IWAKI PUMPS

IWAKI Air Chamber

Type A / Type N

Instruction Manual

⚠Read this manual before use of product

To use IWAKI Air Chamber with its full function for a long time, read and understand this instruction manual to use it correctly.

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Safety section

For the Safe and Correct Handling of the Pump

- Before use of the pump, read carefully this "Safety Section" to prevent accidents and to avoid the damage or loss of other assets.
- Observe and abide by the instructions described in this "Safety Section". These instructions are very important for protecting pump users or other persons from hazard or from loss of assets.
- Meaning of symbols
  Following two symbols describe the extent of hazards and loss which may brought if the instructions are not observed or if the pump is wrongly used.

WARNING	**Nonobservance or misapplication of the contents of the "Warning" could lead to a death or heavy injury of person.**
CAUTION	**Nonobservance or misapplication of the contents of the "Caution" could lead to a injury of person or damage of assets.**

Following two symbols describe the content to be observed.

	Prohibited action or procedure is indicated. Inside or near this circle, a concrete activity to be prohibited is depicted.
	Action or procedure which must be performed without fail is indicated. Inside this circle, a concrete activity to be performed is depicted.

⚠Export Restrictions

Technical information contained in this instruction manual might be treated as controlled technology in your countries, due to agreements in international regime for export control. Please be reminded that export license/permission could be required when this manual is provided, due to export control regulations of your country.

Safety section

⚠WARNING

• **Turn off power before service**

Risk of personal injury. Before performing any service, turn off power to stop the pump and related devices and display a warning sign near the power switch to prevent others from restoring power during service.

Power off

• **Qualified personnel only**

The air chamber should be handled or operated by qualified personnel with a full understanding of the air chamber and the pump. Any person not familiar with them should not take part in the operation or maintenance of the air chamber.

• **Wear protective clothing**

Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a face shield during disassembly, assembly or maintenance work. The specific solution will dictate the degree of protection. Refer to SDS precautions from the solution supplier.

Wear protective gear

• **Install a relief valve between the pump and the discharge valve**

If the relief valve is not installed, air chamber may burst caused by abnormal pressure increase due to erratic operation.

• **Do not modify the air chamber**

Alternations to the air chamber carry a high degree of risk. It is not the manufacturer's responsibility for any failure or injury resulting from alterations to the chamber.

No Remodeling

• **Ventilation**

Fumes or vapours can be hazardous with certain solutions. Ensure proper ventilation at the operation site.

• **Spill precautions**

Ensure protection and containment of solution in the event of air chamber, plumbing or pump damage (secondary containment). Do not drain the liquid onto the floor.

• **Daily inspection and maintenance**

Daily inspection and maintenance are required for the prevention of chemical spray or leakage when handling:

- Explosive or flammable liquid,
- Corrosive liquid, or
- Harmful liquid.

⚠CAUTION

• **Do not install or store the air chamber:**
- Where ambient temperature can exceed 0-40 ºC.
- In direct sunlight.

A deformed or damaged chamber may cause liquid leakage or fragments of the chamber to be ejected, resulting in personal injury.

• **Fix the air chamber**

Air chambers weighing 15 kg or more must be securely mounted to a supporting frame or equivalent structure. Otherwise, the weight of the air chamber may cause the piping to break or become disconnected.

• **Non freezing**

Frozen liquid may damage the chamber and piping. Drain liquid before leaving it for a long time.

• **Do not use the air chamber in any condition other than its intended purpose**

The use of the air chamber in any conditions other than those clearly specified may result in failure or injury. Use this product in specified conditions only.

• **Before returning the air chamber for repair**

Be sure to drain any remaining chemicals from the air chamber and thoroughly flush the inside of the chamber so that a harmful chemical does not spill out in transit.

1. Unpacking and inspection

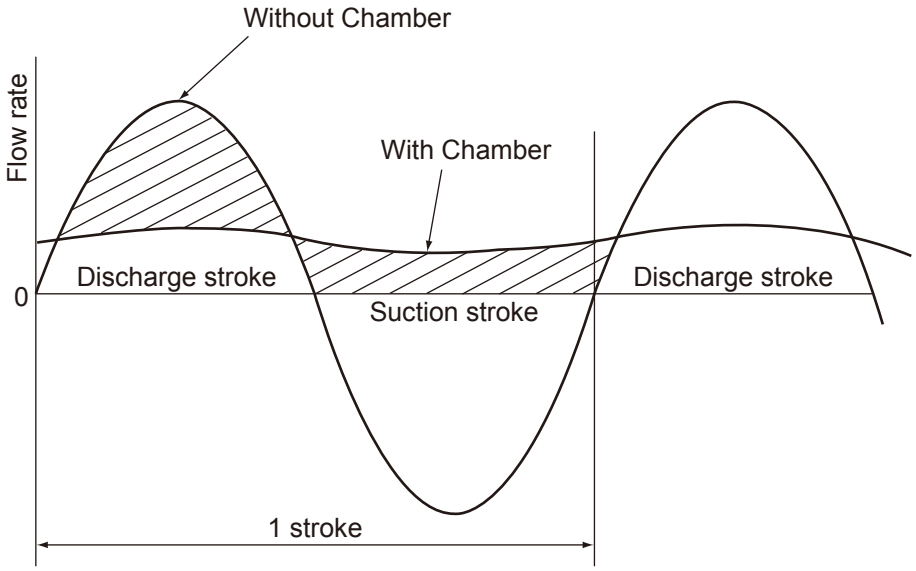
After unpacking, check the following:

1. The model code to identify capacity, material, O ring material and connection.
2. The air chamber was not damaged during transportation, no abnormality is found or no bolts were loosened.

2. Principle of operation

Air chamber is mounted at discharge piping of the reciprocating metering pump for the purpose of damping pulsation and inertia resistance to reduce vibration of pipe and over feeding.

(1) At discharge stroke of pump, a part of liquid discharged from pump is kept in the chamber.
(2) At suction stroke, the liquid kept in chamber is discharged to discharge pipe.
(3) If chamber is not installed, liquid is not discharged at suction stroke, which makes large pulsation. If chamber is installed, liquid is discharged from chamber to damp pulsation.



3. Model identification

A - 5 V E - __ __
(1) (2) (3) (4) (5)

(1) Capacity
- 05 : 0.5 litres
- 1 : 1
- 2 : 2
- 5 : 3
- 10 : 10
- 20 : 20
- 36 : 36

(2) Material code
- S6 : SUS316
- V : Polyvinylchloride
- TC : PFA (lining steel pipe) + PTFE gasket

(3) O ring material
- V : FKM
- E : EPDM

(4) Connection
- No symbol .... Common for 15A & 25A flange
- 10 ..... 10A flange
- 15 ..... 15A flange
- 20 ..... 20A flange
- 25 ..... 25A flange
- 40 ..... 40A flange
- 50 ..... 50A flange
- 65 ..... 65A flange

(5) Special version code
- No symbol ..... JIS 10K flange
- A ..... ANSI flange
- S ..... Others

N __ - __ __ __ - F __
(1) (2) (3) (4) (5)

(1) Connection
- 40 ... 40A flange
- 50 ... 50A flange
- 65 ... 65A flange

(2) Capacity
- 10 ... 10 litres
- 20 ... 20 litres
- 30 ... 30 litres

(3) Material code
- S6... SUS316
- V..... Polyvinylchloride

(4) O ring material
- No symbol ..... CR
- 2 ..... FKM

(5) Special version code
- No symbol ..... JIS 10K flange
- A ..... ANSI flange
- S ..... Others

4. Specification

Material	Model	Capacity Litre	Max. press. MPA	Connection (JIS 10K Flange)	Mass kg	Liquid temp.
PVC	A-1V ( )	1	0.5	15A - 25A	2	0-50deg.C
	A-2V ( )	2			2.5	
	A-5V ( )	5			4.5	
	N40A-10V ( )-F	10		40A	15.5	
	N50A-20V ( )-F	20		50A	25.5	
	N65A-30V ( )-F	30		65A	47	
SUS316	A-05S6- ( )	0.5	0.9	10A · 15A · 20A	3	0-80deg.C
	A-1S6- ( )	1.5		15A · 20A · 25A	5	
	A-5S6- ( )	5		25A · 40A	12	
	A-10S6- ( )	10		40A · 50A	15	
	A-20S6- ( )	20		50A · 65A	29	
	A-36S6-65	36		65A	55	
PFA	A-05TC- ( )	0.5	0.5	15A	12	0-40deg.C
	A-1TC- ( )	1		15A · 25A	28 · 20	
	A-2TC- ( )	2		10A · 20A · 25A	20 · 20 · 16	
	A-3TC- ( )	3		25A	47	
	A-5TC- ( )	5		25A	50	
	A-10TC- ( )	10		40A	70	
	A-20TC- ( )	20		50A	100	

5. Dimension

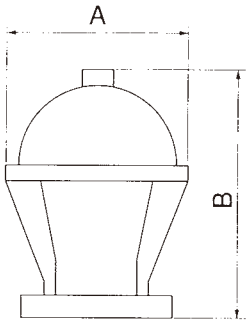


Fig. 1

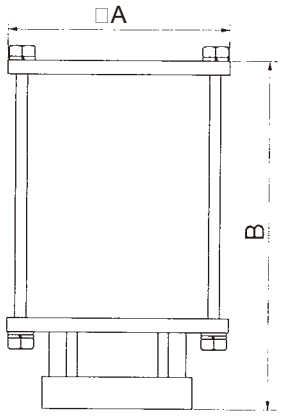


Fig. 2

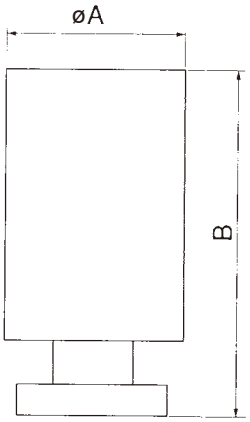


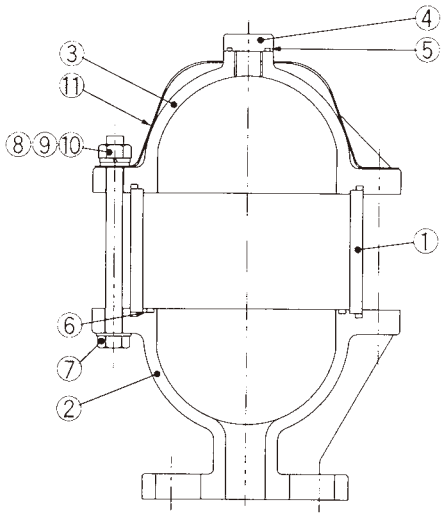
Fig. 3

Material	Model	A	B	Fig.No.
PVC	A-1V ( )	186	214	1
	A-2V ( )	186	281	1
	A-5V ( )	186	526	1
	N40A-10V ( )-F	208	790	2
	N50A-20V ( )-F	266	920	2
	N65A-30V ( )-F	330	848	2
SUS316	A-05S6- ( )	86.5	200	3
	A-1S6- ( )	115	270	3
	A-5S6- ( )	166	420	3
	A-10S6- ( )	166	680	3
	A-20S6- ( )	217	800	3
	A-36S6- ( )	319	680	3
PFA	A-05TC-15	140	538	3
	A-1TC-15	185	377	3
	A-1TC-25	185	324	3
	A-2TC-15	210	451	3
	A-2TC-20	210	451	3
	A-2TC-25	210	398	3
	A-3TC-25	280	304	3
	A-5TC-25	280	404	3
	A-10TC-40	330	507	3
	A-20TC-50	400	601	3

6. Construction and parts names

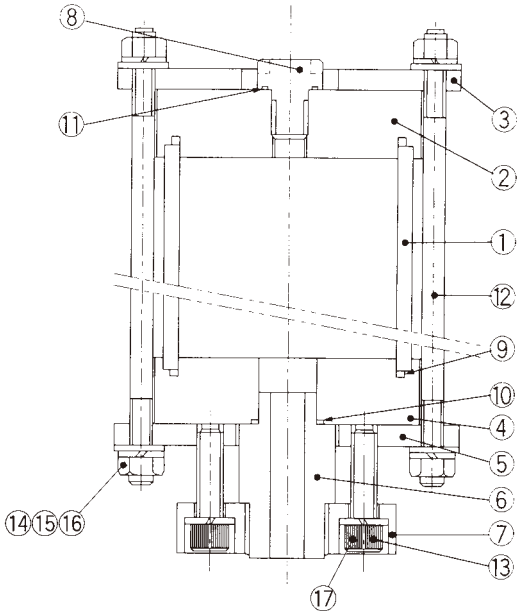
■ PVC material type

Models A-1, 2, 5



No.	Parts name	Remarks
1	Pipe	
2	Bottom flange	
3	Top flange	
4	Cap	
5	O ring	P22
6	O ring	G135
7	Hex. head bolt	M10
8	Hex. head nut	M10
9	Spring washer	M10
10	Plate washer	M10
11	Protective cover	

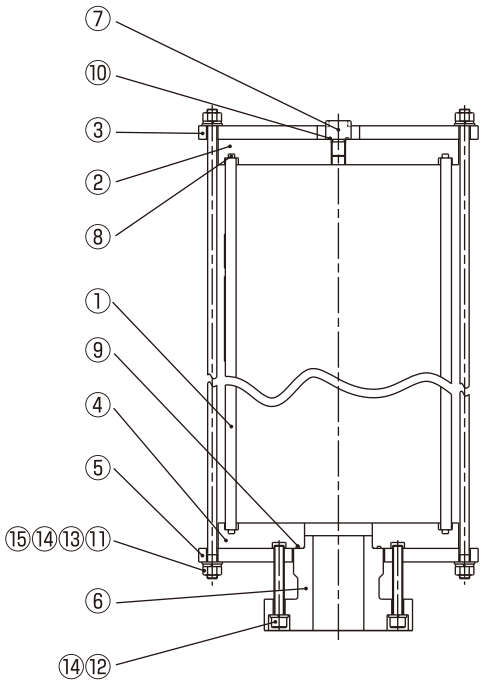
Models N40A, 50A



No.	Parts name	Remarks
1	Pipe	
2	Top cover	
3	Top cover holder	
4	Bottom cover	
5	Bottom cover holder	
6	Connection port	
7	Flange	
8	Air supply cap	
9	O ring	JIS B2401
10	O ring	JIS B2401
11	O ring	JIS B2401 P20
12	Stud bolt	M10
13	Hex. socket head bolt	M12
14	Hex. head nut	
15	Spring washer	
16	Plate washer	
17	Spring washer	

O ring	No. 9 on drawing	No. 10 on drawing
N40A-10V2-F	G145	P40
N50A-20V2-F	G200	G60

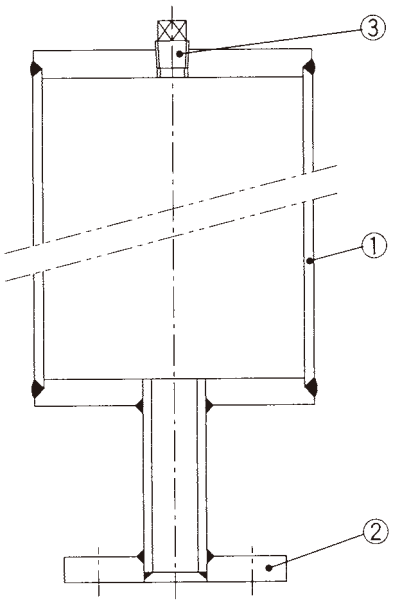
Model N65A



No.	Parts name	Remarks
1	Pipe	
2	Top cover	
3	Top cover holder	
4	Bottom cover	
5	Bottom cover holder	
6	Flange	
7	Air supply cap	
8	O ring	JIS B2401 G250
9	O ring	JIS B2401 G95
10	O ring	JIS B2401 P20
11	Stud bolt	M12
12	Hex. socket head bolt	M12
13	Hex. head nut	M12
14	Spring washer	M12
15	Plate washer	M12

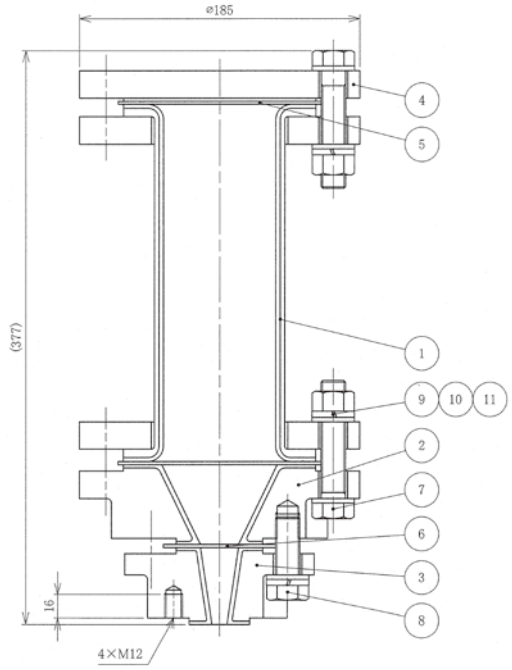
■ Stainless steel material type

Models A-05, 1, 10, 20, 36S6



No.	Parts name	Remarks
1	Chamber unit	
2	Flange	
3	Plug	For air supply

■ PFA (Lining Steel Pipe) type



No.	Parts name	Remarks
1	Air chamber body	
2	Flange	
3	Flange	A-1TC-15/A-2TC-15/A-2TC-20 /A-10TC-40/A-20TC-50
4	Flange	
5	Gasket	
6	Gasket	A-1TC-15/A-2TC-15/A-2TC-20 /A-10TC-40/A-20TC-50
7	Hex head bolt	
8	Hex head bolt	A-1TC-15/A-2TC-15/A-2TC-20 /A-10TC-40/A-20TC-50
9	Hex nut	
10	Spring washer	
11	Plain washer	

7. Installation

1) Place to be installed
   The most suitable place to install air chamber is just above the discharge port of pump within one meter. If you are obliged to install it in horizontal piping, place it within a meter from discharge port of pump.
2) Air chambers weighing 15 kg or more must be installed on a mounting frame or must be securely fixed by supporting device.

⚠Caution
Pay attention so that piping can not be damaged or chamber is dislocated from piping due to the weight of chamber itself.

8. Plumbing

Following is a recommended piping diagram.

(1) Discharge valve

A discharge valve must be installed between drain valve and back pressure valve.

(2) Suction valve

A suction valve must be installed close to suction port of pump. It is needed for maintenance and inspection works.

(3) Pressure gauge

Install a pressure gauge before the discharge valve (gate valve). Without the pressure gauge, you can not know operating pressure of chamber, pulsation condition and air removing condition or so.

(4) Drain valve

Install a drain valve at lower position than chamber. Without the drain, you can not supply chamber with air and can not do maintenance and inspection works.

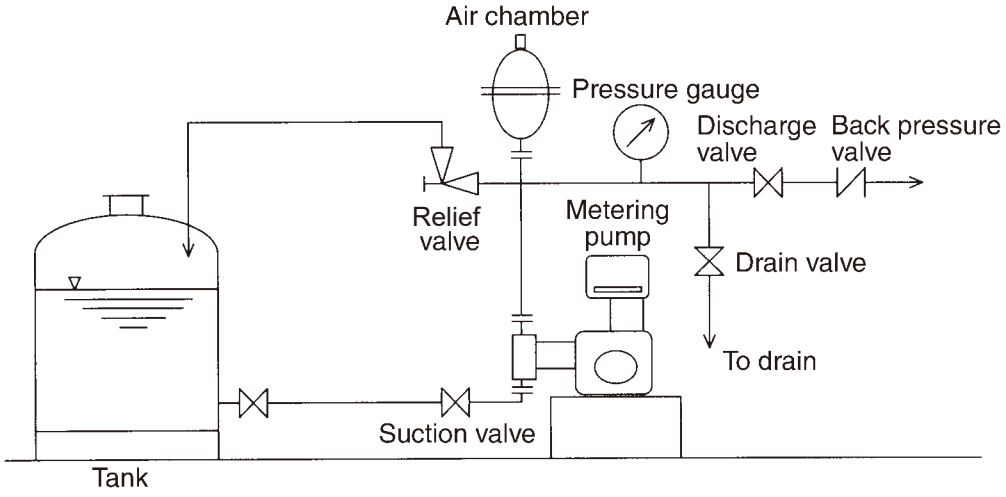
The drain valve can be used as air vent of pump.

(5) Relief valve

Install a relief valve between pump and discharge valve.

⚠Warning

If a relief valve is not installed, discharge side pressure increases abnormally and chamber may be exploded if discharge valve is closed by mistake.



Recommended plumbing

9. Precaution for use of product

(1) Do not apply pressure exceeding max. allowable pressure.
Max. allowable pressure PVC material type : 0.5MPa
Stainless steel material type : 0.9MPa
PFA (Lining Steel Pipe) type: 0.5MPa

(2) Periodically replenish air (or gas).
Air in air chamber is dissolved little by little into pumped liquid. As air volume in chamber reduces, pulsation dampening effect is reduced resulting in large pulsation.

(3) Handling Precautions for the PVC Air Chamber:
To ensure safety and performance, it is recommended to replace the PVC air chamber every three years. The material (hard polyvinyl chloride) gradually deteriorates when exposed to direct sunlight or chemical liquids. A deformed or damaged chamber may cause liquid leakage or fragments of the chamber to be ejected, resulting in personal injury.

10. Troubleshooting

Trouble	Cause	Corrective action	Remarks
Too large pulsation (Note 1)	Air is reduced.	Supply air.	When vibration width of press. gauge becomes twice of starting time.
	Too low pressure (Note 2)	Apply back pressure.	
	Air chamber capacity is too small.	Select a proper capacity.	
Liquid leaks from cap.	O ring failure	Replace by new O ring.	PVC material type
Liquid leaks through bolts.	O ring failure	Ask us.	PVC material type
	Plastics are deformed or deteriorated.	Replace by new one.	

Note 1. Pulsation means the ratio of operating pressure (central value of pointer vibration width of pressure gauge) against total vibration width of pointer but not it does not mean the total width of vibration.
2. For example, if operating pressure is low of 0.05MPa, the chamber does not function unless back pressure is applied to chamber.

11. Maintenance and inspection

11-1. Periodical air supply

Air inside chamber gradually reduces by being melted in pumped liquid. As air volume in chamber reduces, dampening effect is reduced and pulsation becomes larger. When vibration width of pointer becomes twice as original one, it is the time to replace air.

11-2. Procedure to supply air

Following is to supply air. Contact IWAKI if nitrogen gas or so is supplied.

(1) Stop pump and close discharge and suction valves.

(2) Open drain valve of discharge side to remove liquid from chamber and to release pressure to zero MPa.

> **⚠Warning**
> If pressure is not released, liquid may gush out when a air supply cap is removed according to item (3) below.

(3) Remove a cap (4) or an air supply cap (8) at the top of chamber, and the liquid in air chamber goes out and air is supplied. For the air chamber with the material code of "TC", take apart the flange (4) to supply air.

(4) Close drain valve and screw in cap (4) or air supply cap (8).

(5) Open discharge and suction valves to finish the works.

11-3. Retightening bolts

Tighten bolts to the rated torque below every three months.

Model codes	Part names	Tightening torque (N·m)
A-1V	M10×65 HEX HEAD BOLT	5.4
	M10 HEX NUT	5.4
A-2V	M10×130 HEX HEAD BOLT	5.4
	M10 HEX NUT	5.4
A-5V	M10 HEX NUT	5.4
N40A-10V	M10 HEX NUT	15.7
	M12×65 HEX SOCKET HEAD BOLT	13.7
N50A-20V	M10 HEX NUT	15.7
	M12×75 HEX SOCKET HEAD BOLT	13.7
N65A-30V	M12 HEX NUT	15.7
	M12×85 HEX SOCKET HEAD BOLT	13.7
A-05TC-15	M16×70 HEX BOLT	25
	M16 HEX NUT	25
A-1TC-15	M16×80 HEX BOLT	35
	M16 HEX NUT	35
	M16×45 HEX BOLT	15
A-1TC-25	M16×80 HEX BOLT	35
	M16 HEX NUT	35
A-2TC-15	M16×85 HEX BOLT	55
	M16 HEX NUT	55
	M16×45 HEX BOLT	15
A-2TC-20	M16×85 HEX BOLT	55
	M16 HEX NUT	55
	M16×45 HEX BOLT	15
A-2TC-25	M16×85 HEX BOLT	55
	M16 HEX NUT	55
A-3TC-25	M20×90 HEX BOLT	100
	M20 HEX NUT	100
A-5TC-25	M20×100 HEX BOLT	100
	M20 HEX NUT	100
A-10TC-40	M16×50 HEX BOLT	40
	M20×90 HEX BOLT	100
	M20 HEX NUT	100
A-20TC-50	M16×55 HEX BOLT	35
	M22×100 HEX BOLT	150
	M22 HEX NUT	150

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T512-5 '26/08