Doc. no. CRS-OMA0038-E

Operation Manual

PRODUCT NAME

Air Shocker

MODEL / Series / Product Number

XT316-30(B)～100(B)

SMC Corporation

Contents

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)[*1)], and other safety regulations.

∗1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1:Robots
etc.

Danger	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
Warning	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Caution	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.
Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.
1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.
1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

Safety Instructions

⚠ Caution

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not covered.
Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.
The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.* 2)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Design precautions / Selection

⚠ Warning

(1)Confirm the specifications.

This product is developed, designed and manufactured for use in general industrial machinery. Not designed for the applications such as nuclear power, railroad, aviation, space equipment, ships, vehicles, military, medical equipment, beverage / food equipment, fuel equipment, entertainment equipment, emergency shutoff circuit, safety equipment or circuits where clutches and brakes are pressed etc.

The product is designed for use only in compressed air systems. Do not use fluids other than compressed air. Do not operate at pressures or temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction.

⚠ Caution

(1)Use in low temperature environments.

When using the valve in a low temperature condition, take appropriate measures to avoid freezing of drainage, moisture etc. in low temperature.

(2)Allows sufficient margin in the piping conditions of the tubing.

(3)Prevent the connected tube from being rotated.

If the fittings are used in this way, the fitting is likely to break.

Mounting

⚠ Warning

(1)Mount and operate the product after reading the manual carefully and understanding its contents. Also keep the manual where it can be referred to as necessary.

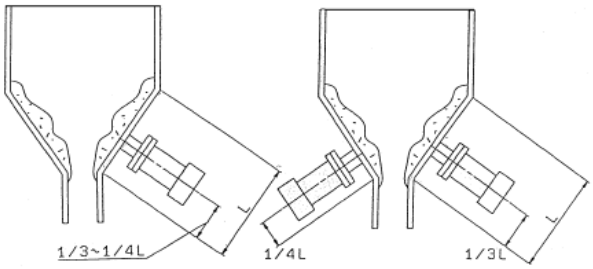
(2)Maintenance space

When installing the products, allow access for maintenance.

(3)Mounting position

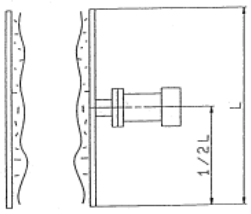
The figure below shows the location of the product(s) on the hopper.

It is possible to mount the product in the position where the hammer was used to hit the hopper to eliminate the clogging.



1 piece is used

2 or more pieces are used. (Mount the products at different heights)



Mounted on the wall

(4)Check the mounting conditions

Make sure that screws and fittings are properly tightened and the piping is not bent or flattened. Connect the compressed air supply to the product and perform appropriate functional and leakage inspections to check it is mounted properly.

(5)Painting of the valve

Models or specifications printed or marked on the product should not be erased, removed or covered up. Do not paint resin parts, as this may have an adverse effect due to the solvent in the paint.

(6)Disassembly and modification is prohibited.

Do not disassemble the product or make any modifications, including additional machining. It may cause injury and/or an accident and will void the warranty.

(7)Please make countermeasures after mounting to prevent falling main body by chain, wire etc.

If mounting bolt is damaged, it can be lead to fall main body.

⚠ Caution

(1)Transportation, installation, piping, wiring, operation, handling, and maintenance should be performed by personnel with sufficient knowledge and experience.

There is a risk of injury.

(2)Do not disassemble or modify the product.

This may cause human injury and/or an accident. Contact SMC for repairs and maintenance of the product.

(3)Do not wipe the product using chemicals.

Piping

⚠ Caution

(1)Before piping

Before piping, perform air blow (flushing) or cleaning to remove any cutting chips, cutting oil, dust, etc. from the piping.

(2)Tube piping

①Check the model, type and size before installation. Also, confirm that there is no scratches, gouges or cracks on the product.

②Allow extra length when connecting a tube to accommodate changes in tube length due to pressure.

③Confirm that no twisting, turning or tensile force or moment load is applied to the fittings or tube. This may cause fittings to fracture or tubes to be crushed, burst or come loose.

④Do not abrade, entangle or scratch the tube. This may cause the tube to be crushed, burst or come loose.

(3)When using tubing brands other than SMC, confirm that the tubing outside diameter tolerances satisfy the following specifications.

①Nylon tubing within ±0.1 mm

②Soft nylon tubing within ±0.1 mm

③Polyurethane tubing within +0.15 mm
within –0.2 mm

Do not use tubing if the outside diameter tolerance is not satisfied. It may not be possible to connect the tubing, or leakage or disconnection may occur after connection. Confirm that no problem will occur in the operating conditions.

(4)Connection of the product

R thread

After hand tightening of the product, apply a spanner of the correct size to the spanner flats of the body, and tighten it for 2 to 3 rotations. Use the tightening torque shown in the table below as a guide.

Tightening Torque for applicable piping

Thread	Number of turns after tightening by hand	Appropriate tightening torque（N･m）
R1/8	2 to 3 turns	3 to 5
R3/8		15 to 20

①Tighten with an appropriate wrench, using the hexagonal face of the fitting.

Use the root nearest the thread when tightening with a wrench. Tightening with a wrench of the wrong size, or too close to the tube side, may cause damage or deformation of the fitting. After mounting, check that the fitting is not damaged or deformed.

Note) Excessive tightening may damage the thread, or deform the gasket, causing air leakage. Sealant may come out. Remove the excess sealant. Insufficient tightening may loosen the thread or cause air leakage.

②Reuse

Normally, the fittings with sealant can be reused 2 to 3 times. Remove loose sealant stuck to the fitting by blowing air over the threaded portion of the fitting before reusing. If the loose sealant enters adjacent machinery, it may cause air leakage or malfunction.

③When sealing effect is lost

Apply sealant tape onto the sealant.

Only use sealant tape, do not use other types of sealant.

④If positioning is required, if the fitting is loosened after it has been tightened, it may cause air leakage.

Air Supply

⚠ Warning

(1)Use clean air.

Do not use compressed air that contains chemicals, organic solvents based synthetic oils, salts or corrosive gases, etc., as this can cause damage or malfunction.

⚠ Caution

(1)Install air filters.

Install air filters close to air shocker on the upstream side. A filtration degree of 40 micrometer or less should be selected.

(2)Install an aftercooler, air dryer or drain catch before the filter.

Compressed air that contains excessive drainage may cause malfunction of air shocker and other pneumatic equipment. Therefore, take appropriate measures to ensure air quality, such as by providing an after cooler, water separator.

(3)If excessive carbon powder is seen, install a mist separator on the upstream side of the air shocker.

If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause malfunction.

(4)Ensure that the fluid and ambient temperature are within the specified range.

For detailed information regarding the quality of the compressed air described above, refer to "SMC's Cleaning Systems".

Operating Environment

⚠ Warning

(1)Do not use in an environment where corrosive gases, chemicals, sea water, water or steam are present.

(2)Do not use in an atmosphere containing flammable or explosive gases. Fire or an explosion can result. The product is not designed to be explosion proof.

(3)Do not operate in a location subject to vibration or impact.

(4)Use a protective cover, etc. to shield the product from direct sunlight.

(5)Shield the product from radiated heat generated by nearby heat sources.

(6)Do not use the fitting in an environment foreign matter may get stuck to or get inside the product.

(7)Employ suitable protective measures in a location where there is contact with water, oil or welding spatter, etc.

⚠ Caution

(1)Avoid using in a location where it could be splashed by liquids such as oils, coolant and water, and dust.

Maintenance

⚠ Warning

(1)Maintenance should be done along with the procedure shown in operating manual.

If handling is wrong, it can cause malfunction and damage of machine or equipment.

(2)Removal of equipment, and supply/exhaust of compressed air.

When equipment is serviced, first confirm that measures are in place to prevent dropping of driven objects and/-or equipment running out of control, etc. Then cut the supply pressure and power, and exhaust all compressed air from the system using its residual pressure release function.

When the equipment is to be started again after remounting, first confirm that measures are in place to prevent lurching of actuators, etc., and then confirm that the equipment can operate normally.

⚠ Caution

(1)Draining

Remove condensate from air filters regularly.

(2)Be sure to wear safety goggles for regular maintenance.

(3)Please check the following points, and replace the parts as necessary.

①Scratches, damage, wear, or corrosion of the tubing

②Air leakage

③Squeezing, kinking or twisting of the tubing

④Hardening or deterioration of the tubing, softness of the tubing

2. Application

Air shocker is a piston type pneumatic shock generator. It is used to solve obstruction which is caused by power of bridge and adhesion at hopper and chute etc.

3. Specifications

Model	XT316-30(B)	XT316-40(B)	XT316-63(B)	XT316-80(B)	XT316-100(B)
Cylinder bore	φ30	φ40	φ63	φ80	φ100
Operating pressure(MPa)	0.4～0.6				
Striking cycle per／min	MAX.15				
Air consumption per／cycle	0.33	0.75	1.29	1.91	4
Striking energy(kgm) *1)	0.05～0.07	0.17～0.31	0.45～0.75	1.0～1.8	2.2～4.0
Weight(kg) *2)	2.5	4.4	11.2	15	33.5
Ambient & fluid temperature	-5～60°C(No freezing)				
Port size	Rc1/8				Rc3/8
Lubrication	Not required				

*1) Change of potential energy which is given to pendulum.

*2) Weight include mounting bases and bolts.

*3) Use the turbine oil class1 (ISO VG32) for lubrication.

4. Dimensions

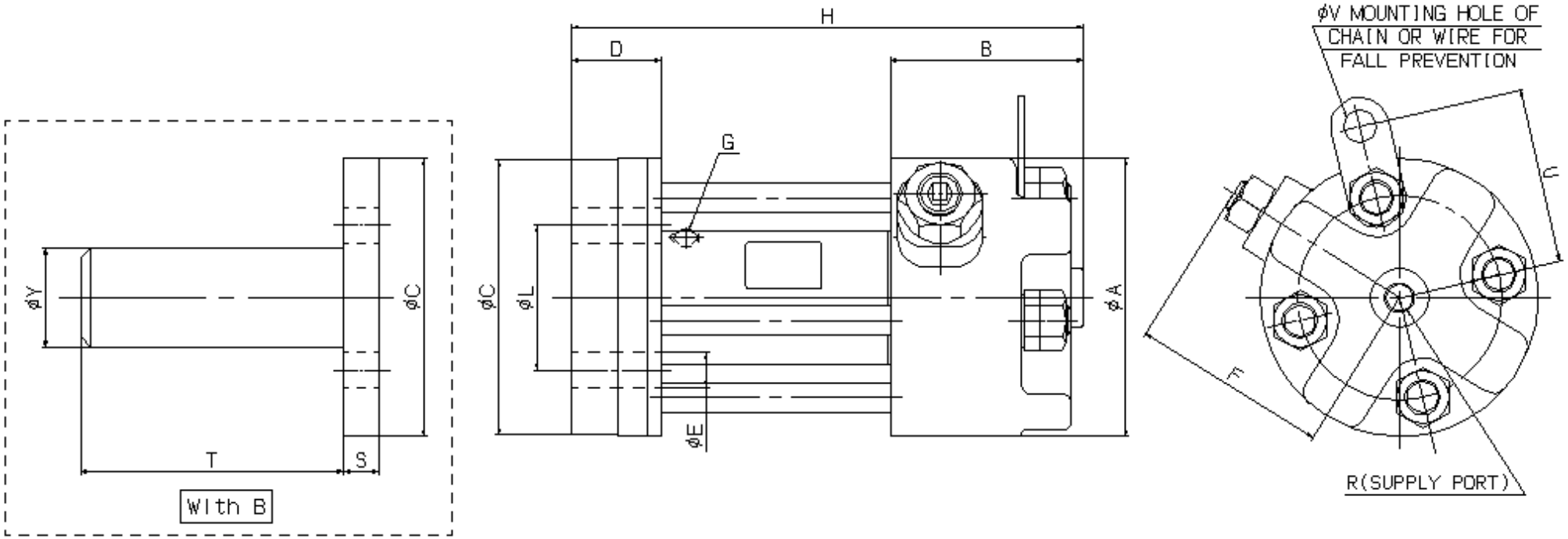
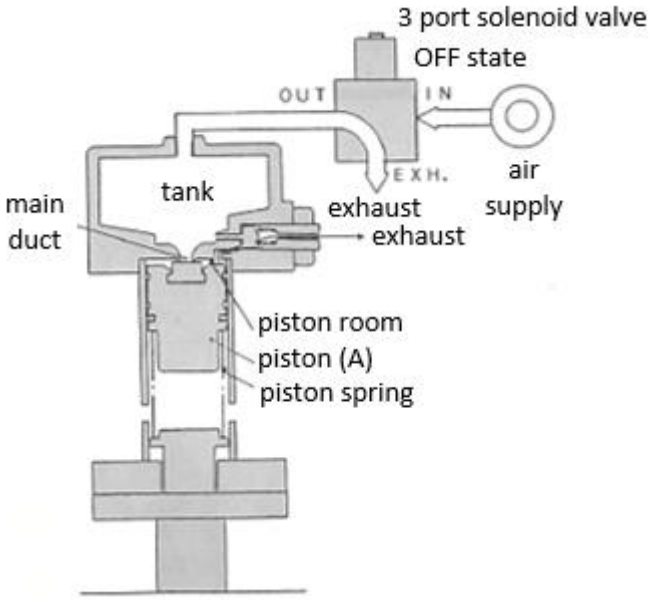


Figure 2

Model	Cylinder bore	φA	B	φC	D	φE	F	G	H	φL	S	T	φY	R	U	φV
XT316-30(B)	φ30	70	51	70	13	9	58	M8×1	134	55	7	41	27.2	1/8	43	8.5
XT316-40(B)	φ40	95	66	95	30.5	13.5	67	M10×1	175	70	12	90	34	1/8	60	11
XT316-63(B)	φ63	140	61	140	31.5	15.5	80	M12×1.5	215	110	12	100	76.3	1/8	80	13
XT316-80(B)	φ80	150	76	150	36	17.5	86	M16×1.5	250	120	14	100	76.3	1/8	90	15
XT316-100(B)	φ100	190	88	210	41	22	105	M20×1.5	306	170	22	145	114.3	3/8	109	17

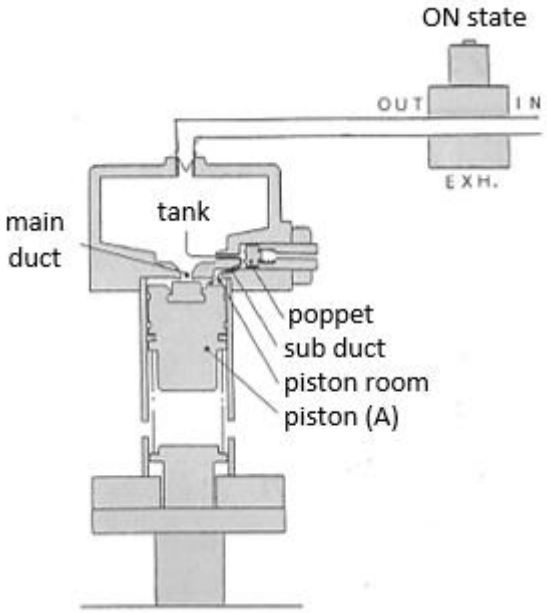
5. Internal constitution / Theory

1）Initial condition



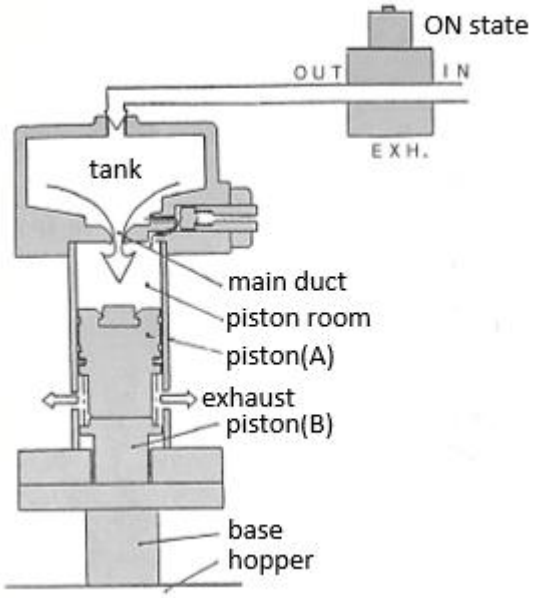
When the solenoid valve is OFF, air pressure of the tank and the piston room is same as atmospheric pressure, piston(A) is fixed by the piston spring, and the main duct is closed.

2）Start of the piston move



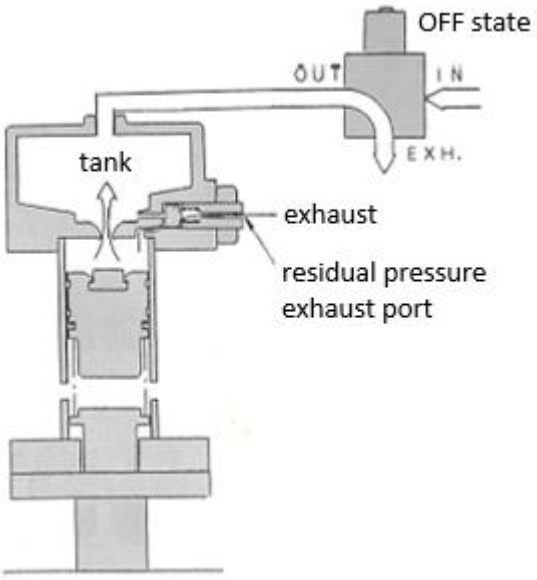
When the solenoid valve is ON, the air flows in the tank. When it achieves prescribed pressure, the poppet opens, the air flows in the piston room through the sub duct, the piston(A) is moved, and the main duct is opened.

3）Striking condition



A large volume of air accumulated in the tank flows in the piston room from the main duct, piston(A) moves in high speed, strikes piston(B) and makes the hopper vibrate.

4）Return



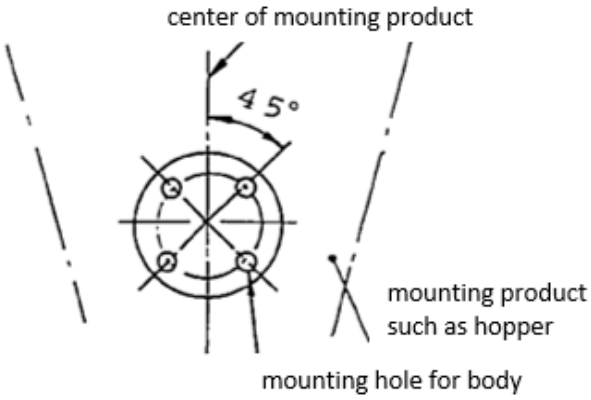
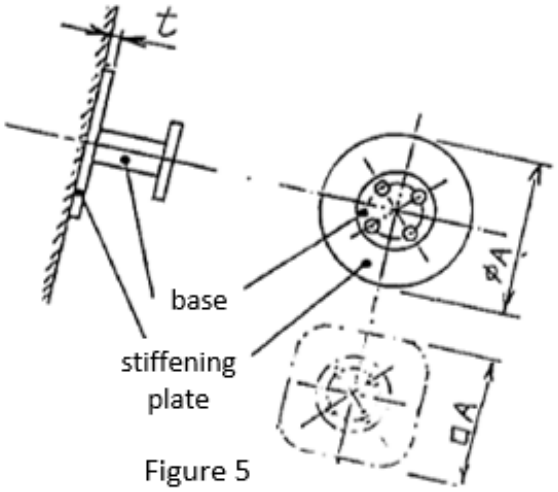
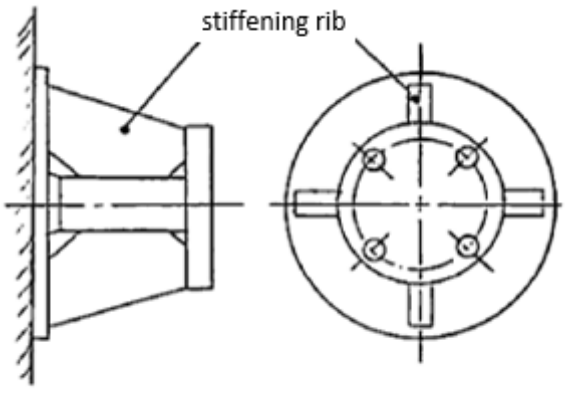
When the solenoid valve is OFF, the air in the tank and the cylinder is exhausted through the exhaust port and the residual pressure exhaust port. And piston(A) returns to the initial condition.

Figure 3

6. Setting

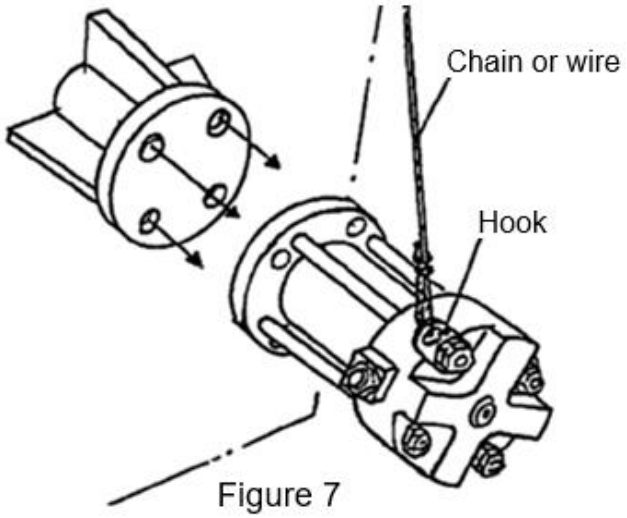
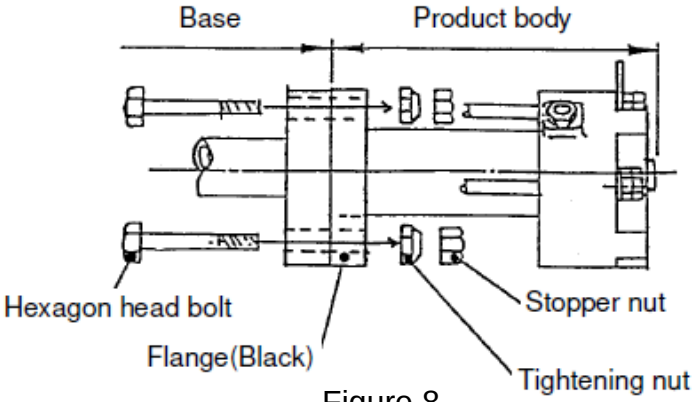
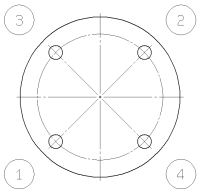
6 - 1 Mounting instruction

1) Base welding

Procedure	Drawing and safety instruction
①Mount the base as direction of figure 4.	 Figure 4
②When the mounting section is thin, install stiffening plate. Weld all its periphery completely since base and stiffening plate receive impact load by repetition of the air shocker. Round stiffening plate is recommended, in case square one is used, take large angle R to reduce stress concentration and deformation.(Figure 5) Weld should not be broken at angle R. Table 1 Size of stiffening plate	 Figure 5
In addition to this stiffening rib is recommended. (Figure 6)	 Figure 6

Model	Φ or □A	Thickness(t)
XT316-30(B)	150	3.2
XT316-40(B)	250	3.2
XT316-63(B)	300	4.5
XT316-80(B)	400	4.5
XT316-100(B)	500	6

2) Body mounting

Procedure	Drawing and safety instruction
①Align the base corresponding mounting holes in the body and direction of the hook should be top.	 Figure 7
②Bolt and hard lock should be mount as following ; A) Insert hexagon bolts to the mounting hole from behind the base, and mount the hard lock tightening nuts by hand tightening through the body flange, cushion, and cushion holder, then increase tightening them by using two spanners listed on Table 2. B) Tighten the stopper nut.	 Figure 8 Note1) To tighten the tightening nuts equally, follow as order of diagonal line. Ex. Tightening order  Note2) To increase tighten tightening nut rotate about 1/2 after tightening by hand. Note3) Stopper nut is to lock. Tighten it very hard, space between tightening nut should be less than 1mm to prevent loosening. Table2 Hard lock nut tightening reference torque
③Apply wire or chain to the hook as figure 7 to prevent it from falling.	

Model	Nut size	Tightening nut (Protruding nut) (N·m)	Stopper nut (Nut with dent) (N·m)
XT316-30(B)	M8	12～14	9～11
XT316-40(B)	M12	37～41	30～33
XT316-63(B)	M14	66～73	53～58
XT316-80(B)	M16	100～110	80～88
XT316-100(B)	M20	190～220	140～160

6 - 2 Connecting instruction

1) Example of piping

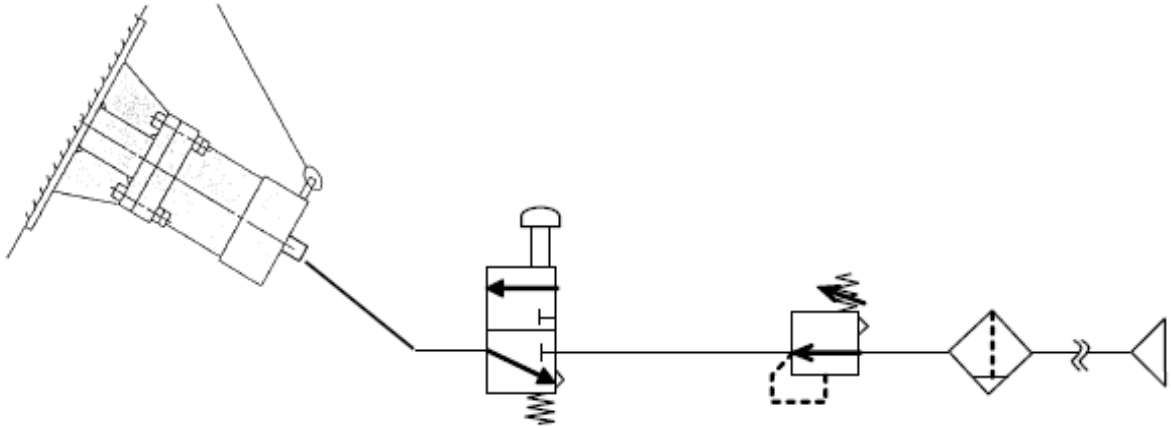


Figure 9

2) Carry out air blowing (flashing) or cleaning enoght before piping and remove chips, cutting oil and dust inside of the tube.

3) In case of inserting tubes and fittings, take care not to get mixed with chips of piping threads and sealant. In case of using seal tape, tape the thread part leaving 1 grooves.

4) The impacts generated by the product may affect the pipe fittings.
Use either self-align or insert fittings.
(SMC product series: H series or HF series)

7. Malfunctions and Countermeasures

Table 3

Fault	Cause	Countermeasure
・No impact force ・Weak impact force	Low air pressure is low	Turn up the pressure
	Short timing of impact force	Adjust timing of impact force
	Loosening of poppet holder or tightening nut	Tighten the poppet holder or tightening nut
	Fault at solenoid valve	Repair or replace solenoid valve
	Sealing failure in poppet sheet or piston sheet by foreign materials	Eliminate foreign materials or check the air source
	Broken piston spring	Replace piston spring
・Looseness of body and base	Not enough tightening at mounting of hard lock	Tighten the hard lock again (See page 12)
・Leakage from breather hole	Adhesion of foreign material on the NLP packing sheet	Eliminate foreign material
	Wearing of NLP packing	Replace NLP packing

8. Maintenance

8 - 1 Replacement parts

Table 4 shows the replacement parts. The next page (page 15) shows the exploded view.
Spare parts kits and replacement parts can be ordered separately. For ordering the individual replacement parts, order them with the part No. or the order code in the brackets (Refer to Table 4).

Table 4 List of spare parts kit / replacement parts

SPARE PARTS KIT	1	2	3	4	5	6	7	8	9	10	11
	POPPET	PISTON SPRING	BASE	"O"RING	"O"RING	"O"RING	NLP PACKING	WEAR RING	HEXAGON HEAD BOLT	HARD LOCKING NUT	SPRING WASHER
	QTY:1	QTY:1	QTY:1	QTY:1	QTY:1	QTY:1	QTY:1	QTY:2	QTY:4 ※φ100 QTY:6	QTY:4 ※φ100 QTY:6	QTY:4 ※φ100 QTY:6
XT316-30B-SP	XT316-4-6-2	XT316-13-6	XT316-13-B	AS568-026 (KA01018)	AS568-029 (KA00415)	P10A (KA00067)	NLP-30A (KB00475)	CM-030-07-303A	M8x35 8.8 (CB00124)	M8 (MD00005)	NOMINAL8 (EC00012)
XT316-40B-SP	XT316-4-6-2	XT316-3-10-2	XT316-4-20-1	AS568-028 (KA00332)	AS568-133 (KA00580)	P12.5 (KA00625)	NLP-40A (KB00484)	C1A040-07-305B	M12x65 8.8 (CB00103)	M12 (MD00002)	NOMINAL12 (EC00004)
XT316-63B-SP	XT316-4-6-2	XT316-11-6	XT316-11-B	AS568-036 (KA00746)	AS568-040 (KA00747)	P12.5 (KA00625)	NLP-63A (KB00490)	C1A063-07-307B	M14x70 8.8 (CB00106)	M14 (MD00003)	NOMINAL14 (EC00005)
XT316-80B-SP	XT316-4-6-2	XT316-14-6	XT316-14-B	AS568-042 (KA00555)	AS568-043 (KA0074B)	P12.5 (KA00625)	NLP-80A (KB00495)	C1A080-07-308B	M16x85 8.8 (CB00107)	M16 (MD00021)	NOMINAL16 (EC00007)
XT316-100B-SP	XT316-4-6-2	XT316-12-6	XT316-12-B	AS568-045 (KA00558)	113.9x109.1x2.4 (KA0033B)	P12.5 (KA00625)	NLP-100A (KB00426)	C1A100-07-309B	M20x100 8.8 (CB00108)	M20 (MD00004)	NOMINAL20 (EC00034)

SPARE PARTS KIT	12	13	14	9	10	11
	HEXAGON SOCKET HEAD CAP SCREW	HARD LOCKING NUT	SPRING WASHER	HEXAGON HEAD BOLT	HARD LOCKING NUT	SPRING WASHER
	QTY:4 ※φ100 QTY:6	QTY:4 ※φ100 QTY:6	QTY:4 ※φ100 QTY:6			
XT316-30B-SP2	M8x130 (CA00906)	M8 (MD00010)	NOMINAL8 (EC00041)			
XT316-40B-SP2	M10x160 (CA00458Y)	M10 (MD00006)	NOMINAL10 (EC00082)			
XT316-63B-SP2	M12x210 (CA00501)	M12 (MD00007)	NOMINAL12 (EC00016)	See above	See above	See above
XT316-80B-SP2	M14x250 (CA00533Y)	M14 (MD00008)	NOMINAL14 (EC00104)			
XT316-100B-SP2	M16x300 (CB00032) ※HEXAGON HEAD BOLT	M14 (MD00009)	NOMINAL16 (EC00024)			

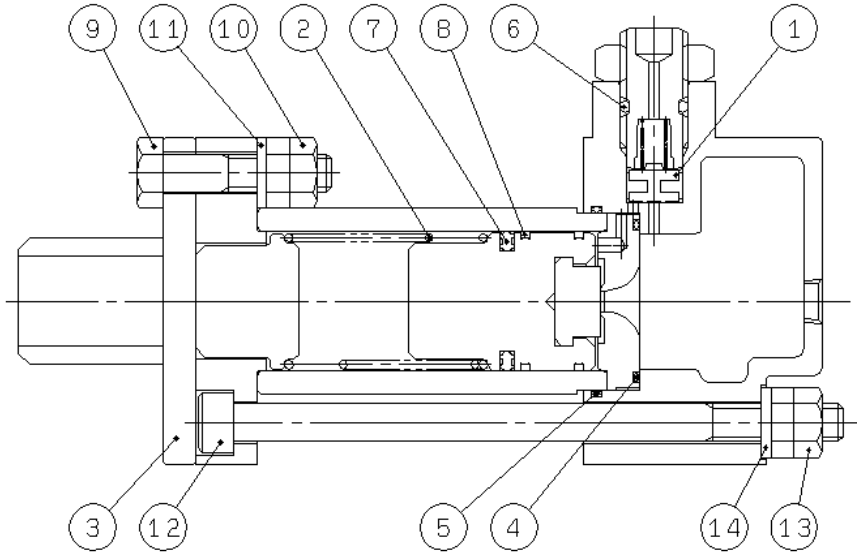
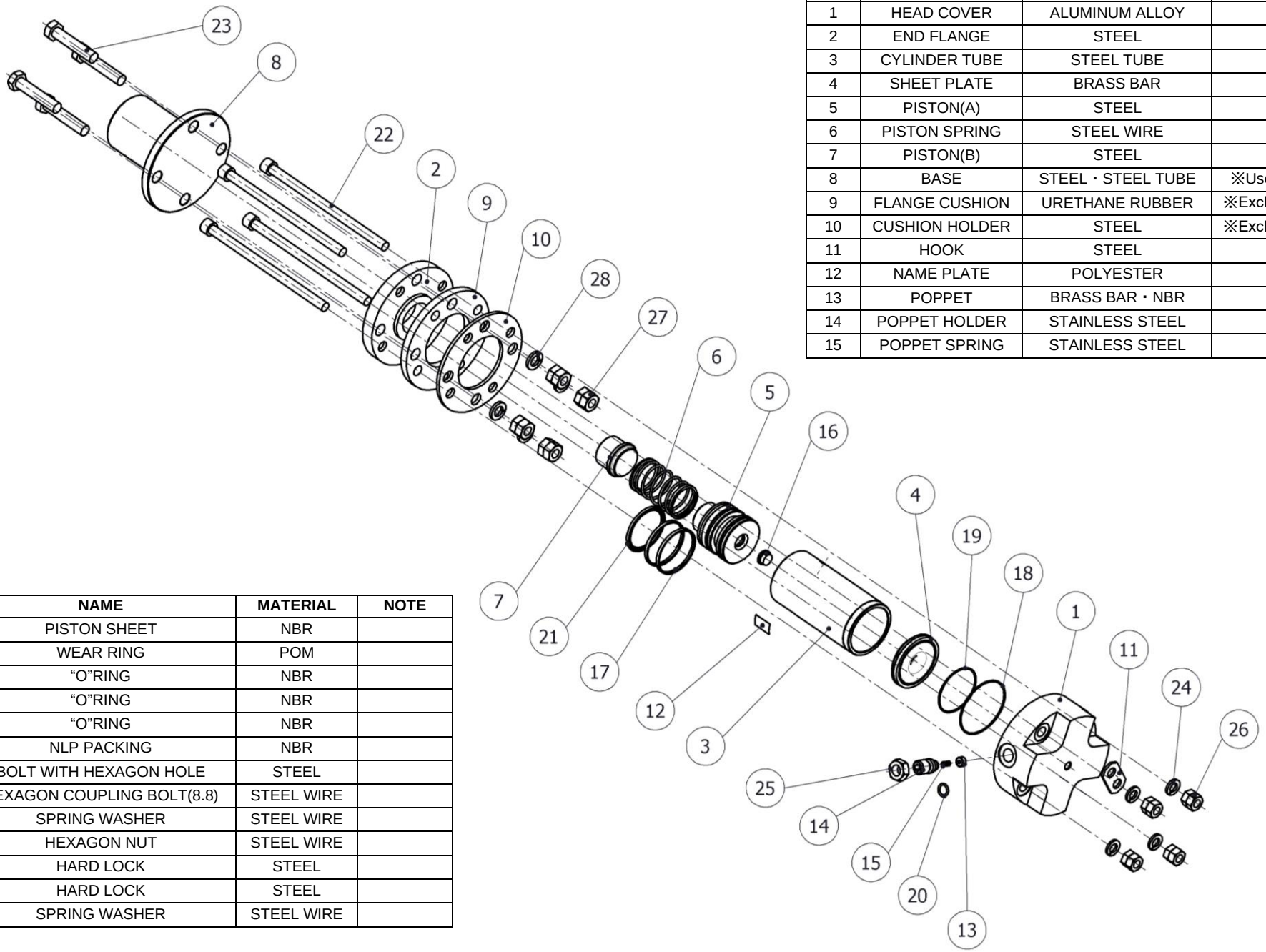


Figure10　Exploded view



NO.	NAME	MATERIAL	NOTE
1	HEAD COVER	ALUMINUM ALLOY	
2	END FLANGE	STEEL	
3	CYLINDER TUBE	STEEL TUBE	
4	SHEET PLATE	BRASS BAR	
5	PISTON(A)	STEEL	
6	PISTON SPRING	STEEL WIRE	
7	PISTON(B)	STEEL	
8	BASE	STEEL・STEEL TUBE	※Used for "B"
9	FLANGE CUSHION	URETHANE RUBBER	※Excluding φ30
10	CUSHION HOLDER	STEEL	※Excluding φ30
11	HOOK	STEEL	
12	NAME PLATE	POLYESTER	
13	POPPET	BRASS BAR・NBR	
14	POPPET HOLDER	STAINLESS STEEL	
15	POPPET SPRING	STAINLESS STEEL	

NO.	NAME	MATERIAL	NOTE
16	PISTON SHEET	NBR	
17	WEAR RING	POM	
18	“O”RING	NBR	
19	“O”RING	NBR	
20	“O”RING	NBR	
21	NLP PACKING	NBR	
22	BOLT WITH HEXAGON HOLE	STEEL	
23	HEXAGON COUPLING BOLT(8.8)	STEEL WIRE	
24	SPRING WASHER	STEEL WIRE	
25	HEXAGON NUT	STEEL WIRE	
26	HARD LOCK	STEEL	
27	HARD LOCK	STEEL	
28	SPRING WASHER	STEEL WIRE	

8 - 2 How to replace

1)Replace the body

⚠ Warning

Before demount the body, please turn off the power which supplies solenoid valve, stop supply air and exhaust compressed air in the system.

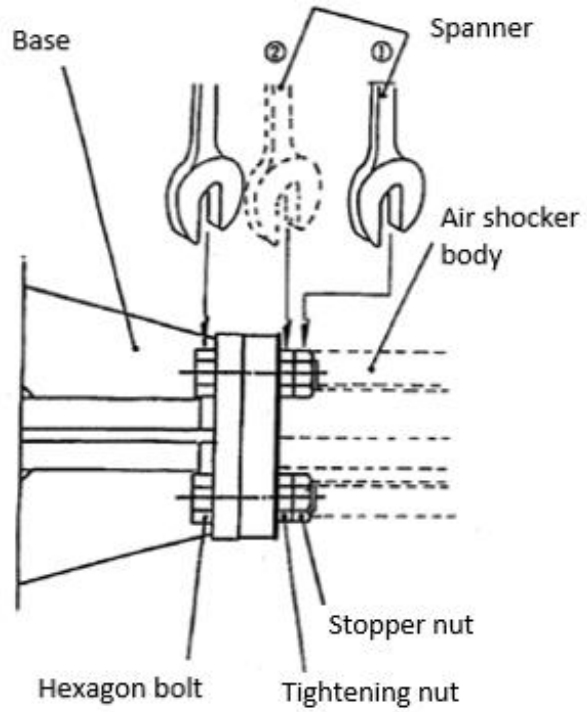
<table>
<tr><th>Procedure</th><th>Caution</th></tr>
<tr><td>Remove
 

Figure 11</td><td>①Use two spanners of table 5 to tighten the hexagon bolts and lock nuts.
②Remove hard lock stopper nuts first, then loosen tightening nuts.

Table 5 Using tool and parts size
<table>
<tr><th>Model</th><th>Using spanner width across flats(mm)</th><th>Hexagon bolt size</th><th>Spring washer size</th><th>Hard lock nut size</th></tr>
<tr><td>XT316-30(B)</td><td>13</td><td>M8×35</td><td>-</td><td>M8</td></tr>
<tr><td>XT316-40(B)</td><td>19</td><td>M12×65</td><td>-</td><td>M12</td></tr>
<tr><td>XT316-63(B)</td><td>22</td><td>M14×70</td><td>Nominal 14</td><td>M14</td></tr>
<tr><td>XT316-80(B)</td><td>24</td><td>M16×85</td><td>-</td><td>M16</td></tr>
<tr><td>XT316-100(B)</td><td>30</td><td>M20×100</td><td>Nominal 20</td><td>M20</td></tr>
</table></td></tr>
<tr><td>Mounting
Refer to page 12 for mounting procedure.</td><td></td></tr>
</table>

2)Replace piston(B), piston spring, NLP packing, wear ring, piston sheet, sheet plate, and O ring

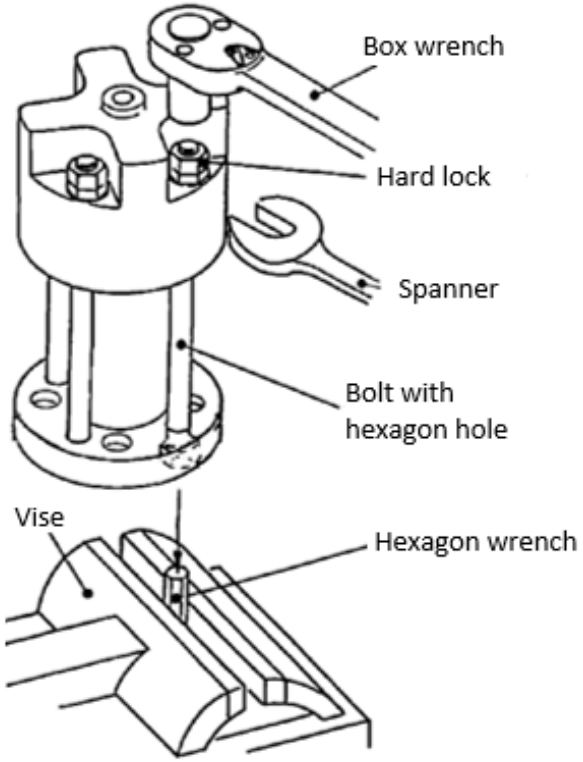
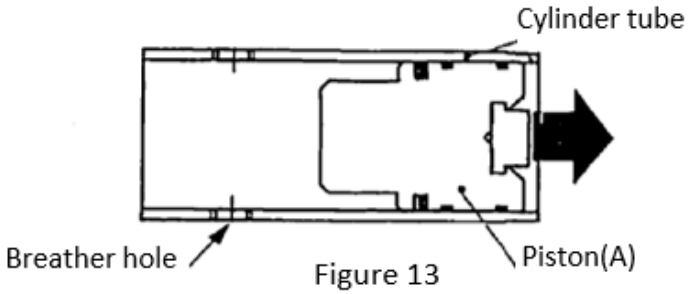
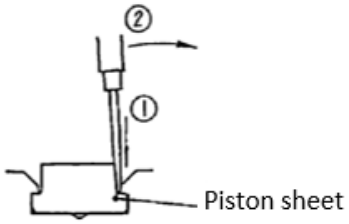
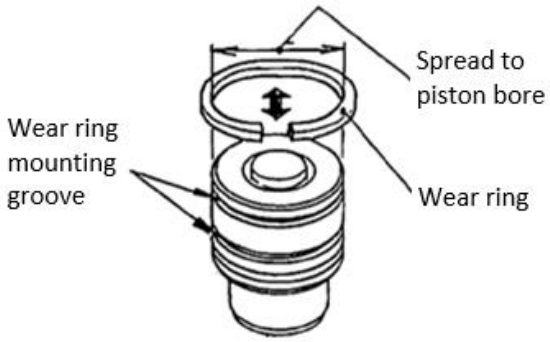
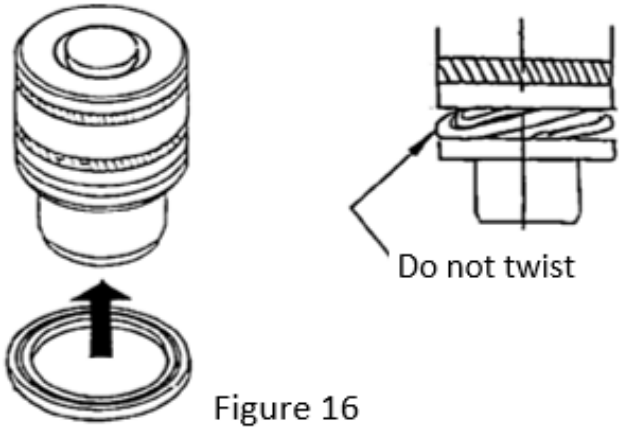
<table>
<tr><th rowspan="4">Disassembly</th><th>No.</th><th>Procedure</th><th>Caution</th></tr>
<tr><td>1</td><td>Tightening hexagon bolts not to rotate, remove hard lock nuts by spanner or box wrench, and pull out all bolts.
(Following is an example of how to tighten the hexagon bolt.)
 

Figure 12</td><td>・Remove hard lock stopper nuts first, then loosen the tightening nuts.
・Loosen tightening nuts in order y facing position.

Table 6 Using tool and parts size
<table>
<tr><th>Model</th><th>Used spanner width across flats (mm)</th><th>Used hexagon wrench across flats (mm)</th><th>Hexagon bolt size</th><th>Hard lock nut size</th></tr>
<tr><td>XT316-30(B)</td><td>13</td><td>6</td><td>M8×130</td><td>M8</td></tr>
<tr><td>XT316-40(B)</td><td>17</td><td>8</td><td>M10×160</td><td>M10</td></tr>
<tr><td>XT316-63(B)</td><td>19</td><td>10</td><td>M12×210</td><td>M12</td></tr>
<tr><td>XT316-80(B)</td><td>22</td><td>12</td><td>M14×250</td><td>M14</td></tr>
<tr><td>XT316-100(B)</td><td>24</td><td>24
(Box wrench)</td><td>M16×300
※Hexagon head bolt</td><td>M16</td></tr>
</table></td></tr>
<tr><td>2</td><td>Replace piston(B) and piston spring.</td><td></td></tr>
<tr><td>3</td><td>Rotate as removing cylinder tube from the head cover.</td><td>Caution for scratching on cylinder tube and head cover.</td></tr>
</table>

	No.	Procedure	Caution
Disassembly	4	Remove piston(A) from the cylinder tube.  Figure 13	Follow the arrow to remove piston(A) so that breather hole of the wear ring or NLP packing is not covered.
	5	Replace piston sheet 1) Remove  2) Insert  Figure 14	Insert minus driver to direction ① then remove the piston sheet with pushing down toward direction ②. Insert a part of piston to the piston sheet hole, and insert gradually with pushing by minus driver to circumference direction.
	6	Replace wear ring  Figure 15	To remove or mount the wear ring, spread it same size with piston bore. The wear ring can be broke if it is spread too much.
	7	Replace NLP packing  Figure 16	・To remove the packing, insert tweezers to packing groove and pull out a part of packing gradually. ・To mount the packing, spread it same size with piston bore and follow the arrow to insert. Be careful not to twist the packing. ・ Apply lithium grease (EX. Mitsubishi oil multi diamond purpose No.2) to the packing when replacing NLP packing and wear ring.

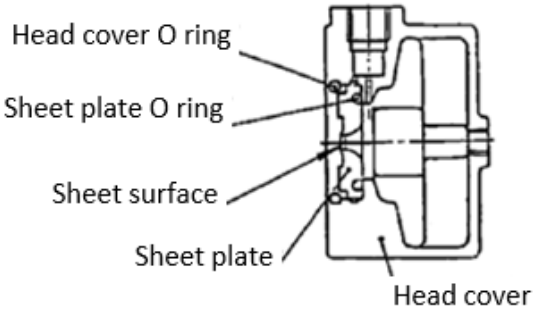
<table>
<tr><th></th><th>No.</th><th>Procedure</th><th>Caution</th></tr>
<tr><td>Disassembly</td><td>8</td><td>Replace head cover O ring and sheet plate.
1) Remove
・Pull out head cover O ring by tweezers.
・Sheet plate O ring is mounted in the sheet plate. Replace after removing the sheet plate.
2) Mount
Reverse of removing procedure. Mount sheet plate O ring on the sheet plate, insert sheet plate, then head cover O ring.
 

Figure 17</td><td>・Remove head cover O ring first, then sheet plate.
・Remove sheet plate with keeping parallel to head cover. If it is not parallel, it will cause scratching.
・Do not scratch or gouge on the sheet surface of sheet plate.

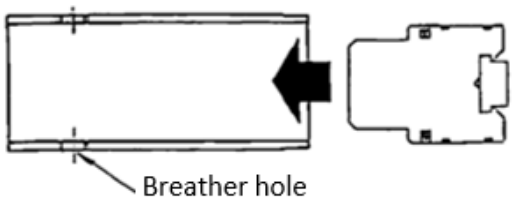
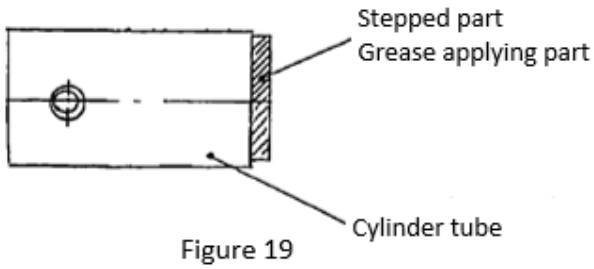
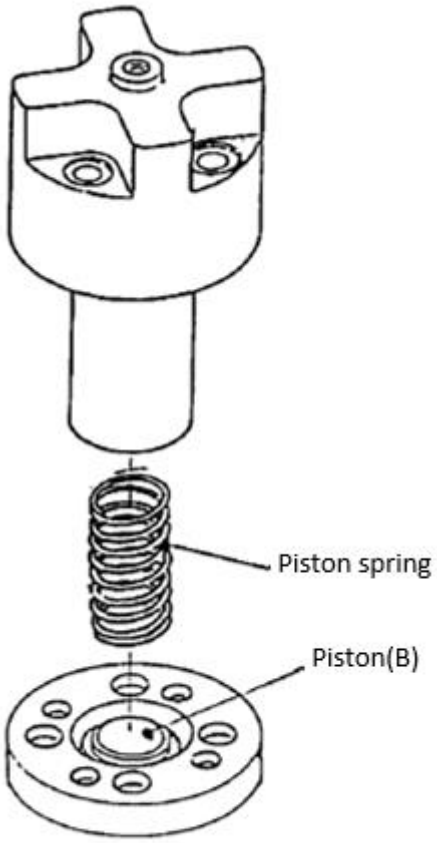
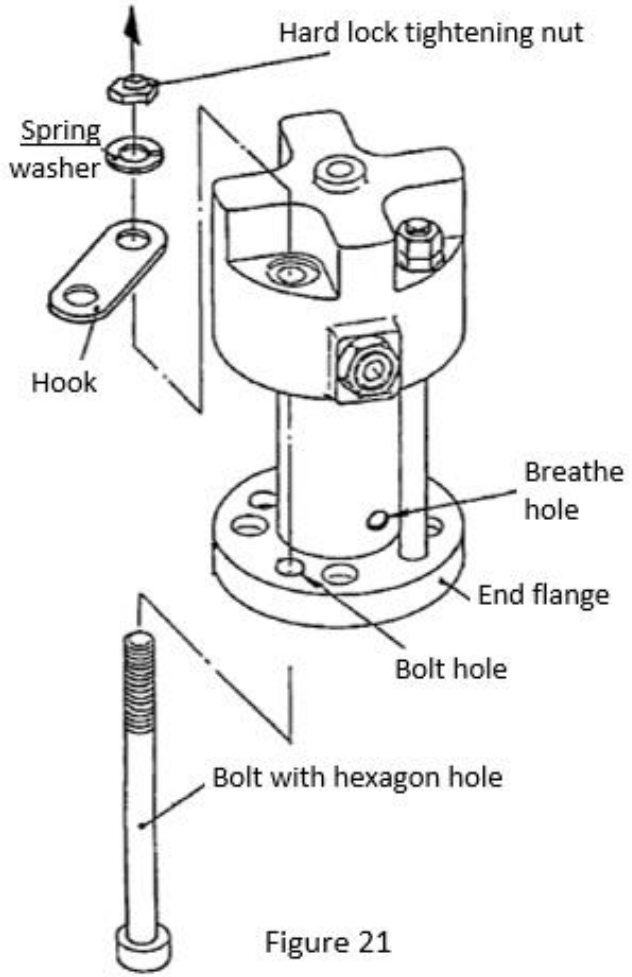
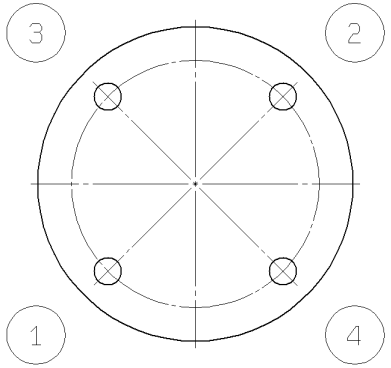
Table 7 Using O ring number
<table><tr><th>Model</th><th>Head cover O ring</th><th>Sheet plate O ring</th></tr><tr><td>XT316-30(B)</td><td>AS568-029</td><td>AS568-026</td></tr><tr><td>XT316-40(B)</td><td>AS568-133</td><td>AS568-028</td></tr><tr><td>XT316-63(B)</td><td>AS568-040</td><td>AS568-036</td></tr><tr><td>XT316-80(B)</td><td>AS568-043</td><td>AS568-042</td></tr><tr><td>XT316-100(B)</td><td>113.9×109.1 ×2.4</td><td>AS568-045</td></tr></table></td></tr>
<tr><td>Assembly</td><td>9</td><td>Insert piston(A) to the cylinder tube.
 

Figure 18</td><td>Same as removing procedure, insert from opposite direction of the cylinder tube.</td></tr>
</table>

	No.	Procedure	Caution
Assembly	10	Insert cylinder tube to the head cover.  Figure 19	・Apply some grease on stepped part of the tube to ease insertion. ・Insert cylinder tube until strike the head cover.
	11	Set the piston(B) to the end flange.	Caution for mounting direction.
	12	Place the piston spring on spring sheet of piston(B) and cover the cylinder tube.  Figure 20	

	No.	Procedure	Caution
Assembly	13	・Mount temporary the spring washer and hard lock tightening nut by using bolt with hexagon hole through bolt hole on mounting surface of base of the end flange. ・Place the hook as followed drawing.  Figure 21	・Insert head part of the bolt to spot facing hole. ・Set the breather hole position to necessary direction. ・Caution with mounting position of the hook. Set it to necessary direction. Table 8 Using tool and parts size

Model	Hexagon bolt size	Bolt hole	Spring washer size	Hard lock nut size
XT316-30(B)	M8×130	φ9	Nominal 8	M8
XT316-40(B)	M10×160	φ11	Nominal 10	M10
XT316-63(B)	M12×210	φ13.5	Nominal 12	M12
XT316-80(B)	M14×250	φ15.5	Nominal 14	M14
XT316-100(B)	M16×300 ※Hexagon head bolt	φ18	Nominal 16	M16

<table>
<tr><td rowspan="3">Assembly</td><td>No.</td><td>Procedure</td><td>Caution</td></tr>
<tr><td>14</td><td>・Tighten four tightening nuts (※XT316-100(B)：six nuts) which is facing each other by order.
・To work easy, fix as method on No.1 of page 17.</td><td rowspan="2">Table 9 Hard lock tightening torque
<table><tr><th>Model</th><th>Tightening nut (Protruding nut) (N・m)</th><th>Stopper nut (Nut with dent) (N・m)</th></tr><tr><td>XT316-30(B)</td><td>12～14</td><td>9～11</td></tr><tr><td>XT316-40(B)</td><td>37～41</td><td>30～33</td></tr><tr><td>XT316-63(B)</td><td>66～73</td><td>53～58</td></tr><tr><td>XT316-80(B)</td><td>100～110</td><td>80～88</td></tr><tr><td>XT316-100(B)</td><td>190～220</td><td>140～160</td></tr></table>Note) To tighten the tightening nut equally, follow as order of diagonal line.
Ex. Tightening order  </td></tr>
<tr><td>15</td><td>Same as above, tighten the stopper nut.</td></tr>
</table>

3)Replace poppet, poppet spring, and O ring

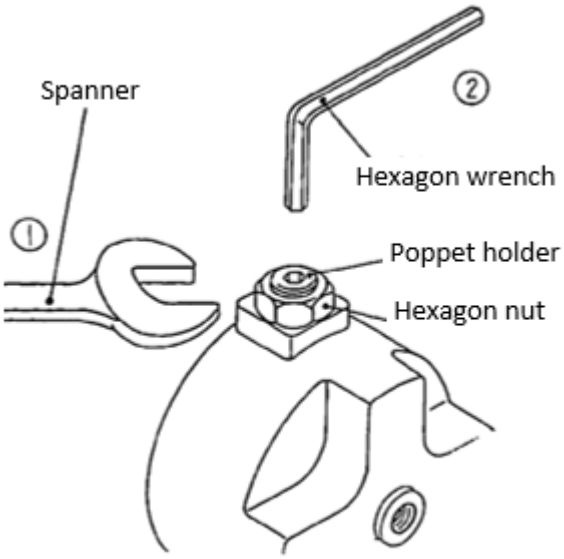
<table>
<tr><td rowspan="4">Disassembly</td><td>No.</td><td>Procedure</td><td>Caution</td></tr>
<tr><td>1</td><td>①Remove hexagon, nut by spanner showed table 10.
②Remove poppet holder by hexagon wrench showed table 10.
 

Figure 22</td><td>・Disassemble the hexagon nut first then poppet holder.

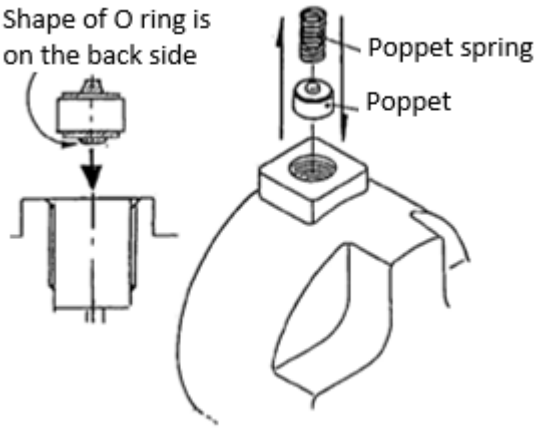
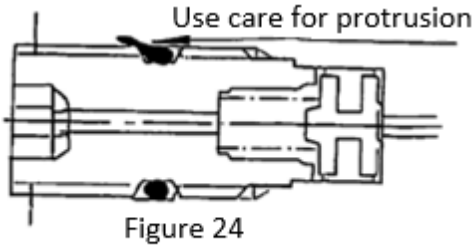
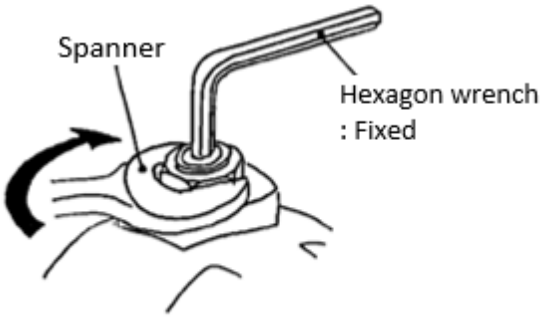
Table 10 Using tool and part size
<table><tr><th>Model</th><th>Used spanner width across flats(mm)</th><th>Using hexagon wrench across flats (mm)</th><th>Hexagon nut</th></tr><tr><td>XT316-30(B)</td><td>21</td><td>6</td><td>M14</td></tr><tr><td>XT316-40(B)
～
XT316-100(B)</td><td>24</td><td>8</td><td>M16</td></tr></table></td></tr>
<tr><td>2</td><td><u>Replace poppet or poppet spring</u>
・Please work with tweezers.
 

Figure 23</td><td>Poppet has the direction to set.
Assemble as drawing on the left.

Table 11 Using O ring
<table><tr><th>Model</th><th>O ring</th></tr><tr><td>XT316-30(B)</td><td>P10A</td></tr><tr><td>XT316-40(B)
～
XT316-100(B)</td><td>P12.5</td></tr></table></td></tr>
<tr><td>3</td><td>Replace O ring.(Table 11)</td><td></td></tr>
</table>

	No.	Procedure	Caution
Assembly	4	Tight poppet holder followed by hexagon nut.  Figure 24  Figure 25	・Use extreme caution to avoid protrusion of poppet O ring, when tightening poppet holder. ・Please lock hexagon nut fixing by hexagon wrench in order to avoid poppet holder is not tighten. Table 12 Tools, parts, and hexagon nut torque

Model	Spanner width across flats (mm)	Hexagon wrench across flats (mm)	hexagon nut torque (N・m)
XT316-30(B)	21	6	0.13
XT316-40(B) ～ XT316-100(B)	24	8	0.20

8 - 3 How to adjust Cracking Pressure

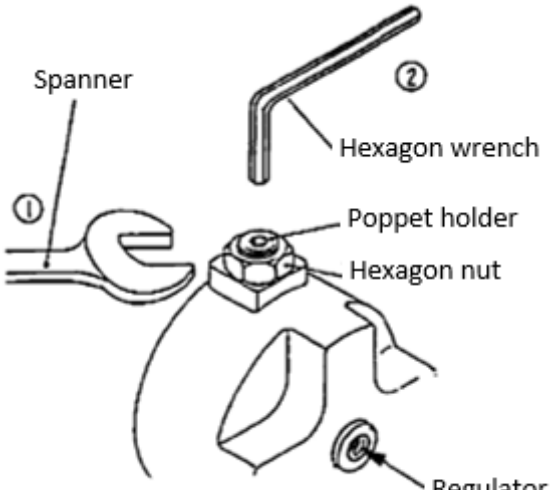


Figure 26

When poppet holder is loosen, cracking pressure (working pressure) reduced. When poppet holder is tighten, it is increased. The width is approximately 0.1 ~ 0.35MPa.

1. Verify cracking pressure at the position before adjustment. How to verify is when air is increased from zero by regulator at supply port, and start working at 0.3MPa, it is the cracking pressure.
   (It is set 0.3MPa at shipping.)
2. To adjust cracking pressure, insert hexagon wrench and loosen hexagon nut by spanner at the position. After loosening, tightening and loosening poppet holder by hexagon wrench (measure approximately 0.5 cycle) and lock hexagon nut at optional position, then verify and set cracking pressure by increasing pressure at supply port as procedure 1.
3. Fasten by hexagon wrench as poppet holder dose not rotate after setting, and lock the hexagon nut. Refer to Table 12 for tools and hexagon nut torque.

Revision history
D : Safety Instructions changed. 2023.12
E : Updated formats. 2024.3

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