

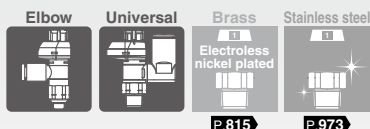
# Speed Controller with Indicator

## AS-FS Series

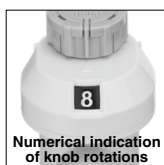
The numerical indication of flow rate knob rotations

RoHS

reduces flow setting time  
and setting errors!

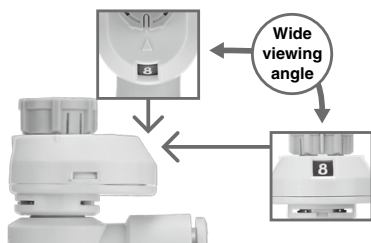


### Indicator window



Body size 1		Body size 2 or larger	
Indicator window	Number of needle rotations	Indicator window	Number of needle rotations
1	1	1	1
2	2	2	2
...	...	...	...
8	8	10	10

### 4 indicator window directions available



Universal type

Indicator window direction: 90°/270°



## 4 indicator window directions offer improved visibility



Indicator window direction: 0°

Indicator window direction: 180°

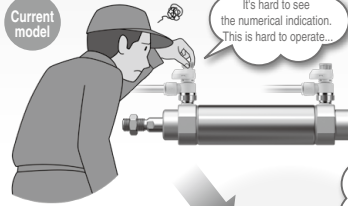


Indicator window direction: 90°

Indicator window direction: 270°

Inspection and maintenance labor can be reduced by selecting the indicator window direction suitable for the operating conditions. In addition, the flexibility of equipment design has been improved.

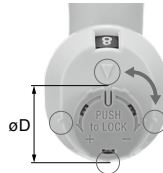
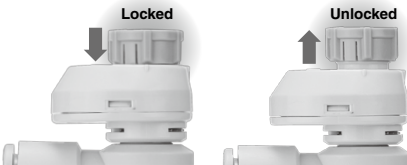
Current model



## Larger push-lock type knob

Easy to lock

The larger knob and marking of every 90° mark allows for easier operation



Body size	øD [mm]
1	9.4
2	12 (Port size 1/8) 13 (Port size 1/4)
3	16.6
4	18.8

### Push-lock type

ø9.4 mm



ø12 mm  
(Port size 1/8)



ø13 mm  
(Port size 1/4)



ø16.6 mm



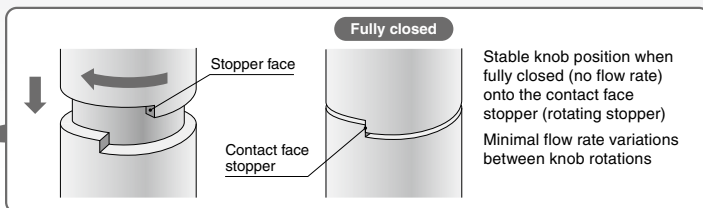
ø18.8 mm



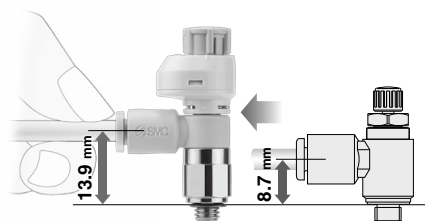
Easy to turn large knob  
Easy to make fine adjustments



## Improved reproducibility of flow rate



## Easier to insert and remove the tube

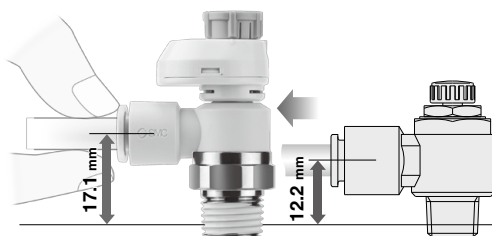


AS-FS Series

Current model

Tubing diameter	Thread	Part number
ø4	M5	AS12□1FS-M5□-04

Part number
AS12□1F-M5-04



AS-FS Series

Current model




Tubing diameter	Thread	Part number
ø6	1/4	AS22□1FS-02-06S

Part number
AS22□1F-02-06

## Easy identification of product type

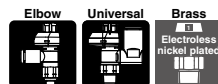
Series	Knob color		Release button color	
	Meter-out	Meter-in	Metric	Inch
 AS-FS    AS-FS-U□	Gray	Light blue	Light gray	Orange
 AS-FSG	Gray	Light blue	White	White

Series Variations

	Seal method	Body size	Port size	Applicable tubing O.D.													Metal parts material	Applicable tubing material	
				Metric size						Inch size									
				2	3.2	4	6	8	10	12	16	1/8"	5/32"	1/4"	5/16"	3/8"			1/2"
	Gasket seal	1	M5 x 0.8	±1														• Brass/ Steel wire  • Stainless steel	Nylon (T,TIA Series)  Soft nylon (TS,TIUB Series)  Polyurethane (T,TIUB Series)  Fluoropolymer (TLM,TILM Series) (TH,TIH Series)
			10-32UNF	±1															
	Sealant	2	R	1/8						±1									
				1/4		±1							±1						
		NPT	1/4																
			3/8																
	4	1/2								±1									
	Face seal	2	G	1/8						±1									
				1/4		±1													
		3	1/4																
			3/8																
	4	1/2								±1									
		Gasket seal	2	Uni	1/8		±1	±1	±1	±1	±1			±1	±1	±1	±1	±1	
					1/4		±1	±1	±1	±1	±1			±1	±1	±1	±1	±1	
3			1/4				±1	±1	±1	±1				±1	±1	±1	±1		
			3/8				±1	±1	±1	±1				±1	±1	±1	±1		
4		1/2							±1	±1	±1				±1	±1			

# Speed Controller with Indicator (Elbow Type / Universal Type) *AS-FS Series*

RoHS



## Model

Model	Port size	Seal method	Applicable tubing O.D.														*3 Max. number of rotations
			Metric size								Inch size						
			2*2	3.2	4	6	8	10	12	16	1/8"	5/32"	1/4"	5/16"	3/8"	1/2"	
AS1□□1FS□-M5□	M5 x 0.8	Gasket seal	●*4	●	●	●					●	●	●				8
AS1□□1FS□-U10/32□	10-32UNF		●*4	●	●	●					●	●	●				
AS2□□1FS□-□01	R NPT	1/8		●	●	●		●*4			●	●	●	●			10
AS2□□1FS□-□02		1/4		●*4	●	●	●	●			●*4	●	●	●	●		
AS3□□1FS□-□02		1/4				●	●	●	●				●	●	●		
AS3□□1FS□-□03		3/8				●	●	●	●				●	●	●		
AS4□□1FS□-□04	1/2							●	●*4					●	●		
AS2□□1FS□-G01	G	1/8		●	●	●	●	●*4									
AS2□□1FS□-G02		1/4		●*4	●	●	●	●									
AS3□□1FS□-G02		1/4				●	●	●	●								
AS3□□1FS□-G03		3/8				●	●	●	●								
AS4□□1FS□-G04		1/2							●	●	●	●*4					
			Face seal														

\*1 "Without sealant" type can be selected as a standard option.

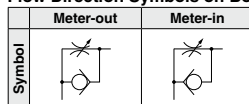
\*2 Only polyurethane tubing is applicable for ø2.

\*3 There are differences in actual rate as by the indicator window over the maximum number of rotations depending on the individual product.

\*4 The universal type is not available.

## Specifications

### Flow Direction Symbols on Body



Fluid	Air
Proof pressure	1.5 MPa
Max. operating pressure	1 MPa
Min. operating pressure	0.1 MPa
Ambient and fluid temperature	-5 to 60°C (No freezing)
Applicable tubing material	Nylon, Soft nylon, Polyurethane*1, FEP, PFA

\*1 Use caution at the max. operating pressure when using soft nylon or polyurethane tubing.  
(For details, refer to pages 678 and 682.)

## Caution

Be sure to read this before handling the products. Refer to page 11 for safety instructions and pages 19 to 22 for flow control equipment precautions.

## Flow Rate and Sonic Conductance

Model		AS1□□1FS-M5□				AS2□□1FS-01				AS2□□1FS-02				AS3□□1FS			AS4□□1FS	
Tubing O.D.	Metric size	ø2	ø3.2 ø4 ø6	ø3.2	ø4	ø6 ø8 ø10	ø3.2	ø4	ø6	ø8 ø10	ø6	ø8	ø10 ø12	ø10	ø12 ø16			
	Inch size	—	ø1/8" ø1/4" ø5/32"	ø1/8"	ø5/32"	ø1/4" ø5/16"	ø1/8"	ø5/32"	—	ø1/4" ø5/16" ø3/8"	ø1/4"	ø5/16"	ø3/8"	ø3/8"	ø1/2"			
C values: Sonic conductance dm <sup>3</sup> /(s·bar)	Free flow	0.2	0.3	0.4	0.6	0.6	0.7	1.0	1.3	1.5	1.6	1.7	2.5	4.4	4.8			
	Controlled flow	0.2	0.3	0.4	0.7	0.8	0.6	0.9	1.3		2.1	2.4	3.3	4.4	4.9			
b values: Critical pressure ratio	Free flow	0.3	0.4	0.2		0.3	0.3		0.4		0.4		0.3	0.3				
	Controlled flow	0.2		0.2		0.3	0.3				0.3			0.3				

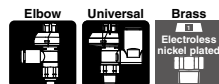
\* 10-32UNF has the same specification as M5.

\* C and b values are for controlled flow with the needle fully open and free flow with the needle fully closed.

# AS-FS Series



## How to Order



### Width across flats (H)

E	8 mm
Nil	9 mm

### Port size

M5	M5 x 0.8
U10/32	10-32UNF

### Body size

1	M5 x 0.8 10-32UNF
---	----------------------

### Body size 1

AS 1 2 0 1 F S - M5 E - 06 -

### Body size 2/3/4

AS 2 2 0 1 F S - 01 - 06 S -

### Body size

2	1/8, 1/4
3	3/8
4	1/2

### With indicator

### Type

2	Elbow
3	Universal

### Control type<sup>\*1</sup>

0	Meter-out
1	Meter-in

<sup>\*1</sup> Meter-out and meter-in types can be visually identified by color of the knob.  
Meter-out: Gray  
Meter-in: Light blue

### Indicator window direction

			Elbow	Universal
Nil	0°		•	—
1	180°		•	•
2	90°		•	—
3	270°		•	—

\* Orientation of indicator direction is fixed when manufacturing, and cannot be changed by the user. In addition, the universal type is only available with 180° setting.

### Applicable tubing O.D.<sup>\*1</sup>

Metric size	Inch size
02	ø2
23	ø3.2 <sup>*2</sup>
04	ø4
06	ø6
01	ø1/8"
03	ø5/32"
07	ø1/4"

<sup>\*1</sup> For selecting applicable tubing O.D., refer to the "Model" on page 815.  
Metric size and inch size types can be visually identified by color of the release button.

Metric size: Light gray

Inch size: Orange

<sup>\*2</sup> Use ø1/8" tubing.

### Made to Order

Refer to page 826 for details.

### Seal method

Nil	Without sealant
S	With sealant

\* Face seal type is used for the G thread type.

Select "Nil/Without sealant".

Example) AS2201FS-G01-06

### Applicable tubing O.D.<sup>\*1</sup>

Metric size	Inch size <sup>*3</sup>
23	ø3.2 <sup>*2</sup>
04	ø4
06	ø6
08	ø8
10	ø10
12	ø12
16	ø16
01	ø1/8"
03	ø5/32"
07	ø1/4"
09	ø5/16"
11	ø3/8"
13	ø1/2"

<sup>\*1</sup> For selecting applicable tubing O.D., refer to the "Model" on page 815.

<sup>\*2</sup> Use ø1/8" tubing.

<sup>\*3</sup> Only the metric size is available for the G thread type.

### Port size

01	1/8
02	1/4
03	3/8
04	1/2

### Thread type

Nil	R
N	NPT
G	G



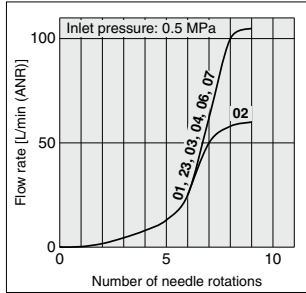
### Made to Order

(For details, refer to page 826.)

Symbol	Specifications
-X12	Lubricant: Vaseline
-X21	Grass-free (Seal: Fluorine-coated) + Restrictor (Without check valve)
-X214	Restrictor (Without check valve)
10-	Clean series

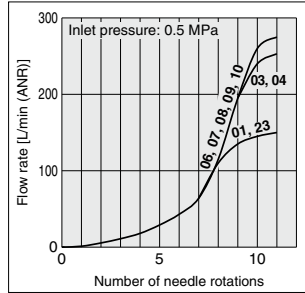
## Needle Valve: Flow Rate Characteristics

AS1□01FS□-M5□, AS1□11FS□-M5□

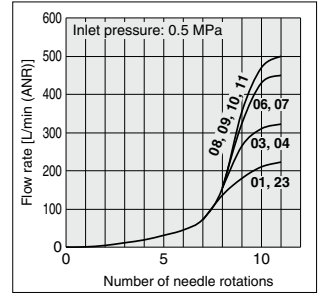


\* -U10/32 has the same specification as M5.

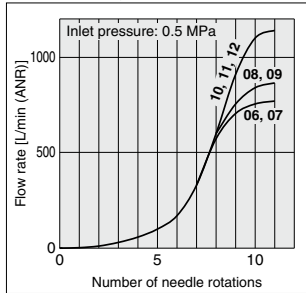
AS2□01FS□-01, AS2□11FS□-01



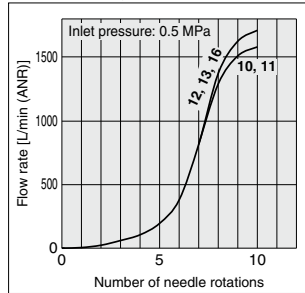
AS2□01FS□-02, AS2□11FS□-02



AS3□01FS□, AS3□11FS□



AS4□01FS□, AS4□11FS□

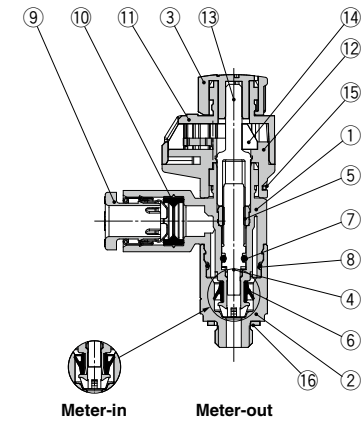


\* The numbers above the flow rate characteristic curves in the charts show the applicable tubing outside diameter as defined by the product number.

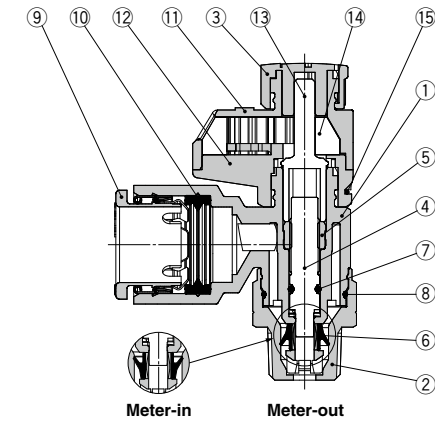
# AS-FS Series

## Construction: Elbow Type

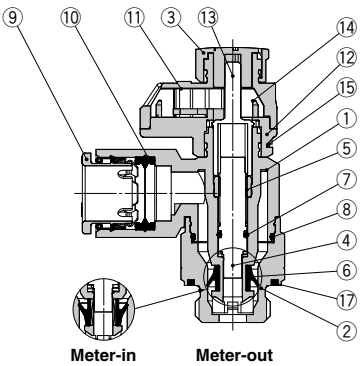
Seal method: Gasket seal  
For M5, 10-32UNF



Seal method: Sealant  
For R, NPT thread



Seal method: Face seal  
For G thread



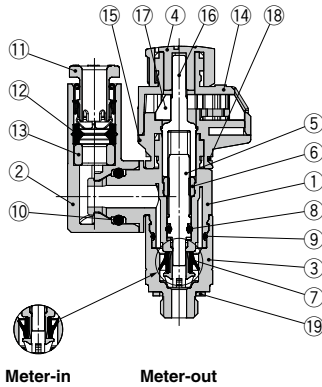
### Component Parts

No.	Description	Material	Note
1	Body A	PBT	
2	Body B	Brass	Electroless nickel plating
3	Knob	POM	
4	Needle	PBT	
5	Needle guide	Brass	Electroless nickel plating
6	U-seal	HNBR	
7	O-ring	NBR	
8	O-ring	NBR	
9	Cassette	—	
10	Seal	NBR	
11	Bonnet A	POM	
12	Bonnet B	POM	
13	Gear	POM	
14	Indicator gear	POM	
15	Clip	Stainless steel	
16	Gasket	NBR/Stainless steel	
17	Seal	NBR	

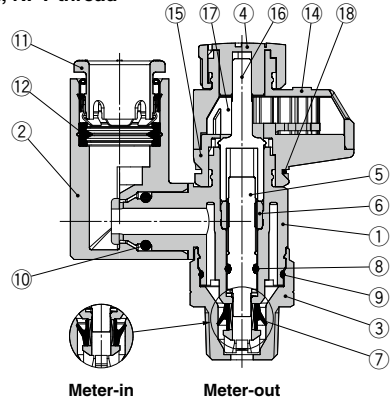


**Construction: Universal Type**

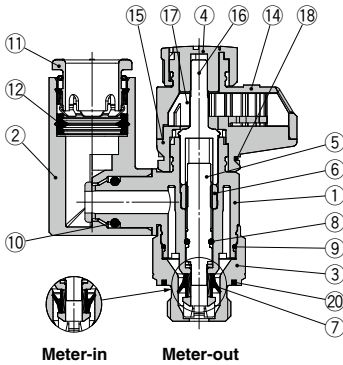
**Seal method: Gasket seal**  
For M5, 10-32UNF



**Seal method: Sealant**  
For R, NPT thread



**Seal method: Face seal**  
For G thread



**Component Parts**

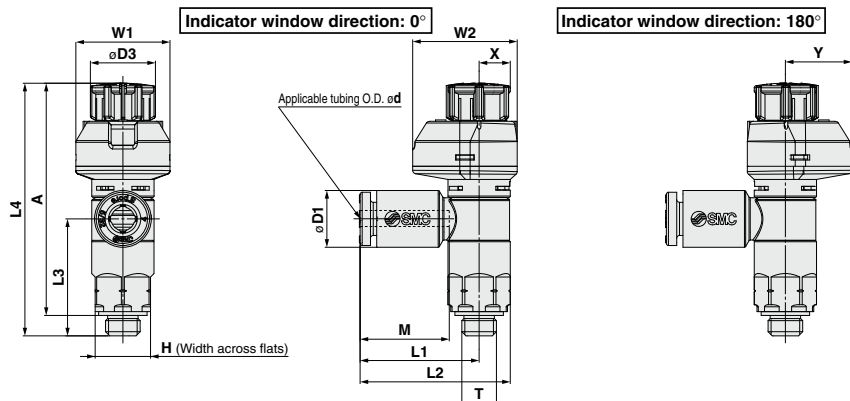
No.	Description	Material	Note
1	Body A	PBT	
2	Elbow body	PBT	
3	Body B	Brass	Electroless nickel plating
4	Knob	POM	
5	Needle	PBT	
6	Needle guide	Brass	Electroless nickel plating
7	U-seal	HNBR	
8	O-ring	NBR	
9	O-ring	NBR	
10	O-ring	NBR	
11	Cassette		
12	Seal	NBR	
13	Spacer	PBT	ø3.2, ø1/8", ø4, ø5/32" and ø6 only
14	Bonnet A	POM	
15	Bonnet B	POM	
16	Gear	POM	
17	Indicator gear	POM	
18	Clip	Stainless steel	
19	Gasket	NBR/Stainless steel	
20	Seal	NBR	

# AS-FS Series

## Dimensions: Elbow Type

Seal method: Gasket seal

For M5, 10-32UNF



### Metric Size

Metric Size																	[mm]	
Model	d	T	H*1	D1	D3	L1	L2	L3	L4*2		A*3		M	W1	W2	X	Y	Weight [g]
									Unlocked	Locked	Unlocked	Locked						
AS12□1FS□-M5E-02	2	M5 x 0.8 10/32UNF	8 (9)	5.8	9.4	15.8	20.3	16.9	39	36.5	35	33.5	11.9	13.6	15.1	5.5	9.6	7
AS12□1FS□-U10/32E-02	3.2			7.2		17.2	21.7											
AS12□1FS□-M5E-23																		
AS12□1FS□-U10/32E-23																		
AS12□1FS□-M5E-04	4			8.2		17.2	21.7						13.3					
AS12□1FS□-U10/32E-04																		
AS12□1FS□-M5E-06																		
AS12□1FS□-U10/32E-06	6	10.4	18.6	23.1	16.5												8	

\*1 The value in ( ) indicates that the dimension for the width across flats is 9 mm.

\*2 Reference dimensions

\*3 Reference dimensions of threads after installation

### Inch Size

Inch Size																	[mm]	
Model	d	T	H <sup>+1</sup>	D1	D3	L1	L2	L3	L4 <sup>+2</sup>		A <sup>+3</sup>		M	W1	W2	X	Y	Weight [g]
									Unlocked	Locked	Unlocked	Locked						
AS12□1FS□-M5E-01	1/8"	M5 x 0.8 10/32UNF	8 (9)	7.2	9.4	17.2	21.7	16.9	39	36.5	35	33.5	13.3	13.6	15.1	5.5	9.6	7
AS12□1FS□-U10/32E-01	5/32"			8.2		18.6	23.1	16.5										
AS12□1FS□-M5E-03																		
AS12□1FS□-U10/32E-03	1/4"			11.2														8
AS12□1FS□-M5E-07																		
AS12□1FS□-U10/32E-07																		

\*1 The value in ( ) indicates that the dimension for the width across flats is 9 mm.

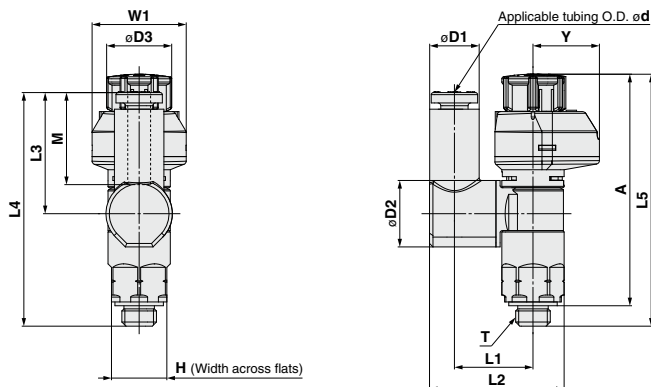
\*2 Reference dimensions

\*3 Reference dimensions of threads after installation



## Dimensions: Universal Type

Seal method: Gasket seal  
For M5, 10-32UNF



### Metric Size

Metric Size																		[mm]								
Model	d	T	H*1	D1	D2	D3	L1	L2	L3	L4	L5*2		A*3		M	W1	Y	Weight [g]								
											Unlocked	Locked	Unlocked	Locked												
AS13□1FS1-M5E-23	3.2	M5 x 0.8 10/32UNF	8 (9)	7.2		9.6	11.6	19.4	17.5	33.8	39	36.5	35	33.5	13.3	13.6	9.6	7								
AS13□1FS1-U10/32-23																										
AS13□1FS1-M5E-04	4			8.2				19.8																		
AS13□1FS1-U10/32-04	6			10.4	11.5	20.9	20.4	36.6																		8
AS13□1FS1-M5E-06																										
AS13□1FS1-U10/32-06																										

\*1 The value in ( ) indicates that the dimension for the width across flats is 9 mm.

\*2 Reference dimensions

\*3 Reference dimensions of threads after installation

### Inch Size

Inch Size																		[mm]		
Model	d	T	H*1	D1	D2	D3	L1	L2	L3	L4	L5*2		A*3		M	W1	Y	Weight [g]		
											Unlocked	Locked	Unlocked	Locked						
AS13□1FS1-M5E-01	1/8	M5 x 0.8 10/32UNF	8 (9)	7.2	9.6	9.4	11.6	19.4	17.5	33.8	39	36.5	35	33.5	13.3	13.6	9.6	7		
AS13□1FS1-U10/32-01																				
AS13□1FS1-M5E-03																				
AS13□1FS1-U10/32-03																				
AS13□1FS1-M5E-07	1/4				11.2			21.3	20.4	36.6								8		
AS13□1FS1-U10/32-07																				

\*1 The value in ( ) indicates that the dimension for the width across flats is 9 mm.

\*2 Reference dimensions

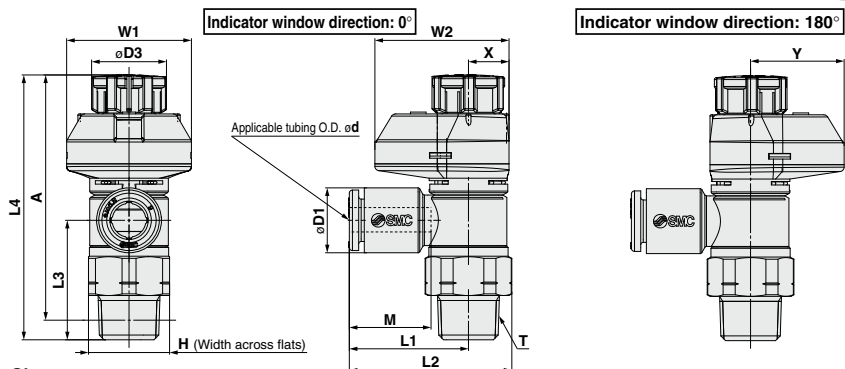
\*3 Reference dimensions of threads after installation

# AS-FS Series

## Dimensions: Elbow Type

Seal method: Sealant

For R, NPT thread



### Metric Size

Model	d	T (R, NPT)	H	D1	D3	L1	L2	L3	L4 <sup>#1</sup>		A <sup>#2</sup>		M	W1	W2	X	Y	Weight [g]
									Unlocked	Locked	Unlocked	Locked						
AS22□1FS□-01-23 (S)	3.2	1/8	13 (12.7)	7.2	12	19.1	26.2	19.1	43.9	42.4	40.8	39.3	13.3	20	21.5	6.5	15	13 (13)
AS22□1FS□-01-04 (S)	4			8.2									14.2					14 (13)
AS22□1FS□-01-06 (S)	6			10.4									15.6					15 (14)
AS22□1FS□-01-08 (S)	8			13.2									16.2					16 (15)
AS22□1FS□-01-10 (S)	10	1/4	17 (17.5)	15.9	13	20.9	30.2 (30.3)	22.6	49.7	48.3	44.2	42.8	13.3	21.5	24	7.8	16.2	23 (24)
AS22□1FS□-02-04 (S)	4			8.2									14.2					24 (25)
AS22□1FS□-02-06 (S)	6			10.4									15.6					25 (26)
AS22□1FS□-02-08 (S)	8			13.2									16.2					26 (27)
AS22□1FS□-02-10 (S)	10	3/8	19	15.9	16.6	21.8	32.1	36.4	63.1	61.7	57.9	56.5	13.3	24.5	28.5	9.3	19.2	47 (48)
AS32□1FS□-02-06 (S)	6			10.4									14.2					38 (39)
AS32□1FS□-02-08 (S)	8			13.2									15.6					50 (51)
AS32□1FS□-02-10 (S)	10			15.9									17					50 (51)
AS32□1FS□-03-06 (S)	6	1/2	24 (23.8)	10.4	18.8	21.8	32.1	28.7	64.1	62.5	57	55.4	13.3	26	29	10	19	38 (39)
AS32□1FS□-03-08 (S)	8			13.2									14.2					62 (61)
AS32□1FS□-03-10 (S)	10			15.9									15.6					64 (63)
AS42□1FS□-03-12 (S)	12			18.5									17					68 (67)
AS42□1FS□-04-12 (S)	12	1/2	24 (23.8)	18.5	18.8	30.8	43.7 (43.6)	35.1	64.1	62.5	57	55.4	15.6	26	29	10	19	64 (63)
AS42□1FS□-04-14 (S)	14			20.6									20.6					68 (67)

\*1 Reference dimensions \*2 Reference dimensions of threads after installation \* The values in ( ) are for NPT thread.

### Inch Size

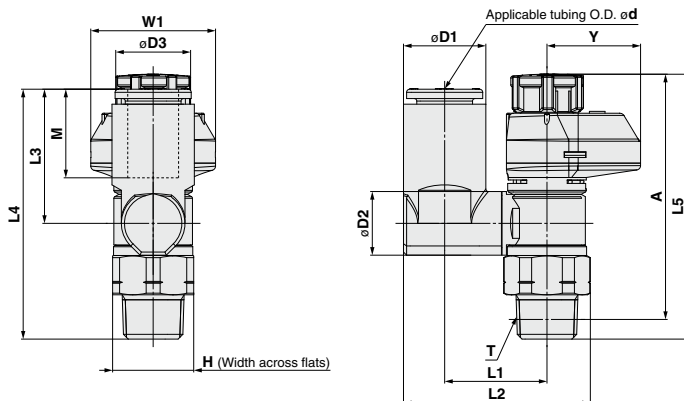
Model	d	T (R, NPT)	H	D1	D3	L1	L2	L3	L4 <sup>#1</sup>		A <sup>#2</sup>		M	W1	W2	X	Y	Weight [g]
									Unlocked	Locked	Unlocked	Locked						
AS22□1FS□-01-01 (S)	1/8"	1/8	13 (12.7)	7.2	12	19.1	26.2	19.1	43.9	42.4	40.8	39.3	13.3	20	21.5	6.5	15	13 (13)
AS22□1FS□-01-03 (S)	5/32"			8.2									14.2					14 (13)
AS22□1FS□-01-07 (S)	1/4"			11.2									15.6					15 (14)
AS22□1FS□-01-09 (S)	5/16"			13.2									16.2					16 (15)
AS22□1FS□-02-01 (S)	1/8"	1/4	17 (17.5)	7.2	13	20.9	30.2 (30.3)	22.6	49.7	48.3	44.2	42.8	13.3	21.5	24	7.8	16.2	23 (24)
AS22□1FS□-02-03 (S)	5/32"			8.2									14.2					24 (24)
AS22□1FS□-02-07 (S)	1/4"			11.2									15.6					25 (25)
AS22□1FS□-02-09 (S)	5/16"			13.2									16.2					26 (26)
AS22□1FS□-02-11 (S)	3/8"	3/8	19	15.9	16.6	21.8	32.1	36.4	63.1	61.7	57.9	56.5	13.3	24.5	28.5	9.3	19.2	47 (48)
AS32□1FS□-02-07 (S)	1/4"			10.4									14.2					38 (39)
AS32□1FS□-02-09 (S)	5/16"			13.2									15.6					50 (51)
AS32□1FS□-02-11 (S)	3/8"			15.9									17					50 (51)
AS32□1FS□-03-07 (S)	5/16"	1/2	24 (23.8)	11.2	18.8	21.8	32.1	28.7	64.1	62.5	57	55.4	13.3	26	29	10	19	38 (39)
AS32□1FS□-03-09 (S)	3/8"			13.2									14.2					62 (61)
AS32□1FS□-03-11 (S)	7/16"			15.9									15.6					64 (63)
AS42□1FS□-04-11 (S)	3/8"			18.5									17					68 (67)
AS42□1FS□-04-13 (S)	1/2"	1/2	24 (23.8)	20.6	18.8	30.9	43.8 (43.7)	34.7	64.1	62.5	57	55.4	15.6	26	29	10	19	64 (63)
AS42□1FS□-04-15 (S)	5/8"			22.9									20.6					68 (67)

\*1 Reference dimensions \*2 Reference dimensions of threads after installation \* The values in ( ) are for NPT thread.



## Dimensions: **Universal Type**

Seal method: Sealant  
For R, NPT thread



## Metric Size

Model	d	T	H	D1	D2	D3	L1	L2	L3	L4	L5		A		M	W1	Y	Weight [g]
											Unlocked	Locked	Unlocked	Locked				
AS23□1FS1-01-23 (S)	3.2	1/8	13 (12.7)	7.2	9.6	12	13.3	24	17.5	36	43.9	42.4	40.8	39.3	13.3	20	15	14
AS23□1FS1-01-04 (S)	4			8.2			13.9	25.1	20.4	38.8								15
AS23□1FS1-01-06 (S)	6			10.4			16.4	30.1	21.5	40								16
AS23□1FS1-01-08 (S)	8	1/4	17 (17.5)	13.2	12.9	13	16.5	29.9	17.5	40.1	49.7	48.3	44.2	42.8	14.2	21.5	16.2	24
AS23□1FS1-02-04 (S)	4			8.2			19	33.8	21.4	43.9								26
AS23□1FS1-02-06 (S)	6			11.2			34.9	23.5	46									27
AS23□1FS1-02-08 (S)	8	1/4	19	13.2	17.4	16.6	20.9	38.1	24.7	47.3	63.1	61.7	57.9	56.5	15.6	24.5	19.2	28
AS23□1FS1-02-10 (S)	10			15.9			20.2	36	21.4	57.8								49
AS33□1FS1-02-06 (S)	6			11.2			23	37.1	23.5	59.9								50
AS33□1FS1-02-08 (S)	8	1/4	19	13.2	17.4	16.6	23	41.2	26.1	62.5	64.1	62.5	57	55.4	15.6	26	19	53
AS33□1FS1-02-10 (S)	10			15.9			23	42.5	28.3	64.7								55
AS33□1FS1-02-12 (S)	12			18.5			23	42.5	28.3	57								47
AS33□1FS1-03-06 (S)	6	3/8	19	10.4	17.4	16.6	20.2	36	21.4	50.1	55.4	54	50.2	48.8	13.3	24.5	19.2	41
AS33□1FS1-03-08 (S)	8			13.2			23	37.1	23.5	52.2								42
AS33□1FS1-03-10 (S)	10			15.9			23	41.2	26.1	54.8								45
AS33□1FS1-03-12 (S)	12	1/2	24 (23.8)	18.5	17.4	18.8	23	42.5	28.3	57	64.1	62.5	57	55.4	15.6	26	19	47
AS43□1FS1-02-10 (S)	10			15.9			25.6	46.4	26.1	61.2								69
AS43□1FS1-04-12 (S)	12			18.5			26.2	48.3	28.3	63.4								72

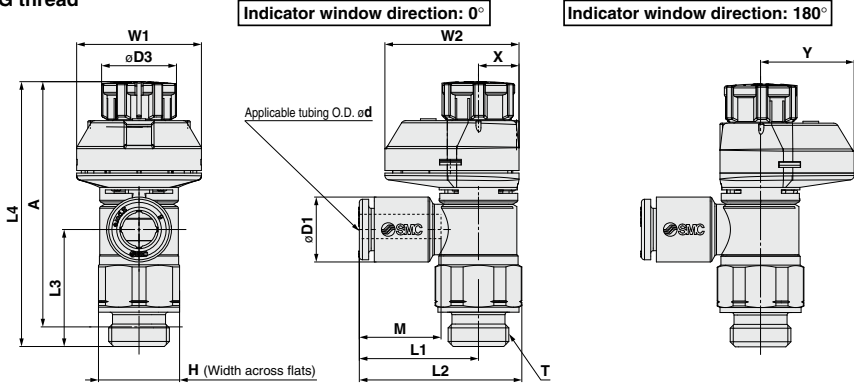
## Inch Size

Model	d	T	H	D1	D2	D3	L1	L2	L3	L4	L5		A		M	W1	Y	Weight [g]
											Unlocked	Locked	Unlocked	Locked				
AS23□1FS1-01-01 (S)	1/8	1/8	13 (12.7)	7.2	9.6	12	13.3	24	17.5	36	43.9	42.4	40.8	39.3	13.3	20	15	14
AS23□1FS1-01-03 (S)	5/32			8.2			13.9	25.1	20.4	38.7								15
AS23□1FS1-01-07 (S)	1/4			11.2			16.4	29.1	20.2	38.7								16
AS23□1FS1-01-09 (S)	5/16	1/4	17 (17.5)	13.2	12.9	13	16.5	29.9	17.5	40.1	49.7	48.3	44.2	42.8	14.2	21.5	16.2	24
AS23□1FS1-02-03 (S)	5/32			8.2			19	33.8	21.4	43.9								26
AS23□1FS1-02-07 (S)	1/4			11.2			34.9	23.5	46									27
AS23□1FS1-02-09 (S)	5/16	1/4	19	13.2	17.4	16.6	20.9	38.1	24.7	47.3	63.1	61.7	57.9	56.5	15.6	24.5	19.2	28
AS23□1FS1-02-11 (S)	3/8			15.9			20.2	36	21.4	57.8								49
AS33□1FS1-02-07 (S)	1/4			11.2			23	37.1	23.5	59.9								50
AS33□1FS1-02-09 (S)	5/16	1/4	19	13.2	17.4	16.6	23	41.2	26.1	62.5	64.1	62.5	57	55.4	15.6	24.5	19.2	53
AS33□1FS1-02-11 (S)	3/8			15.9			23	41.2	26.1	54.8								55
AS33□1FS1-03-07 (S)	1/4			11.2	17.4	16.6	20.2	36	21.4	50.1	55.4	54	50.2	48.8	13.3	24.5	19.2	41
AS33□1FS1-03-09 (S)	5/16	3/8	19	13.2			23	37.1	23.5	52.2								42
AS33□1FS1-03-11 (S)	3/8			15.9			23	41.2	26.1	54.8								45
AS43□1FS1-04-11 (S)	3/8	1/2	24 (23.8)	15.9	17.4	18.8	25.6	46.4	26.1	61.2	64.1	62.5	57	55.4	15.6	26	19	69
AS43□1FS1-04-13 (S)	1/2			18.5			26.2	48.3	28.3	63.4								72

# AS-FS Series

## Dimensions: Elbow Type

Seal method: Face seal  
For G thread



### Metric Size

Metric Size																		[mm]				
Model	d	T	H	D1	D3	L1	L2	L3	L4 <sup>#1</sup>		A <sup>#2</sup>		M	W1	W2	X	Y	Weight [g]				
									Unlocked	Locked	Unlocked	Locked										
AS22□1FS□-G01-23	3.2	1/8	13	7.2	12	19.1	26.2	18.8	43.8	42.4	38.3	36.9	13.3	20	21.5	6.5	15	14				
AS22□1FS□-G01-04	4			8.2																		
AS22□1FS□-G01-06	6			10.4																	14.2	15
AS22□1FS□-G01-08	8			13.2									22.4					29.5			15.6	16
AS22□1FS□-G01-10	10			15.9		25.3	32.4															
AS22□1FS□-G02-23	3.2	1/4	17	7.2	13	23.4	32.7	22.6	49.7	48.3	43.2	41.8	13.3	21.5	24	7.8	16.2	26				
AS22□1FS□-G02-04	4			8.2																		
AS22□1FS□-G02-06	6			10.4																	14.2	27
AS22□1FS□-G02-08	8			13.2									23.9					33.2			15.6	28
AS22□1FS□-G02-10	10			15.9		26.9	36.2															
AS32□1FS□-G02-06	6	1/4	21	10.4	16.6	21.8	33	36.4	63.1	61.7	54.6	53.2	13.3	24.5	28.5	9.3	19.2	55				
AS32□1FS□-G02-08	8			13.2									22.7					33.9			14.2	57
AS32□1FS□-G02-10	10			15.9									26.7					37.9	35.7	15.6	59	
AS32□1FS□-G02-12	12			18.5									29.7					40.9	34.5	17	45	
AS32□1FS□-G03-06	6	3/8	21	10.4	16.6	21.8	33	28.7	55.4	54	47.9	46.5	13.3	24.5	28.5	9.3	19.2	45				
AS32□1FS□-G03-08	8			13.2									22.7					33.9			14.2	46
AS32□1FS□-G03-10	10			15.9									26.7					37.9	28	15.6	47	
AS32□1FS□-G03-12	12			18.5									29.7					40.9	26.8	17	49	
AS42□1FS□-G04-10	10	1/2	27	15.9	18.8	27.4	41.8	36.2	64.1	62.5	55.1	53.5	15.6	26	29	10	19	80				
AS42□1FS□-G04-12	12			18.5									30.8					45.2	35.1	17	82	
AS42□1FS□-G04-16	16			23.8									34.8					49.2	32.7	20.6	86	

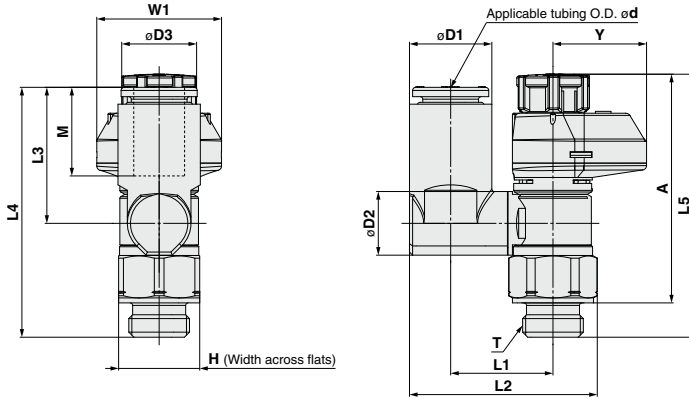
\*1 Reference dimensions

\*2 Reference dimensions of threads after installation



## Dimensions: **Universal Type**

Seal method: Face seal  
For G thread



## Metric Size

Model	d	T	H	D1	D2	D3	L1	L2	L3	L4	L5		A		M	W1	Y	Weight [g]
											Unlocked	Locked	Unlocked	Locked				
AS23□1FS1-G01-23	3.2	1/8	13	7.2	9.6	12	13.2	24	17.5	35.7	43.8	42.4	38.3	36.9	13.3	20	15	14
AS23□1FS1-G01-04	4			8.2			13.9	25.1	20.4	38.5								15
AS23□1FS1-G01-06	6			10.4			16.4	26.2	21.5	39.7								15
AS23□1FS1-G01-08	8			13.2			16.5	29.9	17.5	40.1								16
AS23□1FS1-G02-04	4	1/4	17	8.2	12.9	13	19	33.8	21.4	43.9	49.7	48.3	43.2	41.8	13.3	21.5	16.2	26
AS23□1FS1-G02-06	6			10.4			19	34.9	23.5	46								28
AS23□1FS1-G02-08	8			13.2			20.9	38.1	24.7	47.3								29
AS23□1FS1-G02-10	10			15.9			20.2	36.1	21.4	57.8								32
AS33□1FS1-G02-06	6	1/4	21	10.4	12.9	16.6	20.2	38	23.5	59.9	63.1	61.7	54.6	53.2	13.3	24.5	19.2	55
AS33□1FS1-G02-08	8			13.2			23	42.2	26.1	58								56
AS33□1FS1-G02-10	10			15.9			23	43.5	28.3	59.9								59
AS33□1FS1-G02-12	12			18.5			23	43.5	28.3	59.9								61
AS33□1FS1-G03-06	6	3/8	21	10.4	12.9	16.6	20.2	36.6	21.4	50.1	55.4	54	47.9	46.5	13.3	24.5	19.2	45
AS33□1FS1-G03-08	8			13.2			23	38	23.5	52.2								46
AS33□1FS1-G03-10	10			15.9			23	42.2	28.1	50.3								47
AS33□1FS1-G03-12	12			18.5			23	43.5	28.3	52.2								49
AS43□1FS1-G04-10	10	1/2	27	15.9	17.4	18.8	25.6	47.9	26.1	61.2	64.1	62.5	55.1	53.5	15.6	26	19	80
AS43□1FS1-G04-12	12			18.5			26.2	49.8	28.3	63.4					17			82

# AS-FS Series

## Made to Order

Please contact SMC for detailed dimensions, specifications and lead times.

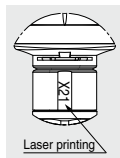


### 1 Lubricant: Vaseline -X12



Example) AS2201FS-01-04S-X12

### 2 Grease-free (Seal: Fluorine-coated) + Restrictor (Without check valve) -X21



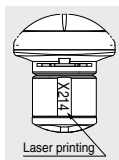
Example) AS2201FS-01-04S-X21

Note 1) Not particle-free

Note 2) This product is a restrictor without a check valve (no control direction). Be aware that all part numbers are for a meter-out type; there is no part number for a meter-in type.

Note 3) Only the needle and O-ring are fluorine-coated.

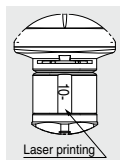
### 3 Restrictor (Without check valve) -X214



Example) AS2201FS-01-04S-X214

Note) This product is a restrictor without a check valve (no control direction). Be aware that all part numbers are for a meter-out type; there is no part number for a meter-in type.

### 4 Clean Series 10-



Example) 10-AS2201FS-01-04S

Note 1) Fluorine grease is used.

Note 2) The cleanliness class (ISO class) is 5.





# AS-FS Series Specific Product Precautions 1

Be sure to read this before handling the products. Refer to page 11 for safety instructions and pages 19 to 22 for flow control equipment precautions.

## Design and Selection

### Warning

#### 1. Check the specifications.

The products in this catalog are designed to be used in compressed air systems (including vacuum) only.

If the products are used in an environment where pressure or temperature is out of the specified range, damage and/or malfunction may result. Do not use under such conditions. (Refer to the specifications.)

We do not guarantee against any damage if the product is used outside of the specification range.

#### 2. The products in this catalog are not designed for the use as stop valve with zero air leakage.

A certain amount of leakage is allowed in the product's specifications.

Tightening the needle to reduce leakage to zero may result in equipment damage.

#### 3. Do not disassemble the product or make any modifications, including additional machining.

It may cause human injury and/or an accident.

#### 4. The flow rate characteristics for each product are representative values.

The flow rate characteristics are characteristics of each individual product. Actual values may differ depending on the piping, circuitry, pressure conditions, etc.

#### 5. Sonic conductance (C) and critical pressure ratio (b) values for products are representative values.

The speed controller's controlled flow values are with the needle fully open and free flow with the needle fully closed.

#### 6. Check if PTFE can be used in application.

PTFE powder (Polytetrafluoroethylene resin) is included in the seal material for piping taper thread of male thread type.

## Mounting

### Warning

#### 1. Operation Manual

Install the products and operate them only after reading the Operation Manual carefully and understanding its contents. Also, keep the Operation Manual where it can be referred to as necessary.

#### 2. Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance.

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

When installing the products, follow the listed proper torque.

## Mounting

### Warning

#### 4. After pushing the knob down to lock, confirm that it is locked.

It should not be possible to rotate the knob to the right or to the left. If the knob is pulled with force, it may break. Do not pull the knob with excessive force.



#### 5. Check the degree of rotation of the needle valve.

The products in this catalog are retainer type so that the needle is not removed completely. Over rotation will cause damage.

#### 6. Do not use tools such as pliers to rotate the knob.

It can cause idle rotation of the knob or damage.

#### 7. Verify the air flow direction.

Mounting backward is dangerous, because the speed adjustment needle will not work and the actuator may lurch suddenly.

#### 8. Adjust the speed by opening the needle slowly from the fully closed state.

Loose needle valves may cause unexpected sudden actuator lurching.

When a needle valve is turned clockwise, it is closed and actuator speed decreases. When a needle valve is turned counter-clockwise, it is open and actuator speed increases.

#### 9. Do not apply excessive force or shock to the body or fittings with an impact tool.

It can cause damage or air leakage.

#### 10. For handling One-touch fittings, refer to the Fittings and Tubing Precautions on pages 14 to 18.

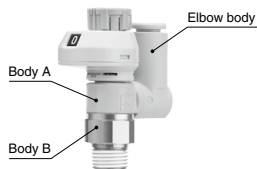
#### 11. To install/remove the product, use an appropriate wrench to tighten/loosen at the supplied nut on body B.

Do not apply torque at other points as the product may be damaged. Rotate body A manually for positioning after installation.

#### 12. Do not use body A and/or elbow body for applications involving continuous rotation.

Body A and the fitting section may be damaged.

#### Universal





# AS-FS Series

## Specific Product Precautions 2

Be sure to read this before handling the products. Refer to page 11 for safety instructions and pages 19 to 22 for flow control equipment precautions.

### Mounting

#### ⚠ Caution

##### For M5, 10-32UNF

#### Tightening method

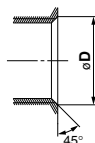
First, tighten it by hand, then give it an additional 1/6 turn to 1/4 turn with a wrench. A reference value for the tightening torque is 1 to 1.5 N·m.

(Note) Excessive tightening may damage the thread portion or deform the gasket and cause air leakage.

If the screw is too shallowly screwed in, it may come loose or air may leak.

#### Chamfered area for female thread

1. Conforming to ISO 16030 (air pressure fluid dynamics – connection – ports and stud ends), the chamfered dimensions shown in the table below are recommended.



Female thread size	Chamfered dimension øD (Recommended value)
M5	5.1 to 5.4
10-32UNF	5.0 to 5.3

#### For R, NPT Thread (With sealant)

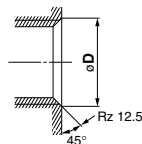
#### Tightening method

1. The proper tightening torques of the fittings are as shown in the table below. As a guide, tighten it by hand, then turn it two or three turns with a wrench. Check the dimensions of each product for the hexagon width across flats.

Connection thread size	Proper tightening torque [N·m]
NPT, R1/8	3 to 5
NPT, R1/4	8 to 12
NPT, R3/8	15 to 20
NPT, R1/2	20 to 25

#### Chamfered area for female thread

By chamfering as shown in the table below, machining of threads is easier and effective for burr prevention.



Connection thread size	Chamfered dimension øD (Recommended value)	
	Rc	NPT, NPTF
1/8	10.2 to 10.4	10.5 to 10.7
1/4	13.6 to 13.8	14.1 to 14.3
3/8	17.1 to 17.3	17.4 to 17.6
1/2	21.4 to 21.6	21.7 to 21.9

\* For Uni thread, Rz 12.5 is necessary for sealing at the chamfered part.

#### For G Thread (Face seal)

#### Tightening method

First, tighten the threaded portion by hand, then use a proper wrench, which could be suitable for the width across flats of the hexagon body, to tighten it further at a wrench tightening angle shown in the table below. For a tightening torque guide, refer to the table below. Check the dimensions of each product for the hexagon width across flats.

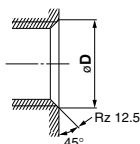
Connection thread size	Wrench tightening angle after hand-tightening [deg]	Proper tightening torque [N·m]
G1/8	10 to 20	3 to 4
G1/4	15 to 35	4 to 5
G3/8	15 to 35	8 to 9
G1/2	15 to 35	14 to 15

#### ⚠ Caution

##### For G Thread (Face seal)

#### Chamfered area for female thread (Recommended value)

1. Conforming to ISO 16030-2001, the chamfered dimensions shown in the table below are recommended. By chamfering as shown in the table below, machining of threads is easier and effective for burr prevention.



Nominal thread size	Chamfered dimension øD	
	Min.	Max.
1/8	9.8	10.2
1/4	13.3	13.7
3/8	16.8	17.2
1/2	21.0	21.4

2. Use G external threads with G internal threads.

#### For Uni Thread

#### Tightening method

1. First, tighten the threaded portion by hand, then use a proper wrench, which could be suitable for the width across flats of the hexagon body, to tighten it further at a wrench tightening angle shown in the table below. For a tightening torque guide, refer to the table below.

#### Connection Female Thread: Rc, NPT, NPTF

Uni thread size	Wrench tightening angle after hand-tightening [deg]	Tightening torque [N·m]
1/8	30 to 60	3 to 5
1/4	30 to 60	8 to 12
3/8	15 to 45	14 to 16
1/2	15 to 30	20 to 22

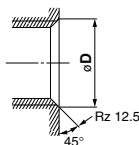
#### Connection Female Thread: G

Uni thread size	Wrench tightening angle after hand-tightening [deg]	Tightening torque [N·m]
1/8	30 to 45	3 to 4
1/4	15 to 30	4 to 5
3/8	15 to 30	8 to 9
1/2	15 to 30	14 to 15

2. The gasket can be reused up to 6 to 10 times.

#### Chamfered area for female thread

By chamfering as shown in the table below, machining of threads is easier and effective for burr prevention.



Connection thread size	Chamfered dimension øD (Recommended value)		
	G	Rc	NPT, NPTF
1/8	10.2 to 10.6	10.2 to 10.4	10.5 to 10.7
1/4	13.6 to 14.0	13.6 to 13.8	14.1 to 14.3
3/8	17.1 to 17.5	17.1 to 17.3	17.4 to 17.6
1/2	21.4 to 21.8	21.4 to 21.6	21.7 to 21.9

\* For Uni thread, Rz 12.5 is necessary for sealing at the chamfered part.



# AS-FS Series Specific Product Precautions 3

Be sure to read this before handling the products. Refer to page 11 for safety instructions and pages 19 to 22 for flow control equipment precautions.

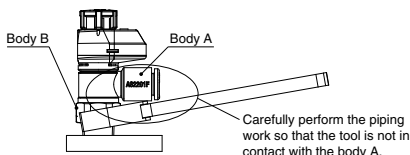
## Mounting

### ⚠ Caution

1. This product has a stopper for fully close in rotating direction. Excess torque may break the stopper. Table below shows the maximum allowable torque of the knob.

Body size	Maximum allowable torque [N·m]
M5	0.05
1/8	0.07
1/4	0.16
3/8	0.2
1/2	0.4

When performing the piping work, turn the tightening tool in the horizontal direction to the hexagon across flats of the body B so that any moment is not applied to the body A. If the tool is in contact with the body A, this may cause the body B to come off.



2. Actuator speed needs to be checked each time the setting is changed.

Individual product difference due to tolerance of the components, individual actuator difference, operating conditions and temperature, etc. may cause a large variation in the actuator speed, and for this reason, the final actuator speed needs to be checked every time the setting is changed.

3. Force for lifting the knob is specified as shown in the table below.

Larger lifting force than specified in the table below will cause removal of the knob, flow rate not according to the flow rate characteristics curve, incorrect flow indication with the indicator or damage to the product.

Port size	Knob lifting force
M5 10-32/UNF	1 to 1.5 N
1/8, 1/4, 3/8, 1/2	3.5 to 4 N

4. Do not rotate the product by the indicator part.

Use a wrench for mounting the product.

Otherwise, it may cause damage to the product.

## Piping Threads with Sealant

### ⚠ Caution

1. If the fitting is tightened with excessive torque, a large amount of sealant will seep out. Remove the excess sealant.
2. Insufficient tightening may loosen the threads, or cause air leakage.
3. Reuse
  - 1) Normally, fittings with a sealant can be reused 2 to 3 times.
  - 2) To prevent air leakage through the sealant, remove any loose sealant stuck to the fitting by blowing air over the threaded portion.
  - 3) If the sealant no longer provides effective sealing, wind sealing tape over the sealant before reusing. Do not use the sealant in any form other than a tape type.
4. Once the fitting has been tightened, backing it out to its original position often causes the sealant to become defective. Air leakage will occur.
5. Use R external threads with Rc internal threads and NPT external threads with NPT internal threads.

## Piping

### ⚠ Caution

1. For handling One-touch fittings, refer to the Fittings and Tubing Precautions on pages 14 to 18.
2. Preparation before piping
 

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.
3. 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 pipe. Also, when the sealant tape is used, leave approx. 1 thread ridge exposed at the end of the threads.

