

Soft Start-up Valve

AV2000/3000/4000/5000



How to Order

Soft start-up valve

AV **20** 00 - **02** - **1** **G** -

Body size

20	1/4
30	3/8
40	1/2
50	3/4,1

Thread type

Nil	Rc
F	G
N	NPT

Port size

02	1/4 (AV2000 only)
03	3/8 (AV3000 only)
04	1/2 (AV4000 only)
06	3/4 (AV5000 only)
10	1 (AV5000 only)

Option

Nil	None
G	With pressure gauge

Flow direction

Nil	Left to right
R	Right to left

Manual override

Nil	Non-locking push type (Flush)
B	Locking type (Tool required)
C	Locking type (Lever)

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor (Grommet type only)
Z	With light/surge voltage suppressor (Not possible with grommet type)

Coil rated voltage

1	100 VAC (50/60 Hz)
2	200 VAC (50/60 Hz)
3	110 to 120 VAC (50/60 Hz)
4	220 VAC (50/60 Hz)
5	24 VDC
6	12 VDC
7	240VAC (50/60 Hz)
9	Other

Electrical entry

G	Grommet
D	Type D DIN terminal (With connector)
DO	Type D DIN terminal (Without connector)
Y	Type Y DIN terminal (With connector)
YO	Type Y DIN terminal (Without connector)

How to Order Pilot Valve Assembly

SF4 - **1** **G** - **80**

Soft start-up valve

Rated coil voltage

1	100 VAC (50/60 Hz)
2	200 VAC (50/60 Hz)
3	110 to 120 VAC (50/60 Hz)
4	220 VAC (50/60 Hz)
5	24 VDC
6	12 VDC
7	240 VAC (50/60 Hz)
9	Other

Flow direction

Nil	Left to right
R	Right to left

Manual override

Nil	Non-locking push type (Flush type)
B	Locking type (Tool required)
C	Locking type (Lever type)

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor (Grommet type only)
Z	With light/surge voltage suppressor (Not possible with grommet type)

Electrical entry

G	Grommet
D	Type D DIN terminal (With connector)
Y	Type Y DIN terminal (With connector)
DO	Type D DIN terminal (Without connector)
YO	Type Y DIN terminal (Without connector)

Note) The grommet type can have a surge voltage suppressor (direct coupling type lead wire), but without indicator light.

TÜV approved product
(Conforms to standards necessary to satisfy EC directives.)

TÜV Rheinland BAUART GEPRÜFT TYPE APPROVED

Series AV has received approval from TÜV Rheinland, an EC Notified Body (EC authorization number 0197), for conformity to DIN VDE0580: 1994 Standards.

Please consult with SMC for details when ordering TÜV approved products because of restrictions regarding product model, voltage specification, and electrical entry, etc.

Soft Start-up Valve *Series AV2000/3000/4000/5000*

Specifications

Model		AV2000	AV3000	AV4000	AV5000		
Port size		1/4	3/8	1/2	3/4	1	
Proof pressure		1.5 MPa					
Operating pressure range		0.2 to 1 MPa					
Pressure gauge port size		1/8					
Ambient and fluid temperature		0 to 60°C (1)					
Effective area (mm ²)	1(P) → 2(A)	20	37	61	113	122	
	2(A) → 3(R)	24	49	76	132	141	
Mass (kg)		0.27	0.48	0.74	1.60	1.54	
Electrical specifications	Rated coil voltage	100, 200, 110 to 120, 220 VAC (50/60 Hz), 240 VAC (50/60 Hz) 12, 24 VDC					
	Allowable voltage fluctuation	-15 to +10% of rated voltage					
	Coil insulation type	Equivalent to B type (130°C)					
	Apparent power (Current consumption) AC	Inrush	5.6 VA (50 Hz), 5.0 VA (60 Hz)				
		Energized	3.4 VA (2.1 W)/50 Hz, 2.3 VA (1.5 W)/60 Hz				
	Current consumption DC	1.8 W					
	Electrical entry	Grommet, Type D DIN terminal, Type Y DIN terminal					
Option specifications	Indicator light/Surge voltage suppressor (2)						
Pilot valve manual override		Non-locking push type (Flush), Locking type (Tool required), Locking type (Lever)					

Note 1) Use dry air when operating at a low temperature.

Note 2) The grommet type is equipped with a surge voltage suppressor (direct coupling type lead wire), but not an indicator light.

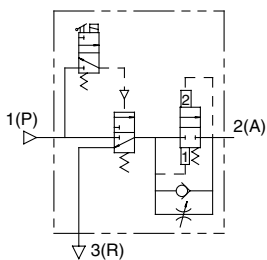


Type D DIN terminal



Type Y DIN terminal

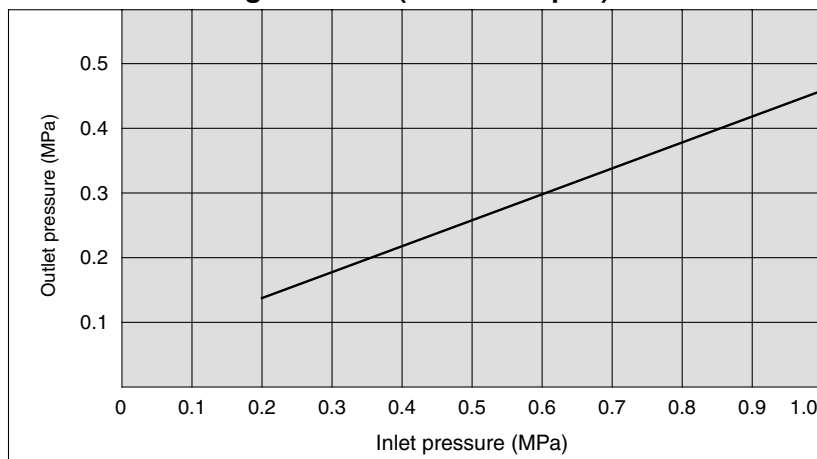
JIS Symbol



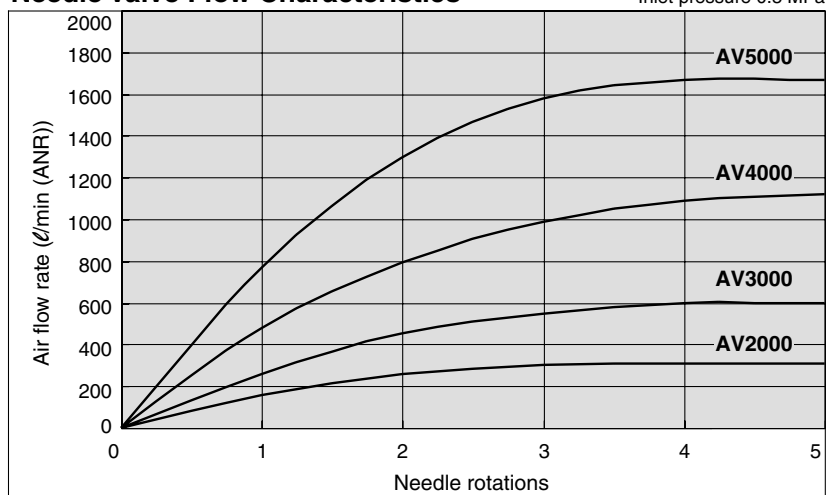
Accessory/Pressure Gauge

Description	Pressure gauge
Part no.	G36-10-01
Pressure range	1 MPa

Piston B Switching Pressure (Close → Open)



Needle Valve Flow Characteristics



AC

AF□

AR

AL

AW□

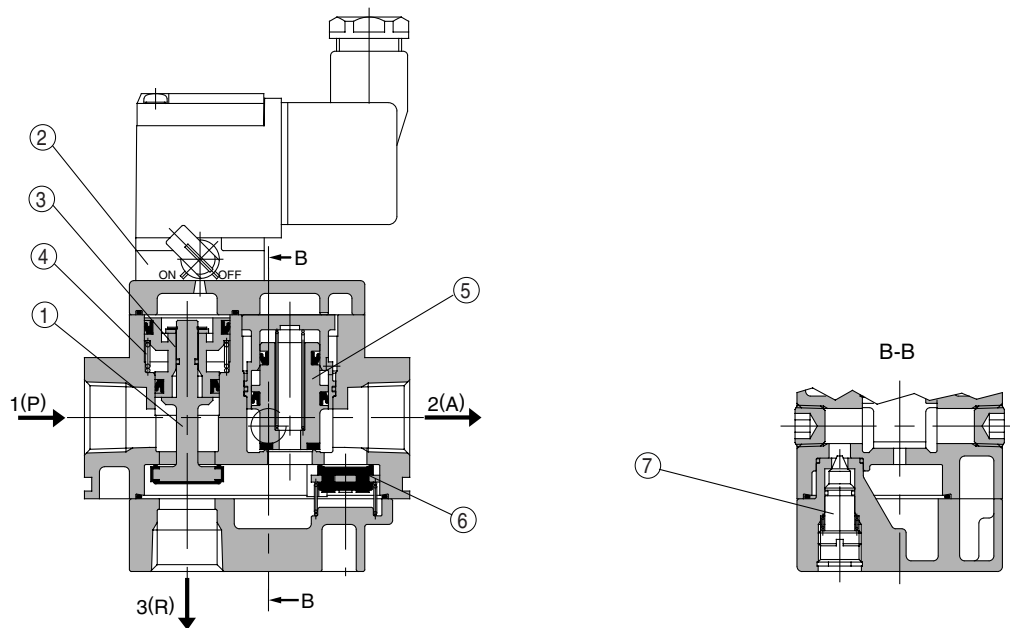
A□G

AV

AF800
AF900

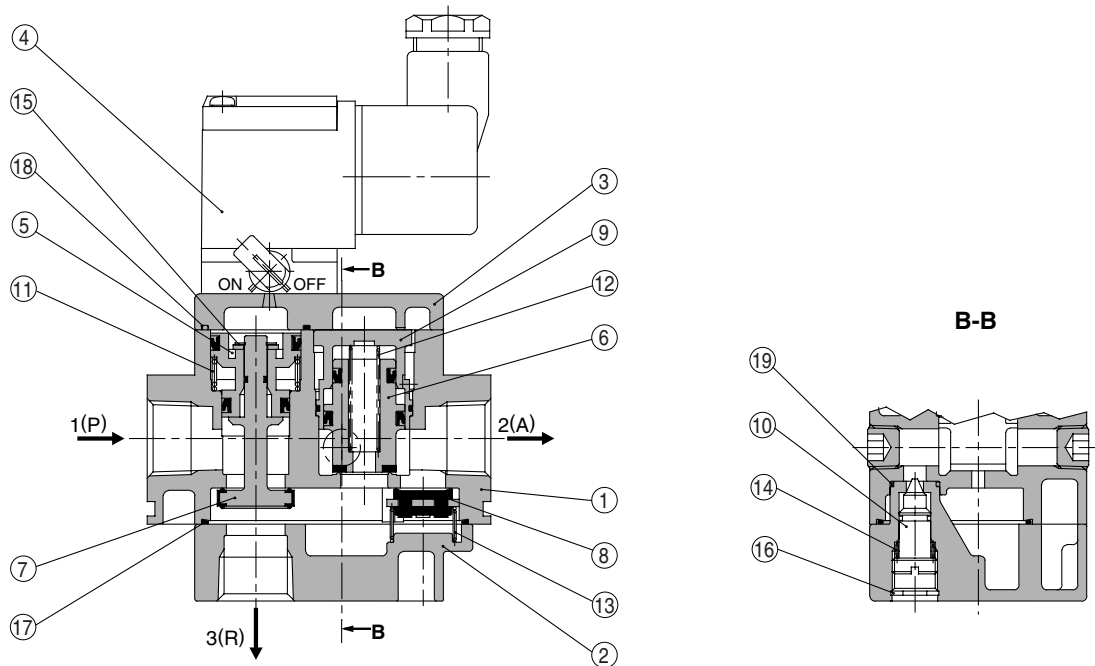
Series AV2000/3000/4000/5000

Working Principle



Working condition	Pilot valve	Pressure conditions	Working description	Pressure time chart (Meter-out control) example	Cylinder drive circuit (Meter-out control) example
Low speed supply	ON	$1/2 PP > PA$	When pilot valve ② is turned ON by energization or manual override, the pilot air pushes piston A ③ and main valve ① downward and opens main valve ① while R port closes simultaneously. The air from P port moves to needle valve ⑦, where its flow is adjusted, and flows to A port. The meter-in control of needle valve ⑦ slowly moves the cylinder from ④ to ⑤.	<p>Initial Operation Return Stroke</p>	
High speed supply		$1/2 PP \leq PA$	When $1/2 PP \leq PA$ after the cylinder reaches ⑤, piston B ⑤ fully opens and PA increases rapidly as shown from ③ to ④ and becomes the same pressure as PP.		
Normal operation		$1/2 PP \approx PA$	Since piston B ⑤ holds the fully open condition, during normal operation the cylinder's speed will be controlled by the usual meter-out control.		
Quick exhaust	OFF	—	When pilot valve ② is turned OFF, spring ④ pushes piston A ③ and main valve ① upward and opens R port while shutting off the air supply from P port. The pressure difference generated at this time lets the check valve ⑥ open and the residual pressure on the A port side is quickly exhausted from R port.		

Construction



Component Parts

No.	Description	Material
1	Body	Aluminum die-casted
2	Cap	Aluminum die-casted
3	Cover	Aluminum die-casted

Replacement Parts

No.	Description	Material	Part no.			
			AV2000	AV3000	AV4000	AV5000
4	Pilot valve assembly	—	SF4-□-80*1			
5	Piston A assembly	POM, NBR	P424204A	P424304A	P424404A	P424504A
6	Piston B assembly	Brass, NBR (HNBR)	P424205A	P424305A	P424405A	P424505A
7	Main valve assembly	Brass, NBR (HNBR)	P424206A	P424306A	P424406A	P424506A
8	Check valve	Brass, NBR (HNBR)	P424207	P424307	P424407	P424507
9	Piston guide assembly	POM, NBR	P424208A	P424308A	P424408A	P424508A
10	Needle assembly	Brass, NBR	P424209A	P424309A	P424409A	P424509A
11	Valve spring	Steel wire	P424211	P424311	P424411	P424511
12	Piston spring	Stainless steel	P424212	P424312	P424412	P424512
13	Check spring	Stainless steel	P424213	P424313	P424413	P424513
14	Needle spring	Steel wire	P424214	P424314	P424414	—
15	Type C retaining ring for shaft	Tool steel	G-5	STW-5	STW-8	STW-10
16	Type C retaining ring for hole	Tool steel	0-9	0-10	RTW-12	RTW-15
17	Seal	NBR	P424210	P424310	P424410	P424510
18	Seal	NBR	P424218	P424315	P424415	P424514
19	O-ring	NBR	10 x 8 x 1	11 x 9 x 1	12.5 x 9.5 x 1.5	16.5 x 12.5 x 2

*1 For "How to Order" pilot valve assembly, refer to page 436.

AC

AF□

AR

AL

AW□

A□G

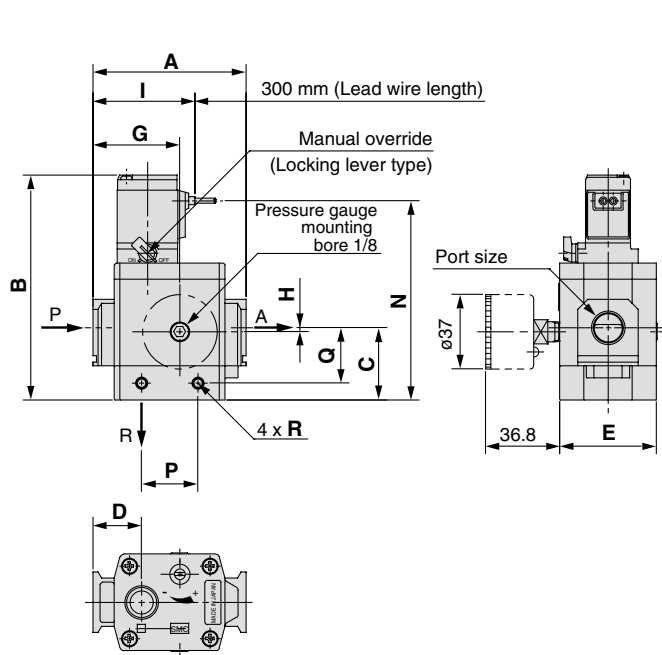
AV

AF800
AF900

Series AV2000/3000/4000/5000

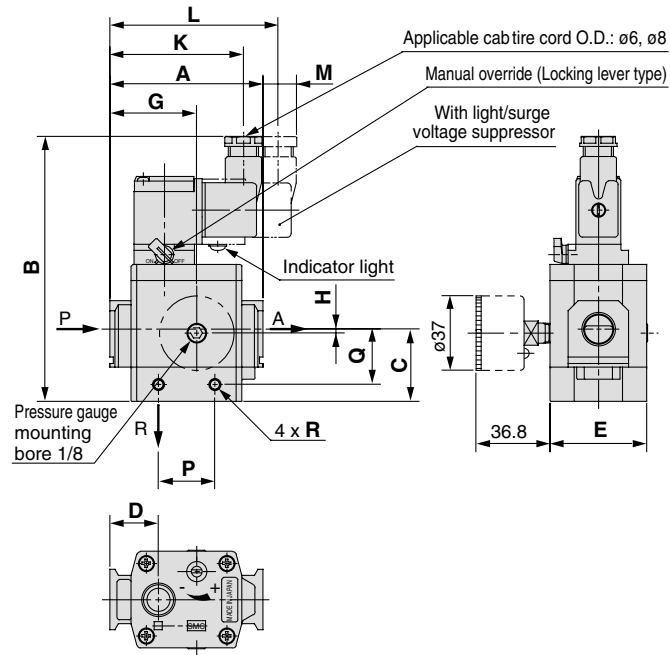
Dimensions

Grommet: AV□00-□-□G, GS



DIN terminal: AV□00-□-□D, DZ

DIN terminal for European use: AV□00-□-□Y, YZ



Model	Port size	A	B	C	D	E	G	H	I	K	L	M	N	P	Q	R
AV2000-□02-□G□	1/4	66	105	31	22	40	38	0	47.5	—	—	—	93	29	23.5	M4 x 0.7 Depth 4.5
AV2000-□02-□GS□										—	—	—				
AV2000-□02-□D□	1/4	66	125	31	22	40	38	0	—	65.5	—	6	—	29	23.5	M4 x 0.7 Depth 4.5
AV2000-□02-□DZ□									—	80.5	23					
AV2000-□02-□Y□	1/4	66	125	31	22	40	38	0	—	67.5	—	10.5	—	29	23.5	M4 x 0.7 Depth 4.5
AV2000-□02-□YZ□									—	84.5	27.5					
AV3000-□03-□G□	3/8	76	112	36	24	48	43	2	50.5	—	—	—	100	28	27.5	M5 x 0.8 Depth 5
AV3000-□03-□GS□										—	—	—				
AV3000-□03-□D□	3/8	76	132	36	24	48	43	2	—	66.5	—	—	—	28	27.5	M5 x 0.8 Depth 5
AV3000-□03-□DZ□									—	83.5	16					
AV3000-□03-□Y□	3/8	76	132	36	24	48	43	2	—	70.5	—	3.5	—	28	27.5	M5 x 0.8 Depth 5
AV3000-□03-□YZ□									—	87.5	20.5					
AV4000-□04-□G□	1/2	98	127	47	32	52	57	3	62.5	—	—	—	115	42	37	M6 x 1 Depth 6
AV4000-□04-□GS□										—	—	—				
AV4000-□04-□D□	1/2	98	147	47	32	52	57	3	—	78.5	—	—	—	42	37	M6 x 1 Depth 6
AV4000-□04-□DZ□									—	95.5	6					
AV4000-□04-□Y□	1/2	98	147	47	32	52	57	3	—	82.5	—	—	—	42	37	M6 x 1 Depth 6
AV4000-□04-□YZ□									—	99.5	10.5					
AV5000-□ $\frac{9}{16}$ -□G□	3/4, 1	128	155	59	39	74	77	0	74	—	—	—	143	50	46	M6 x 1 Depth 7.5
AV5000-□ $\frac{9}{16}$ -□GS□										—	—	—				
AV5000-□ $\frac{9}{16}$ -□D□	3/4, 1	128	175	59	39	74	77	0	—	90	—	—	—	50	46	M6 x 1 Depth 7.5
AV5000-□ $\frac{9}{16}$ -□DZ□									—	107	—					
AV5000-□ $\frac{9}{16}$ -□Y□	3/4, 1	128	175	59	39	74	77	0	—	94	—	—	—	50	46	M6 x 1 Depth 7.5
AV5000-□ $\frac{9}{16}$ -□YZ□									—	111	—					