

Electric Top-Guided Single-Seated Control Valves

Model AGVB__ __/AGVM__ __

OVERVIEW

Model AGVB/AGVM range of top-guided single-seat control valves features a compact valve body with excellent flow control and minimal pressure loss. Model AGVB/AGVM valves have large Cv values, high range ability, and accurate flow control performance.

When securely held in place by a top-guided stem with a long stroke, the valve plug is highly resistant against vibration and provides flow shutoff performance that fully satisfies IEC standards.

The actuator section performs two-position control or proportional control by directly receiving the signal of 4 to 20 mA DC or 1 to 5V DC from the electronic-type controller. The provided electric-type actuator offers high accuracy, compactness, and sturdy structure.

Model AGVB/AGVM control valves are especially suitable for process control applications where high reliability and tight flow shutoff are essential.

1. Selection of Model AGVB/AGVM Specifications

Selection of control valves has traditionally required knowledge and experience. However, Model AGVB/AGVM offers you more accurate product specifications, so that you can easily pinpoint the control valve that satisfies fluid specifications (such as flowrate, pressure, and temperature) at your plant and provides the functions that you need.

If you do not find a valve that completely satisfies your requirements, contact the Azbil Group representative for assistance.

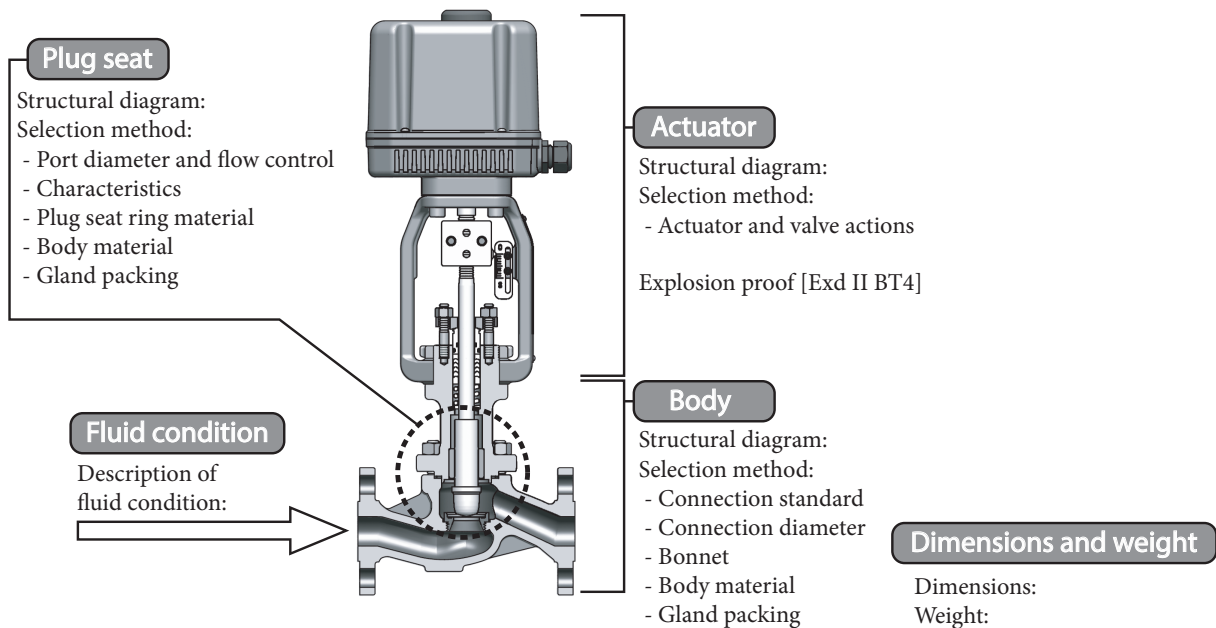


Figure 1. Model AGVB/AGVM selection map

2. Basic Model Numbers

Basic model: 1/2 to 4 inches

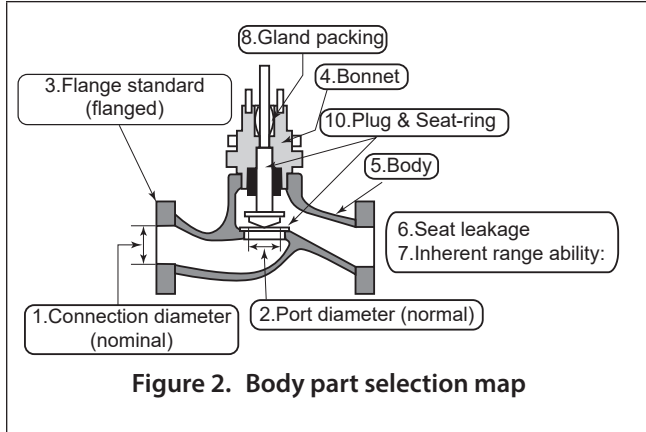
Please select basic model no. from the following two kinds according to connected rating.

Model AGVB: JIS 10K, ANSI 150, JPI 150

Model AGVM: JIS 16K, JIS 20K, JIS 30K, ANSI 300, JPI 300

3. Body part optional specifications

Figure 2 shows optional specifications of the body.



3-1 Nominal size

Azbil Corporation manufactures diameters from 1/2 inch (15 mm) to 2 inches (50 mm) as shown in Table 1.

For other diameters, we recommend a selection from other control valve models.

3-2 Port size and flow characteristics

The selection of the port size and the rated Cv value falls within the scope of Table 1 according to the nominal size. For nominal sizes 1 inch (25 mm) or less, port sizes are expressed in terms of Cv values. Flow characteristics depend on the rated Cv value.

Based on the rated Cv value and the calculated necessary Cv value, check the controllability (valve position) using the flow control characteristics tables in Figure 4, 5, and 6.

3-3 Pressure (flange type)

RF ;

JIS 10K, 16K, 20K, 30K, (JIS B2210-1984)

ANSI 150, 300 (ASME/ANSI B16.5-1988)

JPI 150, 300 (JPI-75-15-1993)

For other rated pressures and connection types, you are recommended to consider the other control valve models.

3-4 Bonnet

We manufacture bonnets that can be used at fluid temperatures ranging from -196 to +400 °C.

[Unit: °C]

Body material / Bonnet type	SCPH2	SCS13A/ SCS14A
General use	-5 to +30	-17 to +230
Extension type (high&low temp.)	+230 to +400	-45 to -17 +230 to +400

For fluid temperatures outside the above temperature range, we recommend a selection from the other control valve models.

3-5 Body and plug seat ring materials

For combinations of body and plug seat ring materials and their applicable temperature ranges, see Table 2. In some ranges the plug seat ring material needs hardening treatment. See Figure 10. When you select a soft seat, refer to Figure 11.

For materials other than those shown in Table 2, we recommend a selection from the other control valve models.

3-6 Valve seat leakage

For the seat leak performance when the valve is fully closed, select from among the following four classifications, which conform to IEC60534-4:2006 or JIS B2005-4:2008

Class IV: $10^{-4} \times$ rated Cv value
(0.01 % of rated Cv value)

Class VI: $3 \times$ valve differential pressure (MPa) \times leakage coefficient mL/min. shown below

Nominal size inches (mm)	1 (25)	1-1/2 (40)	2 (50)	2-1/2 (65)	3 (80)	4 (100)
Leakage coefficient	0.15	0.23	0.36	0.51	0.62	1.20

For shutoff valves, choose either Class VI. (soft seat)

3-7 Inherent range ability:

Rated Cv	Inherent Range ability
0.1, 0.16, 0.25, 0.4	20:1
0.63	30:1
1.0 or more than 1.0	50:1 (75:1*)

Note) *:Optional, metal seat and equal percentage only.

3-8 Gland packing

According to your application, select appropriate type of gland packing from among the following:

Usage	Type	Material
General use (oils, solvent acids, alkalis, etc.)	PTFE yarn packing (P4519)	Woven PTFE yarn with carbon fiber core
General use and oil-free treatment	V shaped PTFE packing	PTFE molding
Vacuum service	V shaped PTFE packing (direct+reverse mounted)	PTFE molding
Low temperature service	V shaped PTFE packing	PTFE molding
High temperature service	Graphite yarn packing *1 (P6610CL+P6722)	Graphite
Low emission gland packing for VOC *2 regulation *3	PTFE yarn packing(P4519) with live load structure	Woven PTFE yarn with carbon fiber core

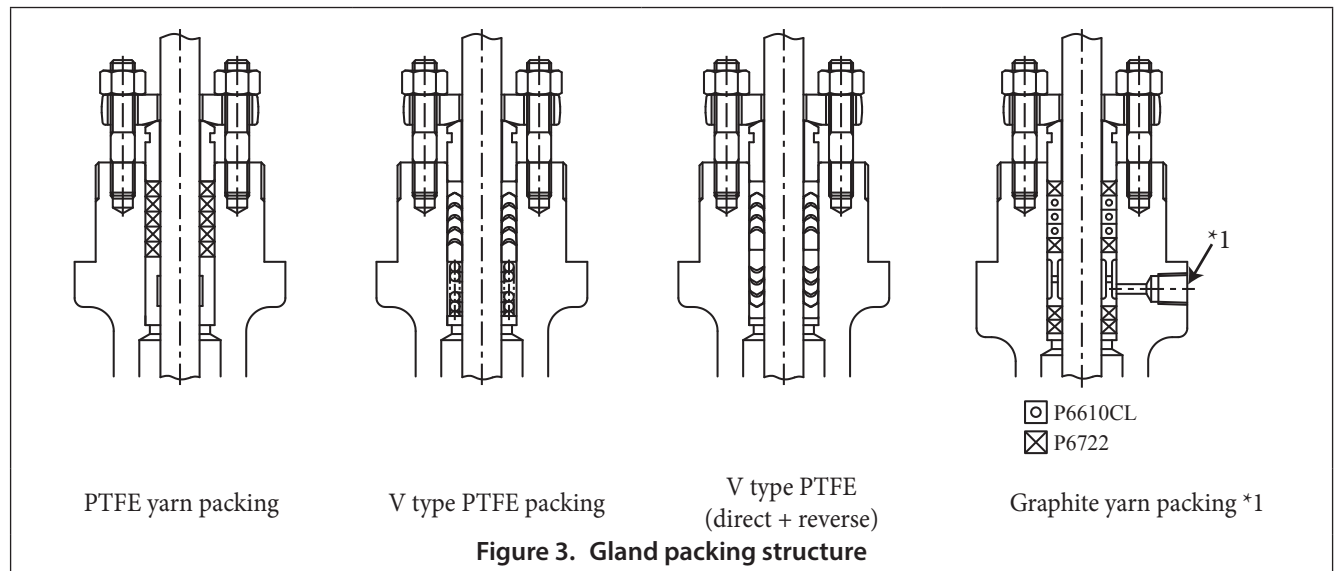
Note) PTFE: polytetrafluoroethylene resin

*1 Grease provided

*2 Volatile Organic Compound

*3 Refer to No.SS2-SSL100-0100 about detail of Low emission gland packing.

For other gland packing materials, please provide closest model number and Azbil Corporation will take your request under advice.



Note) *1: Grease is used.

3-9 Gasket

	General / Low temp.	High temperature	General or low temp. / Oil-free treatment
Between bonnet and body	Metal gasket (PTFE coating) V543 (PTFE)	Metal gasket V543	Metal gasket (PTFE coating) V543 (PTFE)
Between seat ring and body	Not necessary	Flat metal gasket V564	Flat metal gasket with PTFE coating V563 (PTFE)

Table 1. Models of AGVB and AGVM

Nominal size inches (mm)	1 (25)					10	1-1/2 (40)			2 (50)			2-1/2 (65)			3 (80)			4 (100)									
	3/4 (20)				8.0		1	1-1/4	1-1/2	1-1/4	1-1/2	2	1-1/2	2	2-1/2	2	2-1/2	3	2-1/2	3	3	4						
	0.1	0.16	0.4	1.0																			2.5	6.3				
Port diameter (inches)	0.1	0.16	0.4	1.0	2.5	6.3	14	21	30	21	30	50	30	50	85	50	85	115	85	115	200							
Rated Cv value	0.25																											
Rated travel (mm)	20																											
Flow control characteristics	Fig. 4						Figure 5, 7																Figure 6, 8					

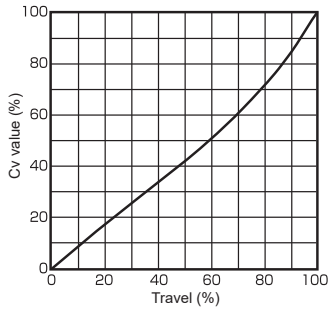


Figure 4. Cv values 0.1, 0.16, 0.25 for 1 inch port size or less (linear model)

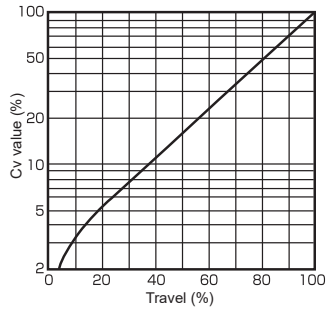


Figure 5. Cv values 0.4 to 14 for 1 inch port size or less (equal percentage model)

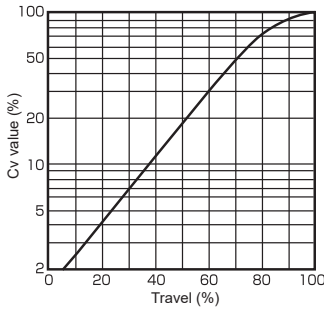


Figure 6. Port size 1-1/2 to 4 inches (equal percentage model)

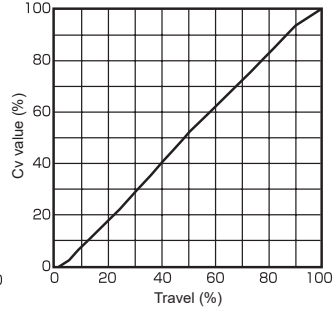


Figure 7. Cv values 0.4 to 14 (linear model)

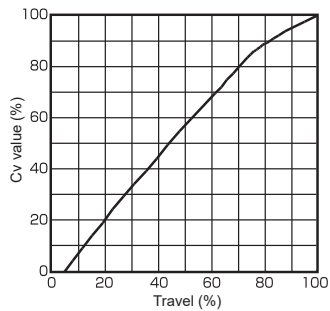


Figure 8. Port size 1 to 2 inch (linear model)

3-10 Body and trim material combinations

3-10-1 Selecting the materials of the body, plug, and seat ring

Depending on the material of the body, the operating temperature range of the trim material varies. Select the body and trim material according to the operating temperature of the control valve. In addition, refer to Figure 10 to determine whether hardening treatment is necessary for the trim.

Table 2. Combinations of body, plug, and seat ring materials

Trim material		Temperature range (°C)		
SUS 316		-5 to +300	-45 to +300	-45 to +300
SUS 316 CoCr-A		-5 to +400	-45 to +400	-45 to +400
SUS440C		-5 to +400	-45 to +400	---
SUS 316 soft seat		-5 to +230	-45 to +230	-45 to +230
SUS 316 CoCr-A face		-5 to +400	-45 to +400	-45 to +400
SUS 316L		---	-45 to +300	-45 to +300
SUS 316L CoCr-A		---	-45 to +400	-45 to +400
SUS 316L soft seat		-5 to +230	-45 to +230	-45 to +230
Body material	JIS	SCPH2	SCS13A	SCS14A
	ASTM	A216WCB	A351CF8	A351CF8M

Note *1: Parts that adjust flow (such as a plug and a seat ring) are referred to as the valve trim.

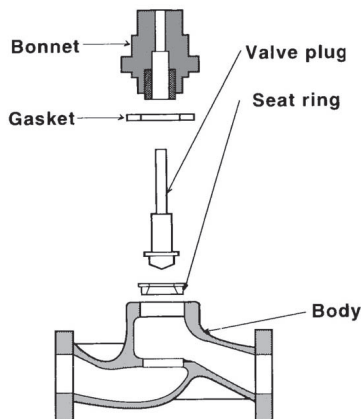


Figure 9. Development view of AGVB/AGVM

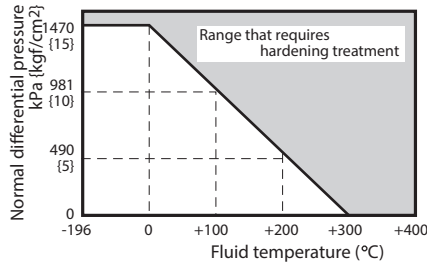


Figure 10. Temperature and normal differential pressure ranges requiring hardening treatment

- Note) 1. Depending on the methods of hardening treatment, CoCr-A welding or SUS440C is available.
2. For valves for cavitation/flashing service, oil-proof service, or tight shutoff service, a CoCr-A is recommended regardless of process fluid temperatures or differential pressures.
3. For cold water or for hot water exceeding 100 °C (fluids that do not require consideration of corrosiveness), SUS440C is recommended.

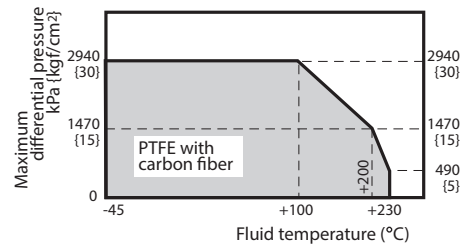


Figure 11. Temperature and maximum differential pressure ranges for soft seats

- Note) 1. When there is a possibility of erosion by such fluids as saturated steam and heated water please use metal seats.
2. The material of washing treatment for oil-free of the wetted parts (inside the body) is PTFE with glass.

3-10-2 Combination of body component materials

Following table shows typical body and trim material combinations.

Based on the trim material selected in the above section, select the material of body components such as gaskets.

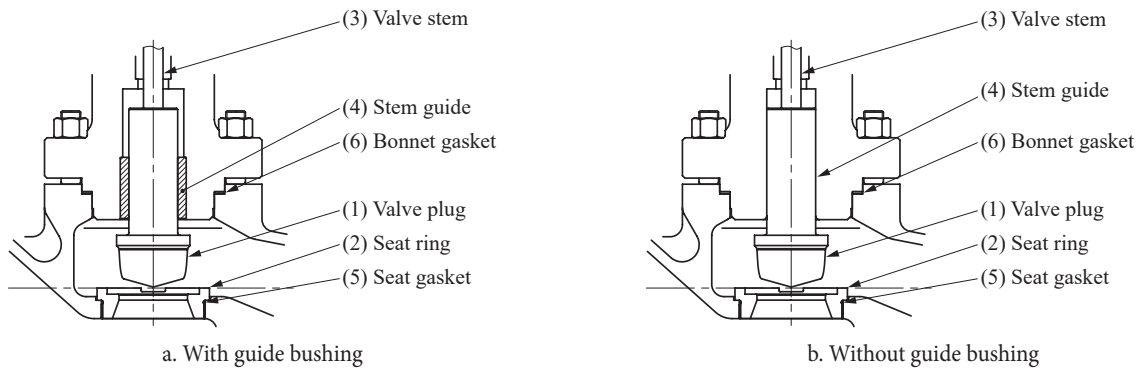


Figure 12. Structural drawing of trim

Table 3. The valve body material is carbon steel (SCPH2/A216WCB).

(1) Valve plug (2) Seat ring	SUS316		SUS440C	SUS316 CoCr-A SUS316 CoCr-A face		SUS316 soft seat	
	General	Oil-free	General	General	Oil-free	General	Oil-free
(3) Valve stem	SUS316						
(4) Stem guide	SUS440C	SUS316 CoCr-A face	SUS440C	SUS316 CoCr-A	SUS316 CoCr-A	SUS440C	SUS316 CoCr-A face
(5) Seat gasket	Without (Design temperature: -17 to +230 °C)	SUS316 (PTFE coating)	Without (Design temperature: -17 to +230 °C)	Without (Design temperature: -17 to +230 °C)	SUS316 (PTFE coating)	Without	SUS316 (PTFE coating)
	Ni-Cu Alloy (Design temperature: above +230 °C)		Ni-Cu Alloy (Design temperature: above +230 °C)	Ni-Cu Alloy (Design temperature: above +230 °C)			
(6) Bonnet gasket	SUS316(PTFE coating) (Design temperature: -17 to +230 °C)	SUS316 (PTFE coating)	SUS316(PTFE coating) (Design temperature: -17 to +230 °C)	SUS316(PTFE coating) (Design temperature: -17 to +230 °C)	SUS316 (PTFE coating)	SUS316 (PTFE coating)	SUS316 (PTFE coating)
	SUS316 (Design temperature: above +230 °C)		SUS316 (Design temperature: above +230 °C)	SUS316 (Design temperature: above +230 °C)			

(1) Valve plug (2) Seat ring	SUS316		SUS316L CoCr-A		SUS316L soft seat	
	General	Oil-free	General	Oil-free	General	Oil-free
(3) Valve stem	SUS316L					
(4) Stem guide	SUS316L	SUS316L CoCr-A face	SUS316L CoCr-A	SUS316L CoCr-A	SUS316L	SUS316L CoCr-A face
(5) Seat gasket	Without (Design temperature: -17 to +230 °C)	SUS316 (PTFE coating)	Without (Design temperature: -17 to +230 °C)	SUS316 (PTFE coating)	Without	SUS316 (PTFE coating)
	Ni-Cu Alloy (Design temperature: above +230 °C)		Ni-Cu Alloy (Design temperature: above +230 °C)			
(6) Bonnet gasket	SUS316 (PTFE coating) (Design temperature: -17 to +230 °C)	SUS316 (PTFE coating)	SUS316(PTFE coating) (Design temperature: -17 to +230 °C)	SUS316 (PTFE coating)	SUS316 (PTFE coating)	SUS316 (PTFE coating)
	SUS316 (Design temperature: above +230 °C)		SUS316 (Design temperature: above +230 °C)			

Table 4. The valve body material is stainless steel (SCS13A/A351CF8 or SCS14A/A351CF8M)

(1) Valve plug (2) Seat ring	SUS316		SUS440C *1	SUS316 CoCr-A SUS316 CoCr-A face		SUS316 soft seat	
	General	Oil-free	General	General	Oil-free	General	Oil-free
(3) Valve stem	SUS316						
(4) Stem guide	Without: bonnet guide (Design temperature: -17 to +230 °C)	SUS316 CoCr-A face	SUS440C	SUS316 CoCr-A	SUS316 CoCr-A	Without (bonnet guide) (Design temperature: -17 to +230 °C)	SUS316 CoCr-A face
	SUS316 (Design temperature: above +230 °C and below -17 °C)					SUS316 (Design temperature: above +230 °C and below -17 °C)	
(5) Seat gasket	Without (Design temperature: -17 to +230 °C and below -17 °C)	SUS316 (PTFE coating)	Without (Design temperature: -17 to +230 °C and below -17 °C)	Without (Design temperature: -17 to +230 °C and below -17 °C)	SUS316 (PTFE coating)	Without	SUS316 (PTFE coating)
	Ni-Cu Alloy (Design temperature: above +230 °C)		Ni-Cu Alloy (Design temperature: above +230 °C)	Ni-Cu Alloy (Design temperature: above +230 °C)			
(6) Bonnet gasket	SUS316 (PTFE coating) (Design temperature: -17 to +230 °C and below -17 °C)	SUS316 (PTFE coating)	SUS316 (PTFE coating) (Design temperature: -17 to +230 °C and below -17 °C)	SUS316(PTFE coating) (Design temperature: -17 to +230 °C and below -17 °C)	SUS316 (PTFE coating)	SUS316 (PTFE coating)	SUS316 (PTFE coating)
	SUS316 (Design temperature: above +230 °C)		SUS316 (Design temperature: above +230 °C)	SUS316 (Design temperature: above +230 °C)			

(1) Valve plug (2) Seat ring	SUS316L		SUS316L CoCr-A		SUS316L soft seat		
	General	Oil-free	General	Oil-free	General	Oil-free	
(3) Valve stem	SUS316L						
(4) Stem guide	Without: bonnet guide (Design temperature: -17 to +230 °C)	SUS316L CoCr-A face	SUS316L CoCr-A	SUS316L CoCr-A	SUS316L CoCr-A	Without: bonnet guide (Design temperature: -17 to +230 °C)	SUS316L CoCr-A face
	SUS316L (Design temperature: above +230 °C and below -17 °C)					SUS316L (Design temperature: below -17 °C)	
(5) Seat gasket	Without (Design temperature: -17 to +230 °C and below -17 °C)	SUS316 (PTFE coating)	Without (Design temperature: -17 to +230 °C and below -17 °C)	Without (Design temperature: -17 to +230 °C and below -17 °C)	SUS316 (PTFE coating)	Without	SUS316 (PTFE coating)
	Ni-Cu Alloy (Design temperature: above +230 °C)		Ni-Cu Alloy (Design temperature: above +230 °C)	Ni-Cu Alloy (Design temperature: above +230 °C)			
(6) Bonnet gasket	SUS316 (PTFE coating) (Design temperature: -17 to +230 °C and below -17 °C)	SUS316 (PTFE coating)	SUS316 (PTFE coating) (Design temperature: -17 to +230 °C and below -17 °C)	SUS316 (PTFE coating) (Design temperature: -17 to +230 °C and below -17 °C)	SUS316 (PTFE coating)	SUS316 (PTFE coating)	SUS316 (PTFE coating)
	SUS316 (Design temperature: above +230 °C)		SUS316 (Design temperature: above +230 °C)	SUS316 (Design temperature: above +230 °C)			

Note) *1 SUS440C is applicable to body material SCS14A/A351CF8M.

4. Actuator

4-1 Actuator and valve actions

Table 5. Specification of actuator

Type	Electronic motor
Control action	Proportional control or two-position control
Power supply	Single phase 100V, 110V, 115V, 120V, 200V, 210V, 220V, 230V, 240V AC ±10 %, 50/60 Hz)
Input signal	4 to 20 mA DC, 1 to 5 VDC Open or close contact input
Action	Direct or reverse
Power failure action	Close, open or hold
Input resistance	250 Ω
Power supply capacity (general)	0.32A (power supply 100V AC) 0.18A (power supply 200V AC)
Insulation resistance	Between input terminal and case 100 MΩ / 500V DC
With stand voltage	Between poser supply terminal and case 500V / 1 min
Main material	Case: Aluminium die-casting (ADC 12) Stem: SUS303 Yoke: Carbon steel (SCPH2)
Type of protection	IP65 equivalent
Explosion-proof	None
Motor	Reversible motor
Coil insulation class	E
Rated temperature	Continuity (built-in thermal switch: 120°C trip automatic operation type)
Position sensor	Potentiometer
Protective device	Built-in open/close limit switch (standard) Built-in lower torque limiter (standard)
Electrical connection	G1/2 (two position)
Ambient temperature limits	-25 to +55°C
Ambient humidity limits	10 to 90 %RH
Vibration tolerance	2 G 5 to 100 Hz
Travel transmission*	1 to 5V DC
Manual operation	Top handle (standard)
Dead band	Within ±1 % F.S.
Operation speed (open ↔ close)	16 sec.
Hazardous chemical regulations	Compliant with China RoHS RoHS (EU) and CE marks available

Note) *: The travel transmission is a standard specification for the proportional control, but that is a optional specification for the two position control.

Valve action

The valve action is decided by selecting the operation of the actuator action.

Signal to open: actuator action where the valve opens as the input signal increases

Signal to close: actuator action where the valve closes as the input signal increases

- With the Model AGVB/AGVM, the valve closes as the plug lowers. The valve action depends, in turn, on whether an signal to close or signal to open actuator is chosen.
- When the power supply is “Stop”, the actuator keeps the travel transmission of that time.

4-2 Tables of allowable differential pressures

Ensure the required shut-off differential pressure specified in the equipment design is satisfied by selecting an actuator with an allowable differential pressure equal to or higher than the shut-off pressure, according to the seat leakage class.

Seat leakage, Class IV (0.01 % of rated Cv value)

- Model AGVB: Table 6-1 and 6-2 on page 8
- Model AGVM: Table 6-3 and 6-4 on page 8

Seat leakage, Class VI (high shutoff model: soft seat)

- Model AGVB: Table 7-1 and 7-2 on page 8
- Model AGVM: Table 7-3 and 7-4 on page 8

5. Finish

Valve body and bonnet; Blue (Munsell 10B5/10) or silver. Actuator and york; Silver.

You can specify any other color using the number code of the Japan Paint Industry Assignment or the Munsell color system.

Valve seat leakage, Class IV: 0.01 % of the rated Cv value

Table 6-1. Model AGVB nominal size 1/2, 3/4, and 1 inch

Note that the allowable differential pressure varies with the rated Cv value you have selected.

Nominal size [inches]	Actuator	Differential pressure (by Cv value) kPa {kgf/cm ² }					
		0.25 or less	0.4 0.63	1.0 1.6	2.5 4.0	6.3 8.0	10 14
1 inch or less	EA1	1960{20.0}					

Note) Note that the maximum allowable differential pressures must not exceed the maximum working pressures specified by JISB2201-1984, ANSIB16.34-1981, and JPI-7S-65-83.

Table 6-2. Model AGVB nominal size 1-1/2, 2 inches

Note that the allowable differential pressure varies with the port diameter (inches) you have selected.

Nominal size inches	Actuator	Differential pressure (by Port size) kPa {kgf/cm ² }			
		1	1-1/4	1-1/2	2
1-1/2	EA1	1960 {20.0}	1870	1270	-
2		-	{19.0}	{12.9}	760 {7.7}

Note) Note that the maximum allowable differential pressures must not exceed the maximum working pressures specified by JISB220-1-1984, ANSIB16.34-1981, and JPI-7S-65-83

Table 6-3. Model AGVM nominal size 1/2, 3/4, and 1 inch

Note that the allowable differential pressure varies with the rated Cv value you have selected.

Nominal size inches	Actuator	Differential pressure (by Cv value) kPa{kgf/cm ² }					
		0.25 or less	0.4 0.63	1.0 1.6	2.5 4.0	6.3 8.0	10 14
1/2 3/4 1	EA1	1960{20.0}					
		5100{52.0}	4120{42.0}		3040{31.0}		

Note) 1. Note that the maximum allowable differential pressures must not exceed the maximum working pressures specified by JISB2201-1984, ANSIB16.34-1981, and JPI-7S-65-83.

Note) 2. In the differential pressure column, upper figures show normal differential pressures and lower figures differential pressures when the valve is fully closed. At your request, we can manufacture control valves with normal pressures exceeding 1960 kPa.

Table 6-4. Model AGVM nominal size 1-1/2, 2 inches

Note that the allowable differential pressure varies with the port diameter (inches) you have selected.

Nominal size inches	Actuator	Differential pressure (by Port size) kPa{kgf/cm ² }			
		1	1-1/4	1-1/2	2
1-1/2	EA1	1960 {20.0}	1870	1270	-
		3040 {31.0}	{19.0}	{12.9}	
2		-			760 {7.7}

Note) 1. Note that the maximum allowable differential pressures must not exceed the maximum working pressures specified by JISB2201-1984, ANSIB16.34-1981, and JPI-7S-65-83.

Note) 2. In the differential pressure column, upper figures show normal differential pressures and lower figures differential pressures when the valve is fully closed. At your request, we can manufacture control valves with normal pressures exceeding 1960 kPa.

Valve seat leakage, Class VI: high shutoff model: soft seat

Table 7-1. Model AGVB nominal size 1/2, 3/4, and 1 inch

Note that the allowable differential pressure varies with the rated Cv value you have selected.

Nominal size inches	Actuator	Differential pressure (by Cv value) kPa{kgf/cm ² }					
		0.25 or less	0.4 0.63	1.0 1.6	2.5 4.0	6.3 8.0	10 14
1 inch or less	EA1	1960{20.0}					

Note) Note that the maximum allowable differential pressures must not exceed the maximum working pressures specified by JISB220-1-1984, ANSIB16.34-1981, and JPI-7S-65-83.

Table 7-2. Model AGVB nominal size 1-1/2, 2 inches

Note that the allowable differential pressure varies with the port diameter (inches) you have selected.

Nominal size inches	Actuator	Differential pressure (by port size) kPa{kgf/cm ² }			
		1	1-1/4	1-1/2	2
1-1/2	EA1	1700{17.3}	1100	630	-
2		-	{11.2}	{6.4}	250 {2.5}

Note) Note that the maximum allowable differential pressures must not exceed the maximum working pressure specified by JISB220-1-1984, ANSIB16.34-1981, and JPI-7S-65-83.

Table 7-3. Model AGVM nominal size 1/2, 3/4, and 1 inch

Note that the allowable differential pressure varies with the rated Cv value you have selected.

Nominal size inches	Actuator	Differential pressure (by Cv value) kPa{kgf/cm ² }					
		0.25 or less	0.4 0.63	1.0 1.6	2.5 4.0	6.3 8.0	10 14
1/2 3/4 1	EA1	1960{20.0}				1700{17.3}	
		2940{30.0}		2070{21.1}			

Note) 1. Note that the maximum allowable differential pressures must not exceed the maximum working pressures specified by JISB220-1-1984, ANSIB16.34-1981, and JPI-7S-65-83.

Note) 2. In the differential pressure column, upper figures show normal differential pressures and lower figures differential pressures when the valve is fully closed. At your request, we can manufacture control valves with normal pressures exceeding 1960 kPa.

Table 7-4. Model AGVM nominal size 1-1/2, 2 inches

Note that the allowable differential pressure varies with the port diameter (inches) you have selected.

Nominal size inches	Actuator	Differential pressure (by port size) kPa{kgf/cm ² }			
		1	1-1/4	1-1/2	2
1-1/2	EA1	1700 {17.3}	1100	630	-
		-	{11.2}	{6.4}	
2		-			250 {2.5}

Note) 1. Note that the maximum allowable differential pressures must not exceed the maximum working pressures specified by JISB220-1-1984, ANSIB16.34-1981, and JPI-7S-65-83.

Note) 2. In the differential pressure column, upper figures show normal differential pressures and lower figures differential pressures when the valve is fully closed. At your request, we can manufacture control valves with normal pressures exceeding 1960 kPa.

DIMENSIONS

Table 8 and 9 show the dimensions and weight of the control valves. Note that the addition of any optional specifications will change their installed dimensions and weights.

Table 8. Face-to-face dimension and External dimensions

Connection diameter (inches)	Actuator	Dimensions (mm)					
		A			H		B
		JIS10K ANSI150 JPI150	JIS16K	JIS20K, 30K ANSI300 JPI300	Plain bonnet	Extension bonnet	
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 9. Weight

(unit: kg)

Nominal size (inches)	JIS10K, ANSI150, JPI150		JIS16K		JIS20K, JIS30K, ANSI300, JPI300	
	Plain bonnet	Extension bonnet	Plain bonnet	Extension bonnet	Plain 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

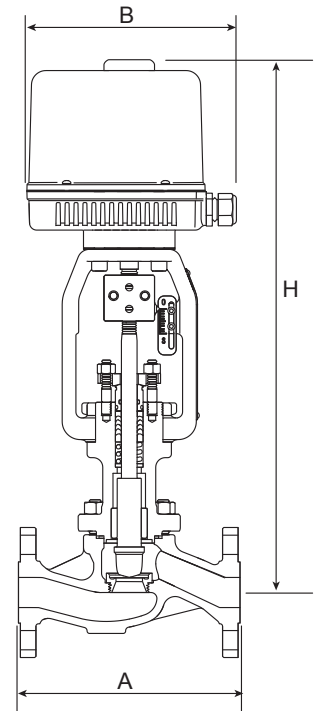


Figure 13. Face-to-face dimension and External dimensions

Note

Note

Please read "Terms and Conditions" from the following URL
before ordering and use.

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Specifications are subject to change without notice.

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Azbil Corporation
Advanced Automation Company

1-12-2 Kawana, Fujisawa
Kanagawa 251-8522 Japan
URL: <https://www.azbil.com/>

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