Multistage Ejector

Only for the models with a valve or pressure switch The ZL1 with an AC voltage valve is not compliant.

Max. suction flow rate

3 types available:

3.5, 10.6*1 and 21.2*1 SCFM (ANR)

*1 Branch + Port exhaust

Air consumption

Suction: 11 cfm
ZL3

Cuts off supply air when the pressure reaches the desired vacuum

Suction: 21.2 cfm
ZL6

90% reduction

A pressure switch for vacuum with an energy saving function is mounted.

Suction: 3.5 cfm
ZL1

10% reduction

Weight

Suction: 11 cfm
ZL3

Suction: 21.2 cfm
ZL6

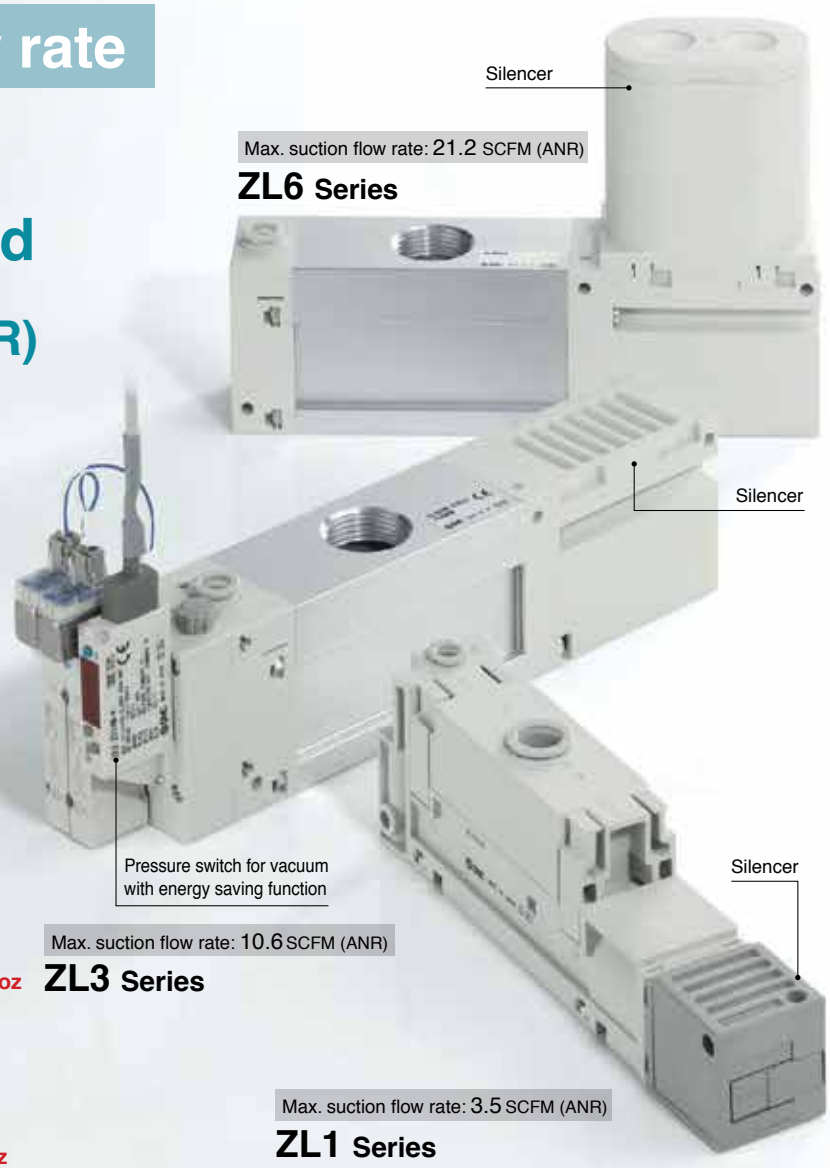
Max. 44% reduction*2

*2 ZL212 (Existing model): 24.69oz\ ZL3: 13.76oz

Suction: 3.5 cfm
ZL1

Max. 60% reduction*3

*3 ZL112 (Existing model): 15.87oz\ ZL1: 6.35oz



Series	Vacuum pressure [psi]	Max. suction flow rate [SCFM (ANR)]	Air consumption [SCFM (ANR)]	Weight*6 [oz]	Page
ZL1	-12.1832	3.5	2.01	6.35	p. 7
ZL3	-13.4885*4	10.6*5	4.77*4	13.76	p. 19
ZL6	-13.4885*4	21.2*5	9.53*4	16.58	p. 19

*4 ZL3H, ZL6H (Standard supply pressure: 7.25 psi)
*5 Branch + Port exhaust
*6 Basic type

ZL1/ZL3/ZL6 Series

NC391-A
(ES100-108B)

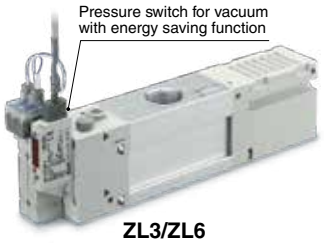
Energy saving

Suction: 100 L — ZL1 | Suction: 300 L — ZL3 | Suction: 600 L — ZL6

Air consumption

90% reduction[*1]

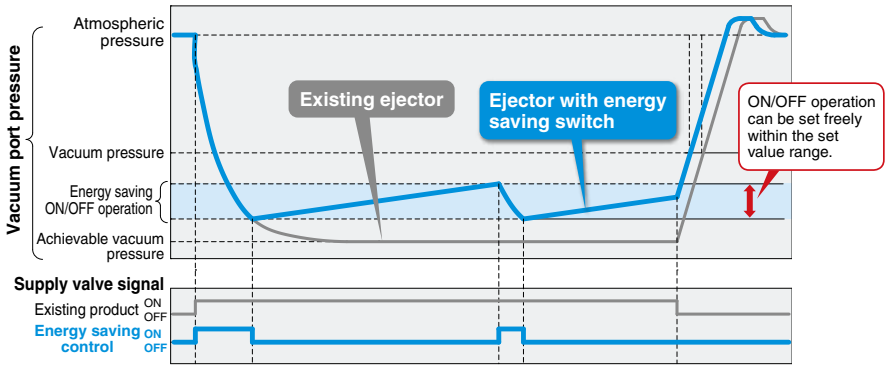
*1 Based on SMC's measurement conditions
When equipped with a pressure switch for vacuum with energy saving function (ZL3, ZL6)



ZL3/ZL6

Energy saving is possible due to the pressure switch for vacuum with energy saving function.

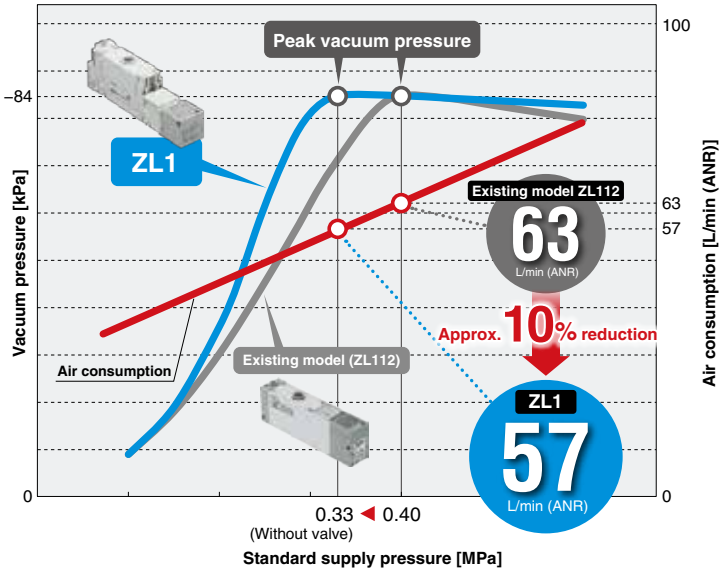
Even when the suction signal is ON, the ON/OFF operation of the supply valve is performed automatically within the set value.



Air consumption

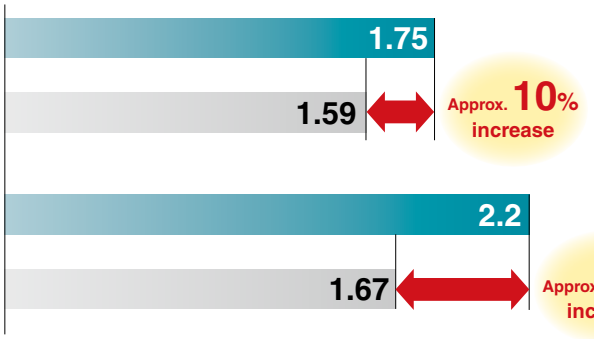
10% reduction

ZL1



Increased efficiency (Suction flow rate/Air consumption)

Suction: 100 L — ZL1 | Suction: 300 L — ZL3

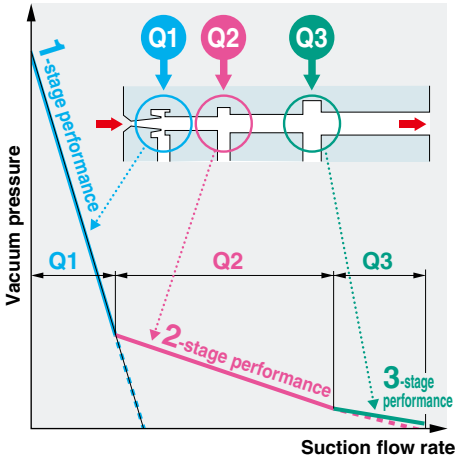


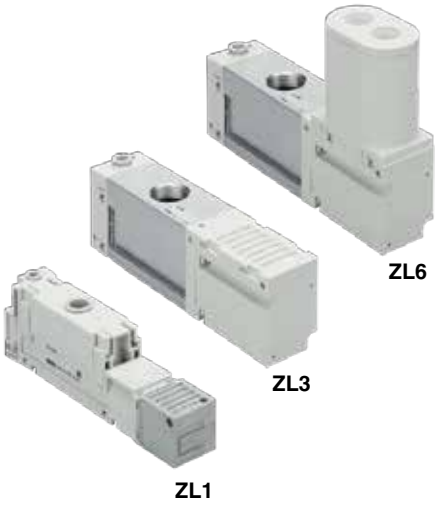
	Max. suction flow rate	Air consumption	Efficiency
ZL1	**100**	**57**	**1.75**
ZL112	100	63	1.59
ZL3	**300**	**135**	**2.2**
ZL212	250	150	1.67
ZL6	**600**	**270**	**2.22**

* ZL1 (Standard supply pressure: 0.33 MPa)
* ZL3H (Standard supply pressure: 0.5 MPa)

3-stage diffuser construction

Suction: 100 L	Suction: 300 L	Suction: 600 L
ZL1	ZL3	ZL6





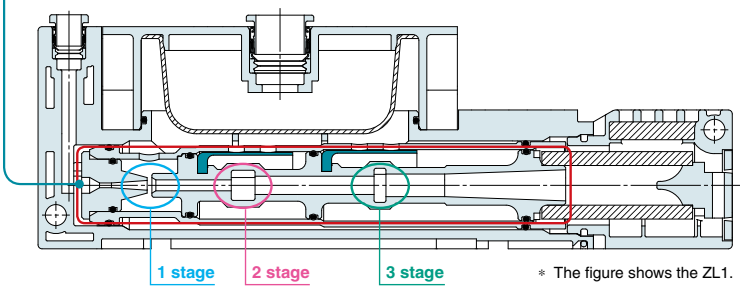
ZL1/ZL3

Max. suction flow rate **100/300 L/min (ANR)**

1 built-in ejector assembly

Suction flow rate increased by 250%

(For the ZL1: Compared to SMC 1-stage nozzle type models with nozzle size ø1.3)



∗ The figure shows the ZL1.

ZL6

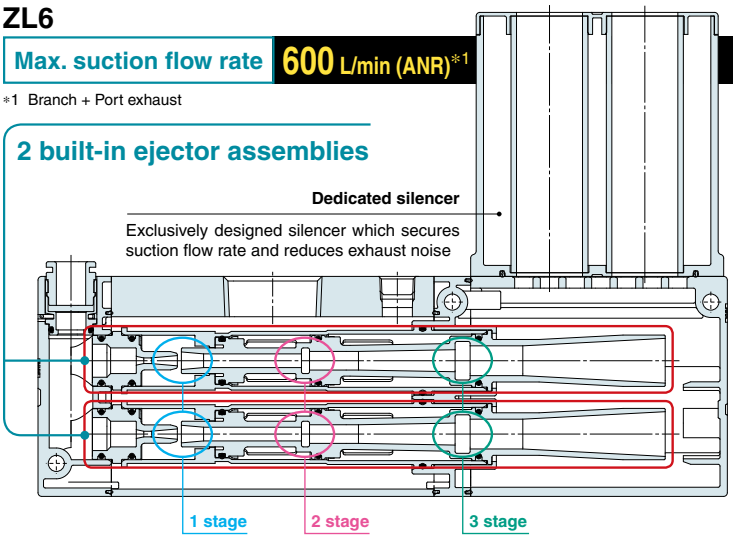
Max. suction flow rate **600 L/min (ANR)∗1**

∗1 Branch + Port exhaust

2 built-in ejector assemblies

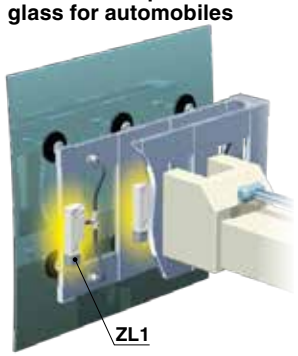
Dedicated silencer

Exclusively designed silencer which secures suction flow rate and reduces exhaust noise

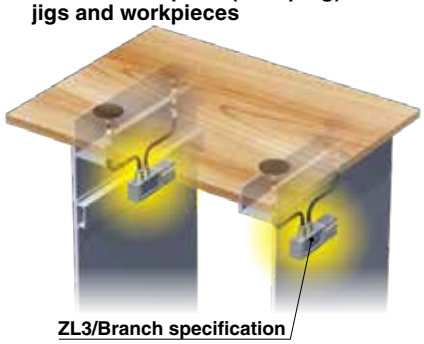


Applications

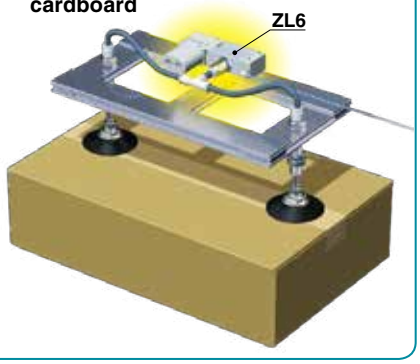
For the adsorption transfer of glass for automobiles



For the adsorption (clamping) of jigs and workpieces



For the adsorption transfer of cardboard



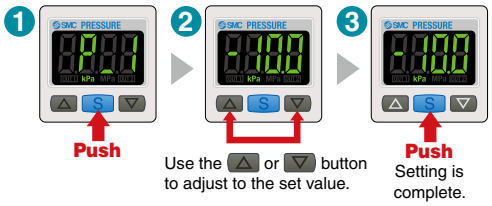
3 types of vacuum pressure sensors

Suction: 100 L ZL1 | Suction: 300 L ZL3 | Suction: 600 L ZL6

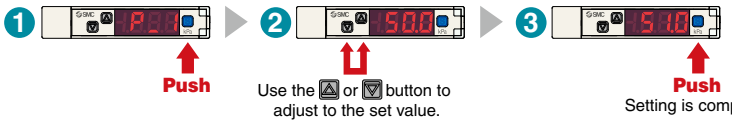
1 With vacuum pressure switch

3-step setting

ZL1



ZL3/ZL6



Output specifications

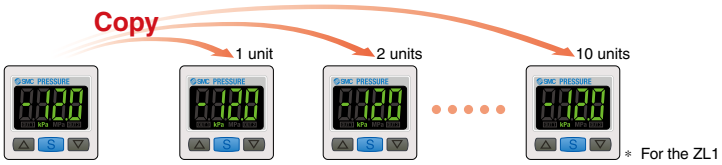
- NPN or PNP open collector 1 output/2 outputs
- NPN or PNP open collector 1 output + Analog output (1 to 5 V or 4 to 20 mA)

Power saving mode

Power consumption is reduced by the turning off the monitor.
(Power consumption reduced by 20% max.)

Can copy to up to 10 units simultaneously

- Reduced setting time
- Minimized risk of setting mistakes

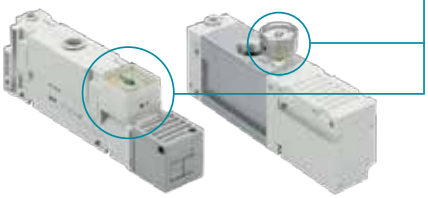


* For the ZL1

2 With pressure gauge

Pressure range:

–100 to 100 kPa (When the fittings are metric spec.)
–30 inHg to 14 psi (When the fittings are inch spec.)



3 With vacuum pressure detection port

Port size: Rc1/8

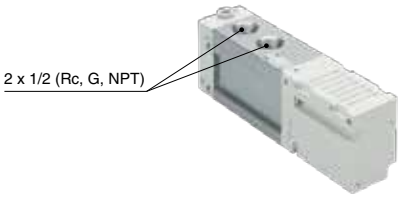
Without vacuum pressure detection port

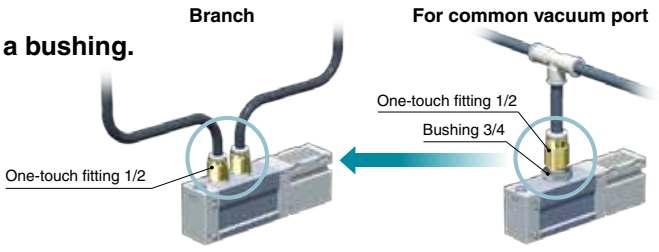
Vacuum port: A branch specification is selectable.

Suction: 300 L ZL3 | Suction: 600 L ZL6

Easy connection of branch piping

One-touch fittings can be connected without a bushing.





Standard supply pressure: A 0.35 MPa specification has been added.

Suction: 300 L ZL3 | Suction: 600 L ZL6

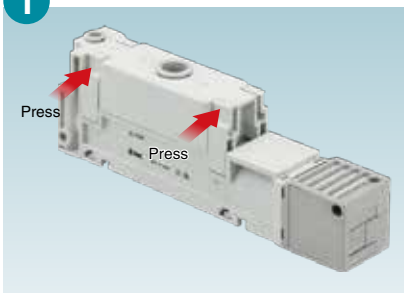
Supports the adoption of low pressure in factories

No tools are required! Maintenance labor can be reduced.

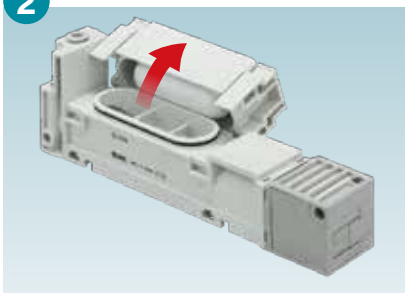
Suction: 100 L
ZL1

Filter element

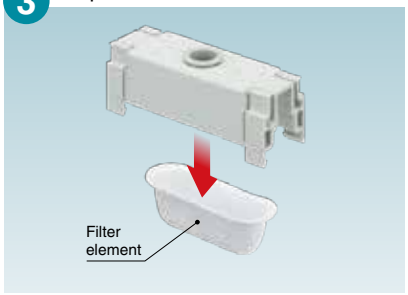
1 Press the levers.



2 Remove the suction cover.

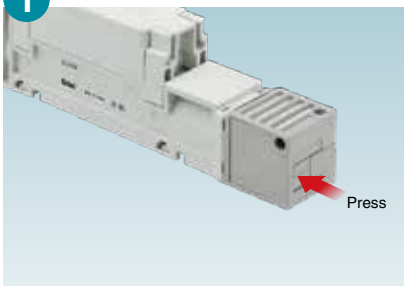


3 Replace the filter element.

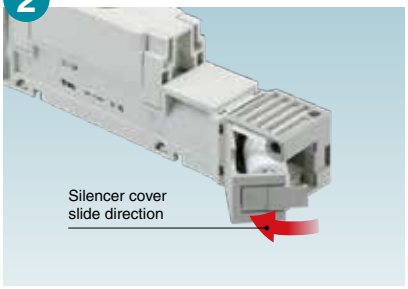


Sound absorbing material

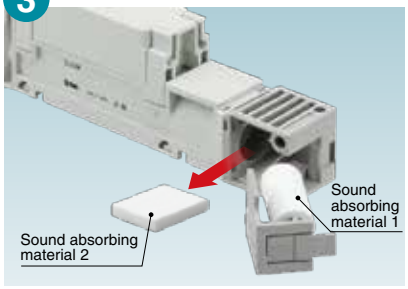
1 Press the “PUSH” button.



2 Remove the silencer cover.

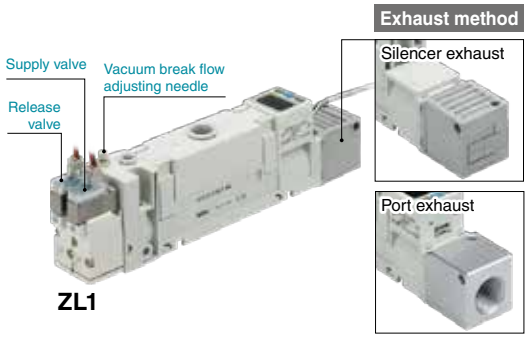


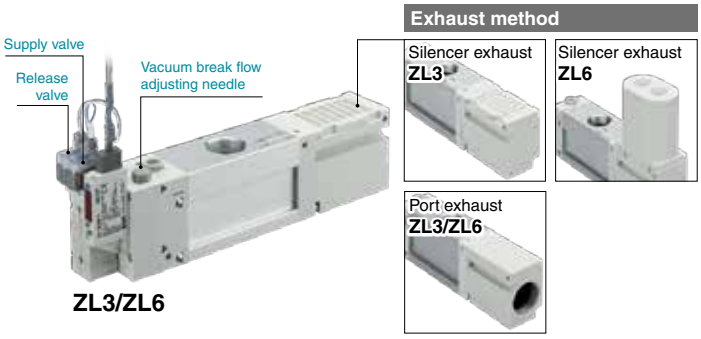
3 Replace the sound absorbing material.



Supply valve/release valve and exhaust method

Suction: 100 L ZL1 | Suction: 300 L ZL3 | Suction: 600 L ZL6





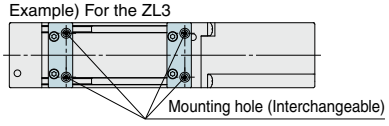
Option

Suction: 100 L ZL1 | Suction: 300 L ZL3

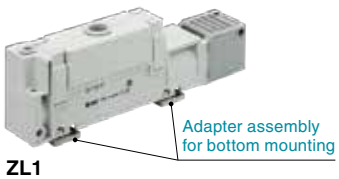
An adapter assembly is required for bottom mounting interchangeability with the existing model.

* The mounting holes on the top and on the side are interchangeable as standard.

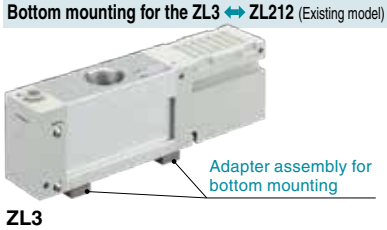
Example) For the ZL3



Bottom mounting for the ZL1 ⇔ ZL112 (Existing model)



Bottom mounting for the ZL3 ⇔ ZL212 (Existing model)



Combinations

	Supply valve	Release valve
Pattern ①	N.C.	N.C.
Pattern ②	N.C.	—
Pattern ③	N.O.	N.C.
Pattern ④	N.O.	—

Variations

Series		ZL1	ZL3M	ZL3H	ZL6M	ZL6H
Nominal nozzle size [mm]		1.2	1.9	1.5	1.9 x 2	1.5 x 2
Standard supply pressure*1 [MPa]		0.33	0.35	0.50	0.35	0.50
Vacuum pressure [kPa]		–84	–91	–93	–91	–93
Max. suction flow rate [L/min (ANR)]		100	300*2		600*2	
Air consumption [L/min (ANR)]		57	150	135	300	270
Port size	Supply port	ø6 ø1/4"	ø8 ø5/16"			
	Vacuum port	ø12 ø1/2"	3/4 (Rc, NPT, G) 2 x 1/2 (Rc, NPT, G)			
With or without valve	With supply valve and release valve	●	●	●	●	●
	Supply valve	●	●	●	●	●
	None	●	●	●	●	●
Exhaust type	Silencer exhaust	●	●	●	●	●
	Port exhaust	●	●	●	●	●
Pressure switch for vacuum with energy saving function			●	●	●	●
Vacuum pressure sensor	With vacuum pressure switch	●	●	●	●	●
	With pressure gauge	●	●	●	●	●
	With port: Rc1/8	●	●	●	●	●
	None	●	●	●	●	●

*1 Without valve
*2 Branch + Port exhaust

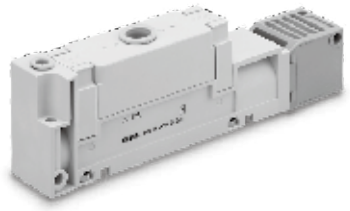


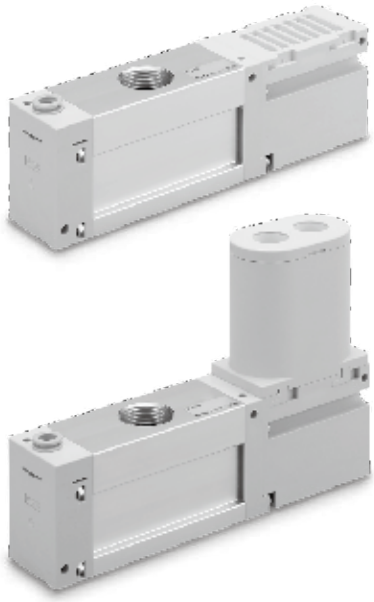
CONTENTS

Multistage Ejector *ZL1/ZL3/ZL6 Series*

UNIT CONVERSIONS

	unit	conversion	result
length	m	x 3.28	ft
	mm	x 0.04	in
mass	g	x 0.04	oz
volume	cm^3	÷ 16.387	in^3
	L	x 61.024	in^3
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





Multistage Ejector *ZL1 Series*

Multistage Ejector *ZL3/ZL6 Series*

Multistage Ejector

Max. suction flow rate: 100 L/min (ANR)

ZL1 Series

Only for the models with a valve or pressure switch AC voltage valves are not compliant.

RoHS

How to Order

Without valve ZL 1 12A ❶ ❷ – ❸ ❹ ❺ ❻ ❼ – ❽ ❾ ❿ ⓫ – ⓬

With valve ZL 1 12A ❶ ❷ – K1 5 M Z ❼ – D A M L – ⓬

Max. suction flow rate: 100 L/min (ANR)

❶❷ Ejector ❸❹❺❻❼ Supply valve/Release valve ❽❾❿⓫ Vacuum pressure sensor

❶ Supply (P), Vacuum (V) port/ One-touch fitting connection size

Symbol	Supply (P) port	Vacuum (V) port	Pressure gauge unit*1
Nil	ø6 (Metric)	ø12 (Metric)	kPa
N	ø1/4" (Inch)	ø1/2" (Inch)	inHg·psi

*1 When the vacuum pressure gauge (Symbol: G) is selected for ❽, these are the unit specification options. Under the New Measurement Act, products with inHg·psi unit specifications are not permitted for use in Japan.

❷ Exhaust method

Nil	Silencer exhaust
P	Rc1/2 port exhaust
PF	G1/2 port exhaust*2
PN	1/2-14NPT port exhaust

*2 The thread ridge shape is in compliance with G thread standard ISO 228-1, but the other shapes are not in compliance with ISO 16030 or ISO 1179.

❸ Supply valve/Release valve combination

K1	Supply valve (N.C.), Release valve (N.C.)
K2	Supply valve (N.C.)
B1	Supply valve (N.O.), Release valve (N.C.)
B2	Supply valve (N.O.)

❹ Rated voltage

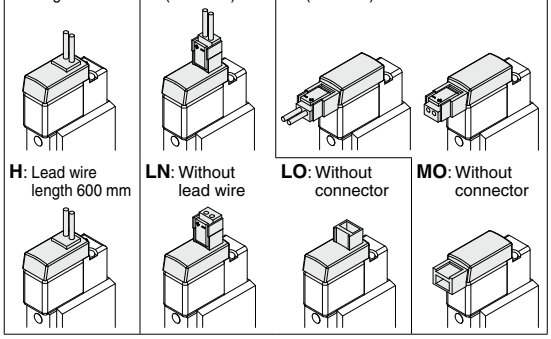
DC		CE-compliant
5	24 VDC	●
6	12 VDC	●
V	6 VDC	●
S	5 VDC	●
R	3 VDC	●

AC (50/60 Hz)		CE-compliant
1	100 VAC	—
2	200 VAC	—
3	110 VAC [115 VAC]	—
4	220 VAC [230 VAC]	—

* CE-compliant: For DC only

❺ Electrical entry

24, 12, 6, 5, 3 VDC/100, 110, 200, 220 VAC		
Grommet	L plug connector	M plug connector
G: Lead wire length 300 mm	**L**: With lead wire (300 mm)	**M**: With lead wire (300 mm) **MN**: Without lead wire
H: Lead wire length 600 mm	**LN**: Without lead wire	**LO**: Without connector **MO**: Without connector



* LN and MN types: With 2 sockets per valve
* Refer to page 13 for the lead wire length of L and M plug connectors.

❻ Light/Surge voltage suppressor

Nil	Without light/surge voltage suppressor
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
U	With light/surge voltage suppressor (Non-polar type)

* For type "U," only 24 or 12 VDC is available.
* There is no "S" option for AC voltage valves because the generation of surge voltage is prevented by a rectifier.

❼ Manual override

Nil	Non-locking push type
D	Push-turn locking slotted type

❽ Vacuum pressure sensor

Nil	None
GN	With vacuum pressure detection port (Rc1/8)
G	Pressure gauge*3
D	Vacuum pressure switch

*3 For ❶, the units for metric spec. fittings are in kPa. The units for inch spec. fittings are in inHg·psi. (Under the New Measurement Act, products with these unit specifications are not permitted for use in Japan.)

Applicable only when "D" is selected for ❽ Vacuum pressure sensor

❾ Output

N	NPN open collector 1 output
P	PNP open collector 1 output
A	NPN open collector 2 outputs
B	PNP open collector 2 outputs
C	NPN open collector 1 output + Analog voltage output
D	NPN open collector 1 output + Analog current output
E	PNP open collector 1 output + Analog voltage output
F	PNP open collector 1 output + Analog current output

❿ Unit

Nil	With unit switching function
M	SI unit only (kPa)
P	With unit switching function (Initial value psi)

* Under the New Measurement Act, switches with the unit switching function are not permitted for use in Japan.

⓫ Lead wire

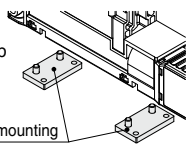
Nil	Without lead wire
L	Lead wire with connector (2 m)

* For output types "N" and "P," a 3-core lead wire is included. For other output types, a 4-core lead wire is included.

⓬ Option (Included)

Nil	None
B	Adapter assembly for bottom mounting (ZL112A-AD1-A)

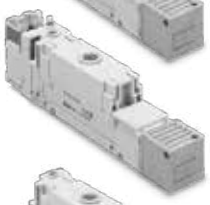
* Bottom mounting screw pitch = 28 mm (Interchangeable with the existing ZL112 model)
* 2 pcs./set, with 4 bolts
* The mounting holes on the top and on the side are interchangeable as standard.



Adapter assembly for bottom mounting

Without valve

With valve



With vacuum pressure switch

With pressure gauge

With vacuum pressure detection port

Port exhaust

Ejector Specifications

Model		ZL1
Nozzle size [mm]		1.2
Standard supply pressure [MPa]	Without valve	0.33
	With valve	0.35
Max. vacuum pressure [kPa]∗1		–84
Max. suction flow rate [L/min (ANR)]∗1		100
Air consumption [L/min (ANR)]∗1		57
Supply pressure range [MPa]		0.2 to 0.5
Operating temperature range [°C]		5 to 50 (No condensation)
Fluid		Air
Vibration resistance [m/s²]∗2	Without pressure switch	30
	With pressure switch	20
Impact resistance [m/s²]∗3	Without pressure switch	150
	With pressure switch	100

∗1 Values are at the standard supply pressure and based on SMC's measurement standards. They depend on atmospheric pressure (weather, altitude, etc.) and the measurement method.
∗2 10 to 500 Hz for 2 hours in each direction of X, Y, and Z (De-energized, Initial value)
∗3 3 times in each direction of X, Y, and Z (De-energized, Initial value)

Supply Valve/Release Valve Specifications

Model	SYJ5□4
Response time (at 0.5 MPa)∗1	25 ms or less
Max. operating frequency	5 Hz
Manual override	Non-locking push type, Push-turn locking slotted type

∗1 Based on JIS B 8419: 2010 dynamic performance test (Standard type: Coil temperature 20°C, at rated voltage, without surge voltage suppressor)
∗ Refer to the **Web Catalog** for details on the SYJ500 series.

Pressure Gauge Specifications

Model	ZL112A-PG1-A	ZL112A-PG2-A
Fluid	Air	
Pressure range	–100 to 100 kPa	–30 inHg to 14 psi
Scale range (Angular)	230°	
Accuracy	±3% F.S. (Full span)	
Class	Class 3	
Operating temperature range	0 to 50°C	
Material	Housing: Polycarbonate/ABS resin	

∗ **The solenoid valve mounted on this product is the SMC 3-port solenoid valve SYJ500 series.**

For details on solenoid valve functions, refer to the Operation Manual of the SYJ500 series on the SMC website.

3-port solenoid valve SYJ500 series

SYJ5□4-□□□□-□

CE-compliant

Nil	AC
Q	DC

Multistage ejector ZL1 series

ZL112A□□-□□□□□-□□□□-□

Manual override

Light/Surge voltage suppressor

Electrical entry

Rated voltage

Supply valve/Release valve

ZL112A□□-K1
Select "1" for both supply and release valve.

ZL112A□□-K2
Select "1" for supply valve.

ZL112A□□-B1
Select "2" for supply valve.
Select "1" for release valve.

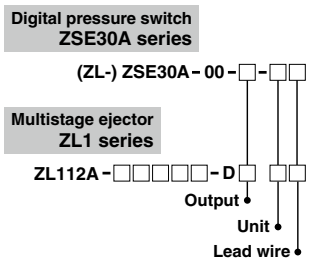
ZL112A□□-B2
Select "2" for supply valve.

Refer to page 13.

∗ The vacuum pressure switch mounted on this product is equivalent to our SMC product, the ZSE30A series digital pressure switch.

For details on vacuum pressure switch functions, refer to the Operation Manual of the ZSE30A series on the SMC website .

● Pressure switch correspondence table



Refer to page 13.

Vacuum Pressure Switch Specifications

Model			ZL-ZSE30A
Rated pressure range			0.0 to –101.0 kPa
Set pressure range			10.0 to –105.0 kPa
Withstand pressure			500 kPa
Smallest settable increment			0.1 kPa
Applicable fluid			Air, Non-corrosive gas, Non-flammable gas
Power supply voltage			12 to 24 VDC ±10% (with power supply polarity protection)
Current consumption			40 mA (at no load)
Switch output			NPN or PNP open collector 1 output NPN or PNP open collector 2 outputs (selectable)
	Max. load current		80 mA
	Max. applied voltage		28 V (at NPN output)
	Residual voltage		1 V or less (with load current of 80 mA)
	Response time		2.5 ms or less (with anti-chattering function: 20, 100, 500, 1000, 2000 ms)
	Short-circuit protection		Yes
Repeatability			±0.2% F.S. ±1 digit
Hysteresis	Hysteresis mode		Variable (0 to variable)
	Window comparator mode		
Analog output	∗1 Voltage output	Output voltage (Rated pressure range)	1 to 5 V ±2.5% F.S.
		Linearity	±1% F.S. or less
		Output impedance	Approx. 1 kΩ
	∗2 Current output	Output current (Rated pressure range)	4 to 20 mA ±2.5% F.S.
		Linearity	±1% F.S. or less
		Load impedance	Maximum load impedance: Power supply voltage 12 V: 300 Ω, Power supply voltage 24 V: 600 Ω Minimum load impedance: 50 Ω
Display			4-digit, 7-segment, 2-color LCD (Red/Green) Sampling cycle: 5 times/s
Display accuracy			±2% F.S. ±1 digit (Ambient temperature of 25°C)
Indicator light			Lights up when switch output is turned ON. (OUT1: Green, OUT2: Red)
Environmental resistance	Enclosure		IP40
	Operating temperature range		Operating: 0 to 50°C, Stored: –10 to 60°C (No freezing or condensation)
	Operating humidity range		Operating/Stored: 35 to 85% RH (No condensation)
	Withstand voltage		1000 VAC for 1 minute between terminals and housing
	Insulation resistance		50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing
Temperature characteristics			±2% F.S. (25°C standard)
Lead wire			Oilproof heavy-duty vinyl cable, 3 cores ø3.5, 2 m 4 cores Conductor area: 0.15 mm² (AWG26) Insulator O.D.: 1.0 mm
Standards			CE, RoHS compliant

∗1 When analog voltage output is selected, analog current output cannot be used together.
∗2 When analog current output is selected, analog voltage output cannot be used together.

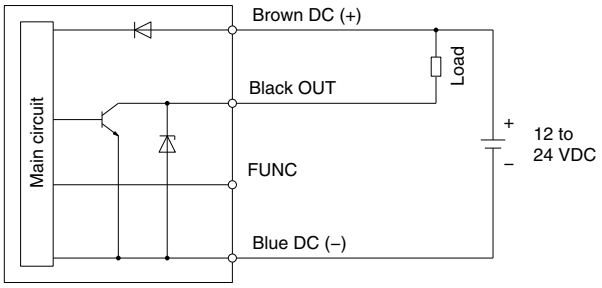
Weight

[g]

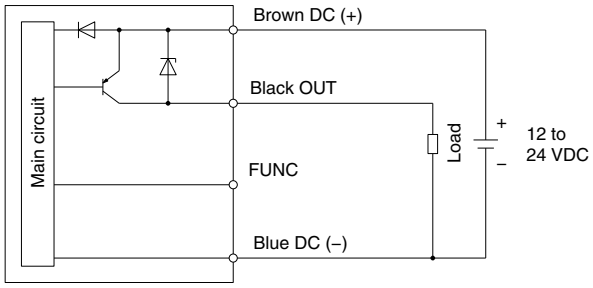
Model	ZL1
Basic type	180
Port exhaust	+70
Vacuum pressure switch (Excluding lead wire)	+25
Vacuum pressure switch (Including 3 cores lead wire)	+56
Vacuum pressure switch (Including 4 cores lead wire)	+60
With supply valve and release valve	+105
With supply valve and without release valve	+65

Vacuum Pressure Switch/Internal Circuits and Wiring Examples

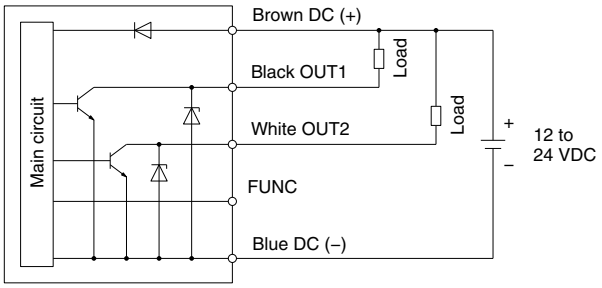
Output specification "N"
NPN (1 output)



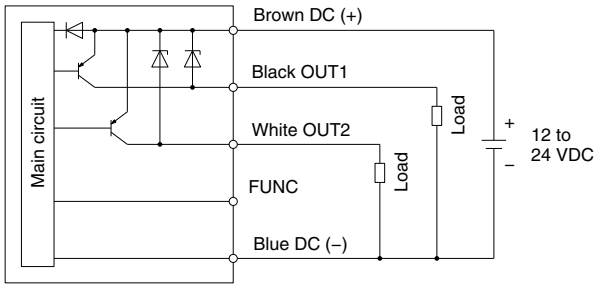
Output specification "P"
PNP (1 output)



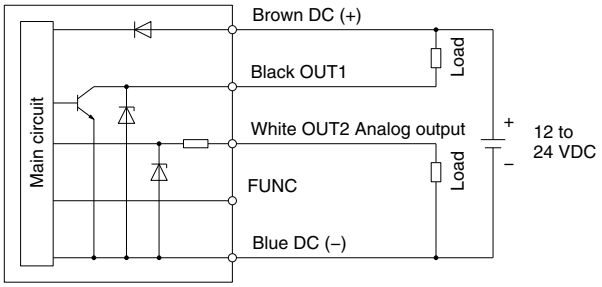
Output specification "A"
NPN (2 outputs)



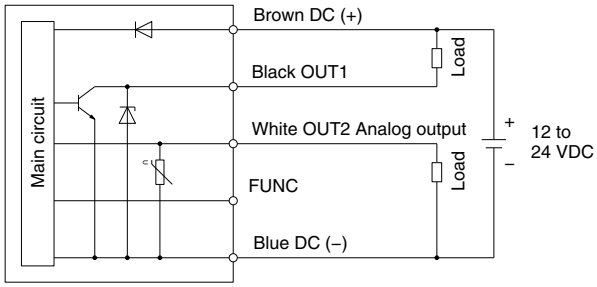
Output specification "B"
PNP (2 outputs)



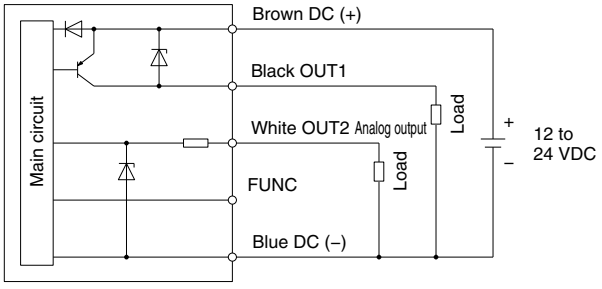
Output specification "C"
NPN (1 output) + Analog voltage output



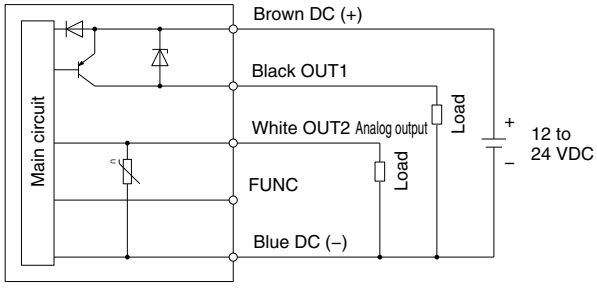
Output specification "D"
NPN (1 output) + Analog current output



Output specification "E"
PNP (1 output) + Analog voltage output



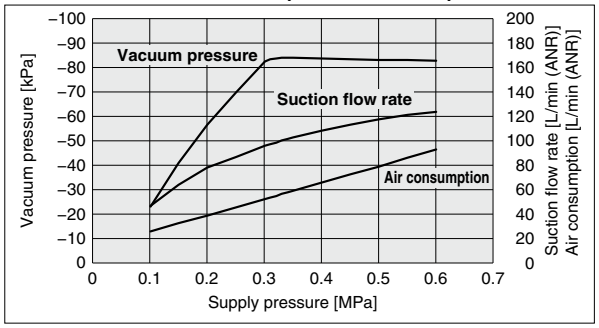
Output specification "F"
PNP (1 output) + Analog current output



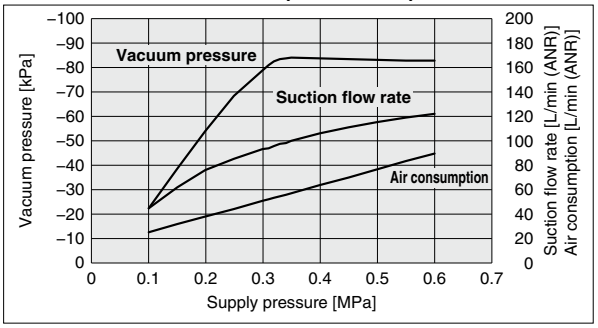
∗ Refer to the **Web Catalog** for details on pressure switches.

Exhaust Characteristics/Flow Rate Characteristics/Time to Reach Vacuum (Representative value)

Exhaust Characteristics (Without valve)

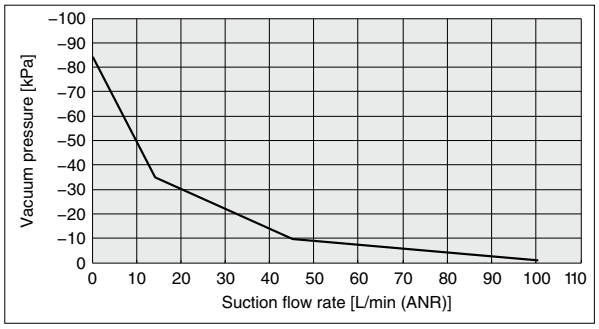


Exhaust Characteristics (With valve)



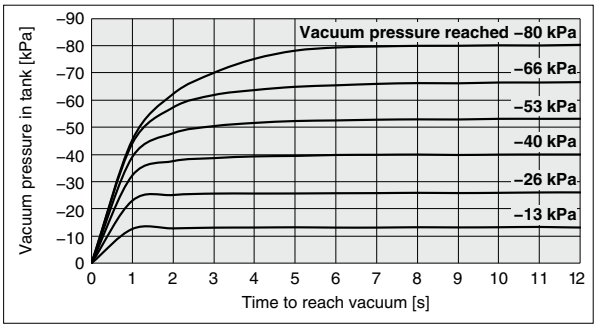
Standard supply pressure: 0.33 MPa (Without valve)
0.35 MPa (With valve)

Flow Rate Characteristics



Time to Reach Vacuum

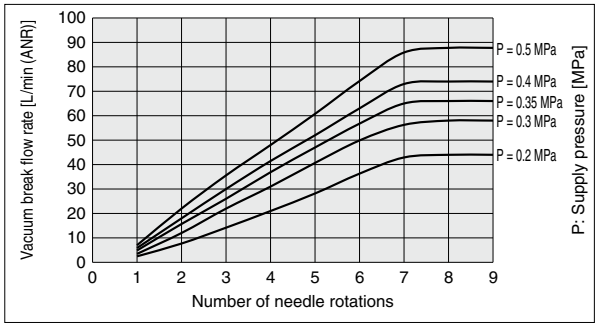
Tank capacity: 1 L



Vacuum Break Flow Rate Characteristics*1 (Representative value)

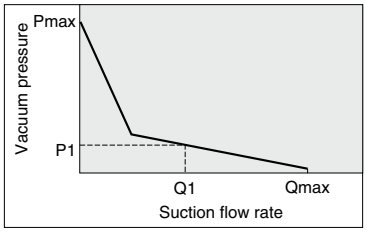
*1 Silencer exhaust specification

The graph shows the flow rate characteristics at different supply pressures when the vacuum break flow adjusting needle is open from the fully closed state.



* The flow rates shown in this graph are representative values for the ejector with silencer exhaust specification, and the suction flow may vary depending on the piping conditions at the vacuum (V) port and exhaust (EXH) port, etc.

How to Read the Flow Rate Characteristics



The flow rate characteristics indicate the relationship between the vacuum pressure and the suction flow rate of the ejector. They also show that when the suction flow rate changes, the vacuum pressure also changes. In general, this indicates the relationship at the ejector's standard operating pressure.

In the graph, Pmax indicates the max. vacuum pressure, and Qmax indicates the max. suction flow rate. These are the values that are published as specifications in catalogs, etc. Changes in vacuum pressure are explained below.

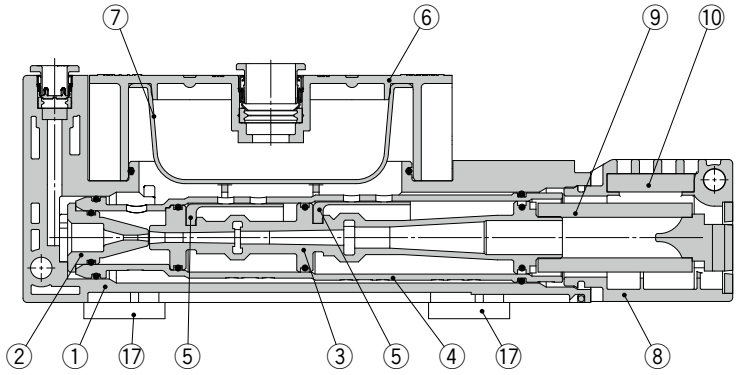
1. If the ejector's suction port is closed and sealed tight, the suction flow rate becomes "0," and the vacuum pressure increases to the max. (Pmax).
2. If the suction port is opened and air is allowed to flow (the air leaks), the suction flow rate increases, and the vacuum pressure decreases. (The condition of P1 and Q1)
3. If the suction port is opened completely, the suction flow rate increases to the max. (Qmax), while the vacuum pressure then drops almost to "0" (atmospheric pressure). When adsorbing workpieces which are permeable, subject to leakage, etc., caution is required as the vacuum pressure will not be very high.

How to Read the Time to Reach Vacuum

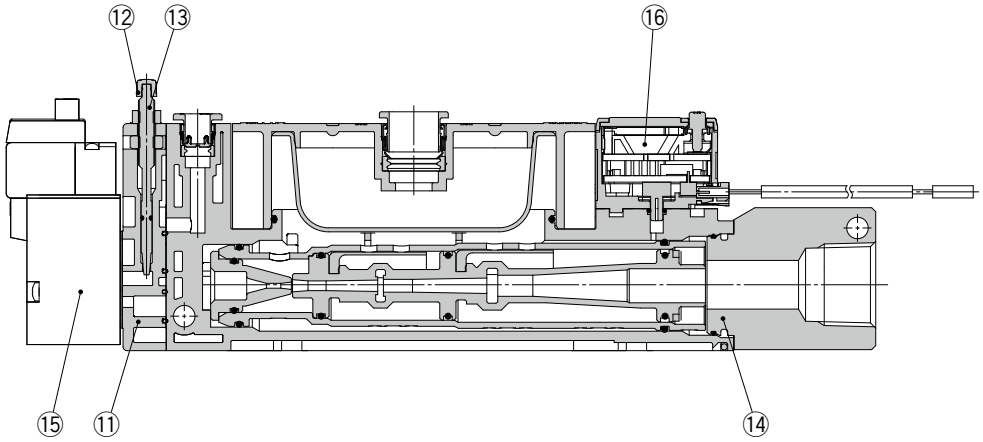
The graph indicates the time required to reach a vacuum pressure determined by adsorption conditions for workpieces, etc., starting from atmospheric pressure in a 1 L sealed tank. For the ZL1, approximately 7.0 seconds are necessary to attain a vacuum pressure of –80 kPa.

Construction

Without valve or pressure switch, Silencer exhaust



With valve and pressure switch, Port exhaust



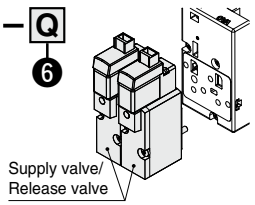
Component Parts

No.	Description	Material	Note
1	**Body**	PBT	—
2	**Nozzle**	POM	Refer to 6 on page 14 for replacement parts.
3	**Diffuser**	PBT	
4	**Attachment**	POM	
5	**Check valve**	FKM	
6	**Suction cover**	PBT	Refer to 3 on page 13 for replacement parts.
7	**Filter element**	Non-woven fabric	Refer to 8 on page 14 for replacement parts.
8	**Silencer case assembly**	PBT/Stainless steel	Refer to 4 on page 14 for replacement parts.
9	**Sound absorbing material 1**	Resin	Refer to 9 on page 14 for replacement parts.
10	**Sound absorbing material 2**	Resin	
11	**Valve plate**	PBT	Refer to 7 on page 14 for replacement parts.
12	**Knob**	POM	
13	**Needle**	Brass (Electroless nickel plating)	
14	**Port block assembly**	Aluminum alloy/NBR/Stainless steel	Refer to 5 on page 14 for replacement parts.
15	**Supply valve, Release valve**	—	Refer to 1 on page 13 for replacement parts.
16	**Vacuum pressure switch**	—	Refer to 2 on page 13 for replacement parts.
17	**Adapter assembly for bottom mounting**	Brass (Electroless nickel plating)	Refer to 10 on page 14 for replacement parts.
—	**Seal material (O-ring, etc.)**	HNBR/NBR	—
—	**Screws for assembly**	Steel	—

How to Order Replacement Parts

1 How to Order Supply Valve/Release Valve

SYJ5 1 4 – 5 M Z □ – Q
❶ ❷ ❸ ❹ ❺ ❻



❶ Type of actuation

1	Normally closed
2	Normally open (Supply valve only)

❷ Rated voltage

DC		CE-compliant
5	24 VDC	●
6	12 VDC	●
V	6 VDC	●
S	5 VDC	●
R	3 VDC	●

AC (50/60 Hz)		CE-compliant
1	100 VAC	—
2	200 VAC	—
3	110 VAC [115 VAC]	—
4	220 VAC [230 VAC]	—

∗ CE-compliant: For DC only

❸ Electrical entry

24, 12, 6, 5, 3 VDC/100, 110, 200, 220 VAC			
Grommet	L plug connector	M plug connector	
G: Lead wire length 300 mm	**L**: With lead wire (300 mm)	**M**: With lead wire (300 mm)	**MN**: Without lead wire
H: Lead wire length 600 mm	**LN**: Without lead wire	**LO**: Without connector	**MO**: Without connector

∗ LN and MN types: With 2 sockets
∗ For the lead wire length of the L and M plug connectors, refer to the lead wire with connector assembly for supply valves and release valves.

❹ Light/Surge voltage suppressor
(Electrical entry: G, H, L, or M)

Nil	Without light/surge voltage suppressor
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
U	With light/surge voltage suppressor (Non-polar type)

∗ There is no "S" option for AC voltage valves because the generation of surge voltage is prevented by a rectifier.
∗ For type "U," only DC voltage is available.

❺ Manual override

Nil	Non-locking push type
D	Push-turn locking slotted type

❻ CE-compliant

Nil	— (For AC)
Q	CE-compliant (For DC)

How to Order Connector and Socket for Supply Valve/Release Valve

SY100 – 30 – A

∗ With connector and 2 sockets only

How to Order Lead Wire with Connector Assembly for Supply Valve/Release Valve

SY100 – 30 – 4 A – 6
❶ ❷

❶ Power supply voltage

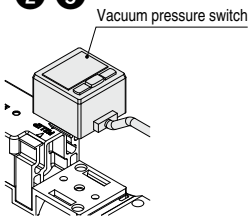
1	100 VAC
2	200 VAC
3	Other VAC
4	DC

❷ Lead wire length

6	600 mm
10	1000 mm
15	1500 mm
20	2000 mm
25	2500 mm
30	3000 mm
50	5000 mm

2 How to Order Vacuum Pressure Switch

ZL – ZSE30A – 00 – A – M L
❶ ❷ ❸



❶ Output

N	NPN open collector 1 output
P	PNP open collector 1 output
A	NPN open collector 2 outputs
B	PNP open collector 2 outputs
C	NPN open collector 1 output + Analog voltage output
D	NPN open collector 1 output + Analog current output
E	PNP open collector 1 output + Analog voltage output
F	PNP open collector 1 output + Analog current output

❷ Unit

Nil	With unit switching function∗1
M	SI unit only∗2
P	With unit switching function (Initial value psi)∗1

∗1 Under the New Measurement Act, switches with the unit switching function are not permitted for use in Japan.
∗2 Fixed unit: kPa

❸ Connector/Lead wire

Nil	Without lead wire
L	Lead wire with connector (Length: 2 m)

∗ For output types "N" and "P," a 3-core lead wire is included. For other output types, a 4-core lead wire is included.

How to Order Lead Wire Assembly with Connector

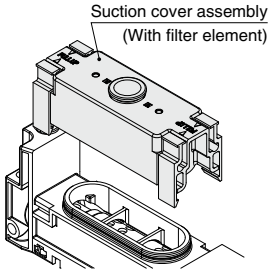
ZS – 38 – 3 L
❶

❶ Number of cores

3	3 cores, 1 output
4	4 cores, 2 outputs

3 How to Order Suction Cover Assembly

ZL112A – FC1 □ – A
❶



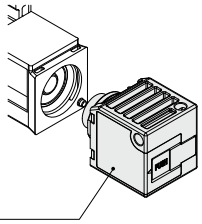
❶ Vacuum port size

Nil	Applicable tubing O.D. ø12
N	Applicable tubing O.D. ø1/2"

How to Order Replacement Parts

4 How to Order Silencer Case Assembly

ZL112A – SC1 – A



Silencer case assembly
(Including sound material assembly and a clip)

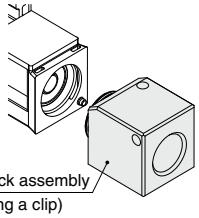
5 How to Order Port Block Assembly

ZL112A – EP1 □ – A

❶

❶ Thread type

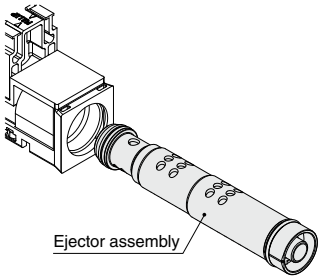
Nil	Rc thread
F	G thread
N	NPT thread



Port block assembly
(Including a clip)

6 How to Order Ejector Assembly

ZL112A – EJ1 – A



Ejector assembly

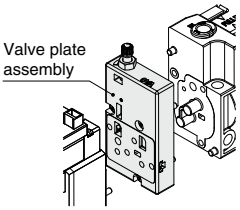
7 How to Order Valve Plate Assembly*1

ZL112A – VP 1 – A

❶

❶ Supply valve/Release valve combination

1	Supply valve + Release valve
2	Supply valve only

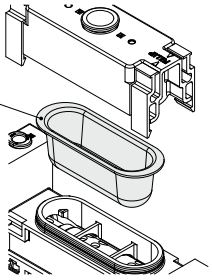


Valve plate assembly

*1 It is not possible to switch between models with valves and models without valves.

8 How to Order Filter Element

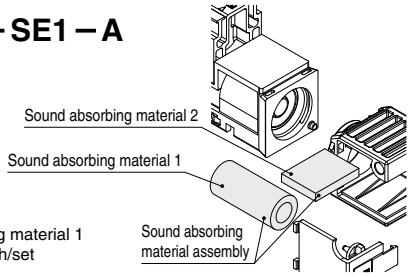
ZL112A – FE1 – A



Filter element
* 1 pc.

9 How to Order Sound Absorbing Material Assembly

ZL112A – SE1 – A

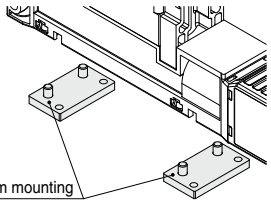


Sound absorbing material 2
Sound absorbing material 1
Sound absorbing material assembly

* Sound absorbing material 1 and 2, 1 pc. each/set

10 How to Order Adapter Assembly for Bottom Mounting

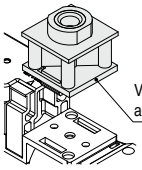
ZL112A – AD1 – A



Adapter assembly for bottom mounting
* 2 pcs./set, with 4 bolts

How to Order Vacuum Port Adapter Assembly*2

ZL112A – AD2 – A



Vacuum port adapter assembly

*2 A vacuum port adapter cannot be installed when "Nil" is selected for the pressure sensor.

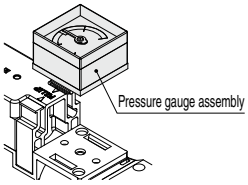
How to Order Pressure Gauge Assembly*3

ZL112A – PG 1 – A

❶

❶ Units for pressure

1	kPa
2	inHg·psi*4



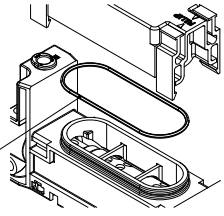
Pressure gauge assembly

*4 Under the New Measurement Act, products with inHg·psi unit specifications are not permitted for use in Japan.

*3 A pressure gauge cannot be installed when "Nil" is selected for the pressure sensor.

How to Order O-ring for Suction Cover

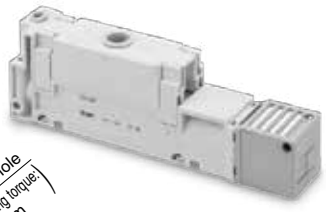
ZL112A – OR1 – A

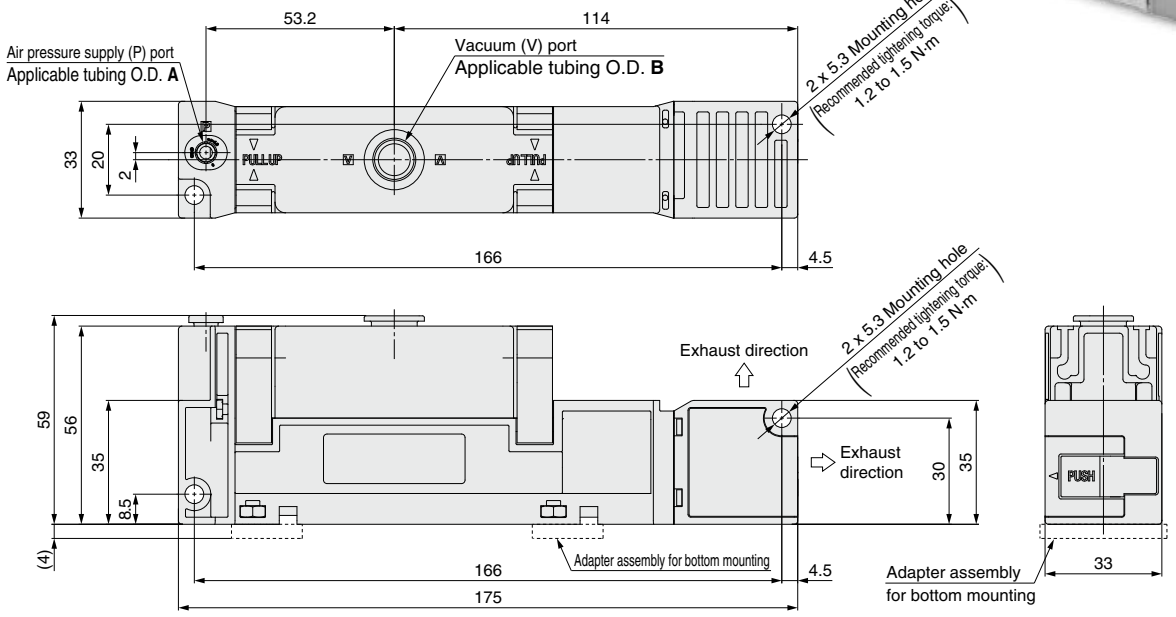


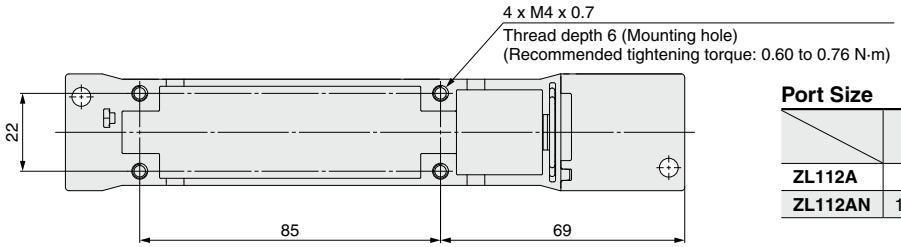
O-ring for suction cover
* 5 pcs./set

Dimensions

ZL112A(N)(-B) Valve (Without supply valve or release valve)







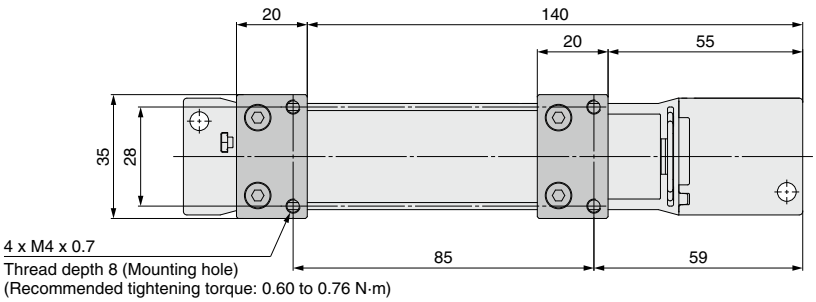
Port Size

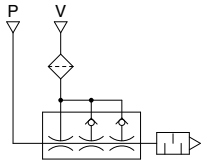
	A	B
ZL112A	6	12
ZL112AN	1/4"	1/2"

Release Button

	P port		V port	
	Color	Type	Color	Type
ZL112A	Light gray	Oval	Light gray	Round
ZL112AN	Orange	Round	Orange	Round

ZL112A(N)-B With adapter assembly for bottom mounting



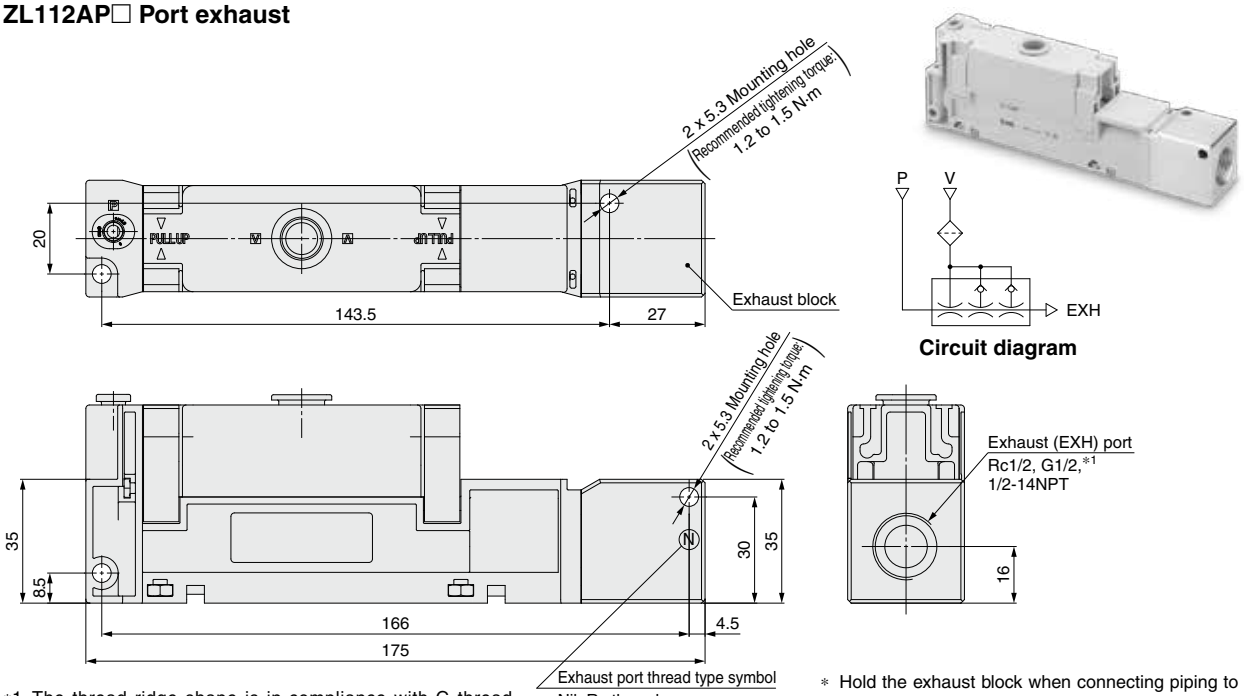


Circuit diagram

∗ Tighten to the recommended torque to mount the body. Tightening with excessive force may damage the product.

Dimensions

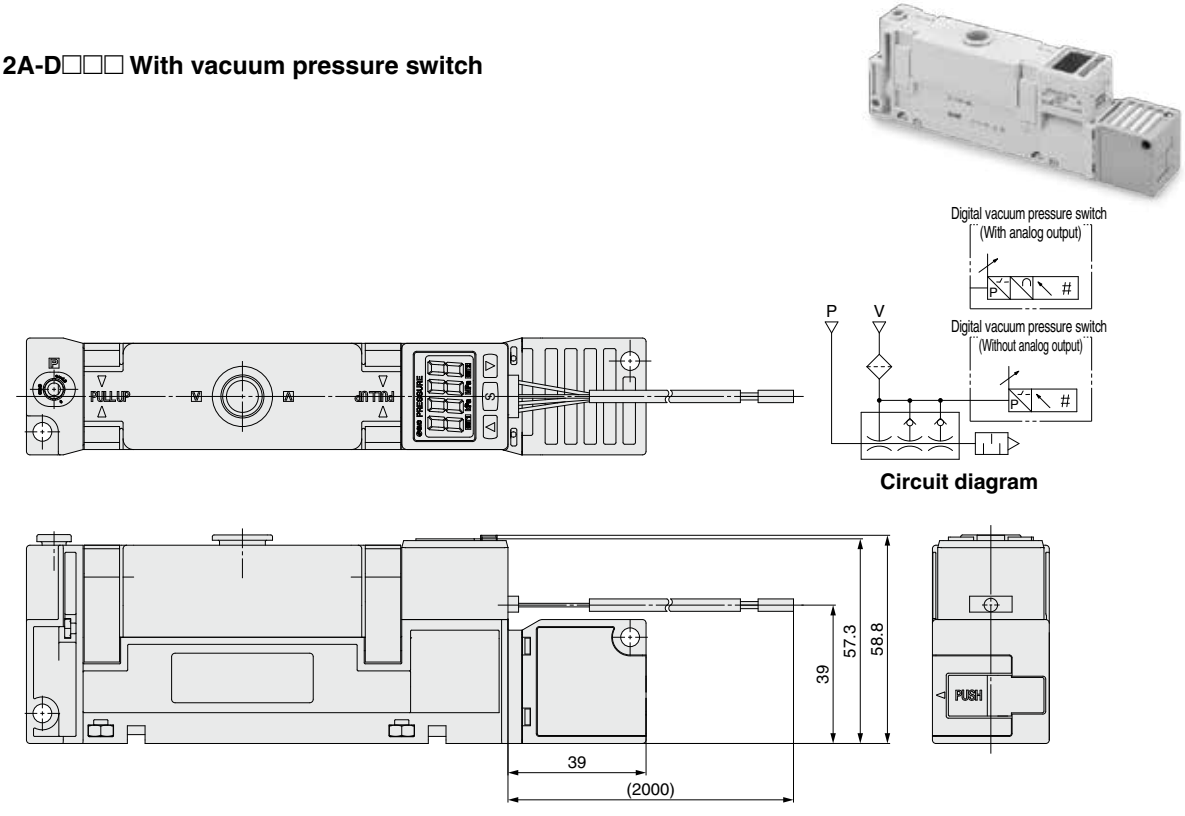
ZL112AP□ Port exhaust



∗1 The thread ridge shape is in compliance with G thread standard ISO 228-1, but the other shapes are not in compliance with ISO 16030 or ISO 1179.
Use a male thread with a length of 9 or less for connection.

∗ Hold the exhaust block when connecting piping to the exhaust port.
(Recommended tightening torque: 20 to 25 N·m)

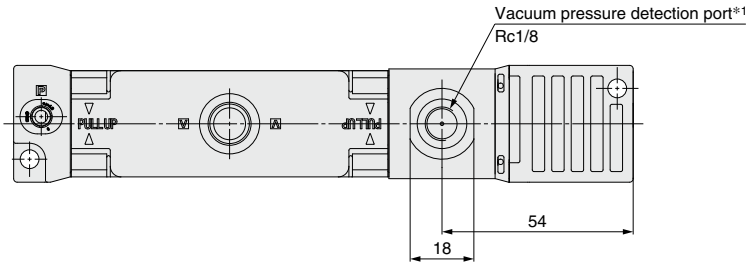
ZL112A-D□□□ With vacuum pressure switch

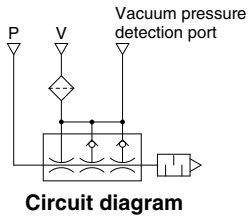


∗ Tighten to the recommended torque to mount the body.
Tightening with excessive force may damage the product.

Dimensions

ZL112A-GN With vacuum pressure detection port

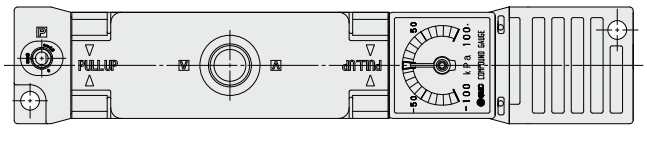


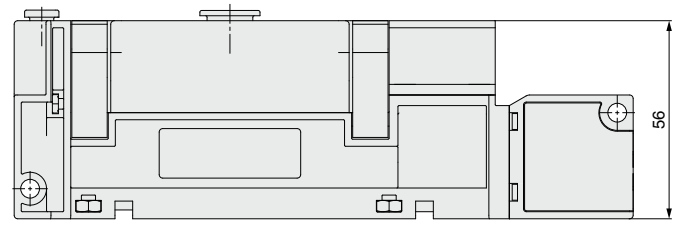


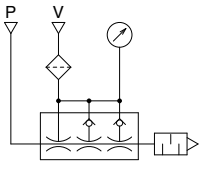
Circuit diagram

*1 Hold across the flats (18) when mounting a fitting to the vacuum pressure detection port. (Recommended tightening torque: 3 to 5 N·m)

ZL112A-G With pressure gauge





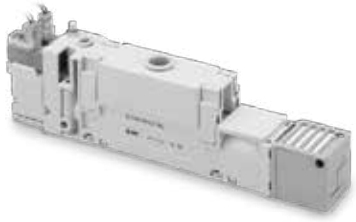


Circuit diagram

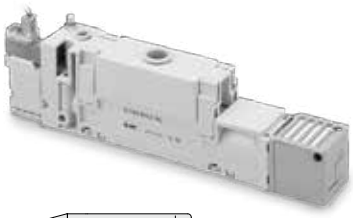
* Tighten to the recommended torque on pages 15 and 16 to mount the body. Tightening with excessive force may damage the product.

Dimensions

ZL112A-$^{K1}_{B1}$□L□□ Valve (With supply valve and release valve)



ZL112A-$^{K2}_{B2}$□L□□ Valve (With supply valve)



*1 [ ] for AC

* Tighten to the recommended torque on pages 10 and 11 to mount the body. Tightening with excessive force may damage the product.

Multistage Ejector

Max. suction flow rate: 300 L/min (ANR) | **Max. suction flow rate: 600 L/min (ANR)**

ZL3/ZL6 Series

Only for the models with a valve or pressure switch

RoHS

How to Order

Without valve	ZL	3	M	06	☐				–	☐	☐	☐	☐	–	☐			
With valve	ZL	3	M	06	☐	–	K1	5	LO	Z	☐	–	E	A	M	G	–	☐
Pressure switch with energy saving function	ZL	3	M	06	☐	–	K1	5	LO	Z	☐	–	V	A	M	☐	–	☐
		❶	❷	❸	❹		❺	❻	❼	❽	❾		❿	⓫	⓬	⓭		⓮
		Ejector					Supply valve/Release valve						Vacuum pressure sensor					ZL3 only

❶ Max. suction flow rate

3	300 L/min (ANR)*1
6	600 L/min (ANR)*1

*1 Branch, Port exhaust

❷ Standard supply pressure

M	0.35 MPa
H	0.50 MPa

❸ Vacuum (2/V) port size/ Supply (1/P) port applicable tubing O.D.

Symbol	Vacuum (2/V) port	Supply (1/P) port
06	Rc3/4	8 (Metric)
04	2 x Rc1/2 (Branch specification)	
F06	G3/4*2	
F04	2 x G1/2*2 (Branch specification)	
N06	NPT3/4	5/16" (Inch)
N04	2 x NPT1/2 (Branch specification)	

*2 The thread ridge shape is in compliance with G thread standard ISO 228-1, but the other shapes are not in compliance with ISO 16030 or ISO 1179.

❹ Exhaust method

Nil	Silencer exhaust
P	Port exhaust (Rc1, G1, NPT1)*3

*3 The same thread type selected for ❸ is used for the port.

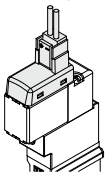
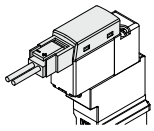
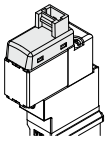
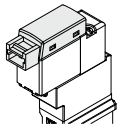
❺ Supply valve/Release valve combination

K1	Supply valve (N.C.), Release valve (N.C.)
K2	Supply valve (N.C.)
B1	Supply valve (N.O.), Release valve (N.C.)
B2	Supply valve (N.O.)

❻ Rated voltage

5	24 VDC

❼ Electrical entry

L plug connector	M plug connector
L: Lead wire length 0.3 m 	**M**: Lead wire length 0.3 m 
LO: Without connector 	**MO**: Without connector 

❽ Light/Surge voltage suppressor

Z	With light/surge voltage suppressor

❾ Manual override

Nil	Non-locking push type
D	Push-turn locking slotted type
E	Push-turn locking lever type

❿ Vacuum pressure sensor

Nil	None
GN	With vacuum pressure detection (G) port (Rc1/8, G1/8, NPT1/8)*4
G	Pressure gauge*5
E	Vacuum pressure switch (Vacuum 2 outputs)
F	Vacuum pressure switch (Compound pressure 2 outputs)
V	Pressure switch for vacuum with energy saving function (Compound pressure 1 output)*6

*4 The same thread type selected for ❸ is used for the port.

*5 Not selectable when "F06" or "F04" is selected for ❸
When "06" or "04" is selected for ❸, the units of the pressure gauge are displayed in kPa. When "N06" or "N04" is selected, the units are displayed in inHg·psi (Under the New Measurement Act, products with these unit specifications are not permitted for use in Japan.).

*6 When "V" is selected, only "K1" can be selected for ❺.

Applicable only when "E," "F," or "V" is selected for ❿ Vacuum pressure sensor

⓫ Output

A	NPN open collector
B	PNP open collector

⓬ Unit

Nil	With unit switching function*7
M	SI unit only (kPa)
P	With unit switching function (Initial value psi)*7, *8

*7 Under the New Measurement Act, switches with the unit switching function are not permitted for use in Japan (implemented October 1999).

*8 When "V" is selected for ❿, "P" cannot be selected.

⓭ Lead wire

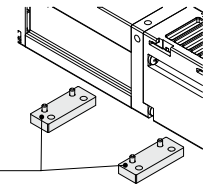
Nil	Without lead wire with connector
G	Lead wire with connector (Length: 2 m) (Included)
W	Lead wire for switch with energy saving function (Length: 2 m) (Included)

Only applicable to ZL3

⓮ Option

Nil	None
B	Adapter assembly for bottom mounting*9 (Included)

*9 This adapter assembly is for adjusting the product to the 27 mm pitch of the bottom mounting thread of the existing ZL212 series model.
This is required when replacing an existing bottom-mounted ZL212 series model. (2 pcs./set, with 4 bolts)
The mounting holes on the top and on the side are interchangeable as standard.

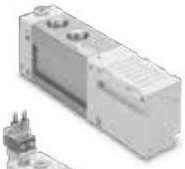


Without valve

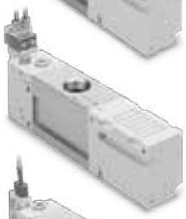
ZL3

ZL6

Branch



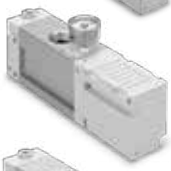
With valve



With pressure switch

Pressure switch for vacuum with energy saving function

With pressure gauge



With vacuum pressure detection port

Port exhaust

∗ **The solenoid valve mounted on this product is the SMC 5-port solenoid valve JSY3000 series.**

For details on solenoid valve functions, refer to the Operation Manual of the JSY3000 series on the SMC website.

5-port solenoid valve JSY3000 series

(ZL3-) JSY3140 − 5 □ Z □

Multistage ejector ZL$^{3}_{6}$ series

ZL$^{3}_{6}$□□□−□ 5 □ Z □−□□□□−□

- **Manual override**
- **Electrical entry**

Refer to page 26.

Ejector Specifications

ZL3

Model		ZL3M□□	ZL3H□□
Nozzle size [mm]		1.9	1.5
Standard supply pressure [MPa]		0.35	0.50
Max. vacuum pressure [kPa]∗1		−91	−93
Max. suction flow rate [L/min (ANR)]		280	
	Branch/Port exhaust	300	
Air consumption [L/min (ANR)]		150	135
Supply pressure range [MPa]		0.2 to 0.6	
Operating temperature range [°C]		−5 to 50 (No freezing or condensation)	
Fluid		Air	
Vibration resistance [m/s²]∗2		20	
Impact resistance [m/s²]∗3		100	

∗1 Values are at the standard supply pressure and based on SMC's measurement standards. They depend on atmospheric pressure (weather, altitude, etc.) and the measurement method.
∗2 10 to 500 Hz for 2 hours in each direction of X, Y, and Z (De-energized, Initial value)
∗3 3 times in each direction of X, Y, and Z (De-energized, Initial value)

ZL6

Model		ZL6M□□	ZL6H□□
Nozzle size [mm]		1.9 x 2	1.5 x 2
Standard supply pressure [MPa]	**Without valve**	0.35	0.50
	With valve	0.37	0.52
Max. vacuum pressure [kPa]∗1		−91	−93
Max. suction flow rate [L/min(ANR)]		580	
	Branch/Port exhaust	600	
Air consumption [L/min(ANR)]		300	270
Supply pressure range [MPa]		0.2 to 0.6	
Operating temperature range [°C]		−5 to 50 (No freezing or condensation)	
Fluid		Air	
Vibration resistance [m/s²]∗2		20	
Impact resistance [m/s²]∗3		100	

∗1 Values are at the standard supply pressure and based on SMC's measurement standards. They depend on atmospheric pressure (weather, altitude, etc.) and the measurement method.
∗2 10 to 500 Hz for 2 hours in each direction of X, Y, and Z (De-energized, Initial value)
∗3 3 times in each direction of X, Y, and Z (De-energized, Initial value)

Supply Valve/Release Valve Specifications

Model	ZL3-JSY3140
Response time (at 0.5 MPa)	27 ms or less∗1
Max. operating frequency	5 Hz
Manual override	Non-locking push type, Push-turn locking slotted type, Push-turn locking lever type
Rated coil voltage	24 VDC
Allowable voltage range	Rated voltage ±10%
Power consumption	0.4 W

∗1 Based on JIS B 8419: 2010 dynamic performance test (Coil temperature 20°C, at rated voltage)
∗2 Refer to the **Web Catalog** for details on the JSY3000 series.

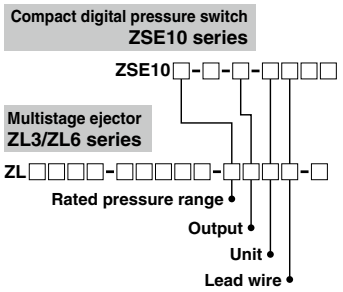
Pressure Gauge Specifications

Model	GZ33-K1K-01-X56	GZ33-P1C-N01-X55
Pressure unit	kPa	inHg/psi dual scale
Pressure range	−100 to 100 kPa	−30 inHg to 14 psi
Connection thread	R1/8	NPT1/8
Accuracy	Vacuum ±3% F.S., Positive pressure ±5% F.S.	
Weight	30 g	

∗ The vacuum pressure switch mounted on this product is equivalent to our SMC product, the ZSE10 series compact digital pressure switch.

For details on compact digital pressure switch functions, refer to the Operation Manual of the ZSE10 series on the SMC website.

● Pressure switch correspondence table



∗ Except pressure switch with energy saving function

Refer to page 26.

Vacuum Pressure Switch Specifications

Model		ZSE10		
		Vacuum pressure switch	Compound pressure switch	Pressure switch for vacuum with energy saving function
Rated pressure range		0 to −101 kPa	−100 to 100 kPa	
Set pressure range/Display pressure range		10 to −101 kPa	−105 to 105 kPa	
Withstand pressure		500 kPa		
Smallest settable increment		0.1 kPa		
Applicable fluid		Air, Non-corrosive gas, Non-flammable gas		
Power supply voltage		12 to 24 VDC ±10%, Ripple (p-p) 10% or less (with power supply polarity protection)		
Current consumption		40 mA or less		
Switch output		NPN or PNP open collector 2 outputs (selectable)		NPN or PNP open collector OUT1: General purpose OUT2: Valve control
	Max. load current	80mA		
	Max. applied voltage	28 V (at NPN output)		26.4 V (at NPN output)
	Residual voltage	2 V or less (with load current of 80 mA)		
	Response time	2.5 ms or less (with anti-chattering function: 20, 100, 500, 1000, 2000 ms)		
	Short-circuit protection	Yes		
Repeatability		±0.2% F.S. ±1 digit		
Hysteresis	Hysteresis mode	Variable (0 or above)∗1		
	Window comparator mode	Variable (0 or above)∗1		—
Display		3 1/2 digit, 7-segment LED, 1-color display (Red)		
Display accuracy		±2% F.S. ±1 digit (Ambient temperature of 25 ±3°C)		
Indicator light		Lights up when switch output is turned ON. OUT1: Green, OUT2: Red		
Environmental resistance	Enclosure	IP40		
	Operating temperature range	Operating: −5 to 50°C Stored: −10 to 60°C (No freezing or condensation)		
	Operating humidity range	Operating/Stored: 35 to 85% RH (No condensation)		
	Withstand voltage	1000 VAC for 1 minute between terminals and housing		
	Insulation resistance	50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing		
Temperature characteristics		±2% F.S. ±1 digit (at 25°C in an ambient temperature of −5 and 50°C)		
Lead wire		Oilproof heavy-duty vinyl cable 5 cores Conductor area: 0.15 mm² (AWG26) Insulator O.D.: 1.0 mm		
Standards		CE, RoHS compliant		

∗1 If the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the fluctuating width. Otherwise, chattering will occur.

Weight

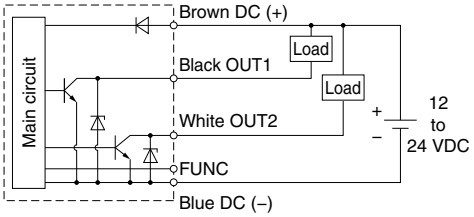
[g]

Model	ZL3	ZL6
Basic type	390	470
Port exhaust	+80	+25
Vacuum pressure switch (Excluding lead wire)	+20	+20
Vacuum pressure switch (Including lead wire)	+60	+60
With supply valve and release valve	+120	+120
With supply valve and without release valve	+80	+80
With pressure gauge	+30	+30
With adapter assembly for bottom mounting	+60	—

Internal Circuits and Wiring Examples

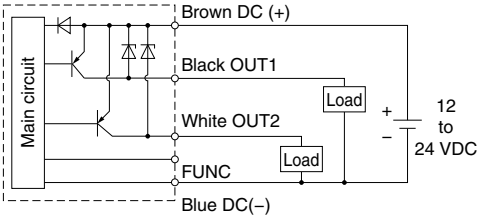
■ Vacuum pressure switch

NPN (2 outputs)



Max. 28 V, 80 mA
Residual voltage 2 V or less

PNP (2 outputs)

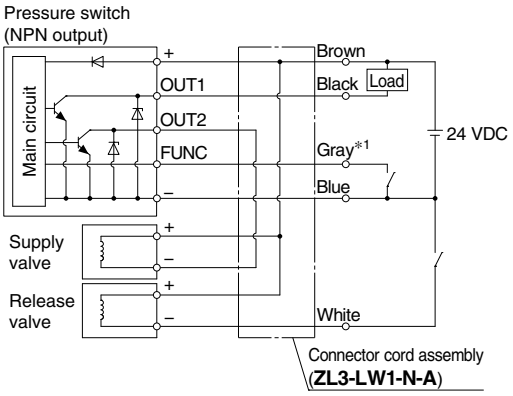


Max. 80 mA
Residual voltage 2 V or less

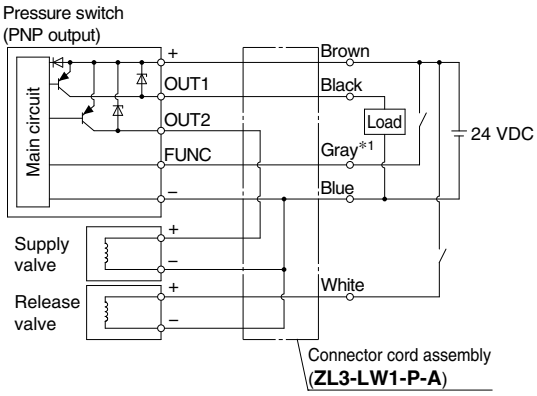
∗ The FUNC terminal is connected when using the copy function. (Refer to the Operation Manual.)

■ Pressure switch for vacuum with energy saving function

NPN (1 output)



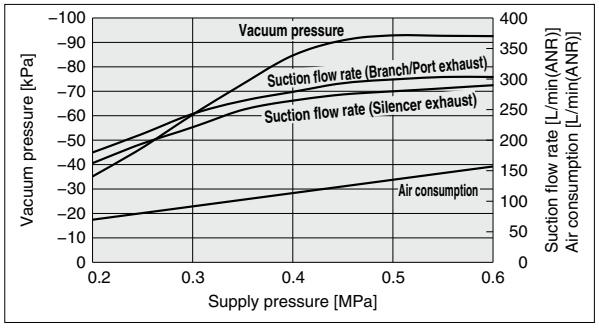
PNP (1 output)



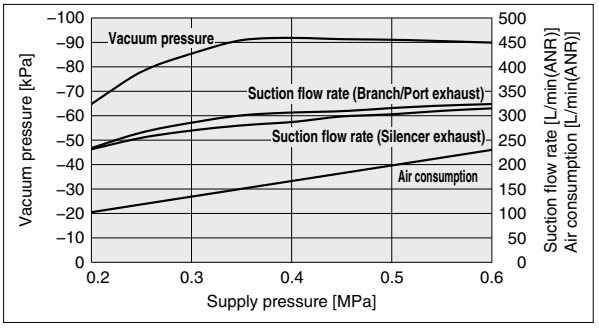
∗1 The gray wire (FUNC) is connected when operating the supply valve by energy saving control (for workpiece adsorption). (Refer to the Operation Manual.)

Exhaust Characteristics (Representative value)

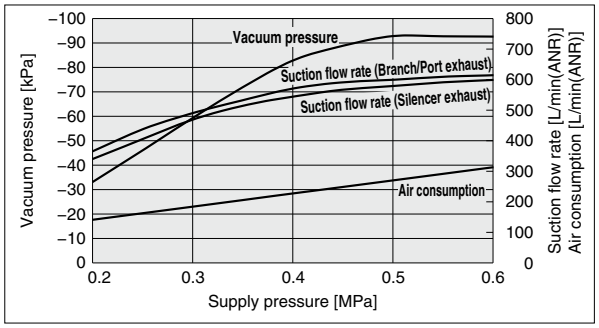
ZL3H



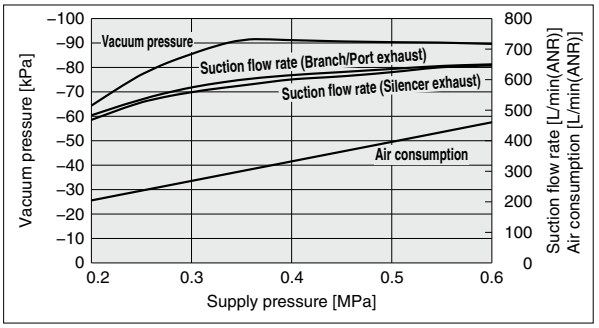
ZL3M



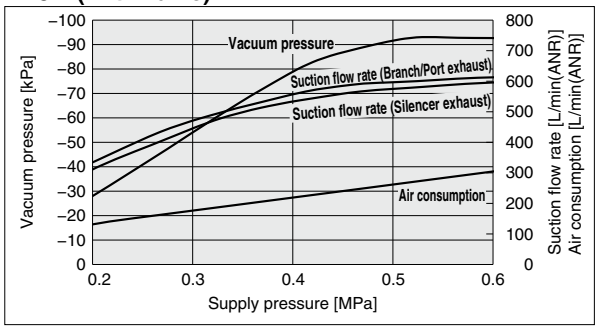
ZL6H



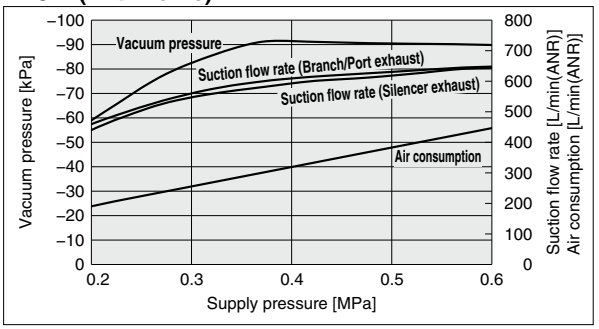
ZL6M



ZL6H (With valve)



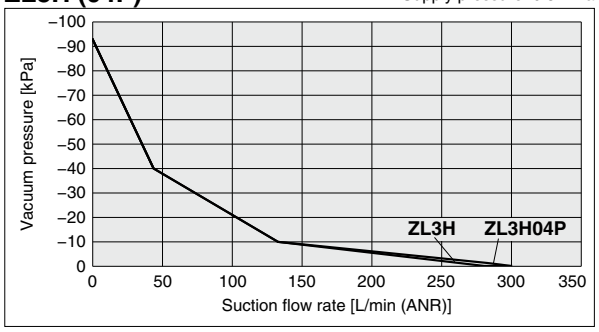
ZL6M (With valve)



Flow Rate Characteristics (Representative value)

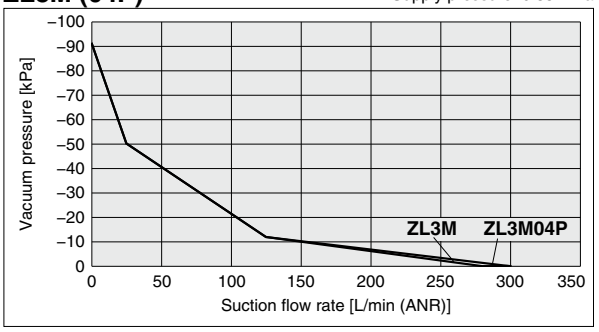
ZL3H (04P)

Supply pressure: 0.5 MPa



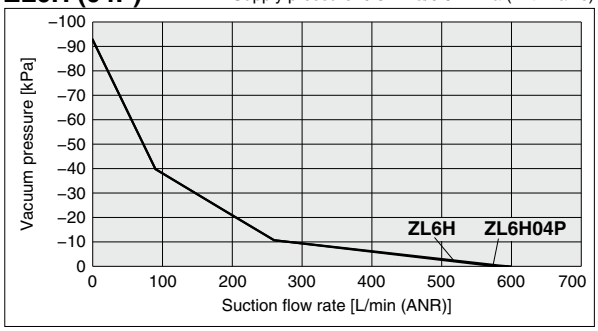
ZL3M (04P)

Supply pressure: 0.35 MPa

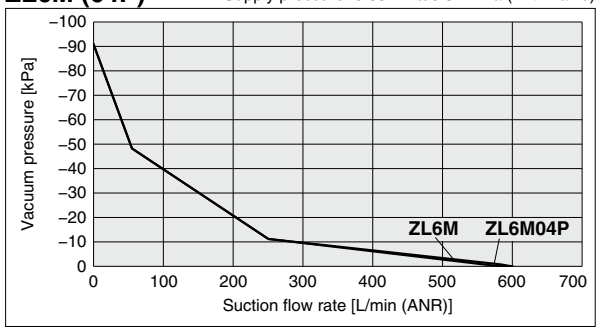


Flow Rate Characteristics (Representative value)

ZL6H (04P) Supply pressure: 0.5 MPa/0.52 MPa (With valve)

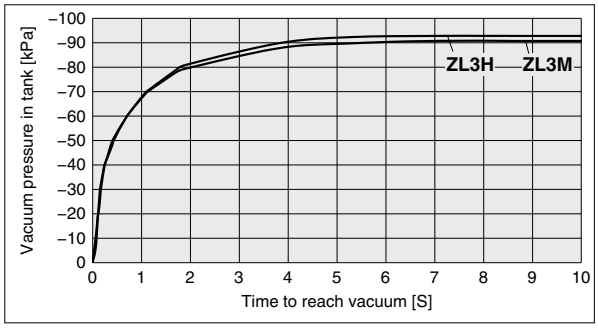


ZL6M (04P) Supply pressure: 0.35 MPa/0.37 MPa (With valve)

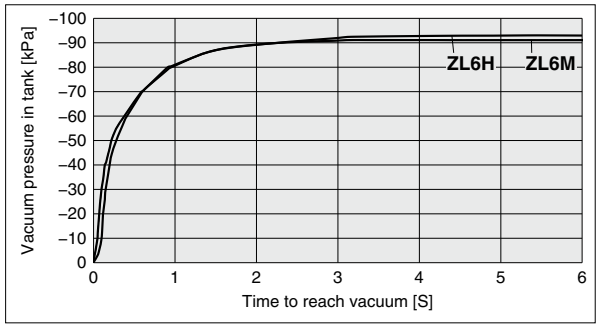


Time to Reach Vacuum (Representative value)

ZL3□ (Tank capacity: 1 L)

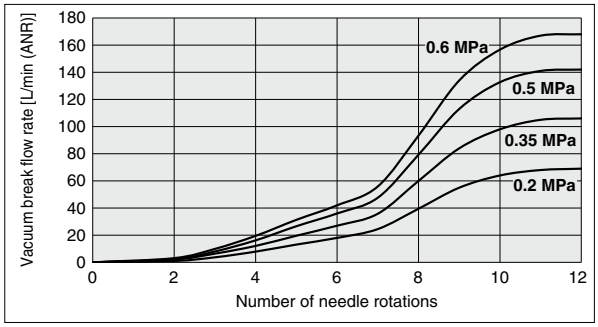


ZL6□ (Tank capacity: 1 L)



Break Flow Rate Characteristics (Representative value)

Break flow rate supplied to vacuum area at different needle openings and at each supply pressure

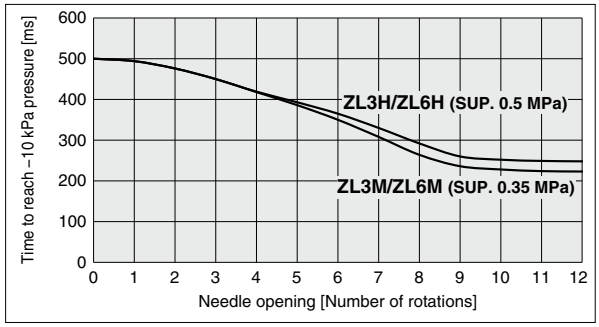


∗ The flow rate is not the flow rate output from the vacuum port. The break flow rate is also output on the exhaust side of the product, and the output flow rate from the vacuum port fluctuates depending on the piping conditions of the vacuum port.

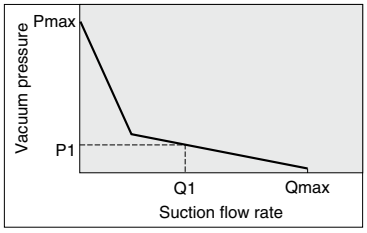
Vacuum Breaking Time (Representative value)

Max. vacuum pressure → Time to reach -10 kPa

(Tank capacity: 1 L)



How to Read the Flow Rate Characteristics



The flow rate characteristics indicate the relationship between the vacuum pressure and the suction flow rate of the ejector. They also show that when the suction flow rate changes, the vacuum pressure also changes. In general, this indicates the relationship at the ejector's standard operating pressure.

In the graph, Pmax indicates the max. vacuum pressure, and Qmax indicates the max. suction flow rate. These are the values that are published as specifications in catalogs, etc. Changes in vacuum pressure are explained below.

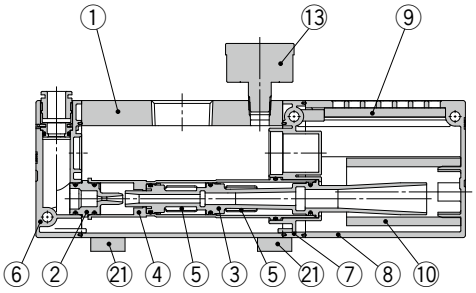
1. If the ejector's suction port is closed and sealed tight, the suction flow rate becomes "0," and the vacuum pressure increases to the max. (Pmax).
2. If the suction port is opened and air is allowed to flow (the air leaks), the suction flow rate increases, and the vacuum pressure decreases. (The condition of P1 and Q1)
3. If the suction port is opened completely, the suction flow rate increases to the max. (Qmax), while the vacuum pressure then drops almost to "0" (atmospheric pressure). When adsorbing workpieces which are permeable, subject to leakage, etc., caution is required as the vacuum pressure will not be very high.

How to Read the Time to Reach Vacuum

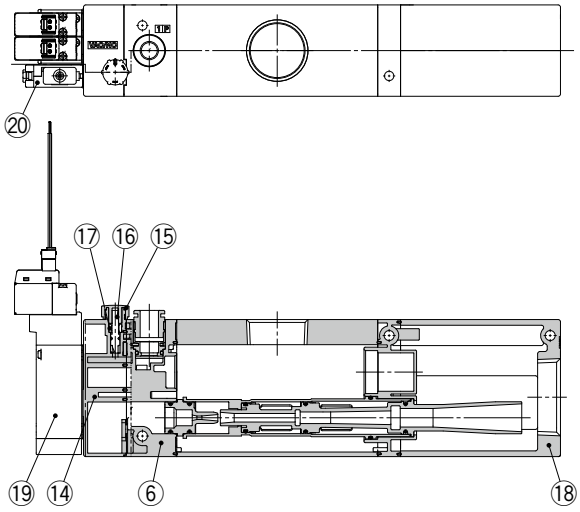
The graphs indicate the time required to reach a vacuum pressure determined by adsorption conditions for workpieces, etc., starting from atmospheric pressure in a 1 L sealed tank. For the ZL3H, approximately 4.0 seconds are necessary to attain a vacuum pressure of –90 kPa.

Construction

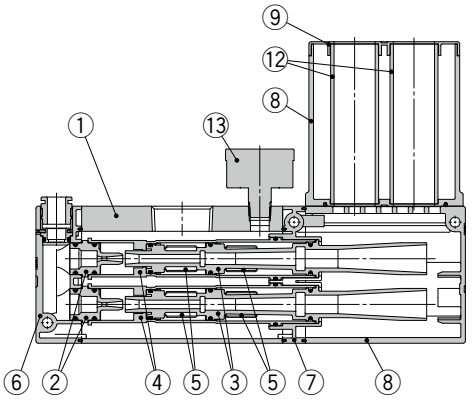
ZL3
Without valve or pressure switch, Silencer exhaust



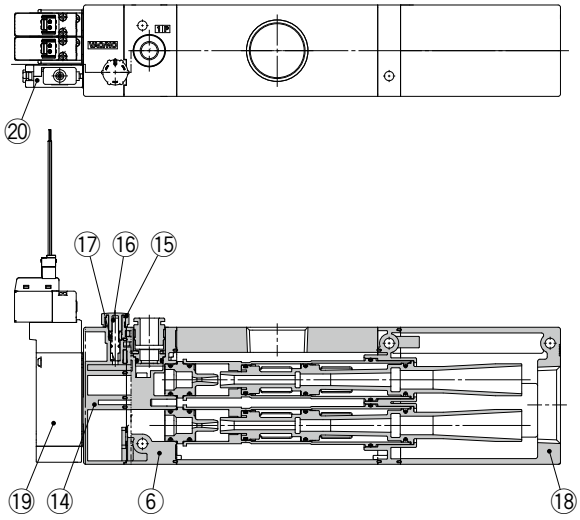
ZL3
With valve and pressure switch, Port exhaust



ZL6
Without valve or pressure switch, Silencer exhaust



ZL6
With valve and pressure switch, Port exhaust



Component Parts

No.	Description	Material	Note
1	**Body**	Aluminum alloy (Anodized)	—
2	**Nozzle**	POM	Refer to 2 on page 26 for replacement parts.
3	**Diffuser**	PBT	
4	**Attachment**	POM	
5	**Check valve**	FKM	
6	**Front adapter**	PBT	—
7	**End adapter**	PBT	—
8	**Silencer case**	PBT	Refer to 3 (ZL3) or 5 (ZL6) on page 26 for replacement parts.
9	**Silencer cap**	POM	
10	**Sound absorbing material 1**	Resin	Refer to 4 on page 26 for replacement parts.
11	**Sound absorbing material 2**	Non-woven fabric	
12	**Sound absorbing material**	Non-woven fabric	— (Disassembly is not possible. The silencer assembly must be replaced.)

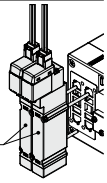
No.	Description	Material	Note
13	**Pressure gauge**	—	Refer to 7 on page 26 for replacement parts.
14	**Valve plate**	PBT	—
15	**Knob**	POM	—
16	**Needle**	PBT	—
17	**Needle guide**	Brass (Electroless nickel plating)	—
18	**Port block**	Aluminum alloy (Chromated, Painted)	Refer to 6 on page 26 for replacement parts.
19	**Supply valve, Release valve**	—	Refer to 1 on page 26 for replacement parts.
20	**Vacuum pressure switch**	—	—
21	**Adapter assembly for bottom mounting**	Brass (Electroless nickel plating)	Refer to 8 on page 26 for replacement parts.
—	**Seal material (O-ring, etc.)**	HNBR/NBR	—
—	**Screws for assembly**	Steel (Trivalent chromated)	—

How to Order Replacement Parts

1 How to Order Supply Valve/Release Valve (For ZL3/ZL6)

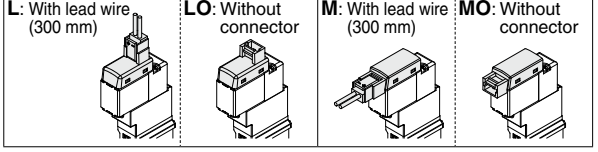
ZL3 – JSY3140 – 5 L Z ☐ – ☐

Rated voltage 24 VDC ❶
With light/surge voltage suppressor ❷
❸



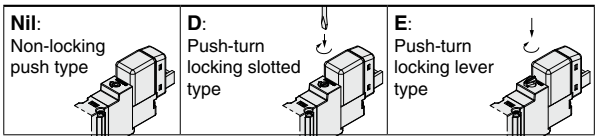
❶ Electrical entry

L plug connector		M plug connector	
L	**LO**	**M**	**MO**
L: With lead wire (300 mm)	**LO**: Without connector	**M**: With lead wire (300 mm)	**MO**: Without connector



❷ Manual override

Nil: Non-locking push type	**D**: Push-turn locking slotted type	**E**: Push-turn locking lever type



❸ Supply valve/Release valve

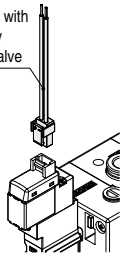
Nil	Supply valve
X12	Release valve

How to Order Lead Wire with Connector Assembly for Supply Valve/Release Valve (For ZL3/ZL6)

SY100 – 30 – 4 A – 6

❶
❷

Lead wire assembly with connector for supply valve and release valve



❶ Power supply voltage

1	100 VAC
2	200 VAC
3	Other VAC
4	DC

❷ Lead wire length

6	600 mm
10	1000 mm
15	1500 mm
20	2000 mm
25	2500 mm
30	3000 mm
50	5000 mm

How to Order Connector and Socket for Supply Valve/Release Valve (For ZL3/ZL6)

SY100 – 30 – A

∗ With connector and 2 sockets only

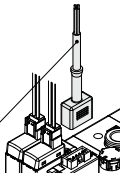
How to Order Lead Wire with Connector for Vacuum Pressure Switch (For ZL3/ZL6)

(When an individual lead wire is necessary, order with the part number below.)

● **Lead wire with connector for vacuum pressure switch**

ZS – 39 – 5G

Lead wire with connector for vacuum pressure switch

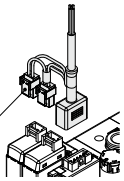


● **Lead wire with connector for switch with energy saving function**

ZL3 – LW1 – N – A

❶

Lead wire with connector for switch with energy saving function



❶ Output

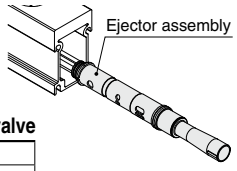
N	NPN open collector
P	PNP open collector

⚠ Note that the vacuum pressure switch cannot be replaced.

2 How to Order Ejector Assembly (For ZL3/ZL6)

ZL3 – EJ1 – H ☐ – A

❶
❷



❶ Standard supply pressure

M	0.35 MPa
H	0.50 MPa

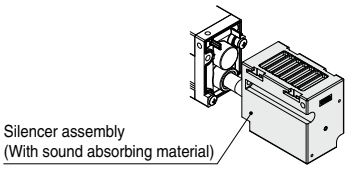
❷ 1-stage check valve

Nil	None
V	Yes

A 1-stage check valve is required for specifications with pressure switches with an energy saving function.

3 How to Order Silencer Assembly (With sound absorbing material) (For ZL3)

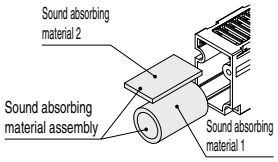
ZL3 – SC1 – A



4 How to Order Sound Absorbing Material Assembly (For ZL3)

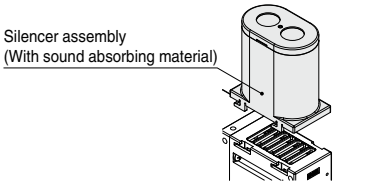
ZL3 – SE1 – A

∗ Sound absorbing material 1 and 2, 1 pc. each/set



5 How to Order Silencer Assembly (With sound absorbing material) (For ZL6)

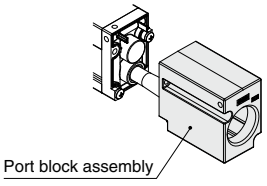
ZL6 – SC1 – A



6 How to Order Port Block Assembly (For ZL3/ZL6)

ZL3 – EP1 – 1 ☐ – A

❶



❶ Thread type

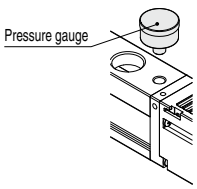
Nil	Rc thread
F	G thread
N	NPT thread

7 How to Order Pressure Gauge (For ZL3/ZL6)

GZ33 – K1K – 01 – X56
(Displayed in kPa)

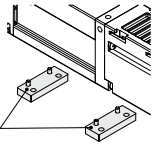
GZ33 – P1C – N01 – X55
(Displayed in inHg·psi)∗1

∗1 Under the New Measurement Act, products with inHg·psi unit specifications are not permitted for use in Japan.



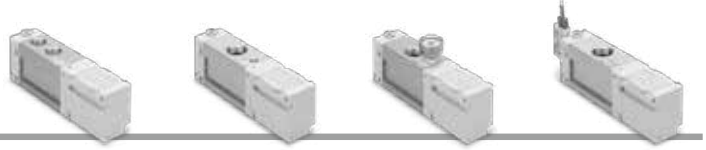
8 How to Order Adapter Assembly for Bottom Mounting (For ZL3)

ZL3 – AD3 – A



∗ 2 pcs./set, with 4 bolts

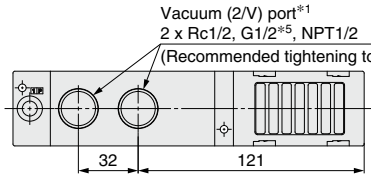
Branch | With vacuum pressure detection port | With pressure gauge | With pressure switch



Dimensions

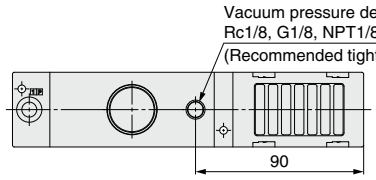
ZL3□□□-□□□□-□ (Without supply valve or release valve)

Branch



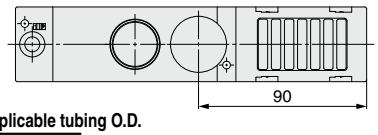
With vacuum pressure detection port

∗ Refer to the vacuum port figure above for the branch specification.



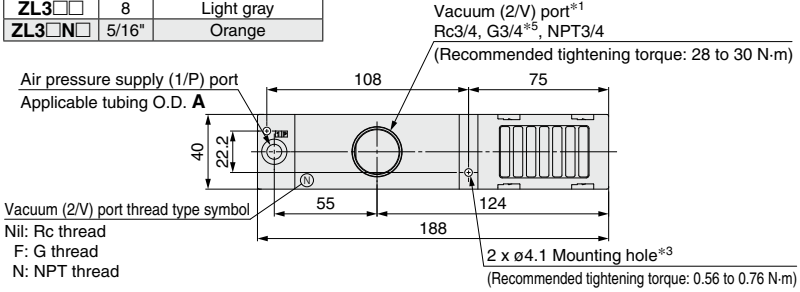
With pressure gauge

∗ Refer to the vacuum port figure above for the branch specification.

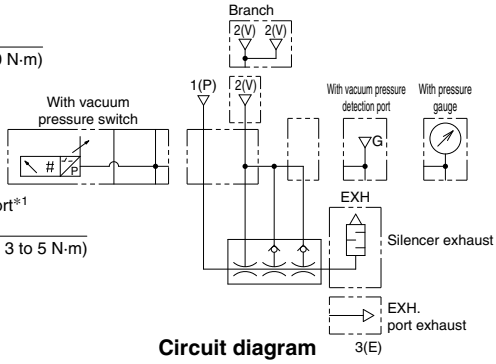


Air pressure supply (1/P) port applicable tubing O.D.

	A	Release button color
ZL3□□	8	Light gray
ZL3□N□	5/16"	Orange

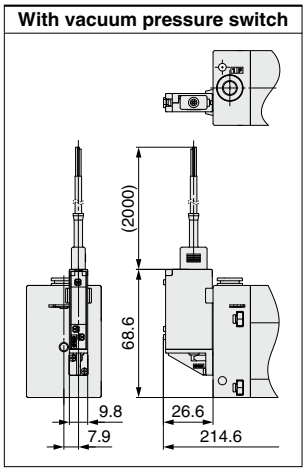


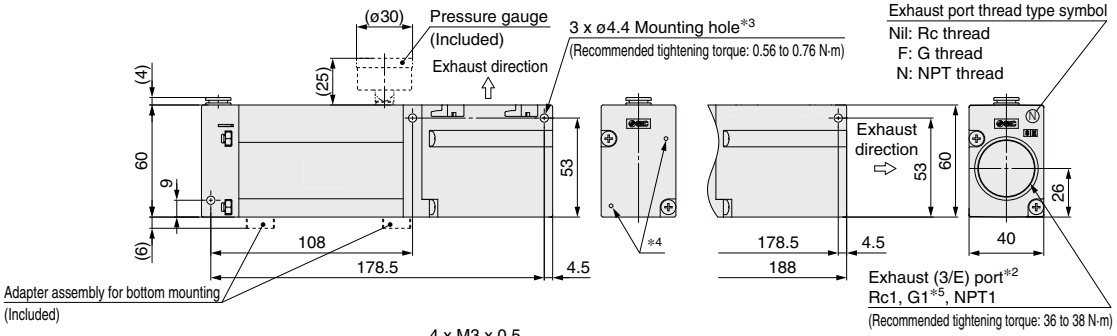
ZL3 Without valve



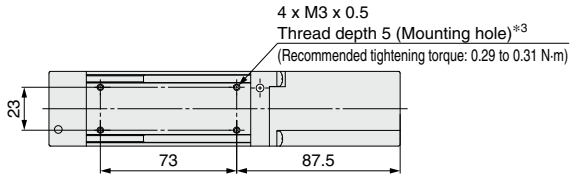
Circuit diagram

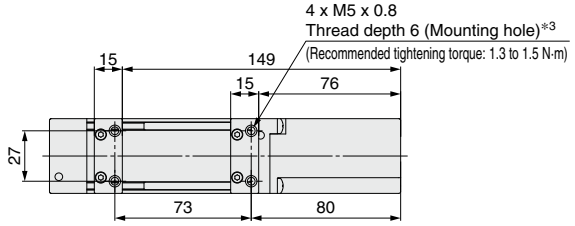
With vacuum pressure switch





Port exhaust





∗1 To connect piping to the vacuum port and vacuum pressure detection port, hold the aluminum alloy body, then connect the piping.

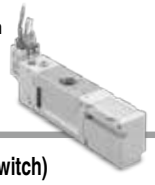
∗2 Hold the exhaust block when connecting piping to the exhaust port.
It is recommended that piping with an inner diameter of 21.7 or more be used.

∗3 Tighten to the recommended torque to mount the body. Tightening with excessive force may damage the product.

∗4 These holes are required for the forming of the product. They are not exhaust ports.

∗5 The thread ridge shape is in compliance with G thread standard ISO 228-1, but the other shapes are not in compliance with ISO 16030 or ISO 1179.
Use a male thread with a length of 10.5 or less for the vacuum port and 11.5 or less for the exhaust port for connection.

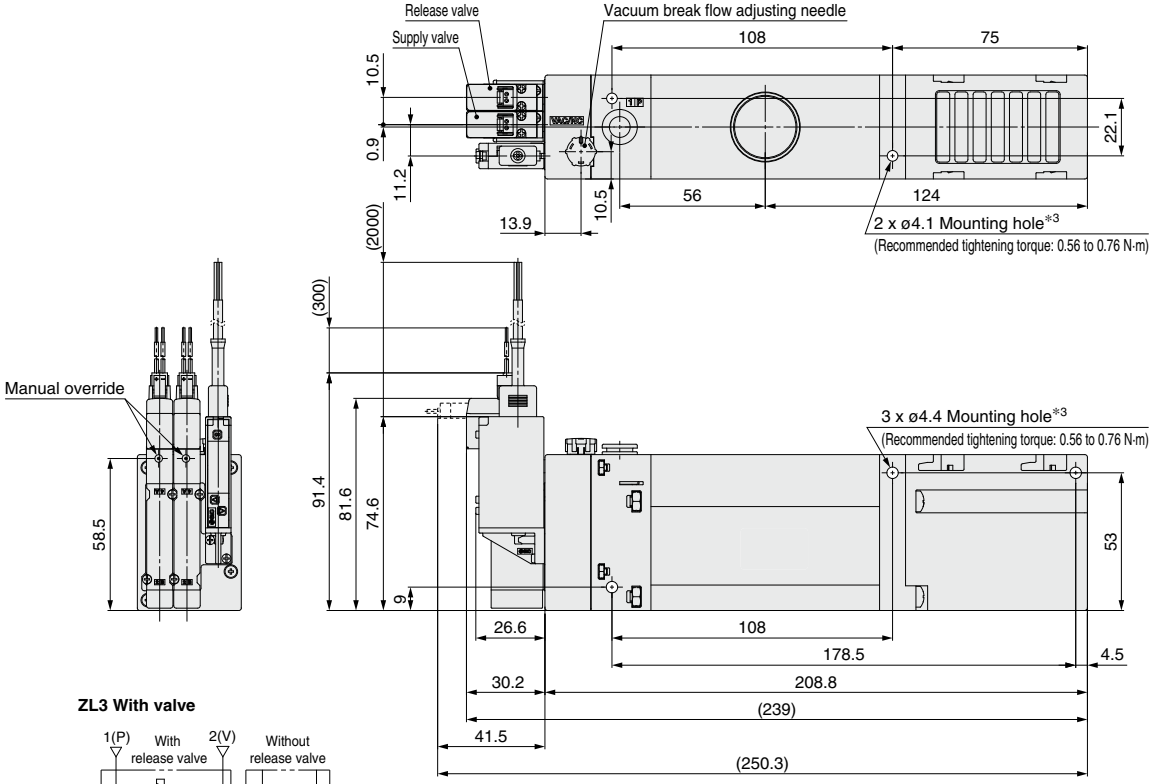
Pressure switch for vacuum with energy saving function



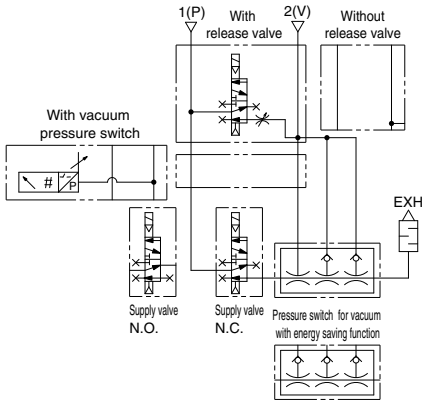
With supply valve and release valve

Dimensions

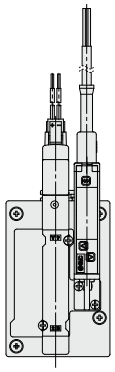
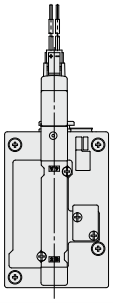
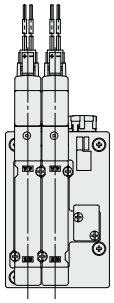
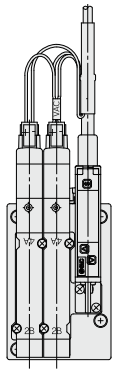
ZL3□□□-$^{K1}_{B1}$ 5□Z□-$^{E}_{F}$ □□□ (With supply valve, release valve and vacuum pressure switch)

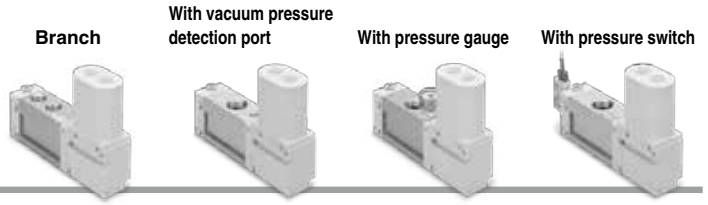


ZL3 With valve



Circuit diagram

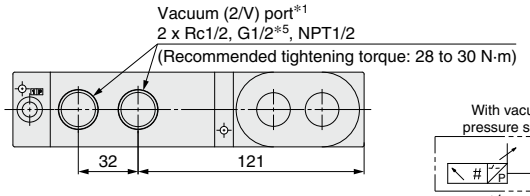
ZL3□□□-$^{K2}_{B2}$ 5□Z□-$^{E}_{F}$ □□□	**ZL3□□□-$^{K2}_{B2}$ 5□Z□**	**ZL3□□□-$^{K1}_{B1}$ 5□Z□**	**ZL3□□□-K15L0Z-V□□W**
With supply valve and vacuum pressure switch	**With supply valve**	**With supply valve and release valve**	**With pressure switch for vacuum with energy saving function**
			



Dimensions

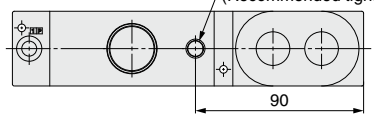
ZL6□□□-□□□□ (Without supply valve or release valve)

Branch



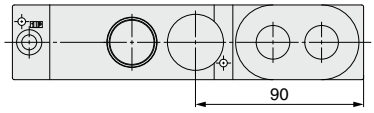
With vacuum pressure detection port

∗ Refer to the vacuum port figure above for the branch specification.



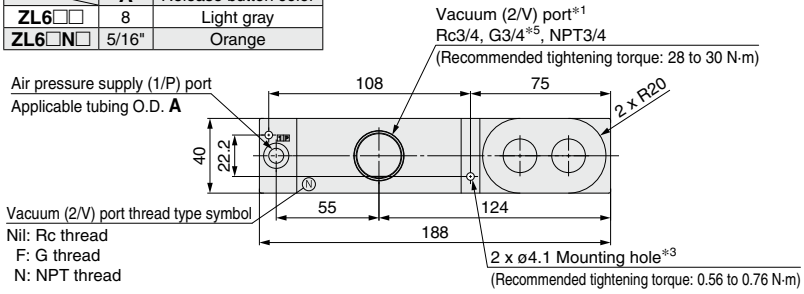
With pressure gauge

∗ Refer to the vacuum port figure above for the branch specification.

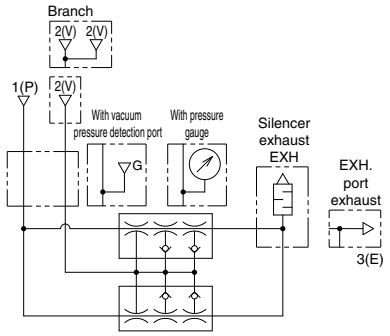


Air pressure supply (1/P) port applicable tubing O.D.

	A	Release button color
ZL6□□	8	Light gray
ZL6□N□	5/16"	Orange

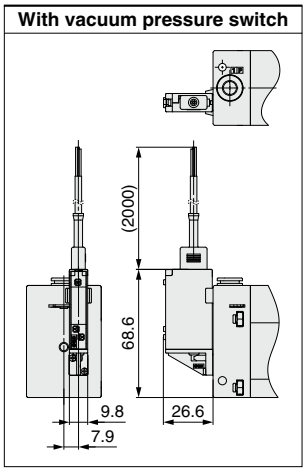


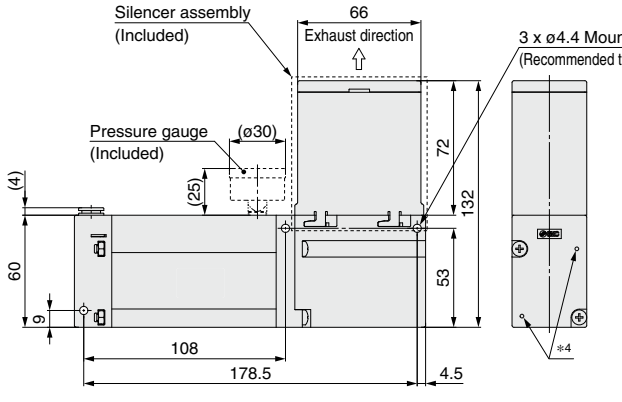
ZL6 Without valve



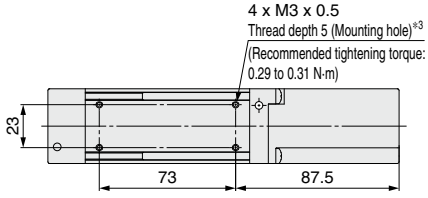
Circuit diagram

With vacuum pressure switch



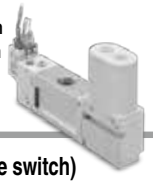


Port exhaust



∗1 To connect piping to the vacuum port and vacuum pressure detection port, hold the aluminum alloy body, then connect the piping.
∗2 Hold the exhaust block when connecting piping to the exhaust port. It is recommended that piping with an inner diameter of 21.7 or more be used.
∗3 Tighten to the recommended torque to mount the body. Tightening with excessive force may damage the product.
∗4 These holes are required for the forming of the product. They are not exhaust ports.
∗5 The thread ridge shape is in compliance with G thread standard ISO 228-1, but the other shapes are not in compliance with ISO 16030 or ISO 1179. Use a male thread with a length of 10.5 or less for the vacuum port and 11.5 or less for the exhaust port for connection.

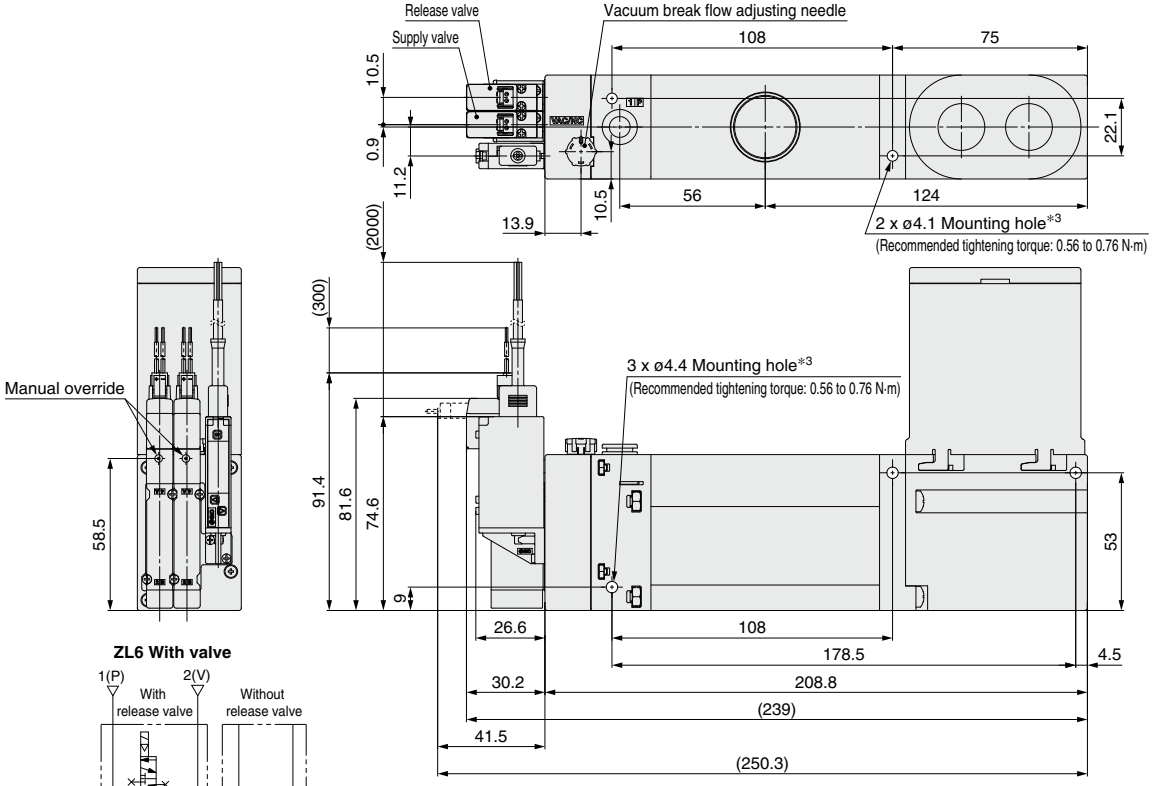
Pressure switch for vacuum with energy saving function

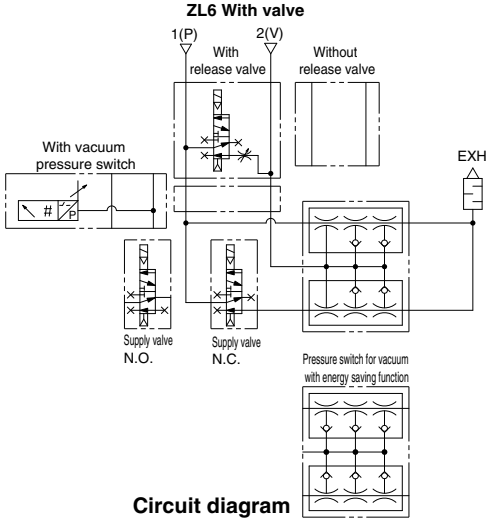


With supply valve and release valve

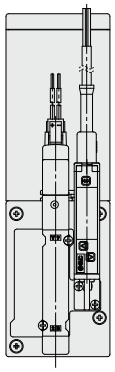
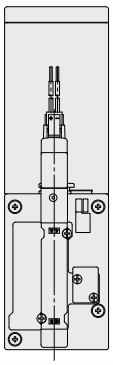
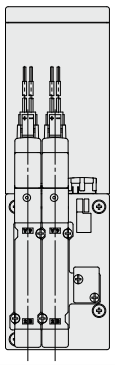
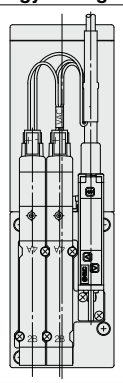
Dimensions

ZL6□□□-$^{K1}_{B1}$ 5□Z□-$^{E}_{F}$ □□□ (With supply valve, release valve and vacuum pressure switch)





Circuit diagram

ZL6□□□-$^{K2}_{B2}$ 5□Z□-$^{E}_{F}$ □□□	**ZL6□□□-$^{K2}_{B2}$ 5□Z□**	**ZL6□□□-$^{K1}_{B1}$ 5□Z□**	**ZL6□□□-K15L0Z-V□□W**
With supply valve and vacuum pressure switch	**With supply valve**	**With supply valve and release valve**	**With pressure switch for vacuum with energy saving function**
			

ZL1/ZL3/ZL6 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.

■ Handling of Products

Handling / Mounting

⚠ Caution

1. Do not drop, hit, or apply excessive impact to the product when handling it.
Even if the body looks undamaged, the internal components may be damaged, leading to a malfunction.

2. Use the product within the specified supply pressure range.
Operation at a pressure which exceeds the specified supply pressure range can cause damage to the product.

3. Load to the ejector body
The ejector body is made of resin; therefore, do not apply load to the port after mounting. Prevent any kind of operation which generates moment as this may cause reduced performance or damage to the body.

4. The exhaust resistance should be as small as possible to obtain max. ejector performance.
There should be no shield around the exhaust port for the silencer exhaust specification.
Note that exhaust resistance may occur depending on the piping diameter and length for the port exhaust specification.
DO NOT block the exhaust port. Doing so will cause the product to crack or break.

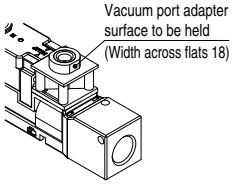
5. If the sound absorbing material is clogged, it will cause reduced ejector performance.
In particular, if the product is used in a dusty environment, not only the filter element but also the sound absorbing material will become clogged. It is recommended that the sound absorbing material be replaced periodically.

■ Piping

Piping to the Vacuum Port Adapter (ZL1)

⚠ Caution

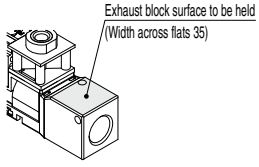
1. When mounting or removing the fitting, etc., to or from the vacuum port adapter, hold the vacuum port adapter.
Recommended tightening torque:
3 to 5 N·m
The product may break if it is held directly during mounting or removal.



Piping to the Exhaust Port (ZL1)

⚠ Caution

1. When mounting or removing the piping to or from the exhaust port, hold the exhaust block.
Recommended tightening torque:
20 to 25 N·m
The product may break if it is held directly during mounting or removal.



■ Piping

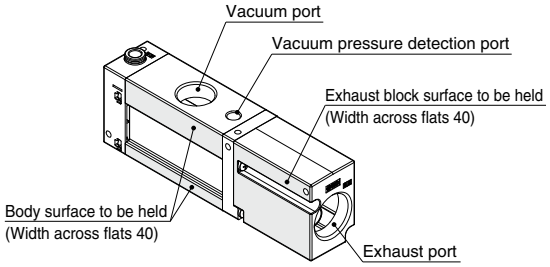
Piping of Each Port (ZL3/ZL6)

⚠ Caution

1. When mounting or removing the fitting to or from the vacuum port or vacuum pressure detection port, hold the aluminum alloy body.

2. When mounting or removing the piping to or from the exhaust port, hold the exhaust block.

Thread size	Recommended tightening torque [N·m]
1/8	3 to 5
1/2	28 to 30
3/4	28 to 30
1	36 to 38



Branch Port

⚠ Warning

1. When using the branch port specification to adsorb and transfer multiple workpieces using branch piping, if one workpiece detaches, the vacuum pressure will decrease and the other workpieces will also detach. When connecting branch piping, please take measures to prevent the dropping of workpieces.

Other Tubing Brands

⚠ Caution

1. When using tubing from a manufacturer other than SMC, be careful of the tolerance of the tubing O.D.
1) Nylon tubing: Within ±0.1 mm
2) Soft nylon tubing: Within ±0.1 mm
3) Polyurethane tubing: Within +0.15 mm, within –0.2 mm
Do not use tubing which does not satisfy the specified tubing O.D. accuracy. It may cause difficulty when connecting the tubing, air leakage after connection, or the disconnection of the tubing.

ZL1/ZL3/ZL6 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.

■ Suction Cover

Replacement Procedure for Filter Element (ZL1)

⚠ Caution

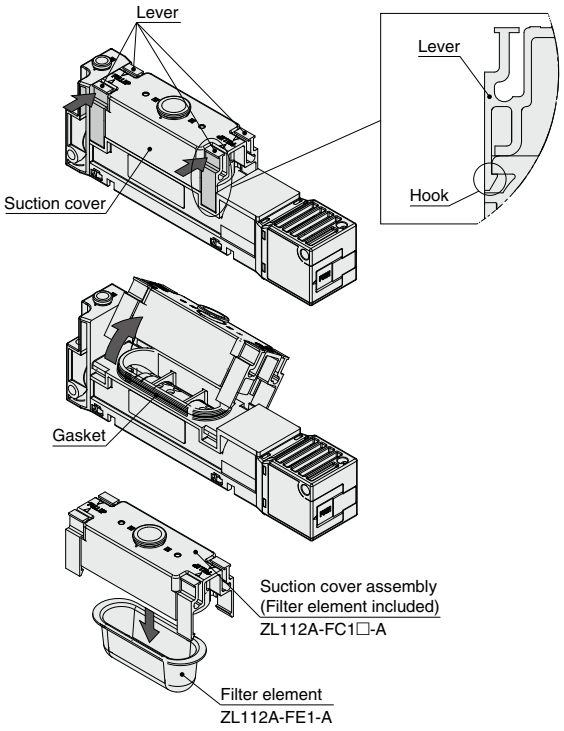
1. The suction cover can easily be attached or detached.

The suction cover can be removed by pushing the suction cover levers (2 pcs.) on the side. (It can be removed from the opposite side as well.)

Replace the filter element assembled in the filter case.

Check that the gasket is sitting correctly in the groove before mounting the suction cover.

Check that the lever hook is locked in the correct position when mounting the suction cover. If the hook or the lever is damaged or deformed, replace the suction cover assembly.



■ Solenoid Valve / Pressure Switch

Wiring and Connection of Solenoid Valves and Vacuum Pressure Switches

⚠ Caution

1. Incorrect wiring can damage the vacuum pressure switch and cause failure or malfunction. Connections should only be made when the power supply is turned OFF.

2. Do not attempt to insert or pull out the connector while the power is ON. Doing so may cause malfunction.

■ Solenoid Valve / Pressure Switch

Wiring and Connection of Solenoid Valves and Vacuum Pressure Switches

⚠ Caution

3. Malfunctions stemming from noise may occur if the wire is installed in the same route as that of the power cable or another high-voltage cable. Wire the switch independently.

4. Be sure to ground the frame ground (FG) terminal when using a commercially available switching power supply. (Pressure switch)

5. The tensile force of the solenoid valve and vacuum pressure switch lead wire is 30 N. Exceeding this value can cause breakage. Hold the body when handling the product.

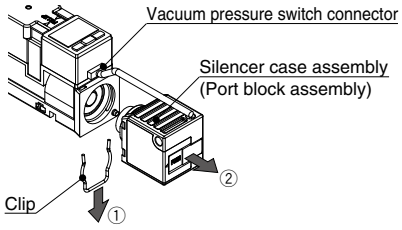
6. Avoid repeatedly bending or stretching the lead wire of the solenoid valve or vacuum pressure switch.
Lead wires will break if bending stress or tensile force is applied to them repeatedly.
If the lead wire moves around, secure it near the body of the product. The recommended bending radius is 40 mm or more. Please contact SMC for further details.

Mounting or Removal of the Vacuum Pressure Switch Connector (ZL1)

⚠ Caution

1. Before the mounting or removal of the vacuum pressure switch connector, it is necessary to remove the silencer case assembly (port block assembly). Remove the silencer case assembly (port block assembly) following the procedure below before mounting or removing the pressure switch connector.

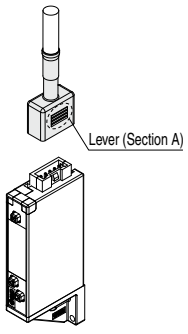
Remove the clip using a flat blade screwdriver from the bottom of the product. Remove the silencer case assembly (port block assembly) from the body. Mount or remove the pressure switch connector.



Mounting or Removal of the Vacuum Pressure Switch Connector (ZL3/ZL6)

⚠ Caution

- When mounting the connector to the switch housing, push the connector straight onto the pins until the lever locks into the housing slot.
- When removing the connector from the switch housing, push the lever (section A) down with your thumb to unlock it from the slot, and then lift the connector straight off of the pins.



ZL1/ZL3/ZL6 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.

■ Solenoid Valve / Pressure Switch

Environment

⚠ Warning

1. The solenoid valve and vacuum pressure switch are not designed to be explosion proof, dustproof, or drip proof. Never use in atmospheres which contain flammable or explosive gases.

⚠ Caution

1. The vacuum pressure switch and solenoid valve (DC type) are CE-compliant but not immune to lightning strikes.
Take measures against lightning strikes in your system.

2. Do not use the product in places where static electricity is a problem. Doing so may result in system failure or malfunction.

Design

⚠ Caution

1. Avoid energizing the solenoid valve for long periods of time.

If a solenoid valve is continuously energized for an extended period of time, the heat generated by the coil assembly may reduce the performance and life of the valve or have adverse effects on peripheral equipment.

Therefore, if the solenoid valve is to be continuously energized for an extended period of time or if the energized period per day will be longer than the de-energized period, use an N.O. (normally open) type product.

When the valve is mounted onto a control panel, take measures to radiate heat in order to keep the product temperature within the specified range.

2. Note that the vacuum pressure switch for the ZL3/ZL6 cannot be replaced.

3. For specific product precautions on solenoid valves, refer to the solenoid valve catalog.

ZL1: SYJ500 Series
ZL3/ZL6: JSY3000 Series

4. For specific product precautions on vacuum pressure switches, refer to the pressure switch catalog.

ZL1: ZSE30A Series
ZL3/ZL6: ZSE10 Series

■ Ejector Exhaust

Exhaust Air and How to Replace Sound Absorbing Material (ZL1)

⚠ Caution

1. Air is exhausted from the connecting part between the silencer case and the silencer cover. This does not affect the performance of the product.

2. The sound absorbing material can be easily replaced.

Push the area where the word "PUSH" is printed on the silencer cover in the direction shown in Fig. 1.

The silencer cover will come out. (Refer to Fig. 2.) Remove sound absorbing material 1 and 2, and replace them. (Refer to Fig. 3.)

After replacing the sound absorbing material, align the end surface of sound absorbing material 1 with the end surface of the diffuser while engaging the hooks with the hook holes, and push the silencer cover back into place. (Refer to Fig. 4.)

Fig. 1

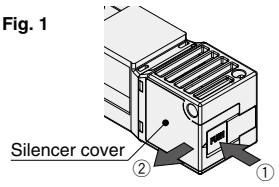


Fig. 2

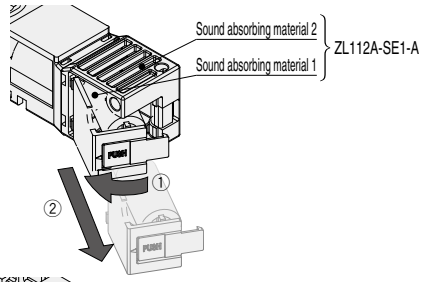


Fig. 3

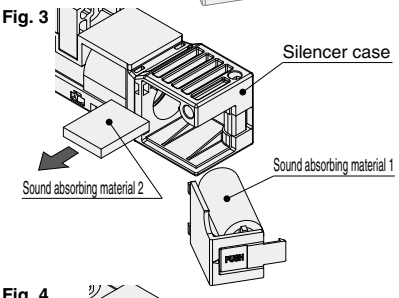
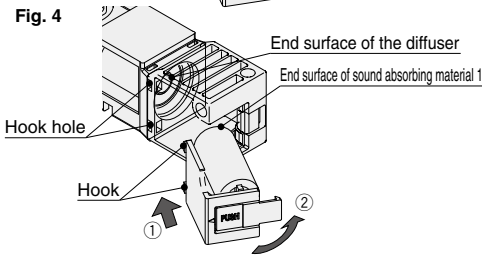


Fig. 4



* If the product is mounted with the silencer cover side facing a wall, the maintenance method shown in the figures above will not be possible.
Move the product away from the wall before conducting maintenance.

Specific Product Precautions 4

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.

■ Ejector Exhaust

How to Replace Sound Absorbing Material (ZL3)

Loosen the assembly screws as shown in Fig. 1 to remove the silencer assembly.
Replace the sound absorbing material in the silencer assembly in the direction shown in Fig. 2. Assemble the silencer assembly using the assembly screws.
Recommended tightening torque: 0.76 to 0.84 N·m

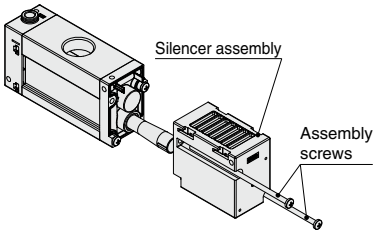


Fig. 1

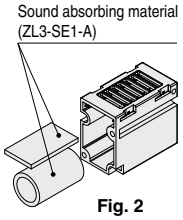
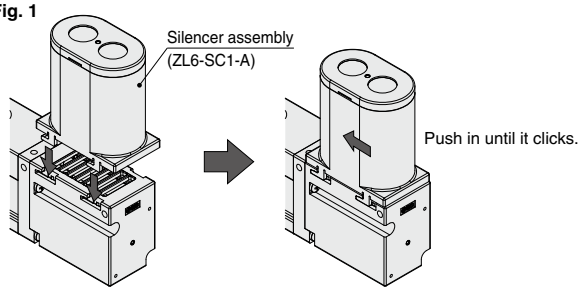


Fig. 2

How to Assemble and Replace Silencer Assembly (ZL6)

The silencer assembly of the ZL6 series is not attached at the time of delivery. Please attach it before use.
As shown in Fig. 1, align the hooks of the silencer assembly with the grooves on the body, and push in the direction of the arrow until it clicks.

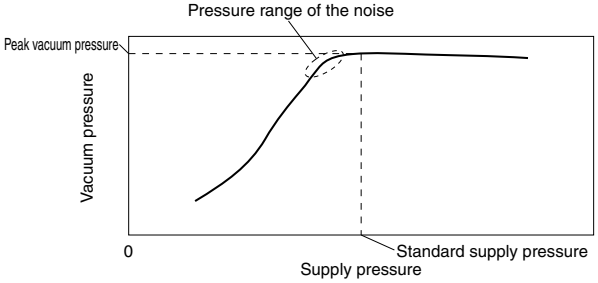
Fig. 1



Exhaust Noise

⚠ Caution

- When the vacuum ejector generates vacuum, noise can be heard from the exhaust port when the standard supply pressure is close to the pressure that generates peak vacuum pressure, making the vacuum pressure unstable. If the vacuum pressure range is adequate for adsorption, there should be no problem. If the noise causes a problem or affects the setting of the pressure switch, change the supply pressure slightly to avoid the pressure range of the noise.



■ Vacuum Break Flow Adjusting Needle

Vacuum Break Air

⚠ Caution

1. **The flow rate characteristics show the representative values of the product itself.**
   They may change depending on piping, circuit and pressure conditions, etc. The flow rate characteristics and the number of needle rotations will vary due to the range of the specifications of the product.
2. **When fully closed, leakage cannot be prevented completely. There is an allowance for a certain amount of leakage in the product's specifications. Tightening the needle to reduce leakage to zero may result in equipment damage.**

Operation of Vacuum Break Flow Adjusting Needle (ZL1)

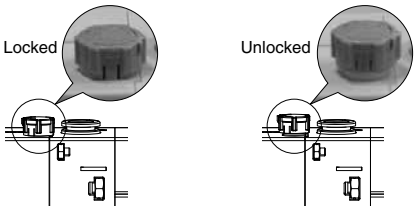
⚠ Caution

1. **The needle has a retaining mechanism, so it will not continue to rotate after it reaches the rotation stop position.**
   Turning the needle too far may cause damage.
2. **Do not use tools, such as pliers, to rotate the knob.**
   This can cause the idle rotation of the knob or damage.
3. **Do not overtighten the lock nut.**
   It is possible to tighten the lock nut (hexagon) manually. When tightening further with tools, tighten by approximately 15° to 30°. Overtightening may cause breakage.

Operation of Vacuum Break Flow Adjusting Needle (ZL3/ZL6)

⚠ Warning

1. **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.



2. **Check the number of rotations of the needle valve.**
   The needle valve has a retaining mechanism, so it will not continue to rotate any further. Turning the needle too far may cause damage.
3. **Do not use tools, such as pliers, to rotate the knob.**
   This can cause the idle rotation of the knob or damage.

⚠ 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.

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