

# Soft Start-up Valve

A start-up valve for low-speed air supply to gradually raise initial pressure in an air system and for quick exhaust by cutting off the air supply



**IP65**

DIN terminal/  
M12 connector

## Power consumption: 0.35 W

\* At 12/24 VDC

Existing model: 1.8 W (80% reduction)

## Improved flow rate characteristics: By up to 2.3 times C[dm<sup>3</sup>/(s·bar)]: 9.2

\* For the AV2000-A

## Energy saving

No air flow when the main valve is switched

## Can be connected to

### F.R.L. units\*1

\*1 The AC-D, -A, -B Series



### New Air operated type/ AVA Series p.5



### New Lockout type/ AVL Series p.6

Manual override

With solenoid valve



**AV□2000-A/3000-A/4000-A/5000-A Series**

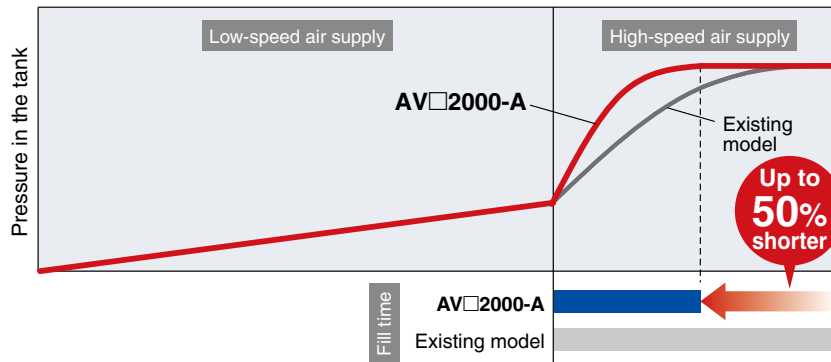
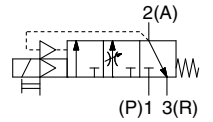


CAT.ES40-63B ④

## Improved flow rate characteristics\*1: By up to 2.3 times

C[dm<sup>3</sup>/(s·bar)]: 9.2      Fill time: Up to 50% shorter

\*1 For high-speed air supply

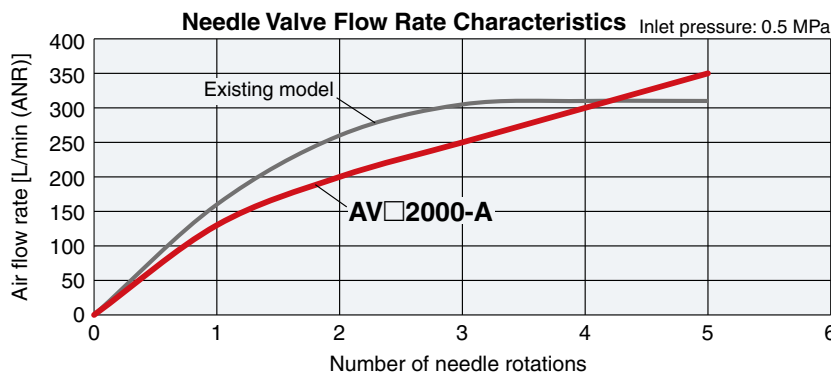


C[dm<sup>3</sup>/(s·bar)]

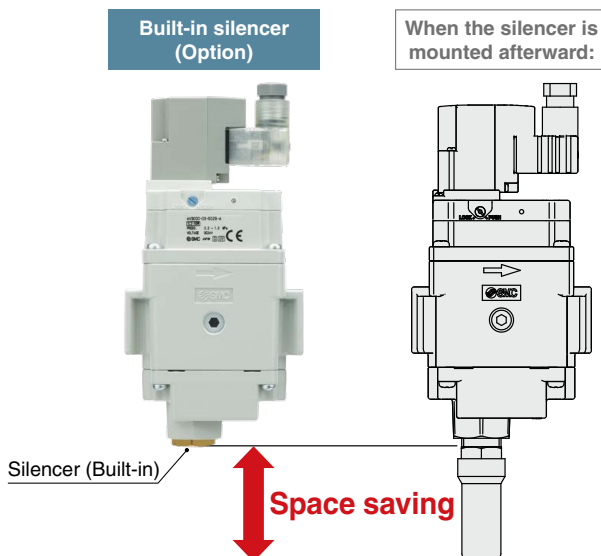
Body size	AV-A	Existing model
20	9.2	4
30	13.1	7.4
40	19.2	12.2
50 (Port size 3/4)	34.8	22.6
50 (Port size 1")	41.3	24.4

For 1(P) → 2(A)

## Improved low-speed air supply adjustability



## Smaller profile and less work required due to integrated silencer



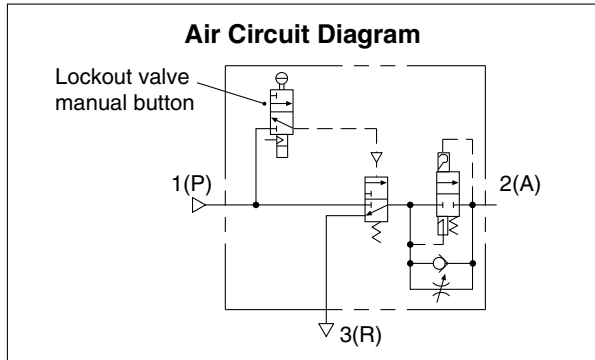
Model	Shortened dimensions [mm]	Silencer part number (when mounted afterward)
AV□2000-□S-A	37	AN20-02
AV□3000-□S-A	49	AN30-03
AV□4000-□S-A	56	AN40-04
AV□5000-□S-A	92	AN500-06

## Energy saving

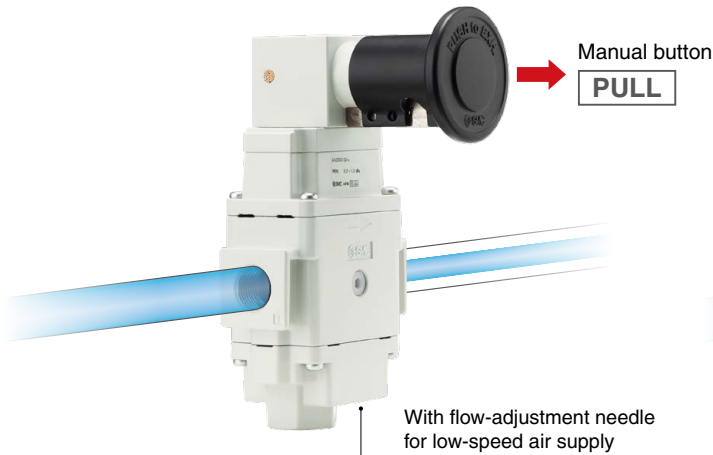
As the flow passage to port 3(R) is already closed for the main valve, air does not blow out from the product when switching the main valve (exhaust → low-speed air supply).

## With a lockout mechanism (With locking hole)

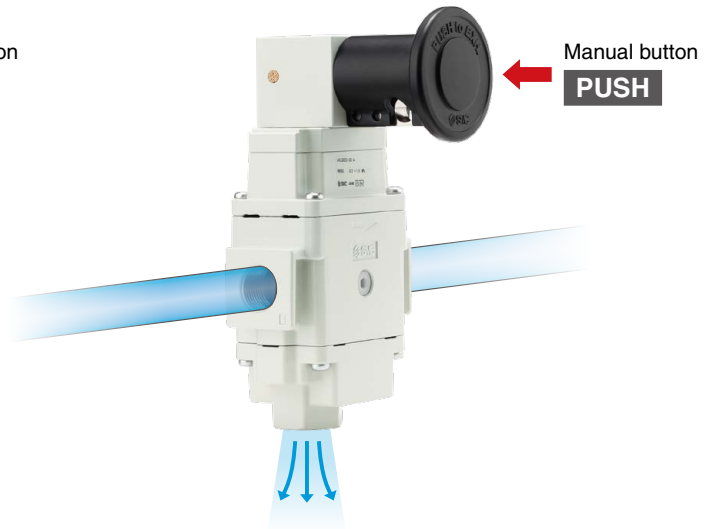
The manual button can be padlock secured during pressure release. This can prevent accidental operation.



**For Air Supply** Prevents sudden cylinder extensions during start-up



**For Residual Pressure Release**



## Options



## Variations

Series	C [dm <sup>3</sup> /(s·bar)]	Port size		Voltage	Electrical entry	Option
		1(P) 2(A)	3(R)			
AV□2000-A	9.2	1/4	1/4	100 VAC 200 VAC 110 VAC 220 VAC 24 VDC 12 VDC	· Grommet · DIN terminal · M12 connector	· Bracket · Pressure gauge · Silencer (Built-in)
AV□3000-A	13.1	3/8	3/8			
AV□4000-A	19.2	1/2	1/2			
AV□5000-A	34.8	3/4	3/4			
	41.3	1				

# Soft Start-up Valve AV□2000-A/3000-A/4000-A/5000-A Series

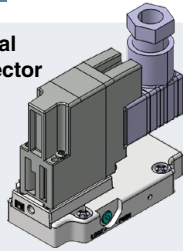
## Electrical Entry Variations

AV Series

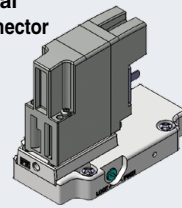
p. 4



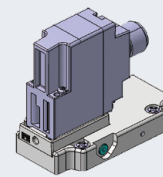
**DIN terminal with connector**  
Type D  
Type Y\*1



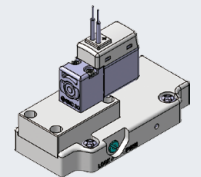
**DIN terminal without connector**  
Type D  
Type Y\*1



**New M12 connector**



**Grommet**

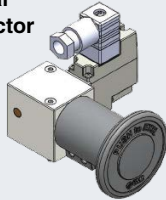


AVL Series

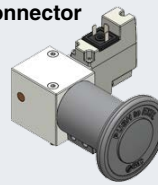
p. 6



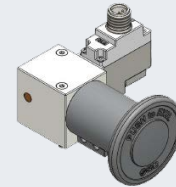
**DIN terminal with connector**  
Type D  
Type Y\*1



**DIN terminal without connector**  
Type D  
Type Y\*1

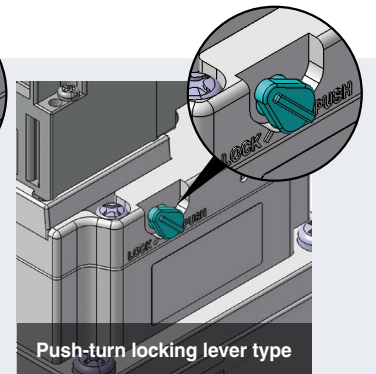
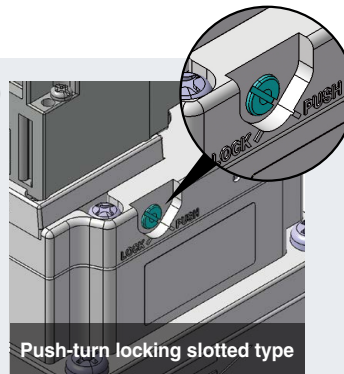
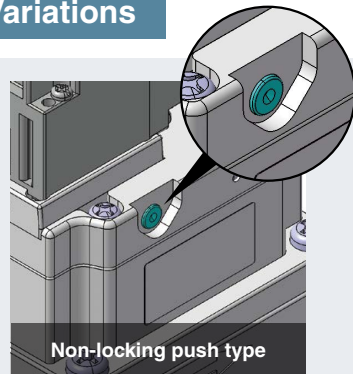


**M12 connector**



\*1 A DIN terminal in compliance with EN-175301-803C (former DIN43650C)

## Manual Override Variations



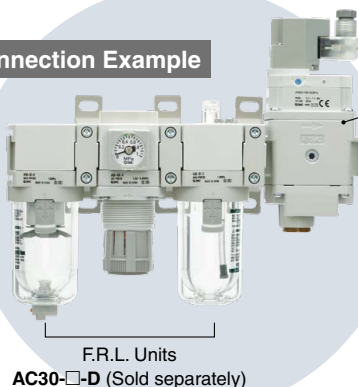
\* The AV type only

## Combination with F.R.L. Units

Series	Port size	F.R.L. units				
		AC20	AC30	AC40*1	AC50	AC60
AV□2000-A	1/4	●				
AV□3000-A	3/8		●			
AV□4000-A	1/2			●		
AV□5000-A	3/4				●	
	1				●	●

\*1 Excludes port size 06

### Connection Example



### Application Example

For slow air supply during start-up and for rapid air exhaust after stopping the equipment



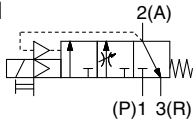
### Simple Specials System

This product can be integrated into an F.R.L. unit through the simple special ordering system. The lead time is almost the same as that of the standard product. Please contact your local sales representative for more details.

# Soft Start-up Valve

# AV2000-A/3000-A/4000-A/5000-A Series

Symbol



How to Order



AV **20** **00** - **02** **B** - **1** **D** **B** -  - **A**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

\* CE/UKCA compliant: ● UL certification: ○

	Electrical entry		
	Grommet	DIN terminal	M12 connector
AC	—	●	—
DC	●○	●○	●

	Symbol	Description	① Body size					
			20	30	40	50		
②	Thread type	Nil	Rc	●	●	●	●	
		N	NPT	●	●	●	●	
		F	G	●	●	●	●	
③	Port size 1(P), 2(A)	02	1/4	●	—	—	—	
		03	3/8	—	●	—	—	
		04	1/2	—	—	●	—	
		06	3/4	—	—	—	●	
		10	1	—	—	—	●	
④	a	Mounting	Nil	Without mounting option	●	●	●	●
			B	With bracket	●	●	●	●
		b	Pressure gauge	Nil	Without pressure gauge	●	●	●
	G			Round type pressure gauge (with limit indicator)	●	●	●	●
	c		Silencer	Nil	Without silencer	●	●	●
		S		Silencer (Built-in)	●	●	●	●
⑤	Rated coil voltage (50/60 Hz)	AC	1	100 VAC	●	●	●	●
			2	200 VAC	●	●	●	●
			3	110 VAC [115 VAC]*1	●	●	●	●
		DC	4	220 VAC [230 VAC]*1	●	●	●	●
			5	24 VDC	●	●	●	●
			6	12 VDC	●	●	●	●
⑥	Electrical entry	G	Grommet (Lead wire length: 300 mm)	●	●	●	●	
		D	Type D (DIN terminal/With connector)	●	●	●	●	
		Y	Type Y (DIN terminal/With connector)*2	●	●	●	●	
		DO	Type D (DIN terminal/Without connector)	●	●	●	●	
		YO	Type Y (DIN terminal/Without connector)	●	●	●	●	
		KO	M12 connector (Without cable)	○*3	○*3	○*3	○*3	
⑦	Light/surge voltage suppressor	Nil	None	●	●	●	●	
		Z	With light/surge voltage suppressor	○*4	○*4	○*4	○*4	
⑧	Manual override	Nil	Non-locking push type	●	●	●	●	
		B	Push-turn locking slotted type	●	●	●	●	
		C	Push-turn locking lever type	●	●	●	●	
⑨	d	Flow direction	Nil	Flow direction: Left to right	●	●	●	●
			R	Flow direction: Right to left	●	●	●	●
	e	Pressure unit	Nil	Unit on product label: MPa, Pressure gauge: MPa	●	●	●	●
			Z*5	Unit on product label: psi, Pressure gauge: MPa/psi dual scale	○*6	○*6	○*6	○*6

\*1 The 110 VAC and the 115 VAC are interchangeable. The 220 VAC and the 230 VAC are interchangeable as well. The allowable voltage fluctuation is -15% to +5% of the rated voltage for the 115 VAC or the 230 VAC.  
 \*2 Type "Y" is a DIN terminal in compliance with EN-175301-803C (former DIN43650C).  
 \*3 When the electrical entry is "KO," only the DC specifications (5 or 6) can be selected for the rated coil voltage.  
 \*4 When the electrical entry is "DO" or "YO," the light/surge voltage suppressor cannot be selected. When it is "KO," only the "With light/surge voltage suppressor" option can be selected.  
 \*5 For the pipe thread type: NPT  
 This product is for overseas use only according to the New Measurement Act. (The SI unit type is provided for use in Japan.)  
 \*6 Pressure unit Z: For the pipe thread type: NPT only

• Select one each for options "a" to "c" and semi-standard options "d" and "e."  
 • Option/Semi-standard symbol: When more than one specification is required, indicate in alphabetical order.  
**Example) AV2000-02BGS-1DB-A**



# Air Operated Type Soft Start-up Valve

RoHS

# AVA2000-A/3000-A/4000-A/5000-A Series



## How to Order

AV A **20** 00 - **02** **B** - **02** - A

1
2
3
4
5

	Symbol	Description	1					
			Body size					
			20	30	40	50		
2	Thread type	Nil	Rc	●	●	●	●	
		N	NPT	●	●	●	●	
		F	G	●	●	●	●	
+								
3	Port size	02	1/4	●	—	—	—	
		03	3/8	—	●	—	—	
		04	1/2	—	—	●	—	
		06	3/4	—	—	—	●	
		10	1	—	—	—	●	
+								
4	a	Mounting	Nil	Without mounting option	●	●	●	●
			B	With bracket	●	●	●	●
	+							
	b	Pressure gauge	Nil	Without pressure gauge	●	●	●	●
			G	Round type pressure gauge (with limit indicator)	●	●	●	●
	+							
c	Silencer	Nil	Without silencer	●	●	●	●	
		S	Built-in silencer (EXH port)	●	●	●	●	
+								
5	d	Flow direction	Nil	Flow direction: Left to right	●	●	●	●
			R	Flow direction: Right to left	●	●	●	●
+								
5	e	Pressure unit	Nil	Unit on product label: MPa, Pressure gauge: MPa	●	●	●	●
			Z*1	Unit on product label: psi, Pressure gauge: MPa/psi dual scale	○*2	○*2	○*2	○*2

\*1 For the pipe thread type: NPT

This product is for overseas use only according to the New Measurement Act. (The SI unit type is provided for use in Japan.)

\*2 Pressure unit Z: For the pipe thread type: NPT only

· Select one each for options "a" to "c" and semi-standard options "d" and "e."

· Option/Semi-standard symbol: When more than one specification is required, indicate in alphabetical order.

Example) AVA3000-N03BGS-RZ-A

# Lockout Type

# Soft Start-up Valve

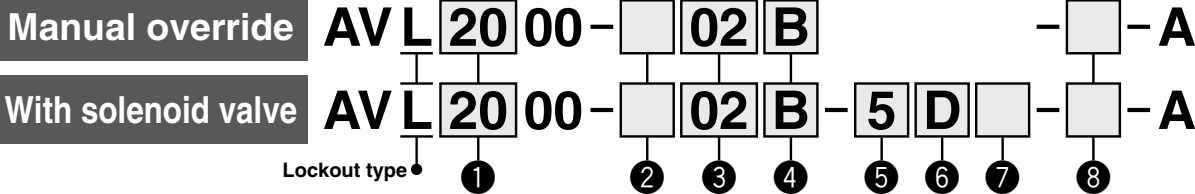
# AVL2000-A/3000-A/4000-A/5000-A Series



Manual override With solenoid valve



## How to Order



	Symbol	Description	① Body size					
			20	30	40	50		
② Thread type	Nil	Rc	●	●	●	●		
	N	NPT	●	●	●	●		
	F	G	●	●	●	●		
③ Port size	02	1/4	●	—	—	—		
	03	3/8	—	●	—	—		
	04	1/2	—	—	●	—		
	06	3/4	—	—	—	●		
	10	1	—	—	—	●		
④ Option	a Mounting	Nil	Without mounting option		●	●	●	●
		B	With bracket		●	●	●	●
	b Pressure gauge	Nil	Without pressure gauge		●	●	●	●
		G	Round type pressure gauge (with limit indicator)		●	●	●	●
	c Silencer	Nil	Without silencer		●	●	●	●
		S	Built-in silencer (EXH port)		●	●	●	●
⑤ Rated coil voltage	AC (50/60 Hz)	1	100 VAC		●	●	●	●
		2	200 VAC		●	●	●	●
		3	110 VAC [115 VAC]*1		●	●	●	●
	DC	4	220 VAC [230 VAC]*1		●	●	●	●
		5	24 VDC		●	●	●	●
		6	12 VDC		●	●	●	●
⑥ Electrical entry	D	Type D (DIN terminal/With connector)		●	●	●	●	
	Y	Type Y (DIN terminal/With connector)*2		●	●	●	●	
	DO	Type D (DIN terminal/Without connector)		●	●	●	●	
	YO	Type Y (DIN terminal/Without connector)		●	●	●	●	
	KO	M12 connector (Without cable)		○*3	○*3	○*3	○*3	
⑦ Light/surge voltage suppressor	Nil	None		●	●	●	●	
	Z	With light/surge voltage suppressor		○*4	○*4	○*4	○*4	
⑧ Semi-standard	d Flow direction	Nil	Flow direction: Left to right		●	●	●	●
		R	Flow direction: Right to left		●	●	●	●
	e Pressure unit	Nil	Unit on product label: MPa, Pressure gauge: MPa		●	●	●	●
		Z*5	Unit on product label: psi, Pressure gauge: MPa/psi dual scale		○*6	○*6	○*6	○*6

\*1 The 110 VAC and the 115 VAC are interchangeable. The 220 VAC and the 230 VAC are interchangeable as well. The allowable voltage fluctuation is -15% to +5% of the rated voltage for the 115 VAC or the 230 VAC.  
 \*2 Type "Y" is a DIN terminal in compliance with EN-175301-803C (former DIN43650C).  
 \*3 When the electrical entry is "KO," only the DC specifications (5 or 6) can be selected for the rated coil voltage.  
 \*4 When the electrical entry is "DO" or "YO," the light/surge voltage suppressor cannot be selected. When it is "KO," only the "With light/surge voltage suppressor" option can be selected.  
 \*5 For the pipe thread type: NPT  
 This product is for overseas use only according to the New Measurement Act. (The SI unit type is provided for use in Japan.)  
 \*6 Pressure unit Z: For the pipe thread type: NPT only

· Select one each for options "a" to "c" and semi-standard options "d" and "e."  
 · Option/Semi-standard symbol: When more than one specification is required, indicate in alphabetical order.  
**Example) AVL3000-N03BGS-5DZ-RZ-A**

# AV□2000-A/3000-A/4000-A/5000-A Series

## Specifications

Body size		20	30	40	50	
Port size	1(P), 2(A)	1/4	3/8	1/2	3/4	1
	3(R)	1/4	3/8	1/2	3/4	
Pressure gauge port size						1/8
Fluid		Air				
Ambient and fluid temperatures		0 to 50°C (With solenoid valve), 0 to 60°C (Without solenoid valve)*1				
Proof pressure		1.5 MPa				
Operating pressure range		0.2 to 1.0 MPa				
Weight [kg]	AV	0.43	0.45	0.80	1.30	1.25
	AVA	0.43	0.45	0.80	1.32	1.27
	AVL	0.62	0.64	0.99	1.51	1.46
	AVL (With solenoid valve)	0.67	0.68	1.03	1.55	1.50
Enclosure		Dust-protected (DIN terminal and M12 connector: IP65)*2				

\*1 If the temperature is low, use the product with dry air to prevent it from freezing.

\*2 Based on IEC 60529

## Solenoid Specifications

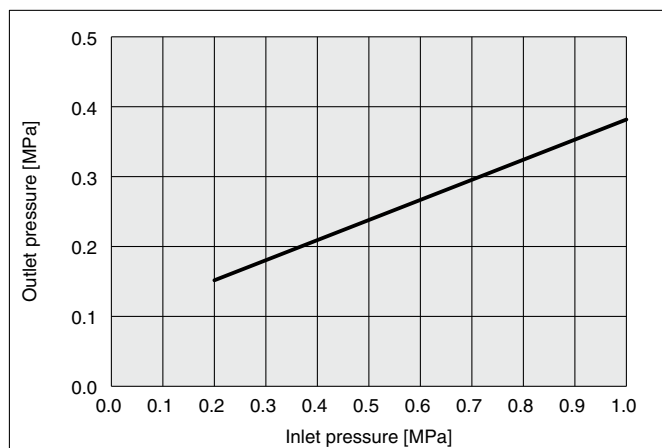
Electrical entry		Grommet	DIN terminal	M12 connector	
Rated coil voltage [V]	DC	24, 12 V			
	AC 50/60 Hz	100, 200, 110 [115], 220 [230]*1			
Allowable voltage fluctuation	DC	24 V	±10% of the rated voltage		
		12 V	±10% of the rated voltage		
	AC	100 V	±10% of the rated voltage		
		110 V*1	±10% of the rated voltage		
		[115 V]	[-15% to +5% of the rated voltage]		
		200 V	±10% of the rated voltage		
220 V*1	±10% of the rated voltage				
[230 V]	[-15% to +5% of the rated voltage]				
Power consumption [W]	DC	0.35 (With light: 0.40)	0.35 (With light: 0.45)	With light: 0.40	
Apparent power [VA]	AC	100 V	0.78 (With light: 0.81)	0.78 (With light: 0.86)	
		110 V	0.86 (With light: 0.89)	0.86 (With light: 0.97)	
		[115 V]	[0.94 (With light: 0.97)]	[0.94 (With light: 1.07)]	
		200 V	1.18 (With light: 1.22)	1.15 (With light: 1.30)	
		220 V	1.30 (With light: 1.34)	1.27 (With light: 1.46)	
[230 V]	[1.42 (With light: 1.46)]	[1.39 (With light: 1.60)]			
Surge voltage suppressor		Refer to the Specific Product Precautions 4 (page 21) and 5 (page 22).			
Indicator light		LED	LED (Neon bulb for AC)	LED	

\*1 The 110 VAC and the 115 VAC are interchangeable. The 220 VAC and the 230 VAC are interchangeable as well.

## Flow Rate Characteristics

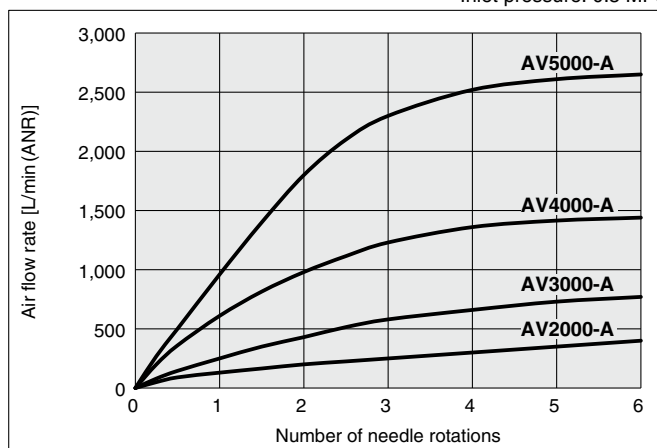
Body size		20	30	40	50		
Port size	1(P), 2(A)	1/4	3/8	1/2	3/4	1	
	3(R)	1/4	3/8	1/2	3/4		
Flow rate characteristics	1(P) → 2(A)	C[dm <sup>3</sup> /(s·bar)]	9.2	13.1	19.2	34.8	41.3
		b	0.36	0.27	0.32	0.66	0.34
		Cv	2.4	3.1	5.1	12.6	13.7
	2(A) → 3(R)	C[dm <sup>3</sup> /(s·bar)]	8.8	9.2	10.1	23.7	
		b	0.46	0.48	0.55	0.67	
		Cv	2.5	2.6	3.2	9.2	

## Pressure for Switching from Low-speed Air Supply to Rapid Air Supply



## Needle Flow Characteristics at Low-speed Air Supply \* Representative values

Inlet pressure: 0.5 MPa





# Soft Start-up Valve AV□2000-A/3000-A/4000-A/5000-A Series

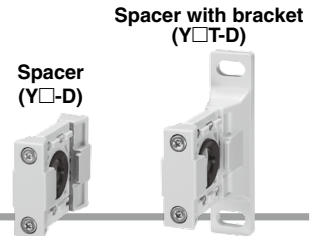
## Optional Part Nos.

Series	AV2000-A	AV3000-A	AV4000-A	AV5000-A
<b>Bracket assembly</b> *1	AV22P-210AS	AV32P-210AS	AV42P-210AS	AV52P-210AS
<b>Silencer assembly</b> *2	AV22P-250AS	AV32P-250AS	AV42P-250AS	AV52P-250AS
<b>Pressure gauge</b> *3	G36-10-□01			

\*1 Bracket: 1 pc., Mounting screw: 2 pcs. (3 pcs. for the AV5000-A)

\*2 Element, Element O-ring, and Element cover: 1 pc. each

\*3 The □ in the pressure gauge part number indicates the type of connection thread. No indication is necessary for R; however, indicate "N" for NPT. Please contact SMC for details on the pressure gauge with MPa/psi dual scale unit specifications.



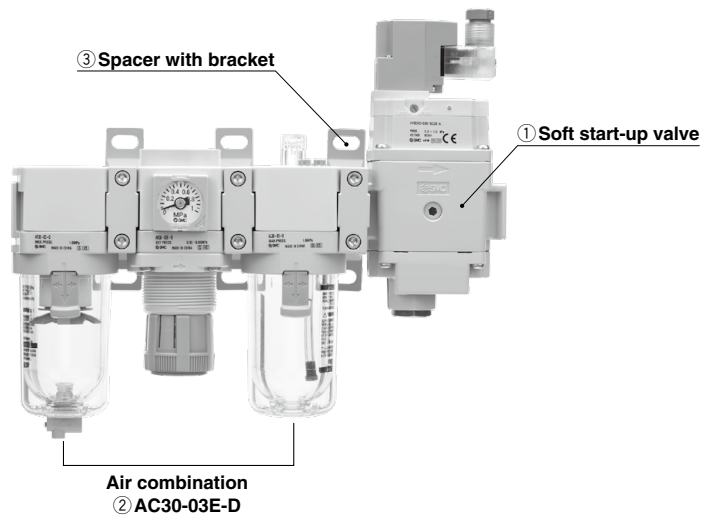
## Spacer for Modular Type F.R.L. Unit

Series	AV2000-A	AV3000-A	AV4000-A	AV5000-A
<b>Spacer</b>	Y200-D	Y300-D	Y400-D	Y600-D
<b>Spacer with bracket</b>	Y200T-D	Y300T-D	Y400T-D	Y600T-D
<b>Applicable model</b>	AC20-D	AC30-D	AC40-D*1	AC50-D AC60-D

\*1 Excludes port size 06

\* The AC-A series and the B series can also be connected.

## Assembly Example



**Products do not come assembled. They should be ordered separately and assembled by the customer.**

\* The Simple Specials System deals with product unification. Please contact your local sales representative for more details.

### Assembly Example

- ① Soft start-up valve: AV3000-03S-5DZB-A ..... 1 pc.
- ② Air combination: AC30-03E-D ..... 1 pc.
- ③ Spacer with bracket: Y300T-D ..... 1 pc.

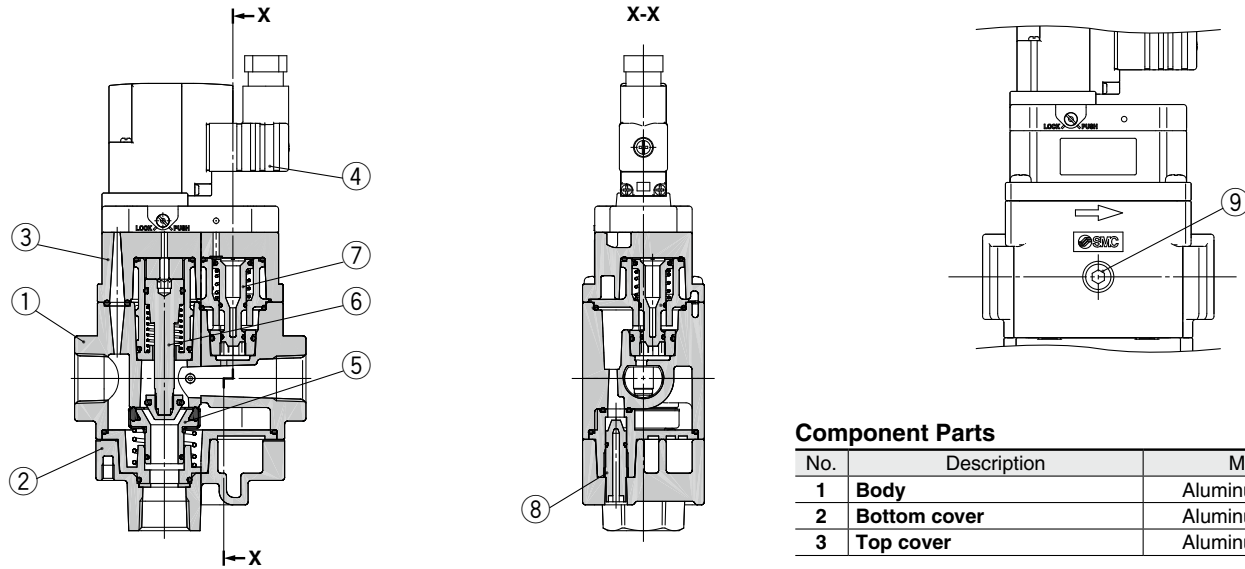
# AV□2000-A/3000-A/4000-A/5000-A Series

## Working Principle

Working conditions	Pilot valve	Pressure conditions	Operation description	Internal construction/Cylinder actuation circuit (Meter-out control) example
Low-speed air supply	ON	$P_s > P_A$	<p><b>Operation description of the soft start-up valve</b></p> <p>When the pilot valve ① is energized or turned ON manually, the spool ② is pushed down due to the pilot air and gets into contact with the valve ③, closing the flow passage to port 3 (R). At this time, force that pushes the valve ③ <math>\geq</math> force that pushes down the spool ②. Therefore, the flow passage from the valve ③ to port 2 (A) is still closed.</p> <p>Furthermore, the piston ④ is pushed down due to the pilot air, and the flow passage from the needle ⑤ to port 2 (A) opens. And then, the air pressure whose flow rate is adjusted by the needle ⑤ flows to port 2 (A).</p> <p><b>Description of cylinder actuation</b></p> <p>The meter-in control of the needle ⑤ slowly moves the cylinder from A to B.</p> <p>PP: Inlet pressure PA: Outlet pressure</p>	
High-speed air supply		$P_s \leq P_A$	<p><b>Operation description of the soft start-up valve</b></p> <p>When the outlet side is filled with pressure supplied from the needle ⑤, <math>P_A</math> increases. When <math>P_A</math> exceeds the specified pressure, the force that pushes up the valve ③ becomes smaller than the force that pushed down the spool ②. Then, the valve ③ is pushed down, opening the flow passage, and pressure is supplied to port 2 (A) rapidly.</p> <p><b>Description of cylinder actuation</b></p> <p>When <math>P_s &lt; P_A</math> after the cylinder reaches B, the main valve fully opens and <math>P_A</math> increases rapidly as shown from C to D and becomes the same pressure as <math>P_p</math>.</p> <p><math>P_s</math>: Pressure for switching to rapid air supply</p>	
Normal operation	OFF	$P_p \approx P_A$	<p><b>Operation description of the soft start-up valve</b></p> <p>The valve ③ holds the fully open condition.</p> <p><b>Description of cylinder actuation</b></p> <p>The cylinder operation is controlled by a meter-out circuit on the cylinder side.</p>	
Exhaust		—	<p><b>Operation description of the soft start-up valve</b></p> <p>When the pilot valve ① is turned OFF, the pilot air of the spool ② is exhausted from the pilot valve ①, and the spool ② and valve ③ are returned upward due to the spring. This opens the flow passage to port 3 (R), exhausting the air pressure on the port 2 (A) side.</p> <p>The pilot air of the piston ④ is also exhausted from the pilot valve ①, and the piston ④ is returned upward due to the spring, closing the flow passage from the needle ⑤.</p>	

# Soft Start-up Valve AV□2000-A/3000-A/4000-A/5000-A Series

## Construction



### Component Parts

No.	Description	Material
1	Body	Aluminum die-cast
2	Bottom cover	Aluminum die-cast
3	Top cover	Aluminum die-cast

### Replacement Parts

No.	Description	Material	AV2000-A	AV3000-A	AV4000-A	AV5000-A
4	Pilot valve assembly*1	—	Refer to the How to Order below.		Refer to the How to Order below.	
5	Valve assembly	Rubber material: HNBR	AV22P-060AS	AV22P-060AS	AV42P-060AS	AV52P-060AS
6	Control valve assembly	—	AV22P-110AS	AV22P-110AS	AV42P-110AS	AV52P-110AS
7	Piston assembly	POM, NBR	AV22P-120AS	AV22P-120AS	AV42P-120AS	AV52P-120AS
8	Needle assembly	POM, NBR	AV22P-150AS	AV32P-150AS	AV42P-150AS	AV52P-150AS
9	Plug assembly	POM, NBR	AR22P-320AS-□01			

\*1 Refer to the How to Order below for pilot valve model numbers.

## How to Order Pilot Valve Assembly

**AV** 2 0 - 1 G   B A

	Symbol	Description	Applicable body size				
			20	30	40	50	
①	Body size	2	For the AV2000-A, AV3000-A				
		4	For the AV4000-A, AV5000-A				
②	Rated coil voltage	AC (50/60 Hz)	1	100 VAC			
			2	200 VAC			
			3	110 VAC [115 VAC]*1			
		DC	4	220 VAC [230 VAC]*1			
			5	24 VDC			
			6	12 VDC			
③	Electrical entry	+	G	Grommet (Lead wire length: 300 mm)			
			D	Type D (DIN terminal/With connector)			
			Y	Type Y (DIN terminal/With connector)*2			
			DO	Type D (DIN terminal/Without connector)			
			YO	Type Y (DIN terminal/Without connector)			
			KO	M12 connector (Without cable)			
④	Light/surge voltage suppressor	+	Nil	None			
			Z	With light/surge voltage suppressor			
⑤	Manual override	+	Nil	Non-locking push type			
			B	Push-turn locking slotted type			
			C	Push-turn locking lever type			

\*1 The 110 VAC and the 115 VAC are interchangeable. The 220 VAC and the 230 VAC are interchangeable as well.

The allowable voltage fluctuation is -15% to +5% of the rated voltage for the 115 VAC or the 230 VAC.

\*2 Type "Y" is a DIN terminal in compliance with EN-175301-803C (former DIN43650C).

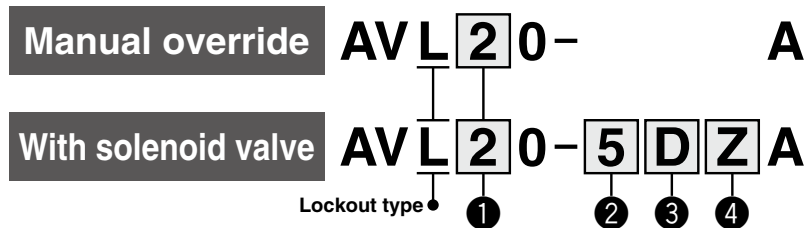
\*3 When the electrical entry is "KO," only the DC specifications (5 or 6) can be selected for the rated coil voltage.

\*4 When the electrical entry is "DO" or "YO," the light/surge voltage suppressor cannot be selected.

When it is "KO," only the "With light/surge voltage suppressor" option can be selected.

# AV□2000-A/3000-A/4000-A/5000-A Series

## How to Order Pilot Valve Assembly (For the AVL type)



	Symbol	Description	Applicable body size				
			20	30	40	50	
<b>1</b>	Body size	<b>2</b> For the AVL2000 to 5000-A	●	●	●	●	
		+					
<b>2</b>	Rated coil voltage	AC (50/60 Hz)	<b>1</b> 100 VAC	●	●	●	●
			<b>2</b> 200 VAC	●	●	●	●
			<b>3</b> 110 VAC [115 VAC]* <sup>1</sup>	●	●	●	●
		DC	<b>4</b> 220 VAC [230 VAC]* <sup>1</sup>	●	●	●	●
			<b>5</b> 24 VDC	●	●	●	●
			<b>6</b> 12 VDC	●	●	●	●
		+					
<b>3</b>	Electrical entry	<b>D</b> Type D (DIN terminal/With connector)	●	●	●	●	
		<b>Y</b> Type Y (DIN terminal/With connector)* <sup>2</sup>	●	●	●	●	
		<b>DO</b> Type D (DIN terminal/Without connector)	●	●	●	●	
		<b>YO</b> Type Y (DIN terminal/Without connector)	●	●	●	●	
		<b>KO</b> M12 connector (Without cable)	○* <sup>3</sup>	○* <sup>3</sup>	○* <sup>3</sup>	○* <sup>3</sup>	
		+					
<b>4</b>	Light/surge voltage suppressor	<b>Nil</b> None	●	●	●	●	
		<b>Z</b> With light/surge voltage suppressor	○* <sup>4</sup>	○* <sup>4</sup>	○* <sup>4</sup>	○* <sup>4</sup>	

\*1 The 110 VAC and the 115 VAC are interchangeable. The 220 VAC and the 230 VAC are interchangeable as well.

The allowable voltage fluctuation is -15% to +5% of the rated voltage for the 115 VAC or the 230 VAC.

\*2 Type "Y" is a DIN terminal in compliance with EN-175301-803C (former DIN43650C).

\*3 When the electrical entry is "KO," only the DC specifications (5 or 6) can be selected for the rated coil voltage.

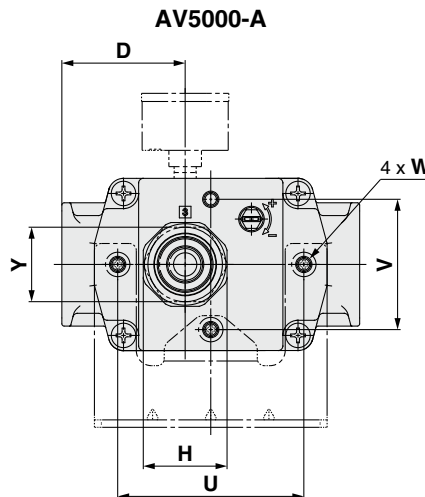
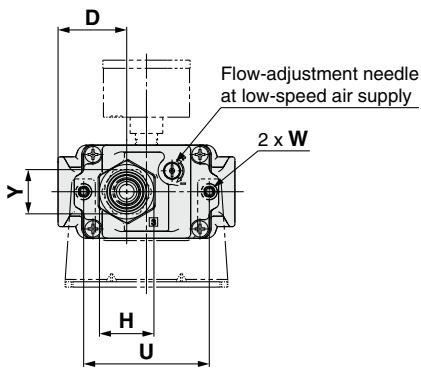
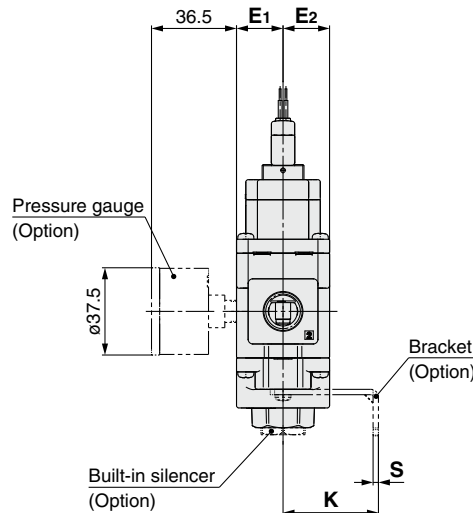
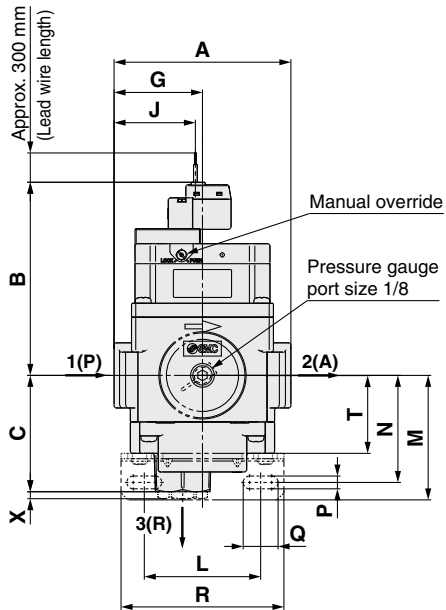
\*4 When the electrical entry is "DO" or "YO," the light/surge voltage suppressor cannot be selected.

When it is "KO," only the "With light/surge voltage suppressor" option can be selected.

# Soft Start-up Valve AV□2000-A/3000-A/4000-A/5000-A Series

## Dimensions

Grommet: AV□00-□-□G□□-□



			[mm]
Body size	Coil type	B	
20	AC	85	
	DC	83	
30	AC	85	
	DC	83	
40	AC	95	
	DC	93	
50	AC	98	
	DC	96	

## Dimensions

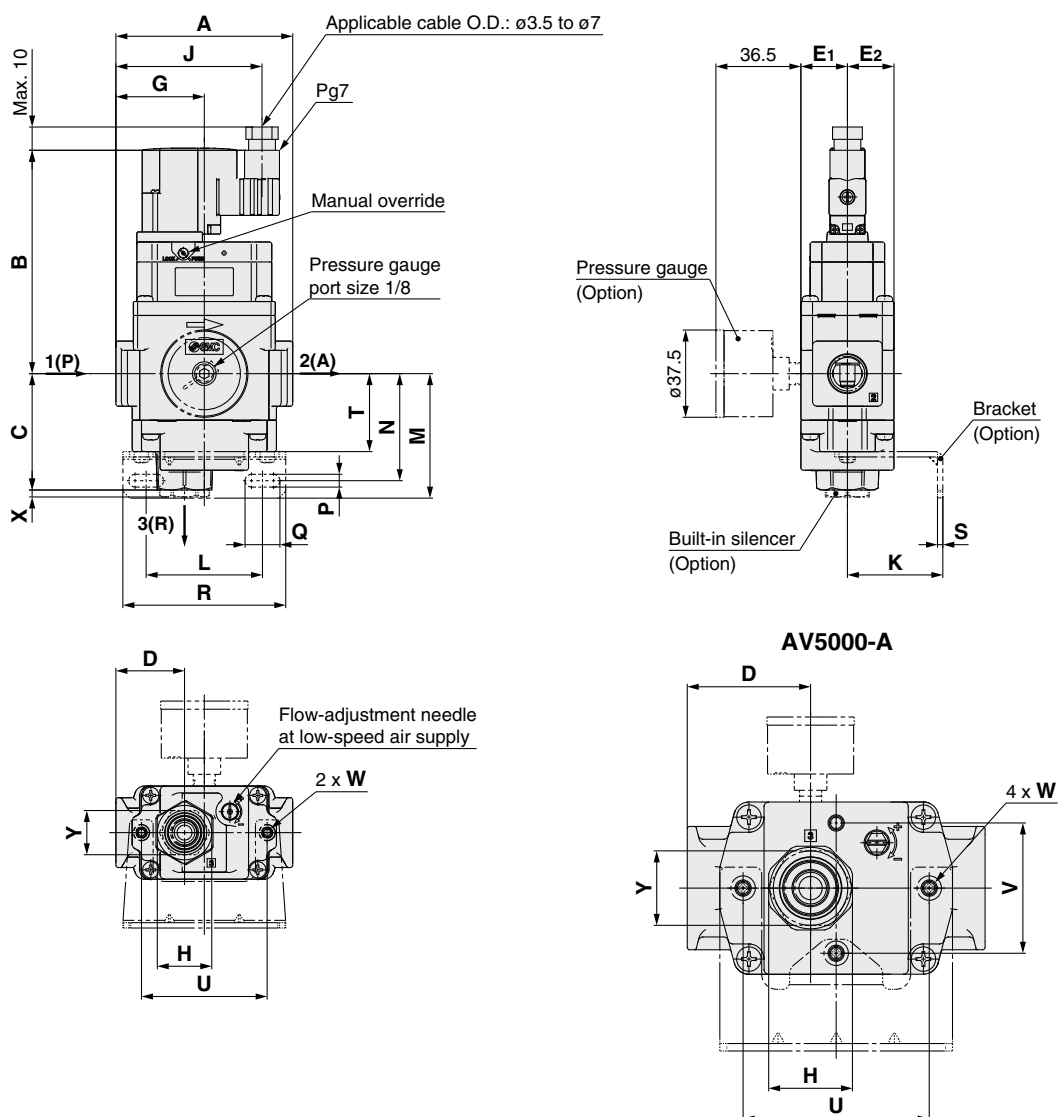
Model	Standard specifications										
	Port size			A	C	D	E1	E2	G	H	J
	1(P)	2(A)	3(R)								
AV2000-□02-1 to 4G(Z)□-A	1/4	1/4	1/4	66	47	24.5	20	20	33	Width across flats 22	30
AV2000-□02-5 to 6G(Z)□-A											
AV3000-□03-1 to 4G(Z)□-A	3/8	3/8	3/8	76	50	29.5	20	20	38	Width across flats 24	35
AV3000-□03-5 to 6G(Z)□-A											
AV4000-□04-1 to 4G(Z)□-A	1/2	1/2	1/2	98	56	39.5	26	26	49	Width across flats 30	33
AV4000-□04-5 to 6G(Z)□-A											
AV5000-□06, 10-1 to 4G(Z)□-A	3/4, 1	3/4, 1	3/4	128	59	53	37	37	53	Width across flats 36	52
AV5000-□06, 10-5 to 6G(Z)□-A											

Model	Optional specifications													
	With bracket											With built-in silencer		
	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y
AV2000-□02-1 to 4G(Z)□-A	30	50	51.5	44	5.5	10	66	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 14
AV2000-□02-5 to 6G(Z)□-A														
AV3000-□03-1 to 4G(Z)□-A	41	50	53.5	46	5.5	15	70	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 19
AV3000-□03-5 to 6G(Z)□-A														
AV4000-□04-1 to 4G(Z)□-A	50	60	64	54	8.5	18	90	3.2	39	74	—	M5 x 0.8 Depth 6.5	4	Width across flats 22
AV4000-□04-5 to 6G(Z)□-A														
AV5000-□06, 10-1 to 4G(Z)□-A	70	75	70	60	11	16	100	3.2	45	80	56	M6 x 1 Depth 8	6	Width across flats 32
AV5000-□06, 10-5 to 6G(Z)□-A														

# AV□2000-A/3000-A/4000-A/5000-A Series

## Dimensions

DIN terminal: AV□00-□-□D/Y□□-□-A



## Dimensions

[mm]

Model	Standard specifications											
	Port size			A	B	C	D	E1	E2	G	H	J
	1(P)	2(A)	3(R)									
AV2000-□02-1 to 6D/Y(Z)□-A	1/4	1/4	1/4	66	97	47	24.5	20	20	33	Width across flats 22	58
AV3000-□03-1 to 6D/Y(Z)□-A	3/8	3/8	3/8	76	97	50	29.5	20	20	38	Width across flats 24	63
AV4000-□04-1 to 6D/Y(Z)□-A	1/2	1/2	1/2	98	107	56	39.5	26	26	49	Width across flats 30	61
AV5000-□06, 10-1 to 6D/Y(Z)□-A	3/4, 1	3/4, 1	3/4	128	109	59	53	37	37	53	Width across flats 36	80

[mm]

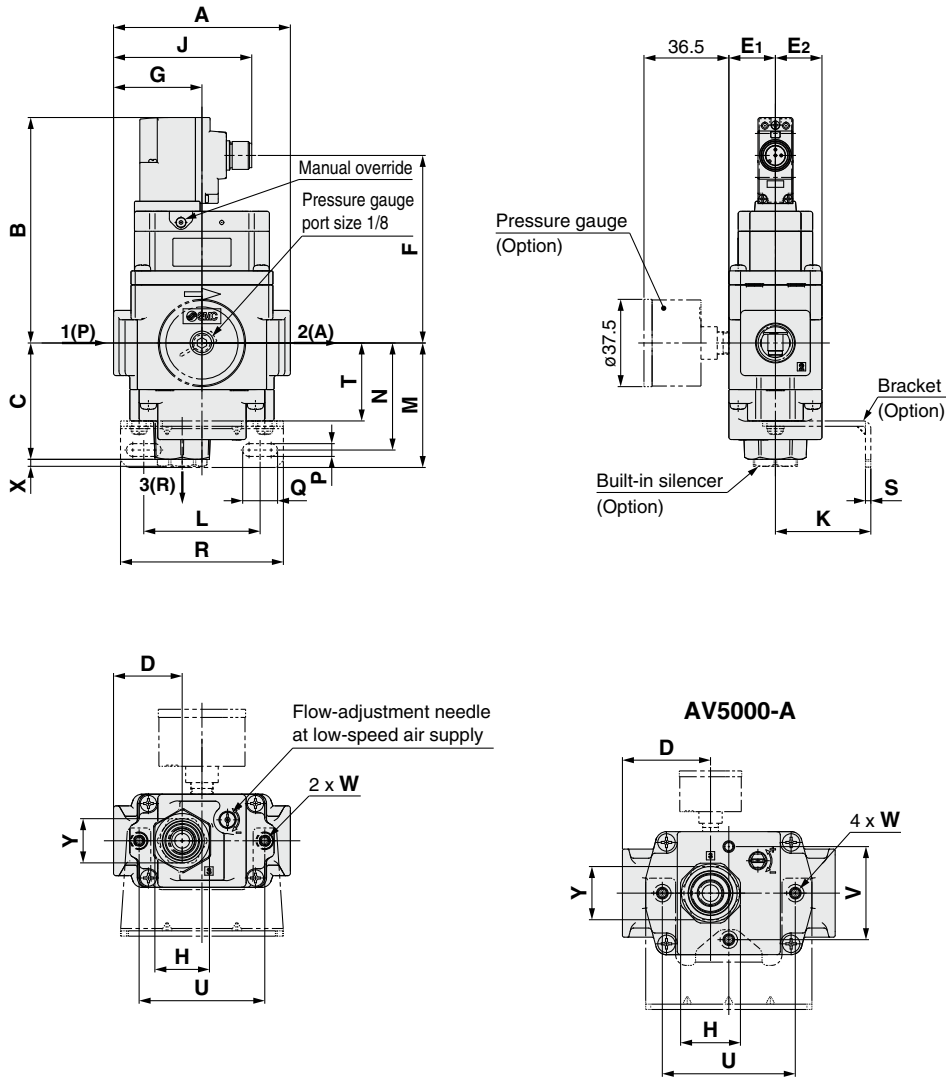
Model	Optional specifications													
	With bracket											With built-in silencer		
	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y
AV2000-□02-1 to 6D/Y(Z)□-A	30	50	51.5	44	5.5	10	66	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 14
AV3000-□03-1 to 6D/Y(Z)□-A	41	50	53.5	46	5.5	15	70	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 19
AV4000-□04-1 to 6D/Y(Z)□-A	50	60	64	54	8.5	18	90	3.2	39	74	—	M5 x 0.8 Depth 6.5	4	Width across flats 22
AV5000-□06, 10-1 to 6D/Y(Z)□-A	70	75	70	60	11	16	100	3.2	45	80	56	M6 x 1 Depth 8	6	Width across flats 32



# Soft Start-up Valve AV□2000-A/3000-A/4000-A/5000-A Series

## Dimensions

M12 connector: AV□00-□-□KOZ-□-A



## Dimensions

[mm]

Model	Standard specifications												
	Port size			A	B	C	D	E1	E2	F	G	H	J
	1(P)	2(A)	3(R)										
AV2000-□02-5 to 6KOZ-□-A	1/4	1/4	1/4	66	97	47	24.5	20	20	81	33	Width across flats 22	54.4
AV3000-□03-5 to 6KOZ-□-A	3/8	3/8	3/8	76	97	50	29.5	20	20	81	38	Width across flats 24	59.4
AV4000-□04-5 to 6KOZ-□-A	1/2	1/2	1/2	98	107	56	39.5	26	26	91	49	Width across flats 30	57.4
AV5000-□06,10-5 to 6KOZ-□-A	3/4, 1	3/4, 1	3/4	128	109	59	53	37	37	94	53	Width across flats 36	76.4

[mm]

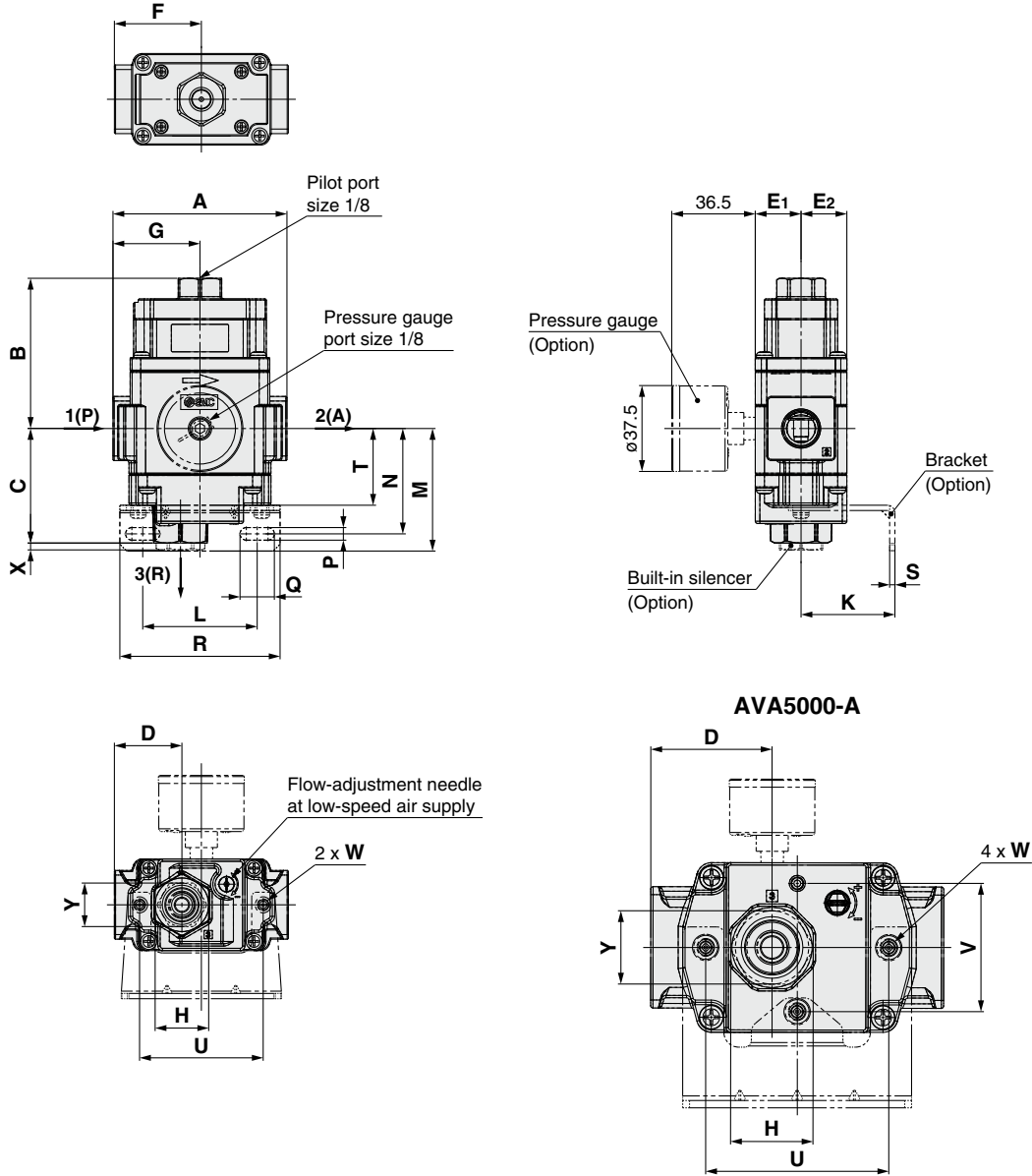
Model	Optional specifications													
	With bracket											With built-in silencer		
	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y
AV2000-□02-5 to 6KOZ-□-A	30	50	51.5	44	5.5	10	66	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 14
AV3000-□03-5 to 6KOZ-□-A	41	50	53.5	46	5.5	15	70	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 19
AV4000-□04-5 to 6KOZ-□-A	50	60	64	54	8.5	18	90	3.2	39	74	—	M5 x 0.8 Depth 6.5	4	Width across flats 22
AV5000-□06,10-5 to 6KOZ-□-A	70	75	70	60	11	16	100	3.2	45	80	56	M6 x 1 Depth 8	6	Width across flats 32



# Soft Start-up Valve **AV**□**2000-A/3000-A/4000-A/5000-A Series**

## Dimensions

Air operated type: AVA□00-□-□-**A**



## Dimensions

[mm]

Model	Port size			Pilot port size	Standard specifications									
	1(P)	2(A)	3(R)		A	B	C	D	E <sub>1</sub>	E <sub>2</sub>	F	G	H	
AVA2000-□02-□- <b>A</b>	1/4	1/4	1/4	1/8	66	65.6	47	24.5	20	20	33	33	Width across flats 22	
AVA3000-□03-□- <b>A</b>	3/8	3/8	3/8	1/8	76	65.6	50	29.5	20	20	38	38	Width across flats 24	
AVA4000-□04-□- <b>A</b>	1/2	1/2	1/2	1/8	98	75.6	56	39.5	26	26	36	49	Width across flats 30	
AVA5000-□06, 10-□- <b>A</b>	3/4, 1	3/4, 1	3/4	1/8	128	78.6	59	53	37	37	55	53	Width across flats 36	

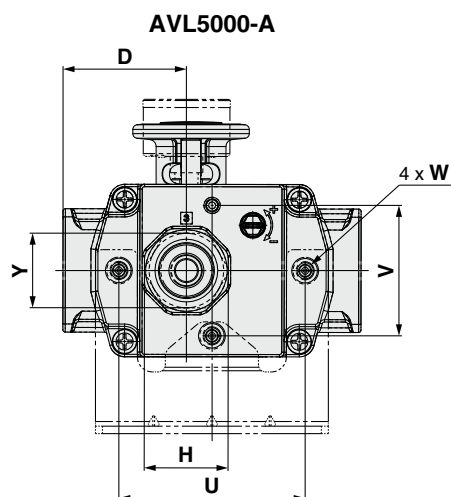
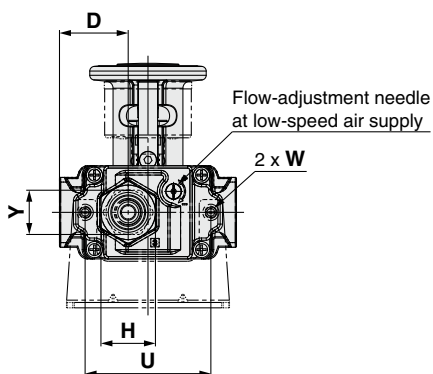
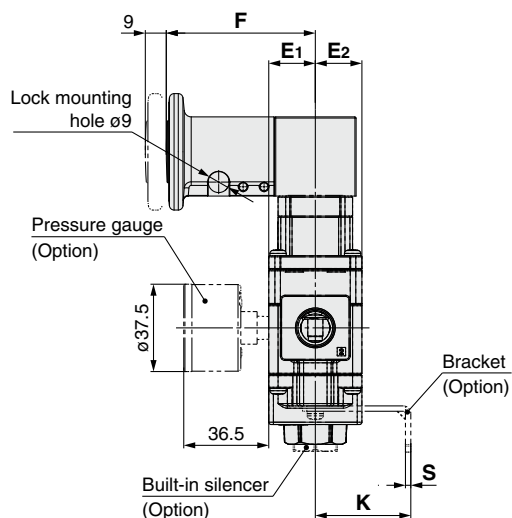
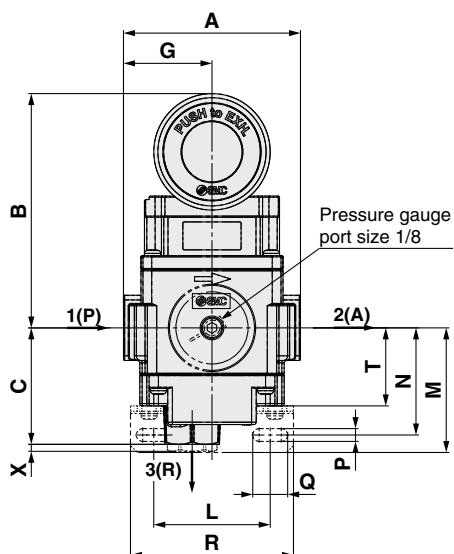
[mm]

Model	Optional specifications													
	With bracket											With built-in silencer		
	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y
AVA2000-□02-□- <b>A</b>	30	50	51.5	44	5.5	10	66	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 14
AVA3000-□03-□- <b>A</b>	41	50	53.5	46	5.5	15	70	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 19
AVA4000-□04-□- <b>A</b>	50	60	64	54	8.5	18	90	3.2	39	74	—	M5 x 0.8 Depth 6.5	4	Width across flats 22
AVA5000-□06, 10-□- <b>A</b>	70	75	70	60	11	16	100	3.2	45	80	56	M6 x 1 Depth 8	6	Width across flats 32

# AV□2000-A/3000-A/4000-A/5000-A Series

## Dimensions

Lockout type/Manual override: AVL□00-□-□-A



## Dimensions

[mm]

Model	Standard specifications											
	Port size			A	B	C	D	E1	E2	F	G	H
	1(P)	2(A)	3(R)									
AVL2000-□02-□-A	1/4	1/4	1/4	66	100.6	47	24.5	20	20	64	33	Width across flats 22
AVL3000-□03-□-A	3/8	3/8	3/8	76	100.6	50	29.5	20	20	64	38	Width across flats 24
AVL4000-□04-□-A	1/2	1/2	1/2	98	110.6	56	39.5	26	26	64	49	Width across flats 30
AVL5000-□06, 10-□-A	3/4, 1	3/4, 1	3/4	128	113.6	59	53	37	37	64	53	Width across flats 36

[mm]

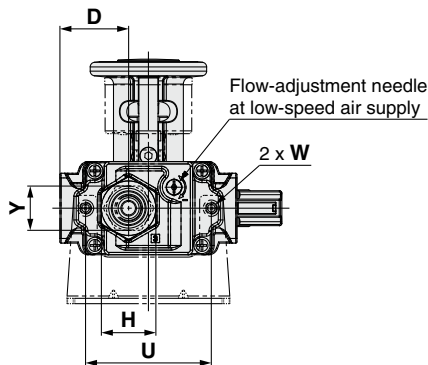
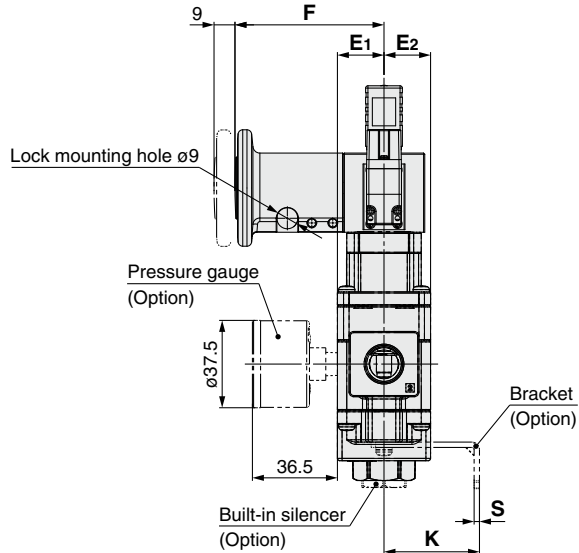
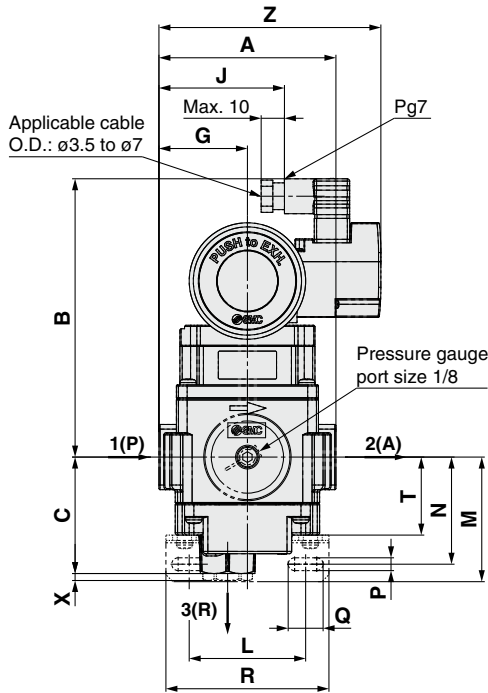
Model	Optional specifications														
	With bracket												With built-in silencer		
	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	
AVL2000-□02-□-A	30	50	51.5	44	5.5	10	66	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 14	
AVL3000-□03-□-A	41	50	53.5	46	5.5	15	70	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 19	
AVL4000-□04-□-A	50	60	64	54	8.5	18	90	3.2	39	74	—	M5 x 0.8 Depth 6.5	4	Width across flats 22	
AVL5000-□06, 10-□-A	70	75	70	60	11	16	100	3.2	45	80	56	M6 x 1 Depth 8	6	Width across flats 32	

# Soft Start-up Valve **AV□2000-A/3000-A/4000-A/5000-A Series**

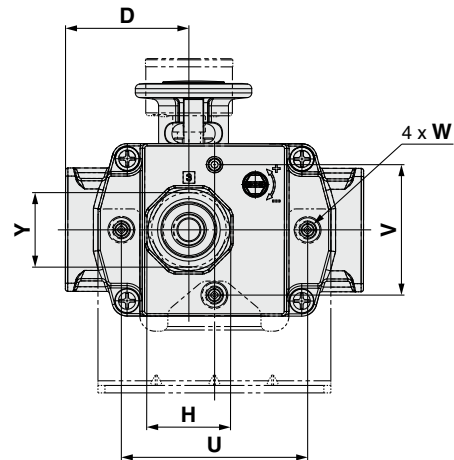
## Dimensions

Lockout type/Manual override, With solenoid valve

DIN terminal: AVL□00-□-□D/Y□□-□-A



**AVL5000-A**



## Dimensions

[mm]

Model	Standard specifications													
	Port size			A	B	C	D	E <sub>1</sub>	E <sub>2</sub>	F	G	H	J	Z
	1(P)	2(A)	3(R)											
AVL2000-□02-1 to 6D/Y(Z)-□-A	1/4	1/4	1/4	66	119.5	47	24.5	20	20	64	33	Width across flats 22	48.9	90.3
AVL3000-□03-1 to 6D/Y(Z)-□-A	3/8	3/8	3/8	76	119.5	50	29.5	20	20	64	38	Width across flats 24	53.9	95.3
AVL4000-□04-1 to 6D/Y(Z)-□-A	1/2	1/2	1/2	98	129.5	56	39.5	26	26	64	49	Width across flats 30	51.9	93.3
AVL5000-□06, 10-1 to 6D/Y(Z)-□-A	3/4, 1	3/4, 1	3/4	128	132.5	59	53	37	37	64	53	Width across flats 36	70.9	112.3

[mm]

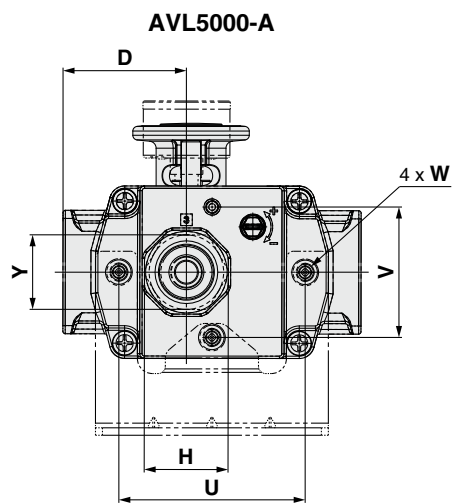
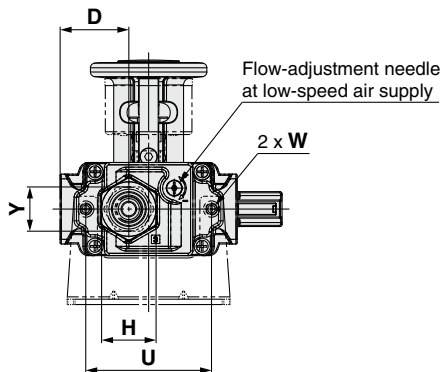
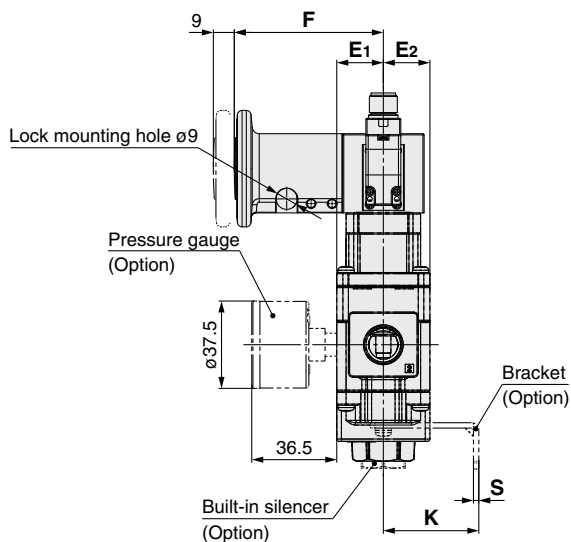
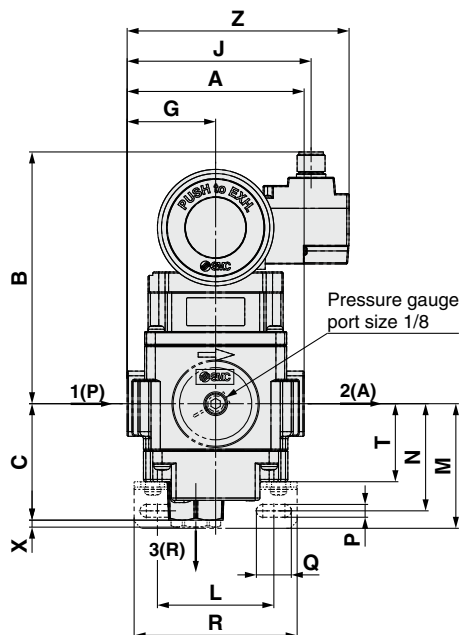
Model	Optional specifications													
	With bracket											With built-in silencer		
	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y
AVL2000-□02-1 to 6D/Y(Z)-□-A	30	50	51.5	44	5.5	10	66	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 14
AVL3000-□03-1 to 6D/Y(Z)-□-A	41	50	53.5	46	5.5	15	70	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 19
AVL4000-□04-1 to 6D/Y(Z)-□-A	50	60	64	54	8.5	18	90	3.2	39	74	—	M5 x 0.8 Depth 6.5	4	Width across flats 22
AVL5000-□06, 10-1 to 6D/Y(Z)-□-A	70	75	70	60	11	16	100	3.2	45	80	56	M6 x 1 Depth 8	6	Width across flats 32

# AV□2000-A/3000-A/4000-A/5000-A Series

## Dimensions

Lockout type/Manual override, With solenoid valve

M12 connector: AVL□00-□-□KOZ-□-A



## Dimensions

Model	Standard specifications													
	Port size			A	B	C	D	E <sub>1</sub>	E <sub>2</sub>	F	G	H	J	Z
	1(P)	2(A)	3(R)											
AVL2000-□02-5 to 6KOZ-□-A	1/4	1/4	1/4	66	108.1	47	24.5	20	20	64	33	Width across flats 22	74	90.3
AVL3000-□03-5 to 6KOZ-□-A	3/8	3/8	3/8	76	108.1	50	29.5	20	20	64	38	Width across flats 24	79	95.3
AVL4000-□04-5 to 6KOZ-□-A	1/2	1/2	1/2	98	118.1	56	39.5	26	26	64	49	Width across flats 30	77	93.3
AVL5000-□06, 10-5 to 6KOZ-□-A	3/4, 1	3/4, 1	3/4	128	121.1	59	53	37	37	64	53	Width across flats 36	96	112.3

Model	Optional specifications													
	With bracket												With built-in silencer	
	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y
AVL2000-□02-5 to 6KOZ-□-A	30	50	51.5	44	5.5	10	66	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 14
AVL3000-□03-5 to 6KOZ-□-A	41	50	53.5	46	5.5	15	70	2.3	33.5	54	—	M4 x 0.7 Depth 6	3	Width across flats 19
AVL4000-□04-5 to 6KOZ-□-A	50	60	64	54	8.5	18	90	3.2	39	74	—	M5 x 0.8 Depth 6.5	4	Width across flats 22
AVL5000-□06, 10-5 to 6KOZ-□-A	70	75	70	60	11	16	100	3.2	45	80	56	M6 x 1 Depth 8	6	Width across flats 32





# AV□2000-A/3000-A/4000-A/5000-A Series Specific Product Precautions 1

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For F.R.L. precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website: <https://www.smcworld.com>

## Design

### ⚠ Warning

#### 1. Actuator operation

When using solenoid valve or actuator in the outlet side of this product, implement appropriate measures to prevent potential danger caused by actuator operation.

#### 2. Holding pressure

Since the valve might have slight internal leakage, it is not suitable for holding pressure in a tank or another vessel for long periods of time.

#### 3. Not suitable for use as an emergency shutoff valve etc.

The valves listed in this catalog are not designed for safety applications such as an emergency shutoff valve. If the valves are used for the mentioned applications, additional safety measures should be adopted.

#### 4. Ventilation

Provide ventilation when using a valve in a confined area, such as in a closed control panel. For example, install a ventilation opening etc. in order to prevent pressure from increasing inside of the confined area and to release the heat generated by the valve.

#### 5. Lock out

We recommend using a lock with a shackle diameter of  $\phi 5$  or more for this product (lockout type). If a lock with a shackle diameter of less than  $\phi 5$  is to be used, please test it on the actual machine.

## Selection

### ⚠ Warning

#### 1. Confirm the specifications.

This product is designed only for use in compressed air systems. Do not operate at pressures, temperatures, etc., beyond the range of the specifications, as this can cause a malfunction or damage to the product. (Refer to the specifications.) Please contact SMC if using for other fluids than compressed air.

#### 2. Operation of closed center solenoid valves

Even if this product is used for closed center solenoid valves or actuator with a load factor of 50% or more, lurching (quick extension) cannot be prevented.

#### 3. Using a regulator in the outlet side

When mounting a regulator in the outlet side (A port side), use a residual pressure relief regulator (AR25K to 40K) or a check type regulator. With a standard regulator (AR10 to 60), the outlet side pressure may not be released when this valve is exhausted.

#### 4. Operation of solenoid valves in the outlet side

To operate solenoid valves mounted on this product's outlet side (A port side), first confirm that the outlet side's pressure ( $P_A$ ) has increased to become equal to the inlet side's pressure ( $P_P$ ).

#### 5. Operation

The residual pressure release function of this product is for emergency use only; therefore, avoid the operation in the same manner as ordinary 3-port valves.

## Selection

### ⚠ Warning

#### 6. Using a lubricator

If mounting a lubricator, mount it on the inlet side (P port side), of this product. If mounted on the outlet side (A port side), back flow of oil will occur and may spurt out of the valve's R port.

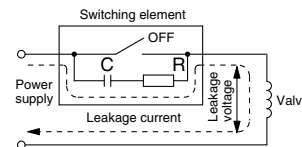
#### 7. Operation for air blowing

This product cannot be operated for air blowing due to the mechanism that switches the main valve to be fully open after the outlet side's pressure ( $P_A$ ) increases to approx. 1/2 of the inlet side's pressure ( $P_P$ ).

### ⚠ Caution

#### 1. Leakage voltage

Particularly when using a C-R element (surge voltage suppressor) to protect the switching element, take note that leakage current will flow through the C-R element, thus increasing leakage voltage.



AC coil is 8% or less of the rated voltage.

DC coil is 3% or less of the rated voltage.

#### 2. Low-temperature operation

Although the valve can be operated at temperature as low as  $0^{\circ}\text{C}$ , measures should be taken to avoid solidifying or freezing drainage or moisture, etc.

## Mounting

### ⚠ Warning

#### 1. Operation manual

Mount and operate the product after reading the manual carefully and understanding its contents. Also, keep the manual in a place where it can be referred to as necessary.

#### 2. Maintenance space

Allow sufficient space for maintenance and inspection.

#### 3. If air leakage increases or equipment does not operate properly, stop operation.

After mounting or maintenance, etc., supply compressed air and power, and perform appropriate function and leakage tests to confirm that the unit is mounted properly.

#### 4. Painting and coating

Warnings or specifications printed or labeled on a product should not be erased, removed or covered up.

Furthermore, please contact SMC before painting the resin parts, as this may cause adverse effects depending on the solvent.



# AV□2000-A/3000-A/4000-A/5000-A Series Specific Product Precautions 2

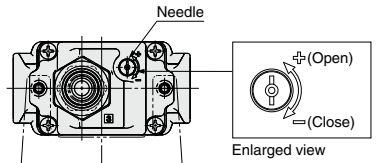
Be sure to read this before handling the products. Refer to the back cover for safety instructions. For F.R.L. precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website: <https://www.smcworld.com>

## Adjustment

### ⚠ Caution

#### 1. Needle operation of low-speed air supply

To perform the initial speed adjustment in the outlet side actuator, supply air from this product's inlet side and turn ON the pilot valve. Then, rotate the needle counterclockwise from the fully closed position.



Product bottom surface (Exhaust port side)

## Piping

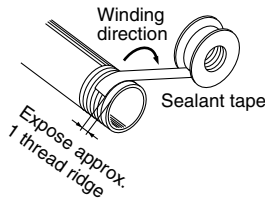
### ⚠ Warning

#### 1. Preparation before piping

Before piping is connected, it should be thoroughly blown out by air (flushing) or washed to remove chips, cutting oil, or other debris from inside the pipe.

#### 2. Winding of sealant tape

When screwing together pipes and fittings, etc., be certain that chips from the pipe threads and sealing material do not get inside the valve. Also, when the sealant tape is used, leave 1 thread ridge exposed at the end of the threads.



#### 3. Tighten threads with the proper tightening torque.

When screwing fittings into valves, tighten with the torques given below. Also, when using SMC fittings, please tighten with the torque conforming to the catalog or operation manual.

#### Tightening Torque when Piping

Connection thread	Proper tightening torque [N·m]
1/8	3 to 5
1/4	8 to 12
3/8	15 to 20
1/2	20 to 25
3/4	28 to 30
1	36 to 38

#### 4. Piping to products

When piping to products, avoid making an error of supply port etc., by referring to the operation manuals.

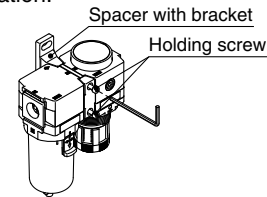
## Piping

### ⚠ Warning

#### 5. F.R.L. module combination

When connecting to a modular F.R.L. combinations (AC20 to 60), select one of the spacers, which are included. (Refer to page 8 for details.) However, modular combinations with the AC40-06 are not possible.

Furthermore, connect soft start-up valves to the outlet side of the F.R.L. combination.



Tighten the 2 holding screws on the spacer with bracket or spacer evenly.

Tighten them to the recommended tightening torque.

Insufficient tightening torque may result in loosening or sealing failure. Excessive tightening torque may damage the thread, etc.

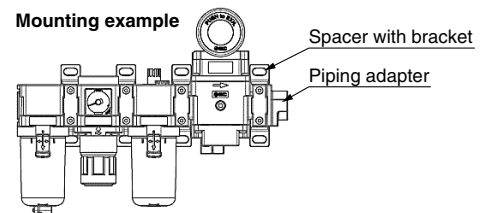
#### Recommended Tightening Torque

Unit: N·m

Applicable model	AC20□	AC30□	AC40□	AC50□ AC60□
Spacer with bracket part no.	Y200T-D	Y300T-D	Y400T-D	Y600T-D
Spacer part no.	Y200-D	Y300-D	Y400-D	Y600-D
Torque	0.36 ±0.036	1.2 ±0.05	1.2 ±0.05	2.0 ±0.1

#### 6. Lockout type manual button operating load and moment control

Please do not apply excessive load to the manual button when operating the valve switching, when using this product (lockout type) by connecting to the outlet side of the F.R.L. combination. Application of excessive moment force to the spacer may cause air leakage. Please consider using one more spacer with bracket on the outlet side of this product, if necessary.



#### 7. Inlet side piping conditions

The nominal size of the piping material's or equipment's bore should be equal to or larger than the port size of this product. The combined sonic conductance of the inlet side's (P port side's) piping or equipment should be equal to or larger than the values below.

Series	Combined sonic conductance [dm <sup>3</sup> /(s·bar)]
AV2000-A	1
AV3000-A	4
AV4000-A	7
AV5000-A	10

When the piping is restricted or the supply pressure is insufficient, the main valve will not switch and air leakage may occur from the R port.



# AV□2000-A/3000-A/4000-A/5000-A Series Specific Product Precautions 3

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## Wiring

### ⚠ Caution

#### 1. Applied voltage

When electric power is connected to a solenoid valve, be careful to apply the proper voltage. Improper voltage may cause a malfunction or damage to the coil.

#### 2. Check the connections.

Confirm that the connections are correct after completing all wiring.

#### 3. External force applied to the lead wire

If an excessive force is applied to the lead wire, this may cause faulty wiring. Take appropriate measures so that a force of 30 N or more should not be applied to the lead wire.

## Lubrication

### ⚠ Caution

1. The valve has been lubricated for life at the factory, and does not require any further lubrication.

2. If a lubricant is used in the system, use class 1 turbine oil (no additive), ISO VG32.

Using other lubricant can cause damage to devices and result in a malfunction.

Once lubricant is utilized within the system, since the original lubricant applied within the product during manufacturing will be washed away, please continue to supply lubrication to the system. Without continued lubrication, malfunctions could occur.

If turbine oil is used, refer to the corresponding Material Safety Data Sheet (SDS).

#### 3. Lubrication amount

If the lubrication amount is excessive, the oil may accumulate inside the pilot valve, causing a malfunction or response delay. So, do not apply a large amount of oil.

## Air Supply

### ⚠ Warning

#### 1. Use clean air.

Do not use compressed air that contains chemicals, synthetic oils that include organic solvents, salt, corrosive gases, etc., as they can cause a malfunction or damage to the product.

### ⚠ Caution

#### 1. Install an air filter.

Install an air filter upstream near the valve. Select an air filter with a filtration size of 5 μm or smaller.

#### 2. Take measures to ensure air quality, such as by installing an aftercooler, air dryer, or water separator.

Compressed air that contains a large amount of drainage can cause a malfunction of pneumatic equipment such as valves. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or water separator.

## Air Supply

### ⚠ Caution

#### 3. Install a mist separator.

If an excessive amount of carbon powder is present, install a mist separator on the upstream side of this product. If excessive carbon dust is generated by the compressor, it may adhere to the inside of the product and cause it to malfunction. For compressed air quality, refer to the **Web Catalog**.

## Operating Environment

### ⚠ Warning

1. Do not use in an atmosphere where corrosive gases, chemicals, sea water, water, or water vapor is present. Do not use in cases where there is direct contact with any of the above.

2. Do not use in an explosive environment.

3. Do not use in a place subject to heavy vibration and/or impact.

4. The valve should not be exposed to prolonged sunlight. Use a protective cover, if necessary.

5. Remove any sources of excessive heat.

6. In locations where there is contact with water, oil, weld spatter, etc., take suitable protective measures.

7. In a dusty environment or when valve switching noise is intrusive, install a silencer in the R port to prevent dust from entering, and to reduce noise.

## Maintenance

### ⚠ Warning

1. Perform maintenance and inspection according to the procedures indicated in the operation manual.

If handled improperly, a malfunction or damage to machinery or equipment may occur.

#### 2. Removal of equipment and supply/exhaust of compressed air

When components are removed, first confirm that measures are in place to prevent workpieces from dropping, run-away equipment, etc. Then, cut off the supply pressure and electric power, and exhaust all compressed air from the system using the residual pressure release function.

#### 3. Low-frequency operation

Valves should be switched at least once every 30 days to prevent a malfunction. (Use caution regarding the air supply.)

#### 4. Manual override

When the manual override is operated, connected equipment will be actuated. Confirm the safety before operating.

### ⚠ Caution

#### 1. Drain removal

Remove drain from air filters periodically.



# AV□2000-A/3000-A/4000-A/5000-A Series Specific Product Precautions 4

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## Manual Override

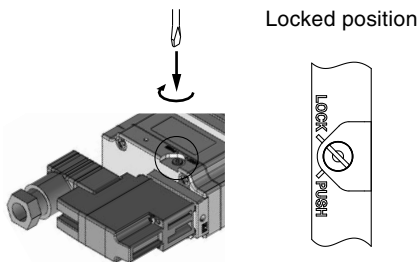
### ⚠ Caution

Control by electricity is not available while manual override is operated.

### ⚠ Warning

#### ■ Push-turn locking slotted type [Type B]

While pressing, turn in the direction of the arrow.  
If it is not turned, it can be operated the same way as the non-locking type.

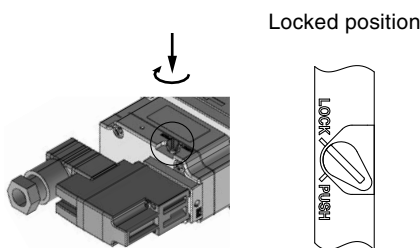


### ⚠ Caution

When operating the locking type B with a screwdriver, turn it gently using a watchmaker's screwdriver.  
[Torque: Less than 0.1 N·m]

#### ■ Push-turn locking lever type [Type C]

While pressing, turn it the direction of the arrow.  
If it is not turned, it can be operated the same way as the non-locking type.



### ⚠ Caution

When locking the manual override on the push-turn locking types (B, C), be sure to push it down before turning.  
Turning without first pushing it down can cause damage to the manual override and trouble such as air leakage.

## Solenoid Valve for 200/220 VAC Specification

### ⚠ Warning

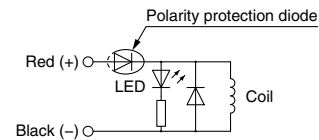
AC specification solenoid valves with grommet have a built-in rectifier circuit in the pilot section to operate the DC coil.  
With 200/220 VAC specification pilot valves, this built-in rectifier generates heat when energized. The surface may become hot depending on the energized condition; therefore, do not touch the solenoid valves.

## Surge Voltage Suppressor

### ⚠ Caution

<For DC>  
Grommet

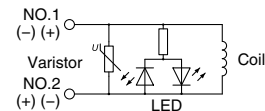
#### With light/surge voltage suppressor (GZ)



- Connect in accordance with the +, - polarity indication.
- Solenoids, whose lead wires have been prewired: positive side red and negative side black

#### DIN terminal

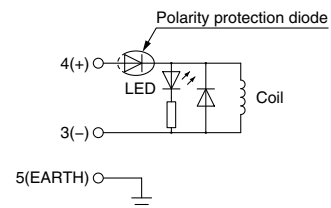
#### With light/surge voltage suppressor (DZ) (YZ)



DIN terminal has no polarity.

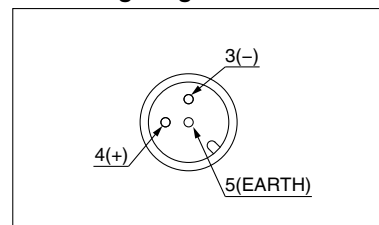
#### M12 connector

#### With light/surge voltage suppressor (KOZ)



- Connect in accordance with the +, - polarity indication.

#### Pin Wiring Diagram





# AV□2000-A/3000-A/4000-A/5000-A Series Specific Product Precautions 5

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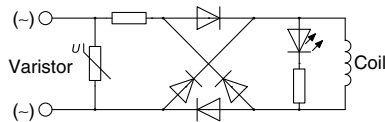
## Surge Voltage Suppressor

### ⚠ Caution

<For AC>

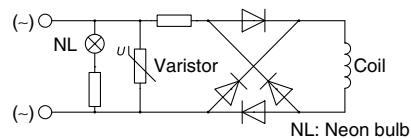
#### Grommet

With light (GZ)



#### DIN terminal

With light (DZ)  
(YZ)



\* Surge voltage suppressor of varistor has residual voltage corresponding to the protective element and rated voltage; therefore, protect the controller side from the surge. The residual voltage of the diode is approx. 1 V.

## How to Use DIN Terminal Connector

### ⚠ Caution

#### Connection

1. Loosen the holding screw and pull the connector out of the solenoid valve terminal block.
2. After removing the holding screw, insert a flat head screwdriver etc. into the notch on the bottom of the terminal block and pry it open, separating the terminal block and the housing.
3. Loosen the screw (slotted screws) in the terminal block. Insert the lead core wires to the terminals according to the connection method, and secure the wires by re-tightening the terminal screw.
4. Secure the cord by tightening the gland nut.

### ⚠ Caution

When making connections, please note that using other than the supported size ( $\varnothing 3.5$  to  $\varnothing 7$ ) heavy-duty cord will not satisfy IP65 (enclosure) standards. Also, make sure to tighten the gland nut and holding screw within their specified torque ranges.

#### Changing the entry direction

After separating the terminal block and housing, the cord entry can be changed by attaching the housing with 90° interval direction. Note that the direction cannot be changed toward this product.

\* When equipped with a light, be careful not to damage the light with the cord's lead wires.

#### Precautions

Plug in and pull out the connector vertically without tilting to one side.

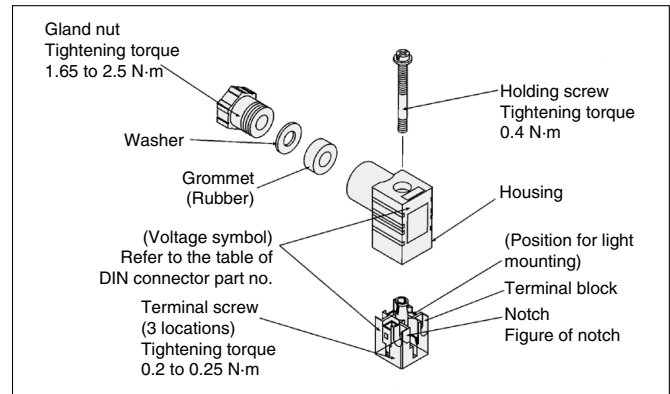
## How to Use DIN Terminal Connector

### ⚠ Caution

#### Compatible Cable

Cord O.D.:  $\varnothing 3.5$  to  $\varnothing 7$

(Reference) 0.5 mm<sup>2</sup>, 2-core or 3-core, equivalent to JIS C 3306



#### Type "Y"

Type "Y" DIN connector is a DIN connector that conforms to the DIN pitch 8-mm standard.

- Type "D" DIN connector with a 9.4 mm pitch between terminals is not interchangeable.
- To distinguish it from type "D" DIN connector, "N" is listed at the end of voltage symbol. (For connector parts without lights, "N" is not indicated. Refer to the name plate to distinguish.)
- The dimensions are completely the same as those of type "D" DIN connector.

## DIN Connector Part Nos.

### ⚠ Caution

#### <Type D>

Without light	SY100-61-1	SY100-61-1-C
---------------	------------	--------------

#### With Light

Rated voltage	Voltage symbol	Part number (For AV)	Part number (For AVL)
24 VDC	24 V	SY100-61-3-05	SY100-61-3-05-C
12 VDC	12 V	SY100-61-3-06	SY100-61-3-06-C
100 VAC	100 V	SY100-61-2-01	SY100-61-2-01-C
200 VAC	200 V	SY100-61-2-02	SY100-61-2-02-C
110 VAC	110 V	SY100-61-2-03	SY100-61-2-03-C
220 VAC	220 V	SY100-61-2-04	SY100-61-2-04-C

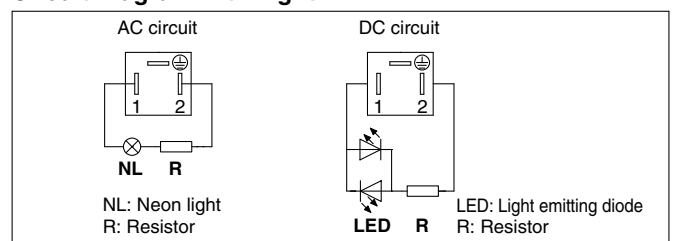
#### <Type Y>

Without light	SY100-82-1	SY100-82-1-C
---------------	------------	--------------

#### With Light

Rated voltage	Voltage symbol	Part number (For AV)	Part number (For AVL)
24 VDC	24 VN	SY100-82-3-05	SY100-82-3-05-C
12 VDC	12 VN	SY100-82-3-06	SY100-82-3-06-C
100 VAC	100 VN	SY100-82-2-01	SY100-82-2-01-C
200 VAC	200 VN	SY100-82-2-02	SY100-82-2-02-C
110 VAC	110 VN	SY100-82-2-03	SY100-82-2-03-C
220 VAC	220 VN	SY100-82-2-04	SY100-82-2-04-C


#### Circuit Diagram with Light







## Safety Instructions

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

 **Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

 **Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

 **Danger :** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

\*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.  
ISO 4413: Hydraulic fluid power – General rules relating to systems.  
IEC 60204-1: Safety of machinery – Electrical equipment of machines.  
(Part 1: General requirements)  
ISO 10218-1: Manipulating industrial robots – Safety.  
etc.

### Warning

#### 1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

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

#### 2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

#### 3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

#### 4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

### Caution

#### 1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.  
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.  
If anything is unclear, contact your nearest sales branch.

## Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

### Limited warranty and Disclaimer

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

#### \*2) Vacuum pads are excluded from this 1 year warranty.

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

### Compliance Requirements

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


### Caution

#### SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

### Revision History

Edition	Content	AT
Edition B	* A non-locking push type has been added to the AV series. * An air operated type and lockout type have been added. * UKCA compliance has been added. * The AC-D series has been added to the list of connectable F.R.L. units. * The number of pages has been increased from 16 to 24.	AT

 **Safety Instructions** Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.

## SMC Corporation

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Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.

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