

Pneumatic cylinder actuators

GAAXH03-BC17

Installation, maintenance and
operating instructions

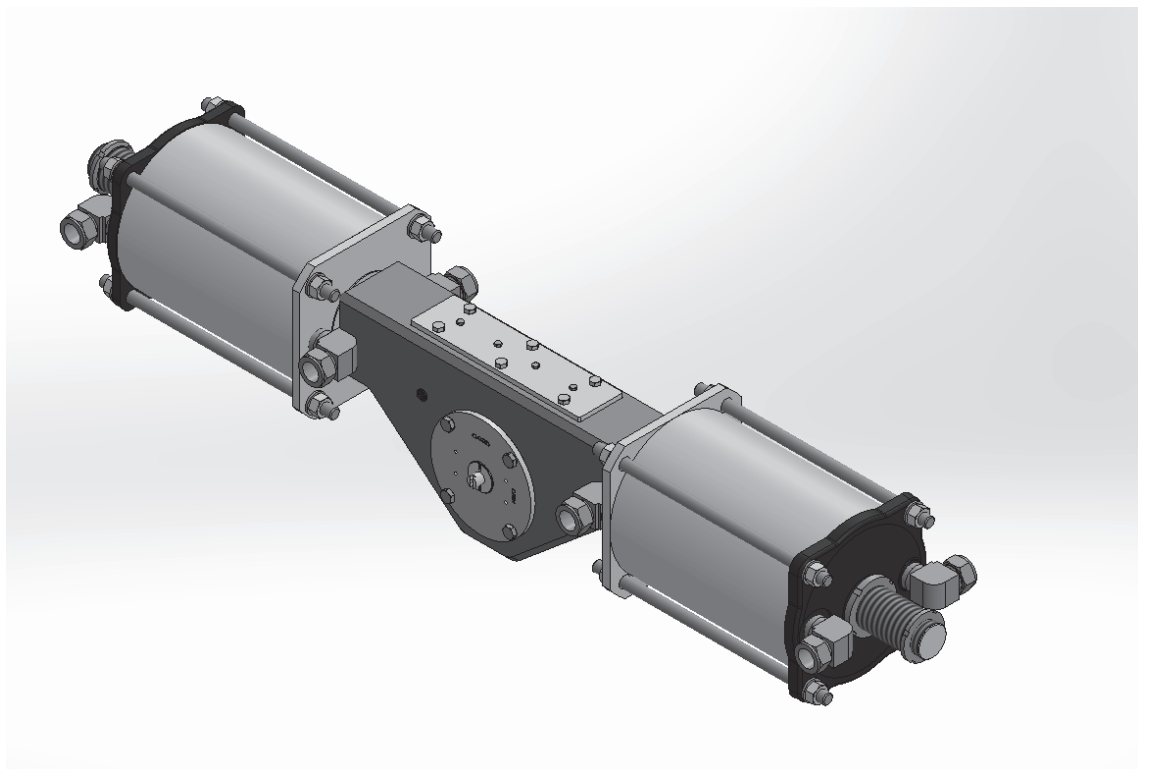


Table of Contents

GENERAL	3	MAINTENANCE	6
Scope of the manual	3	Maintenance general	6
Structure and operation	3	Replacement of piston seals	6
Actuator markings	4	MALFUNCTIONS	7
Specifications (see page 11)	4	TOOLS	7
Recycling and disposal	4	ORDERING SPARE PARTS	8
Safety precautions	4	EXPLODED VIEWS AND PARTS LISTS	9
TRANSPORTATION, RECEPTION AND STORAGE	5	Actuators GAAXH03_BC17	9
MOUNTING AND DEMOUNTING	5	DIMENSIONS AND WEIGHTS	10
Actuator gas supply	5	Actuator GAAXH03-BC17	10
Mounting the actuator on the valve	5	TYPE CODE	11
Demounting the actuator from the valve	5		

READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the actuator.
If you require additional assistance, please contact the manufacturer or manufacturer's representative.
Addresses and phone numbers are printed on the back cover.

SAVE THESE INSTRUCTIONS!

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This product meets the requirements set by the Customs Union of the Republic of Belarus,
the Republic of Kazakhstan and the Russian Federation.

1 GENERAL

1.1 Scope of the manual

These instructions provide essential information for the use of Neles™ GAAXH03-BC17 series actuators. For more details about valves, positioners and accessories, refer to the separate installation, operating and maintenance instructions of the particular unit.

1.2 Structure and operation

The GAAXH03-BC17 series actuators are pneumatic cylinder actuators designed for control and shut-off service.

The linkage mechanism is rack and pinion type. The robust cast-iron housing efficiently protects the mechanism from ambient dust and moisture.

The mounting face dimensions of the GAAXH03-BC17 actuator comply with the ISO 5211 standard.

The linkage converts the linear motion of the piston into rotation by the actuator shaft. The torque output is constant through the operation range.

Stop screws are located in the cylinder ends to regulate the length of the piston stroke and also the rotation angle of the actuator shaft.

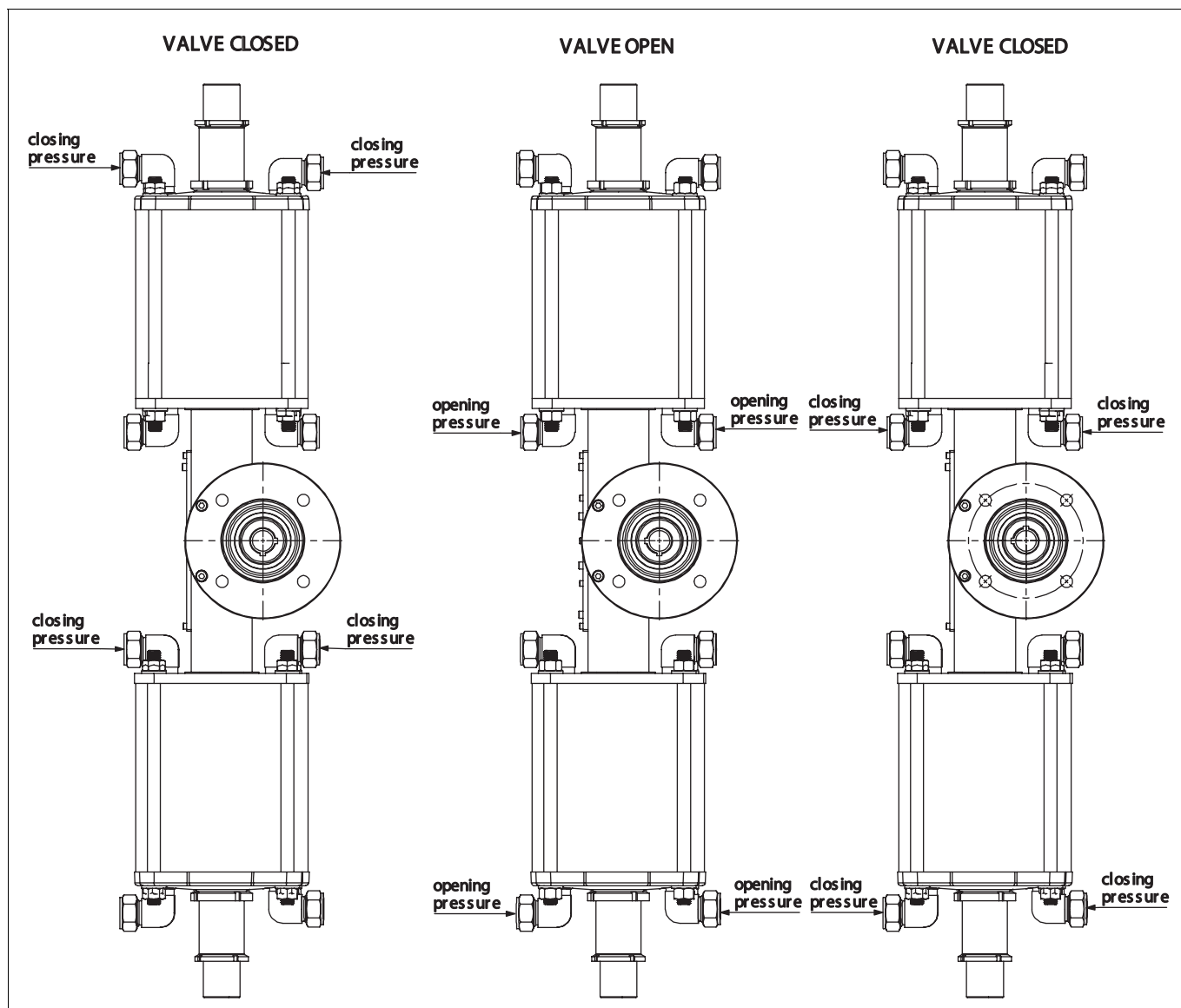


Fig. 1 Operating principle of the actuator

1.3 Actuator markings

The actuator is provided with an identification plate, see Fig. 2.
Identification plate markings are:

1. Type
2. Manufacturing site, date, successive no. (bar code)
3. SO number or ID number (bar code)
4. Checked by
5. Max. supply pressure
6. ATEX category and protection level

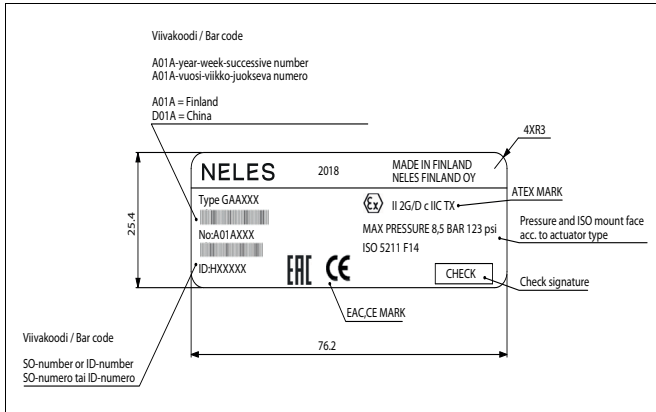


Fig. 2 ID plate.

1.4 Specifications (see page 11)

Protection class: IP66, NEMA 4X
 Ambient temperatures: -20° to 70 °C / -4° to 160 °F
 Standard design
 Maximum supply pressure:
 GAAXH03-BC17 8.5 bar / 120 psi
 Stroke volume, dm³ / in³
 GAAXH03-BC17 11.1 / 675
 Nominal torque, Nm / lbf ft (at max. supply pressure):
 GAAXH03-BC17 2669 / 1970
 Weight:
 GAAXH03-BC17 150 kg / 330 lbs
 NB. The torque changes according to supply pressure.

1.5 Recycling and disposal

Most actuator parts can be recycled if sorted according to material.
 Most parts have material marking. A material list is supplied with the actuator. In addition, separate recycling and disposal instructions are available from the manufacturer. An actuator can also be returned to the manufacturer for recycling and disposal against a fee.

1.6 Safety precautions

CAUTION:

Don't exceed the permitted values!

Exceeding the permitted pressure value marked on the actuator may cause damage and lead to uncontrolled pressure release in the worst case. Damage to the equipment and personal injury may result.

CAUTION:

Don't dismantle a pressurized actuator!

Dismantling a pressurized actuator leads to uncontrolled pressure release. Shut off the supply pressure and release pressure from the cylinder before dismantling the actuator. Otherwise, personal injury and damage to equipment may result.

CAUTION:

Beware of the cutting movement of the valve!

Hands, other parts of the body, tools or other objects must not be pushed into the valve's flow port while it is open. Also prevent foreign objects from entering the pipes. The valves function like a cutter while operating. Shut off and detach the supply of compressed air to the actuator during maintenance. Otherwise, personal injury or damage to the equipment may result.

CAUTION:

Don't use the lever in the torsion arm for manual operation when the actuator is pressurized!

Shut off the supply pressure and release pressure from the cylinder before using the hand lever. Note also the dynamic torque caused by the pipe flow. Otherwise, personal injury and damage to equipment may result.

CAUTION:

Don't leave the lever in the torsion arm after manual operation!

Leaving the lever in the torsion arm can cause personal injury or damage to the equipment.

CAUTION:

Take the weight of the actuator or valve combination into account when handling it!

Do not lift the valve combination from the actuator, positioner, limit switch or their piping. Lift the actuator as directed in Section 2, lifting ropes for a valve combination should be fastened around it. The weights are shown in Section 9. Dropping may result in personal injury or damage to the equipment.

CAUTION:

Potential electrostatic charging hazard, do not rub surface with dry cloth.

2 TRANSPORTATION, RECEPTION AND STORAGE

Check the actuator and the accompanying devices for any damage that may have occurred during transport. Store the actuator carefully before installation, preferably indoors in a dry place. Do not take the actuator to the intended location and do not remove protection plugs from the pipe connections until the actuator is installed.

Lift the actuator according to Figure 4:

Horizontally from the stop screws, vertically from a lifting eyebolt which has been fitted instead of the stop screw. Do not use eye-bolts for double cylinder actuators. See Section 9 for weights.

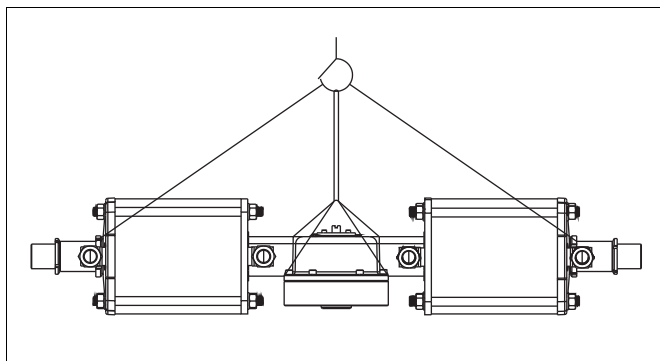


Fig. 3 Lifting the actuator

3 MOUNTING AND DEMOUNTING

3.1 Actuator gas supply

Dry compressed air or natural gas can be used in double-acting cylinder actuators; an oil spray is not needed. Clean, dry and oil-free compressed air must be used in cylinder actuators equipped with a positioner. The air inlets are shown in the dimensional drawing in Section 9. The maximum permitted supply pressure is indicated on the identification plate. See also Section 1.4.

3.2 Mounting the actuator on the valve

CAUTION:

Take the weight of the actuator or valve combination into account when handling it!

CAUTION:

Beware of the cutting movement of the valve!

Install the actuator so that the shaft of the valve or any other device to be actuated goes into the shaft bore of the actuator. If the bore is larger than the shaft diameter, use a keyed shaft adapter sleeve or bushing. There are two keyway slots in the shaft bore of the actuator at an angle of 90°. These allow the installation position of the actuator to be changed in relation to the valve. Neles valves have a bevel at the end of their shafts to facilitate installation.

The installation position can be chosen freely, although Neles recommends one in which the cylinder is vertical. This is the best way to protect the actuator from impurities in the supply air or damage caused by water.

When you change the position of the actuator make certain the indicator arrow has been turned to a position corresponding to that of the valve.

When necessary, lubricate the shaft bore and bushing with Cortec VCI 369 or an equivalent anti-corrosive agent to prevent it from jamming due to rust.

The actuator must not touch the pipeline, because pipeline vibration may damage it or interfere with its operation.

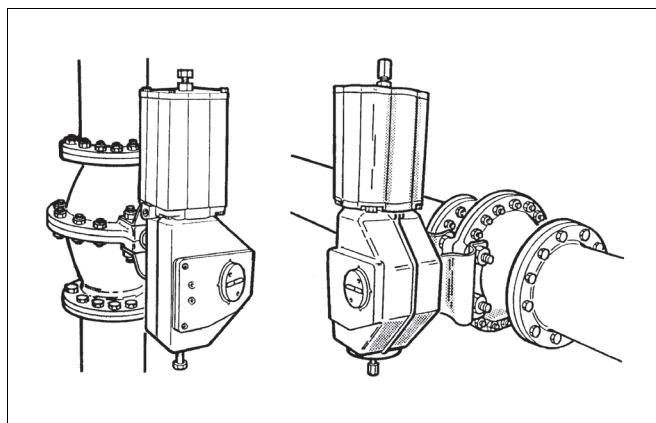


Fig. 4 Ways to install the actuator

In some cases, for instance when the actuator is exceptionally large, the valve has an extended stem or when there is lot of piping vibration, it may be advisable to support the actuator. Contact Neles for more instructions.

There are two adjustable stop screws (adapter 33A) in the actuator; these stop the movement of the secondary shaft in the extreme positions. For some valves, e.g. butterfly valve, the closing torque and position is accurate. The stop screw at the cylinder end has to be adjusted according to right instructions, see separate valve specific instructions for more detailed information. A thread sealant is used for sealing the stop screw in the cylinder end. See also the instructions of the valve.

3.3 Demounting the actuator from the valve

CAUTION:

Take the weight of the actuator or valve combination into account when handling it!

CAUTION:

Beware of the cutting movement of the valve!

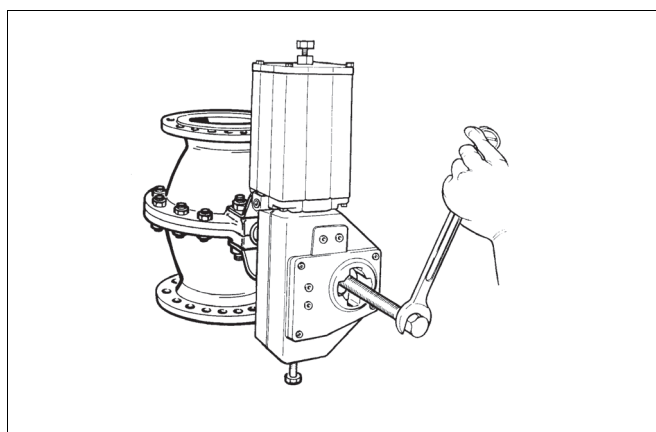


Fig. 5 Removing the actuator with the extractor

The actuator must be depressurized and the supply air pipes disconnected. Unscrew the actuator-side screws of the bracket and pull the actuator off the valve shaft. This is best done using a specific extractor, see Fig. 5 and Section 6. Note the mutual positioning of the valve and the actuator to ensure correct functioning after reassembly.

4 MAINTENANCE

4.1 Maintenance general

CAUTION:

Observe the safety precautions mentioned in Section 1.6 before maintenance!

Although Neles actuators are designed to work under severe conditions, proper preventative maintenance can significantly help to prevent unplanned downtime and in real terms reduce the total cost of ownership. Neles recommends inspecting the actuators at least every five (5) years.

The inspection and maintenance interval depends on the actual application and process condition. The inspection and maintenance intervals can be specified together with your local Neles experts.

During this periodic inspection the parts detailed in the Spare Part Set should be replaced. Time in storage should be included in the inspection interval.

Maintenance can be performed as presented below. If maintenance assistance is required, please contact your local Neles office.

The part numbers in the text refer to the exploded view and to the parts list in Section 8, unless otherwise stated.

NOTE:

In order to ensure safe and effective operation, always use original spare parts to make sure that the actuator functions as intended.

NOTE:

When sending goods to the manufacturer for repair, do not disassemble them.

NOTE:

For safety reasons, replace bolting if the threads are damaged, have been heated, stretched or corroded.

4.2 Replacement of piston seals

CAUTION:

Don't dismantle a pressurized actuator!

Replacement of all seals and soft bearings is recommended when the actuator has been disassembled for maintenance.

- Operate the actuator so that the piston goes to the outermost end of the cylinder. Release the pressure from the cylinder.
- Loosen the fastening screws (31b) of the cylinder end (44). Remove cylinder end (44). Loosen the hexagon nut (28) from the piston (9).

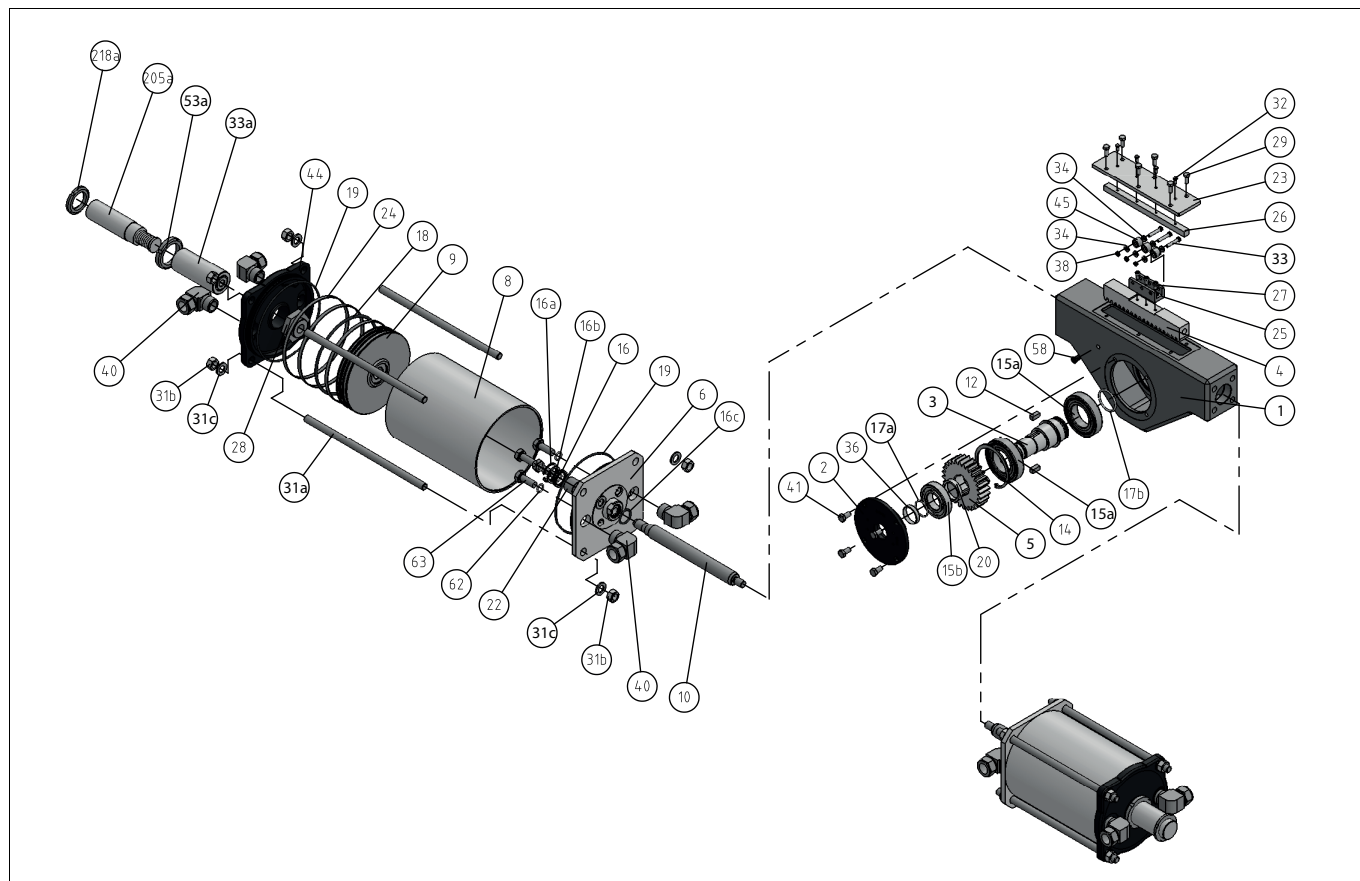


Fig. 6 Exploded view of the actuator GAAXH03_BC17.

- Remove the cylinder pipe (8) and the piston (9).
- Remove the old seals and the O-ring (24, 18, 19).
- Loosen the fastening screws (31b) of the cylinder base (6) and remove studs (31a). See Figure 6.
- Loosen the hexagon screws (63) and remove the cylinder base (44).
- Remove the retainer ring, spacer ring, o-ring and lip-seal (16a, 16b, 16c and 16). Clean the seal space.
- Lubricate the seal space and the new O-ring with Unisilikon L250L or equal silicone grease. Install the new bearing and O-ring and lip seal. See Figure 7.

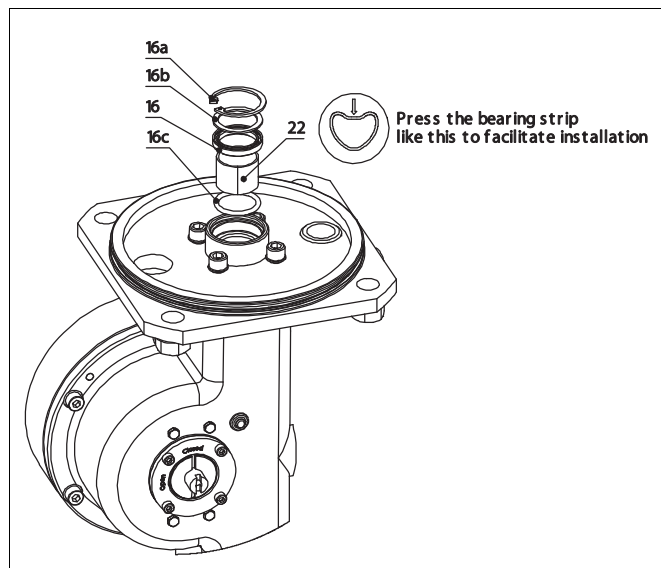


Fig. 7 Mounting the piston rod bearing and seal

- Clean the piston seal groove and lubricate with a thin layer of Cortec VCI 369.
- Place the O-ring (18) under the piston seals.
- Locate the seals (24) around the piston so that the ends of the strips come on opposite sides. Tighten the strips with the tie ring as shown in Figure 8. The strips marked with an asterisk (*) may be cut 1.5-3 mm shorter to facilitate assembly.

NOTE:

The inside surface of the cylinder must be free of any grease!

- Knock or press the piston through the tie ring with a press, Fig. 9.

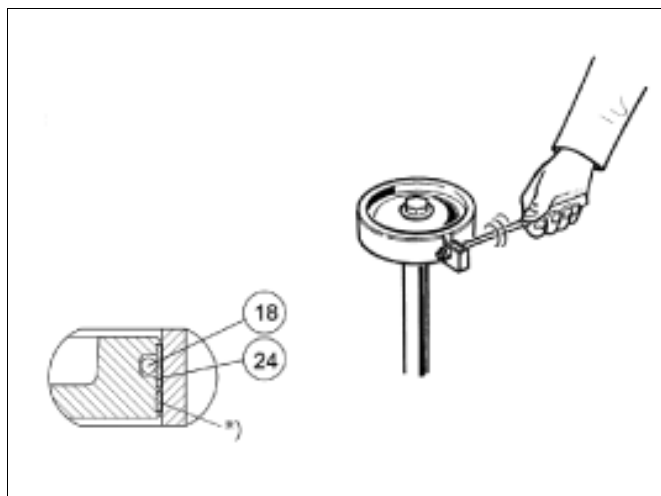


Fig. 8 Tightening piston seals with a tie ring

- Mount the O-ring (19) and the cylinder and piston. Note the location of the air inlet: use the air inlet of the cylinder base as a guide. When re-assembling the cylinder base apply locking

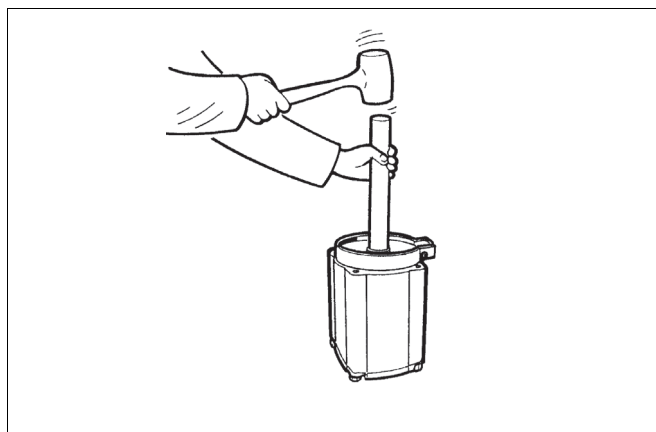


Fig. 9 Placing the piston in the cylinder

sealant e.g. Loctite 225 to the fastening screws (63). Tighten the screws (31b). See Table 1 for torques.

CAUTION:

Keep your fingers, tools or other items out of the housing while operating the actuator with the cover open!

- Check the assembly of the cylinder to the cylinder base and end. Connect the supply air to the cylinder temporarily via a shut-off valve.
- Operate the actuator and check the function of the cylinder. Remove the air supply and release pressure from the cylinder..

Table 1 Tightening torques for screws

Torque, Nm	
Item	31b
Actuator	
B1C 17	80

5 MALFUNCTIONS

Table 4 lists malfunctions that might occur after prolonged use.

6 TOOLS

For maintenance of the actuator, you will need a few special tools in addition to the usual ones. The following can be ordered from the manufacturer:

- For actuator removal:
 - Extractor (Table 2)
- For piston seal installation:
 - Tie ring (Table 3)

Table 2 Extractor tools

Actuator size	Tool ID.
BC 12-17 / BJ 12-16	8546-2

Table 3 Mounting Collars

Actuator size	Tool ID.
BC 17-20 / BJ 12	7814-5

7 ORDERING SPARE PARTS

NOTE:

Use only original spare parts. This ensures proper functioning of the actuator.

When ordering spare parts, always include the following information:

- type code, sales order number, serial number
- number of the parts list, part number, name of the part and quantity required

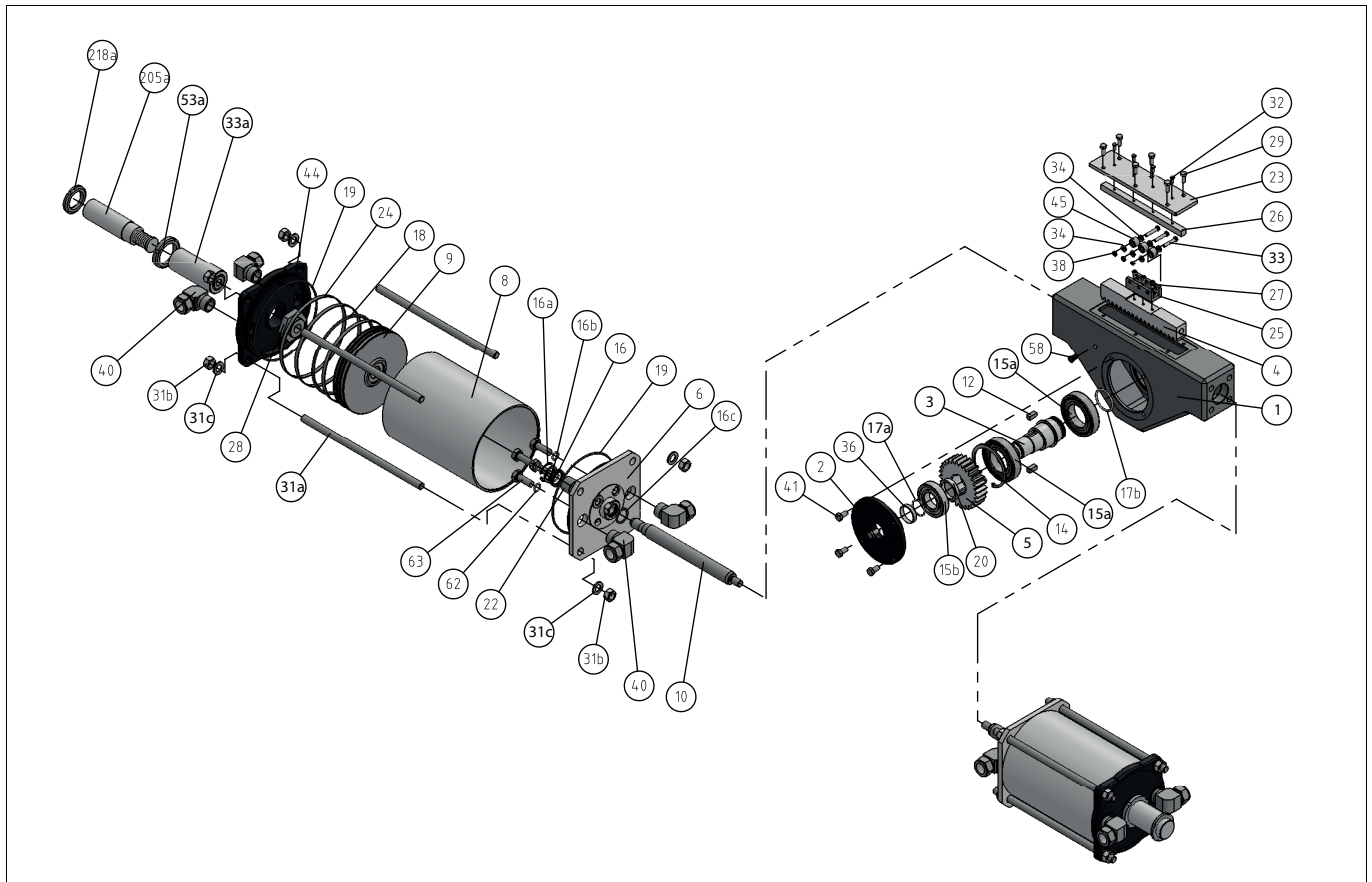
This information can be found from the identification plate or documents.

Table 4 Possible malfunctions

Symptom	Possible cause	Action
Irregular or slow operation	Low supply pressure	Make sure that the supply pressure comply with minimum torque required by valve. Check that the supply air pipes are large enough.
	Positioner malfunction	Check the operation of the positioner.
	Valve malfunction	Check that valve functions properly without actuator.
	Wrong size actuator	Contact the manufacturer for checking the size.
	Leak in piston or piston rod seal	Replace seals, see Section 4.1.
	Cylinder damaged by impurities	Note the installation position recommendation. Cylinder damage always requires replacement.
	Worn-out actuator bearings	Check condition of bearings in accordance with section 4.2. Replace the bearings if necessary. If the frequency of operation is high, the bearings and piston seals should be replaced at regular intervals, max. of 500 000 operations.
	Linkage rusted in difficult damp conditions	Clean the linkage and replace the bearings. Lubricate the housing regularly and apply grease as in section 4.1. If water collects in the housing, bore a hole in the lower part of the housing (ø5 mm).
	The fastening screw in the bearing unit is loose	Tighten screw. Lock with Loctite 225.
	Play in the joint between actuator and valve	Replace necessary parts.
	Backlash of the gear drive	Check the rack (4), gear (5) and support bearing (45), and replace them if needed

8 EXPLODED VIEWS AND PARTS LISTS

8.1 Actuators GAAXH03_BC17

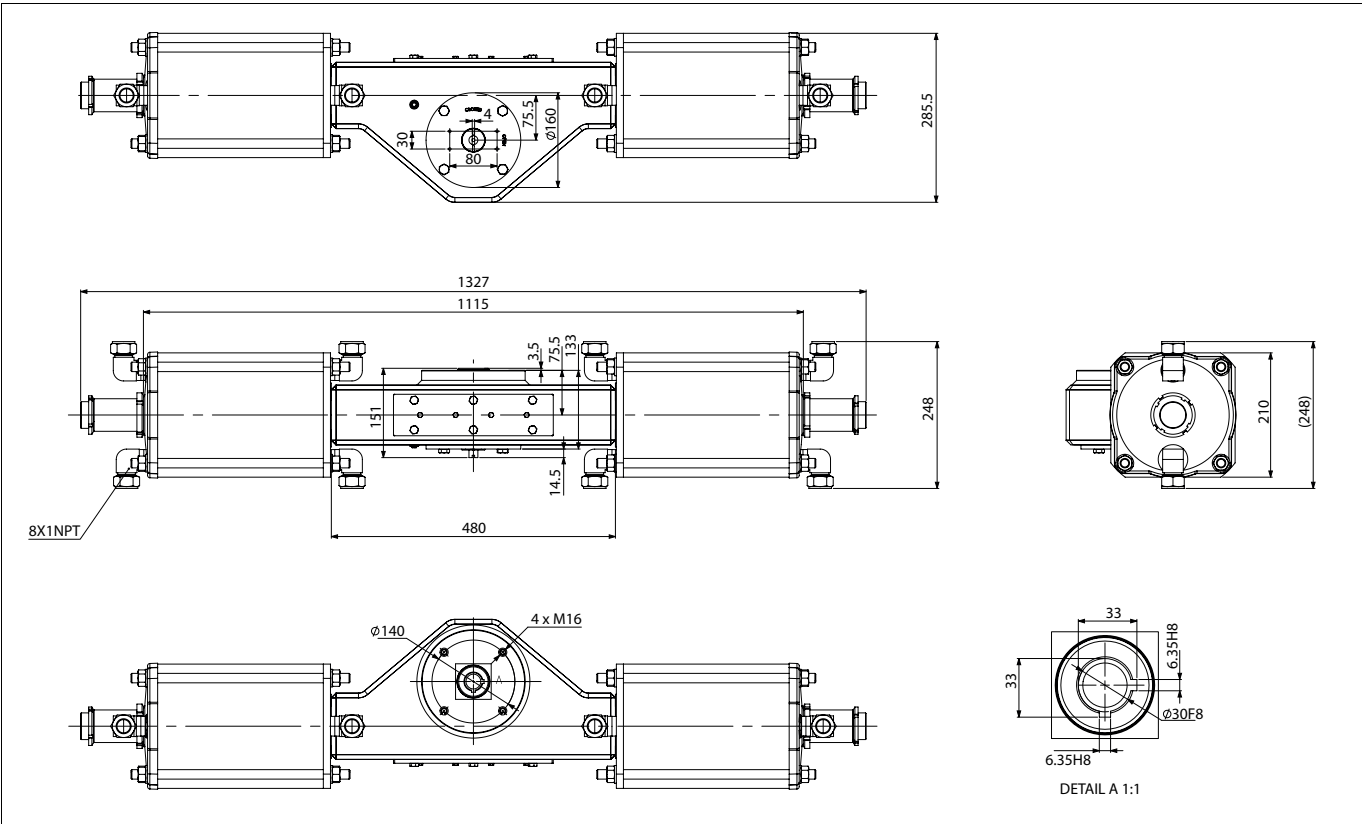


Item	Qty	Description	Material	Spare part category
1	1	HOUSING	CARBON STEEL	3
2	1	COVER	CARBON STEEL	3
3	1	DRIVE SHAFT	STAINLESS STEEL	3
4	1	GEAR RACK	CARBON STEEL	3
5	1	GEAR WHEEL	CARBON STEEL	3
6	2	CYLINDER BASE	CARBON STEEL	3
8	2	CYLINDER PIPE	CARBON STEEL+HCR	3
8a	1	STICKER	PLASTIC	
8b	1	STICKER	PLASTIC	
9	2	PISTON	CAST IRON	3
10	2	PISTON ROD	ASTM A479 gr. XM?19+HCr	3
12	2	KEY	STAINLESS STEEL	3
14	2	RETAINER RING	CARBON STEEL	2
15a	2	BALL BEARING	CARBON STEEL	2
15b	1	BALL BEARING	CARBON STEEL	2
16	2	LIP?SEAL	AISI 301+PTFE+POLYIMIDE	1
16a	2	RETAINER RING	DIN 17222?C67	2
16b	2	SPACER RING	AISI 316	2
16c	2	O?RING	NITRILE, NBR	1
17a	1	O?RING	NITRILE, NBR	1
17b	1	O?RING	NITRILE, NBR	1
18	2	O?RING	NITRILE, NBR	1
19	4	O?RING	NITRILE, NBR	1
20	1	BUSHING	CARBON STEEL	2
22	2	BEARING STRIP	UHMWPE	1
23	1	TOP COVER	EN 10025?S355JO	3

Item	Qty	Description	Material	Spare part category
24	6	PISTON RING	UHMWPE	1
25	2	SUPPORT PLATE	AISI 304	3
26	1	GUIDE RAIL	CARBON STEEL	3
27	3	SOCKET HEAD SCREW	ISO 3506 A4?80	
28	2	TORQUE NUT	ISO 3506 A2?70	
29	6	SOCKET HEAD SCREW	ISO 3506 A4?80	
31	8	STUD	CARBON STEEL+ZINC	
031a	8	STUD	EN 10083?1.7218+ZINC	
031b	16	HEXAGON NUT	ISO 898/2 8+ZINC+PASS.	
32	4	SOCKET HEAD SCREW	ISO 3506 A2?70	
33	3	SHOULDER SCREW	EN 10083?1.1191	2
033a	2	ADAPTER	EN 10025?S355JO	
34	6	BUSHING	AISI 304	2
36	1	PROTECTION BUSHING	DIN 17440?1.4310	3
38	3	HEXAGON NUT	AISI 304	
39	1	IDENTIFICATION PLATE	POLYESTER	
40	8	ELBOW90?PIECE	AISI 316	
41	4	HEXAGON SCREW	ISO 3506 A2?70	
44	2	CYLINDER END	CAST IRON	3
45	3	SUPPORT BEARING	STAINLESS STEEL	2
053a	2	LOCK NUT	EN 10025?S355JO+ENP	
58	1	BREATHER	EPDM	
62	8	O?RING	NITRILE, NBR	
63	8	HEXAGON SCREW	ISO 3506 A2?70	
205a	2	SHOCK ABSORBER		2
218a	2	LOCK NUT	EN 10025?S355JO+ENP	

9 DIMENSIONS AND WEIGHTS

9.1 Actuator GAAXH03-BC17



Actuator type	Cylinder bore mm/inch	Swept volume liters/in3	Maximum shaft bore mm/inch	Maximum operating pressure bar/psi
GAA_B1C17	200/7.87	11.1/675	30/1.18	8.5/120

Actuator type	Torque output Mn Nm?ft?lbs at Specific Supply Pressure bar?psi													
	3.0 bar	43 psi	3.5 bar	50 psi	4 bar	58 psi	5 bar	72 psi	5.5 bar	80 psi	6 bar	87 psi	7 bar	102 psi
	Nm	lbf ft	Nm	lbf ft	Nm	lbf ft	Nm	lbf ft	Nm	lbf ft	Nm	lbf ft	Nm	lbf ft
GAA_B1C17	942	695	1099	811	1256	927	1570	1159	1727	1275	1884	1390	2198	1622

Actuator type	Weight	
	kg	lbs
GAA_B1C17	150	330

10 TYPE CODE

Pneumatic double-acting cylinder actuator, Series GAAXH

HOW TO ORDER

1.	2.	3.	4.	5.	6.	7.
GAA	XH	03	S	-	F14	

1. sign	PRODUCT GROUP
GAA	Rack and pinion type 180 deg heavy duty piston actuator

2. sign	SERIES
XH	Double acting, pneumatic double cylinder actuator

3. sign	ACTUATOR SIZE
03	BC17 (cylinder Ø 200 mm/7.87")

4. sign	CYLINDER MATERIAL
-	Aluminium
S	Carbon Steel cylinder

5. sign	CONSTRUCTION
-	Standard construction without sign
Z	Actuator equipped with shock absorber on both cylinder ends

6. sign	MOUNTING INTERFACE
F14(BC17)	Valve attachment face dimensions acc. to ISO 5211 F14, accessory face VDI/VDE 3845 30x80.

7. sign	SPECIAL CONSTRUCTION
-	Standard construction without sign
Y	Special, to be specified, e.g. special construction or material.

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