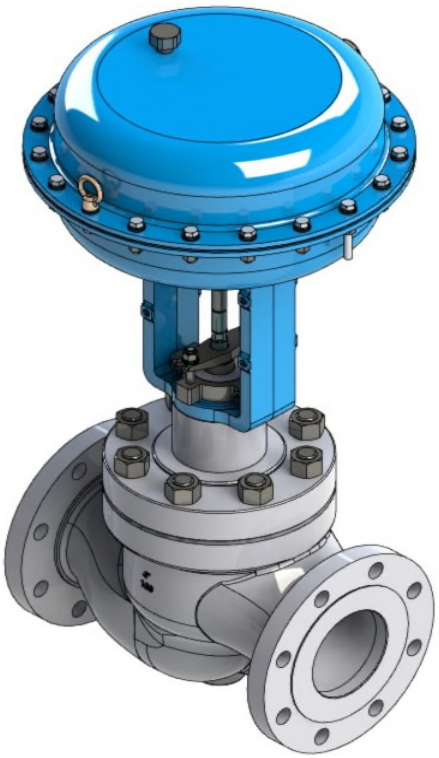
UNICON

Rev Ver. 02
Manual No. M-01

Installation and Instruction Manual

V100, V200 Series



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Safety Information

Important – Please Read Before Installation

UNICON Globe Control Valve instructions contain **Danger**, **Warning** and **Caution** labels, where necessary, to alert you to safety related or other important information. Read the instructions carefully before installing and maintaining your control valve. **Danger** and **Warning** hazards are related to personal injury. **Caution** hazards involve equipment or property damage. Operation of damaged equipment can, under certain operational conditions, result in degraded process system performance that can read to injury or death. Total compliance with all **Danger**, **Warning** and **Caution** notices is required for safe operation.
The safety terms **Danger, Warning**, **Caution** and **Note** have used in these instructions to highlight particular dangers and/or to provide additional information on aspects that may not be readily apparent.

Danger : indicates that death , severe personal injury and/or substantial property damage will occur if proper precaution is not taken.

Warning : indicates that death, severe personal injury and/or substantial property damage can occur if proper precaution is not taken.

Caution : indicates that minor personal injury and/or property damage can occur if proper precaution is not taken.

Note : indicates and provides additional technical information which may not be obvious, even to qualified personnel.

1. Introduction

1-1 General

This instruction manual included installation, operation and maintenance information for UNICON Globe Control Valves. Please refer to separate manuals for instructions covering controllers and positioners.
This operating manual covers the areas of installation, commissioning, maintenance, storage, packaging and transport. The operation manual was compiled in accordance with the regulations of guideline 97/23/EC concerning pressure devices.

1-2 Personnel qualification

Transport, installation, commissioning, maintenance or repair must only be performed by trained or instructed personnel.

⚠Warning

In order to ensure successful and safe operation of our valves the entire operation manual must have been read through and understood prior to installation and commissioning. Under certain operating conditions, the use of damaged equipment could cause a degradation of the performance of the system which may lead to personal injury or death. If you have any questions about problems arise, contact UNICON office.

2. Product description

UNICON valve is designed for general and severe purpose use in liquid and gas control application calling for either modulating or on/off service. Plug control trim is used with the fluid flowing up the characterized valve plug. The fluid pressure drop occurs in the flow area between plug and seat.
Balance cage control trim is used with the fluid flowing either down or up through the characterized ports in the cage. The fluid pressure drop occurs in the flow area of the cage's port with the port's contour characterizing flow as a linear or equal percent.
UNICON valves are equipped standard with spring diaphragm pneumatic actuators, either reverse acting or direct acting type. Both actuator types are available in a range of sizes and with a selection of springs to suit the operating conditions.
The valves are intended for installation in pipelines in accordance with the EC guideline 97/23/EC concerning pressure devices. The type of medium (chemical, abrasion and corrosive effect) agreed with the order and the limit values of medium pressure and temperature according to the data sheet must be adhered to.

2-1 Conformity

UNICON valves have been built according to the state of the art and in accordance with the guideline 97/23/EC concerning pressure devices.

2-2 Valve identification

The valves are provided with a nameplate containing the necessary information according to the pressure devices guideline. A nameplate is attached to the actuator yoke of each valve assembly. The nameplate lists the serial number, model number as well as other information such as trim materials, Cv, stroke.,etc.
When servicing valves, always use only UNICON replacement parts. Please refer to the serial and model numbers on the nameplate when ordering replacement parts.

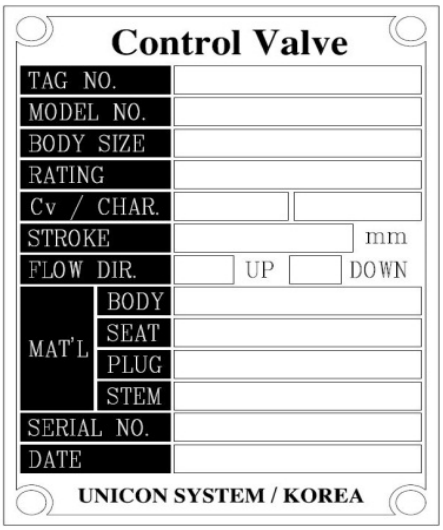


Figure 1. UNICON Nameplate

① Valve Tag Number
② Valve Model Number (Maker Standard)
③ Valve Body Size
④ Valve Rating (ANSI/ASME, KS(JIS), DIN)
⑤ CV
⑥ Character (Medium flow Character)
⑦ Stroke (Plug opening distance)
⑧ Flow DIR (Fluid flow direction for installation)
⑨ MAT'L (Body/bonnet, trim material)
⑩ SERIAL NO
⑪ DATE (Manufacture date)

3. Safety Instruction

Product safety

The valves comply with the state of the art and the recognized rules of technical safety, but dangers can still arise. Operate the valves only in perfect condition taking into account the entire operating manual.

> ⚠ **Warning**
> *Use of material-incompatible media, exceeding the limit values of medium pressure and temperature and mechanical additional loads such as caused by connected pipelines can result in failure of the valve material and bursting of the valve.*

Product specific dangers

Hazards that may arise from the flow medium, the control pressure and moving parts must be prevented through suitable measures. In addition to this ensure that the valves are employed only where type of medium, operating pressure and temperatures correspond with the design criteria used as a base for the order and specified on the nameplate.

3-1. Use of a medium unsuitable for the valve

The valve materials are compatible only with certain media. Please contact the manufacturer when used for media requiring or excluding certain media.

> ⚠ **Danger**
> *When using unintended media, the materials included in the valve may be attacked or could even be combusted explosively with fatal consequences. For the reason, only use media for which the valve has been approved. Keep valves for oxygen free of oil and grease. For ammonia, use valves free of non-ferrous metals.*

3-2. Exceeding the permissible pressure with risk of bursting

A cause for such exceeding could be for instance so-called closing hammer or cavitation. Closing hammer is pressure peaks, which occur when a pipe is closed by means of a valve. The reason for this expressed in simple terms is the momentum of the moved medium column impacting on the closing valve.

> ⚠ **Warning**
> *Maximum allowable pressures for the valve body and actuator and the maximum allowable pressure at the maximum temperature of the valve are shown on the nameplate mounted on the actuator. If pressure to the valves or other over-pressure protection devices in the pressure lines.*

3-3. Leakage of dangerous substances
Dangerous substances can leak for instance from relief bores or when disassembling the valve.

> **⚠ Warning**
> *Collect and dispose of dangerous media (for instance leakages from relief bores or traces of the medium remaining during the disassembly of the valve) so that persons and the environment are not endangered. Observe the legal regulations.*

3-4. Emergency information
In the event of fires, use only such extinguishing agents as are suitable for the extinguishing of corresponding electrical systems. Ensure that the extinguishing agent does not result in a dangerous reaction together with possibly leaking medium.

4. Installation and Operation

> **Caution**
> *When ordered, the valve configuration and construction materials were selected to meet particular pressure, temperature, pressure drop, and fluid conditions. Since some body/trim material combinations are limited in their pressure drop and temperature ranges, do not apply any other conditions to the valve without first contacting the UNICON office or your sales representatives.*

> **⚠ Danger**
> *Before disassembly or maintenance, all pressures in this device must be relieved. Failure to relieve pressures may result in personal injury or device damage.*

① Before installing the valve, inspect it for any shipping damage and for any foreign material that may have collected during crating and shipment. Remove flange protectors from the body end connections.

② Blow out all pipelines to remove pipe scale, chips, welding slag, and other foreign materials. Gasket surfaces should also be free of any foreign materials.

③ Install the valve so that flow in the direction indicated by the flow direction arrow on the tag plate pinned to the body.

④ Install valve using good piping practice. For flanged bodies, use a suitable gasket between the body and pipeline flanges.

⑤ Where piping is insulated, do not insulate the valve above the valve bonnet flange.

⑥ Connect instrument air to actuator or positioner connection. Refer to the nameplate for the maximum instrument air pressure.

⑦ Existing protection and guards have been reinstalled or enabled.

5. Maintenance

≫ Isolate the valve from the process.
≫ shut off all control and supply lines to the actuator.
≫ Release the process pressure.
≫ Vent the actuator loading pressure.

Valve parts are subject to normal wear and must be inspected and replaced as necessary, with the frequency of inspection and maintenance depending upon the severity of service conditions. All maintenance operations may be performed while the valve body remains in line as long as the line is not in service and/or is isolated from active process by block valves.

6. Valve Disassembly, Reassembly

Caution
Use care to avoid damaging *gasket sealing surfaces. The surface finish of the valve stem is critical for making a good packing seal. The seating surfaces of the valve plug and seat ring are critical for tight shutoff. Assume all of these parts are in good condition when disassembling the valve and protect them accordingly.*

Balance type Trim Disassembly (refers to figure 2, 3)

① Supply the instrument air to the actuator for lifting up the 25% position of the valve open to avoid injury or damaging valve parts from disassembly of actuator from bonnet.

② Loosen the lock bolts on the actuator clamp and remove it from valve stem.

③ Loosen the lock bolts on the yoke clamp and remove them from actuator yoke.

④ Lift up the actuator from bonnet by using slings or chins around the actuator or the lifting eye.

⑤ Remove the nuts from the bonnet flange studs.

⑥ Lift the bonnet out of the body.

⑦ Lift the plug-stem, balance cylinder, cage and seat ring out of the body in sequence. Always replace the packing if the stem is removed from the valve bonnet.

Caution
Place the "Body" on a flat surface when you repair the bottom of the body.

Caution
If the packing is to be reused and was not removed from the bonnet, use care when installing the stem in the bonnet to avoid damaging the packing with the valve stem threads.

Balance type Trim Reassembly (refers to figure 3)

① Clean all gasket surfaces, including the body, bonnet, and guide.

② A light coat of lubricant, such as light oil/ silicone grease, may be used on the soft seals to aid ease of assembly.

③ Install the new seat gasket into the seat cavity in the body.

④ Install the seat ring into the body's seat cavity.

⑤ Install the cage on top of the seat ring.

⑥ Insert the balance seal into the balance cylinder's bottom groove. If flow to open condition, the balance seal's groove upward and backup ring installed on top of the cage. If reverse condition, insert the backup ring and the balance seal, which groove downward into the balance cylinder in sequence.

⑦ Install the plug-stem through the balance cylinder and cage until it faces to seat ring.

⑧ Install the new bonnet gasket into the top valve body and the cage gasket in the groove on top of balance cylinder.

⑨ Carefully install the bonnet downward through the stem.

⑩ Tighten the stud nuts to the recommended torques given in table 1.

⑪ Mount the actuator on the bonnet and connect actuator stem to the valve stem.

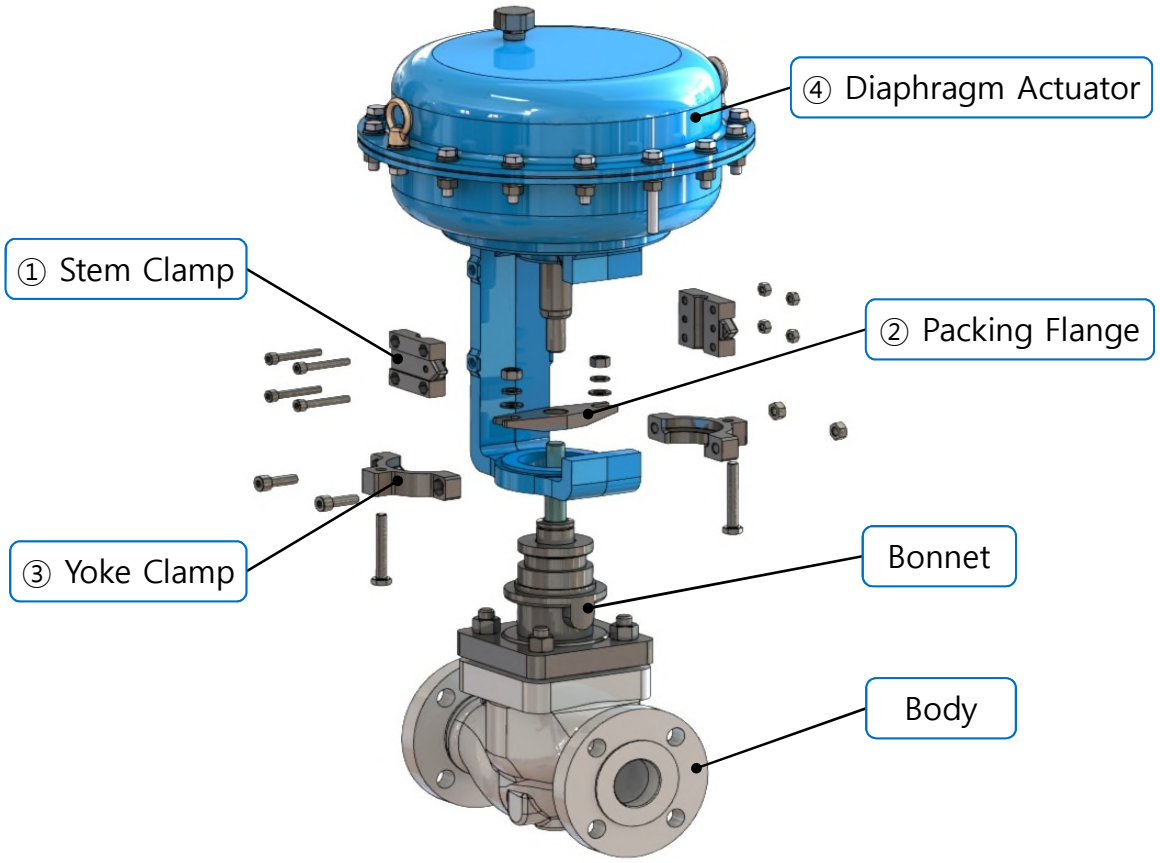
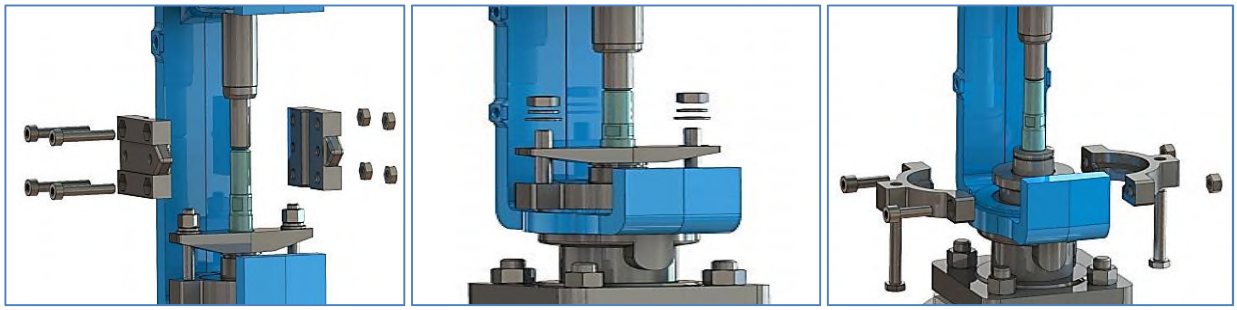


Figure 2. Actuator separated from the Body

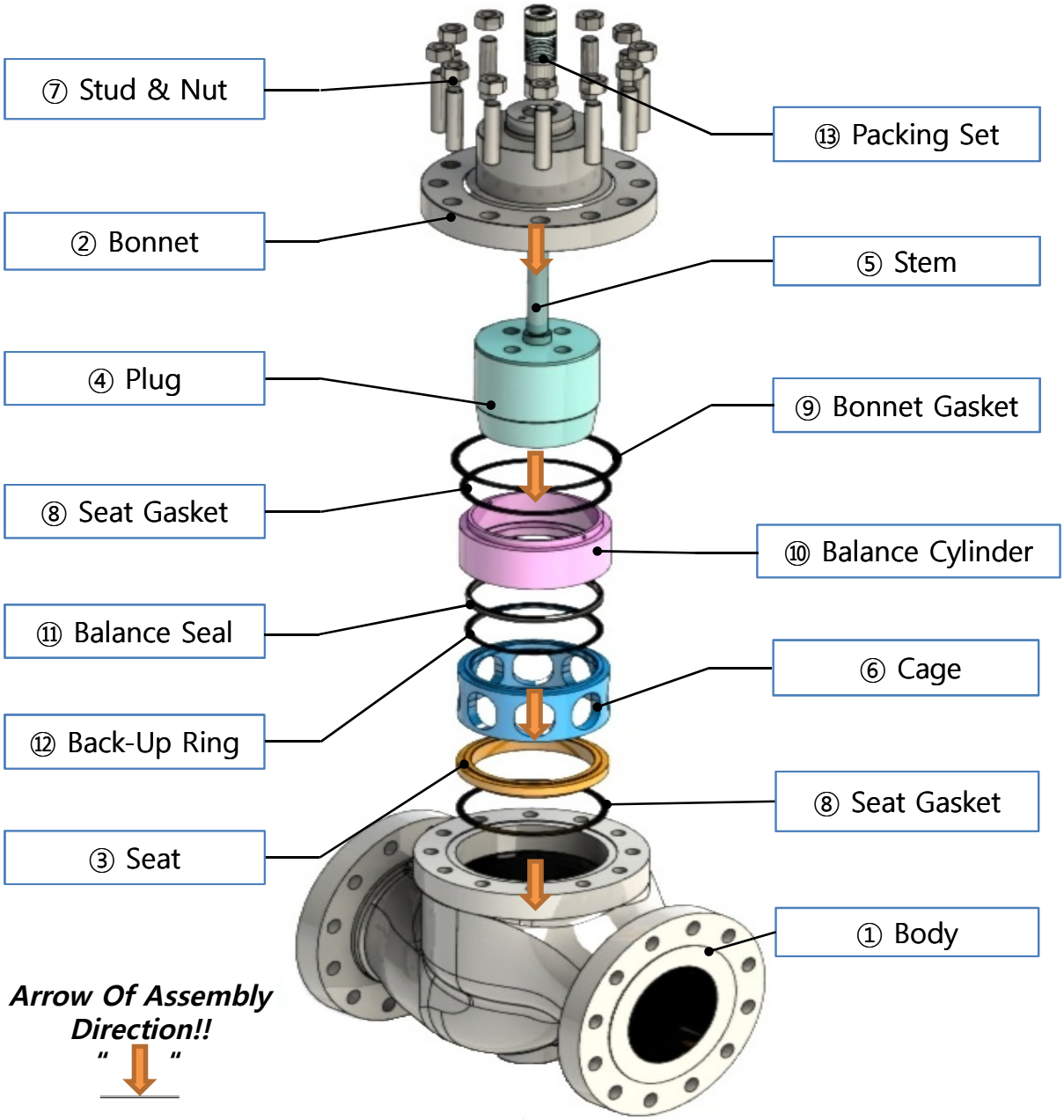
Disassembly Order
①→②→③→④



1. disassemble the Stem Clamp
2. disassemble the Packing Flange
3. disassemble the Yoke Clamp

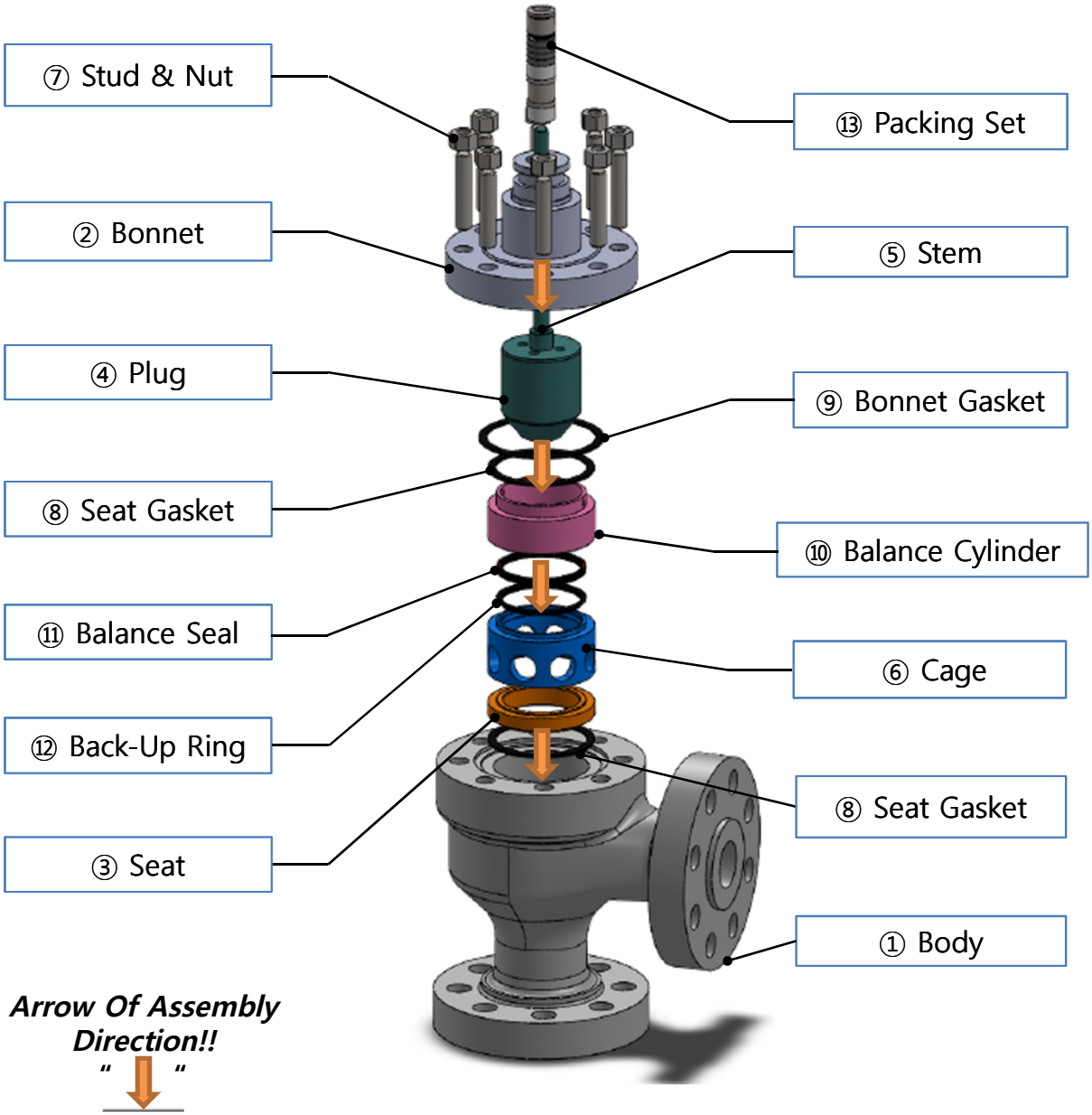
Note!
For more information, refer to the actuator manual(M-04, M-05).

Figure. 2-2 Balance Type Assembly Drawing



Assembly Part Name	Order
Figure.3	①→⑧→③→⑥→⑫→⑪→⑩→⑧→⑨→④→⑤→②→⑦→⑬

Figure. 2-2 Balance Type Assembly Drawing



Assembly Part Name	Order
Figure.3	①→⑧→③→⑥→⑫→⑪→⑩→⑧→⑨→④→⑤→②→⑦→⑬

Unbalance type Trim Disassembly (refers to figure 2, 4)

① Supply the instrument air to the actuator for lifting up the 25% position of valve open to avoid injury or damaging valve parts from disassembly of actuator from bonnet.

② Loosen the lock bolts on the actuator clamp and remove it from the valve stem.

③ Loosen the lock bolts on the yoke clamp and remove them from actuator yoke.

④ Lift up the actuator from bonnet by using slings or chins around the actuator or the lifting eye.

⑤ Remove the nuts from the bonnet flange studs.

⑥ Lift the bonnet off the body along with cage, plug-stem being carefully to lift straight up to avoid scoring or damaging the valve internals.

⑦ Remove the bonnet from plug-stem assembly.

⑧ Lift the seat ring and gasket out of the body. Always replace the packing if the stem is removed from the valve bonnet.

Unbalance type Trim Reassembly (refers to figure 4)

① Clean all gasket surfaces, including the body, bonnet, and guide.

② A light coat of lubricant, such as light oil/ silicone grease, may be used on the soft seals to aid ease of assembly.

③ Install the new seat gasket into the seat cavity in the body.

④ Install the seat ring into the body's seat cavity.

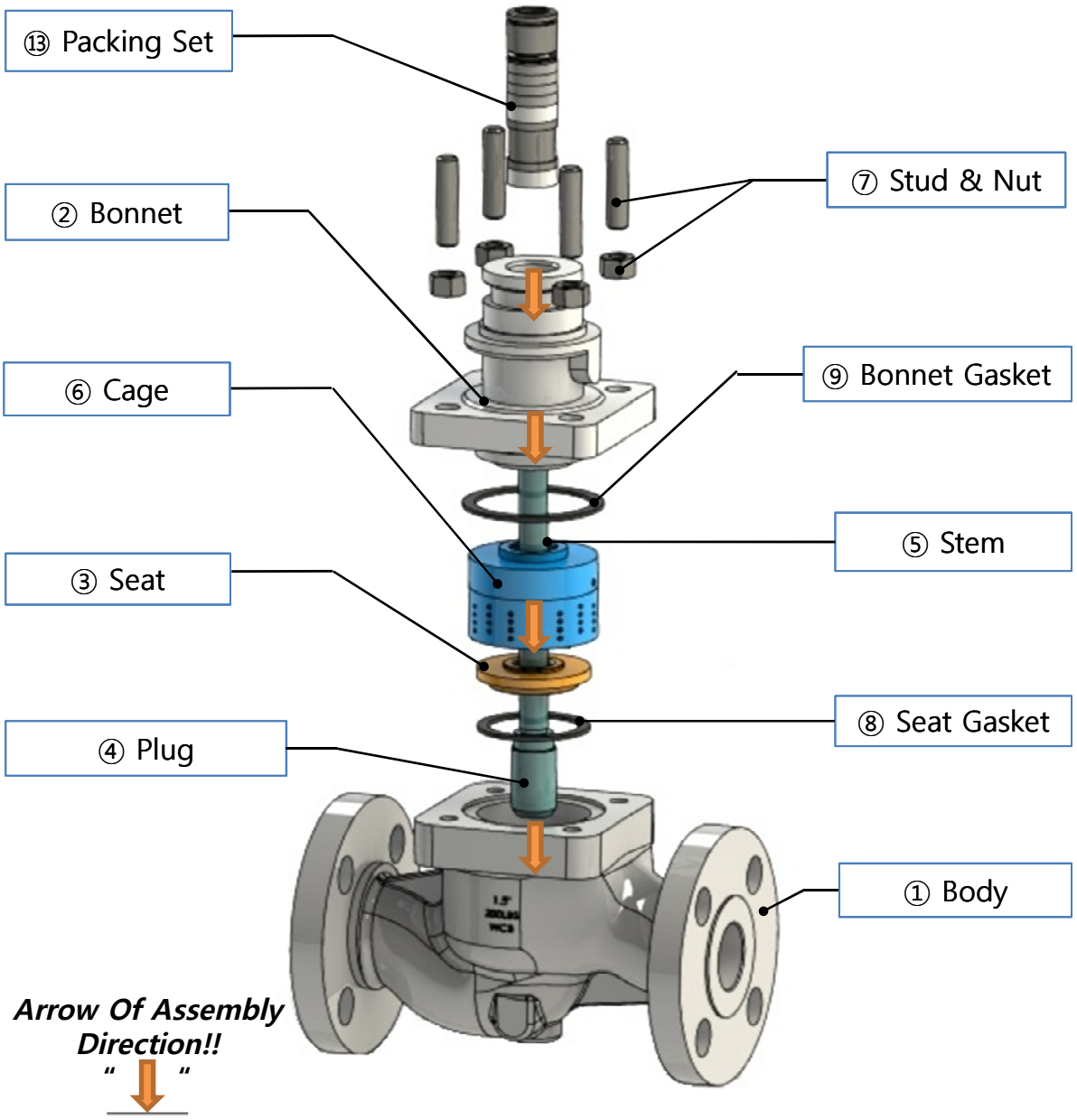
⑤ Insert the plug-stem through the cage and install the assembly on top of the seat ring carefully.

⑥ Install the new bonnet gasket into the top valve body

⑦ Tighten the stud nuts to the recommended torques given in table 1.

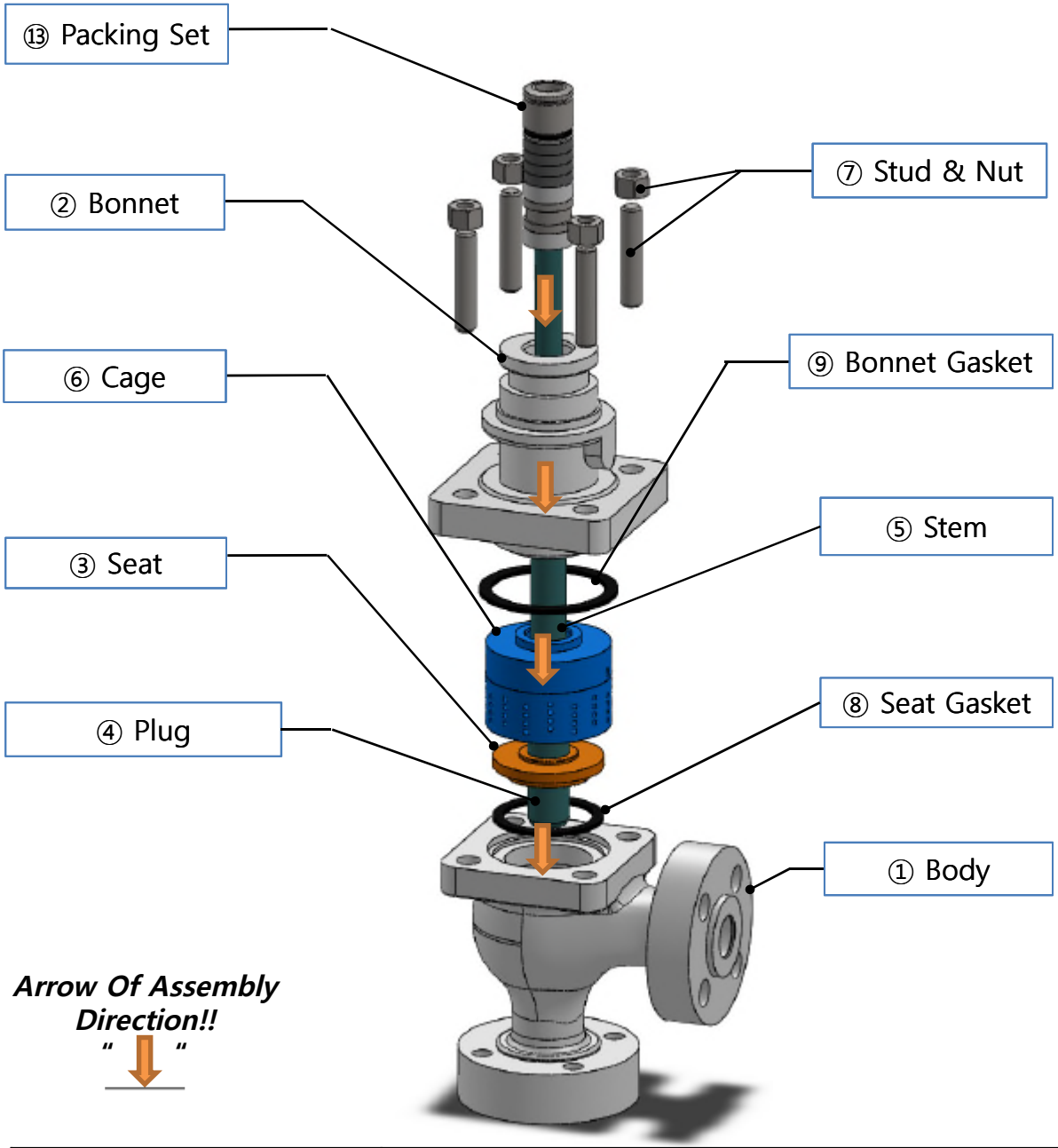
⑧ Mount the actuator on the bonnet and connect actuator stem to the valve stem.

Figure.4-1 Unbalance Type Assembly Drawing



Assembly Part Name	Order
Figure.4	①→⑧→③→⑥→⑨→④→⑤→②→⑦→⑬

Figure.4-2 Unbalance Type Assembly Drawing



Assembly Part Name	Order
Figure.4	①→⑧→③→⑥→⑨→④→⑤→②→⑦→⑬

6.1 Trim Inspection

≫ Visually inspect the valve plug and seat for signs of erosion, pitting, scratched and damage from corrosion.

≫ Fit the plug and the seat together. While looking into the bottom of the seat, hold the trim set against a bright light. If any light can be seen between the plug and seat contact surfaces, this is an indication of poor seat condition.

≫ Determine the magnitude of any wear or corrosion damage. Many times the plug and seat contact surfaces can be fully restored by relapping. Replace any parts that cannot be fully restored by relapping. After the restoration of trims, wash plug and seat in solvent to remove all lapping compounds and wipe the parts dry.

≫ If the stem has been removed, examine the stem for pitting, scratches, or other damage in the packing box area. If any damage cannot be removed by polishing the stem, replace the stem.

6.2 Replacement of Packing

Packing box maintenance is one of the principle chores of routine servicing. Tightness of the packing is maintained by packing compression. Compression is achieved by evenly tightening the packing flange nuts against the packing flange. Care must be taken not to over tighten as this could prevent smooth operation of the valve.
If all compression is used up and the valve leaks, new packing is required.

≫ Remove the two nuts retaining the packing flange and lift the packing flange and packing gland from bonnet. Pull out the old packing with a hook or packing removal tool.

Note!
be careful to avoid scratching the packing box wall or stem. If the stem has been removed, the packing may be pushed out using a rod inserted through the hole in the bottom of the bonnet.

≫ Clean the packing box and all metal parts.

≫ Insert the new packing and associated parts in the following sequence :

In case of Teflon-V Packing (refers to figure 5)	In case of Graphite Packing (refers to figure 6)
1. Guide bush (PTFE+25% GLASS) 2. Spacer 3. V-Packing : "V" downward toward the body 4. Packing follower	1. Lower guide bush (Carbon) 2. Spacer 3. Upper guide bush (Carbon) 4. Graphite packing 5. Packing follower

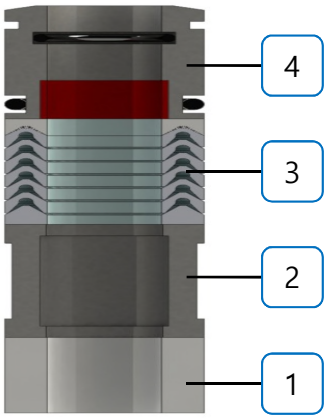


Figure 5. Teflon-V Packing Assembly

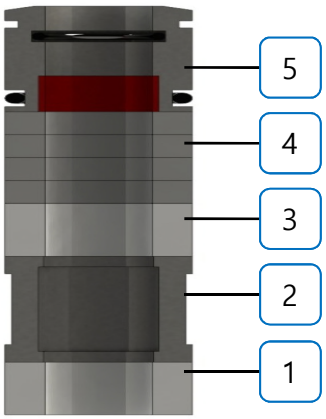


Figure 6. Graphite Packing Assembly

Caution
Materials and assembly methods must be various according to product specification.

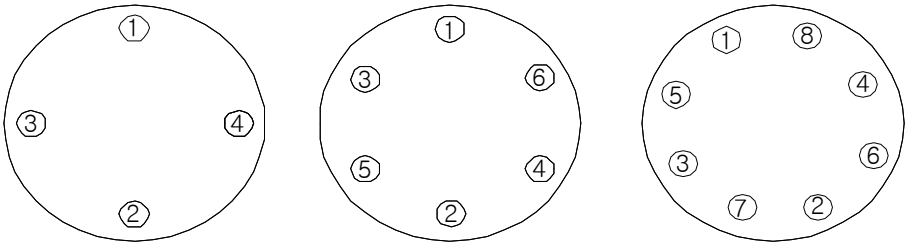


Table.1 Trouble Diagnosis

ANSI Class	Valve Size (NPS) N·m												
	3/4	1	1.5	2	2.5	3	4	6	8	10	12	14	16
150~600	84	115	197	113	146	200	320	490	710	1000	1000	1223	1542
900~1500	93	148	351	228	327	449	694	867	1301	-	-	-	-
2500	93	148	385	266	358	496	734	1832	1648	-	-	-	-

Note!
Tables are based on the use of bolts with a yield strength of 100,000 psi.

7. Storage

During storage, protect the valves from external effects and dirt. Avoid the formation of condensate through ventilation, desiccant or heating. Protect the connection openings to prevent entry of dirt.
The storage room should be dry, dust-free and moderately ventilated. Storage temperature frost-free up to +25℃.

8. Packaging

⚠ Warning
Valves that have come in contact with health-threatening media at the customer must be decontaminated prior to packaging.

Pack the valves so that any coatings or accessories such as plug-in devices, controllers and sensors cannot be damaged through subsequent transport. Protect connection openings to prevent the entry of dirt. Use the packing material in accordance with the applicable regulations and observe country specific regulations.

9. Transport

Valves that can be no longer be moved by hand must be transported with lifting equipment suitable for the weight to be moved.
Transport the valves by using Eyebolts if available. Do not hook up lifting equipment to accessories such as hand wheels, control lines, pressure gages or flange bores. When using suspension belts, these must be placed around the valve body, providing edge protection and ensuring even weight distribution.

10. Replacement parts

If replacement parts are required, please contact the supplier/manufacturer.

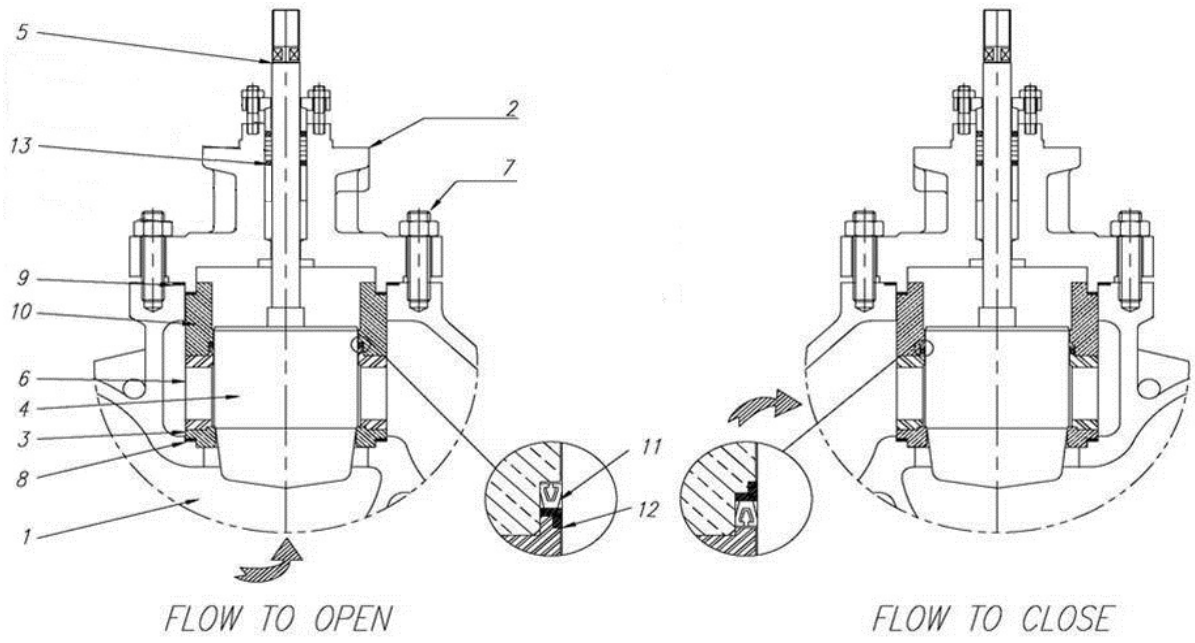


Table.2 PART LIST

Key	Description	Material
1	BODY	A352 LCC / A216 WCB / AL-BRONZE
2	BONNET	A352 LCC / A216 WCB / AL-BRONZE
3	SEAT	316L SS / AL-BRONZE
4	PLUG	316L SS / AL-BRONZE
5	STEM	316L SS / AL-BRONZE
6	CAGE	316L SS / AL-BRONZE
7	STUD & NUT	A193 B7 / A194 2H
8	SEAT GASKET	316+GRAP. - SPIRAL WOUND / TFE
9	BONNET GASKET	316+GRAP. - SPIRAL WOUND / TFE
10	BALANCE CYLINDER	316L SS / AL-BRONZE
11	BALANCE SEAL	316 + TFE / EPDM
12	BACKUP RING	316 + TFE
13	PACKING SET	GRAPHITE / V-PTFE

Table.3 Trouble Diagnosis

TROUBLE	SYMPTOM POSSIBLE CAUSE	CORRECTIVE ACTION
Valve will not cycle when instrument air is applied to the actuator.	1. Broken valve stem. 2. Diaphragm ruptured or torn. 3. Diaphragm plate connection at top may be loose. 4. Actuator vent plugged	1. Replace stem. 2. Remove upper diaphragm housing. Inspect the diaphragm and replace if necessary. 3. Remove upper diaphragm housing. Inspect the plate-to-stem connection and tighten if loose. 4. Clean out vent fitting.
Excessive trim leakage with valve closed	1. Insufficient shut-off force from actuator 2. Foreign object interfering with plug-to-seat contact. 3. Plug and seat contact surfaces may be worn or damaged.	1. For reverse actuator – increase actuator size. For direct actuator - increase supply pressure to diaphragm. 2. Remove actuator and bonnet from body. Inspect trim and remove foreign objects if present. 3. Inspect critical surfaces of plug and seat. For minor wear or damage, lap seating surfaces. If severely worn or damaged, replace plug and seat.
Fluid leakage from top of bonnet.	1. Stem packing is worn or loose.	1. For non-adjustable packing: remove and replace packing. 2. For adjustable packing: tighten adjusting nuts or add extra packing rings.
Fluid leakage from body/bonnet joint.	1. Some or all bonnet studs may be loose. 2. Body/bonnet gasket may be worn or damaged.	1. Check studs and nuts, tighten if necessary. 2. Inspect gasket, replace if necessary.
Instrument air leaks from outer edge of diaphragm cases.	1. Hex bolts securing upper and lower cases may be loose.	1. Inspect hex bolts, tighten as necessary.
Instrument air leaks from actuator vent connection located in upper case of reverse actuator or lower case of direct actuator.	1. Diaphragm may be torn or rupture, allowing air to leak through.	1. Disassemble upper case and lower case and inspect diaphragm. Replace if damaged.
Valve stem movement is sticky or jerky.	1. Valve stem or actuator stem may be bent or misaligned.	1. Disassemble valve and/or actuator to inspect stem. Replace if bent or otherwise damaged.

11. Specification

Table.4 Standard Trim Specification

	Balanced Type (V200)	Unbalanced Type (V100)
Size Range	1 1/2″ to 24″(40mm...600mm)	1/8 ″ to 6″ (3mm...150mm)
Trim Type	P-Port(Parabolic Contoured Plug) Cage Window Low-Noise Drilled Hole Cage(1/2/3-Stage) Anti-Cavitation Channel Cage(1/2/3-Stage) Labyrinth Disk Stack Hybrid Trim(Disk Stack + Drill Hole Cage)	P-Port(Parabolic Contoured Plug) Micro Flow Split Plug Multi-Step(Cascade) Cage Window Low-Noise Drilled Hole Cage(1/2/3-Stage) Anti-Cavitation Channel Cage(1/2/3-Stage) Labyrinth Disk Stack Hybrid Trim(Disk Stack + Drill Hole Cage)
Plug Guide Method	Cage Guide	Top Guide, Cage Guide
Flow Direction	Gas, Steam : Flow to Open Liquid : Flow to Close (* Note)	
Cv Range	12 to 6800	0.002 to 400
Flow Characteristic	Linear, Equal %, Modified Equal %, Quick Open	
Seat Leakage	FCI-70.2 Standard : ANSI Class IV Option : ANSI Class V ANSI Class VI(Soft Seat) MSS-SP61(On-Off)	
Material	316 SS, 316 SS + Stellite #6 Hardeness 410 SS/ 400C SS 17-4PH, F22(Nitride treatment), F51 Inconel 718, XM19 Solid Tungsten Carbied Etc.	
Balance Seal	O-Ring(EPDM, Viton) : + 5˚C to +80˚C U-Seal(RTFE + 316SS) : -194˚C to +230˚C Graph-Lock Seal(Graphite + Inconel) : Up to+580˚C	N/A

Note! Flow Direction can be changed according to your specifications.

Table.5 Standard Body Specification

Body Style	Straight Way(2Way Globe)
Bonnet	Plain(Standard), Fin & Extension, Bellows Seal Long Extension(Cryogenic Service)
Size Range	1 1/2" to 24"(DN40…DN600)
Pressure Rating	ANSI 150LBS to2500LBS JIS 10K to 180K PN20 to PN420
Operating Pressure Range	Up to 4000psi (g) Up to 280 Kg/cm² (g)
Operating Temperature Range	-58˚F to +1,050˚F -50˚C to +565˚C Option : -320˚F to +1,562˚F, -192˚C to +850˚C
End Connection	Socket Weld – ANSI B16.11 Butt Weld – ANSI B 16.25 FF/RF/RTJ Flange – ANSI B 16.5 Option : JIS Flange, DIN Flange, NPT/PT Screw
Material	Carbon Steel(WCB, WCC, A105) Chrome-moly Steel(WC6, WC9, C12A, F11, F22, F91) Stainless Steel(CF8, CF8M, CF3, CF3M, F304, F304L, F310, F316L) Duplex Stainless Steel, Monel, AL Bronze, Inconel 625 Hastelloy B/C, Other Alloy
Actuator	Pneumatic Diaphragm Pneumatic Cylinder Electric Motorized Electric Hydraulic

Note! Basic Design Standard – ANSI B16.34