falling.**

Due to the heavy weight of the components and different mounting configurations available of the valve and actuator in the pipeline, suspended components may fall and cause serious injury.

- ➔ If necessary, use proper extra supporting components.
- ➔ Contact AIR TORQUE in case of additional lifting points needed due to non standard lifting direction.

## 6 Start-up

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

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**⚠ WARNING*****Risk of bursting in the actuator***

*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*****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 impede the movement of the yoke by inserting objects into the actuator.*
- 

Connect the actuator to the pressure supply line and/or to the control system, if any, with fittings and pipes as per actuator model and plant specifications.



## 7 Operation

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

### **⚠ WARNING**

#### **Risk of personal injury during actuator air exhaust.**

*In case of pneumatic power cylinder configuration 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 work position.*
- *Use suitable silencers and vent plugs.*
- *Wear eye and hearing protection when working near the actuator.*

### **⚠ 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.*
- *Do not impede the movement of the yoke by inserting objects into the actuator.*

### **⚠ WARNING**

#### **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 state.*
- *Immediately renew damaged, missing or incorrect nameplates or labels.*

### **⚠ WARNING**

#### **Risk of bursting due to pressurized external chambers of spring return actuator, "Port 4" air connection.**

*Spring Return Pneumatic actuators are pressure equipment that may burst when pressurized incorrectly in the spring chambers. Flying projectile fragments or components can cause serious injury or even death.*

- *Only the internal chamber, "Port 2" air connection, of spring return actuators must be pressurized.*
- *Refer to section 3 "Design and principle of operation" for the function details.*
- *The use of close loop system is allowed.*

The actuator can be operated after connecting it to the supply line and adjusting the stroke.

Double acting actuators require alternate connection ports to be pressurized and vented for stroking.

Single acting actuators work on air stroke or spring stroke by pressurizing or venting respectively the connection port.

- Refer to section 3 'Design and principle of operation'.
- Choose the accessories, control elements, tubing and fittings for adequate flow rates so as not to constrict flow or cause high pressure drop affecting the performance of the actuator.
- In case the plant specifications require a supply pressure for the actuator lower than the maximum supply pressure marked in the actuator nameplate, label the actuator with reduced supply pressure (e.g. "Max. supply pressure limited to ... bar").



## 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
	Lubricant missing	Disassemble the actuator, lubricate all the sliding parts and reassemble the actuator
	Worn components	Disassemble the actuator, inspect and replace the worn/damaged components
	Faulty valve	Check the valve documentation and contact the manufacturer
	Valve accessories	Check the documentation and contact the manufacturer
Incomplete rotation	incorrect stroke adjustment	Observe indications in section 9.5.9 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
	Faulty valve	Check the valve documentation and contact the manufacturer
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 piping and fittings, remove any foreign object/damaged component
	Power module seals leakage	Disassemble the power module, inspect and replace any damaged seals
	Air exhaust hole blocked	Remove caps or foreign objects from the exhaust hole
	Faulty valve	Check the valve documentation and contact the manufacturer

#### **i** Note

Contact AIR TORQUE ([aftersales@airtorque.it](mailto: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 compressed springs.**

Spring modules are under tension due to compressed springs. Consequently, the 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.
- The actuator must be in the fail position while removing the Spring module from the Central module.
- If Spring module service is necessary, contact AIR TORQUE.

### **⚠ WARNING**

#### **Risk of personal injury during actuator air exhaust.**

In case of pneumatic power cylinder configuration, 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.

### **⚠ 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.**

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

- Observe 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 observation 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 90° angular travel in both directions (i.e. 90° to open + 90° to close).

- Spare kits are available for seals and bearing replacement. (HD50900E)
- Refer to the Rubber products storage instructions (T3.3.3.1 EN).

**Table 9-1**

ACTUATOR MODEL	CYCLES NUMBER LIMIT	TIME LIMIT
AT-HD 065	75.000	48 Months/ 4 years from installation or 60 Months/5 years from production date.
AT-HD 085	50.000	
AT-HD 100	30.000	
AT-HD 130	25.000	
AT-HD 160	10.000	
AT-HD 200	2.500	

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  $\leq 5,5$  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 "H" or "L" 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 (see the 'Decommissioning' section).
3. Remove the actuator from the valve (see the 'Removal' section).

## 9.2 Disassembly

### ⚠ WARNING

#### **Risk of personal injury due to compressed springs.**

Spring modules are under tension due to compressed springs. Consequently, the 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.
- ➔ The actuator must be in the fail position while removing the Spring module from the Central module.
- ➔ If Spring module service is necessary, contact AIR TORQUE.

### ⓘ NOTICE

#### **Risk of components damage due to incorrect storage.**

Store the single components in a clean and safe area once disassembled, before proceeding with the service and the reassembly.

### 9.2.1 Stroke adjustment screws removal

There are different stroke adjustment configurations (Fig. 9-1).

#### "A":

- Loosen the nuts (CW10).
- Unscrew and remove the screws (CW09) and the washers (CW11). A minimum pressurization to the actuator may be needed in case the screw is blocked in position due to the yoke contact pressure.
- ➔ Refer to the functioning labels to correctly pressurize the actuator.

#### "B":

- Loosen the cover nut (C037).
- Unscrew and remove the screws (C036) along with the o-rings (CW25) and washers (C038). A minimum pressurization to the actuator may be needed in case the screw is blocked in position due to the yoke contact pressure.
- ➔ Refer to the functioning labels to correctly pressurize the actuator.

#### "C":

- Loosen the cover nut (C037).
- Unscrew and remove the screws (C036) along with the gaskets (C066). A minimum pressurization to the actuator

may be needed in case the screw is blocked in position due to the yoke contact pressure.

- ➔ Refer to the functioning labels to correctly pressurize the actuator.

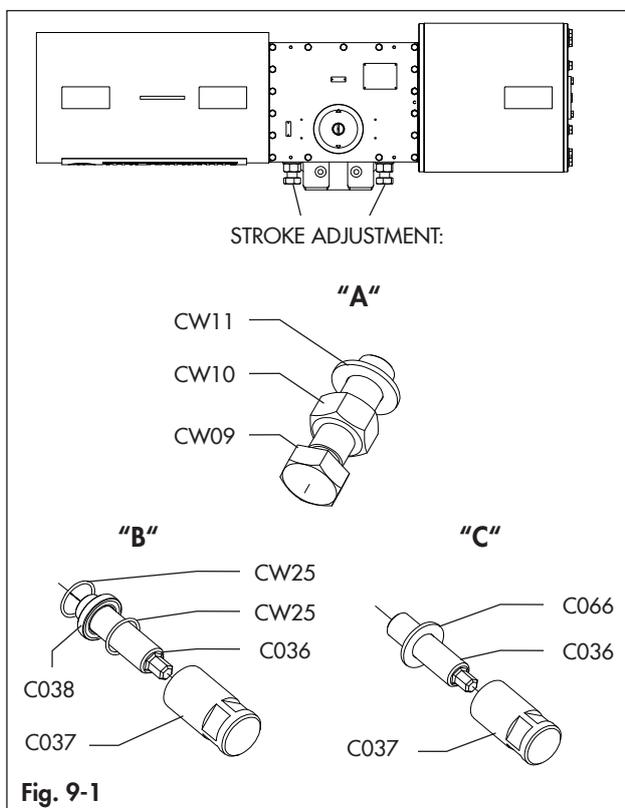


Fig. 9-1

### ⓘ Note

The screws (CW09 /C036) may have different length depending on the actuator stroking range. Make sure to link the correct adjustment screws to the actuator as disassembled.

### 9.2.2 Cover removal

Refer to Fig. 9-2 and Fig. 9-3.

- Remove the ring (CW34) with a proper plier.
- Remove the position indicator (CW15).
- Unscrew the screws (C012) to remove the shaft cover (C025) and the gasket (C021).
- Unscrew all the screws (CW08) with the washers (CW13).
- Remove the cover (C016) and the gasket (C022): four eyebolt can be assembled into the threaded holes to facilitate the lifting operations. (Fig. 9-3)
- ➔ Refer to Table 9-1 for the eyebolts dimensions.

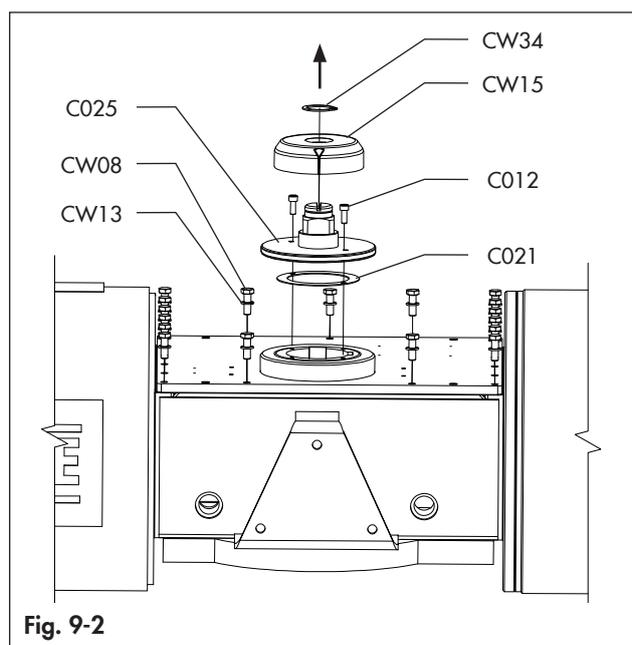


Fig. 9-2

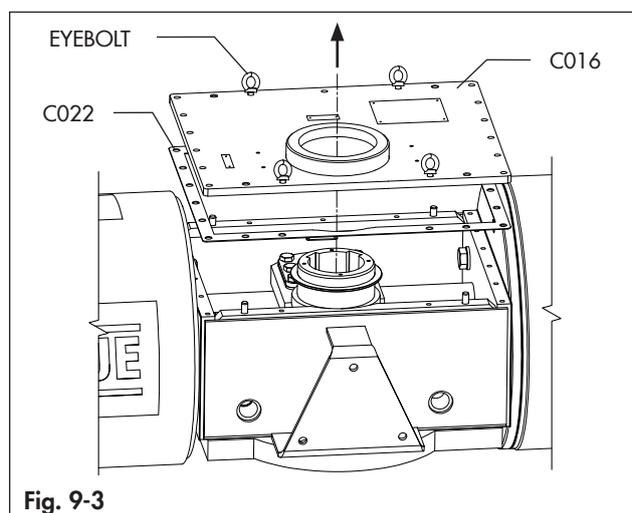


Fig. 9-3

Table 9-1

ACTUATOR MODEL	EYEBOLTS DIMENSIONS
AT-HD 065	M12X30
AT-HD 085	M10X30
AT-HD 100	M10X30
AT-HD 130	M12X30
AT-HD 160	M20X30
AT-HD 200	M20X30

### 9.2.3 Spring module removal

Keep the Spring module in position by means of lifting brackets.

- Unscrew the screw (CW32) from the central sliding block (C019). (Fig. 9-4)
- Unscrew the screws (MW02) from inside the central module.

- For actuator models AT-HD 200 or bigger, unscrew the shaft (M014) from the central sliding block (C019). (Fig. 9-4)

For actuator models from AT-HD 065 to AT-HD 160 the shaft (M014) is not fixed into the central sliding block (C019).

- Remove the spring module from the Central module. (Fig. 9-4)

#### **i** Note

The components (MW01), (M068) and (M068A) may result loosen since they are not fixed. (Fig. 9-4)

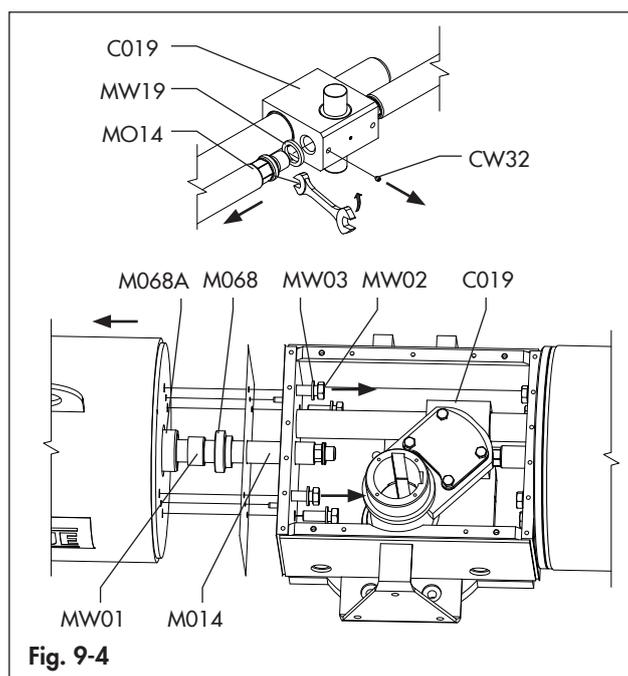


Fig. 9-4

### 9.2.4 Power module removal

#### **i** Note

In case of actuator with complementary parts refer to the corresponding instructions:

- Bevel gear → EB AT-HD-BG,
- Hydraulic pump → EB AT-HD-HP,
- Quick and damper → EB AT-HD-QD.

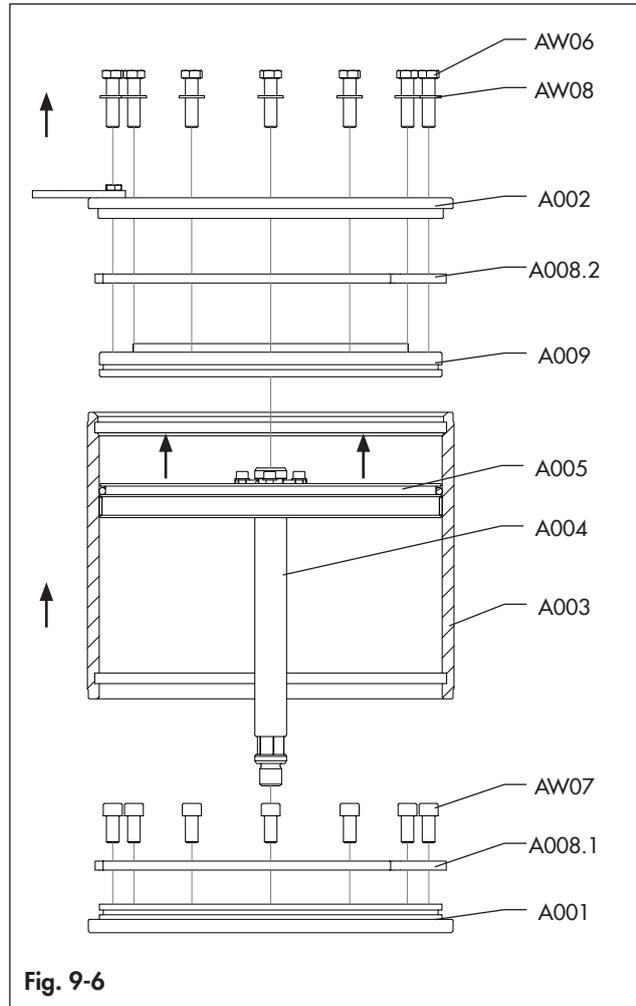
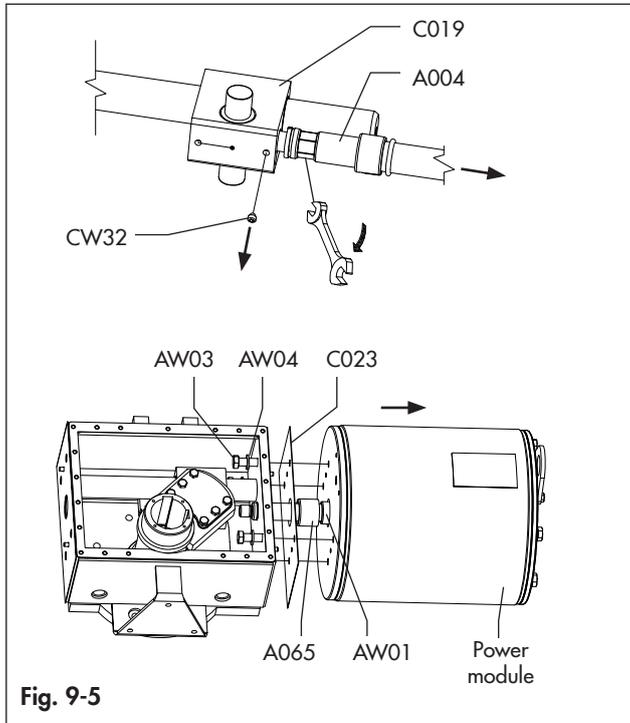
Keep the Power module in position by means of lifting brackets.

- Unscrew the screw (CW32) from the central sliding block (C019), if any. (Fig. 9-5)
- Unscrew the shaft (A004) from the central sliding block (C019). If necessary, rotate the yoke slightly pressurizing the Power module according to the functioning label (section 2.2) to create an easy access to the shaft (A004) for the tools.
- Discharge the Power module and unscrew the screws (AW03) from inside the Central module.

- Remove the Power module from the Central module.
- Remove the central module gasket (C023).

**i Note**

The components (AW01) and (A065), if any, may result loosed since they are not fixed. (Fig. 9-5)



### 9.2.5 Power module disassembly

Operate with the power module in a vertical position as shown in Fig. 9-6.

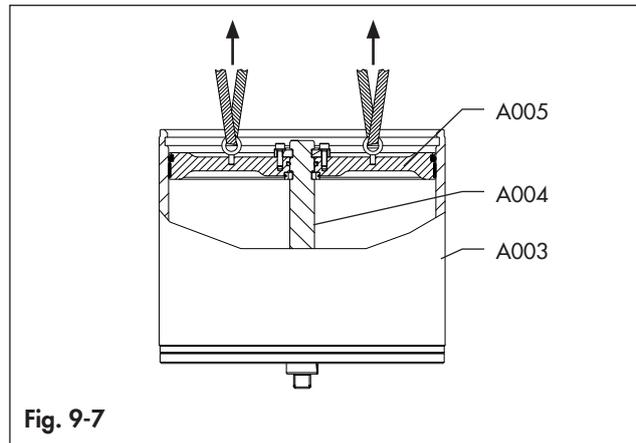
**NOTICE**

**Risk of cylinder damage due to incorrect handling.**  
The internal surface of the cylinder (A003) may be damaged permanently if not handled carefully.

➔ Disassemble the piston (A005) making sure not to scratch the internal surface of the cylinder (A003).

#### 1) Pneumatic module without tie rods

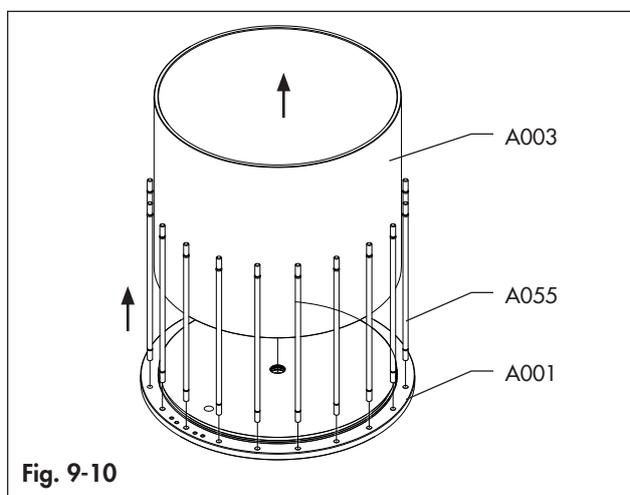
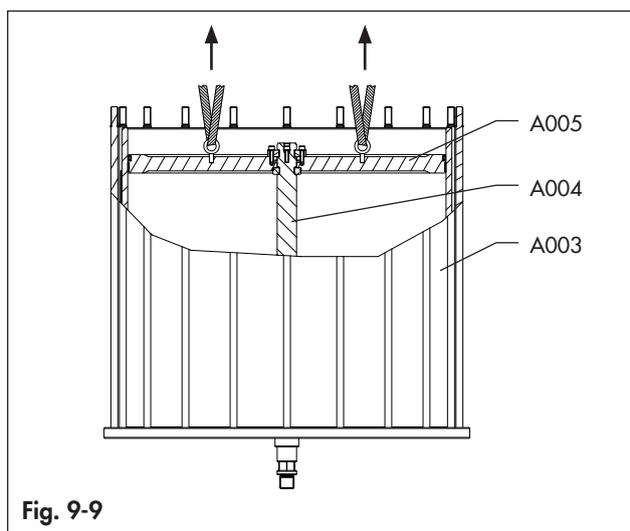
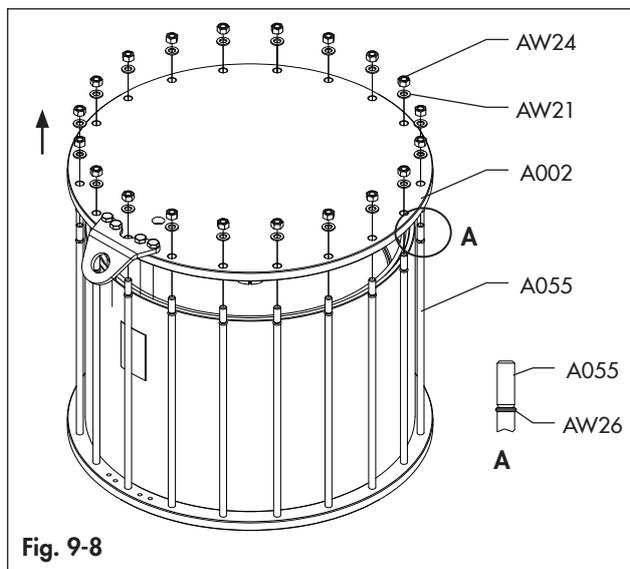
- Unscrew the screws (AW06) and the washers (AW08) and remove the flange (A002). (Fig. 9-6)
- Remove the sector retainers (A008.2) and the retainer flange (A009). (Fig. 9-6)
- Remove the piston (A005) together with the shaft (A004) from the cylinder (A003) by means of eyebolts. (Fig. 9-7)
- Unscrew the screws (AW07) and remove the sector retainers (A008.1) from the flange (A001). (Fig. 9-6)
- Lift and remove the cylinder (A003) from the flange (A001) with proper lifting tools. (Fig. 9-6)



#### 2) Pneumatic module with tie rods

- Unscrew the nuts (AW24) and the washers (AW21). (Fig. 9-8)
- Remove the flange (A002) taking care not to damage the o-rings (AW26). (Fig. 9-8)
- Remove the piston (A005) together with the shaft (A004) from the cylinder (A003) by means of eyebolts as shown in Fig. 9-9.

- Disengage and remove the cylinder (A003) from the flange (A001) as shown in Fig. 9-10.
- Unscrew and remove the rods (A055).



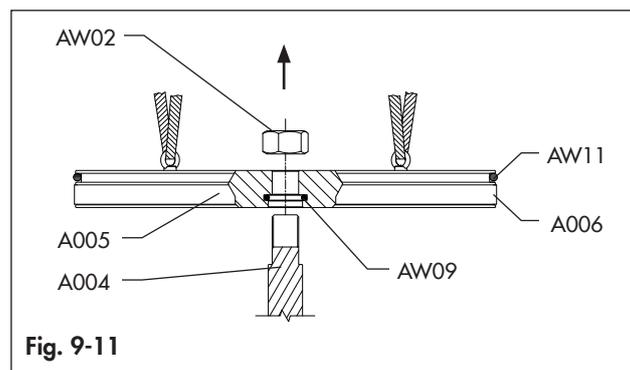
## 9.2.6 Piston disassembly

There are two different piston configurations.

### 1) Piston with retaining nut

Refer to Fig. 9-11.

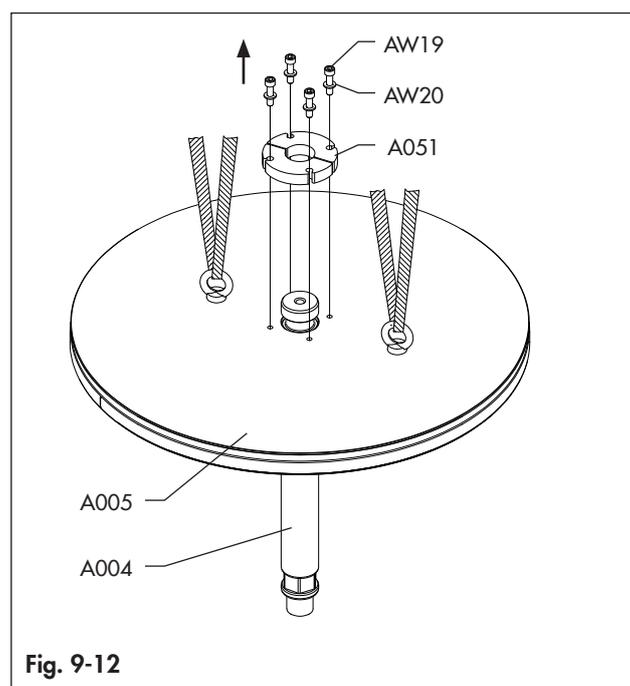
- Unscrew the nut (AW02), disengage and remove the piston (A005) from the shaft (A004).
- Remove the bearing (A006) and the o-rings (AW11 and AW09) from the piston (A005).



### 2) Piston with retaining sectors

Refer to Fig. 9-12 and Fig. 9-13.

- Unscrew the screws (AW19) along with the washers (AW20) and remove the sectors (A051).
- Disengage and remove the piston (A005) from the shaft (A004). (Fig. 9-13)
- Remove the o-ring (AW27) and the sectors (A050) from the shaft (A004).
- Remove the bearing (A006) and the o-rings (AW11 and AW25) from the piston (A005).



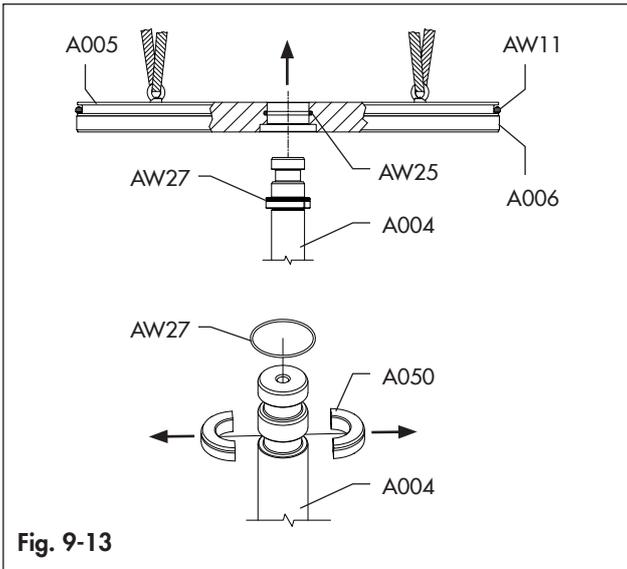


Fig. 9-13

### 9.2.7 Yoke assembly removal

Make sure the Power module and the Spring module have been removed from the Central module. Otherwise refer to paragraph 9.2.3 and 9.2.4.

- Remove the guide bar (C020). A threaded hole is available into the front side of the guide bar for lifting by means of proper equipment. (Fig. 9-14)

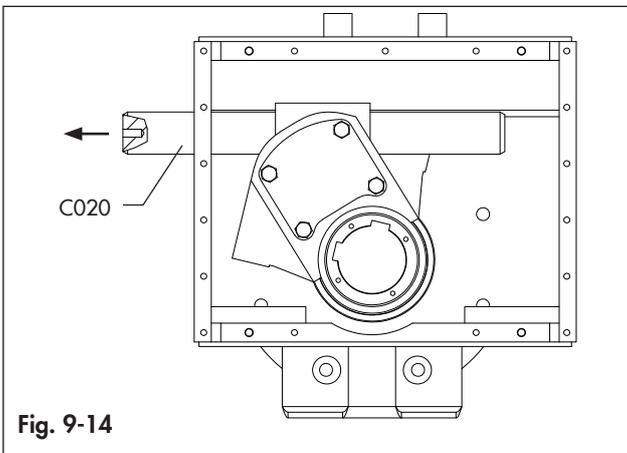


Fig. 9-14

- Remove the yoke assembly from the central module by means of proper lifting equipment and place it in a safe position over the workbench. (Fig. 9-15)
- Remove the thrust bearing (CW01), the shaft bearing (CW16) and the o-ring (CW04) from the Central module. (Fig. 9-15)

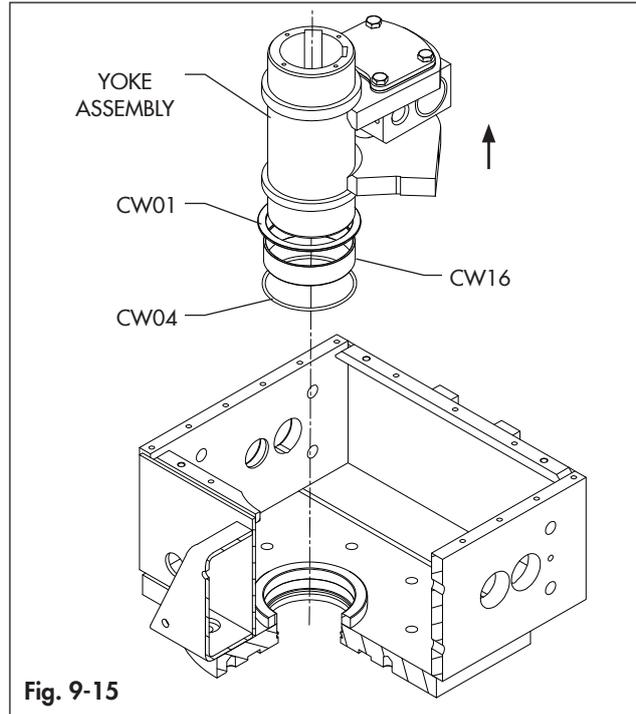


Fig. 9-15

### 9.3 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 HD50900E and to the Rubber products storage instructions T 3.3.3.1 EN.
- Clean and lubricate every o-ring housing.
- Lubricate every o-ring during reassembling.
- ➔ Refer to the data sheet HD50900E for the correct lubricant type.
- Clean and lubricate every sliding component and its housing.
- ➔ Refer to the section 15.3 'Lubricants'.
- Clean the relief valve (C097) counterbore over the Central module housing (C015) bottom side making sure it is not obstructed. (Fig. 9-16)

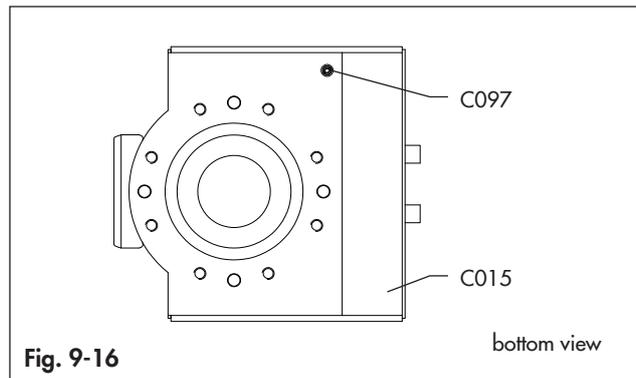


Fig. 9-16

- Where required during the reassembly apply the correct threadlocker.
- ➔ Refer to the threadlocker types indicated in section 15.4.

## 9.4 Reassembly

### 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. Unsuitable lubricants may corrode and damage the surface.

➔ Only use lubricants approved by AIR TORQUE indicated in section 15.3.

### 9.4.1 Yoke assembly mounting

- Place the o-ring (CW04), into the proper housing in the central module housing (C015). (Fig. 9-17)
- Lift carefully the yoke assembly with a proper equipment.

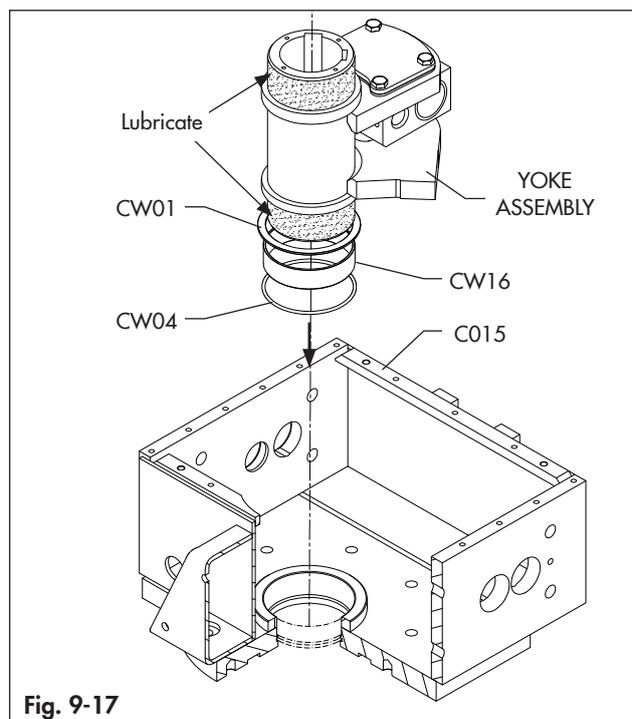


Fig. 9-17

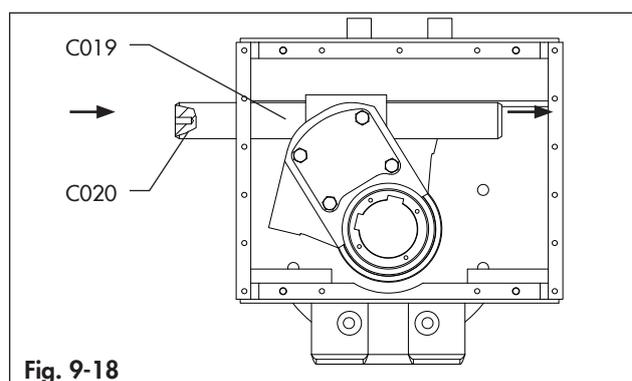


Fig. 9-18

- Place the yoke into the proper housing in the central module housing (C015).
- Insert the guide bar (C020) into the central module housing (C015) engaging the sliding block (C019) and reaching the opposite side of the housing (C015). A threaded hole is available into the front side of the guide bar for lifting by means of proper equipment. (Fig. 9-18)
- Place the gaskets (C023) making sure the pins (CW26) are correctly in position over the central module housing (C015) as per Fig. 9-19.

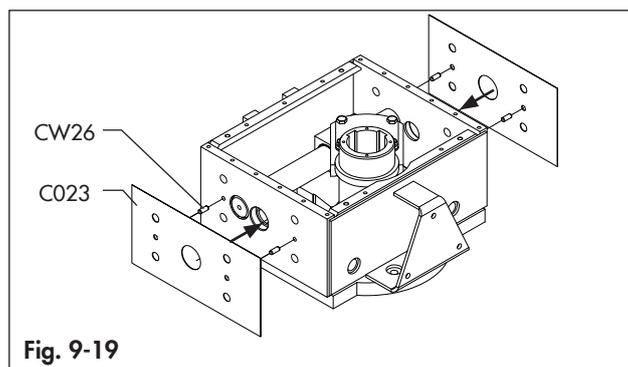


Fig. 9-19

- For DOUBLE ACTING actuators, place the flange (D028) screwing the bolts (DW02) along with the washers (DW04) and nuts (DW03) after applying the threadlocker Loxeal 83•21 or equivalent. (Fig. 9-20)
- ➔ Refer to section 15.2 for the correct tightening torque and sequence.

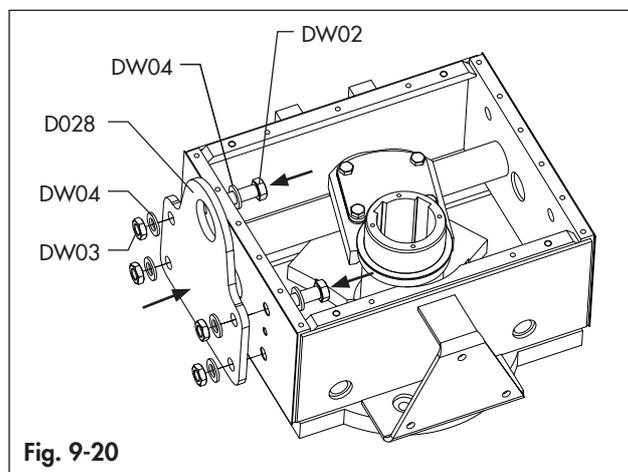


Fig. 9-20

### 9.4.2 Piston reassembly

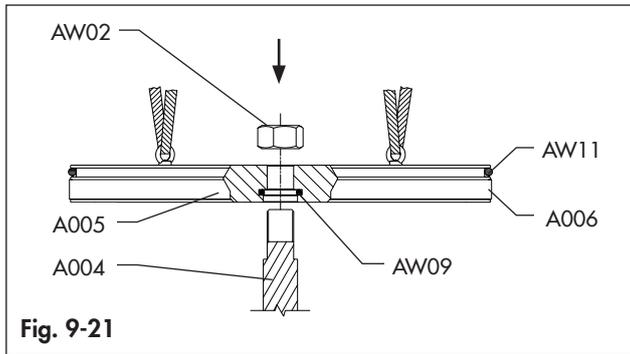
There are two different piston configurations.

#### 1) Piston with retaining nut

Refer to Fig. 9-21.

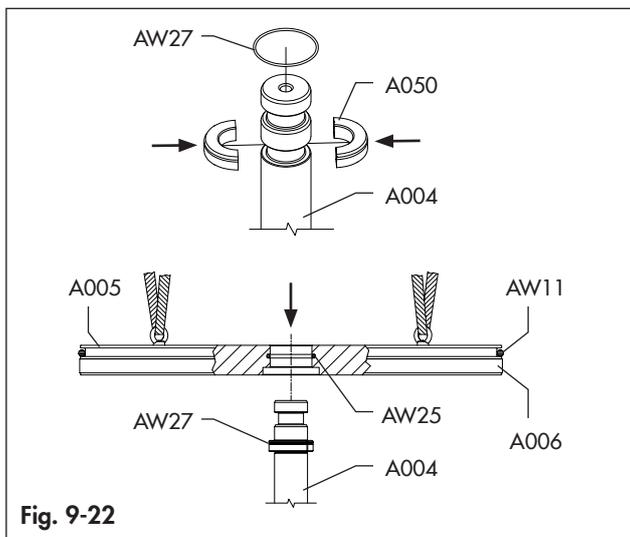
- Clean, inspect, lubricate the related housings and place the bearing (A006) and the o-rings (AW09 and AW11).
- Keeping the shaft (A004) in a vertical position, assemble the piston (A005) by means of proper lifting equipment.

- Fix the piston (A005) in position screwing the nut (AW02) at the correct torque after applying the threadlocker Loxeal 83•21 or equivalent.
- ➔ Refer to section 15.2 for the correct tightening torque.

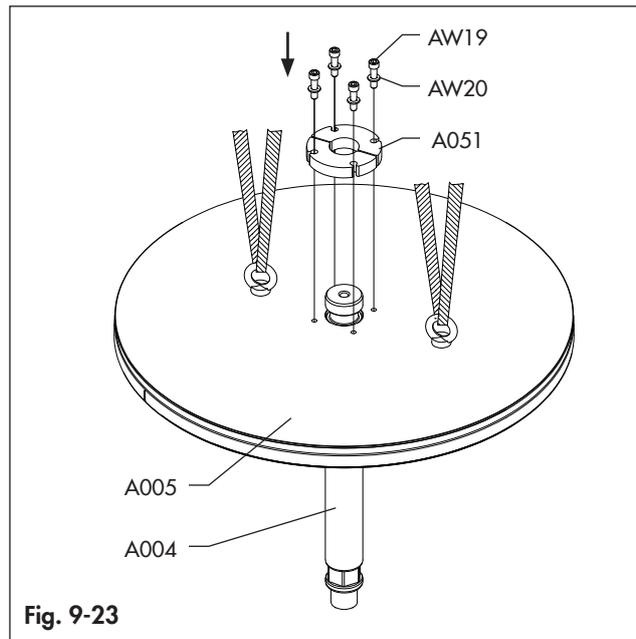


## 2) Piston with retaining sectors

- Clean, inspect, lubricate the related housings and place the bearing (A006) and the o-rings (AW25 and AW11).
- Place the sectors (A050) in the related housings and fix them in position with the o-ring (AW27). (Fig. 9-22)
- Keeping the shaft (A004) in a vertical position, assemble the piston (A005) over the shaft (A004) by means of proper lifting equipment.



- Place the sectors (A051) in the related housings.
- Apply the threadlocker Loxeal 55•03 or equivalent and tighten the screws (AW19) along with the washers (AW20) to fix the piston (A005) in position. (Fig. 9-23)
- ➔ Refer to section 15.2 for the correct tightening torque and sequence.



## 9.4.3 Power module reassembly

### NOTICE

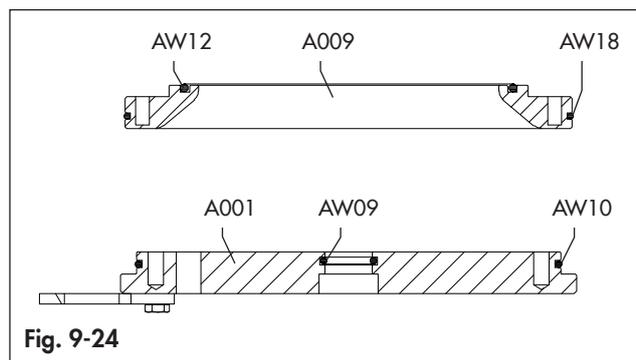
#### Risk of cylinder damage due to incorrect handling.

The internal surface of the cylinder (A003) may be damaged permanently if not handled carefully.

- ➔ Do not leave any external body such as brush bristles into the cylinder (A003) while lubricating the internal surface.
- ➔ Assemble the piston (A005) making sure not to scratch the internal surface of the cylinder (A003).

### 1) Power module without tie rods

- Clean, inspect, lubricate the related housings and replace the o-rings (AW09, AW10, AW12 and AW18). (Fig. 9-24)



- Carefully lift and place the cylinder (A003) over the flange (A001) with proper lifting equipment as shown in Fig. 9-25, making sure non to damage the o-ring (AW10) shown in Fig. 9-24.

**⚠ DANGER****Risk of personal injury due to incorrect assembly of retaining components.**

In case the retaining sectors (A008.1/A008.2) are not correctly assembled, the Power module can get loosen and leak while pressurized. Consequently any flying projectile fragments or components can cause serious injury or even death.

- ➔ Place the sectors (A008.1/A008.2) correctly in position into its housing in the cylinder (A003).
- ➔ Fix the sectors (A008.1/A008.2) carefully fastening the related screws.

- Place the sectors (A008.1) over the flange (A001) into their housing in the cylinder (A003).
- Fix the sectors (A008.1) in position tightening the screw at the correct torque and following the correct sequence, after applying the threadlocker Loxeal 83•21 or equivalent.
- ➔ Refer to section 15.2 for the correct tightening torque and sequence.

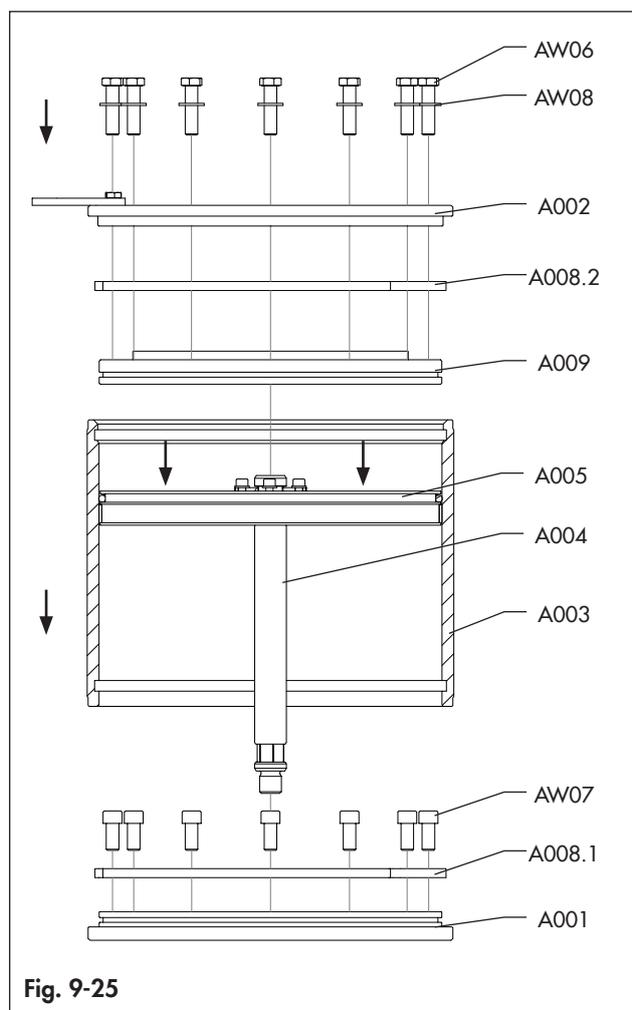


Fig. 9-25

- Lubricate the internal surface of the cylinder (A003).
- Lubricate the shaft (A004).

**ⓘ NOTICE****Risk of piston shaft damage due to incorrect handling.**

The shaft (A004) may be damaged permanently if the piston assembly is excessively lowered while placing it into the cylinder (A003).

- ➔ Keep the piston (A005) in position as indicated in Fig. 9-34 just overpassing the sectors (A008.2) housing into the cylinder (A003).
- ➔ Make sure the shaft (A004) is not excessively stuck out from the flange (A001) in order to avoid any damage while handling.

- Lift and place the piston assembly in the cylinder: engage carefully the shaft (A004) into the flange (A001) and the piston (A005) into the cylinder. (Fig. 9-25 and Fig. 9-26)

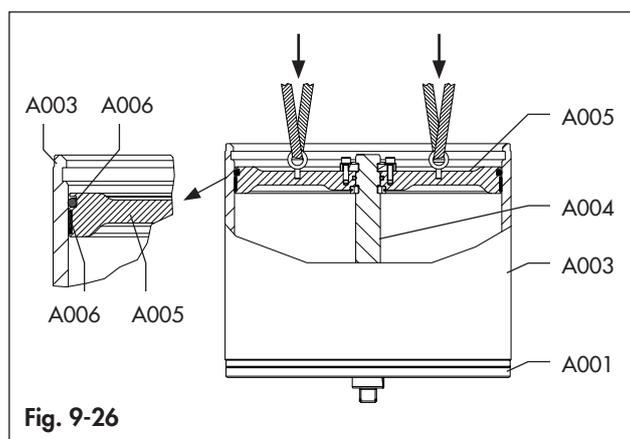


Fig. 9-26

- Place the flange (A009) into the cylinder overpassing the sectors (A008.2) housing as per Fig. 9-27.

**i Note**

In case of actuator with Hydraulic pump, refer to the EB AT-HD-HP instruction to mount the override over the Power module.

- Assemble the sectors (A008.2) and the flange (A002) making sure to correctly align the holes for the screws (AW06): make sure to orient the lifting bracket (A007) referring to the flange (A001) as shown in Fig. 9-28.

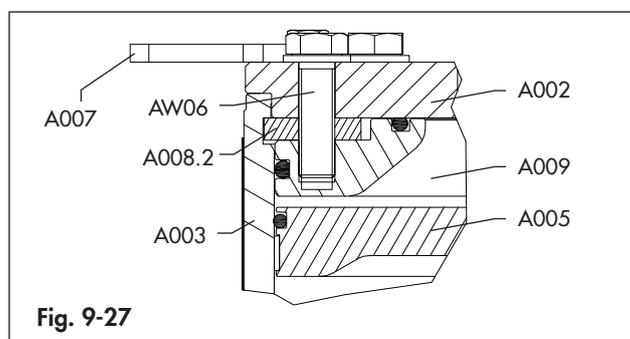


Fig. 9-27

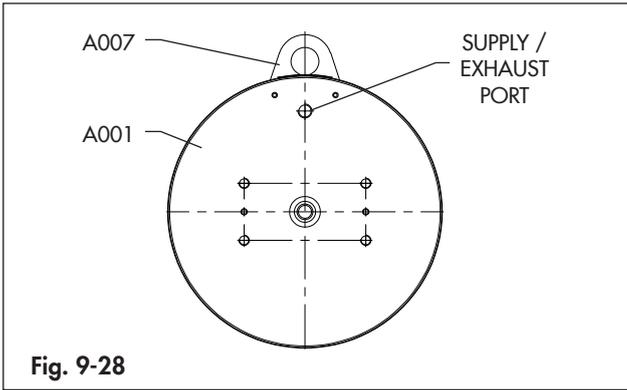


Fig. 9-28

**⚠ DANGER**

**Risk of personal injury due to incorrect assembly of retaining components.**

In case the retaining sectors (A008.2) are not correctly assembled, the Power module can get loosen and leak while pressurized. Consequently any flying projectile fragments or components can cause serious injury or even death.

- ➔ Place the sectors (A008.2) correctly in position into its housing in the cylinder (A003). Fig 9-25 and Fig. 9-28.
- ➔ Fix the sectors (A008.2) carefully fastening the related screws.

- Screw the screws (AW06) and the washers (AW08) at the correct tightening torque and following the correct sequence after applying the threadlocker Loxal 83•21 or equivalent.
- ➔ Refer to section 15.2 for the correct tightening torque and sequence.

**2) Power module with tie rods**

- Clean, inspect, lubricate the related housings and replace the o-rings (AW09, AW10 and AW18). (Fig. 9-29)

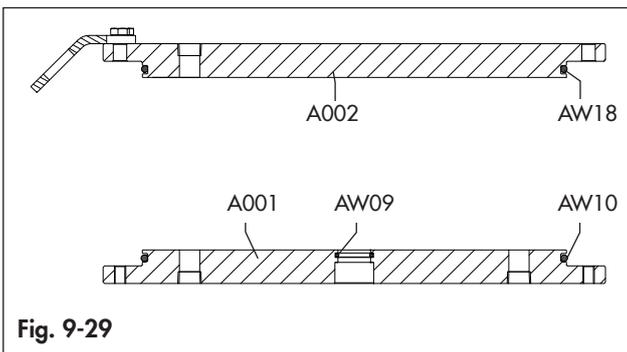


Fig. 9-29

- Place and screw completely the tie rods into the flange A001). (Fig. 9-30)
- Clean, lubricate the related housings and replace the o-rings (AW26).
- Lift and place the cylinder (A003) over the flange (A001) with proper lifting equipment making sure not to damage the tie rod o-rings (AW26).

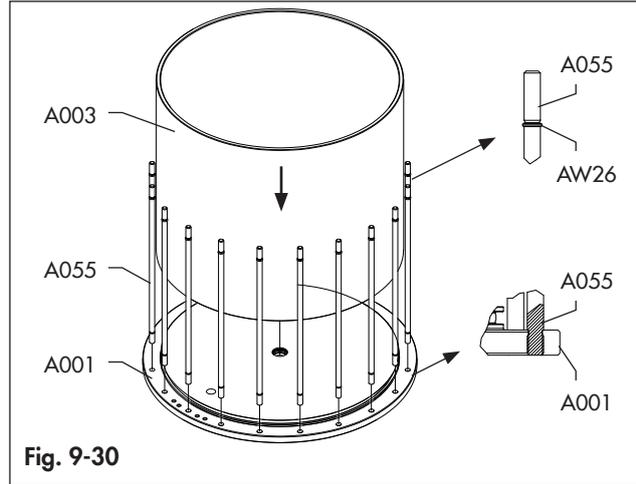


Fig. 9-30

- Lubricate the internal surface of the cylinder (A003).
- Lubricate the shaft (A004).

**ⓘ NOTICE**

**Risk of piston shaft damage due to incorrect handling.**

The shaft (A004) may be damaged permanently if the piston assembly is excessively lowered while placing it into the cylinder (A003).

- ➔ Make sure the shaft (A004) is not excessively stuck out from the flange (A001) in order to avoid any damage while handling.

- Lift and place the piston assembly in the cylinder: engage carefully the shaft (A004) into the flange (A001) and the piston (A005) into the cylinder. (Fig. 9-31)

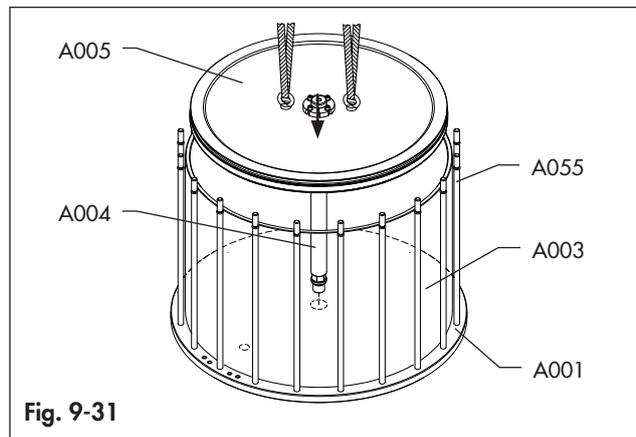


Fig. 9-31

**i Note**

In case of actuator with Hydraulic pump, refer to the EB AT-HD-HP instruction to mount the override over the Power module.

- Place the flange (A002) making sure to correctly align the holes for the tie rods (A055) orienting the lifting bracket (A007) referring to the flange (A001) as per Fig. 9-32. Make sure not to damage the tie rod o-rings (AW26) while engaging the flange (A002) into the tie rods (A055).

**⚠ DANGER**

**Risk of personal injury due to incorrect assembly of retaining components.**

In case the tie rods (A055) are not correctly fastened, the Power module can get loosen and leak while pressurized. Consequently any flying projectile fragments or components can cause serious injury or even death.

➔ Fix the tie rods (A055) carefully fastening the related nuts.

- Apply the threadlocker Loxal 83•21 or equivalent and screw the nuts (AW24) and washers (AW21) at the correct tightening torque and following the correct sequence.
- ➔ Refer to section 15.2 for correct tightening torques and sequence.

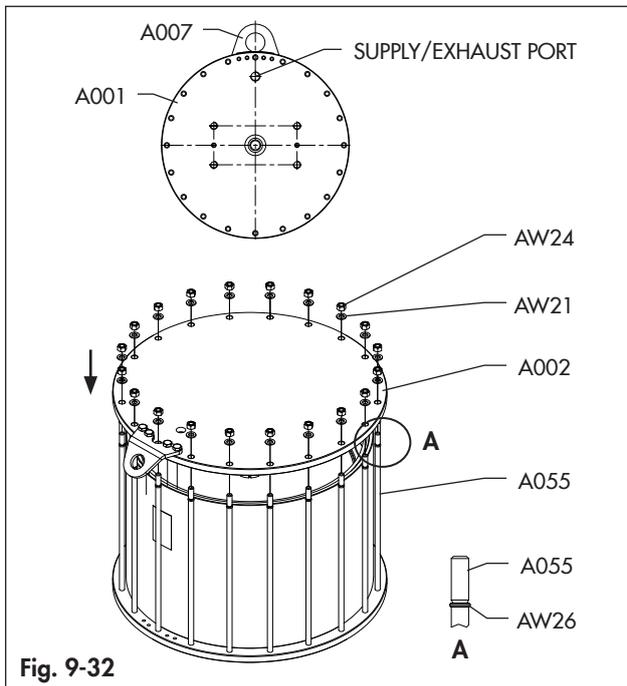


Fig. 9-32

**9.4.4 Power module mounting**

- Lift the Power module with proper equipment and place it over a horizontal surface. (Fig. 9-33)

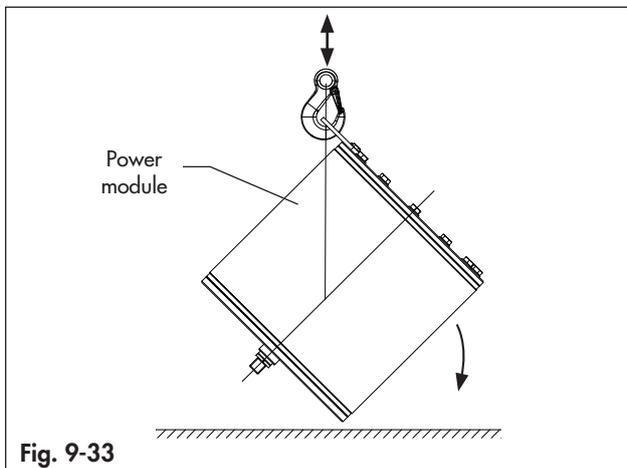


Fig. 9-33

- Lift and align the Power module to the Central module.
- Replace the gasket (C023) and make sure the components (CW26), (A065) and (AW01) are in the correct position, if any, as per Fig. 9-34.
- Insert the shaft (A004) into the Central module, tighten it into the sliding block (C019) and lock it in position screwing the screw (CW32).
- Apply the threadlocker Loxal 83•21 or equivalent and tighten the bolts (AW03) and washers (AW04) following a cross-bolt tightening sequence at the recommended torque.
- ➔ Refer to section 15.2 for the correct tightening torque and sequence.

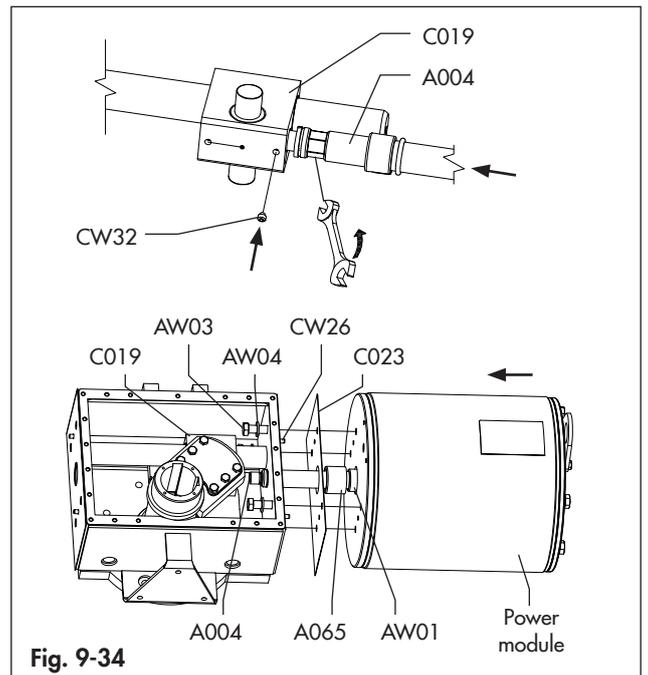


Fig. 9-34

**9.4.5 Spring module mounting**

**1) Actuator models from AT-HD 065 to AT-HD 160**

Refer to Fig. 9-35.

- Lubricate the shaft (M014) and the sleeve (MW01).
- Place the sleeve (MW01) in the Spring module front flange.
- Lift the Spring module with proper equipment and align it to the Central module.
- Make sure the gasket (C023) and the pins (CW26) are correctly in position.
- Insert the shaft (M014) into the central module and engage the sliding block (C019).
- Tighten the screws (MW02) along with the washers (MW03).
- ➔ Refer to section 15.2 for the correct tightening torque and sequence.

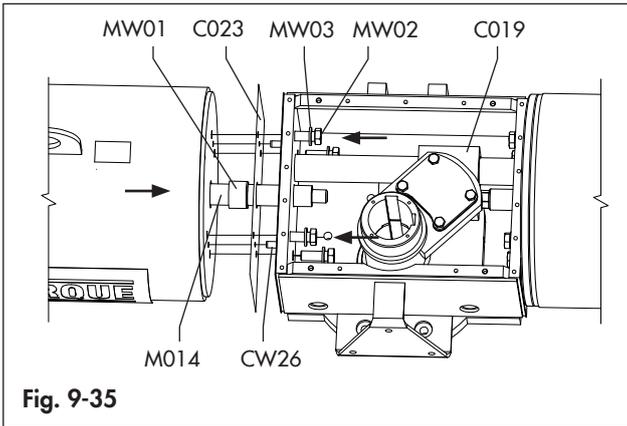


Fig. 9-35

**2) Actuator models AT-HD 200**

Refer to Fig. 9-36.

- Lubricate the shaft (M014) and the sleeve (MW01).
- Slightly pressurize the Power module to rotate the yoke easing the assembly of the shaft (M014) into the sliding block (C019).
- ➔ Refer to the section 2.2. for the functioning label.
- Place the flange (MW68A), the sleeve (MW01) and the flange (MW68) in the Spring module front flange.
- Lift the Spring module with proper equipment and align it to the Central module.
- Make sure the gasket (C023) and the pins (CW26) are correctly in position.
- Insert the shaft (M014) into the central module.
- Insert the washer (MW19) over the shaft.
- Fasten the shaft (M014) into the sliding block (C019).
- Fix the shaft screwing the screw (CW32).
- Apply the threadlocker Loxeal 83•21 and fasten the screws (MW02) with the washers (MW03).

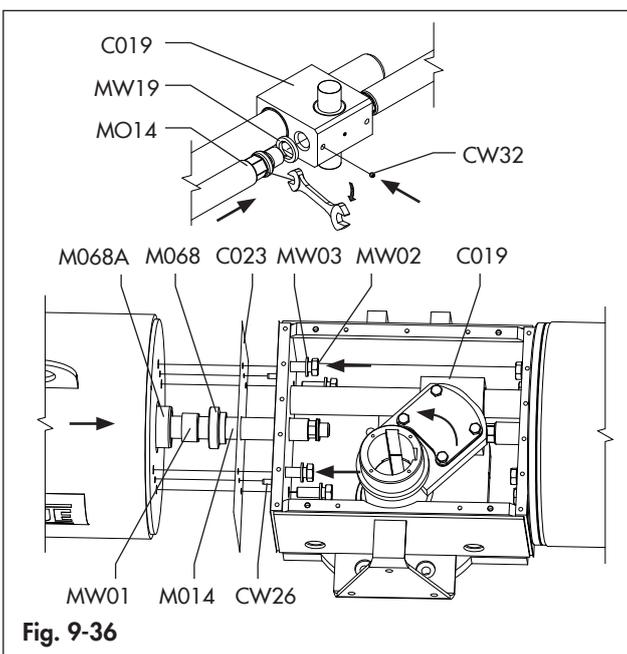


Fig. 9-36

**9.4.6 Cover reassembly**

- Clean, inspect, lubricate the related housings and replace the o-ring (CW04) and the bearing (CW16). (Fig. 9-37)
- Lift the cover (C016) with proper equipment screwing eye-bolts into the threaded holes, if needed.
- Place the thrust bearing (CW01) over the yoke (C017).
- Place the gasket (C022) and the cover (C016) correctly aligning to the pins (CW05).

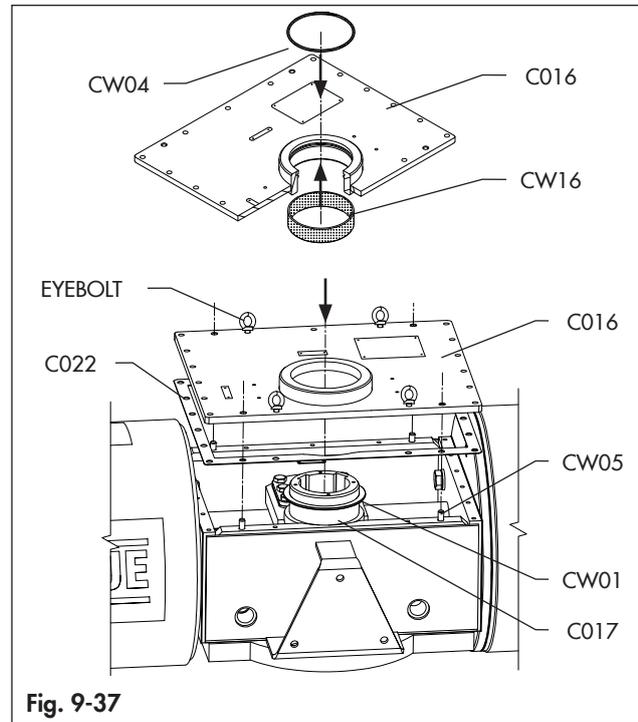


Fig. 9-37

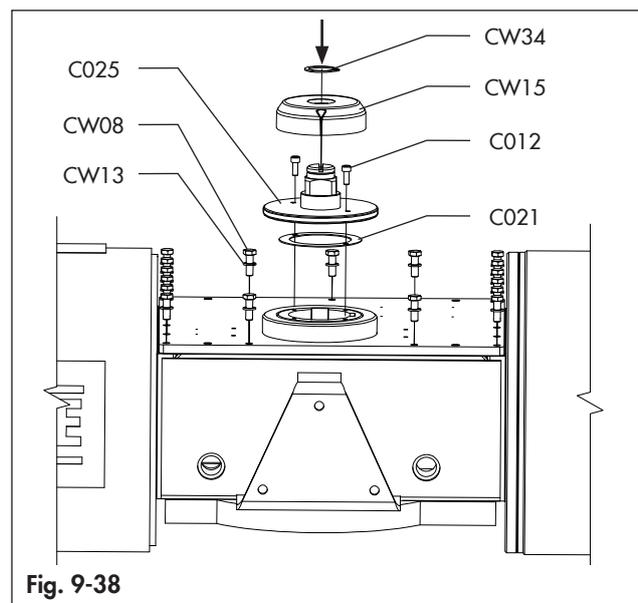


Fig. 9-38

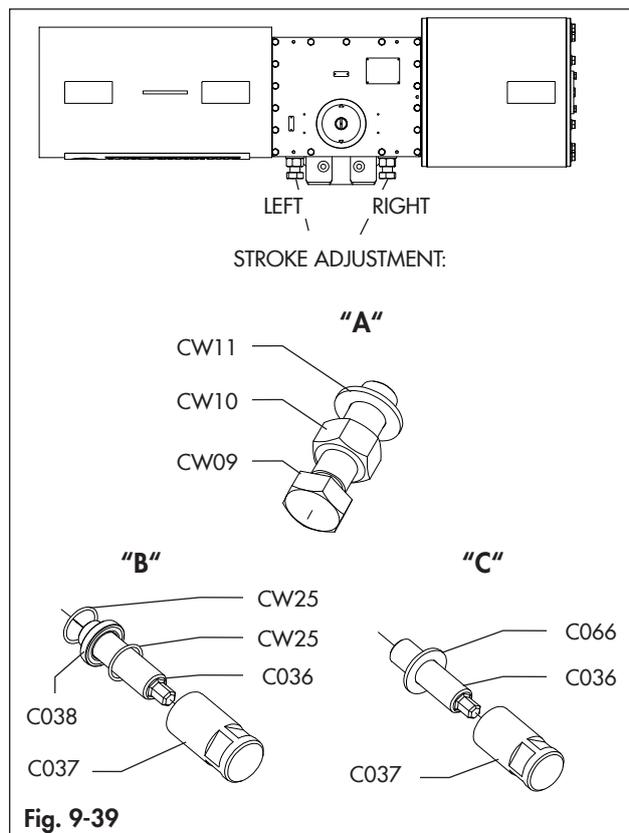
- Apply the threadlocker Loxeal 83•21 or equivalent and tighten the screws (CW08) along with the washers (CW13). (Fig. 9-38)
- Place the gasket (C021) over the yoke.

- Fix the cover (C025) over the yoke screwing the screws (C012).
- Place the position indicator (CW15) and fix it mounting the ring (CW34).

### 9.4.7 Stroke adjustment screws reassembly

#### **i** Note

- In case of actuator with Bevel gear, refer to the EB AT-HD-BG instruction to mount the override over the Power module.
- For actuators with Quick and Damper system, refer to the EB AT-HD-QD instructions.



#### **i** Note

The screws (CW09 /C036) may have different length depending on the actuator stroking range. Make sure to link the correct adjustment screws to the actuator as disassembled.

Refer to Fig. 9-39.

There are different stroke adjustment configurations.

#### "A":

- Partially fasten the bolts (CW09) with the nuts (CW10) and the washers (CW11) into the threaded holes over the Central module.

#### "B":

- Partially fasten the screws (C036) into the threaded holes over the Central module.
- Lubricate and place the o-rings (CW25) into the washers (C038).
- Place the the washers (C038) over the screws (C036).
- Cover the screws (C036) tightening the nuts (C037) until adjusting the stroke.

#### "C":

- Partially fasten the screws (C036) with the gaskets (C066) into the threaded holes over the Central module.
- Cover the screws (C036) tightening the nuts (C037) until adjusting the stroke.

### 9.4.8 Stroke adjustment

Refer to Fig. 9-39.

#### 3.1 Double acting actuators

- Progressively pressurize Port 2 to completely stroke the actuator.
- ➔ Refer to the functioning labels to correctly pressurize the actuator.
- Tighten or loosen the screws (CW09/C036) to adjust to the stroke end.
- Discharge the actuator from Port 2 and progressively pressurize Port 4 to completely stroke the actuator.
- Tighten or loosen the screws (CW09/C036) to adjust to the stroke end.
- If the stroke is not adjusted correctly in both end positions, repeat the steps above.
- When the stroke is correctly adjusted, completely tighten the nuts (CW10/C037).

#### 3.2 Single acting fail close actuators

##### Closed position (0°)

- Loosen the nut (CW10/C037) of the RIGHT adjustment screw.
- Slightly pressurize Port 2 to compress the spring removing the load from the screw (CW09/C036).
- ➔ Refer to the functioning labels to correctly pressurize the actuator (section 2.2).
- Tighten or loosen the screw (CW09/C036) to adjust the stroke in the closed position.
- Release the pressure from the power module and check the actuator stroke reaching the fail close position.
- If the stroke is not adjusted correctly, repeat the steps above.
- When the stroke is correctly adjusted, completely tighten the nuts (CW10/C037).

##### Open position (90°)

- Loosen the nut (CW10/C037) of the LEFT adjustment screw.

## Service

- Tighten or loosen the screw (CW09/C036) to adjust the stroke.
- Progressively pressurize Port 2 to completely stroke the actuator reaching the open position.
- ➔ Refer to the functioning labels to correctly pressurize the actuator (section 2.2).
- Verify the stroke adjustment and release the pressure from the power module reaching the fail close position.
- If the stroke is not adjusted correctly, repeat the steps above.
- When the stroke is correctly adjusted, proceed as follows to completely tighten the nuts (CW10/C037):
  - slightly pressurize Port 2 to slowly rotate the actuator reaching the open position,
  - keep the actuator in the open position to make sure the adjustment screws (CW09/C036) do not fasten out of position.
  - completely tighten the nuts (CW10/C037).

### 9.4.9 Mounting the actuator over the valve

Refer to the section 5.3 'Mounting the actuator over the valve'.

## 10 Decommissioning

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 compressed springs.**

*Spring modules are under tension due to compressed springs. Consequently, the 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.
- The actuator must be in the fail position while removing the Spring module from the Central module.
- If Spring module service is necessary, contact AIR TORQUE.

### **⚠ WARNING**

#### **Risk of personal injury during actuator air exhaust.**

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

→ Wear eye and hearing protection when working near the actuator.

### **⚠ 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.**

*Follow the specified torques to tighten actuator components (bolts and nuts). Tightening torques above the limits lead to parts wearing out quicker. Parts that are not tightened enough may loosen.*

→ Observe the specified tightening torques in section 15.2.

To decommission the actuator for service work or before removing it from the valve, proceed as follows:

1. Put the valve and its accessories out of operation in a safe position. Refer to the documentation available from the valve manufacturer.
2. Disconnect the pneumatic/electrical supply to depressurize the actuator. In case of single acting actuator, make sure the actuator reaches the FAIL position once depressurized.



## 11 Removal

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

Before removing from the valve, make sure the actuator is put out of operation. Refer to section 10 'Decommissioning'.

### **⚠ 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 working on the actuator:

- ➔ 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 during actuator air exhaust.**

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

- ➔ Wear eye and hearing protection when working near the actuator.

### **⚠ WARNING**

#### **Risk of personal injury due to compressed springs.**

Spring modules are under tension due to compressed springs. Consequently, the 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.
- ➔ The actuator must be in the fail position while removing the Spring module from the Central module.
- ➔ If Spring module 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.

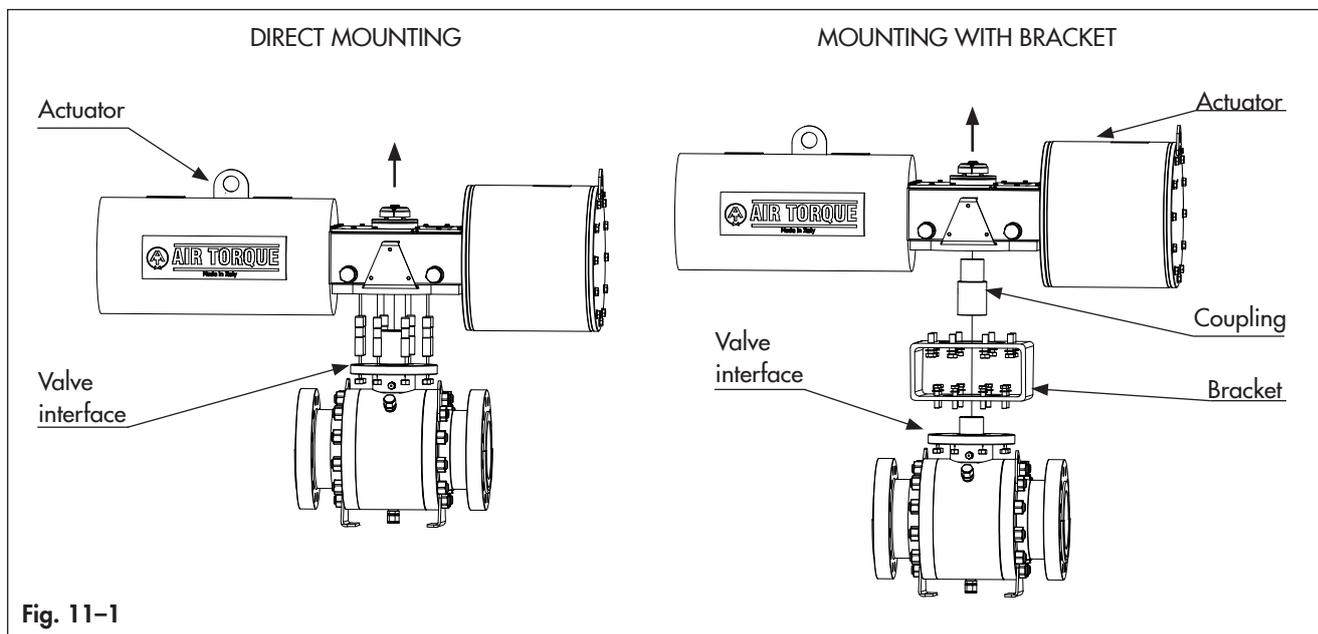


Fig. 11-1

Proceed as follows to remove the actuator from the valve referring to Fig. 11-1, making sure to not expose the plant to any risk:

1. Disconnect any electrical/pneumatic/hydraulic power supply from the actuators and make sure the actuator itself is depressurized.
2. Disconnect all electrical wirings of the control or signal devices, if any.
- ➔ Refer to the control or signal devices documentation for safe disassembly.
3. Remove the bolts and nuts from the valve flange and remove the actuator from the valve.
4. Remove the coupling.
5. Remove the bracket from the actuator, if any.
6. Remove the control or signal devices, if any.
- ➔ Refer to the control or signal devices documentation for safe disassembly.



## 12 Repairs

If the actuator does not function properly according to how it was originally sized or does not function at all, it is defective and must be repaired or replaced.

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### **⚠ NOTICE**

***Risk of actuator damage due to incorrect repair work.***

- Do not perform any repair work on your own.
  - Contact AIR TORQUE ([aftersales@airtorque.it](mailto:aftersales@airtorque.it)) for repair work.
-



## 13 Disposal

At the end of their life cycle AIR TORQUE actuators can be disassembled and disposed sorting the components by the different materials.

→ Observe local, national and international refuse regulations.

All materials have been selected in order to ensure minimal environmental impact, health and safety of personnel during their installation and maintenance, provided that, during use, they are not contaminated by hazardous substances.

Oil, grease and electric components may require special treatment before disposal.

→ Contact waste management companies and/or local authorities.

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### **⚠ WARNING**

***Risk of personal injury due to compressed springs.***

*Spring modules are under tension due to compressed springs. Consequently, the disassembly could result in serious injury.*

→ *If Spring module disposal is necessary, contact AIR TORQUE.*

---

The disposal is to be performed by fully trained and qualified personnel only.

- Decommission and remove the actuator ( section 10 and section 11).
- Create a large area around the actuator in order to work in safe conditions without obstacles that can interfere with the disposal operation.
- Dismantle the actuator sorting the components by the different materials.



## 14 Certificates

The following certificates and documents are available from AIR TORQUE:

- EU Declaration of Conformity,
- ATEX Directive 2014/34/EU,
- SIL Certification,
- Machine Directive 2006/42/EC,
- IP67 Degree of protection,
- TR CU 012/2011,
- UKCA Certification.



# AIR TORQUE

**AIR TORQUE S.p.A.**  
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Doc. n° EDCHDE

Issued: 10/2021 - Pag: 1/1

## EU / UK DECLARATION OF CONFORMITY

In accordance with  
**Machinery Directive 2006/42/EC and U.K. Reg. S.I. 2008 No.1597 (as amended)**  
**Atex Directive 2014/34/EU and U.K. Reg. S.I. 2016 No.1107 (as amended)**  
**Pressure Equipment Directive (PED) 2014/68/EU and U.K. Reg. S.I. 2016 No.1105 (as amended)**  
 We: AIR TORQUE S.p.A. Via dei Livelli di Sopra, 8/11 - 24060 Costa di Mezzate (BG) Italy declare:

### Machinery Directive 2006/42/EC (Art. 13) and U.K. Reg. S.I. 2008 No.1597 (as amended)

#### Declaration of incorporation of the partly completed machine (Annex II part B)

With reference to the Machinery Directive 2006/42/EC (Art. 2 point g) and U.K. Reg. S.I. 2008 No.1597 (as amended) (Part 2 point 6), the pneumatic actuators produced by Air Torque Spa listed below can be classified as "Partly completed machine". We hereby declare that the products specified below meet the basic health and safety requirements.

Before the actuators are put into operation, the machine into which the actuators will be installed, shall fulfill with the requirements of the Directive 2006/42/EC and U.K. Reg. S.I. 2008 No.1597 (as amended).

The essential requirements are applied in compliance with the following points of the Machinery Directive and U.K. Regulation:

1.1.3, 1.1.5, 1.2.1, 1.3.2, 1.3.4, 1.3.7, 1.3.8, 1.3.8.1, 1.4.1, 1.4.2.1, 1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.7, 1.5.8, 1.6.1, 1.7.2, 1.7.3, 1.7.4

**Description of the product line:** Pneumatic/Hydraulic actuators AIR TORQUE AT-HD Series

**Type:** Double acting "D" and Spring return "S".

**Actuator models:** AT-HD series

**Serial number:** Each Air Torque actuator has a serial number for traceability.

For the use, installation and maintenance of the actuators described above, see the related manual instructions.

### Atex Directive 2014/34/EU and U.K. Reg. S.I. 2016 No.1107 (as amended)

The pneumatic actuators produced by Air Torque Spa (AT-HD Series) are designed, produced and classified according to Atex Directive 2014/34/EU and U.K. Reg. S.I. 2016 No.1107 (as amended), (see actuator label and safety instructions); their use in areas with potentially explosive atmosphere is subject to the classification indicated on the label and in compliance with the relevant ATEX safety instructions.

#### Product marking (AT-HD Series)

Execution L, S

Execution H

Group I (Mine) UK CA CE Ex I M2 Ex h I Mb X  
 Group IIB (Gas) UK CA CE Ex II 2 G Ex h IIB T6 ... T5 Gb X  
 Group IIIC (Dust) UK CA CE Ex II 2 D Ex h IIIC T85°C ... T95°C Db X

Group I (Mine) UK CA CE Ex I M2 Ex h I Mb X  
 Group IIB (Gas) UK CA CE Ex II 2 G Ex h IIB T6 ... T3 Gb X  
 Group IIIC (Dust) UK CA CE Ex II 2 D Ex h IIIC T85°C ... T165°C Db X

Group I (Mine) UK CA CE Ex I M2 Ex h I Mb X  
 Group IIC (Gas) UK CA CE Ex II 2 G Ex h IIC T6 ... T5 Gb X  
 Group IIIC (Dust) UK CA CE Ex II 2 D Ex h IIIC T85°C ... T95°C Db X

Group I (Mine) UK CA CE Ex I M2 Ex h I Mb X  
 Group IIC (Gas) UK CA CE Ex II 2 G Ex h IIC T6 ... T3 Gb X  
 Group IIIC (Dust) UK CA CE Ex II 2 D Ex h IIIC T85°C ... T165°C Db X

Compliance has been verified on the basis of the requirements of the standards or normative documents indicated below:

EN 1127-1:2019  
 EN 80079-36:2016

EN 15714-3:2009  
 EN 80079-37:2016

EN 15714-4:2009

Technical file: **ATX19AT-HD**  
 Technical file: **UKX21AT-HD**

Notified body (EU): **INERIS (0080)**  
 Approved body (UK): **EUROFINS E&E CML Limited (2503)**

### Pressure equipment directive (PED) 2014/68/EU and U.K. Reg. S.I. 2016 No.1105 (as amended)

Unless otherwise specified, the power cylinders of the pneumatic actuators AT-HD Series produced by AIR TORQUE S.p.A. are designed according to the criteria of Article 1 paragraph 2. j) ii) and they are suitable to be operated with Group 2 and Group 1 fluids provided that the fluids are compatible with internal parts.

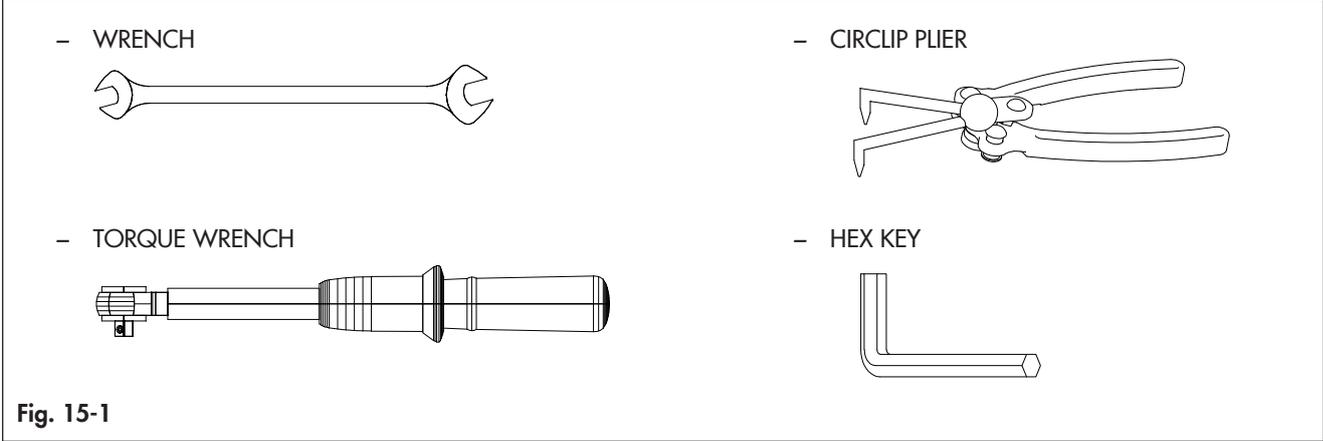
Therefore, according to Article 1 paragraph 2. j) ii) of the 2014/68/EU directive and Part 1, section 4, schedule 1, paragraph 1. j) ii) of U.K. Regulation S.I. 2016 No. 1105 (as amended), the power cylinders are not to be considered as pressure equipment. Only under customer request, the power modules can be designed, produced and certified according to Module H of the pressure Equipment directive 2014/68/EU or UK Regulation S.I. 2016 No. 1105 (as amended).

Signed:  
 Name: *A. Marinoni*  
 Position: Managing Director | Design and Quality Manager  
 AIR TORQUE S.p.A. - Italy

# 15 Annex

## 15.1 Tools

### 15.1.1 Tools list



### 15.1.2 Tools dimensions

Table 15-1: Wrench size (mm)

ACTUATOR MODEL	POWER MODULE				CENTRAL MODULE					SPRING MODULE
	AW02	AW03	AW06	AW21	CW08	CW09	CW20	C036	C037	MW02
AT-HD 065	36	24	21 / 24	-	16	36	10	-	-	24
AT-HD 085	36	24	21 / 24	-	13	41	16	17	50	24
AT-HD 100	55	30	21 / 24 / 30	-	13	-	16	17	50	30
AT-HD 130	55	30	21 / 24 / 30	24	16	-	16	24	55	30
AT-HD 160	-	50	24 / 30	24	24	-	16	27	60	50
AT-HD 200	-	50	24 / 30	30/36	24	-	16	32	70	50

Table 15-2: Hex key size (mm)

ACTUATOR MODEL	POWER MODULE		CENTRAL MODULE		
	AW07	AW19	CW07	CW12	CW32
AT-HD 065	12	6	4	5	3
AT-HD 085	12/14				
AT-HD 100	12/14/17				
AT-HD 130	12/14/17	8	4	5	3
AT-HD 160	14/17				
AT-HD 200	14/17				

## 15.2 Tightening torques and sequences

- 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 15-3:** Tightening torques

PART NUMBER	MATERIAL	THREAD	TIGHTENING TORQUE (Nm)
AW02 	A2-70 Stainless steel	M24	400 ÷ 420
		M36	780 ÷ 800
AW03 	Grade 8.8, A4-80 Stainless steel or ASTM A320 grade L7	M16	100 ÷ 105
		M20	200 ÷ 210
		M33	800 ÷ 840
AW06 	A2-70 Stainless steel or A4-80 Stainless steel	M14	55 ÷ 60
		M16	100 ÷ 105
		M20	170 ÷ 180
AW07 	A2-70 Stainless steel or A4-80 Stainless steel	M14	55 ÷ 60
		M16	100 ÷ 105
		M20	170 ÷ 180
AW19 	A2-70 Stainless steel	M8	15 ÷ 16
		M10	25 ÷ 30
AW21 	ASTM A320 grade L7	M16	140 ÷ 147
		M20	280 ÷ 294
		M24	470 ÷ 494
CW08 	A2-70 Stainless steel	M08	15 ÷ 16
		M10	25 ÷ 30
		M16	100 ÷ 105
CW20 	A2-70 Stainless steel	M8	15 ÷ 16
		M10	25 ÷ 30
		M16	100 ÷ 105
MW03 	Grade 8.8, A4-80 Stainless steel or ASTM A320 grade L7	M16	100 ÷ 105
		M20	200 ÷ 210
		M33	800 ÷ 840

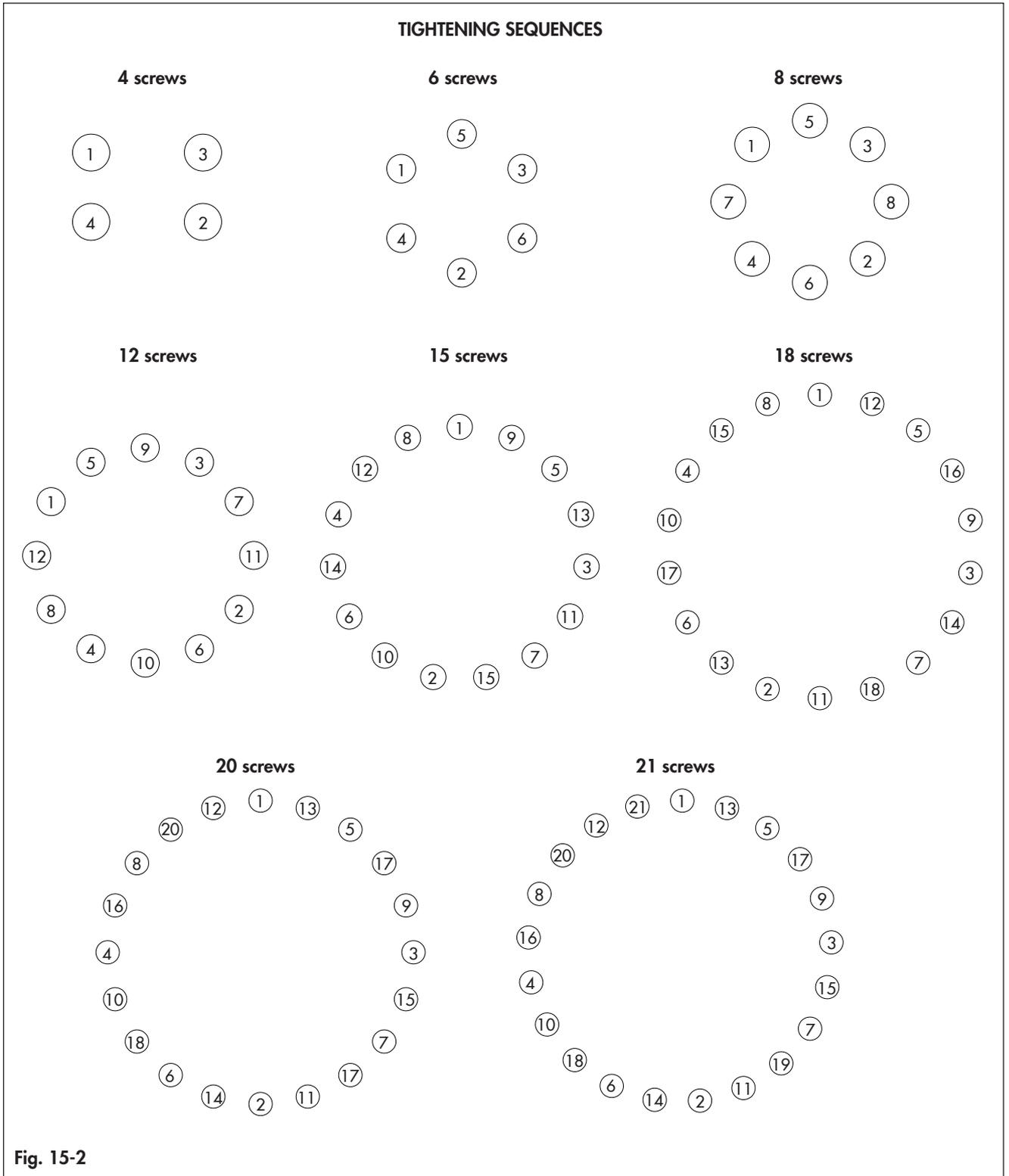


Fig. 15-2

### 15.3 Lubricants

The AT-HD actuators are factory lubricated for the life of the actuator in normal working conditions.

→ Refer to the data sheet HD50900E for lubricant type in relation to the different working temperature ranges.

### 15.4 Threadlocker

The recommended threadlocker types for AT-HD the actuators are:

- Loxeal 83•21 or equivalent,
- Loxeal 55•03 or equivalent.









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