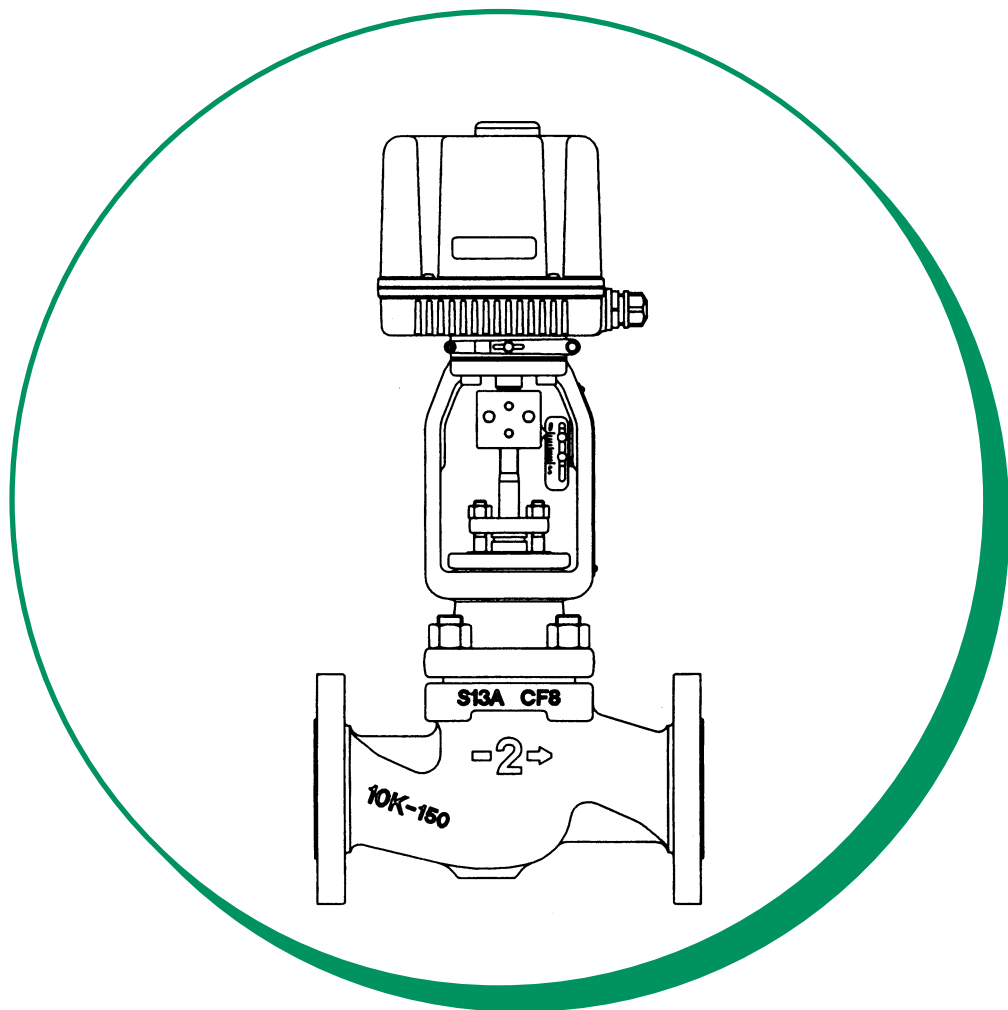


# **Electric Top-Guided Single-Seated Control Valves**

**Model: AGVB / AGVM**

## **User's Manual**



Azbil Corporation

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# Preface

## Introduction

Thank you for purchasing the Azbil Corporation Model AGVB/AGVM control valve.

The model AGVB/AGVM top guided single -seat control valve features accurate flow control performance and reduced cost. It has a new lighter valve body design and compact electric actuator and is 20% lighter and smaller than conventional models. Saving in space, installation costs, and maintenance time are assured of when you choose the Model AGVB/AGVM.

Additionally, the flow shutoff performance equals that of an emergency shutoff valve. The Model AGVB/AGVM thus plays a dual role in your process: A control over normal flow control and an emergency shutoff of process fluid.

## Unpacking and Inspecting Your Model AGVB/AGVM

### Unpacking the Model AGVB/AGVM

Model AGVB/AGVM is a precision instrument and should be handled with care.

After unpacking the Model AGVB/AGVM, verify that the following items are

included:

- Model AGVB/AGVM
- Ordered accessories

### Verifying the specifications

The specifications of your Model AGVB/AGVM are written on the nameplate attached to the actuator.

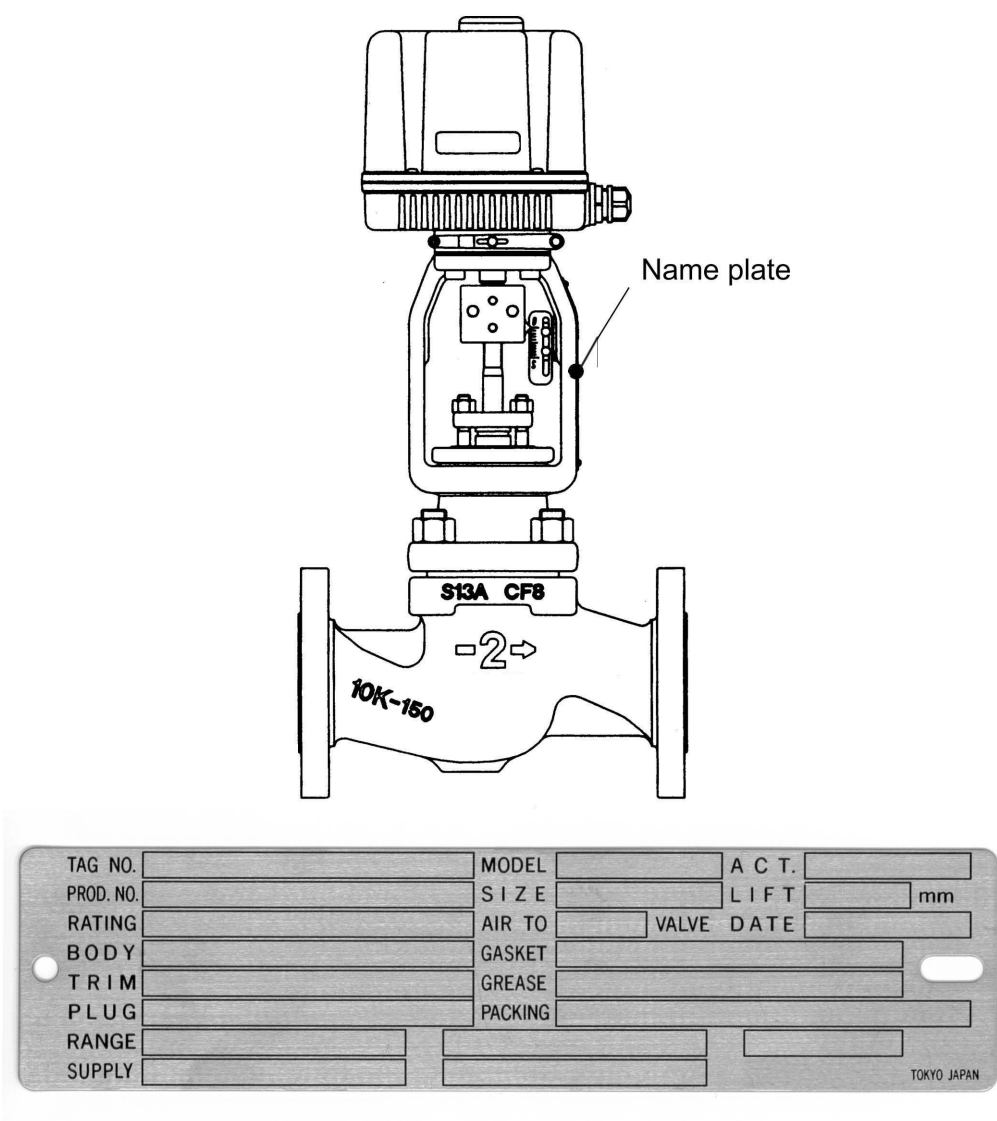


Figure. 1 Nameplate

Enquiries

If you have any questions regarding the specifications of your Model AGVB/AGVM, contact your nearest Azbil Corporation office or an Azbil Corporation representative. When making an enquiry, make sure to provide the model number and product number of your Model AGVB/AGVM.



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## Storing Your Model AGVB/AGVM

### Precautions

An unused Model AGVB/AGVM should be stored;

- indoors at normal temperature and humidity and in a place safe from vibration or electrical shock.
- in the same condition and container as shipped.

### Procedure

Used Model AGVB/AGVM valves must be treated before storage following the procedures below:

- (1) Rinse the inside of the control valve body with water to remove residual fluids, then allow to dry. Anti-corrosive treatment is recommended for control valves with carbon steel bodies.
- (2) Protect flange surface with flange-caps or other safeguards.
- (3) Store the Model AGVB/AGVM indoors at normal Temperature and humidity in a place safe from vibration or shock.



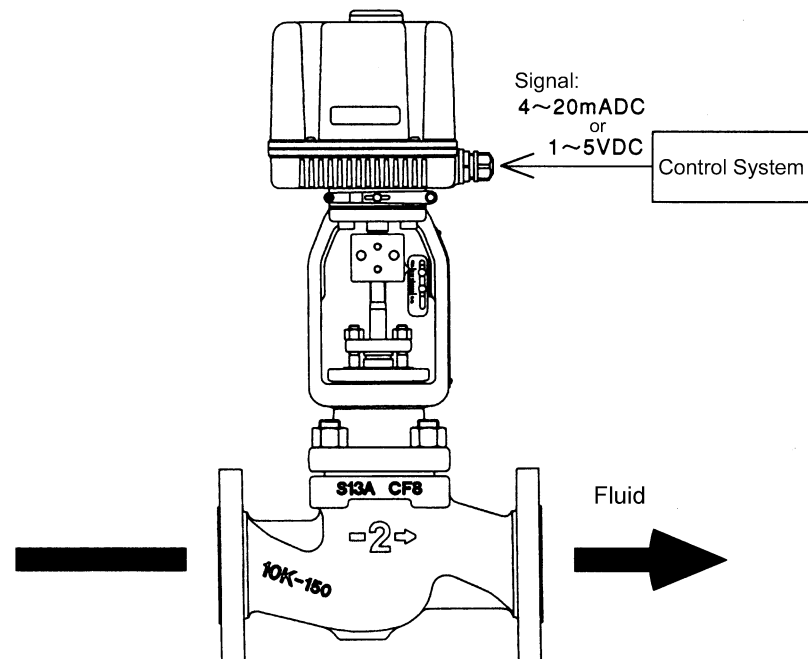
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# Chapter 1 : General Description

## 1-1 : Scope

This manual contains the instructions for using top-guided single -seated control valves

(model AGVB/AGVM)



*Figure 1-1 Model AGVB/AGVM Control System Concept*

## 1-2 : Major Components

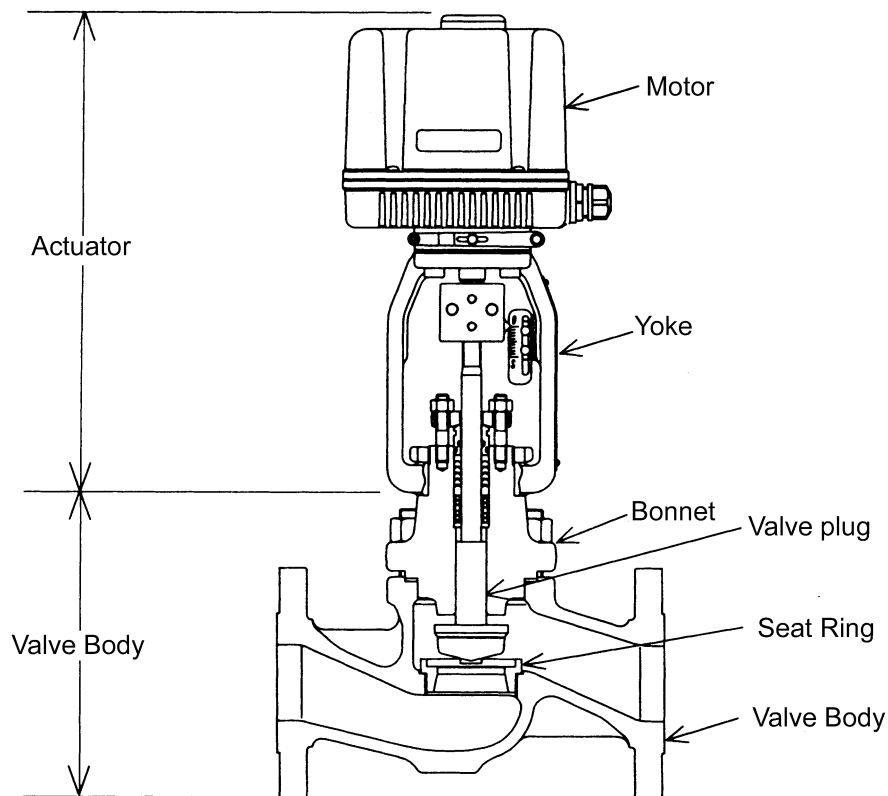
Each control valve is comprised of two main components-a valve body and an actuator. Combinations of valve body and actuator sizes, pressure ratings, types of materials, and actuator size and selectable according to process requirement.

### 1-3 : Structures

A typical Model AGVB/AGVM series control valve is shown in Figure1-2.

The valve body is fixed to the bonnet by stud bolts and nuts. Gaskets mounted between body and bonnet act as a seal for the internal fluid, making the valve body a pressure vessel.

The valve plug is supported by a guide bushing and is driven by the actuator.



*Figure 1-2 Model AGVB/AGVM*

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## Chapter 2 : Installation and Operations

### 2-1 : Lift a Model AGVB/AGVM

When lifting the Model AGVB/AGVM, take steps to suspend it by the yoke with wire. See Figure2-1.

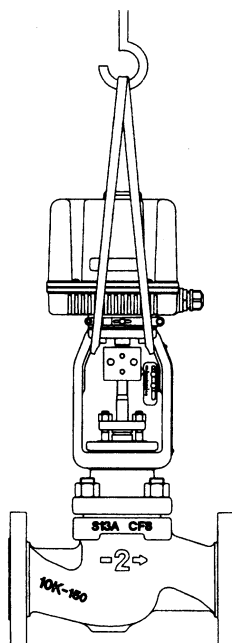


Figure 2-1 Example of Lifting a Model AGVB/AGVM

Table 2-1: Product Weight

(unit:kg)

Nominal size (in.)	JIS10K, ANSI 150, JPI 150		JIS 16K		JIS 20K, 30K, ANSI 300, JPI 300	
	General use bonnet	Extension bonnet	General use bonnet	Extension bonnet	General use bonnet	Extension bonnet
1/2	12	13	12	13	13	14
3/4	13	14	13	14	15	16
1	14	15	14	15	16	17
1-1/2	21	25	21	25	26	30
2	24	28	24	28	27	31

**~Note**      *When lifting a Model AGVB/AGVM, please use extreme care to protect both the actuator and valve body from electrical shock.*

## 2-2 : Installing the valve on a process pipe

1. Before installing the valve, remove scales, welding chips or any other contaminants from both upstream and downstream sides of the process pipe.
2. Confirm that the direction of process fluid flow conforms with the arrowhead mark on the valve body.
3. Ensure that the pipe connection gaskets do not protrude into the process pipe. The type of gasket must be suitable for the process fluid.
4. Ensure that excessive stress is not being transferred from the process pipe to the valve body. Uniformly tighten the bolts on the process pipe connection flanges.
5. Do not install any heating or cooling equipment on the bonnet.

## 2-3 : Electrical wiring connection

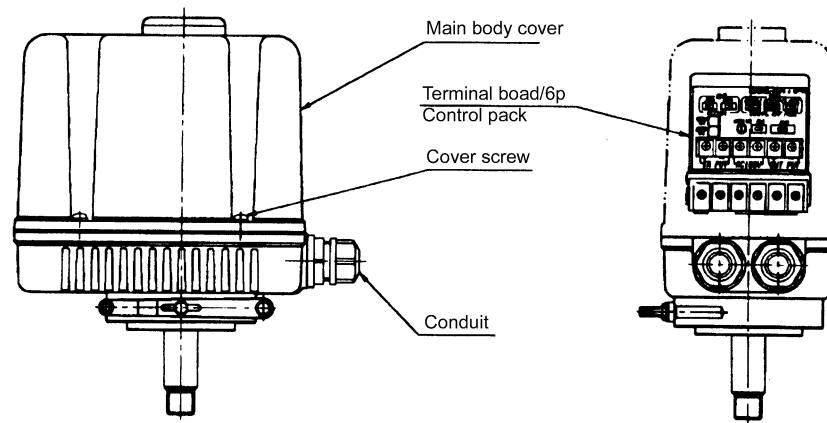
### 2-3-1 : Cable

1. Selection of cable
  - For the installation of this device, a 600V control cable with PVC insulation, vinyl sheath CVV (JIS C3401) twisted pair wire with conductor cross section 1.252 or equal is recommended.
  - If electro-static noise exists at cable installation location, shielded cable is recommended.
  - Select a suitable sheath material which can withstand cable installation environments such as ambient temperature, corrosive gas or liquid.
  - The cable is interconnected to the terminal box through a conduit (G1/2 female thread or 1/2NPT female thread).
  - Use a cable of 9~11mm outer diameter. When a pressure withstanding packing cable adaptor is used, make sure that the size of the packing fits the outer diameter of cable.
  - A crimp-on terminal with an insulation sleeve (M4 screw) is recommended for termination.
  - The maximum length of cable is 1500 m.
2. Cable laying
  - When laying cable between the actuator and the controller, pay particular attention to the following:
  - Lay the cable away from large capacity transformers, motors or plant power sources that may generate noise. Also, do not lay the cable in the same tray or duct with other power source cables,
  - It is recommended to use a conduit and duct to waterproof and protect the exterior of the cable. Also, install a waterproof adaptor on the connecting ends of the conduit.

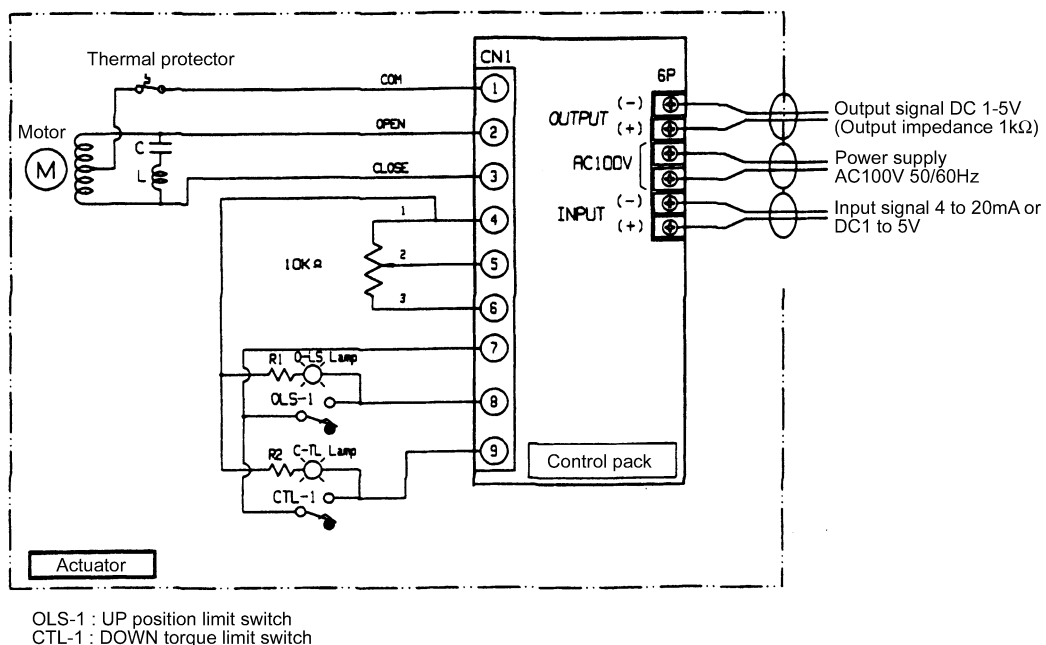
### 2-3-2 : Wiring procedure

Shown below is the wiring procedure for operation:

Step	Procedure
1	Loosen main body cover screw and remove cover
2	Connect cable to terminal board 6P of control pack. Refer to Figure 2-3 when connecting cable.



*Figure 2-2*



*Figure 2-3 Standard wiring diagram*

### 2-3-3 : Ground terminal

(Control action: proportional control)

When you open the cover, you will see a seal. Under the seal there is a ground terminal.

Please connect the ground wire securely to the ground terminal.

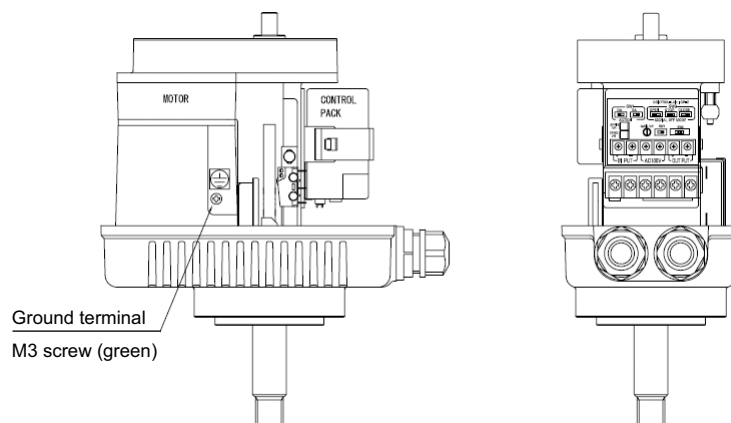


Figure 2-4 Ground terminal

### 2-3-4 : Selection of protection fuse and circuit breaker

Make sure that a power supply line is provided with a protection fuse or circuit breaker.

Refer to the table below for fuse or circuit breaker rating:

Actuator model No.	Fuse or protector rating	Motor size
EA1	2A	8W

## 2-4 : Check after installation and before operation

### 2-4-1 : Tightening torques

Tighten the packing flange nuts to prevent leakage from the gland part. Standard tightening torques are shown in Table 2-2.



## 2-4-2 : Pressure test

Check for any leakage from the process pipe.

**Table 2-2: Tightening Torques of Packing Flange Nuts**

Valve stem diameter (mm)	Yarn packing N.m {kgf-cm}	PTFE chevron packing N.m {kgf-cm}
13	5 {50}	0.8 {8}
16	12 {125}	
30	32 {320}	

**~Note**      *These tightening torques are only reference values, and may vary depending on the packing used.*

## 2-4-3 : Operational test

Apply a 4~20mA DC or 1~5V DC simulated input signal (0~100%) to actuator to verify rated travel of the actuator.

Refer to table 3-1 for tolerable travel. If the travel exceeds the specified tolerable value, adjust the actuator.

**Table 2-3: Control Valve Performance Characteristics**

Actuator model No.	Hysteresis	Linearity
EA1	Within 2% FS	Within $\pm 2\%$ FS

## 2-4-4 : Loop check

Apply an output signal of a higher level control system to the actuator, check and verify if the signal wires are connected as specified and fulfill the functional requirements for control.



### CAUTION

Make sure that power supply has been turned OFF before starting of manual operation. If the power supply is ON when manual operation starts, the handle may suddenly turn to reverse direction. Avoid manual operation over and beyond its upper and lower limits. This may cause malfunction.

## 2-5 : Manual operation

Manual opening and closing of control valve is described here.

Refer to this paragraph when manual operation is necessary.

### CAUTION

Make sure that the manual operation of the control valve with the handle does not hamper process equipment operation.

### 2-5-1 : Operating procedure

Step	Procedure
1	Remove rubber cap from main body cover. A rectangular hole on the manual shaft will be uncovered.
2	Remove attached handle which has been fastened by butterfly bolt and insert it into the hexagon hole.
3	Valve opens by turning of handle clockwise, and closes by turning it counterclockwise.
4	Replace rubber cap on actuator cover when manual operation is finished.

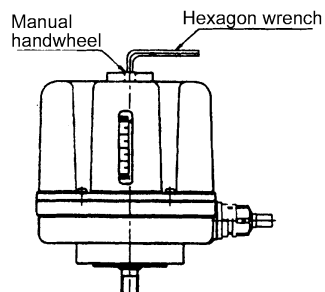


Figure 2-5

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# Chapter 3 : Inspection and Maintenance

## 3-1 : Inspection

Inspect and service the control valve as follows:

1. Tightening the gland

Tighten the gland approximately every 6 months. Follow the tightening procedures given in section, 2-4.

2. Check for valve position hunting. Refer to Chapter 6, "Trouble-shooting".

3. Check for abnormal noise or vibration. Refer to Chapter 6, "Trouble -shooting".



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## Chapter 4 : Disassembly and Assembly

This section covers the disassembly and assembly procedures for the valve's overhaul or modification

### 4-1 : Detaching Actuator from Valve Body

1. Operate control valve with the manual handle, so that the valve position pointer is 10% to 20% over the fully closed position.
2. Remove the stem connector by loosening the clamping bolts. Detach the actuator stem from the valve stem
3. Remove the yoke clamping nut.
4. Lift the actuator to detach it from the valve body.

#### CAUTION

1. Before detaching an actuator from a valve that has already been installed on the process pipe, be sure to shut down the process and release the process pressure.
2. Ensure that the valve body is cool before detaching.
3. Loosen all process piping bolts and nuts so that excessive stress is not being transferred to the eyebolts when detaching the control valve from the process pipe.

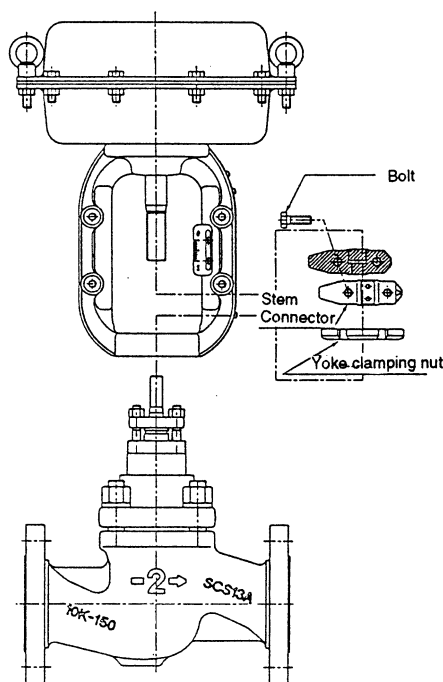


Figure 4-1 Disassembling the Actuator

## 4-2 : Disassembly and Assembly of Valve Body

To disassemble or assemble the valve body, refer to Figures 4-3 and 4-4 and proceed as described below.

### Disassembly Procedure

- (1) Loosen the hex nuts on the packing flange.
- (2) Remove the Hex nuts (1) from the bonnet
- (3) Lift and detach the bonnet from the valve body.
- (4) A seat ring is threaded into the valve body. To remove the seat ring, special tools (available as an option) are required.



#### CAUTION

If the valve plug comes out together with the bonnet, remove the plug from the bonnet by rotating the plug. When doing this, be careful not to damage the valve stem.

### Inspection

Inspect the disassembled parts for damage before assembly. If any damage is found, replace the parts. When ordering parts, refer to the PROD.No. of the valve indicated on the nameplate.

1. Do not reuse the gland packing once it has been removed. Always use new packing when reassembling the valve. In case of vacuum service, verify the gland packing type as shown in Figure 4-2.
2. Check that the seating surfaces of the plug and seat ring are not damaged.
3. Check that the gasket-contacting surfaces of valve body and bonnet which contact the gasket are not damaged. Do not reuse the same gasket. Always use a new gasket when reassembling the valve.
4. Check that the plug guide section, the stem, and the internal guiding sections of the guide bushing are not damaged.

### Assembly Procedure

1. Securely fasten the seat ring onto the threaded valve body, using the Procedure special (optional) tools. For the tightening torque, see Table 4-1. Apply lubricant "Neverseize" to the threaded sections, except for oil free valves.
2. Place the plug onto the seat ring
3. Put the bonnet onto the valve body and check that the bonnet is properly mated with the indented section of the valve body. Tighten the nuts alternately and evenly. For the tightening torque, see Table 4-2.
4. Insert the gland packing as shown in Figure 4-2.

**~Note** When yarn packing sheets are used, overlap the sheets so that their cut ends are alternately positioned.

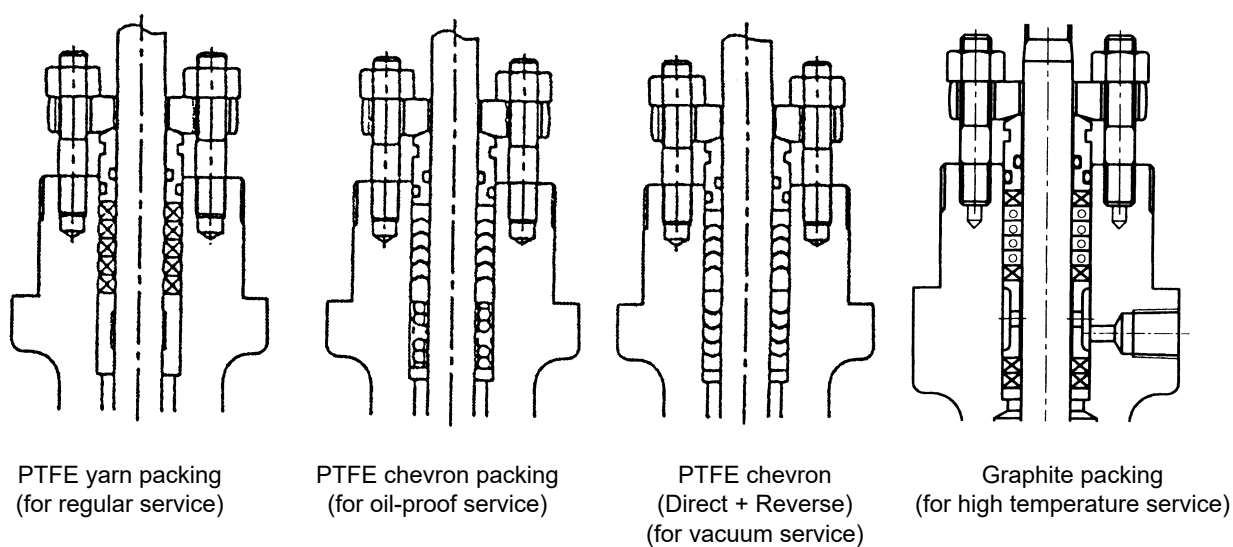
5. Install the packing follower and packing flange, and tighten the nuts. For the tightening torques, see Table 2-2.
6. Check that the external O-Ring of the packing follower is installed on the bonnet gland box.

**Table 4-1: Seat Ring Tightening Torque**

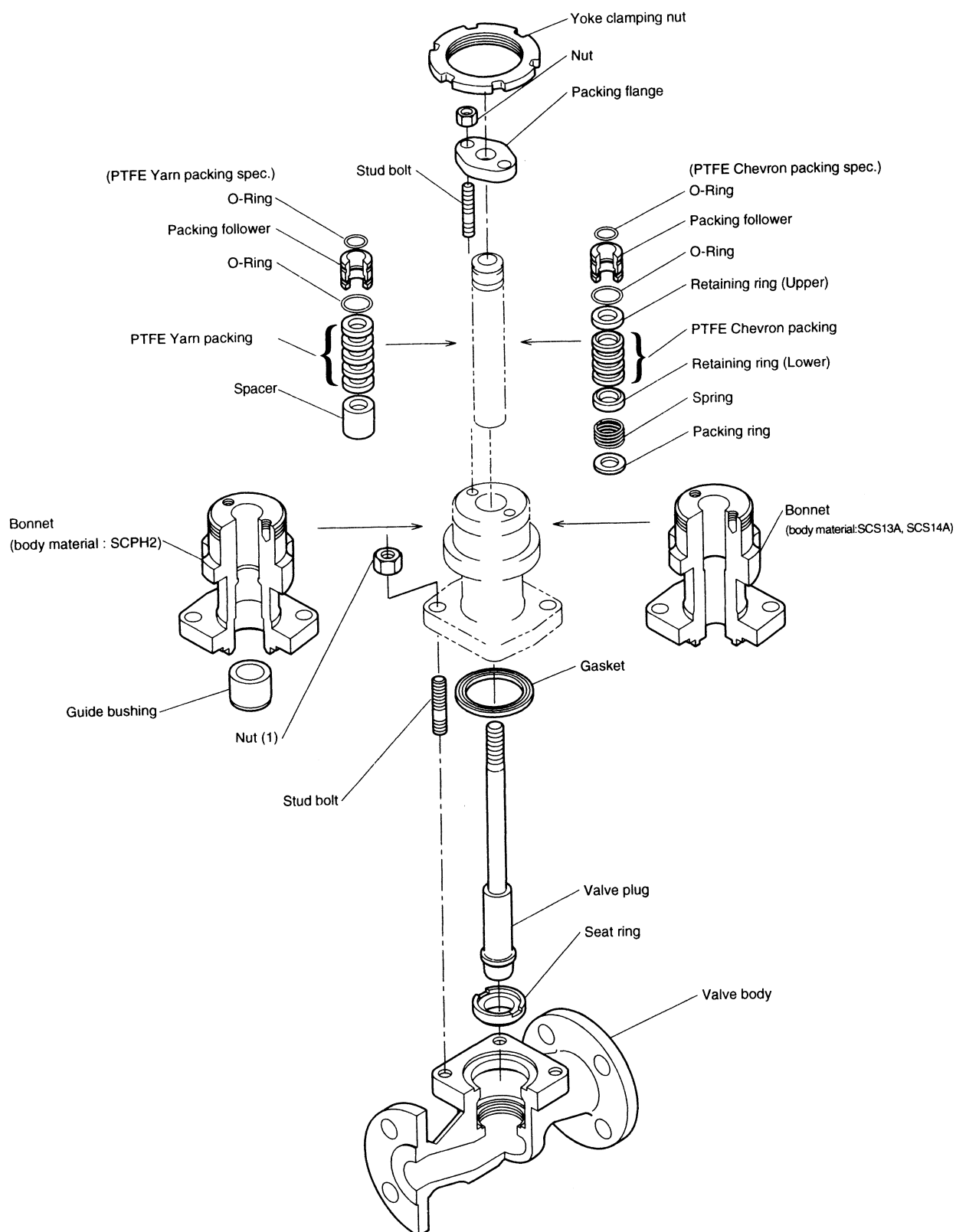
Body size (in.)	Torque N.m {kgf-cm}
1/2, 3/4, 1	140 {1400}
1-1/2, 2	210 {2100}

**Table 4-2: Tightening Torque of Bonnet Stud Bolts.**

Body size (in.)	Bolt size	Torque N.m {kgf-cm}
1/2, 3/4, 1	M10	140 {1400}
1-1/2, 2	M16	210 {2100}

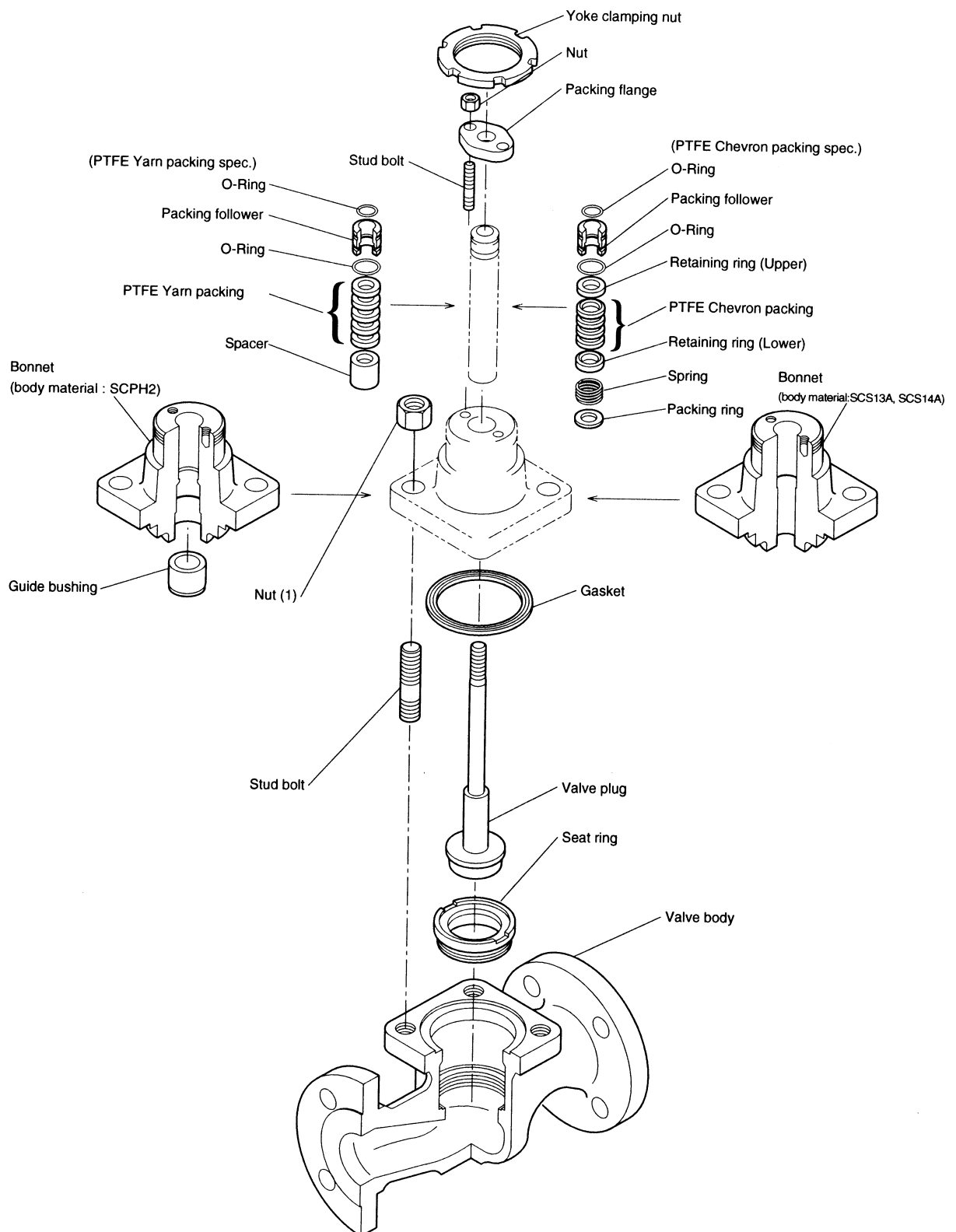


**Figure 4-2 Gland selection**



**Figure 4-3 Model AGVB Control Valve**  
(Available body sizes: 1/2, 3/4, 1 in.)





**Figure 4-4 Model AGVB Control Valve**  
(Available body sizes: 1½, 2 in.)



## Chapter 5 : Adjustment

Zero and span adjustments and mode settings with the signal is OFF are made from the control pack of the actuator.

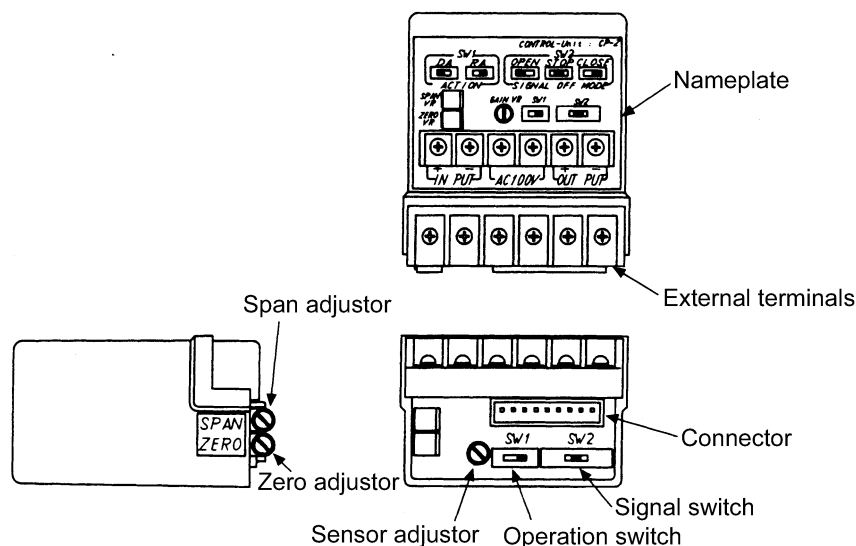


Figure 5-1 Control Pack

### 5-1 : Caution in setting operating mode

Make sure that the power supply is OFF when setting the operating mode.

### Zero/span adjustment and sensitivity setting

<Zero adjustment>

Step	Procedure
1	If the actuator is not connected to a cable, remove actuator cover and connect a cable to the terminal of the control pack. Refer to section 2-3 Electrical wiring connection.
2	Firmly press down the valve plug and ensure that it is seated against the valve seat.
3	Set the zero adjuster on control pack to the center of the range.
4	Apply an input signal for fully closed position. If zero is not set here, adjust the zero adjuster. Zero adjuster turns the valve toward open with a clockwise turn and closed with a counter clockwise turn.
5	Loosen screw on name scale to adjust the stem connector pointer to the closing position. Then fasten screws.

<Span adjustment>	
Step	Procedure
6	Apply a fully open signal to the actuator
7	If the index does not match with the fully open position of the scale, adjust span adjustor on control Pack. Span adjustor expands the range of operation with a clockwise turn of the volume and narrows with a counterclockwise turn.
8	Apply 20.1 to 20.4 mA DC signal for direct action, 3.9 to 3.6 mA DC signal for reverse action. Verify that pilot lamp is lit when valve plug firmly seats against valve seat. If the lamp is not lit, repeat steps 4 to 7 above.

#### <Sensitivity adjustment>

If hunting occurs after starting automatic operation or if the fluctuation of the control signal is drastic, adjust damping by using sensitivity adjustment. Under normal operation, the sensitivity does not require adjustment. If the sensor adjustor is turned clockwise, the sensitivity becomes higher and it becomes lower if the knob is turned counterclockwise.

## 5-2 : Operating mode setting

#### <Input signal and operating mode setting>

Operating mode can be changed from the operating mode setting switch (DA/RA ACTION).

(1) By setting the switch to the left hand side, direct action is set.

- On input signal of 20 mA DC ---> valve is fully open
- On input signal of 4 mA DC ---> valve is fully closed

(2) By setting the switch to the right hand side, reverse action is set.

- On input signal of 4 mA DC ---> valve is fully closed
- On input signal of 20 mA DC ---> valve is fully open

#### <Setting of input signal OFF mode>

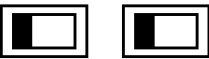
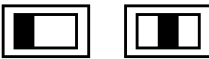
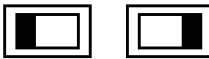
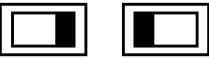


If the input signal cable opens or if input signal drops below 2 mA during operation, the device defines it as interruption of input signal and moves the valve or momentarily stops it as set by the (SIGNAL OFF MODE) switch.

(1) By setting of switch 'left', the valve stops in fully open position,

(2) By setting of switch 'center' the valve stops at the position of signal prior to interruption.

(3) By setting of switch 'right' the valve stops at fully closed position.

There are six direct, reverse and input signal interruption modes as shown below:

(Direct Action)	DA			
		OPEN	STOP	CLOSE
(Reverse Action)	RA			



## Chapter 6 : Trouble-shooting

Table 6-1 shows possible failures during operation. If any one of these failures occurs, take necessary remedial action including replacement of parts.

**Table 6-1: Control Valve malfunction and remedial action**

Symptom		Cause	Remedial action
Valve vibrates	Valve vibrates at any opening	Insufficient support	*Install supports in front and behind of valve
		Vibration source exists nearby	*Remove source
		Worn-out guide	*Replace guide bushing or valve plug
Sluggish valve movement	Valve movement sluggish in both up and down direction	Slurry adhering on valve plug guide or upper and lower bonnets.	*Disassemble and clean *Enlarge pressure balancing hole of guide *Modify body to steam jacket model *Replace with straight through model
		Gland packing deteriorated and hardened	*Replace gland packing or grease
Valve does not operate	Actuator does not operate	Power has not been turned ON	*Turn ON power
		Open wire or loose terminal board connection	*Replace wire or properly install terminal board
		Wrong or low power supply voltage	*Check voltage across power supply terminals and correct if necessary
		Thermal protector activated (Ambient temperature too high or valve load limitation exceeded)	*Reduce ambient temperature *Manually verify valve operation
		Faulty actuator	*Replace actuator
	Actuator does not function even though PS is ON	Jammed or seized valve stem guide	*Disassemble valve body, inspect and repair or replace with new one
		Foreign matters jamming on valve plug	*Disassemble, inspect and clean
		Bent valve stem	*Repair valve stem
		Actuator malfunction	*Check by isolating actuator functions from others

Symptom	Cause	Remedial action
Valve does not fully open/excessive leakage	Valve stem in fully closed position	Corroded, eroded, worn or scarred valve plug or seat ring
		*Re-lap valve seat *Re-machine seat *Replace valve plug and seat ring (Re-check hardening)
		Exterior of seat ring (thread or gasket) corroded or eroded
		*Replace seat ring or gasket *Re-examine seat ring assembly (welding model)
		Leakage from valve body wall
		*Patch weld pin-hole *Replace valve body
	Valve stem in fully open position	Excessive fluid differential pressure
		*Reduce differential pressure *Increase actuator output
		Jamming from foreign matter
		*Disassembly, inspect and clean
		Seized guide or plug
		*Re-machine seized part
	Inner fluid leaks out of gland packing	Loose packing gland or bolt
		*Tighten packing gland and bolt
		Grease depleted (asbestos packing)
		*Replenish grease
		Gland packing deteriorated
		*Replace gland packing (review material)
		Scar, corrosion or erosion of valve stem or packing box interior
		*Disassemble, re-machine or replace parts *Install valve packing protecting felt ring or rubber bellows (if dust is excessive)
	Inner fluid leaks out of gasket	Scar, corrosion or erosion of gasket's face
		*Replace gasket (review material)
	Valve opening changes and rangeability reduced	Corrosion, erosion or wear of valve plug
		*Replace valve plug and seat ring (review material for corrosive resistance or hardness)



---

## Chapter 7 : Recommended Spare Parts

It is recommended to replace the following parts when servicing the control valve.

### 1. Valve Body

Be sure to replace the following parts whenever the valve body is disassembled:

- Gland packing
- Gasket



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## **Chapter 8 : Disposal**

When this product becomes unnecessary, please dispose of it properly as industrial waste.

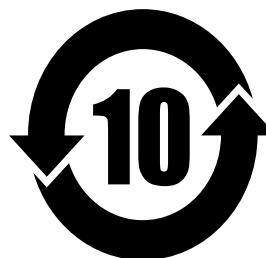


## Chapter 9 : ENVIRONMENTAL COMPLIANCE

Administrative Measures for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products (China RoHS)

The motor of this device complies with the China RoHS regulations.

产品名称	产品编号 · 型号
电动执行器	EA1,EA2,EA3 EA4,EA5



产品中有害物质的名称及含有的信息表										
部件名称	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚	邻苯二甲酸二(2-乙基)己酯	邻苯二甲酸丁基苄酯	邻苯二甲酸二正丁酯	邻苯二甲酸二异丁酯
	(Pb)	(Hg)	(Cd)	(Cr(VI))	(PBB)	(PBDE)	(DEHP)	(BBP)	(DBP)	(DIBP)
致动器	○	○	○	○	○	○	○	○	○	○
机组	×	○	○	○	○	○	○	○	○	○
扭矩限制器机组	×	○	○	○	○	○	○	○	○	○
印刷电路板	○	○	○	○	○	○	○	○	○	○
控制包	○	○	○	○	○	○	○	○	○	○
盖子类	○	○	○	○	○	○	○	○	○	○
注1：○：表示该有害物质在该部件所有均质材料中的含量均不超出电器电子产品有害物质限制使用国家标准要求。 ×：表示该有害物质至少在该部件的某一均质材料中的含量超出电器电子产品有害物质限制使用国家标准要求。 注2：以上未列出的部件，表明其有害物质含量均不超出电器电子产品有害物质限制使用国家标准要求。										



# Appendix A

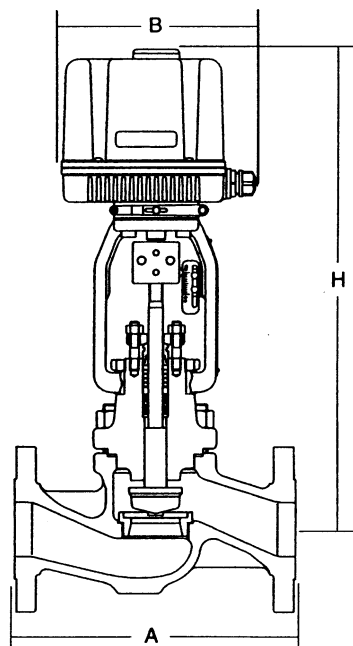
Table A-1, 2 shows the dimensions and weights of the control valves. Note that the addition of any optional specifications will change their installed dimensions and weights.

**Table A-1: Main dimensions and product weight**

Valve size (inch)	Actuator	Duimensions (mm)					
		A			B		B
		JIS 10K	JIS16K	JIS20K, 30K	General use bonnet	Extension bonnet	
		ANSI 150		ANSI 300			
		JPI 150		JPI 300			
1/2, 3/4	EA1	184	190	194	445	570	180
1		184	193	197	445	570	180
1-1/2		222	231	235	445	630	180
2		254	263	267	445	630	180

**Table A-2: Product Weight (kg)**

Valve size (inch)	JIS 10K, ANSI 150, JPI 150		JIS 16K		JIS 20K, 30K, ANSI 300, JPI 300	
	General use bonnet	Extension bonnet	General use bonnet	Extension bonnet	General use bonnet	Extension bonnet
1/2	12	13	12	13	13	14
3/4	13	14	13	14	15	16
1	14	15	14	15	16	17
1-1/2	21	25	21	25	26	30
2	24	28	24	28	27	31



*Figure A-1 Face-to-face dimension and overall dimensions*





# Appendix B

## Parts List

### 1. Bonnet

#### 1-1. Bonnet for fluid temperature -17 to 230 deg.C : Standard Actuator

Connection Size	Body Material	Trim Material	Actuator	Additional Condition	Parts No.
1/2 inch 3/4 inch 1 inch	SCPH2	SUS440C	EA1		82-553462 - 111
		SUS316 316Soft Seat	EA1		82-553462 - 111
		SUS316 316Soft Seat	EA1	Oil free	82-553462 - 131
		SUS316Stellite Stellite face	EA1		82-553462 - 121
	SCS13A	SUS440C	EA1		82-553462 - 112
		SUS316 316Soft Seat	EA1		82-553462 - 101
		SUS316 316Soft Seat	EA1	Oil free	82-553462 - 132
		SUS316Stellite Stellite face	EA1		82-553462 - 122
	SCS14A	SUS316 316Soft Seat	EA1		82-553288 - 102
		SUS316 316Soft Seat	EA1	Oil free	82-553462 - 133
		SUS316Stellite Stellite face	EA1		82-553462 - 123
1½ inch 2 inch	SCPH2	SUS440C	EA1		82-553462 - 211
		SUS316 316Soft Seat	EA1		82-553462 - 211
		SUS316 316Soft Seat	EA1	Oil free	82-553462 - 231
		SUS316Stellite Stellite face	EA1		82-553462 - 221
	SCS13A	SUS440C	EA1		82-553462 - 212
		SUS316 316Soft Seat	EA1		82-552993 - 101
		SUS316 316Soft Seat	EA1	Oil free	82-553462 - 232
		SUS316Stellite Stellite face	EA1		82-553462 - 222
	SCS14A	SUS316 316Soft Seat	EA1		82-552993 - 102
		SUS316 316Soft Seat	EA1	Oil free	82-553462 - 233
		SUS316Stellite	EA1		82-553462 - 223

## 2. Valve plug with stem

Plug is packed with the stem attached

## 2-1. Connection Size 1/2inch to 1inch

\* of these part's numbers means the following materials.

for Cv value=0.25 or under, the material is only SUS316 Stellite face.

*	Material Table
5	SUS316 Stellite face
6	SUS316L
7	SUS316L Stellite

Standard: For fluid temperature -17 to 230 deg.C

Others: Lower than -17 deg.C, higher than 230 deg.C

Connection Size (inch)	Cv value	Material	Flow characteristic	Actuator	Additional Condition	Part No.
1/2    3/4    1	0.1	Refer to Material table	linear	EA1	Standard	82-553274 - 0 1 *
			linear	EA1	Others	82-553764 - 0 1 *
	0.16		linear	EA1	Standard	82-553274 - 0 2 *
			linear	EA1	Others	82-553764 - 0 2 *
	0.25		linear	EA1	Standard	82-553274 - 0 3 *
			linear	EA1	Others	82-553764 - 0 3 *

## 2-2. Connection Size 1/2inch to 1inch Cv0.4 or upper : Metal Seat

The "" mark in the column of parts No. means materials.

For details, please refer to the following table.

*	Material Table
2	SUS316
5	SUS316 Stellite (For Cv value=0.25 or under chose "8")
6	SUS316L
7	SUS316L Stellite
8	SUS316 Stellite face

Connection Size (inch)	Cv value	Material	Flow characteristic	Actuator	Additional Condition	Parts No.
1/2    3/4    1	0.4	Refer to Material table	equal percent	EA1	Standard	82-553274 - 0 4 *
			equal percent	EA1	Others	82-553764 - 0 4 *
	0.63		equal percent	EA1	Standard	82-553274 - 0 5 *
			equal percent	EA1	Others	82-553764 - 0 5 *
	1.0		equal percent	EA1	Standard	82-553274 - 0 6 *
			equal percent	EA1	Others	82-553764 - 0 6 *
	1.6		equal percent	EA1	Standard	82-553274 - 0 7 *
			equal percent	EA1	Others	82-553764 - 0 7 *
	2.5		equal percent	EA1	Standard	82-553274 - 0 8 *
			equal percent	EA1	Others	82-553764 - 0 8 *
	4		equal percent	EA1	Standard	82-553274 - 0 9 *
			equal percent	EA1	Others	82-553764 - 0 9 *
3/4    1	6.3		equal percent	EA1	Standard	82-553274 - 1 6 *
			equal percent	EA1	Others	82-553764 - 1 3 *
	8		equal percent	EA1	Standard	82-553274 - 1 0 *
			equal percent	EA1	Others	82-553764 - 1 0 *
1	10		equal percent	EA1	Standard	82-553274 - 1 1 *
			equal percent	EA1	Others	82-553764 - 1 1 *
	14		equal percent	EA1	Standard	82-553274 - 1 2 *
			equal percent	EA1	Others	82-553764 - 1 2 *

## 2-3. Connection Size 1/2 to 1 inch Material SUS440C : Metal seat

Connection Size (inch)			Cv value	Material	Flow characteristic	Actuator	Additional Condition	Parts No.				
1/2      3/4      1			0.1	SUS440C	linear	EA1	Standard	82-553471	-	0	1	1
					linear	EA1	Others	82-553766	-	0	1	1
			0.16		linear	EA1	Standard	82-553471	-	0	2	1
					linear	EA1	Others	82-553766	-	0	2	1
			0.25		linear	EA1	Standard	82-553471	-	0	3	1
					linear	EA1	Others	82-553766	-	0	3	1
			0.4		equal percent	EA1	Standard	82-553471	-	0	4	1
					equal percent	EA1	Others	82-553766	-	0	4	1
			0.63		equal percent	EA1	Standard	82-553471	-	0	5	1
					equal percent	EA1	Others	82-553766	-	0	5	1
			1.0		equal percent	EA1	Standard	82-553471	-	0	6	1
					equal percent	EA1	Others	82-553766	-	0	6	1
			1.6		equal percent	EA1	Standard	82-553471	-	0	7	1
					equal percent	EA1	Others	82-553766	-	0	7	1
			2.5		equal percent	EA1	Standard	82-553471	-	0	8	1
					equal percent	EA1	Others	82-553766	-	0	8	1
			4		equal percent	EA1	Standard	82-553471	-	0	9	1
					equal percent	EA1	Others	82-553766	-	0	9	1
3/4      1			6.3	SUS440C	equal percent	EA1	Standard	82-553471	-	1	6	1
					equal percent	EA1	Others	82-553766	-	1	7	1
			8		equal percent	EA1	Standard	82-553471	-	1	0	1
					equal percent	EA1	Others	82-553766	-	1	0	1
1			10	SUS440C	equal percent	EA1	Standard	82-553471	-	1	1	1
					equal percent	EA1	Others	82-553766	-	1	1	1
			14		equal percent	EA1	Standard	82-553471	-	1	2	1
					equal percent	EA1	Others	82-553766	-	1	2	1

## 2-4. Connection Size 1 ½ to 2inch : Bonnet for fluid temperature -17 to 230 deg.C

Connection Size (inch)	Port size (inch)	Material	Flow characteristic	Actuator	Additional Condition	Parts No.
1 ½	1	SUS316	equal percent	EA1	Standard	82-553274 - 1 2 2
			equal percent	EA1	Standard	82-553912 - 0 1 2
		SUS316 Stellite	equal percent	EA1	Standard	82-553274 - 1 2 5
			equal percent	EA1	Standard	82-553912 - 0 1 5
		SUS316 Stellite face	equal percent	EA1	Standard	82-553274 - 1 2 8
			equal percent	EA1	Standard	82-553912 - 0 1 8
		SUS440C	equal percent	EA1	Standard	82-553471 - 1 2 1
			equal percent	EA1	Standard	82-553911 - 0 1 1
		SUS316L	equal percent	EA1	Standard	82-553274 - 1 2 6
			equal percent	EA1	Standard	82-553912 - 0 1 6
		SUS316L Stellite	equal percent	EA1	Standard	82-553274 - 1 2 7
			equal percent	EA1	Standard	82-553912 - 0 1 7
1½ 2	1 ¼	SUS316	equal percent	EA1	Standard	82-553274 - 1 4 2
			equal percent	EA1	Standard	82-553912 - 0 3 2
		SUS316Stellite	equal percent	EA1	Standard	82-553274 - 1 4 5
			equal percent	EA1	Standard	82-553912 - 0 3 5
		SUS316 Stellite face	equal percent	EA1	Standard	82-553274 - 1 4 8
			equal percent	EA1	Standard	82-553912 - 0 3 8
		SUS440C	equal percent	EA1	Standard	82-553471 - 1 4 1
			equal percent	EA1	Standard	82-553911 - 0 3 1
		SUS316L	equal percent	EA1	Standard	82-553274 - 1 4 6
			equal percent	EA1	Standard	82-553912 - 0 3 6
		SUS316L Stellite	equal percent	EA1	Standard	82-553274 - 1 4 7
			equal percent	EA1	Standard	82-553912 - 0 3 7
1½ 2	1 ½	SUS316	equal percent	EA1	Standard	82-553274 - 1 3 2
			equal percent	EA1	Standard	82-553912 - 0 2 2
		SUS316Stellite	equal percent	EA1	Standard	82-553274 - 1 3 5
			equal percent	EA1	Standard	82-553912 - 0 2 5
		SUS316Stellite face	equal percent	EA1	Standard	82-553274 - 1 3 8
			equal percent	EA1	Standard	82-553912 - 0 2 8
		SUS440C	equal percent	EA1	Standard	82-553471 - 1 3 1
			equal percent	EA1	Standard	82-553911 - 0 2 1
		SUS316L	equal percent	EA1	Standard	82-553274 - 1 3 6
			equal percent	EA1	Standard	82-553912 - 0 2 6
		SUS316 Stellite	equal percent	EA1	Standard	82-553274 - 1 3 7
			equal percent	EA1	Standard	82-553912 - 0 2 7
2	2	SUS316	equal percent	EA1	Standard	82-553274 - 1 5 2
			equal percent	EA1	Standard	82-553912 - 0 4 2
		SUS316 Stellite	equal percent	EA1	Standard	82-553274 - 1 5 5
			equal percent	EA1	Standard	82-553912 - 0 4 5
		SUS316 Stellite face	equal percent	EA1	Standard	82-553274 - 1 5 8
			equal percent	EA1	Standard	82-553912 - 0 4 8
		SUS440C	equal percent	EA1	Standard	82-553471 - 1 5 1
			equal percent	EA1	Standard	82-553911 - 0 4 1
		SUS316L	equal percent	EA1	Standard	82-553274 - 1 5 6
			equal percent	EA1	Standard	82-553912 - 0 4 6
		SUS316L Stellite	equal percent	EA1	Standard	82-553274 - 1 5 7
			equal percent	EA1	Standard	82-553912 - 0 4 7

## 2-5. Connection Size 1 ½ to 2 inch : Bonnet for fluid temperature higher than 230 deg.C

Connection Size (inch)	Port size (inch)	Material	Flow characteristic	Actuator	Additional Condition	Parts No.
1 ½	1	SUS316	equal percent	EA1	Others	82-553771 - 1 3 2
			equal percent	EA1	Others	82-554094 - 0 1 2
		SUS316Stellite	equal percent	EA1	Others	82-553771 - 1 3 5
			equal percent	EA1	Others	82-554094 - 0 1 5
		SUS316Stellite face	equal percent	EA1	Others	82-553771 - 1 3 8
			equal percent	EA1	Others	82-554094 - 0 1 8
		SUS440C	equal percent	EA1	Others	82-553766 - 1 3 1
			equal percent	EA1	Others	82-553931 - 0 1 1
		SUS316L	equal percent	EA1	Others	82-553771 - 1 3 6
			equal percent	EA1	Others	82-554094 - 0 1 6
		SUS316L Stellite	equal percent	EA1	Others	82-553771 - 1 3 7
			equal percent	EA1	Others	82-554094 - 0 1 7
1 ½ 2	1 ¼	SUS316	equal percent	EA1	Others	82-553771 - 1 5 2
			equal percent	EA1	Others	82-554094 - 0 3 2
		SUS316Stellite	equal percent	EA1	Others	82-553771 - 1 5 5
			equal percent	EA1	Others	82-554094 - 0 3 5
		SUS316 Stellite face	equal percent	EA1	Others	82-553771 - 1 5 8
			equal percent	EA1	Others	82-554094 - 0 3 8
		SUS440C	equal percent	EA1	Others	82-553766 - 1 5 1
			equal percent	EA1	Others	82-553931 - 0 3 1
		SUS316L	equal percent	EA1	Others	82-553771 - 1 5 6
			equal percent	EA1	Others	82-554094 - 0 3 6
		SUS316L Stellite	equal percent	EA1	Others	82-553771 - 1 5 7
			equal percent	EA1	Others	82-554094 - 0 3 7
1 ½ 2	1 ½	SUS316	equal percent	EA1	Others	82-553771 - 1 4 2
			equal percent	EA1	Others	82-554094 - 0 2 2
		SUS316 Stellite	equal percent	EA1	Others	82-553771 - 1 4 5
			equal percent	EA1	Others	82-554094 - 0 2 5
		SUS316 Stellite face	equal percent	EA1	Others	82-553771 - 1 4 8
			equal percent	EA1	Others	82-554094 - 0 2 8
		SUS440C	equal percent	EA1	Others	82-553766 - 1 4 1
			equal percent	EA1	Others	82-553931 - 0 2 1
		SUS316L	equal percent	EA1	Others	82-553771 - 1 4 6
			equal percent	EA1	Others	82-554094 - 0 2 6
		SUS316L Stellite	equal percent	EA1	Others	82-553771 - 1 4 7
			equal percent	EA1	Others	82-554094 - 0 2 7
2	2	SUS316	equal percent	EA1	Others	82-553771 - 1 6 2
			equal percent	EA1	Others	82-554094 - 0 4 2
		SUS316 Stellite	equal percent	EA1	Others	82-553771 - 1 6 5
			equal percent	EA1	Others	82-554094 - 0 4 5
		SUS316 Stellite face	equal percent	EA1	Others	82-553771 - 1 6 8
			equal percent	EA1	Others	82-554094 - 0 4 8
		SUS440C	equal percent	EA1	Others	82-553766 - 1 6 1
			equal percent	EA1	Others	82-553931 - 0 4 1
		SUS316L	equal percent	EA1	Others	82-553771 - 1 6 6
			equal percent	EA1	Others	82-554094 - 0 4 6
		SUS316 LStellite	equal percent	EA1	Others	82-553771 - 1 6 7
			equal percent	EA1	Others	82-554094 - 0 4 7

## 2-6. Three-face cut off plug

## 2-6-1. Connection Size 1/2inch to 1inch under CV0.25 : metal seat

The "\*" mark in the column of parts No. in table means materials.

For the details, please refer to the following table.

for Cv value=0.25 or under, the material is only SUS316 Stellite face.

*	Material Table
8	SUS316 Stellite face
6	SUS316L
7	SUS316L Stellite

Connection Size (inch)	Cv value	Material	Flow characteristic	Actuator	Additional condition	Parts No.
1/2    3/4    1	0.1	Refer to Material Table	linear	EA1	Standard	82-554885 - 0 1 *
	0.16		linear	EA1	Standard	82-554885 - 0 2 *
	0.25		linear	EA1	Standard	82-554885 - 0 3 *

## 2-6-2. Connection Size 1/2inch to 1inch over Cv0.4 : Metal Seat

The "\*" mark in the column of parts No. means materials.

For the details, please refer to the following table.

*	Material Table
2	SUS316
5	SUS316 Stellite (For Cv value=0.25 or under chose"8")
6	SUS316L
7	SUS316L Stellite
8	SU316 Stellite face

Connection Size (inch)	Cv value	Material	Flow characteristic	Actuator	Additional condition	Parts No.
1/2    3/4    1	0.4	Refer to Material Table	equal percent	EA1	Standard	82-554885 - 0 4 *
	0.63		equal percent	EA1	Standard	82-554885 - 0 5 *
	1.0		equal percent	EA1	Standard	82-554885 - 0 6 *
	1.6		equal percent	EA1	Standard	82-554885 - 0 7 *
	2.5		equal percent	EA1	Standard	82-554885 - 0 8 *
	4		equal percent	EA1	Standard	82-554885 - 0 9 *
3/4    1	6.3		equal percent	EA1	Standard	82-554885 - 2 5 *
	8		equal percent	EA1	Standard	82-554885 - 1 0 *
1	10		equal percent	EA1	Standard	82-554885 - 1 1 *
	14		equal percent	EA1	Standard	82-554885 - 1 2 *

## 2-6-3. Connection Size 1 ½ to 2 inch : Bonnet for fluid temperature -17 to 230 deg.C

Connection Size (inch)	Portsize (inch)	Material	Flow characteristic	Actuator	Additional condition	Parts No.
1 ½	1	SUS316	equal percent	EA1	Standard	82-554885 - 1 2 2
		SUS316Stellite	equal percent	EA1	Standard	82-554885 - 1 2 5
		SUS316Stellite face	equal percent	EA1	Standard	82-554885 - 1 2 8
		SUS440C	equal percent	EA1	Standard	Refer to factory
		SUS316L	equal percent	EA1	Standard	82-554885 - 1 2 6
		SUS316LStellite	equal percent	EA1	Standard	82-554885 - 1 2 7
1 ½ 2	1 ¼	SUS316	equal percent	EA1	Standard	82-554885 - 1 4 2
		SUS316Stellite	equal percent	EA1	Standard	82-554885 - 1 4 5
		SUS316Stellite face	equal percent	EA1	Standard	82-554885 - 1 4 8
		SUS440C	equal percent	EA1	Standard	Refer to factory
		SUS316L	equal percent	EA1	Standard	82-554885 - 1 4 6
		SUS316LStellite	equal percent	EA1	Standard	82-554885 - 1 4 7
1 ½ 2	1 ½	SUS316	equal percent	EA1	Standard	82-554885 - 1 3 2
		SUS316Stellite	equal percent	EA1	Standard	82-554885 - 1 3 5
		SUS316Stellite face	equal percent	EA1	Standard	82-554885 - 1 3 8
		SUS440C	equal percent	EA1	Standard	Refer to factory
		SUS316L	equal percent	EA1	Standard	82-554885 - 1 3 6
		SUS316Stellite	equal percent	EA1	Standard	82-554885 - 1 3 7
2	2	SUS316	equal percent	EA1	Standard	82-554885 - 1 5 2
		SUS316Stellite	equal percent	EA1	Standard	82-554885 - 1 5 5
		SUS316Stellite face	equal percent	EA1	Standard	82-554885 - 1 5 8
		SUS440C	equal percent	EA1	Standard	Refer to factory
		SUS316L	equal percent	EA1	Standard	82-554885 - 1 5 6
		SUS316LStellite	equal percent	EA1	Standard	82-554885 - 1 5 7

## 3. Seat ring

## 3-1. Connection Size 1/2inch to 1inch

\* of these parts' numbers means the following materials.

for Cv value=0.25 or under, the material is only SUS316 Stellite face.

*	Material Table
2	SUS316
3	SUS440C
5	SUS316 Stellite
6	SUS316L
7	SUS316L Stellite

Connection Size (inch)			Cv value	Material	Additional condition	Parts No.
1/2      3/4      1			0.1	Refer to Material Table		82-553264 - 0 1 *
			0.16			82-553264 - 0 1 *
			0.25			82-553264 - 0 1 *
			0.4			82-553264 - 0 2 *
			0.63			82-553264 - 0 2 *
			1			82-553264 - 0 3 *
			1.6			82-553264 - 0 3 *
			2.5			82-553264 - 0 4 *
			4			82-553264 - 0 4 *
3/4      1			6.3			82-553264 - 0 5 *
			8			82-553264 - 0 5 *
1			10			82-553008 - 1 0 *
			14			82-553008 - 1 0 *



## 3-2. Connection Size 1 ½ to 2 inch

Connection Size	Port size	Material	Additional condition	Parts No.
1 ½	1	SUS316		82-553010 - 0 4 2
		SUS316 Stellite		82-553010 - 0 4 5
		SUS440C		82-553010 - 0 4 3
		SUS316L		82-553010 - 0 4 6
		SUS316L Stellite		82-553010 - 0 4 7
1 ½ 2	1 ¼	SUS316		82-553010 - 0 3 2
		SUS316Stellite		82-553010 - 0 3 5
		SUS440C		82-553010 - 0 3 3
		SUS316L		82-553010 - 0 3 6
		SUS316L Stellite		82-553010 - 0 3 7
1 ½ 2	1 ½	SUS316		82-553010 - 0 2 2
		SUS316Stellite		82-553010 - 0 2 5
		SUS440C		82-553010 - 0 2 3
		SUS316L		82-553010 - 0 2 6
		SUS316L Stellite		82-553010 - 0 2 7
2	2	SUS316		82-553010 - 0 1 2
		SUS316Stellite		82-553010 - 0 1 5
		SUS440C		82-553010 - 0 1 3
		SUS316L		82-553010 - 0 1 6
		SUS316L Stellite		82-553010 - 0 1 7

## 4. Gasket

Gasket : Gasket between bonnet and valve body

## 4-1. For general use

Seat Gasket : Gasket between seat ring and valve body

Connection Size	Parts	Material	Parts No.	Qty
1/2 3/4 1	Gasket	V543(PTFE)	82-553016 - 1 0 1	1
1 ½ 2	Gasket	V543(PTFE)	82-553016 - 2 0 1	1

## 4-2. For oil free treatment

Connection Size	Parts	Material	Parts No.	Qty
1/2 3/4 1	Gasket	V543(PTFE)	82-553016 - 1 0 1	1
	Seat Gasket	V543(PTFE)	82-660153 - 1 0 1	1
1 ½ 2	Gasket	V543(PTFE)	82-553016 - 2 0 1	1
	Seat Gasket	V543(PTFE)	82-660153 - 3 0 1	1

## 4-3. For high temperature

Connection Size	Parts	Material	Parts No.	Qty
1/2 3/4 1	Gasket	V543	82-553757 - 1 0 1	1
	Seat Gasket	V563(Monel)	82-553756 - 1 0 1	1
1 ½ 2	Gasket	V543	82-553757 - 2 0 1	1
	Seat Gasket	V563(Monel)	82-553756 - 2 0 1	1

## 5. Gland packing

## 5-1. PTFE Yarn packing : For general use

Connection Size	Actuator	Model No.	Additional condition	Parts No.	Qty
1/2 inch to 2inch	EA1	P4519		82-553327-101	5

## 5-2. V type PTFE packing : For oil free

Connection Size	Actuator	Model No.	Additional condition	Parts No.	Qty
1/2 inch to 2inch	EA1	V-PTFE		82-553020-101	4

## 5-3. V type PTFE packing : For vacuum service

Connection Size	Actuator	Model No.	Additional condition	Parts No.	Qty
1/2 inch to 2inch	EA1	V-PTFE	Direct/Reverse	82-553020-101	6

## 5-4. Graphite yarn packing : For high temperature

Connection Size	Actuator	Model No.	Additional condition	Parts No.	Qty
1/2 inch to 2inch	EA1	P6610CL		82-554274-101	3
		P6722		82-554275-101	4

## 6. Surrounding parts of gland packing

## 6-1. PTFE Yarn packing (P4519) used : For general use

## Actuator EA1

Parts	Actuator	Material	Additional condition	Parts No.	Qty
Packing follower	EA1	SUS316		82-553026-101	1
O-ring (P18)	EA1	Aflas		82-592221-801	1
O-ring (P12.5)	EA1	Aflas		82-592221-401	1
Spacer	EA1	SUS316		82-553331-125	1

## 6-2. V type PTFE packing : For general use

## Actuator EA1

Parts	Actuator	Material	Additional condition	Parts No.	Qty
Packing follower	EA1	SUS316		82-553026-101	1
O-ring (P18)	EA1	Aflas		82-592221-801	1
O-ring (P12.5)	EA1	Aflas		82-592221-401	1
Retaining ring upper	EA1	SUS316		82-553272-101	1
Retaining ring lower	EA1	SUS316		82-553273-101	1
Spring	EA1			82-553329-101	1
Packing ring	EA1	SUS316		82-509712-166	1
Spacer	EA1	SUS316		82-553331-111	1

## 6-3. V type PTFE packing : For oil free use

## Actuator EA1

Parts	Actuator	Material	Additional condition	Parts No.	Qty
Packing follower	EA1	SUS316	Oil free	82-553026-101	1
O-ring (P18)	EA1	Biton	Oil free	82-592221-897	1
O-ring (P12.5)	EA1	Biton	Oil free	82-592221-497	1
Retaining ring upper	EA1	SUS316	Oil free	82-553272-101	1
Retaining ring lower	EA1	SUS316	Oil free	82-553273-101	1
Spring	EA1		Oil free	82-553329-101	1
Packing ring	EA1	SUS316	Oil free	82-509712-166	1
Spacer	EA1	SUS316	Oil free	82-553331-111	1

## 6-4. V type PTFE packing (direct/reverse) use : For vacuum service use

## Actuator EA1

Parts	Actuator	Material	Additional condition	Parts No.	Qty
Packing follower	EA1	SUS316	For vacuum	82-553026-101	1
O-ring (P18)	EA1	Aflas	For vacuum	82-592221-801	1
O-ring (P12.5)	EA1	Aflas	For vacuum	82-592221-401	1
Retaining ring upper	EA1	SUS316	For vacuum	82-553272-101	2
Retaining ring lower	EA1	SUS316	For vacuum	82-553273-101	2
Packing ring	EA1	SUS316	For vacuum	82-509712-166	2

6-5. V type PTFE packing (direct/reverse) use : For vacuum service and oil free use

Actuator EA1

Parts	Actuator	Material	Additional condition	Parts No.	Qty
Packing follower	EA1	SUS316	For vacuum • Oil free	82-553026-101	1
O-ring (P18)	EA1	Biton	For vacuum • Oil free	82-592221-897	1
O-ring (P12.5)	EA1	Biton	For vacuum • Oil free	82-592221-497	1
Retaining ring upper	EA1	SUS316	For vacuum • Oil free	82-553272-101	2
Retaining ring lower	EA1	SUS316	For vacuum • Oil free	82-553273-101	2
Packing ring	EA1	SUS316	For vacuum • Oil free	82-509712-166	2

6-6. Graphite yarn packing used : For high temperature service use

Actuator EA1

Parts	Actuator	Material	Additional condition	Parts No.	Qty
Packing follower	EA1	SUS316	High temperature	82-553026-101	1
		SUS316L	High temperature	82-553026-201	1
O-ring (P18)	EA1	Biton	High temperature	82-592221-897	1
O-ring (P12.5)	EA1	Biton	High temperature	82-592221-497	1
Lantern ring	EA1	SUS316	High temperature	82-553862-101	1
		SUS316L		82-553862-201	1
Packing ring	EA1	SUS316	High temperature	82-509712-166	1
		SUS316L		82-509712-201	1

7. Other parts

Parts	Actuator	Material	Additional condition	Parts No.	Qty
Packing flange	EA1	SCS13		82-553028-201	1
Stud bolt	EA1	SUS304		82-592002-264	2
Nut	EA1	SUS304		82-592103-264	2
Nut	EA1	SUS304		82-592103-464	2
Nut to fasten yolk	EA1	S25C		82-509501-126	1



# Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products.

You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

## 1. Warranty period and warranty scope

### 1.1 Warranty period

Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

### 1.2 Warranty scope

In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place. Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

- (1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
- (2) Failure caused for other reasons than Azbil Corporation's product;
- (3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
- (4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
- (5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
- (6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

## 2. Ascertainment of suitability

You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

- (1) Regulations and standards or laws that your Equipment is to comply with.
- (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
- (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use

Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down. You are required to provide your Equipment with safety design such as fool-proof design,\*1 and fail-safe design\*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance,\*3 fault tolerance,\*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

\*1. A design that is safe even if the user makes an error.

\*2. A design that is safe even if the device fails.

\*3. Avoidance of device failure by using highly reliable components, etc.

\*4. The use of redundancy.

## 3. Precautions and restrictions on application

### 3.1 Restrictions on application

Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality*5 required	Nuclear power quality*5 not required
Within a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Cannot be used (except for limit switches for nuclear power*7)
Outside a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Can be used

\*5. Nuclear power quality: compliance with JEAG 4121 required

\*6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes," etc.

\*7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

Any Azbil Corporation's products shall not be used for/with medical equipment.

The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product. However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

### 3.2 Precautions on application

you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below. Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility

to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

- (1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals
- (2) For use of specific purposes, such as:
  - \* Nuclear energy/radiation related facilities  
[When used outside a radiation controlled area and where nuclear power quality is not required]  
[When the limit switch for nuclear power is used]
  - \* Machinery or equipment for space/sea bottom
  - \* Transportation equipment  
[Railway, aircraft, vessels, vehicle equipment, etc.]
  - \* Antidisaster/crime-prevention equipment
  - \* Burning appliances
  - \* Electrothermal equipment
  - \* Amusement facilities
  - \* Facilities/applications associated directly with billing
- (3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
- (4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
- (5) Machinery or equipment that may affect human lives, human bodies or properties
- (6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety

#### 4. Precautions against long-term use

Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.

#### 5. Recommendation for renewal

Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations.

In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.

#### 6. Other precautions

Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.

#### 7. Changes to specifications

Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquiries or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.

#### 8. Discontinuance of the supply of products/parts

Please note that the production of any Azbil Corporation's product may be discontinued without notice. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.

For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.

#### 9. Scope of services

Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

- (1) Installation, adjustment, guidance, and attendance at a test run
- (2) Maintenance, inspection, adjustment, and repair
- (3) Technical guidance and technical education
- (4) Special test or special inspection of a product under the conditions specified by you

Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.









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<b>Document Number:</b>	CM2-AGV300-2003
<b>Document Name:</b>	Electric Top-Guided Single-Seated Control Valves Model: AGVB / AGVM User's Manual
<b>Date:</b>	2nd edition: Nov. 2025
<b>Issued/Edited by:</b>	Azbil Corporation

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