

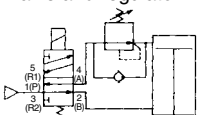
5 Port Electro-Pneumatic Proportional Valve Series *VER2000/4000*

Capable of actuating a cylinder and performing analog control of pressurization

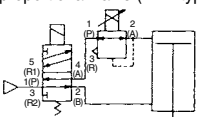
VER alone can be used to switch and actuate a cylinder and to perform stepless pressure control of port A through electric signals.



Circuit of directional control valve and regulator



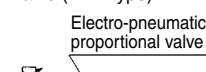
Circuit of directional control valve and electro-pneumatic proportional valve (VEP type)



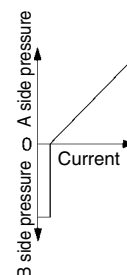
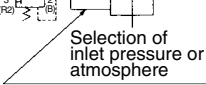
- Simplifying circuit design
- Space saving and piping work eliminated
- Automating pressure control

- Simplifying circuit design
- Space-saving and piping work eliminated

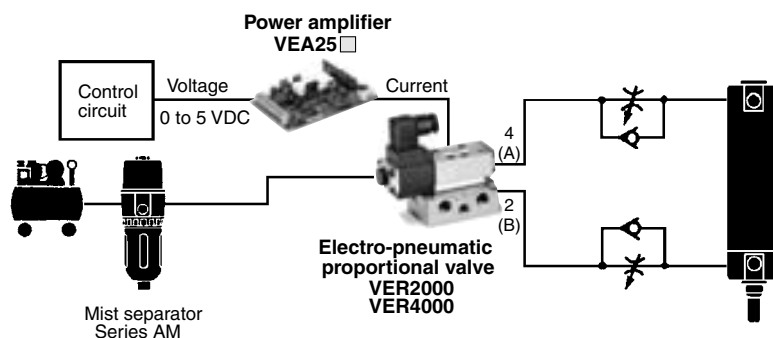
Circuit of electro-pneumatic proportional valve (VER type)



Selection of inlet pressure or atmosphere



System Diagram



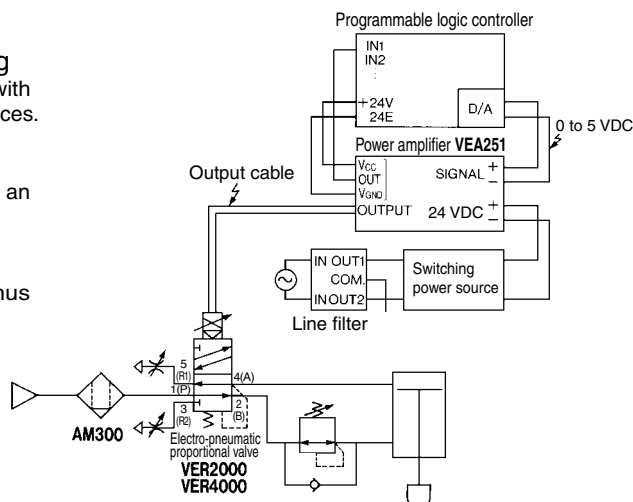
Application Example

Purpose

Electrode pressurization control for spot welding
Automatically varies the applied pressure in accordance with the material, thickness, and stacked quantity of the workpieces.

Auxiliary functions

Through the use of a power amplifier that is equipped with an abnormality detection circuit,
 • Open circuit in the output wire
 • Malfunction in the 24 VDC power supply
 can be detected by a programmable logic controller, thus preventing defective workpieces or equipment damage.



Series VER2000/V4000



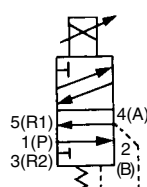
Standard Specifications

	Model	Direct operated type VER2000	Internal pilot type VER4000	External pilot type VER4001
Item				
Port size		1/4, 3/8	3/8, 1/2, 3/4	
Fluid		Air		
Max. operating pressure		1.0 MPa		
Ambient and fluid temperature		0 to 50°C (No condensation)		
A port setting pressure range		0.1 to 0.9 MPa	0.1 to 0.9 MPa ⁽¹⁾	0.1 to 0.9 MPa ⁽²⁾
Max. effective area (Cv factor)		16 mm ² (0.9)	52 mm ² (2.9)	
Response time		0.04 s	0.06 s	
Hysteresis		3% F.S.		
Repeatability		3% F.S.		
Sensitivity		0.5% F.S.	1.5% F.S.	
Linearity		3% F.S.		
Lubrication		Not required (Use turbine oil Class 1, ISO VG32 if lubricated.)		
Mass		1.24 kg	3/8, 1/2: 2.20 kg, 3/4: 2.81 kg	

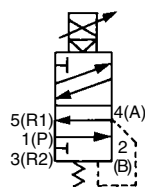


Note 1) Set the inlet pressure by 0.05 MPa or larger than the required maximum set pressure.
 Note 2) Set the pilot pressure by 0.05 MPa or larger than the required maximum set pressure.
 Note 3) The non-lubricated specification is not applicable to these models.

JIS Symbol



VER2000



VER4000

Proportional Solenoid Specifications

Applicable power amplifier	VEA25□
Max. current	1 A
Coil resistance	13 Ω (Ambient temperature 20°C)
Rated power consumption	13 W (Ambient temperature 20°C, with maximum current)
Coil insulation type	Class H or equivalent (180°C)
Max. temperature rise	140°C (Ambient temperature 50°C, with maximum current)
Electrical entry	DIN terminal

Manifold



Can be made into manifold with series "VV72".
 "VER2000" is V type.
 (Refer to Best Pneumatics No. 1 for further information.)

Accessory

Model	VER2000	VER4000
Mounting screw (With washer)	M5 x 45	M6 x 53
Gasket	AXT500-13	AXT510-13, VER4-13
Feed back plate	—	VER4-3P

Option

Model	VER2000	VER4000
Spacer type regulator (B port regulator)	ARB210-00-B	ARB310-00-B
Flow control interface	AXT503-23A	AXT510-32A
Pressure gauge	G36-10-01	G36-10-01



Model Selection

- Applicable cylinder bore size: ø25 to ø125
- For model selection, refer to "Selecting Electro-pneumatic Proportional Valve" on page 706.

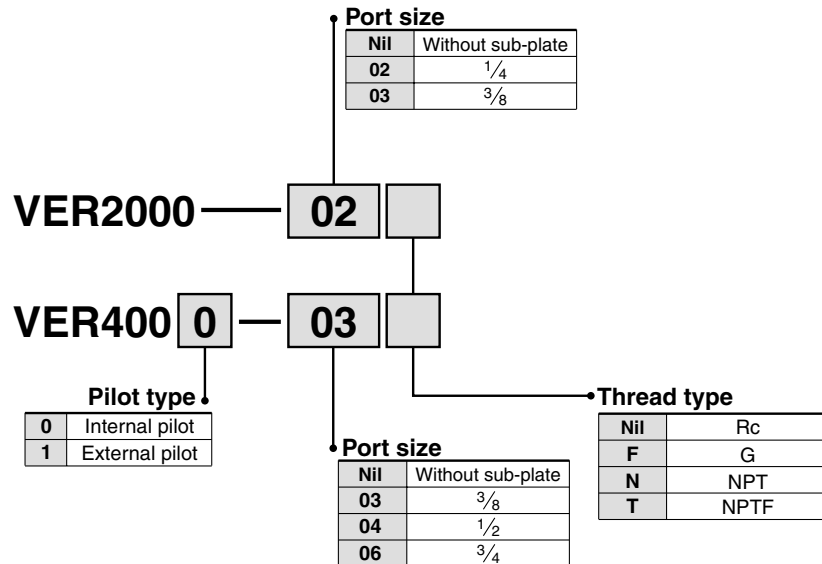
5 Port Electro-Pneumatic Proportional Valve *Series VER2000/4000*

How to Order



Series VER2000

Series VER4000

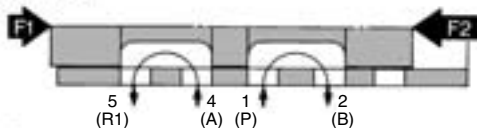


Note) To order valve with interface regulator (B port regulation), flow control interface, or pressure gauge, indicate part number of the electro-pneumatic proportional valve and that of the option *. Refer to "Option" on page 704 for part number of option. Products will be in the same package and not assembled when delivered.

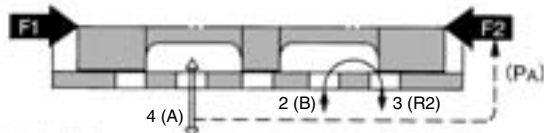
Example) VER4000-03 1 pc.
 * ARB310-00-B 1 pc.
 * G36-10-01 1 pc.

Working Principle

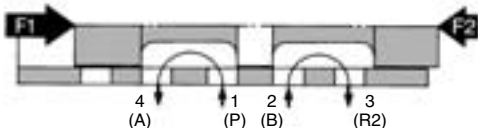
① $F1 < F2$



② $F1 = F2$



③ $F1 > F2$



F1: The pulling force of the solenoid when a specified amperage is applied to the solenoid, or the force that is created by the pilot pressure.

F2: The force that is created by the port 4 pressure (P_A) that passes through the feedback passage and acts on the spool surface, and the spring force.

OFF state

$F1 < F2$ condition: See figure ①.

{ Port 4 (A) → Port 5 (R1) [Exhaust air]
 { Port 1 (P) → Port 12 (B) (Supply air)

ON state

Immediately after turning on — $F1 > F2$: See figure ③.

Thereafter — $F1 = F2$: See figure ②.

[In ②, port 3(R) is half open.]

{ Port 1 (P) → Port 14 (A) (Supply air)
 { Port 2 (B) → Port 13 (R2) (Exhaust air)
 { Port 4 (A) (P_A Setting)
 { Port 2 (B) → Port 13 (R2) (Exhaust air)

ARJ

AR425
to 935

AMR

ARM

ARP

IR

IRV

VEX1□

SRH

SRP

SRF

ARX20

VCHR

ITV

IC

PVQ

VEF
VEP

VER

VEA

VY2

VBA
VBAT

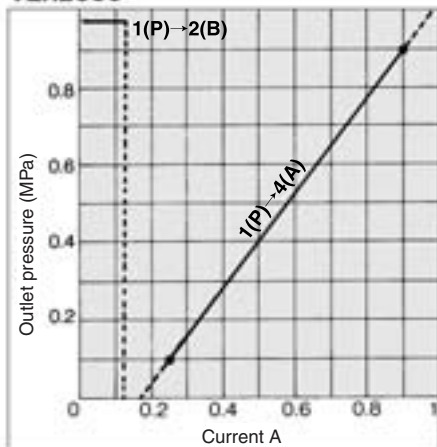
AP100

Series VER2000/V4000

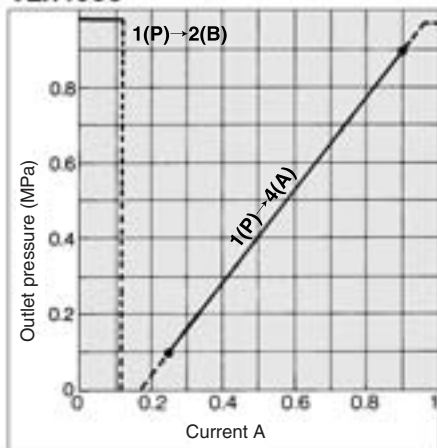
Current—Pressure Characteristics

The horizontal axis of the characteristics represents the output amperage of the power amplifier VEA25□. (If NULL and GAIN are in the shipping condition, 0 to 1 A can be viewed by substituting them with command signals 0 to 5 V.)

VER2000

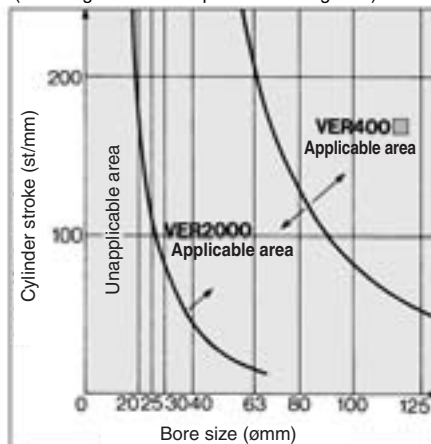


VER4000



Selecting Electro-pneumatic Proportional Valve

The response behavior of an electro-pneumatic proportional valve is affected by the load capacity. Therefore, select an electro-pneumatic proportional valve in accordance with the bore and the stroke of the cylinder to be used. (The diagram below is provided as a guide.)



How to Find the Flow Rate Air temperature of 20°C

Subsonic flow at $P_1 + 0.1013 < 1.89 (P_2 + 0.1013)$

$$Q = 226S\sqrt{\Delta P (P_2 + 0.1013)}$$

Sonic flow at $P_1 + 0.1013 \geq 1.89 (P_2 + 0.1013)$

$$Q = 113S (P_1 + 0.1013)$$

Q: Air flow rate [L/min (ANR)]

S: Effective area [mm²]

ΔP : Amount of pressure drop $P_1 - P_2$ [MPa]

P₁: Upstream pressure [MPa]

P₂: Downstream pressure [MPa]

Note) Correction for varying air temperatures:
Square the coefficient indicated in the table below with the flow rate that has been obtained from the above formula.

Air temp. (°C)	-20	-10	0	10	30	40	50	60
Coef. for compensation	1.08	1.06	1.04	1.02	0.98	0.97	0.95	0.94

⚠ Precautions

Be sure to read before handling.
Refer to front matters 42 and 43 for Safety Precautions and pages 287 to 291 for Precautions on every series.

⚠ Caution

1. Air supply

- Poor quality air could increase the spool's sliding resistance, while preventing it from attaining its specified characteristics. Use compressor oil with a minimal generation of oxidants and install a mist separator (SMC's AM series). Refer to pages 2 and 3.
- Avoid using ultra-dry air since it may reduce the amount of lubricant and shorten the service life.

2. Mounting

- Vibrations are transmitted to the valve by the proportional solenoid's dither. If it is necessary to prevent the transmission of vibrations, insert vibration isolating rubber material.
- Thoroughly flush the pipe to completely eliminate any dust or scales from the pipe inside.
- Install a silencer (AN series) on the exhaust port.
- Be careful with the molded coil because it generates heat while current is applied to it.

3. Lubrication

This product can be used without lubrication. But if lubricated, use turbin oil Class 1, ISO VG32 (with no additive). It is impossible to use spindle oil, machine oil, or grease.

4. Manual operation

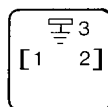
To check the operation of the valve without applying a current, remove the lock nut and use a screwdriver or the like to press the tip of the core. After checking the operation, reinstall the rubber cap in its original position.

How to Use DIN Terminal

Wiring procedure

1. Loosen the retaining screw and pull out the connector from the pin plug.
2. Make sure to remove the retaining screw, insert the tip of a flat head screwdriver into the groove below the terminal block and pry it up to separate the terminal cover from the terminal block.
3. Securely connect the wires to the specified terminals in accordance with the wiring procedure.

Wiring



Pin plug shape

Terminal block
Connection 3 is not used for terminal 1 and 2.
Note) Coil has no polarity.

Applicable cable (Cabtire cable)

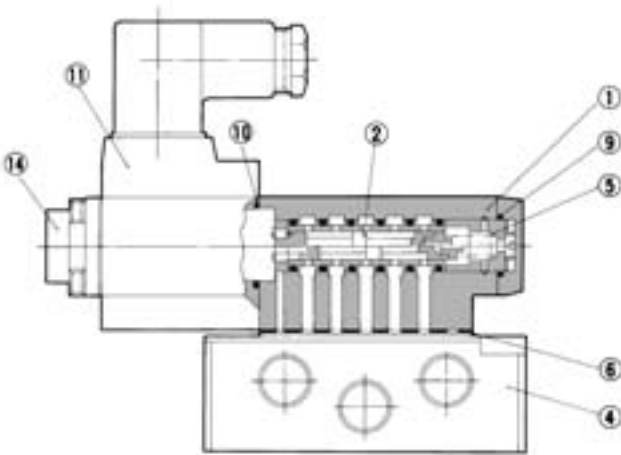
0.75 mm², 1.25 mm²/2 core, 3 core (O.D. ø6.8 to ø11.5) based on JIS C 3312 and C 3322.

Outlet changing procedure

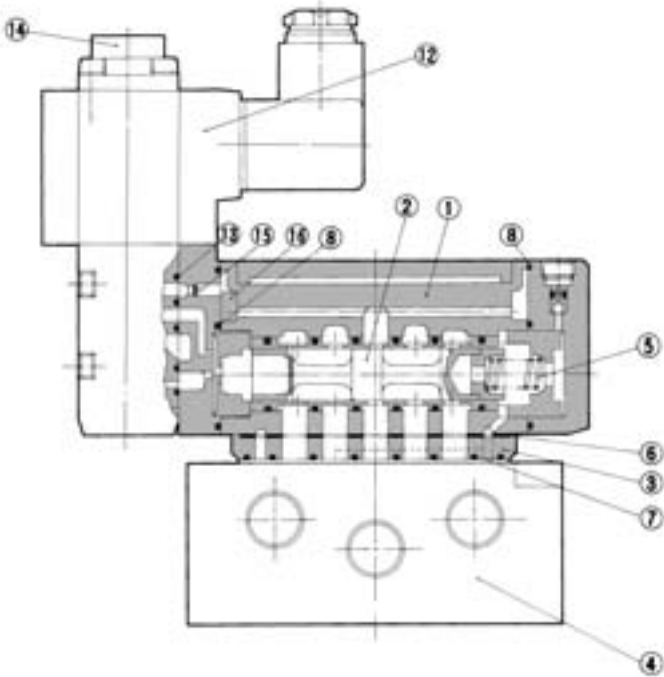
To change the wire outlet, first separate the terminal cover from the terminal block. Then, reinstall the terminal cover in the desired direction (in 90° increments).

Construction

VER2000



VER4000



Component Parts

No.	Description	Material	Note	No.	Description	Material	Note
1	Body	Aluminum alloy	Metallic painted	9	O-ring	NBR	—
2	Spool sleeve	Special stainless steel	—	10	O-ring	NBR	—
3	Feed back plate	Aluminum alloy	Metallic painted	11	Proportional solenoid	—	—
4	Sub-plate	Aluminum alloy	—	12	Pilot valve assembly	—	—
5	Spring B	Stainless steel	—	13	Gasket	NBR	—
6	Gasket	NBR	—	14	Lock nut	NBR	—
7	Gasket	NBR	—	15	Filter	Stainless steel	—
8	Gasket	NBR	—	16	Block packing	NBR	—

Note) Block packing ⑯: VER4001 (Outer pilot)

ARJ

AR425
to 935

AMR

ARM

ARP

IR

IRV

VEX□

SRH

SRP

SRF

ARX20

VCHR

ITV

IC

PVQ

VEF
VEP

VER

VEA

VY2

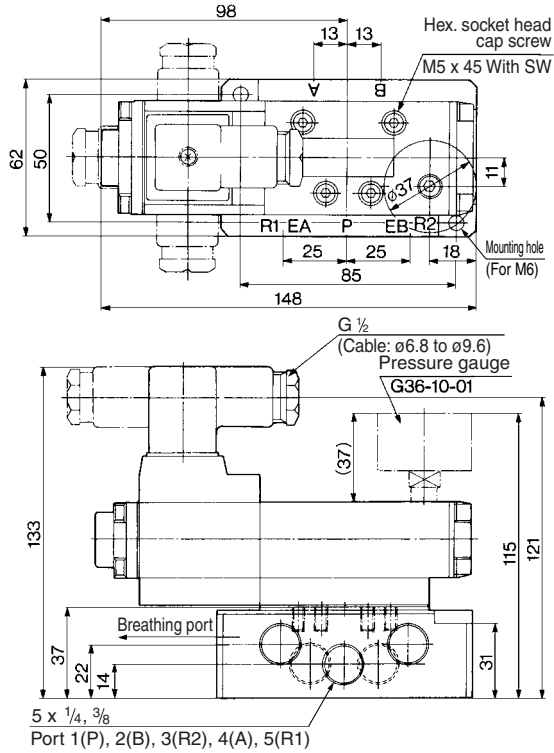
VBA
VBAT

AP100

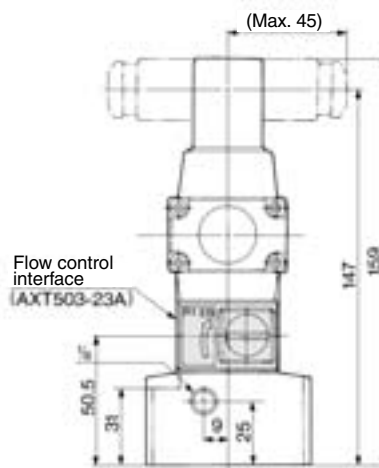
Series VER2000/4000

Dimensions

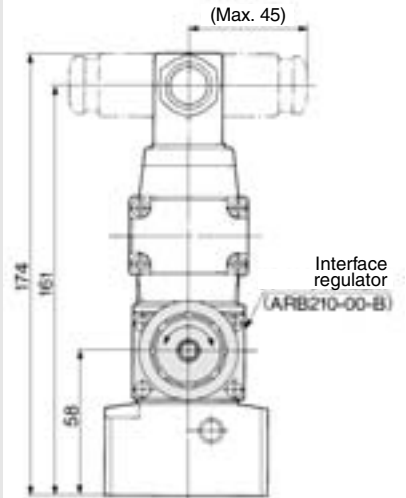
VER2000-□□□: With sub-plate



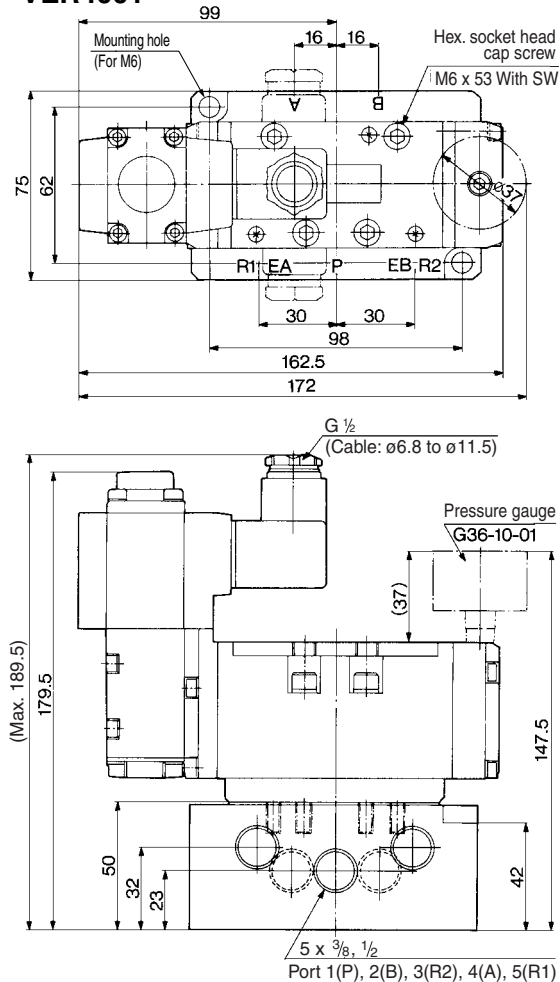
With flow control interface



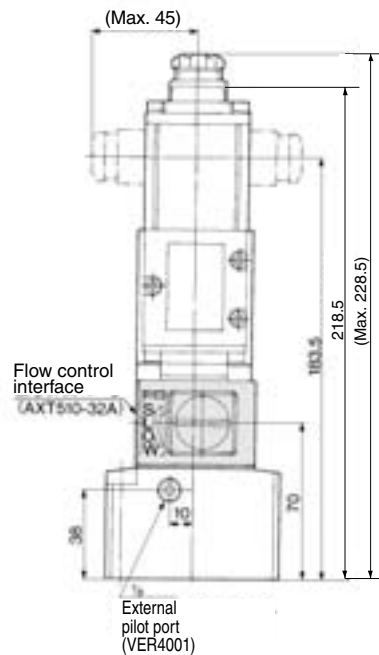
With B port regulator



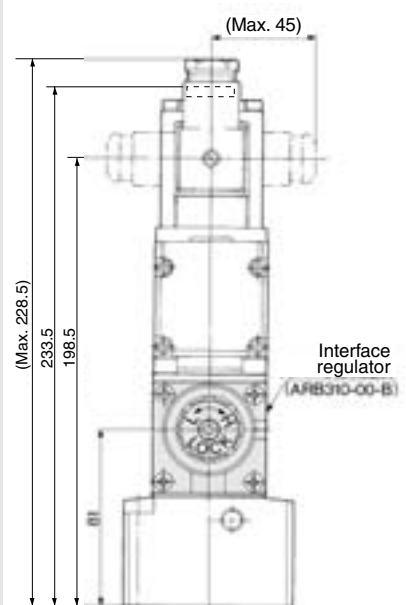
VER4000-□□□: With sub-plate VER4001



With flow control interface



With B port regulator



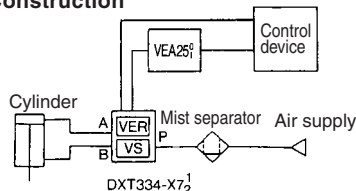
5 Port Electro-Pneumatic Proportional Valve Related Products:

A solenoid valve for actuating a cylinder and an electro-pneumatic proportional valve for pressure control have been integrated into a single unit. High response has been achieved.

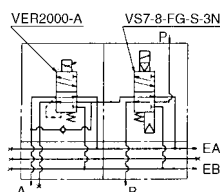
- The size and the direction of the pipe port can be selected.
- The size of the electro-pneumatic proportion can be selected.
- Solenoid valves for actuating a 2 stage stroke gun cylinder or a clamp cylinder can be mounted on an integrated manifold (maximum of 8 stations).



Construction



Circuit (Basic unit: DXT334-X7₂¹)



Specifications

Stations	Solenoid valves (8 stations at max.) can be added to the basic unit (2 stations). ^{Note)}
Port size	Rc 3/8, 1/2

Note) Composed of basic unit (VER2000-A, VS7-8-FG-S-3N)

Refer to Best Pneumatics No. 1 for details about solenoid valve.

VER2000-A

Set pressure range of A port ^{Note)}	0.1 to 0.9MPa
Power amplifier	VEA250, VEA251
Wiring	DIN terminal



Note) In the case of VER4000, set the inlet pressure by 0.05 MPa or higher than the required maximum set pressure.

VS7-8-FG-S-3N

Rated voltage	24 VDC (-15% to +10%)
Wiring	DIN terminal

How to Order

DXT334-X7 — 04R — 04U

Pressurization control unit

Size of 5 port electro-pneumatic proportional valve

1	VER2000-A
2	VER4000-A

R1, R2 port size

04U	R1/R2 port Rc 1/2
-----	-------------------

A, B, P port size

04R	A/B port Rc 1/2 (Right side), P port Rc 1/2 (Left side)
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Additional stations of solenoid valves

Nil	0 station
...	...
8	8 stations

Ordering example

DXT334-X711-04R-04U..... 1 pc.

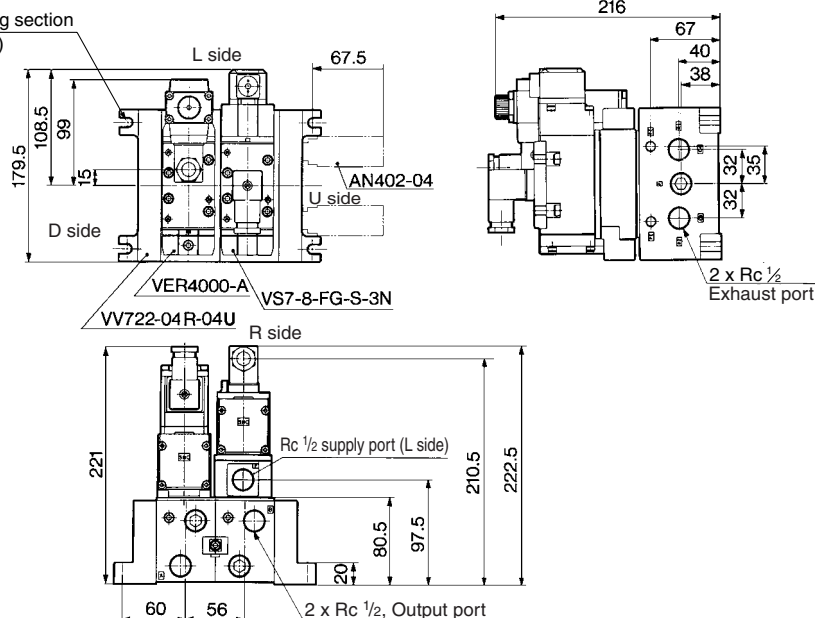
VS7-8-FG-D-3M 1 pc.

(Third station of manifold where 1 piece of "VS7-8-FG-D-3M" is added to the basic unit of "VER2000-A" and "VS7-8-FG-S-3N".)

Dimensions

DXT334-X72-04R-04U

Mounting section
(For M8)



ARJ

AR425
to 935

AMR

ARM

ARP

IR

IRV

VEX1□

SRH

SRP

SRF

ARX20

VCHR

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VER

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AP100