



Installation and Maintenance Manual

Large Size Vacuum Module: Ejector System

ZR Series



1 Safety Instructions

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger", followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the safety instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

Caution	Indicates a hazard with a low level of risk, which if not avoided, could result in minor or moderate injury.
Warning	Indicates a hazard with a medium level of risk, which if not avoided, could result in death or serious injury.
Danger	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

Warning

- The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications. Since the products specified here can be used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet specific requirements.
- **Only trained personnel should operate pneumatically operated machinery and equipment.** Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced personnel.
- **Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
 - 1) Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
 - 2) When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system.
 - 3) Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Supply air into the system gradually to create back pressure, i.e. incorporate a soft-start valve).
- **Do not use this product outside of the specifications. Contact SMC if it is to be used in any of the following conditions:**
 - 1) Conditions and environments beyond the given specifications, or if the product is to be used outdoors.
 - 2) Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.
 - 3) An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

Caution

- Ensure that the air supply system is filtered to 5 microns.

2 Specifications

2.1 Specifications

Specification of valve unit

Valve unit part no.		ZR1-V0000-Q			
Components		Supply Valve		Release Valve	
		Pilot operated		Pilot operated	
Operating method	Vacuum valve, release valve individual	Double Solenoid valve SYJ3233-X126-Q	Solenoid valve SYJ3133-Q	Air operated SYJA3130-Q	Solenoid valve SYJ3133-Q
	Vacuum valve, release valve common	Double Solenoid valve SYJ3233-X126-Q	Solenoid valve SYJ3133-Q	Air operated SYJA3130-Q	Air operated SYJA3130-Q
PV port supply pressure		-0.1 to 0.6 MPa			
PD port supply pressure		0.05 to 0.6 MPa			
PS port supply pressure		0.25 to 0.6 MPa			
Main valve effective area (Cv)		0.45		0.053	
Maximum operating frequency		5 Hz			
Operating temperature range		5 to 50°C			
Enclosure		Equivalent to IP30			

Standard accessory -Bracket B

Solenoid Valve/Specifications

Solenoid	SYJ3133-0000-Q, SYJ3233-0000-X126-Q, SYJ3233-0000-X127-Q
Rated voltage	24, 12, 6, 5, 3VDC, 100, 110VAC(50/60Hz)
Electrical entry	100, 110VAC-L/M plug connector (With rectifier)
Light/Surge voltage suppressor	3, 5, 6, 12, 24VDC-L/M plug connector, Grommet Available, Not available (at grommet)
Manual operation	Non-locking push type, Locking slotted type

*Applicable to plug connector; connector assembly with rectifier is attached.

Ejector Specification

Nozzle diameter (mm)	1.0	1.3	1.5	1.8	2.0
Maximum suction flow rate (l/min(ANR))	S type 22	38	54	62	84
	L type 42	52	74	88	105
Air consumption (l/min(ANR))	46	78	95	150	185
Maximum vacuum pressure	S:-84 kPa, L:-53 kPa				
Supply pressure range	0.2 to 0.55 kPa				
Standard supply pressure	0.45 kPa				
Operating temperature range	5 to 50°C				
Enclosure	IP30				

Vacuum Pressure Switch Specification (ZSE2 type)

Part no.	ZSE2-0R-15
Fluid	Air
Setting pressure range	0 to -101kPa
Hysteresis	3% or less

Temperature characteristics	±3% Full span (5 to 40°C) ±5% Full span (0 to 60°C)
Operating voltage	12 to 24VDC (Ripple ±10% or less)
Output	Open collector 30V, 80mA
Indicator light	Lights up when ON
Current consumption	17mA or less (When 24VDC is ON)
Max. operating pressure	0.2MPa
Operating temperature range	5 to 50°C

Digital vacuum pressure switch specifications (ZSE30A type)

Part no.	ZSE30A-00-x-xx-X505	
Rated pressure range	0.0 to -101.0kPa	
Set pressure range	10.0 to -105.0kPa	
Proof pressure	500kPa	
Min. display unit	0.1kPa	
Applicable fluid	Air, inert gas, Non-flammable gas	
Power supply voltage	12 to 24VDC ±10%, Ripple(p-p)10% or less (With power supply polarity protection)	
Current consumption	40mA or less	
Switch output	NPN or PNP open collector 1 output NPN or PNP open collector 2 output (selectable)	
Max. load current	80mA	
Max. applied voltage	28V(With NPN output)	
Residual voltage	1V or less (With load current of 80mA)	
Response time	2.5ms or less (Response time selections with anti-chattering function: 20, 100, 500, 1000, 2000ms)	
Output protection	Short circuit protection	
Repeatability	±0.2%F.S. ±1digit	
Hysteresis	Adjustable (can be set from 0) (note)	
Window comparator mode		
Analogue output	Output voltage	1 to 5V±2.5%F.S.
	Linearity	±1%F.S. or less
	Output impedance	Approx. 1kΩ
	Output current	4 to 20mA±2.5%F.S.
	Linearity	±1%F.S. or less
Load impedance	Max. load impedance:	300Ω with power supply voltage of 12V 600Ω with power supply voltage of 24V
	Min. load impedance:	50Ω
Display method	4-digit 7-segment indicator LCD 2-color display (Red and green)	
Indicator accuracy	±2%F.S. ±1digit(at 25°C ±3°C ambient temperature)	
Indicator	LED lit when output is ON OUT1: Green OUT2:Red	
Enclosure and Reference	Enclosure	IP40
	Ambient temperature	Operating:0 to 50°C; Stored: -10 to 60°C (No freezing or condensation)
	Ambient humidity	Operating and stored: 35 to 85%RH (No condensation)

Withstand voltage	1000VAC for 1 min. between live parts and enclosure
Insulation resistance	50MΩ or more between live parts and enclosure (at 500VDC)
Vibration proof	10 to 150Hz 1.5mm or 20m/s ² amplitude in X,Y,Z directions for 2 hours each
Impact resistance	100m/s ² X, Y, Z directions 3 times each
Temperature characteristics	±2%F.S.(based on 25°C)
Lead wire	Oil resistant heavy-duty vinyl cable 3 wire φ3.5 2m 4 wire conductor cross section:0.15mm ² (AWG26) Insulator outside diameter:1.0mm

Note) If the applied voltage fluctuates around the set value, the set hysteresis must exceed the fluctuation width, otherwise, chattering will occur.

Suction Filter Unit

Part No.	ZR1-FX
Operating pressure range	Vacuum to 0.5 MPa
Operating temperature range	5 to 50°C
Filtration efficiency	30µm
Element	PVF
Weight	0.1kg

Caution

- The Suction Filter Unit Case is made from polycarbonate. Therefore, do not use or expose to paint thinner, carbon tetrachloride, chloroform, acetic ester, aniline, cyclohexane, trichloroethylene, sulfuric acid, lactic acid, water soluble cutting oil (alkalinic), etc.
- Do not expose to direct sunlight.

Manifold Specifications

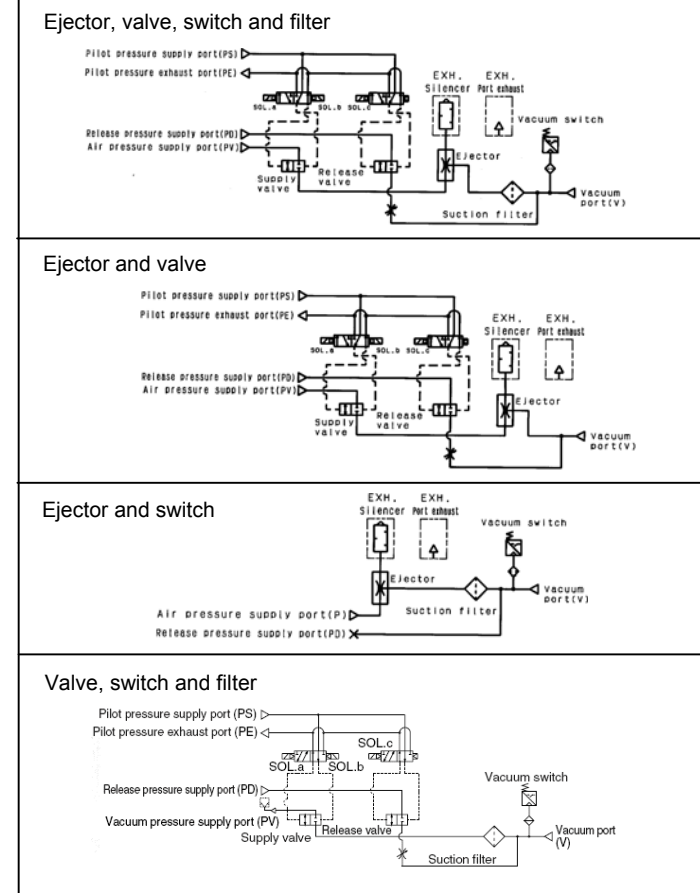
Maximum number of units	6 stations
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Port	Port size	Function
PV port	Rc1/8	Air supply for ejector
PS port	M5	Air supply for pilot valve
PD port	M5	Air supply for release
EXH port	Rc1/2	Common exhaust

Individual Spacer

Part No.	Port	Function
ZR1-R1	PV	Possible to set the external vacuum pressure individually
	PS	Possible to set the pilot valve air supply pressure individually
	PD	Possible to set the release valve supply pressure individually
	PE	Possible to set the pilot valve exhaust individually

2.2 Circuit Symbols



3 Installation

3.1 Installation

Warning

- Do not install the product unless the safety instructions have been read and understood.

3.2 Environment

Warning

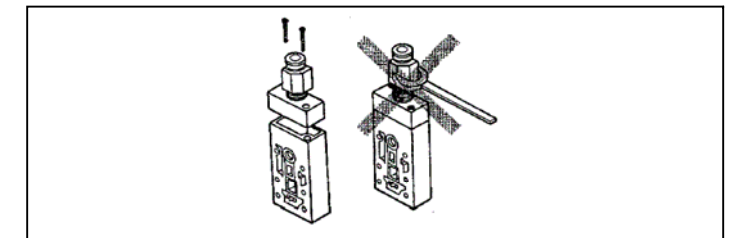
- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact. Check the product specifications.
- Do not mount in a location exposed to radiant heat.

3.3 Piping

Warning

- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

Thread	Tightening Torque
M5	By hand + 1/6 turn with a wrench (1/4 turn for miniature fittings)
Rc 1/8	7 to 9
Rc 1/2	20 to 22



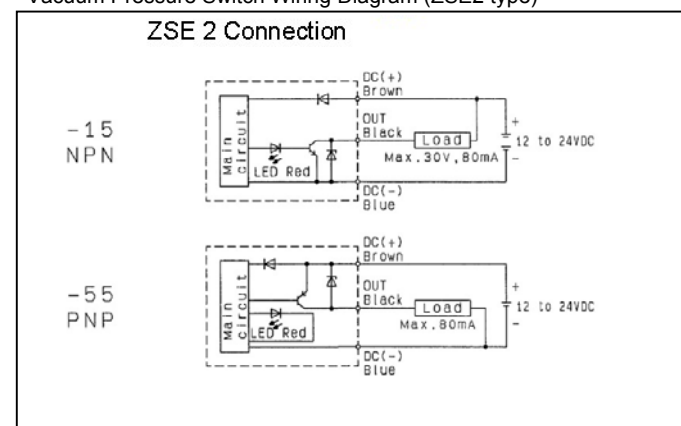
- Install piping adaptor before mounting onto the ejector body

3.4 Electrical Connection

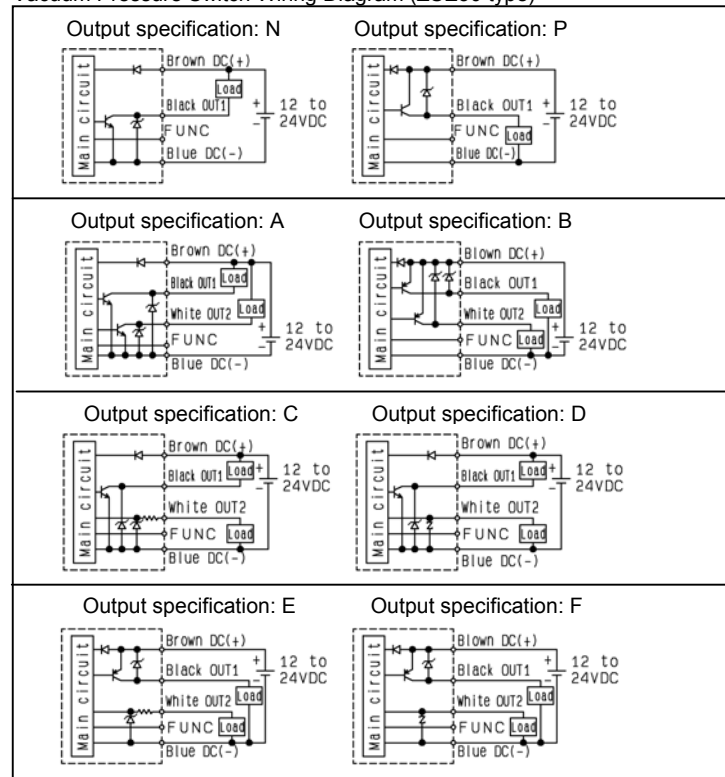
Caution

- When DC power is connected to a solenoid valve equipped with light and/or surge voltage suppressor, check for polarity indications.
- For polarity indications:
 - No diode to protect polarity: if polarity connection is wrong, the diode in the valve or switching device at control equipment or power supply may be damaged.
 - With diode to protect polarity: if polarity connection is wrong, the valve does not switch.

Vacuum Pressure Switch Wiring Diagram (ZSE2 type)



Vacuum Pressure Switch Wiring Diagram (ZSE30 type)



Warning

Wiring electronic Pressure Switch

• **Confirm wire colours and terminal numbers when wiring.**
 Since incorrect wiring can lead to breakage or failure of the switch as well as malfunction, perform wiring after confirming wiring colours and terminal numbers with the instruction manual.

- **Avoid repeatedly bending or stretching lead wires.**
 Broken lead wires will result from applying bending stress or stretching force to the lead wires. In the event that lead wires are damaged creating a possibility of malfunction, replace the entire product. (For cases in which the lead wires cannot be replaced through grommets.)
- **Confirm proper insulation of wiring.**
 Be certain that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.
- **Do not wire with power lines or high voltage lines.**
 Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit. Control circuits containing switches may malfunction due to noise from other lines.
- **Do not allow short circuiting of loads.**
 Use caution, as switches will be damaged if a load is short circuited. Be especially careful not to reverse the power supply line (Brown) and the output line (Black).

3.5 Mounting

Warning

- **Read the instruction manual carefully.**
 The product should be mounted and operated with a good understanding of its contents. Also, keep the manual where it can be easily referred to at any time.
- **Ensure space for maintenance.**
 Ensure the necessary space for maintenance activities.
- **Be sure to tighten screws with the proper torque.**
 When mounting, tighten screws with the recommended torque.
- **Do not obstruct the exhaust port of the ejector.**
 If the exhaust port is obstructed when mounted, a vacuum will not be generated.

Warning

Electronic Pressure Switch

- **Do not use if equipment does not operate properly.**
 Verify correct mounting by suitable function and leakage inspections after air and power are connected following mounting or maintenance.

- **Do not drop or bump.**
 Do not drop, bump or apply excessive impact (1000m/s²) when handling. Even if the switch body is not damaged, the switch may suffer internal damage that will lead to malfunction.
- **Hold the product from the body side when handling.**
 The tensile strength of the power cord is 49N, and pulling it with a force greater than this can cause failure. Hold by the body when handling.
- **Turn the setting trimmer gently using a watchmakers screwdriver.**
 Turn the setting trimmer gently using a watchmakers screwdriver. Do not turn beyond the stoppers located at both ends. If the trimmer is broken, adjustment will be impossible.
- **Pressure port**
 Do not insert wire, etc., from the pressure port. This will damage the pressure sensor, making it impossible to obtain normal operation.

3.6 Air Supply Circuit

Warning

- When designing the air supply circuit ensure that pipe sizes have sufficient capacity to prevent any pressure drop within the generator, this also applies to valves and fittings.
- The supply air should be clean and oil free.

- **Vacuum circuit**
 Ensure that the piping from generator to vacuum pad is kept as short as possible to prevent restriction and leakage.

- **Vacuum pads**
 When installing vacuum generators the rule is one generator → one vacuum pad. If this rule is ignored then possible loss of vacuum during pick-up will occur.

4 Maintenance

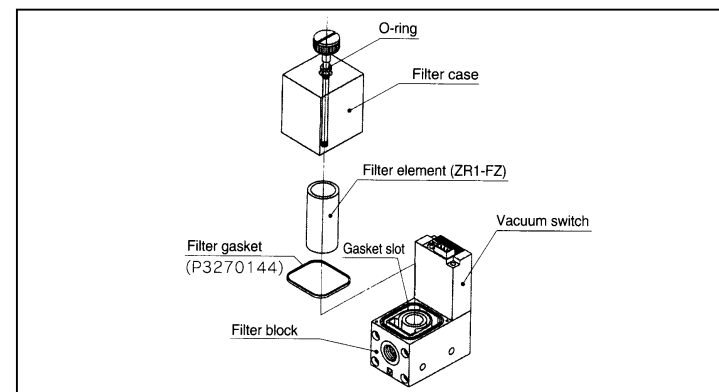
4.1 General Maintenance

Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous. Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

How to replace the Elements

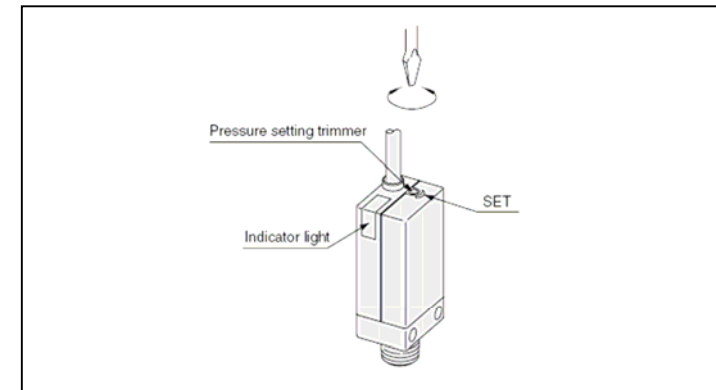
- When an element becomes clogged, vacuum performance and response times degrade. Stop operation and replace the element. (Element no. ZR1-FZ). Please ensure that the gasket is in the slot before re-installation



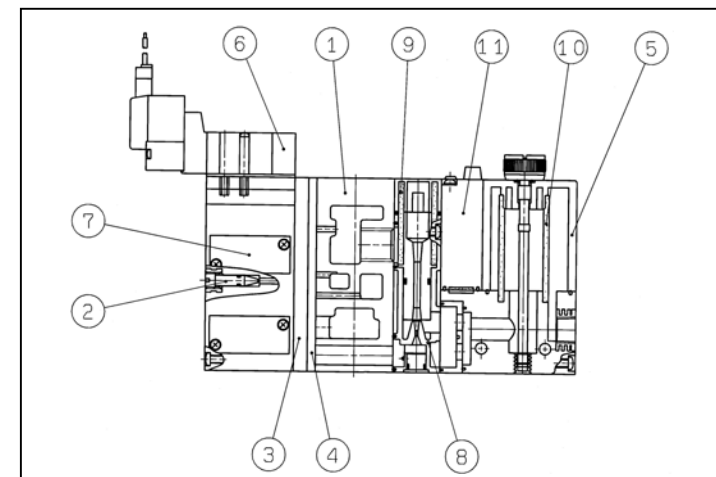
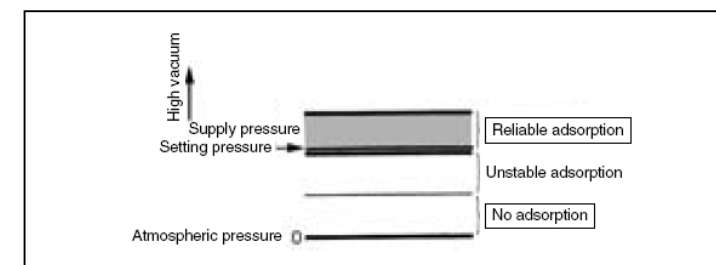
5 Limitations of Use

How to Set the Vacuum Pressure

- The pressure setting trimmer sets the ON pressure. A clockwise rotation increases a high vacuum set point.



- When using the switch to confirm correct adsorption, the set pressure should be as low as possible, but not so low that a false confirmation signal is given when adsorption is incomplete.



Parts List

No.	Description	Material
1	Manifold base	Aluminium
2	Release flow rate adjustment needle	Stainless steel
3	Function plate	PBT
4	Individual spacer	PBT
5	Filter case	Polycarbonate

Replacement Parts

No.	Description	Material	Part No.
6	Pilot valve assembly	-	-
7	Valve body assembly	-	-
8	Ejector assembly	-	-
9	Silencer element	PVF	-
10	Filter element	PVF	ZR1-FZ
11	Vacuum switch	-	ZSE2-OR-15 ZSE30A-00-x-xx-X505

6 Contacts

AUSTRIA	(43) 2262 62280	NETHERLANDS	(31) 20 531 8888
BELGIUM	(32) 3 355 1464	NORWAY	(47) 67 12 90 20
CZECH REP.	(420) 541 424 611	POLAND	(48) 22 211 9600
DENMARK	(45) 7025 2900	PORTUGAL	(351) 21 471 1880
FINLAND	(358) 207 513513	SLOVAKIA	(421) 2 444 56725
FRANCE	(33) 1 6476 1000	SLOVENIA	(386) 73 885 412
GERMANY	(49) 6103 4020	SPAIN	(34) 945 184 100
GREECE	(30) 210 271 7265	SWEDEN	(46) 8 603 1200
HUNGARY	(36) 23 511 390	SWITZERLAND	(41) 52 396 3131
IRELAND	(353) 1 403 9000	UNITED KINGDOM	(44) 1908 563888
ITALY	(39) 02 92711		

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