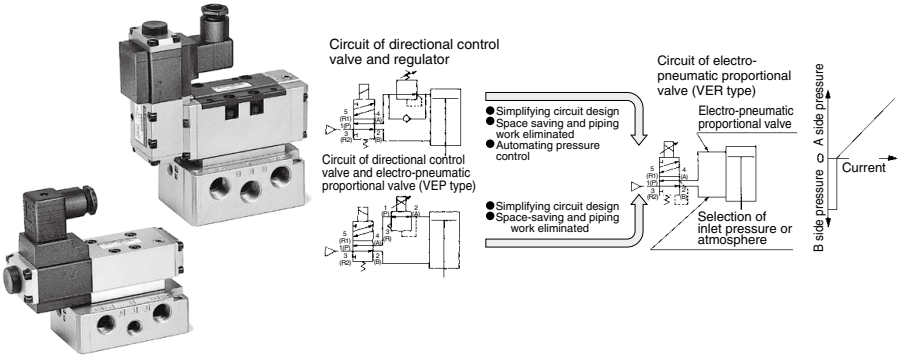
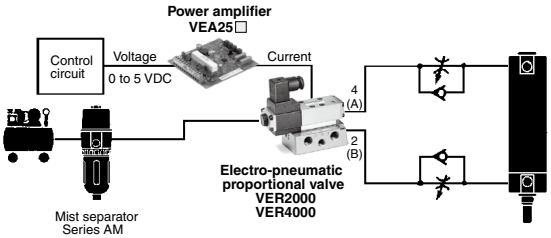
5 Port Electro-Pneumatic Proportional Valve
Series VER2000/4000

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.



System Diagram



Application Example

Purpose

Electrode pressurization control for spot welding

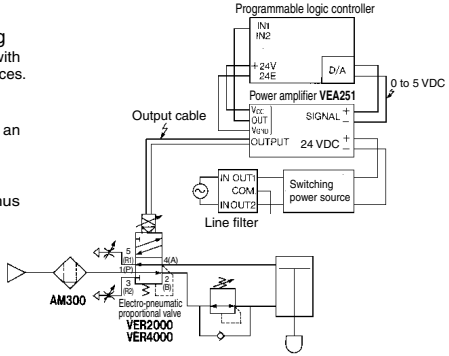
Automatically varies the applied pressure in accordance with the material, thickness, and stacked quantity of the workpieces.

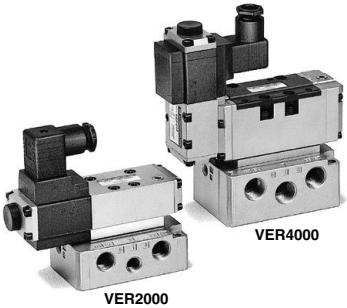
Auxiliary functions

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.



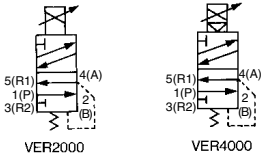


Standard Specifications

Item \ Model	Direct operated type **VER2000**	Internal pilot type **VER4000**	External pilot type **VER4001**
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 mm² (0.9)	52 mm² (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.)		
Weight	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 pressrue.
Note 2) Set the pilot pressure by 0.05 MPa or larger than the required maximum set pressrue.
Note 3) The non-lubricated specification is not applicable to these models.

Symbol



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

Sub-plate and Gasket Part No. for VER2000/4000 (②, ③, and ④ are included in the valve.)

Model	VER2000	VER4000
①Sub-plate	**AXT500-1-□P□** (Port size: Symbol 2 = 1/4, 3 = 3/8; Thread type: Nil = Rc, F = G Note 1), T = NPTF Note 2))	**AXT510-1-□P□** (Port size: Symbol 1 = 3/8, 2 = 1/2, 11 = 3/4; Thread type: Nil = Rc, F = G Note 1), T = NPTF Note 2))
②Mounting screw (With washer)	CA01445	CA01444
③Gasket	AXT500-13	AXT510-13, VER4-13
④Feed back plate	—	VER4-3P

Note 1) Does not conform to ISO1179-1.
Note 2) The sub-plates with the thread types "N: NPT" and "T: NPTF" are common to each other. When using the sub-plate with the thread type "N:NPT", please order the sub-plate with the thread type "T:NPTF".

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

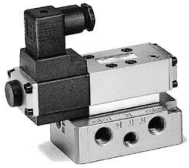
Model Selection

- Applicable cylinder bore size: ø25 to ø125
- For model selection, refer to "Selecting Electro-pneumatic Proportional Valve" on page 895.

Manifold

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

How to Order



Series VER2000

Series VER4000

VER2000 — 02 □

VER400 0 — 03 □

Port size

Nil	Without sub-plate
02	1/4
03	3/8

Pilot type

0	Internal pilot
1	External pilot

Port size

Nil	Without sub-plate
03	3/8
04	1/2
06	3/4

Thread type

Nil	Rc
F	G Note 1)
T	NPTF Note 2)

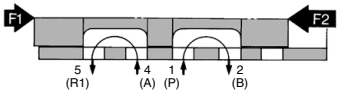
Note 1) Does not conform to ISO1179-1.
Note 2) The sub-plates with the thread types "N: NPT" and "T: NPTF" are common to each other. When using the sub-plate with the thread type "N:NPT", please order the sub-plate with the thread type "T:NPTF".

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 893 for part number of option. Products will be in the same package and not assembled when delivered.

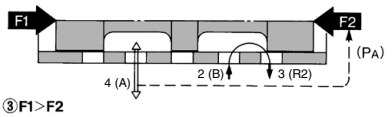
Example) VER4000-03 ····· 1 pc.
∗ ARB310-00-B ····· 1 pc.
∗ G36-10-01 ····· 1 pc.

Working Principle

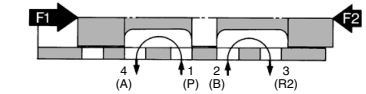
①**F1<F2**



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 ceated by the port **4** pressure (**PA**) 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.
- Port 1 (P)→Port 14 (A) (Supply air)
- Port 2 (B)→Port 13 (R2) (Exhaust air)

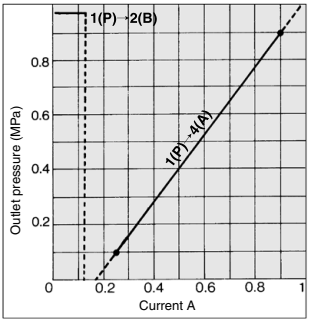
Thereafter — **F1** = **F2**: See figure ②.
- Port 4 (A) (PA Setting)
- Port 2 (B)→Port 13 (R2) (Exhaust air)

[In②, port 3(R) is half open.]

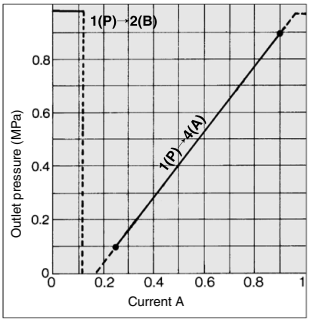
Current—Pressure Characteristics

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

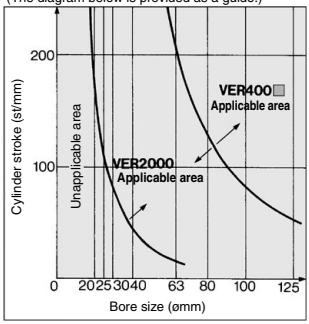


VER4000



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 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

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

Pin plug shape

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).

How to Find the Flow Rate

Air temperature of 20°C

Subsonic flow at P1 + 0.1013 < 1.89 (P2 + 0.1013)

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

Sonic flow of P1 + 0.1013 ≥ 1.89 (P2 + 0.1013)

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

Q: Air flow rate [L/min (ANR)]
S: Effective area [mm²]
△P: Amount of pressure drop $P_1 - P_2$ [MPa]
P_1: Upstream pressure [MPa]
P_2: 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 matter 43 for Safety Instructions and pages 365 to 369 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

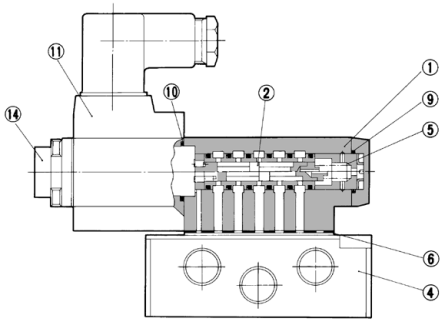
This product can be used without lubrication. But if lubricated, use turbin oil Class 1, ISO VG32 (with no additive). It is impossible to use spindle oil, machine oil, or grease.

4. Manual operation

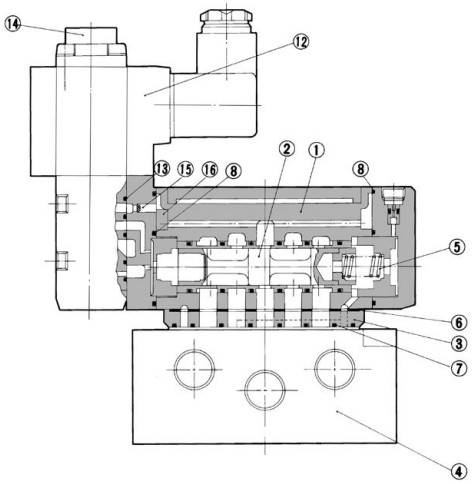
To check the operation of the valve without applying a current, remove the lock nut and use a screwdriver or the like to press the tip of the core. After checking the operation, reinstall the rubber cap in its original position.

Construction

VER2000



VER4000



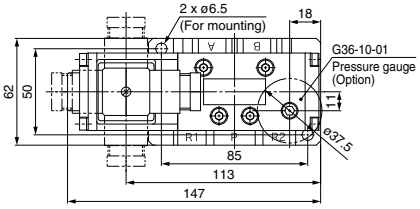
Component Parts

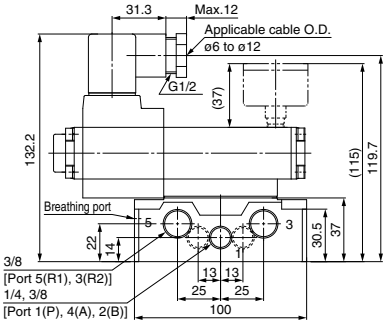
No.	Description	Material	Note	No.	Description	Material	Note
1	**Body**	Aluminum alloy	Metallic painted	9	**O-ring**	NBR	—
2	**Spool sleeve**	Special stainless steel	—	10	**O-ring**	NBR	—
3	**Feed back plate**	Aluminum alloy	Metallic painted	11	**Proportional solenoid**	—	—
4	**Sub-plate**	Aluminum alloy	—	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)

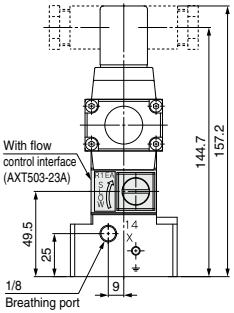
Dimensions

VER2000-□□: With sub-plate

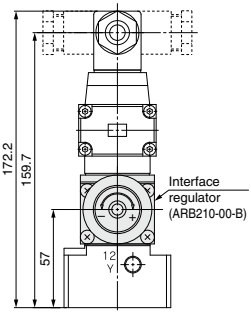




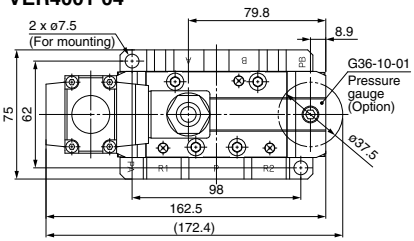
With flow control interface

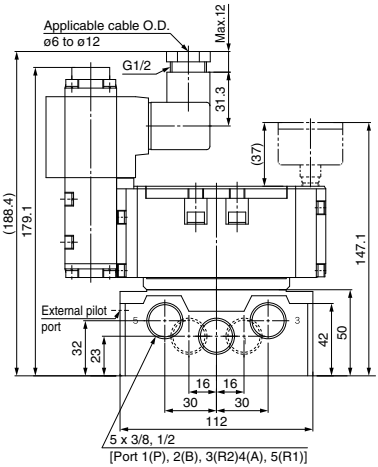


With B port regulator

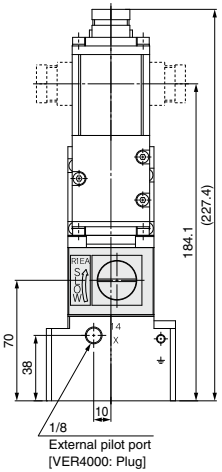


VER4000-03□: With sub-plate
VER4001-04□: With sub-plate

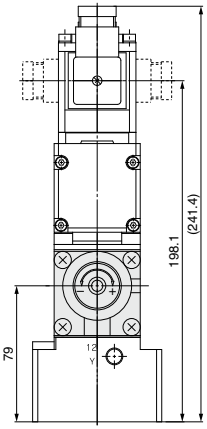




With flow control interface

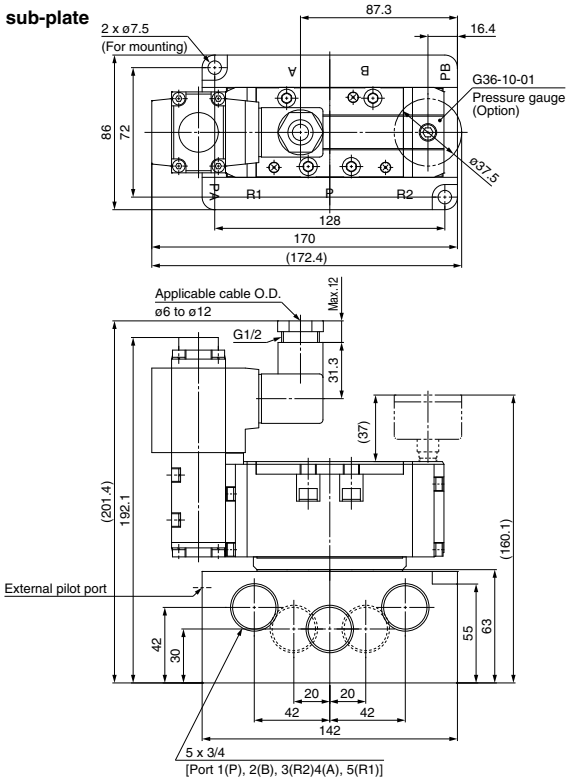


With B port regulator

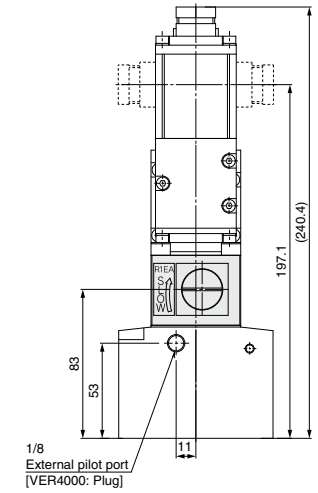


Dimensions

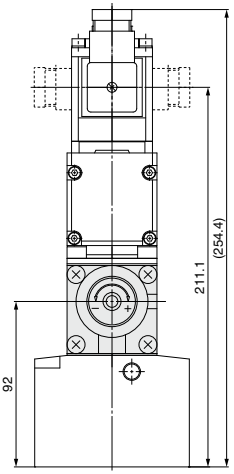
VER400$^{0}_{1}$-06□: With sub-plate



With flow control interface



With B port regulator

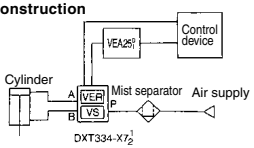


5 Port Electro-Pneumatic Proportional Valve
Related Products:

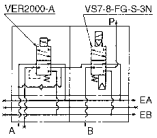
A solenoid valve for actuating a cylinder and an electro-pneumatic proportional valve for pressure control have been integrated into a single unit. High response has been achieved.

- 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-X7□)



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 (VER□000-A, VS7-8-FG-S-3N)
Refer to Best Pneumatics No. 1 for details about solenoid valve.

VER□000-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 reguired 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

Additional stations of solenoid valves

Nil	0 station
⋮	⋮
8	8 stations

A, B, P port size

04R	A/B port Rc 1/2 (Right side), P port Rc 1/2 (Left side)

R1, R2 port size

04U	R1/R2 port Rc 1/2

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