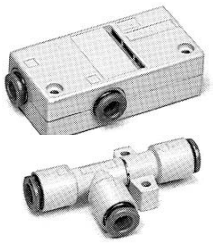
Vacuum Ejector
Box Type (Built-in Silencer)/Body Ported Type
Series ZH

How to Order

Note Refer to "Table (1)" and "(2)" for the combination available for SUP, VAC and EXH port connection.



Box type (Built-in silencer)

Body ported type (Without silencer)

ZH 07 B S 06 06

ZH 07 D S 01 01 01

Nozzle diameter

05	0.5 mmø
07	0.7 mmø
10	1.0 mmø
13	1.3 mmø
15	1.5 mmø
18	1.8 mmø
20	2.0 mmø

Maximum vacuum pressure

S	–88 kPa
L	–48 kPa

SUP. port size Note)

Symbol	Size	Style
06	ø6	One-touch
08	ø8	One-touch
10	ø10	One-touch
12	ø12	One-touch
01	Rc 1/8	Screw-in
02	Rc 1/4	Screw-in
03	Rc 3/8	Screw-in

VAC. port size Note)

Symbol	Size	Style
06	ø6	One-touch
10	ø10	One-touch
12	ø12	One-touch
16	ø16	One-touch
01	Rc 1/8	Screw-in
02	Rc 1/4	Screw-in
03	Rc 3/8	Screw-in
04	Rc 1/2	Screw-in

EXH. port size Note)

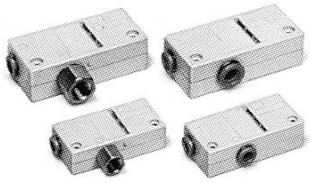
Symbol	Size	Style
06	ø6	One-touch
08	ø8	One-touch
10	ø10	One-touch
12	ø12	One-touch
16	ø16	One-touch
01	Rc 1/8	Screw-in
02	Rc 1/4	Screw-in
03	Rc 3/8	Screw-in
04	Rc 1/2	Screw-in

Table (1) Combination of Connection

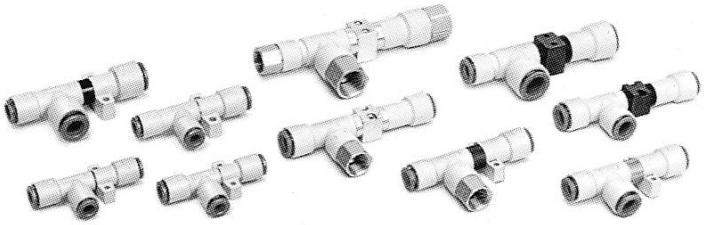
Body type		SUP	VAC	EXH
Box type (Built-in silencer)	1	One-touch	One-touch	—
	2	One-touch	Screw-in	—
	3	Screw-in	Screw-in	—
Body ported type (Without silencer)	1	One-touch	One-touch	One-touch
	2	One-touch	Screw-in	One-touch
	3	Screw-in	Screw-in	Screw-in

Table (2) Port Size

Model	Connection (One-touch/Screw-in)		
	SUP	VAC	EXH
ZH05B	ø6/Rc 1/8	ø6/Rc 1/8	—
ZH07B			
ZH10B			
ZH13B	ø8/Rc 1/8	ø10/Rc 1/4	
ZH05D	ø6/Rc 1/8	ø6/Rc 1/8	ø6/Rc 1/8
ZH07D			
ZH10D	ø6/Rc 1/8	ø6/Rc 1/8	ø8/Rc 1/8
ZH13D	ø8/Rc 1/8	ø10/Rc 1/4	ø10/Rc 1/4
ZH15D	ø10/Rc 1/4	ø12/Rc 3/8	ø12/Rc 3/8
ZH18D	ø12/Rc 3/8		
ZH20D	ø12/Rc 3/8	ø16/Rc 1/2	ø16/Rc 1/2

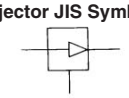


Box type: Type B

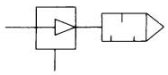


Body ported type: Type D

Ejector JIS Symbol



Body ported type
(Without silencer)
ZH□□D



Box type
(Built-in silencer)
ZH□□B

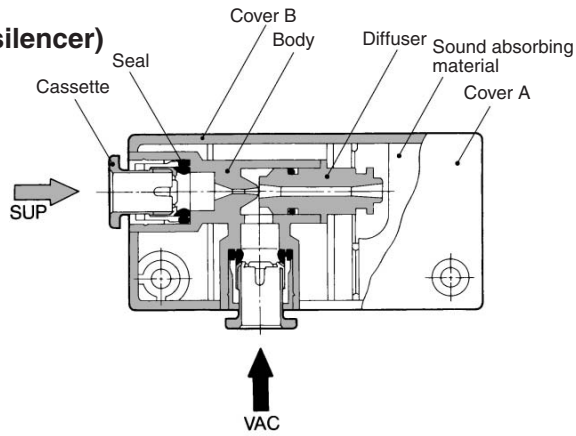
Model

Model	Nozzle diameter (mm)	Body type	Max. vacuum pressure * (kPa)		Maximum suction flow rate (ℓ/min (ANR))		Air consumption (ℓ/min (ANR))	Connection (One-touch/Screw-in)			Weight (g)
			Type S	Type L	Type S	Type L	Type S/Type L	SUP	VAC	EXH	
ZH05B□	0.5	Box type (Built-in silencer)	–88	–48	5	8	13	ø6/Rc 1/8	ø6/Rc 1/8	—	28
ZH07B□	0.7				12	20	23				28
ZH10B□	1.0				24	34	46				33
ZH13B□	1.3				40	70	78	ø8/Rc 1/8	ø10/Rc 1/4		66
ZH05D□	0.5	Body ported type (Without silencer)	–88	–48	5	8	13	ø6/Rc 1/8	ø6/Rc 1/8	ø6/Rc 1/8	11
ZH07D□	0.7				12	20	23				12
ZH10D□	1.0				24	34	46	ø6/Rc 1/8	ø6/Rc 1/8	ø8/Rc 1/8	16
ZH13D□	1.3				40	70	78	ø8/Rc 1/8	ø10/Rc 1/4	ø10/Rc 1/4	27
ZH15D□	1.5	Body ported type (Without silencer)	–88	–53	55	75	95	ø10/Rc 1/4	ø12/Rc 3/8	ø12/Rc 3/8	43
ZH18D□	1.8				65	110	150	ø12/Rc 3/8			55
ZH20D□	2.0				85	135	185	ø12/Rc 3/8	ø16/Rc 1/2	ø16/Rc 1/2	95

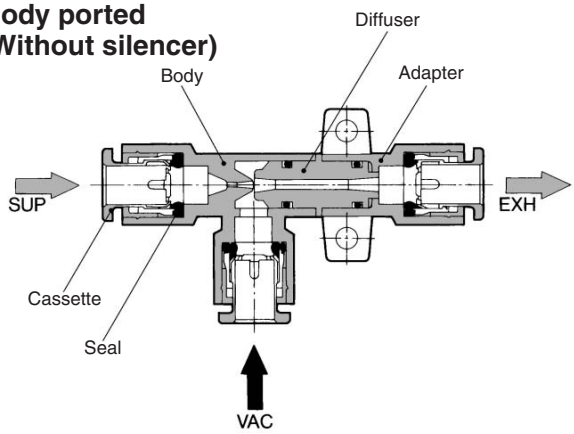
* Supply pressure: 0.45 MPa.

Construction

Box type (Built-in silencer)



Body ported (Without silencer)



⚠Precautions

Be sure to read before handling. Refer to pages 13-15-3 to 13-15-4 for Safety Instructions and Common Precautions on the products mentioned in this catalog, and refer to page 13-1-5 for Precautions on every series.

⚠Caution

Mounting

Make sure that an excessive amount of load or moment is not applied to the ejector body due to pipe connections or installation.

Exhaust piping

On the ZH□□B□ models, keep exhaust ports open on at least one side. Make sure that the back pressure of the exhaust pipe on the ZH□□D□ models is 0.005 MPa or less. (Reference: Using tubing with an applicable diameter, its length must be 0.5 m or less.)
(Port indication: P: supply port; V: vacuum port; E: exhaust port.)

Matching the ejector to the vacuum circuit

Refer to technical data on page 13-1-10 to 19 for precautions on the vacuum circuit.

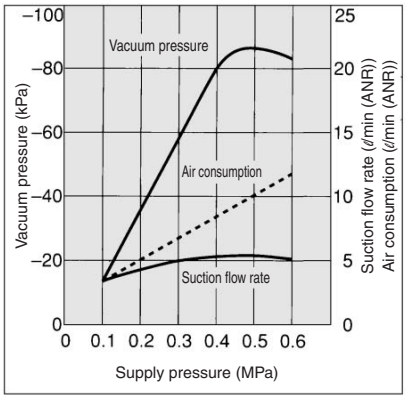
Exhaust Characteristics/Flow Characteristics

The flow characteristics correspond to a supply pressure of 0.45 MPa.

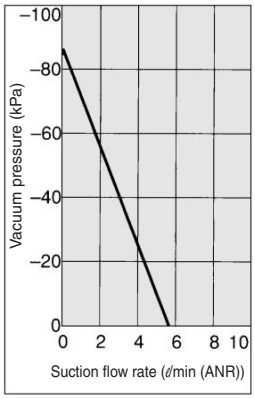
ZH05□S

Max. vacuum pressure: –88 kPa

Exhaust Characteristics



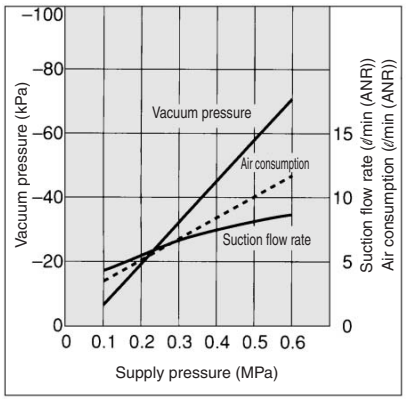
Flow Characteristics



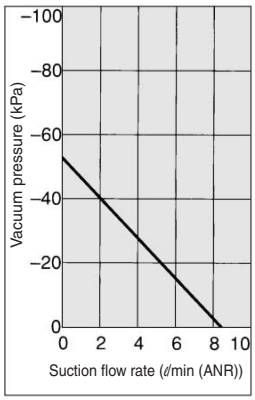
ZH05□L

Max. vacuum pressure: –48 kPa

Exhaust Characteristics



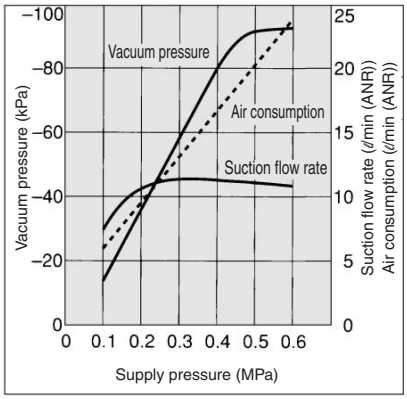
Flow Characteristics



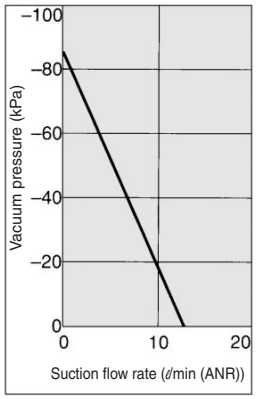
ZH07□S

Max. vacuum pressure: –88 kPa

Exhaust Characteristics



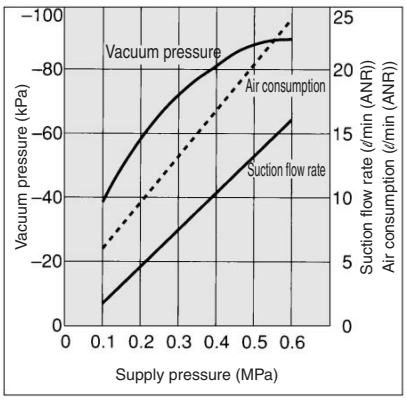
Flow Characteristics



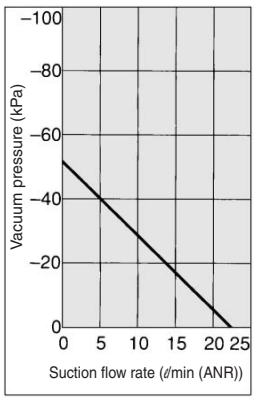
ZH07□L

Max. vacuum pressure: –48 kPa

Exhaust Characteristics



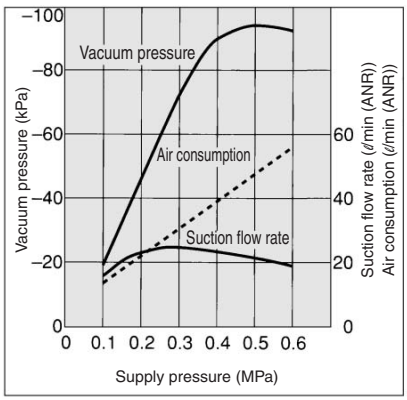
Flow Characteristics



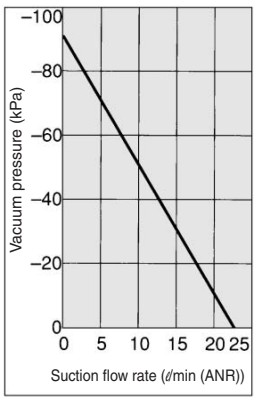
ZH10□S

Max. vacuum pressure: –88 kPa

Exhaust Characteristics



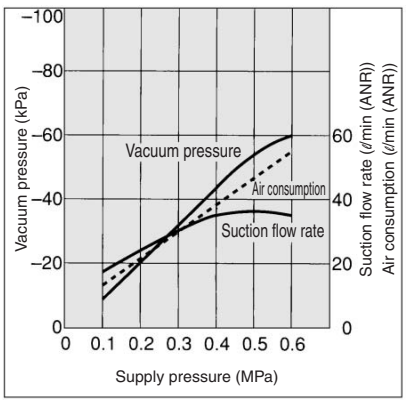
Flow Characteristics



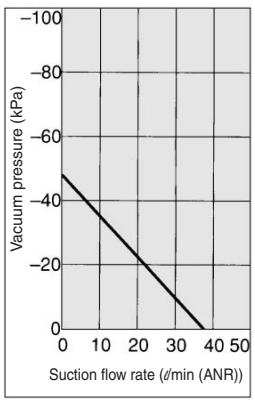
ZH10□L

Max. vacuum pressure: –48 kPa

Exhaust Characteristics



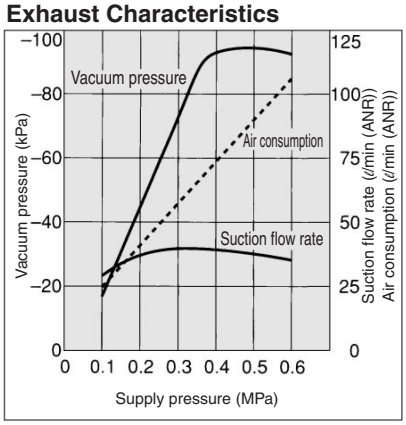
Flow Characteristics



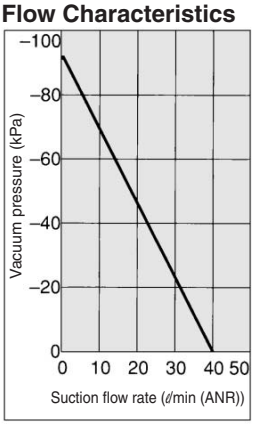
ZH13□S

Max. vacuum pressure: –88 kPa

Exhaust Characteristics



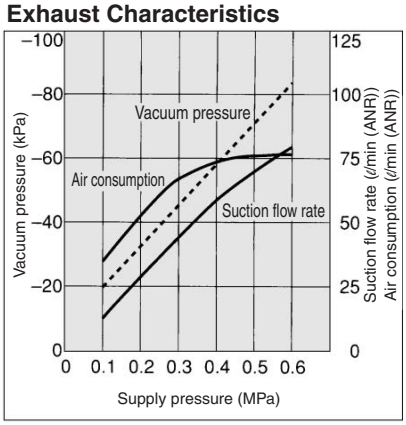
Flow Characteristics



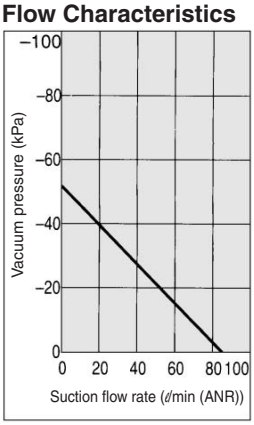
ZH13□L

Max. vacuum pressure: –48 kPa

Exhaust Characteristics



Flow Characteristics



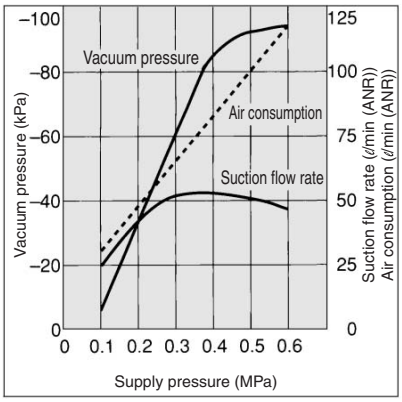
Exhaust Characteristics/Flow Characteristics

The flow characteristics correspond to a supply pressure of 0.45 MPa.

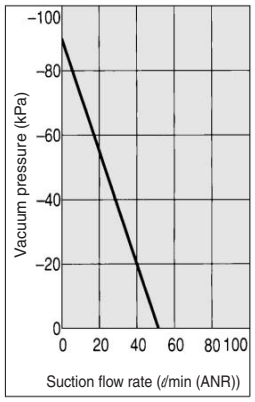
ZH15□S

Max. vacuum pressure: –88 kPa

Exhaust Characteristics



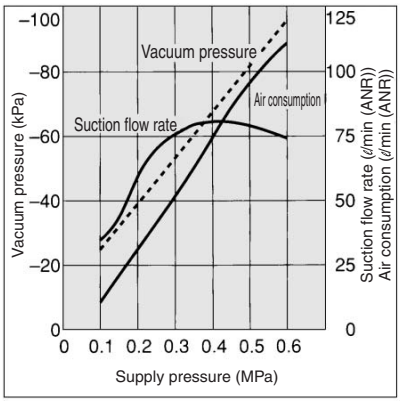
Flow Characteristics



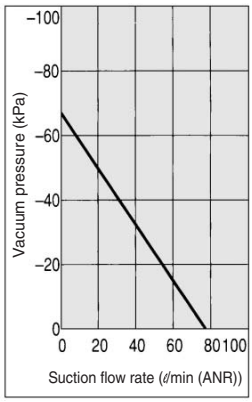
ZH15□L

Max. vacuum pressure: –53 kPa

Exhaust Characteristics



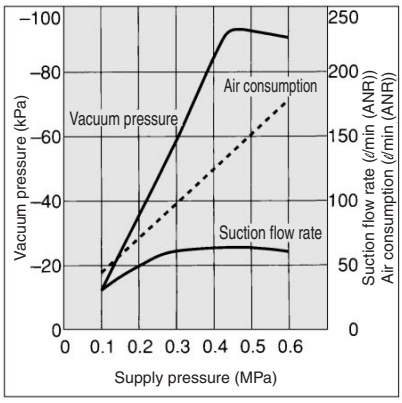
Flow Characteristics



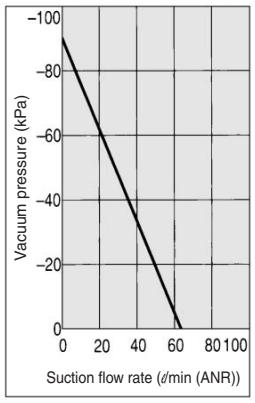
ZH18□S

Max. vacuum pressure: –88 kPa

Exhaust Characteristics



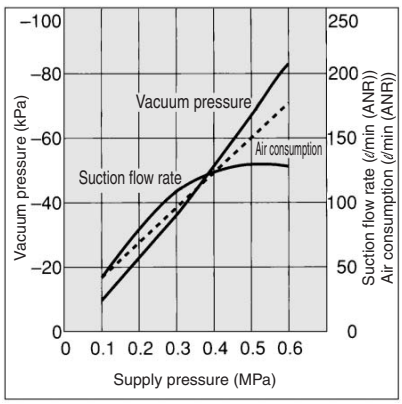
Flow Characteristics



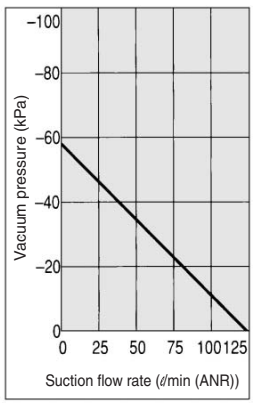
ZH18□L

Max. vacuum pressure: –53 kPa

Exhaust Characteristics



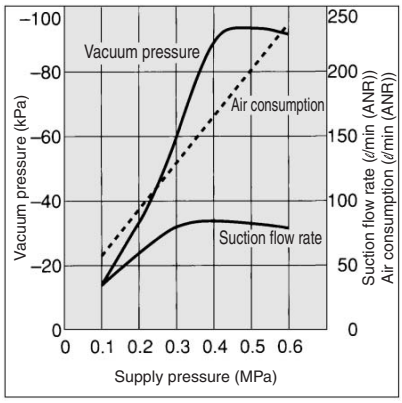
Flow Characteristics



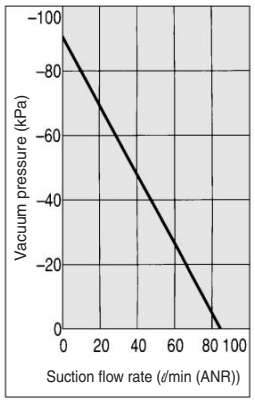
ZH20□S

Max. vacuum pressure: –88 kPa

Exhaust Characteristics



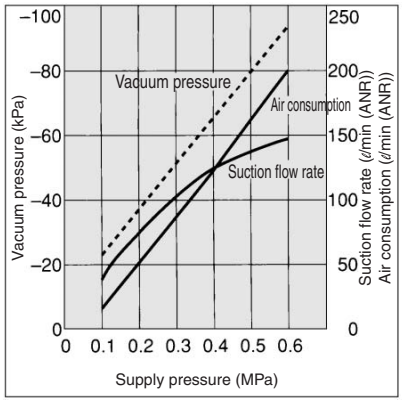
Flow Characteristics



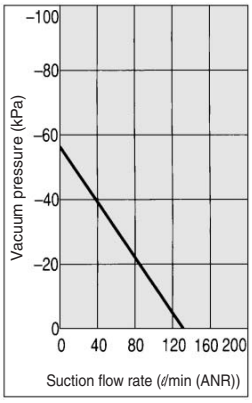
ZH20□L

Max. vacuum pressure: –53 kPa

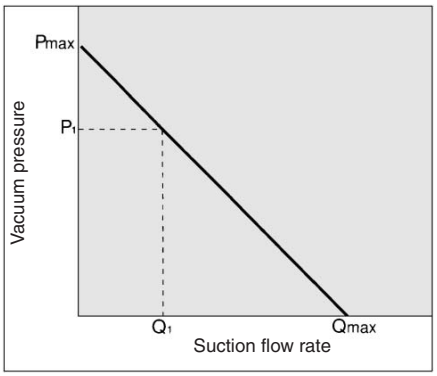
Exhaust Characteristics



Flow Characteristics



How to Read Flow Characteristics Graph



Flow characteristics are expressed in ejector vacuum pressure and suction flow. If suction flow rate changes, a change in vacuum pressure will also be expressed. Normally this relationship is expressed in ejector standard use.

In graph, Pmax is max. vacuum pressure and Qmax is max. suction flow. The valves are specified according to catalog use.

Changes in vacuum pressure are expressed in the order below.

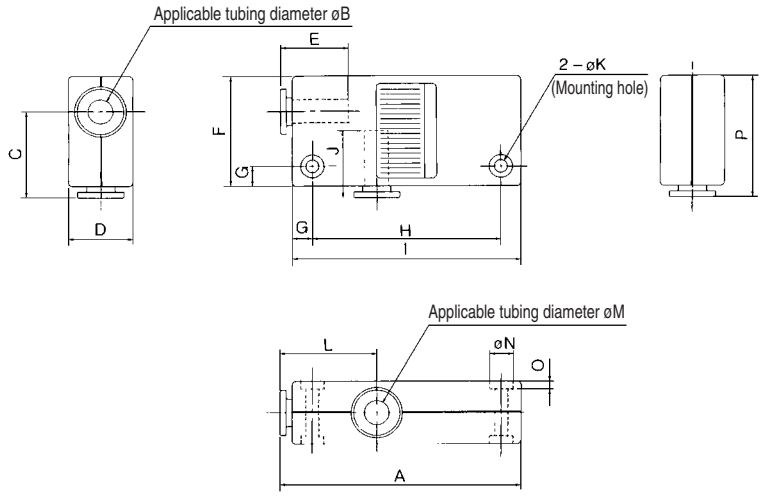
1. When ejector suction port is covered and made airtight, suction flow becomes 0 and vacuum pressure is at maximum value (Pmax).
2. When suction port is opened gradually, air can flow through, (air leakage), suction flow increases, but vacuum pressure decreases. (condition P1 and Q1)
3. When suction port is opened further, suction flow moves to maximum value (Qmax), but vacuum pressure is near 0. (atmospheric pressure).

When vacuum port (vacuum piping) has no leakage, vacuum pressure becomes maximum, and vacuum pressure decreases as leakage increases. When leakage value is the same as max. suction flow, vacuum pressure is near 0.

When ventirative or leaky work must be adsorbed, please note that vacuum pressure will not be high.

Box Type (Built-in silencer): ZH□B$^{S}_{L}$-□-□

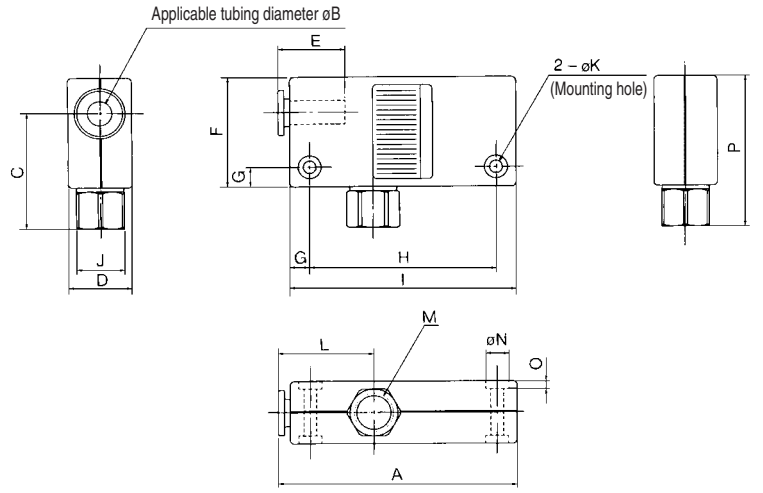
One-touch connection



Model	A	øB	C	D	E	F	G	H
ZH05BS-06-06	60	6	22	16	12.8	28	5	47
ZH05BL-06-06	60	6	22	16	12.8	28	5	47
ZH07BS-06-06	60	6	22	16	12.8	28	5	47
ZH07BL-06-06	60	6	22	16	12.8	28	5	47
ZH10BS-06-06	63	6	23	18	12.8	29	5	50
ZH10BL-06-06	63	6	23	18	12.8	29	5	50
ZH13BS-08-10	78	8	27.5	23	13.7	35	7	61
ZH13BL-08-10	78	8	27.5	23	13.7	35	7	61

Model	I	J	øK	L	øM	øN	O	P
ZH05BS-06-06	57	12.8	3.2	24	6	5.8	2	31
ZH05BL-06-06	57	12.8	3.2	24	6	5.8	2	31
ZH07BS-06-06	57	12.8	3.2	24	6	5.8	2	31
ZH07BL-06-06	57	12.8	3.2	24	6	5.8	2	31
ZH10BS-06-06	60	12.8	3.2	26	6	5.8	2	32
ZH10BL-06-06	60	12.8	3.2	26	6	5.8	2	32
ZH13BS-08-10	75	15.3	4.2	28	10	7.5	3	38.5
ZH13BL-08-10	75	15.3	4.2	28	10	7.5	3	38.5

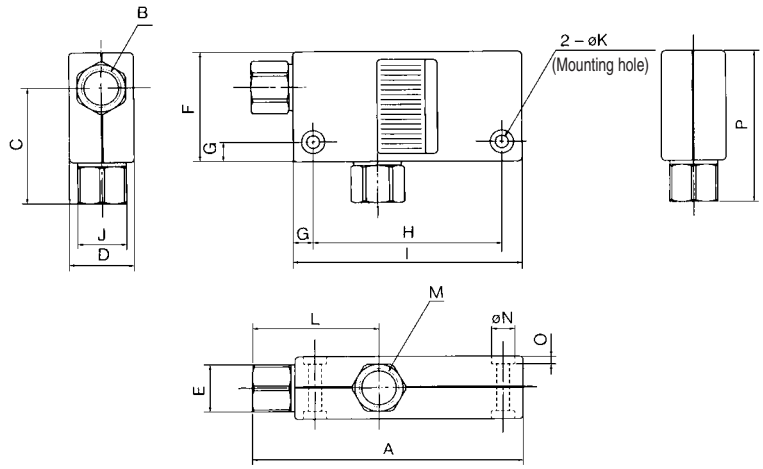
One-touch and screw-in connection



Model	A	øB	C	D	E	F	G	H
ZH05BS-06-01	60	6	29.5	16	12.8	28	5	47
ZH05BL-06-01	60	6	29.5	16	12.8	28	5	47
ZH07BS-06-01	60	6	29.5	16	12.8	28	5	47
ZH07BL-06-01	60	6	29.5	16	12.8	28	5	47
ZH10BS-06-01	63	6	30.5	18	12.8	29	5	50
ZH10BL-06-01	63	6	30.5	18	12.8	29	5	50
ZH13BS-08-02	78	8	39	23	13.7	35	7	61
ZH13BL-08-02	78	8	39	23	13.7	35	7	61

Model	I	J	øK	L	M	øN	O	P
ZH05BS-06-01	57	12	3.2	24	Rc1/8	5.8	2	38.5
ZH05BL-06-01	57	12	3.2	24	Rc1/8	5.8	2	38.5
ZH07BS-06-01	57	12	3.2	24	Rc1/8	5.8	2	38.5
ZH07BL-06-01	57	12	3.2	24	Rc1/8	5.8	2	38.5
ZH10BS-06-01	60	12	3.2	26	Rc1/8	5.8	2	39.5
ZH10BL-06-01	60	12	3.2	26	Rc1/8	5.8	2	39.5
ZH13BS-08-02	75	17	4.2	28	Rc1/4	7.5	3	50
ZH13BL-08-02	75	17	4.2	28	Rc1/4	7.5	3	50

Screw-in connection

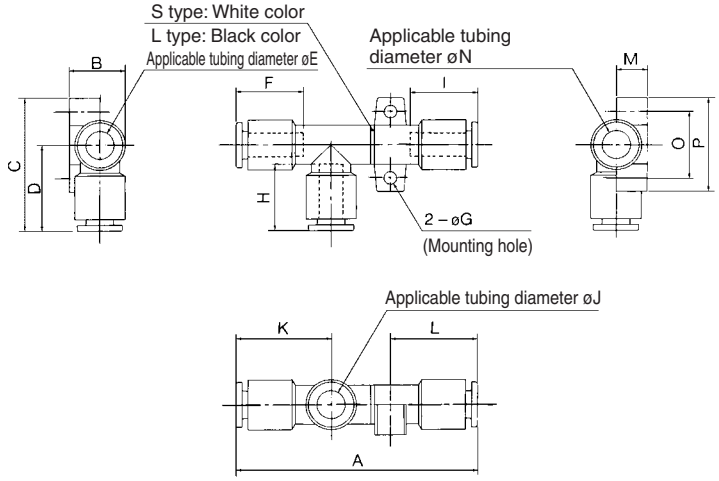


Model	A	B	C	D	E	F	G	H
ZH05BS-01-01	67.5	Rc1/8	29.5	16	12	28	5	47
ZH05BL-01-01	67.5	Rc1/8	29.5	16	12	28	5	47
ZH07BS-01-01	67.5	Rc1/8	29.5	16	12	28	5	47
ZH07BL-01-01	67.5	Rc1/8	29.5	16	12	28	5	47
ZH10BS-01-01	70.5	Rc1/8	30.5	18	12	29	5	50
ZH10BL-01-01	70.5	Rc1/8	30.5	18	12	29	5	50
ZH13BS-01-02	86.5	Rc1/8	39	23	14	35	7	61
ZH13BL-01-02	86.5	Rc1/8	39	23	14	35	7	61

Model	I	J	øK	L	M	øN	O	P
ZH05BS-01-01	57	12	3.2	31.5	Rc1/8	5.8	2	38.5
ZH05BL-01-01	57	12	3.2	31.5	Rc1/8	5.8	2	38.5
ZH07BS-01-01	57	12	3.2	31.5	Rc1/8	5.8	2	38.5
ZH07BL-01-01	57	12	3.2	31.5	Rc1/8	5.8	2	38.5
ZH10BS-01-01	60	12	3.2	33.5	Rc1/8	5.8	2	39.5
ZH10BL-01-01	60	12	3.2	33.5	Rc1/8	5.8	2	39.5
ZH13BS-01-02	75	17	4.2	36.5	Rc1/4	7.5	3	50
ZH13BL-01-02	75	17	4.2	36.5	Rc1/4	7.5	3	50

Body Ported Type (Without silencer): ZH05D$^{S}_{L}$-□-□-□ to ZH15D$^{S}_{L}$-□-□-□

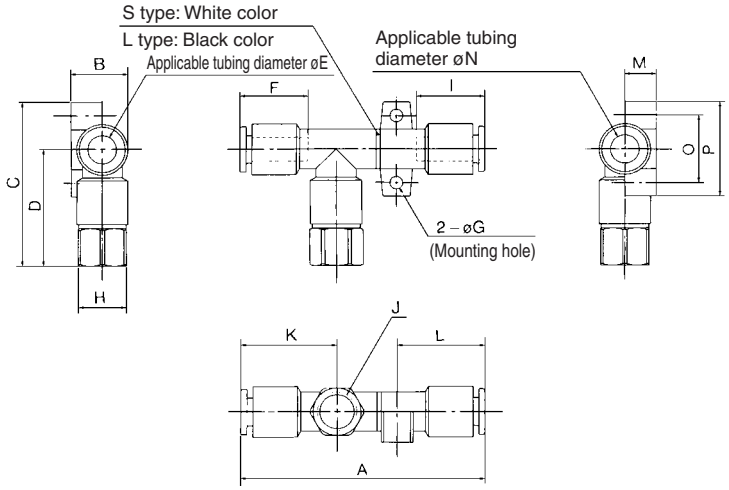
One-touch connection



Model	A	B	C	D	øE	F	øG	H
ZH05DS-06-06-06	58.5	14.2	34	22	6	12.8	3.2	12.8
ZH05DL-06-06-06	58.5	14.2	34	22	6	12.8	3.2	12.8
ZH07DS-06-06-06	61	14.2	34	22	6	12.8	3.2	12.8
ZH07DL-06-06-06	61	14.2	34	22	6	12.8	3.2	12.8
ZH10DS-06-06-08	66	17.2	37	23	6	12.8	4.2	12.8
ZH10DL-06-06-08	70	17.2	37	23	6	12.8	4.2	12.8
ZH13DS-08-10-10	74.5	20	42.5	27.5	8	13.7	4.2	15.3
ZH13DL-08-10-10	79.5	20	42.5	27.5	8	13.7	4.2	15.3
ZH15DS-10-12-12	93.3	22.45	47	29.5	10	15.3	4.2	15.8
ZH15DL-10-12-12	93.3	22.45	47	29.5	10	15.3	4.2	15.8

Model	I	øJ	K	L	M	øN	O	P
ZH05DS-06-06-06	12.8	6	24	21	7.8	6	17	24
ZH05DL-06-06-06	12.8	6	24	21	7.8	6	17	24
ZH07DS-06-06-06	12.8	6	24	22	7.8	6	17	24
ZH07DL-06-06-06	12.8	6	24	22	7.8	6	17	24
ZH10DS-06-06-08	13.7	6	26	24.5	9.6	8	20	28
ZH10DL-06-06-08	13.7	6	26	24.5	9.6	8	20	28
ZH13DS-08-10-10	15.3	10	28	27	10.7	10	22	30
ZH13DL-08-10-10	15.3	10	28	27	10.7	10	22	30
ZH15DS-10-12-12	15.8	12	31.5	32.8	12	12	27	35
ZH15DL-10-12-12	15.8	12	31.5	32.8	12	12	27	35

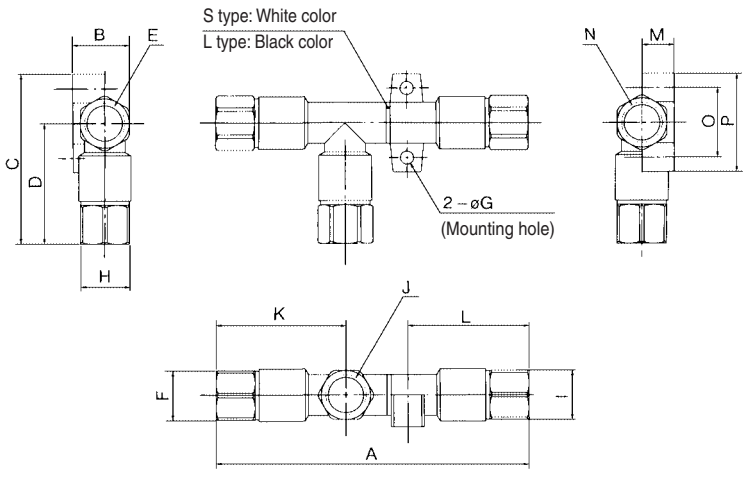
One-touch and screw-in connection



Model	A	B	C	D	øE	F	øG	H
ZH05DS-06-01-06	58.5	14.2	41.5	29.5	6	12.8	3.2	12
ZH05DL-06-01-06	58.5	14.2	41.5	29.5	6	12.8	3.2	12
ZH07DS-06-01-06	61	14.2	41.5	29.5	6	12.8	3.2	12
ZH07DL-06-01-06	61	14.2	41.5	29.5	6	12.8	3.2	12
ZH10DS-06-01-08	66	17.2	44.5	30.5	6	12.8	4.2	12
ZH10DL-06-01-08	70	17.2	44.5	30.5	6	12.8	4.2	12
ZH13DS-08-02-10	74.5	19.95	54	39	8	13.7	4.2	17
ZH13DL-08-02-10	79.5	19.95	54	39	8	13.7	4.2	17
ZH15DS-10-03-12	93.3	22.45	58.5	41	10	15.3	4.2	19
ZH15DL-10-03-12	93.3	22.45	58.5	41	10	15.3	4.2	19

Model	I	J	K	L	M	øN	O	P
ZH05DS-06-01-06	12.8	Rc1/8	24	21	7.8	6	17	24
ZH05DL-06-01-06	12.8	Rc1/8	24	21	7.8	6	17	24
ZH07DS-06-01-06	12.8	Rc1/8	24	22	7.8	6	17	24
ZH07DL-06-01-06	12.8	Rc1/8	24	22	7.8	6	17	24
ZH10DS-06-01-08	13.7	Rc1/8	26	24.5	9.6	8	20	28
ZH10DL-06-01-08	13.7	Rc1/8	26	24.5	9.6	8	20	28
ZH13DS-08-02-10	15.3	Rc1/4	28	27	10.7	10	22	30
ZH13DL-08-02-10	15.3	Rc1/4	28	27	10.7	10	22	30
ZH15DS-10-03-12	15.8	Rc3/8	31.5	32.8	12	12	27	35
ZH15DL-10-03-12	15.8	Rc3/8	31.5	32.8	12	12	27	35

Screw-in connection

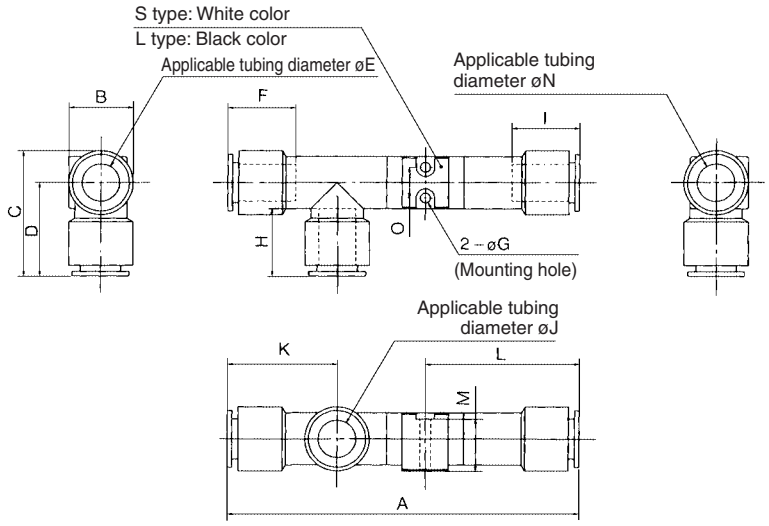


Model	A	B	C	D	E	F	øG	H
ZH05DS-01-01-01	73.5	14.2	41.5	29.5	Rc1/8	12	3.2	12
ZH05DL-01-01-01	73.5	14.2	41.5	29.5	Rc1/8	12	3.2	12
ZH07DS-01-01-01	76	14.2	41.5	29.5	Rc1/8	12	3.2	12
ZH07DL-01-01-01	76	14.2	41.5	29.5	Rc1/8	12	3.2	12
ZH10DS-01-01-01	82	17.2	44.5	30.5	Rc1/8	12	4.2	12
ZH10DL-01-01-01	86	17.2	44.5	30.5	Rc1/8	12	4.2	12
ZH13DS-01-02-02	94.5	19.95	54	39	Rc1/8	14	4.2	17
ZH13DL-01-02-02	99.5	19.95	54	39	Rc1/8	14	4.2	17
ZH15DS-02-03-03	116.5	22.45	58.5	41	Rc1/4	17	4.2	19
ZH15DL-02-03-03	116.5	22.45	58.5	41	Rc1/4	17	4.2	19

Model	I	J	K	L	M	N	O	P
ZH05DS-01-01-01	12	Rc1/8	31.5	28.5	7.8	Rc1/8	17	24
ZH05DL-01-01-01	12	Rc1/8	31.5	28.5	7.8	Rc1/8	17	24
ZH07DS-01-01-01	12	Rc1/8	31.5	29.5	7.8	Rc1/8	17	24
ZH07DL-01-01-01	12	Rc1/8	31.5	29.5	7.8	Rc1/8	17	24
ZH10DS-01-01-01	14	Rc1/8	33.5	33	9.6	Rc1/8	20	28
ZH10DL-01-01-01	14	Rc1/8	33.5	33	9.6	Rc1/8	20	28
ZH13DS-01-02-02	17	Rc1/4	36.5	38.5	10.7	Rc1/4	22	30
ZH13DL-01-02-02	17	Rc1/4	36.5	38.5	10.7	Rc1/4	22	30
ZH15DS-02-03-03	19	Rc3/8	43	44.5	12	Rc3/8	27	35
ZH15DL-02-03-03	19	Rc3/8	43	44.5	12	Rc3/8	27	35

Body Ported Type (Without silencer): ZH18D$^{S}_{L}$-□-□-□, ZH20D$^{S}_{L}$-□-□-□

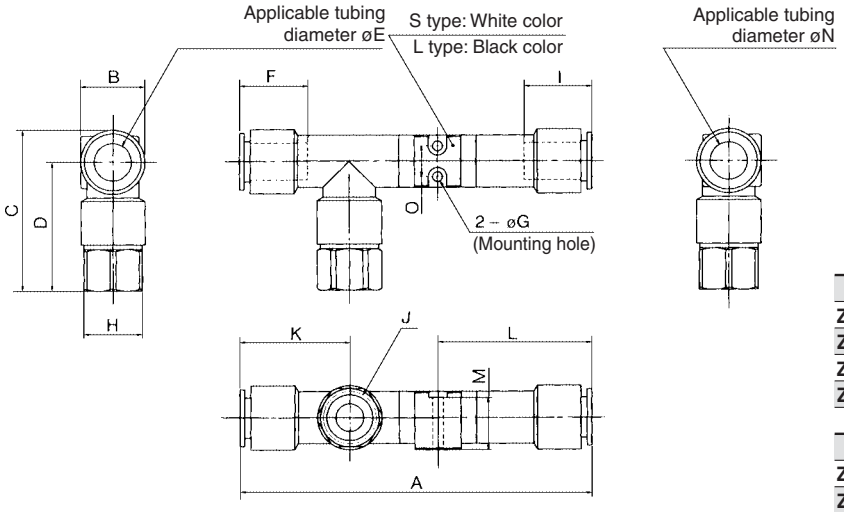
One-touch connection



Model	A	B	C	D	øE	F	øG	H
ZH18DS-12-12-12	114	20.95	40.95	30.5	ø12	15.8	ø3.5	15.8
ZH18DL-12-12-12	114	20.95	40.95	30.5	ø12	15.8	ø3.5	15.8
ZH20DS-12-16-16	124.6	26.75	45.95	32.7	ø12	15.8	ø3.5	17.2
ZH20DL-12-16-16	124.6	26.75	45.95	32.7	ø12	15.8	ø3.5	17.2

Model	I	øJ	K	L	M	øN	O
ZH18DS-12-12-12	15.8	ø12	35.5	50	17	ø12	10
ZH18DL-12-12-12	15.8	ø12	35.5	50	17	ø12	10
ZH20DS-12-16-16	17.2	ø16	38.5	54.3	21.7	ø16	12
ZH20DL-12-16-16	17.2	ø16	38.5	54.3	21.7	ø16	12

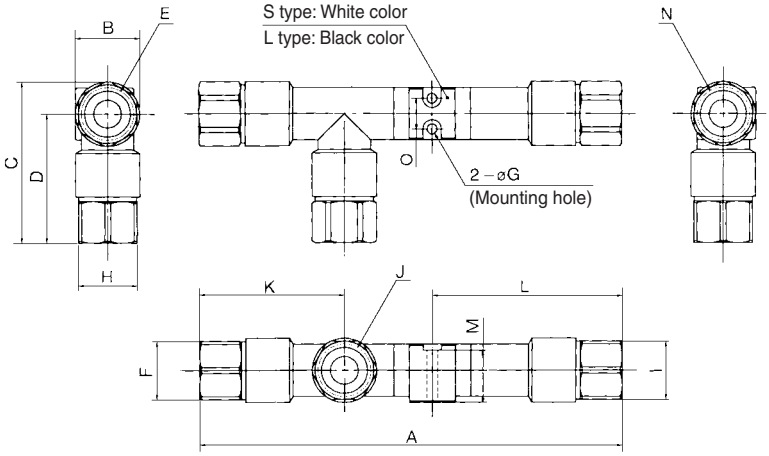
One-touch and screw-in connection



Model	A	B	C	D	øE	F	øG	H
ZH18DS-12-03-12	110	20.95	52.45	42	ø12	15.8	ø3.5	19
ZH18DL-12-03-12	110	20.95	52.45	42	ø12	15.8	ø3.5	19
ZH20DS-12-04-16	124.6	26.75	60.95	47.7	ø12	15.8	ø3.5	24
ZH20DL-12-04-16	124.6	26.75	60.95	47.7	ø12	15.8	ø3.5	24

Model	I	J	K	L	M	øN	O
ZH18DS-12-03-12	15.8	Rc3/8	35.5	50	17	ø12	10
ZH18DL-12-03-12	15.8	Rc3/8	35.5	50	17	ø12	10
ZH20DS-12-04-16	17.2	Rc1/2	38.5	54.3	21.7	ø16	12
ZH20DL-12-04-16	17.2	Rc1/2	38.5	54.3	21.7	ø16	12

Screw-in connection

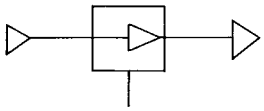


Model	A	B	C	D	E	F	øG	H
ZH18DS-03-03-03	133	20.95	52.45	42	Rc3/8	19	ø3.5	19
ZH18DL-03-03-03	133	20.95	52.45	42	Rc3/8	19	ø3.5	19
ZH20DS-03-04-04	151.1	26.75	60.95	47.7	Rc3/8	19	ø3.5	24
ZH20DL-03-04-04	151.1	26.75	60.95	47.7	Rc3/8	19	ø3.5	24

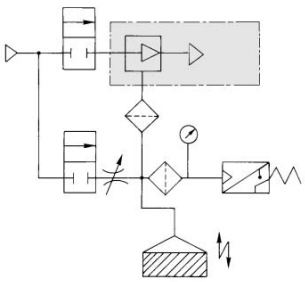
Model	I	J	K	L	M	N	O
ZH18DS-03-03-03	19	Rc3/8	47	57.5	17	Rc3/8	10
ZH18DL-03-03-03	19	Rc3/8	47	57.5	17	Rc3/8	10
ZH20DS-03-04-04	24	Rc1/2	50	69.3	22	Rc1/2	12
ZH20DL-03-04-04	24	Rc1/2	50	69.3	22	Rc1/2	12

Example of Application Circuit

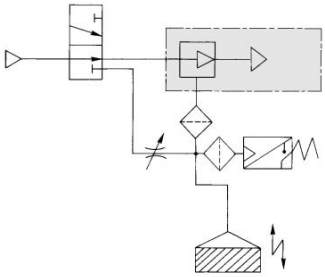
Basic Type



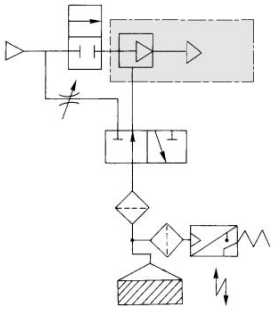
(a) Full system



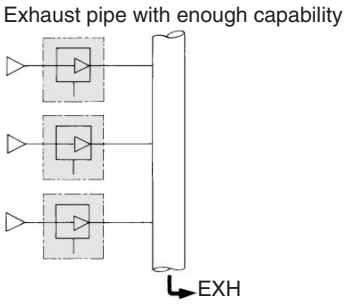
(b) 3 port valve selection



(c) Switching on the vacuum side



(d) Centralized exhaust type



Diagrams (a) to (d) show the combination with peripherals.

⚠Caution

Handling of application circuits

1. Countermeasures for power outages
Select a supply valve for the ejector that is normally open or one that is equipped with a self-holding function.

2. Using a small-diameter picking nozzle
For picking electronic parts or small precision parts, if the picking nozzle is approximately ø1 mm in diameter, the vacuum remains high by being restricted by the nozzle. As a result, it will not be possible to verify it with the vacuum switch. In such a case, it is necessary to use an ejector that is suited to the nozzle and to select a vacuum switch with a favorable hysteresis and precision.

3. Considerable leakage from the suction surface
If a workpiece is made of porous material or if there is air leakage from the area between the pad and the workpiece, use a nozzle with a large diameter and a large suction flow volume.
If the amount of leakage is known based on the effective sectional area of the side with the leakage, the vacuum pressure can be estimated in accordance with the ejector's flow volume characteristics.

4. Suction filter
To protect the ejectors and valves from dust, the use of a suction filter (Series ZFA, ZFB) is recommended.

5. Use of a vacuum switch
It is recommended that verification be made with a vacuum switch as much as possible.

6. Vacuum release valve
To serve as a vacuum release valve, use a 2 port or 3 port valve. As for the performance of the valve, select a valve for a low vacuum. In addition, add a needle valve that can regulate the flow volume of the vacuum releasing air. Use the atmospheric pressure or a positive pressure for the vacuum releasing pressure.