

# Vacuum Ejector

Body Ported Type/Box Type (Built-in Silencer)

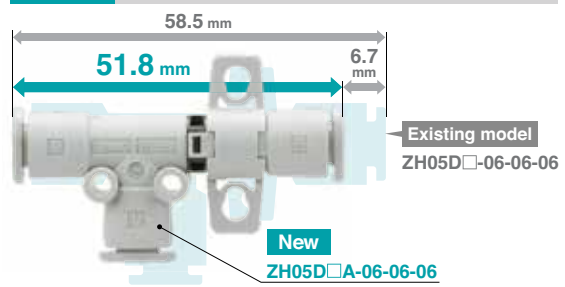
RoHS

## Compact and lightweight

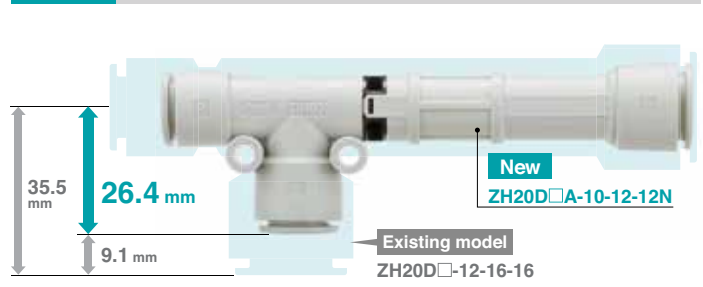


**Body ported type** New Port size: G threads have been added.

**Overall length** Max. **11%** reduction  
(6.7 mm shorter)



**Port height** Max. **25%** reduction  
(9.1 mm shorter)



**Weight** Max. **74%** reduction Existing model 88.4 g ▶ New 23.3 g  
(65.1 g lighter)

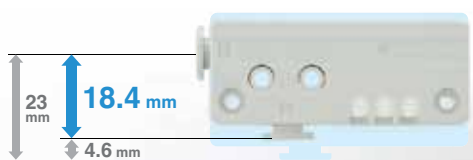
New **Box type** (Built-in silencer)



**Volume** Max. **39%** reduction Existing model ZH10B□-06-06  
(14.1 cm<sup>3</sup> reduction)



**Port height** Max. **20%** reduction  
(4.6 mm shorter)



**Weight** Max. **59%** reduction  
(19.4 g lighter)

Existing model 33 g ▶ New 13.6 g



**ZH Series**



NAS100-109B

## 4 mounting types

Body type	Direct mounting	Standard bracket mounting	L-bracket mounting	DIN rail mounting
Body ported type				
Box type (Built-in silencer)	 --- : Body mounting - - - : Cover mounting	— (Not available)		

## Easy identification of product type



## A silencer and standard bracket are available.

\* Shipped together with the product



- \*1 The silencer can only be connected to the One-touch fitting type EXH port.
- \*2 Mounting is interchangeable with the existing model. (Excludes the inch type with nozzle nominal sizes of 0.5 to 1.3) Refer to page 20 for mounting.

## Variations

Body type	Model	Nozzle nominal size [mm]	Vacuum pressure reached*1 [kPa]		Maximum suction flow rate [L/min (ANR)]		Air consumption [L/min (ANR)]
			Type S	Type L	Type S	Type L	
Body ported type	ZH05D□A	0.5	-90	-48	6	13	13
	ZH07D□A	0.7			12	28	27
	ZH10D□A	1.0			26	52	52
	ZH13D□A	1.3			40	78	84
	ZH15D□A	1.5			58	78	113
	ZH18D□A	1.8			76	128	162
	ZH20D□A	2.0			90	155	196
Box type (Built-in silencer)	ZH05B□A	0.5	-89	-48	6	13	13
	ZH07B□A	0.7			12	28	27
	ZH10B□A	1.0			26	52	52
	ZH13B□A	1.3			40	78	84

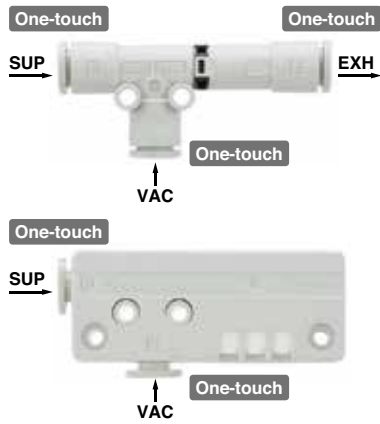
\*1 Supply pressure: 0.45 MPa

# Piping Variations

Metric

Inch

## One-touch connections



### Body ported type

SUP	VAC	EXH	Model
ø6*1	ø6*1	ø6*1	ZH05D□A ZH07D□A
ø6*1	ø6*1	ø8	ZH10D□A
ø8	ø10	ø10	ZH13D□A ZH15D□A
ø10	ø12	ø12	ZH18D□A ZH20D□A

SUP	VAC	EXH	Model
ø1/4"	ø1/4"	ø1/4"	ZH05D□A ZH07D□A
ø1/4"	ø1/4"	ø5/16"	ZH10D□A
ø5/16"	ø3/8"	ø3/8"	ZH13D□A ZH15D□A
ø3/8"	ø1/2"	ø1/2"	ZH18D□A ZH20D□A

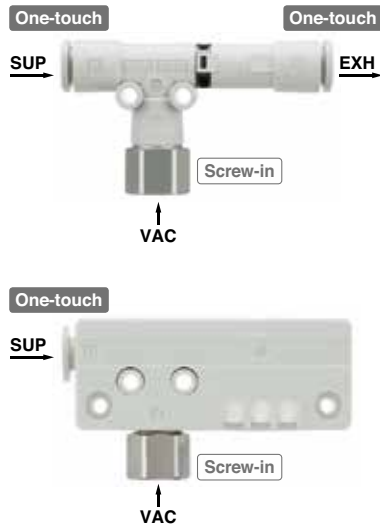
### Box type

SUP	VAC	Model
ø6*1	ø6*1	ZH05B□A ZH07B□A ZH10B□A
ø8	ø10	ZH13B□A

SUP	VAC	Model
ø1/4"	ø1/4"	ZH05B□A ZH07B□A ZH10B□A
ø5/16"	ø3/8"	ZH13B□A

\*1 The oval release button is only available for ø6.

## One-touch and screw-in connections



### Body ported type

SUP	VAC	EXH	Model
ø6*1	Rc1/8 G1/8	ø6*1	ZH05D□A ZH07D□A
ø6*1	Rc1/8 G1/8	ø8	ZH10D□A
ø8	Rc1/4 G1/4	ø10	ZH13D□A
ø8	Rc3/8 G3/8	ø10	ZH15D□A
ø10	Rc3/8 G3/8	ø12	ZH18D□A
ø10	Rc1/2 G1/2	ø12	ZH20D□A

SUP	VAC	EXH	Model
ø1/4"	NPT1/8	ø1/4"	ZH05D□A ZH07D□A
ø1/4"	NPT1/8	ø5/16"	ZH10D□A
ø5/16"	NPT1/4	ø3/8"	ZH13D□A
ø5/16"	NPT3/8	ø3/8"	ZH15D□A
ø3/8"	NPT3/8	ø1/2"	ZH18D□A
ø3/8"	NPT1/2	ø1/2"	ZH20D□A

\*1 The oval release button is only available for ø6.

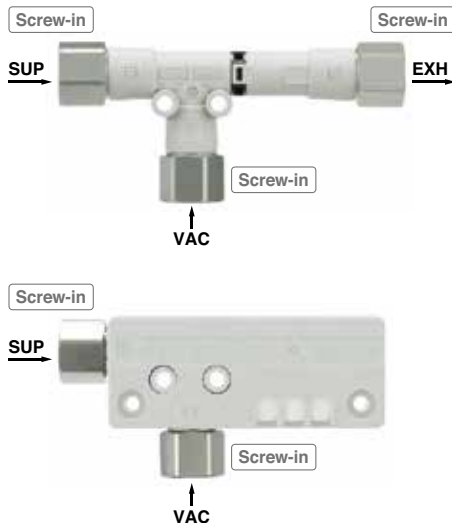
### Box type

SUP	VAC	Model
ø6*1	Rc1/8 G1/8	ZH05B□A ZH07B□A ZH10B□A
ø8	Rc1/4 G1/4	ZH13B□A

SUP	VAC	Model
ø1/4"	NPT1/8	ZH05B□A ZH07B□A ZH10B□A
ø5/16"	NPT1/4	ZH13B□A

\*1 The oval release button is only available for ø6.

## Screw-in connections



### Body ported type

SUP	VAC	EXH	Model
Rc1/8 G1/8	Rc1/8 G1/8	Rc1/8 G1/8	ZH05D□A ZH07D□A ZH10D□A
Rc1/8 G1/8	Rc1/4 G1/4	Rc1/4 G1/4	ZH13D□A
Rc1/4 G1/4	Rc3/8 G3/8	Rc3/8 G3/8	ZH15D□A
Rc3/8 G3/8	Rc3/8 G3/8	Rc3/8 G3/8	ZH18D□A
Rc3/8 G3/8	Rc1/2 G1/2	Rc1/2 G1/2	ZH20D□A

SUP	VAC	EXH	Model
NPT1/8	NPT1/8	NPT1/8	ZH05D□A ZH07D□A ZH10D□A
NPT1/8	NPT1/4	NPT1/4	ZH13D□A
NPT1/4	NPT3/8	NPT3/8	ZH15D□A
NPT3/8	NPT3/8	NPT3/8	ZH18D□A
NPT3/8	NPT1/2	NPT1/2	ZH20D□A

### Box type

SUP	VAC	Model
Rc1/8 G1/8	Rc1/8 G1/8	ZH05B□A ZH07B□A ZH10B□A
Rc1/8 G1/8	Rc1/4 G1/4	ZH13B□A

SUP	VAC	Model
NPT1/8	NPT1/8	ZH05B□A ZH07B□A ZH10B□A
NPT1/8	NPT1/4	ZH13B□A

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### **Dimensions: Box Type (Built-in Silencer)**

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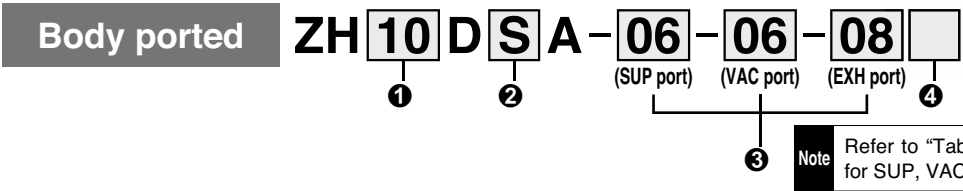
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# Body Ported Type Vacuum Ejector

## ZH Series



### How to Order



**① Nozzle size**

Nozzle size	Nozzle size
05	ø0.5 mm
07	ø0.7 mm
10	ø1.0 mm
13	ø1.3 mm
15	ø1.5 mm
18	ø1.8 mm
20	ø2.0 mm

**② Vacuum pressure reached**

Vacuum pressure reached	Note
S	-90 kPa ZH05 to 20
L	-48 kPa ZH05 to 13
L	-66 kPa ZH15 to 20

**③ Port (SUP/VAC/EXH) size**

One-touch fittings

Metric size	Inch size
06	ø6
07	ø1/4"
08	ø8
09	ø5/16"
10	ø10
11	ø3/8"
12	ø12
13	ø1/2"

Female threads

Metric size	Inch size
01	Rc1/8
02	Rc1/4
03	Rc3/8
04	Rc1/2
F01	G1/8
F02	G1/4
F03	G3/8
F04	G1/2

**④ Accessories (Standard bracket/Silencer)\*4**

Symbol	Standard bracket	Silencer
Nil	●	×
N	×	×
S*3	●	●
NS*3	×	●

\*3 Options S and NS are not available for EXH port with a screw-in connection.  
\*4 Each accessory is not assembled with the product but shipped together.

**Standard bracket**

Applicable model	ZH05 to 10D□A	ZH13/15D□A	ZH18/20D□A
Model	ZH2-BK1A-1-A	ZH2-BK1A-2-A	ZH2-BK1A-3-A

**Silencer**

Silencer can only be selected for EXH port with One-touch fitting.  
The silencer part number depends on the size of the EXH port.

EXH port	Silencer part no.
06	AN10-C06
07	AN10-C07
08	AN15-C08
09	AN15-C08
10	AN20-C10
11	AN20-C11
12	AN30-C12

\* No silencer available for ZH18/20D□A in inch size for EXH port size '13'. In that case, select the screw-in connection, and order silencer AN30-N03 and AN40-N04 separately.  
For details about silencers, refer to the AN series in the Web Catalog.

**Table 1 Body ported SUP/VAC/EXH port size**

Metric Size

Model	SUP	VAC	EXH	SUP	VAC	EXH
ZH05D□A-	06 - 06 - 06	ø6	ø6	ø6	ø6	ø6
	06 - 01 - 06	ø6	Rc1/8	ø6	ø6	ø6
	06 - F01 - 06	ø6	G1/8	ø6	ø6	ø6
	01 - 01 - 01	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/8
	F01 - F01 - F01	G1/8	G1/8	G1/8	G1/8	G1/8
ZH07D□A-	06 - 06 - 06	ø6	ø6	ø6	ø6	ø6
	06 - 01 - 06	ø6	Rc1/8	ø6	ø6	ø6
	06 - F01 - 06	ø6	G1/8	ø6	ø6	ø6
	01 - 01 - 01	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/8
	F01 - F01 - F01	G1/8	G1/8	G1/8	G1/8	G1/8
ZH10D□A-	06 - 06 - 08	ø6	ø6	ø8	ø8	ø8
	06 - 01 - 08	ø6	Rc1/8	ø8	ø8	ø8
	06 - F01 - 08	ø6	G1/8	ø8	ø8	ø8
	01 - 01 - 01	Rc1/8	Rc1/8	Rc1/8	Rc1/8	Rc1/8
	F01 - F01 - F01	G1/8	G1/8	G1/8	G1/8	G1/8
ZH13D□A-	08 - 10 - 10	ø8	ø10	ø10	ø10	ø10
	08 - 02 - 10	ø8	Rc1/4	ø10	ø10	ø10
	08 - F02 - 10	ø8	G1/4	ø10	ø10	ø10
	01 - 02 - 02	Rc1/8	Rc1/4	Rc1/4	Rc1/4	Rc1/4
	F01 - F02 - F02	G1/8	G1/4	G1/4	G1/4	G1/4
ZH15D□A-	08 - 10 - 10	ø8	ø10	ø10	ø10	ø10
	08 - 03 - 10	ø8	Rc3/8	ø10	ø10	ø10
	08 - F03 - 10	ø8	G3/8	ø10	ø10	ø10
	02 - 03 - 03	Rc1/4	Rc3/8	Rc3/8	Rc3/8	Rc3/8
	F02 - F03 - F03	G1/4	G3/8	G3/8	G3/8	G3/8
ZH18D□A-	10 - 12 - 12	ø10	ø12	ø12	ø12	ø12
	10 - 03 - 12	ø10	Rc3/8	ø12	ø12	ø12
	10 - F03 - 12	ø10	G3/8	ø12	ø12	ø12
	03 - 03 - 03	Rc3/8	Rc3/8	Rc3/8	Rc3/8	Rc3/8
	F03 - F03 - F03	G3/8	G3/8	G3/8	G3/8	G3/8
ZH20D□A-	10 - 12 - 12	ø10	ø12	ø12	ø12	ø12
	10 - 04 - 12	ø10	Rc1/2	ø12	ø12	ø12
	10 - F04 - 12	ø10	G1/2	ø12	ø12	ø12
	03 - 04 - 04	Rc3/8	Rc1/2	Rc1/2	Rc1/2	Rc1/2
	F03 - F04 - F04	G3/8	G1/2	G1/2	G1/2	G1/2

\*1 Screw-in: Rc and G female threads

Inch Size

Model	SUP	VAC	EXH	SUP	VAC	EXH
ZH05D□A-	07 - 07 - 07	ø1/4"	ø1/4"	ø1/4"	ø1/4"	ø1/4"
	07 - N01 - 07	ø1/4"	NPT1/8	ø1/4"	ø1/4"	ø1/4"
	N01 - N01 - N01	NPT1/8	NPT1/8	NPT1/8	NPT1/8	NPT1/8
ZH07D□A-	07 - 07 - 07	ø1/4"	ø1/4"	ø1/4"	ø1/4"	ø1/4"
	07 - N01 - 07	ø1/4"	NPT1/8	ø1/4"	ø1/4"	ø1/4"
	N01 - N01 - N01	NPT1/8	NPT1/8	NPT1/8	NPT1/8	NPT1/8
ZH10D□A-	07 - 07 - 09	ø1/4"	ø1/4"	ø5/16"	ø5/16"	ø5/16"
	07 - N01 - 09	ø1/4"	NPT1/8	ø5/16"	ø5/16"	ø5/16"
	N01 - N01 - N01	NPT1/8	NPT1/8	NPT1/8	NPT1/8	NPT1/8
ZH13D□A-	09 - 11 - 11	ø5/16"	ø3/8"	ø3/8"	ø3/8"	ø3/8"
	09 - N02 - 11	ø5/16"	NPT1/4	ø3/8"	ø3/8"	ø3/8"
	N01 - N02 - N02	NPT1/8	NPT1/4	NPT1/4	NPT1/4	NPT1/4
ZH15D□A-	09 - 11 - 11	ø5/16"	ø3/8"	ø3/8"	ø3/8"	ø3/8"
	09 - N03 - 11	ø5/16"	NPT3/8	ø3/8"	ø3/8"	ø3/8"
	N02 - N03 - N03	NPT1/4	NPT3/8	NPT3/8	NPT3/8	NPT3/8
ZH18D□A-	11 - 13 - 13	ø3/8"	ø1/2"	ø1/2"	ø1/2"	ø1/2"
	11 - N03 - 13	ø3/8"	NPT3/8	ø1/2"	ø1/2"	ø1/2"
	N03 - N03 - N03	NPT3/8	NPT3/8	NPT3/8	NPT3/8	NPT3/8
ZH20D□A-	11 - 13 - 13	ø3/8"	ø1/2"	ø1/2"	ø1/2"	ø1/2"
	11 - N04 - 13	ø3/8"	NPT1/2	ø1/2"	ø1/2"	ø1/2"
	N03 - N04 - N04	NPT3/8	NPT1/2	NPT1/2	NPT1/2	NPT1/2

\*2 Screw-in: NPT female threads



# Box Type (Built-in Silencer) Vacuum Ejector ZH Series

RoHS



## How to Order

Box type

ZH **10** B **S** A - **06** - **06**  
 ① (SUP port) (VAC port)

Box type  
(Built-in silencer)

③ Note Refer to "Table 2" for the combination available for SUP and VAC port connection.

### ① Nozzle size

Nozzle size	Nozzle size
05	ø0.5 mm
07	ø0.7 mm
10	ø1.0 mm
13	ø1.3 mm

### ② Vacuum pressure reached

S	-89 kPa
L	-48 kPa

### ③ Port (SUP/VAC) size

#### One-touch fittings

Metric size		Inch size	
06	ø6	07	ø1/4"
08	ø8	09	ø5/16"
10	ø10	11	ø3/8"

#### Female threads

Metric size		Inch size	
01	Rc1/8	N01	NPT1/8
02	Rc1/4	N02	NPT1/4
F01	G1/8		
F02	G1/4		

Table 2 Box type (Built-in silencer) SUP/VAC port size  
Metric size

Model	SUP VAC		SUP VAC	
	SUP	VAC	SUP	VAC
ZH05B□A-	06	- 06	ø6	ø6
	06	- 01	ø6	Rc1/8
	06	- F01	ø6	G1/8
	01	- 01	Rc1/8	Rc1/8
	F01	- F01	G1/8	G1/8
ZH07B□A-	06	- 06	ø6	ø6
	06	- 01	ø6	Rc1/8
	06	- F01	ø6	G1/8
	01	- 01	Rc1/8	Rc1/8
	F01	- F01	G1/8	G1/8
ZH10B□A-	06	- 06	ø6	ø6
	06	- 01	ø6	Rc1/8
	06	- F01	ø6	G1/8
	01	- 01	Rc1/8	Rc1/8
	F01	- F01	G1/8	G1/8
ZH13B□A-	08	- 10	ø8	ø10
	08	- 02	ø8	Rc1/4
	08	- F02	ø8	G1/4
	01	- 02	Rc1/8	Rc1/4
	F01	- F02	G1/8	G1/4

\*5 Screw-in: Rc and G female threads

### Inch size

Model	SUP VAC		SUP VAC	
	SUP	VAC	SUP	VAC
ZH05B□A-	07	- 07	ø1/4"	ø1/4"
	07	- N01	ø1/4"	NPT1/8
	N01	- N01	NPT1/8	NPT1/8
ZH07B□A-	07	- 07	ø1/4"	ø1/4"
	07	- N01	ø1/4"	NPT1/8
	N01	- N01	NPT1/8	NPT1/8
ZH10B□A-	07	- 07	ø1/4"	ø1/4"
	07	- N01	ø1/4"	NPT1/8
	N01	- N01	NPT1/8	NPT1/8
ZH13B□A-	09	- 11	ø5/16"	ø3/8"
	09	- N02	ø5/16"	NPT1/4
	N01	- N02	NPT1/8	NPT1/4

\*6 Screw-in: NPT female threads

## L-Bracket / DIN Rail Mounting Bracket

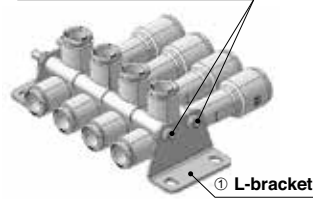
When using the ejectors with a clamp mount, order parts ❶, ❷ and, ❸ below separately.

### ❶ L-Bracket

Part no.	Applicable model	Note	Quantity
AS-10L	ZH05/07/10□□A	Applicable thread size: M3	1 pc.
AS-25L	ZH13□□A/15D□A	Applicable thread size: M4	
AS-30L	ZH18/20D□A	Applicable thread size: M4	

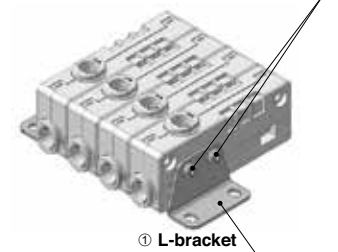
### Body ported type

❸ Set of long clamping screws (1 set/2 pcs. included)



### Box type

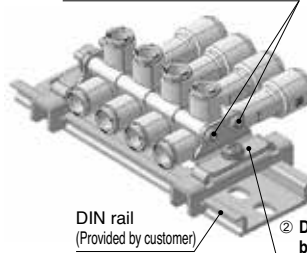
❸ Set of long clamping screws (1 set/2 pcs. included)



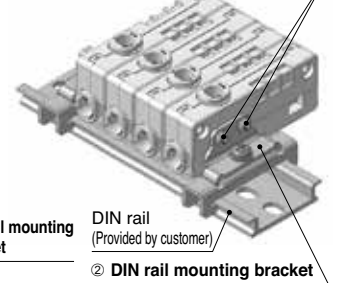
### ❷ DIN Rail Mounting Bracket\*1

Part no.	Applicable model	Note	Quantity
AS-10D	ZH05/07/10□□A	Applicable thread size: M3	1 pc.
AS-25D	ZH13□□A/15D□A	Applicable thread size: M4	
AS-30D	ZH18/20D□A	Applicable thread size: M4	

❸ Set of long clamping screws (1 set/2 pcs. included)



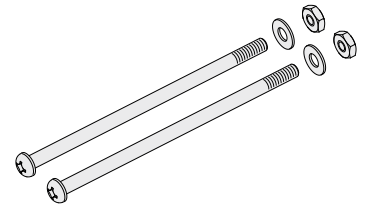
❸ Set of long clamping screws (1 set/2 pcs. included)



\*1 DIN rail is not included. It should be provided by the customer.

### ❸ Set of Long Clamping Screws\*1

Part no.	Applicable model	Stations	Contents*2	
			Screw	Accessories
ZH2-TB101-A	ZH05□□A ZH07□□A ZH10□□A	1	M3 x 20 2 pcs.	· Hexagon nut (M3) 2 pcs. · Flat washer (for M3) 2 pcs.
ZH2-TB102-A		2	M3 x 35 2 pcs.	
ZH2-TB103-A		3	M3 x 50 2 pcs.	
ZH2-TB104-A		4	M3 x 65 2 pcs.	
ZH2-TB106-A		6	M3 x 95 2 pcs.	
ZH2-TB108-A		8	M3 x 125 2 pcs.	
ZH2-TB201-A	ZH13□□A ZH15D□A	1	M4 x 30 2 pcs.	· Hexagon nut (M4) 2 pcs. · Flat washer (for M4) 2 pcs.
ZH2-TB202-A		2	M4 x 50 2 pcs.	
ZH2-TB203-A		3	M4 x 70 2 pcs.	
ZH2-TB204-A		4	M4 x 90 2 pcs.	
ZH2-TB206-A		6	M4 x 130 2 pcs.	
ZH2-TB208-A		8	M4 x 170 2 pcs.	
ZH2-TB201-A*3	ZH18D□A ZH20D□A	1	M4 x 30 2 pcs.	· Hexagon nut (M4) 2 pcs. · Flat washer (for M4) 2 pcs.
ZH2-TB302-A		2	M4 x 55 2 pcs.	
ZH2-TB303-A		3	M4 x 80 2 pcs.	
ZH2-TB304-A		4	M4 x 100 2 pcs.	
ZH2-TB306-A		6	M4 x 145 2 pcs.	
ZH2-TB308-A		8	M4 x 185 2 pcs.	



Set of long clamping screws

\*1 Select only One-touch fitting if ZH ejectors are to be clamped. The screw-in connectors cannot be used as they will interfere with each other when clamped together. Refer to pages 13 and 14 to find the models for which clamp mounting is not available.

\*2 The material of the nut and bolt is carbon steel with a trivalent chromate surface treatment.

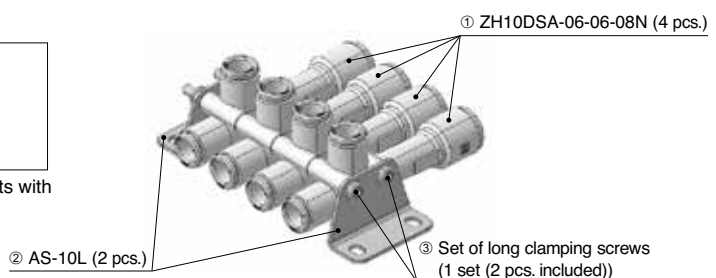
\*3 The same screw set is used for 1 station of ZH13□□A/15D□A and ZH18/20D□A.

### Ordering Example\*1

ZH10DSA 4 products are clamped with L-bracket.

- ❶ ZH10DSA-06-06-08N ..... 4 pcs.
- ❷ AS-10L ..... 2 pcs.
- ❸ ZH2-TB104-A ..... 1 set (2 pcs. included)

\*1 The products are not assembled. M3: Assemble the products with 0.315 ±0.03 N·m, M4: 0.76 ±0.08 N·m.



# ZH Series

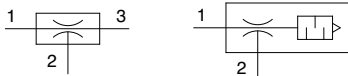


Body ported type



Box type  
(Built-in silencer)

### Symbol



Body ported type  
ZH□D□A

Box type  
ZH□B□A

## Specifications

Operating temperature range	-5 to 50°C*1
Fluid	Air
Applicable tubing material	FEP, PFA, Nylon, Soft nylon, Polyurethane
Operating pressure range	0.1 to 0.6 MPa*2

\*1 No freezing

\*2 This is the supply pressure to the supply (P) port. The vacuum (V) and exhaust (E) ports should not be sealed simultaneously.

## Ejector Specifications\*1

Model	Nozzle nominal size [mm]	Vacuum pressure reached*2 [kPa]		Maximum suction flow rate [L/min (ANR)]		Air consumption [L/min (ANR)]	Weight*3 [g]
		Type S	Type L	Type S	Type L		
ZH05D□A	0.5	-90	-48	6	13	13	5.0
ZH07D□A	0.7			12	28	27	5.2
ZH10D□A	1.0			26	52	52	6.1
ZH13D□A	1.3			40	78	84	12.4
ZH15D□A	1.5			58	78	113	13.4
ZH18D□A	1.8	-66	-48	76	128	162	22.2
ZH20D□A	2.0			90	155	196	23.3
ZH05B□A	0.5			-89	-48	6	13
ZH07B□A	0.7	12	28			27	12.4
ZH10B□A	1.0	26	52			52	13.6
ZH13B□A	1.3	40	78			84	26.9

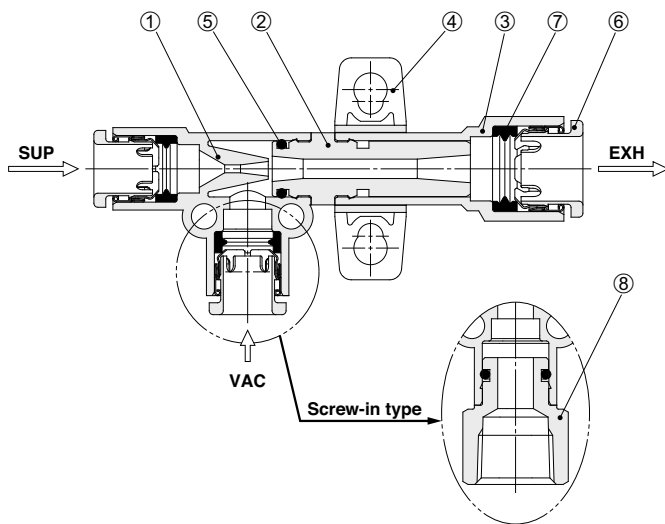
\*1 The values indicating characteristics are representative values and may vary depending on the atmospheric pressure (weather, altitude, etc.).

\*2 Supply pressure: 0.45 MPa

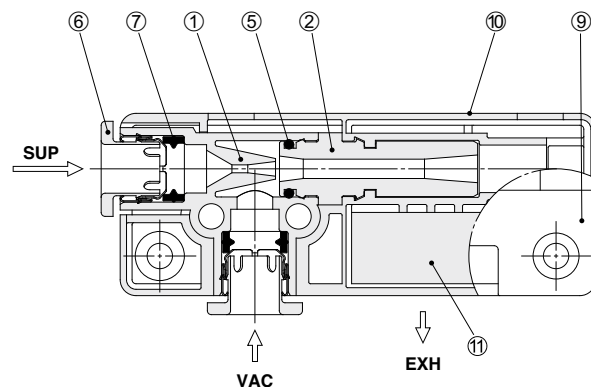
\*3 Weight for the One-touch fitting type (Excludes the standard bracket)

## Construction

### Body ported type



### Box type



## Component Parts

No.	Description	Material	Note
1	Body	PBT	
2	Diffuser	PPS	Type S: Brown, Type L: Black
3	Adapter	PBT	
4	Standard bracket*1	PBT	Detachable (Accessory)
5	O-ring	NBR	Grease applied
6	Cassette	—	

No.	Description	Material	Note
7	Seal	NBR	Grease applied
8	Screw-in stud	Brass	Electroless nickel plating
9	Cover A	PBT	
10	Cover B	PBT	With identification mark for type S or type L (Refer to page 22 for details.)
11	Sound absorbing material	Resin	

\*1 Refer to page 4 for the order number.

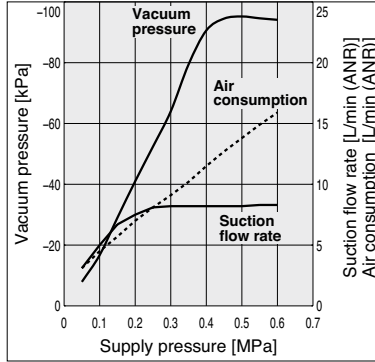


**Exhaust Characteristics / Flow Rate Characteristics (Representative Value)**

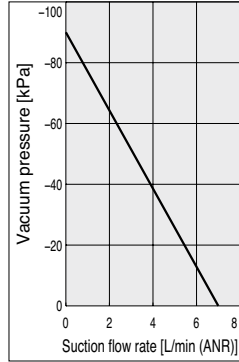
(Flow rate characteristics: Supply pressure: 0.45 MPa)

**ZH05 SA**

**Exhaust Characteristics**

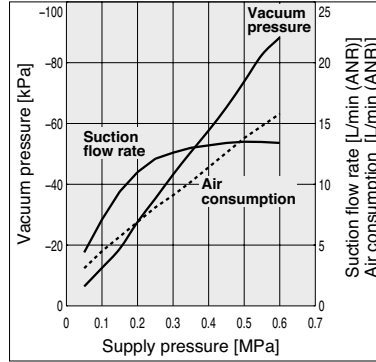


**Flow Rate Characteristics**

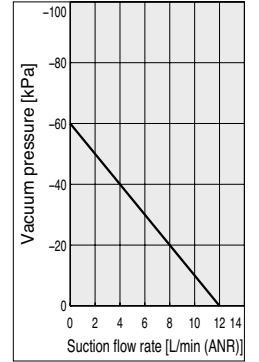


**ZH05 LA**

**Exhaust Characteristics**

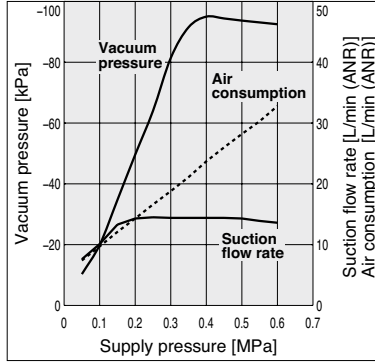


**Flow Rate Characteristics**

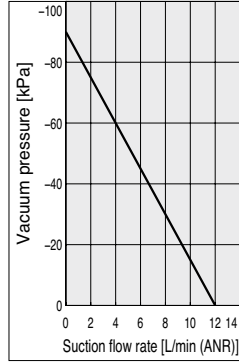


**ZH07 SA**

**Exhaust Characteristics**

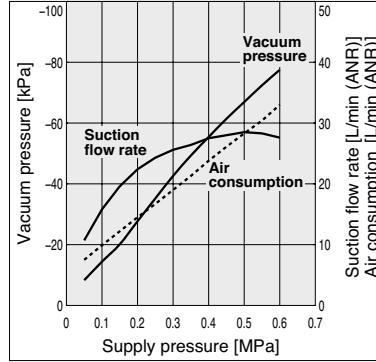


**Flow Rate Characteristics**

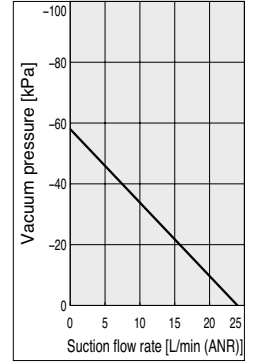


**ZH07 LA**

**Exhaust Characteristics**

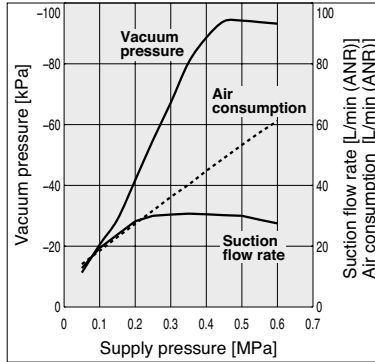


**Flow Rate Characteristics**

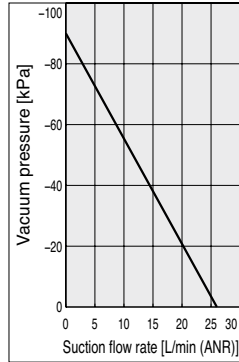


**ZH10 SA**

**Exhaust Characteristics**

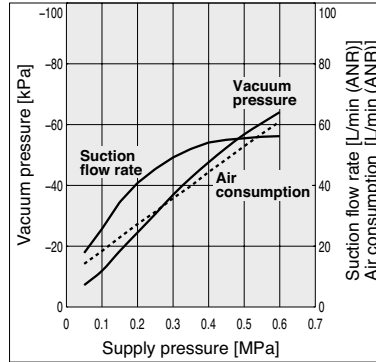


**Flow Rate Characteristics**

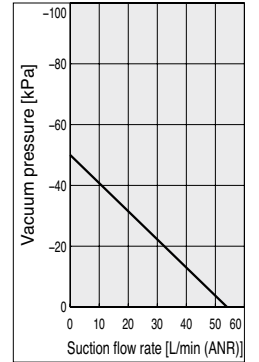


**ZH10 LA**

**Exhaust Characteristics**

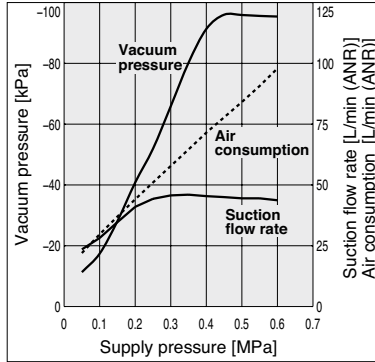


**Flow Rate Characteristics**

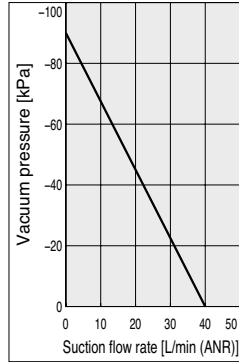


**ZH13 SA**

**Exhaust Characteristics**

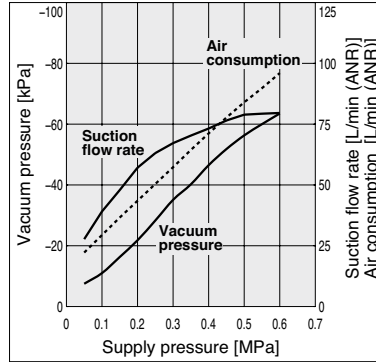


**Flow Rate Characteristics**

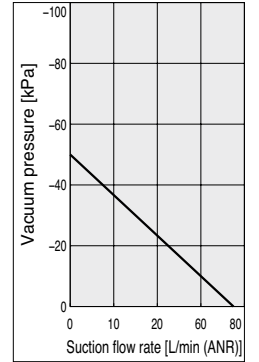


**ZH13 LA**

**Exhaust Characteristics**



**Flow Rate Characteristics**

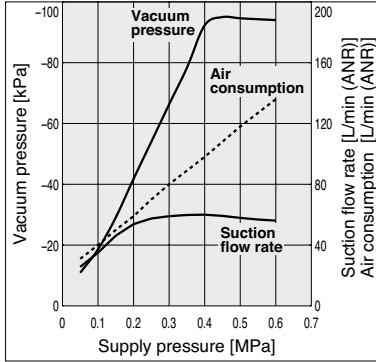


## Exhaust Characteristics / Flow Rate Characteristics (Representative Value)

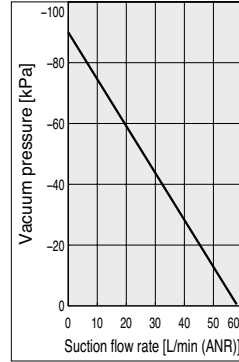
(Flow rate characteristics: Supply pressure: 0.45 MPa)

### ZH15DSA

Exhaust Characteristics

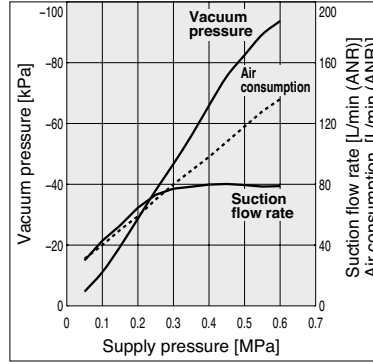


Flow Rate Characteristics

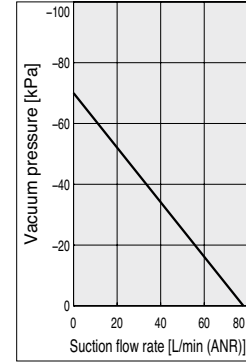


### ZH15DLA

Exhaust Characteristics

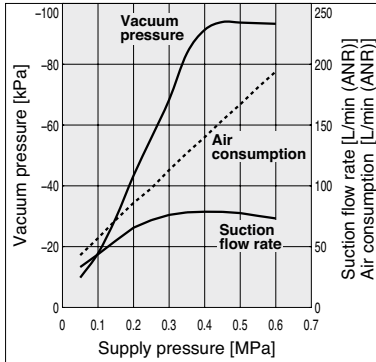


Flow Rate Characteristics

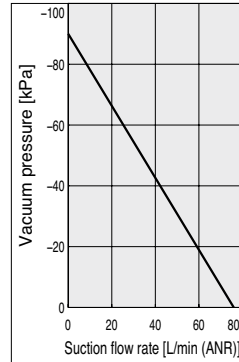


### ZH18DSA

Exhaust Characteristics

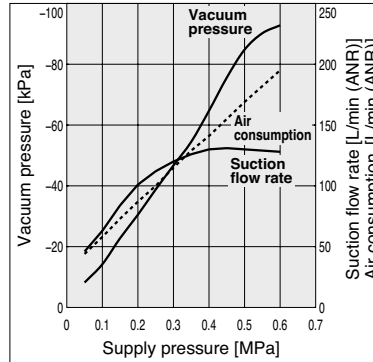


Flow Rate Characteristics

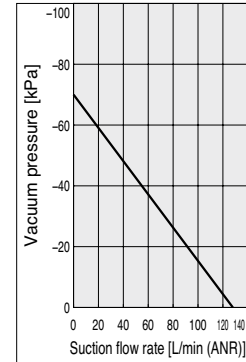


### ZH18DLA

Exhaust Characteristics

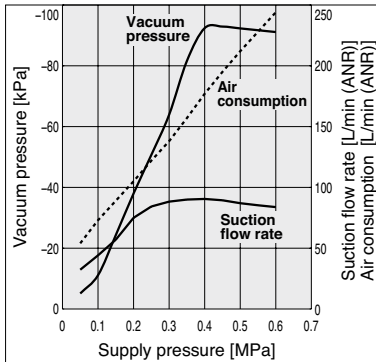


Flow Rate Characteristics

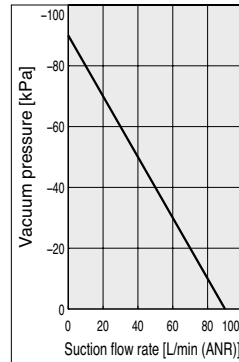


### ZH20DSA

Exhaust Characteristics

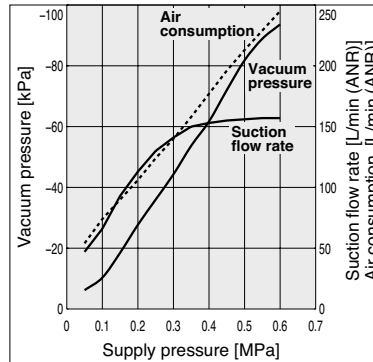


Flow Rate Characteristics

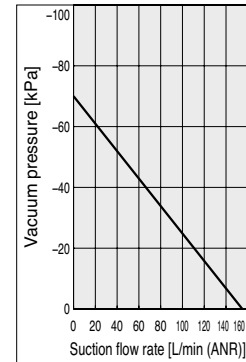


### ZH20DLA

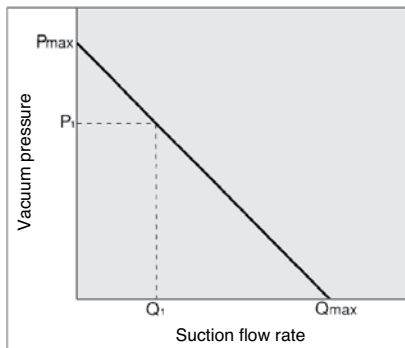
Exhaust Characteristics



Flow Rate Characteristics



## How to Read Flow Rate Characteristics Graph



Flow rate characteristics are expressed in ejector vacuum pressure and suction flow. If suction flow changes, the vacuum pressure will also be changed. Normally this relationship is expressed in ejector standard operating pressure use. In the graph,  $P_{max}$  is maximum vacuum pressure and  $Q_{max}$  is maximum suction flow. The values are specified according to catalog use. Changes in vacuum pressure are expressed in the below order.

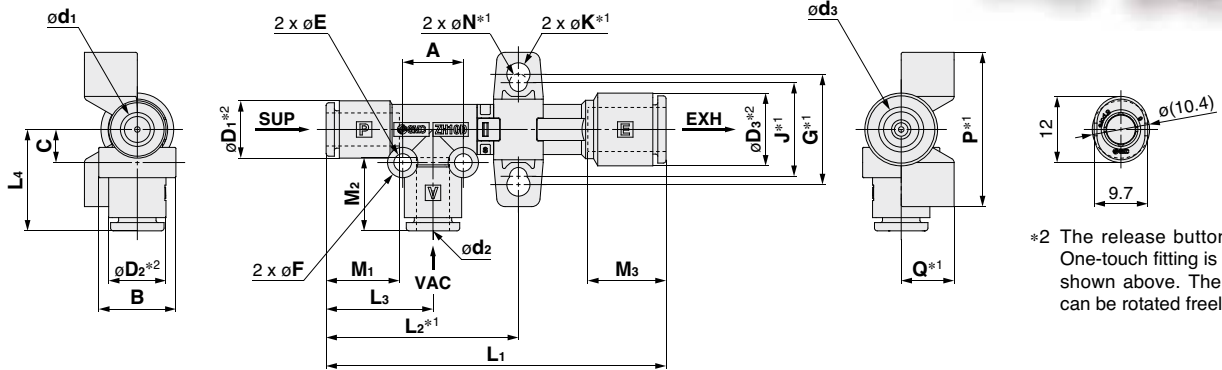
1. When the ejector suction port is covered and made airtight, the suction flow becomes zero and vacuum pressure is at the maximum value ( $P_{max}$ ).
2. When the suction port is opened gradually, air can flow through, (air leakage), suction flow increases, and vacuum pressure decreases. (condition  $P_1$  and  $Q_1$ )

3. When the suction port is opened further and fully opened, suction flow moves to the maximum value ( $Q_{max}$ ), but vacuum pressure is near zero (atmospheric pressure).

As described above, the vacuum pressure changes when the suction flow changes. In other words, when there is no leakage from the vacuum port, the vacuum pressure can reach its maximum, but as the amount of leakage increases, the vacuum pressure becomes almost zero. When the amount of leakage increases, the vacuum pressure becomes almost zero. In the case when a ventilative or leaky workpiece should be adsorbed, take note that vacuum pressure will not rise.

**Body Ported Type: ZH05D<sup>S</sup>A-□-□-□ to ZH20D<sup>S</sup>A-□-□-□**

**One-touch connections**



\*2 The release button of  $\phi 6$  One-touch fitting is oval as shown above. The button can be rotated freely.

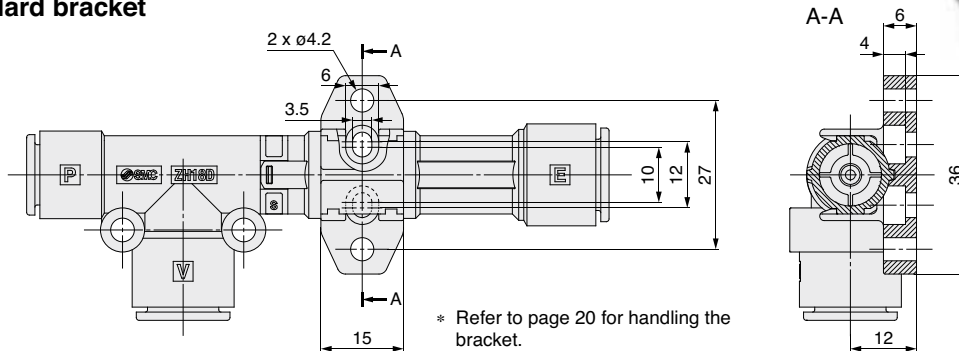
**All Ports: One-touch Fitting**

Model	D1	D2	D3	d1	d2	d3	M1	M2	M3	L1	L2*1	L3	L4	A	B	C	E	F	G*1	J*1	K*1	N*1	P*1	Q*1
ZH05D□A-06-06-06			10.4			6			13.3	51.8														
ZH07D□A-06-06-06	10.4	10.4		6	6		13.3	13.3		55	34.9	19.4	18.4	11	14	6	3.2	5.5	20	17		3.2	28	9.6
ZH10D□A-06-06-08			13.2			8			14.2	61.7											4.2			
ZH13D□A-08-10-10	13.2	15.9	15.9	8	10	10	14.2	15.6	15.6	71.8	43.9	22.4	24.4	17	20	9		7.8	27	22		4.2	35	12
ZH15D□A-08-10-10										83.6	51.4						4.3							
ZH18D□A-10-12-12	15.9	18.5	18.5	10	12	12	15.6	17	17	105.7	60.9	28.4	26.4	22	22	10								
ZH20D□A-10-12-12										112.2	62.2						8							
ZH05D□A-07-07-07	11.15	11.15	11.15	1/4"	1/4"	1/4"	13.3	13.3	13.3	51.8														
ZH07D□A-07-07-07										55	34.9	19.4	18.4	11	14	6	3.2	5.5	20	17		3.2	28	9.6
ZH10D□A-07-07-09			13.2			5/16"			14.2	61.7											4.2			
ZH13D□A-09-11-11	13.2	15.45	15.45	5/16"	3/8"	3/8"	14.2	15.6	15.6	71.8	43.9	22.4	24.4	17	20	9		7.8	27	22		4.2	35	12
ZH15D□A-09-11-11										83.6	51.4						4.3							
ZH18D□A-11-13-13	15.45	19.3	19.3	3/8"	1/2"	1/2"	15.6	17	17	105.7	60.9	28.4	26.4	22	22	10								
ZH20D□A-11-13-13										112.2	62.2						8							

\*1 Dimensions when the standard bracket is mounted

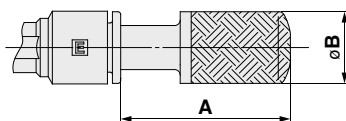
**Body Ported Type: ZH<sup>18S</sup>20D<sup>S</sup>A-□-□-□**

**Standard bracket**

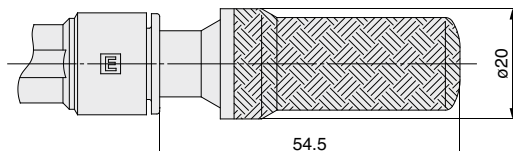


**Silencer**

**ZH05 to 15D□A**



**ZH18/20D□A-□-□-12**



Model	A	øB
ZH05D□A-□-□-06/07	23.2	11
ZH07D□A-□-□-06/07		
ZH10D□A-□-□-08/09	30.8	13
ZH13D□A-□-□-10/11		
ZH15D□A-□-□-10/11	41.9	16.5

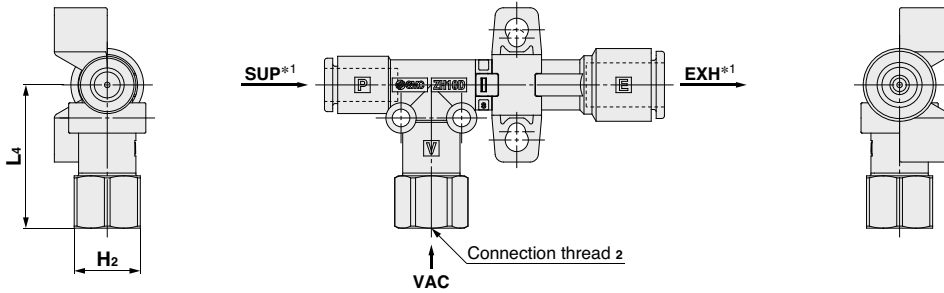
\* Directly mounted silencer not available for 1/2" EXH port of ZH18/20D□A

\* The standard bracket and silencer are not assembled with the product but shipped together.

# ZH Series

## Body Ported Type: ZH05D<sup>S</sup>A-□-□-□ to ZH20D<sup>S</sup>A-□-□-□

One-touch and screw-in connections



### V Port: Screw-in P/E Port: One-touch Fitting

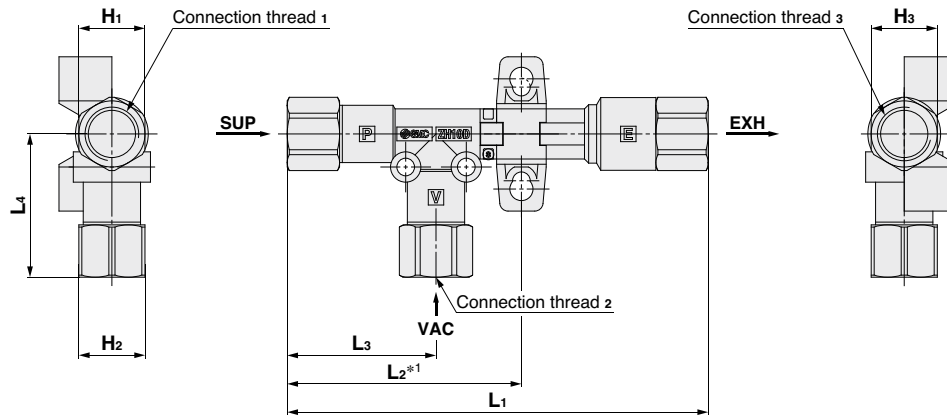
	Model	H <sub>2</sub>	L <sub>4</sub>	Connection thread 2
Metric	ZH05D□A-06-01-06	12	26	Rc1/8
	ZH07D□A-06-01-06			
	ZH10D□A-06-01-08			
	ZH13D□A-08-02-10	17	36.3	Rc1/4
	ZH15D□A-08-03-10	19	37.1	Rc3/8
	ZH18D□A-10-03-12		39.1	
	ZH20D□A-10-04-12	24	44.1	Rc1/2
	ZH05D□A-06-F01-06	12	27	G1/8
	ZH07D□A-06-F01-06			
	ZH10D□A-06-F01-08			
	ZH13D□A-08-F02-10			
	ZH15D□A-08-F03-10	19	39	G3/8
	ZH18D□A-10-F03-12		40.5	
	ZH20D□A-10-F04-12	24	46.1	G1/2
Inch	ZH05D□A-07-N01-07	12.7	26	NPT1/8
	ZH07D□A-07-N01-07			
	ZH10D□A-07-N01-09			
	ZH13D□A-09-N02-11	17.46	36.3	NPT1/4
	ZH15D□A-09-N03-11	22.23	37.1	NPT3/8
	ZH18D□A-11-N03-13		39	
	ZH20D□A-11-N04-13	23.81	44.1	NPT1/2

\*1 Refer to page 10 for the dimensions of the SUP/EXH port one-touch connections.



**Body Ported Type: ZH05D<sup>S</sup>A-□-□-□ to ZH20D<sup>S</sup>A-□-□-□**

**Screw-in connections**



**All Ports: Screw-in**

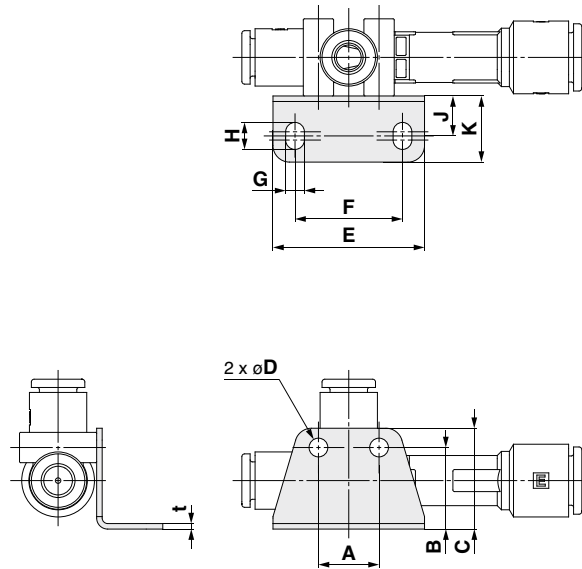
Model		H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	L <sub>1</sub>	L <sub>2</sub> *1	L <sub>3</sub>	L <sub>4</sub>	Connection thread 1	Connection thread 2	Connection thread 3
Metric	ZH05D□A-01-01-01	12	12	12	67	42.5	27	26	Rc1/8	Rc1/8	Rc1/8
	ZH07D□A-01-01-01				70.2						
	ZH10D□A-01-01-01				76.4						
	ZH13D□A-01-02-02	17	17	17	90.8	51	29.5	36.3	Rc1/4	Rc1/4	Rc1/4
	ZH15D□A-02-03-03				108.2						
	ZH18D□A-03-03-03				131.1						
	ZH20D□A-03-04-04	19	24	24	142.6	74.9	41.1	44.1	Rc3/8	Rc1/2	Rc1/2
	ZH05D□A-F01-F01-F01	12	12	12	69	43.5	28	27	G1/8	G1/8	G1/8
	ZH07D□A-F01-F01-F01				72.2						
	ZH10D□A-F01-F01-F01				78.4						
	ZH13D□A-F01-F02-F02	17	17	17	93	52	30.5	37.5	G1/4	G1/4	G1/4
	ZH15D□A-F02-F03-F03				112.1						
ZH18D□A-F03-F03-F03	134.4										
ZH20D□A-F03-F04-F04	19	24	24	146.5	76.8	43	46.1	G3/8	G1/2	G1/2	
Inch	ZH05D□A-N01-N01-N01	12.7	12.7	12.7	67	42.5	27	26	NPT1/8	NPT1/8	NPT1/8
	ZH07D□A-N01-N01-N01				70.2						
	ZH10D□A-N01-N01-N01				76.4						
	ZH13D□A-N01-N02-N02	17.46	17.46	17.46	90.8	51	29.5	36.3	NPT1/4	NPT1/4	NPT1/4
	ZH15D□A-N02-N03-N03				108.2						
	ZH18D□A-N03-N03-N03				131						
	ZH20D□A-N03-N04-N04	22.23	23.81	23.81	142.6	74.9	41.1	44.1	NPT3/8	NPT1/2	NPT1/2

\*1 Dimensions when the standard bracket is mounted

# ZH Series

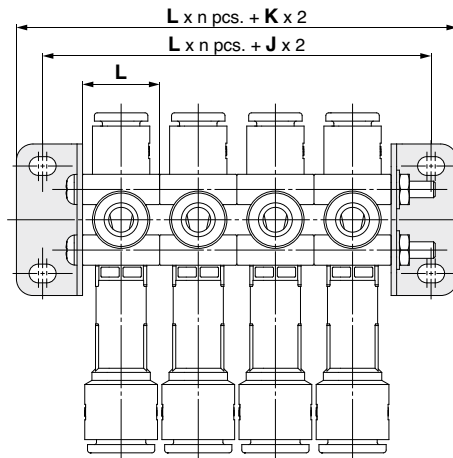
## Body Ported Type: ZH05D<sup>S</sup>A-□-□-□ to ZH20D<sup>S</sup>A-□-□-□

### L-bracket (Bracket on a single side)\*<sup>1</sup>



\*1 Long clamping screw set for 1 station required for assembly needs to be ordered separately. Refer to page 6.

### L-bracket (Brackets on both sides)\*<sup>2</sup>



\*2 Long clamping screw which is required for assembly needs to be ordered separately. Refer to page 6.

- \* ZH15D□A-09-N03-11
- ZH15D□A-N02-N03-N03
- ZH18D□A-11-N03-13
- ZH18D□A-N03-N03-N03
- ZH20D□A-10-04-12
- ZH20D□A-03-04-04
- ZH20D□A-10-F04-12
- ZH20D□A-F03-F04-F04
- ZH20D□A-11-N04-13
- ZH20D□A-N03-N04-N04

The above shown products cannot be mounted closely together, as width across flats of the screw-in connection will interfere with each other.

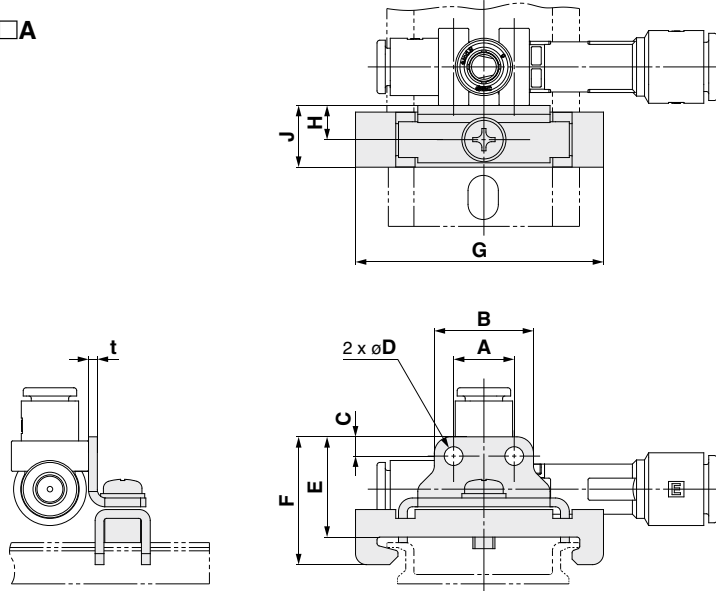
### L-Bracket (Brackets on Both Sides)

Part no.	Applicable model	A	B	C	D	E	F	G	H	J	K	L	t
AS-10L	ZH05/07/10D□A	11	14.8	18.3	3.4	27.5	19.5	3.4	4.9	7.3	12	14	1
AS-25L	ZH13/15D□A	17	19.6	24.6	4.5	38	28	4.5	6.5	9.5	15.5	20	1.2
AS-30L	ZH18/20D□A	22	24.8	29.8		43	33					22	1.4

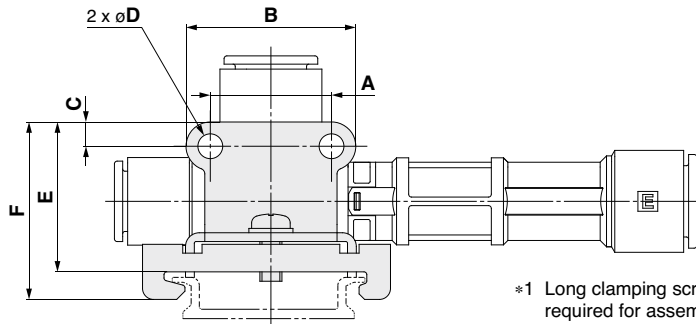
**Body Ported Type: ZH05D<sup>S</sup>A-□-□-□ to ZH20D<sup>S</sup>A-□-□-□**

**DIN rail mounting bracket (Bracket on a single side)\*1**

ZH05 to 10D□A



ZH13 to 20D□A

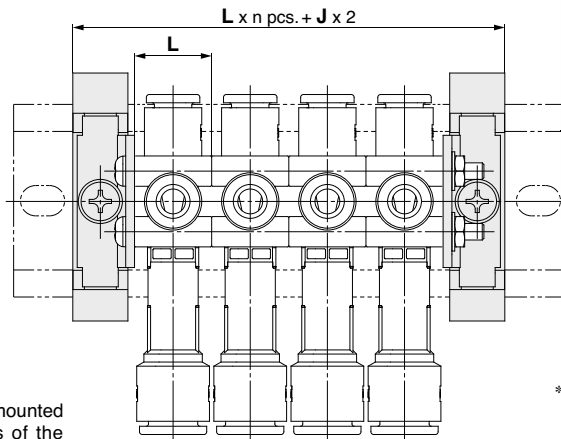


\*1 Long clamping screw set for 1 station required for assembly needs to be ordered separately. Refer to page 6.

**DIN rail mounting bracket (Brackets on both sides)\*2**

- \* ZH15D□A-09-N03-11
- ZH15D□A-N02-N03-N03
- ZH18D□A-11-N03-13
- ZH18D□A-N03-N03-N03
- ZH20D□A-10-04-12
- ZH20D□A-03-04-04
- ZH20D□A-10-F04-12
- ZH20D□A-F03-F04-F04
- ZH20D□A-11-N04-13
- ZH20D□A-N03-N04-N04

The above shown products cannot be mounted closely together, as width across flats of the screw-in connection will interfere with each other.



\*2 Long clamping screw set which is required for assembly needs to be ordered separately. Refer to page 6.

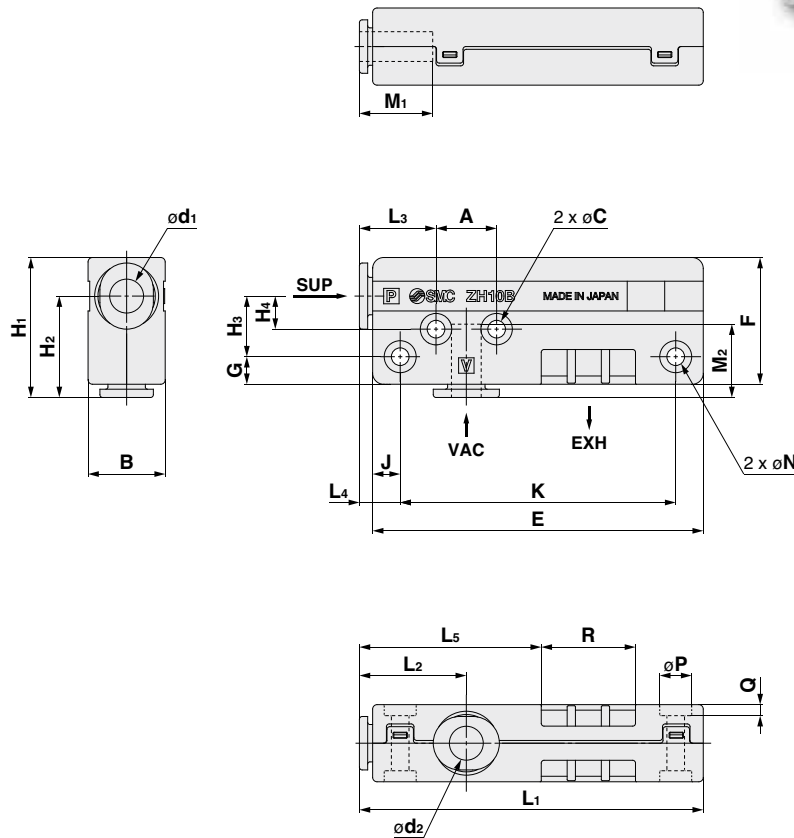
**DIN Rail Mounting Bracket (Brackets on Both Sides)**

Part no.	Applicable model	A	B	C	D	E	F	G	H	J	L	t
AS-10D	ZH05/07/10D□A	11	18	3.5	3.4	18.2	23.2	45	6.2	11.2	14	1.6
AS-25D	ZH13/15D□A	17	25.8	4.4	4.5	22	27				20	
AS-30D	ZH18/20D□A	22	30.8			27.2	32.2				22	

# ZH Series

Box Type: ZH05B<sup>S</sup>A-□-□ to ZH13B<sup>S</sup>A-□-□

One-touch connections



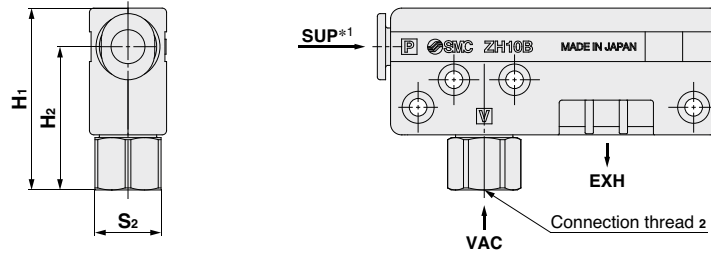
## All Ports: One-touch Fitting

Model		d <sub>1</sub>	d <sub>2</sub>	M <sub>1</sub>	M <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	A	B	C	E	F	G	J	K	N	P	Q	R
Metric	ZH05B□A-06-06	6	6	13.3	13.3	59.4	19.4	13.9	7.4	33.1	25.4	18.4	11	6	11	14	3.2	57	23	5	5	47	3.2	5.8	2	15
	ZH07B□A-06-06																	60				50				17.1
	ZH10B□A-06-06																	62.4				50				17.1
	ZH13B□A-08-10																	9.4				37.6				32.4
Inch	ZH05B□A-07-07	1/4"	1/4"	13.3	13.3	59.4	19.4	13.9	7.4	33.1	25.4	18.4	11	6	11	14	3.2	57	23	5	5	47	3.2	5.8	2	15
	ZH07B□A-07-07																	60				50				17.1
	ZH10B□A-07-07																	62.4				50				17.1
	ZH13B□A-09-11																	5/16"				3/8"				14.2



**Box Type: ZH05B<sup>S</sup>A-□-□ to ZH13B<sup>S</sup>A-□-□**

One-touch and screw-in connections



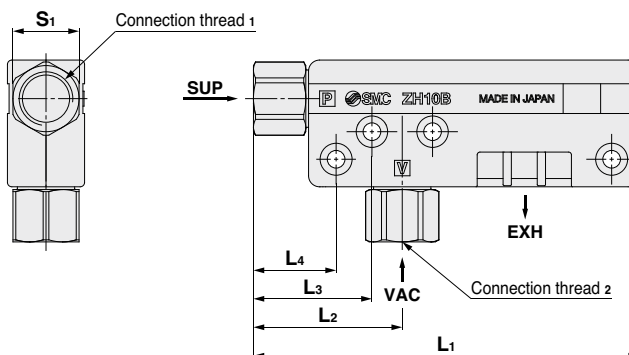
**One-touch and Screw-in Connections**

	Model	S <sub>2</sub>	H <sub>1</sub>	H <sub>2</sub>	Connection thread 2
Metric	ZH05B□A-06-01	12	33	26	Rc1/8
	ZH07B□A-06-01				
	ZH10B□A-06-01				
	ZH13B□A-08-02	17	44.3	36.3	Rc1/4
	ZH05B□A-06-F01				
	ZH07B□A-06-F01				
Inch	ZH10B□A-06-F01	12	34	27	G1/8
	ZH13B□A-08-F02				
	ZH05B□A-07-N01				
	ZH07B□A-07-N01	12.7	33	26	NPT1/8
	ZH10B□A-07-N01				
	ZH13B□A-09-N02				
		17.46	44.3	36.3	NPT1/4

\*1 Refer to page 15 for the dimensions of the SUP port one-touch connection.

**Box Type: ZH05B<sup>S</sup>A-□-□ to ZH13B<sup>S</sup>A-□-□**

Screw-in connections



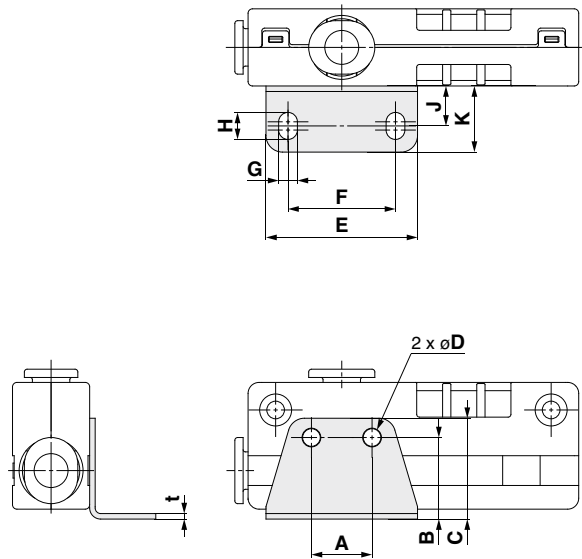
**Screw-in Connections**

	Model	S <sub>1</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	Connection thread 1	Connection thread 2
Metric	ZH05B□A-01-01	12	67	27	21.5	15	Rc1/8	Rc1/8
	ZH07B□A-01-01							
	ZH10B□A-01-01							
	ZH13B□A-01-02	12	68	28	22.5	16	G1/8	G1/8
	ZH05B□A-F01-F01							
	ZH07B□A-F01-F01							
Inch	ZH10B□A-F01-F01	12.7	70	27	21.5	15	NPT1/8	NPT1/8
	ZH13B□A-F01-F02							
	ZH05B□A-N01-N01							
	ZH07B□A-N01-N01	12.7	70	27	21.5	15	NPT1/8	NPT1/8
	ZH10B□A-N01-N01							
	ZH13B□A-N01-N02							
		84.5	29.5	21	16.5	NPT1/4		

# ZH Series

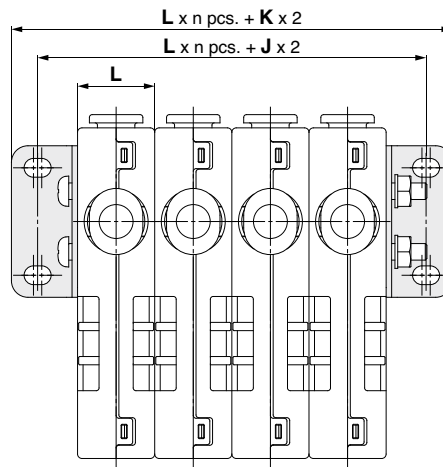
Box Type: ZH05B<sup>S</sup>L A-□-□ to ZH13B<sup>S</sup>L A-□-□

L-bracket (Bracket on a single side)\*1



\*1 Long clamping screw set for 1 station required for assembly needs to be ordered separately. Refer to page 6.

L-bracket (Brackets on both sides)\*2



\*2 Long clamping screw set which is required for assembly needs to be ordered separately. Refer to page 6.

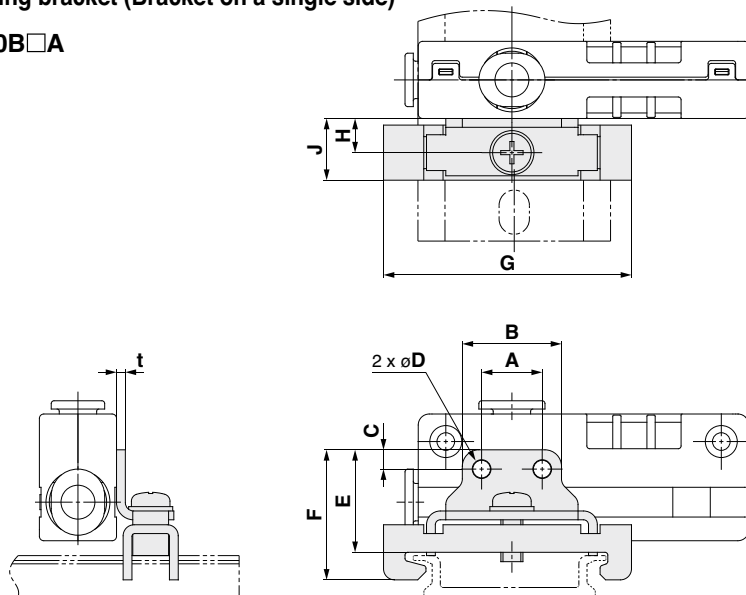
## L-Bracket (Brackets on Both Sides)

Part no.	Applicable model	A	B	C	D	E	F	G	H	J	K	L	t
AS-10L	ZH05/07/10B□A	11	14.8	18.3	3.4	27.5	19.5	3.4	4.9	7.3	12	14	1
AS-25L	ZH13B□A	17	19.6	24.6	4.5	38	28	4.5	6.5	9.5	15.5	20	1.2

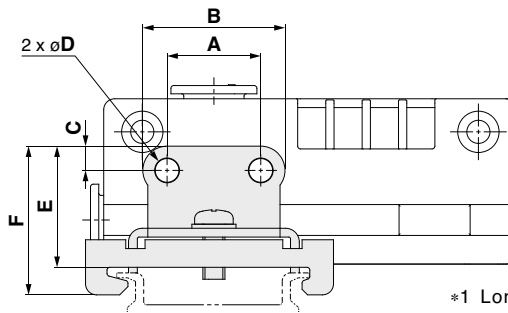
**Box Type: ZH05B<sup>S</sup>A-□-□ to ZH13B<sup>S</sup>A-□-□**

DIN rail mounting bracket (Bracket on a single side)\*1

ZH05 to 10B□A

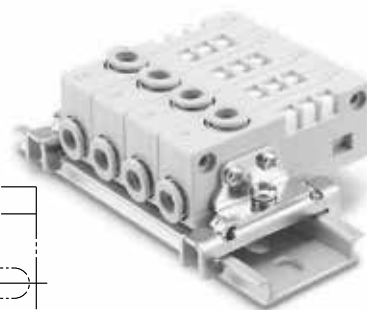
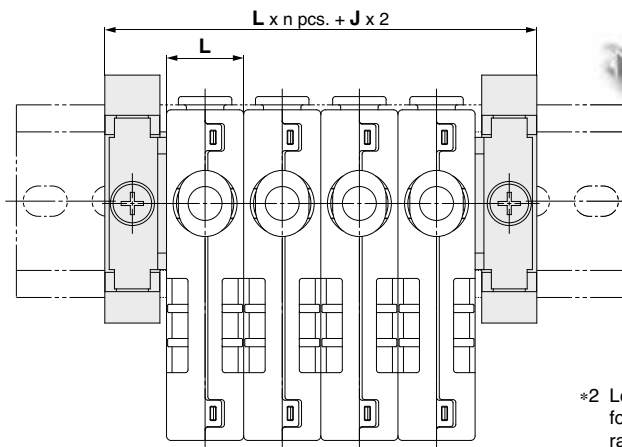


ZH13B□A



\*1 Long clamping screw set for 1 station required for assembly needs to be ordered separately. Refer to page 6.

DIN rail mounting bracket (Brackets on both sides)\*2



\*2 Long clamping screw set which is required for assembly needs to be ordered separately. Refer to page 6.

**DIN Rail Mounting Bracket (Brackets on Both Sides)**

Part no.	Applicable model	A	B	C	D	E	F	G	H	J	L	t
AS-10D	ZH05/07/10B□A	11	18	3.5	3.4	18.2	23.2				14	1.6
AS-25D	ZH13B□A	17	25.8	4.4	4.5	22	27	45	6.2	11.2	20	

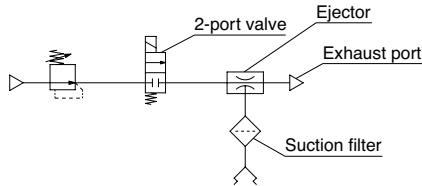
# ZH Series Circuit Examples

## ⚠ Caution

### Handling of Circuits

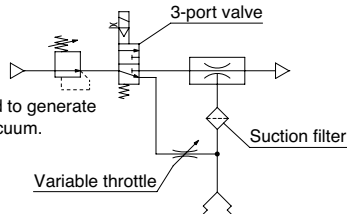
Select the related air preparation equipment with appropriate size in reference to the circuit example below.

#### Ex. 1 Supply valve (2-port valve) + Suction filter



2-port valve is used to generate and stop the vacuum. Vacuum is released to the atmosphere. A suction filter is installed to protect the ejector.

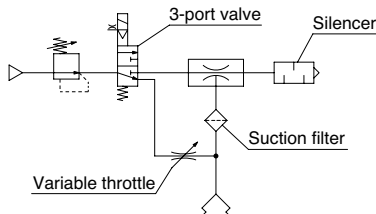
#### Ex. 2 Supply valve (3-port valve) + Variable throttle + Suction filter



3-port valve is used to generate and release the vacuum.

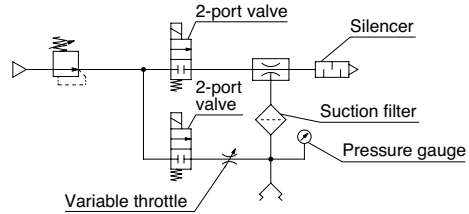
3-port valve is used to generate and stop the vacuum (vacuum release is performed simultaneously). Variable throttle is installed for break flow adjustment. A suction filter is protecting the ejector.

#### Ex. 3 Supply valve (3-port valve) + Variable throttle + Suction filter + Silencer



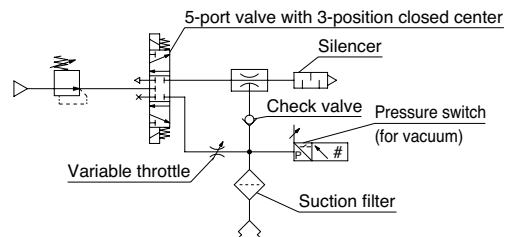
Power failure is prevented by changing the valve piping of Ex. 2 and applying vacuum generation N.O. specification. Variable throttle and suction filters are installed. A silencer is mounted to the exhaust port (to reduce exhaust noise).

#### Ex. 4 Supply valve (2-port valve) + Release valve (2-port valve) + Variable throttle + Silencer + Suction filter + Pressure gauge



Vacuum generation and vacuum release are controlled by a supply valve and release valve. A pressure gauge is installed to visually check the vacuum pressure during adsorption. The suction filter should be mounted to the location where the collected dust should not flow back due to the release of air. (When using the 3-port valve, seal the R-port of the release valve.)

#### Ex. 5 Supply/Release valve (5-port valve with 3-position) + Variable throttle



5-port valve with 3-position closed center is used to control the vacuum generation and release. A check valve is installed to the vacuum port to prevent vacuum pressure from being reduced when the supply valve is OFF\*1. A pressure switch is installed in the vacuum circuit to detect pressure. A suction filter should be mounted to the position where the duct collected by release air can be flushed by released air.

\*1 The vacuum may leak depending on the check valve used. If a breathable workpiece is used, vacuum pressure is reduced rapidly. Sufficient verification is required before use.



# ZH Series Specific Product Precautions 1

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For vacuum equipment precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website .

## Mounting

### ⚠ Caution

#### 1. Load to the ejector body

As the body material is resin, do not apply any load to the port after mounting. Prevent operations which generate moment, as they may cause performance reduction or damage to the body.

#### 2. Standard bracket

It is possible to mount and remove the standard bracket, which is included with this product (an option without a bracket can also be selected). Do not excessively pull on or bend the bracket as it may break. The appropriate tightening torques for the standard bracket, body mounting hole (Fig. 1), and cover mounting hole (Fig. 2) are shown below.

For M3:  $0.315 \pm 0.03$  N·m For M4:  $0.76 \pm 0.08$  N·m

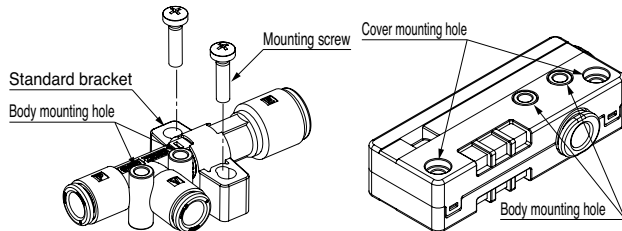


Fig. 1

Fig. 2

#### ● Mounting of the standard bracket (ZH05 to 15D□A) and adjustment of the vacuum (V) port

- 1) Align the recess of the standard bracket and the protrusion of the adapter. Push the bracket from the top onto the adapter (Fig. 3).
- 2) Adjust the adapter to rotate the vacuum (V) port (Fig. 4).

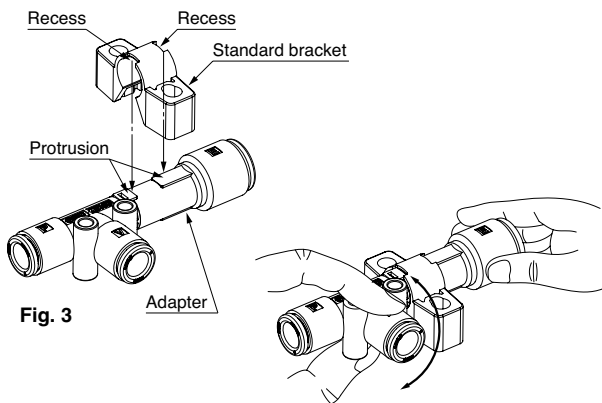


Fig. 3

Fig. 4

- 3) When mounting the product with the standard bracket, tighten the screw while holding both sides of the bracket. If the fit of the bracket is loose, the ejector may move after tightening the screws. (Fig. 5)

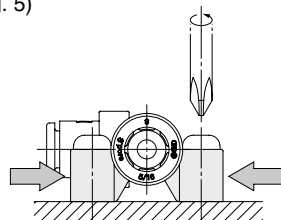


Fig. 5

#### ● Mounting of the standard bracket (ZH18/20D□A) and adjustment of the vacuum (V) port

- 1) The standard bracket for the ZH18/20D□A can be mounted by using either mounting hole 1 or 2 (Fig. 6).
- 2) When mounting the product through mounting hole 1, mount the bracket to the installation surface first (Fig. 6).
- 3) To mount the product to the bracket, push it down with the adapter's narrow rib and E mark facing upward and the wider rib to the side (Fig. 7). Hold the adapter when rotating the vacuum (V) port for adjustment.
- 4) To remove the body from the bracket, unclip the fingers (2 pcs.) on one side and pull the ejector upward while rotating the adapter. If the ejector is pulled upward without first unclipping the fingers, it may damage the bracket (Fig. 8, 9). If an increased holding force is required, please contact your SMC sales representative.

#### Bracket for ZH18/20D□A

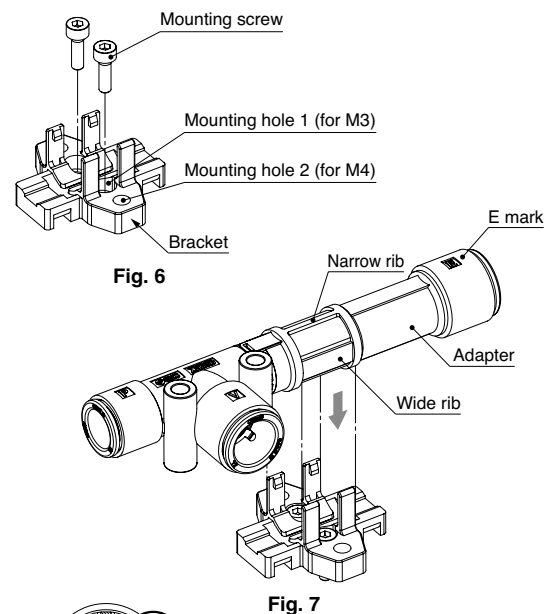


Fig. 6

Fig. 7

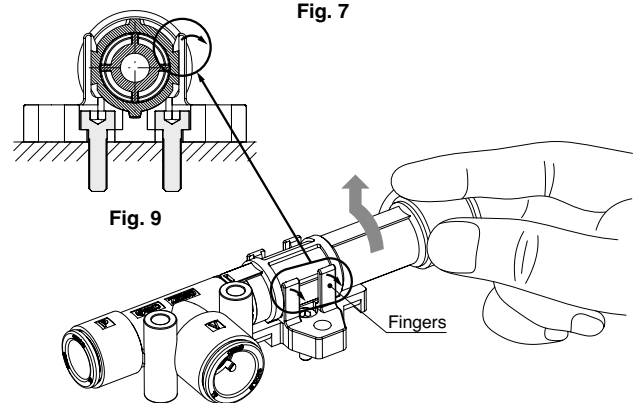


Fig. 9

Fig. 8



# ZH Series Specific Product Precautions 2

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For vacuum equipment precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website .

## Mounting

### ⚠ Caution

#### 3. Precautions for mounting with the body mounting holes

If the models listed below are to be mounted on a plane surface through the body mounting holes, the outside diameter of the screw-in stud will interfere with the mounting surface. Therefore, use a spacer with a thickness of 1 or more (Fig. 9).

Applicable model	t
ZH15D□A-09-N03-11 ZH15D□A-N02-N03-N03	2
ZH18D□A-11-N03-13 ZH18D□A-N03-N03-N03	1
ZH20D□A-10-04-12 ZH20D□A-03-04-04 ZH20D□A-10-F04-12 ZH20D□A-03-F04-F04 ZH20D□A-11-N04-13 ZH20D□A-N03-N04-N04	

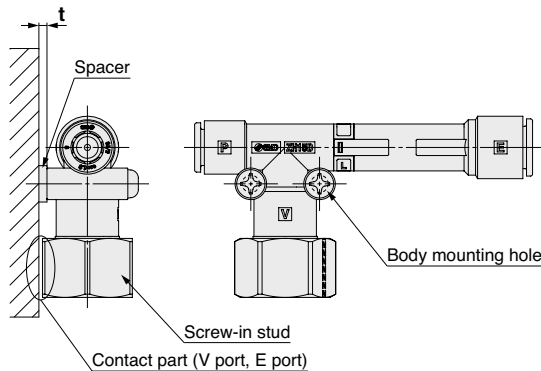


Fig. 9

#### 4. Exhaust port

When mounting the box type product, be sure to allow release from at least 2 of the 4 exhaust directions shown in Fig. 10. If 3 or more directions are covered, the vacuum performance of the ejector will be reduced due to exhaust air back pressure.

##### ● Precautions for mounting the box type

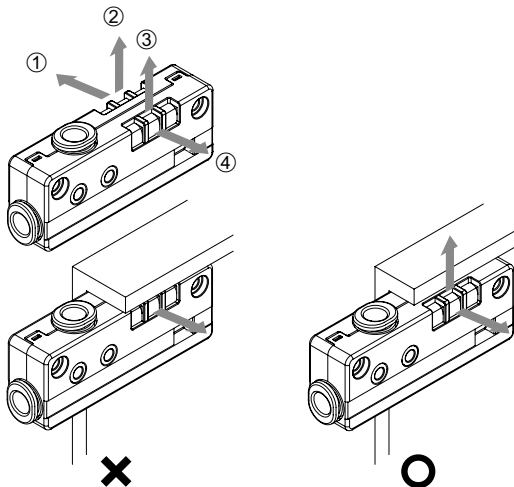


Fig. 10

## Piping

### ⚠ Caution

#### 1. Piping diameter

The piping diameter for each port should be the standard size for One-touch fittings. If the piping diameter is reduced, it may lead to the insufficient flow of supply air, the reduction of suction flow, and a reduction in the vacuum pressure.

#### 2. Exhaust port piping

If there is any piping or a silencer connected to the exhaust port, keep the back pressure at 5 kPa or less. Increased back pressure may lead to the reduction of suction flow and delays in the transport cycle time. If a silencer is connected, the specified vacuum performance is reduced by 10% or less.

#### 3. One-touch fittings

Refer to the “Fittings and Tubing Precautions” on the SMC website for handling One-touch fittings.

#### 4. Piping to the female thread type

When mounting a fitting to the screw-in stud (female thread), hold the width across flats with an appropriate size wrench. If the load is applied to the resin body directly, it may damage the body.

## Model Selection

### ⚠ Caution

#### 1. Supply valve

Select a supply valve which can supply a sufficient flow rate that takes the ejector air consumption into account. If the flow rate of the supply valve is insufficient, it may lead to vacuum failure. The selected supply valve should have a C factor of at least the value shown in the table below.

##### Minimum Supply Valve C Factor

Model	C [dm <sup>3</sup> /(s·bar)]
ZH05□□A	0.12
ZH07□□A	0.23
ZH10□□A	0.47
ZH13□□A	0.80
ZH15D□A	1.06
ZH18D□A	1.53
ZH20D□A	1.88

#### 2. Mounting of air equipment

If particles are sucked through the vacuum (V) port during workpiece adsorption, the vacuum performance might be reduced due to the adhesion of particles in the air passage of the product or clogging of the exhaust passage (silencer). The installation of an air suction filter (ZFA, ZFB, or ZFC series) in the middle of the piping on the vacuum side is recommended to prevent performance reduction. If air containing moisture is sucked, vacuum performance might also be reduced for the same reason. In this case, install a drain separator for vacuum (AMJ series).



# ZH Series Specific Product Precautions 3

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For vacuum equipment precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website .

## Air Supply

### ⚠ Caution

#### 1. Quality of supply air

The recommendation for cleanliness of the compressed air supplied to the product is as specified in “System No. C [Dry air]” of the “Model Selection Guide of Air Preparation Equipment” on the SMC website. This describes the impurity content in the compressed air based on the grade of compressed air quality 2.4.3, 2.5.3 and 2.6.3 of ISO 8573-1:2001 (JIS B 8392-1:2003)

If impurities enter the product, vacuum performance might be reduced due to the deterioration of the air passage or clogging of the exhaust system.

## Ejector Characteristics

### ⚠ Caution

#### 1. Intermittent noise during vacuum generation

When the ejector standard supply pressure is close to the pressure that generates peak vacuum pressure, the vacuum pressure may become unstable due to fluid vibration. If there is any operation failure or the intermittent noise needs to be reduced, increase or decrease the supply pressure. Avoid the supply pressure range where the vacuum pressure becomes unstable.

#### 2. Temperature reduction and vapor condensation during vacuum generation

When the ejector generates vacuum, compressed air expands adiabatically after passing through the nozzle. This reduces the temperature around the nozzle, so condensation might be generated on the product surface (the condensation dew point may vary depending on the temperature and relative humidity of the operating environment).

## When Operating the Ejector

### ⚠ Caution

#### 1. Exhaust air

If solid substances are sucked in through the vacuum (V) port, they will be discharged from the exhaust port at a high speed if the exhaust (EXH) port is opened. Therefore, do not look into the exhaust port or direct the exhaust port toward a person when the ejector is operating.

#### 2. Exhaust noise

Models with a large nozzle diameter generate a large exhaust noise if the exhaust (EXH) port is opened. Install piping or a silencer to the exhaust port to reduce the exhaust noise.

## Identification

### ⚠ Caution

#### 1. The appearance of the screw-in connection differs depending on the thread type. (Fig. 11)

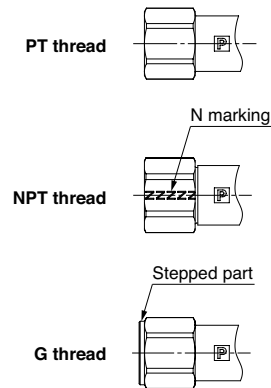


Fig. 11

#### 2. For the box type, a different identification mark symbol is used according to the vacuum pressure reached (type S or type L). (Fig. 12)

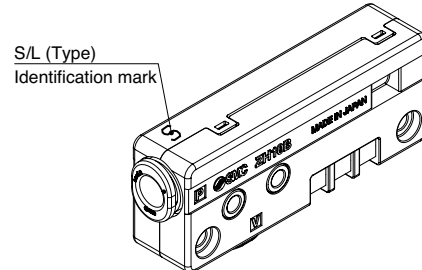





Fig. 12

## 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.







## UNIT CONVERSIONS

	unit	conversion	result
length	m	x 3.28	ft
	mm	x 0.04	in
mass	g	x 0.04	oz
volume	cm <sup>3</sup>	÷ 16.387	in <sup>3</sup>
	L	x 61.024	in <sup>3</sup>
speed	mm/s	÷ 25.4	in/s
pressure	MPa	x 145	psi
	kPa	÷ 6.895	psi
temperature	°C	x1.8 then add 32	°F
torque	N-m	x 0.738	ft-lb
force	N	÷ 4.448	lbf
flow	L/min	÷ 28.317	cfm

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