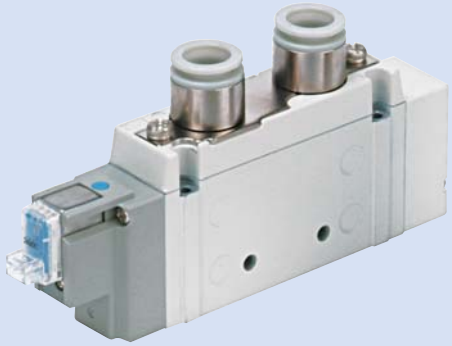
Directional Control Valves
4/5 Port Solenoid Valves for Pneumatics

Solenoid valves

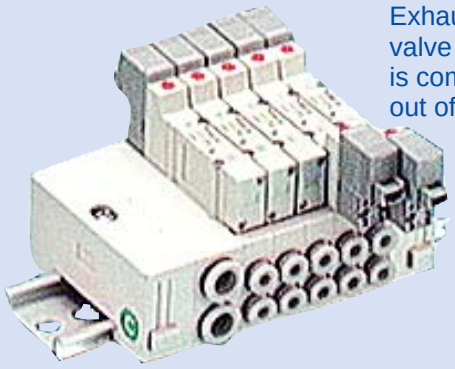


Manifolds

Environment

Clean

Exhaust for the main valve and the pilot valve is common and released out of a clean room.



Serial Transmission

INDEX

General Specifications

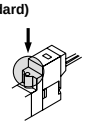
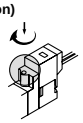
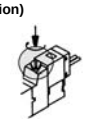
Fluid	Air
Ambient and operating fluid temperature	Max. 50°C
Actuation*	Internal pilot type
Max. operating pressure	0.7 or 0.9 MPa
Manual override*	Non-locking push type
Lubrication	Not required
Piping thread	Rc, G, NPT, NPTF
Mounting	Free
Type of actuation*	Single (S), Double (D), 3 position (3P)
Enclosure*	Dusttight IP50 (IP65, IP67 are also available.)
Range of allowable voltage fluctuation	–10 (or –15) to + 10% of rated voltage
Lead wire length (Standard)	300 mm (or 600 mm)

Respective value in the above table is the representative value for the general solenoid valves for pnuematics and isn't always applicable to all the solenoid valves.
For details, check the specification of the respective valve because those values are different depending on a type.
See below for * mark

Operating Method

- **Internal pilot (Standard)**
  Allows supply pressure to run through the inside of a solenoid valve to act on pilot valve.
- **External pilot**
  Separating from supply pressure, the another pressure for pilot valve is obtained from external.
  Used when the main pressure is less than the minimum operating pressure or vacuum application.
- **Direct operated**
  Drives the main valve by acting force of a solenoid.

Manual Override

Non-locking push type (Standard)	Locking/Slotted type (Option)	Locking/Manual type (Option)
		

Enclosure

Enclosure for the electrical equipment against an external solid foreign object or water ingress.

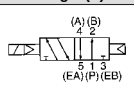
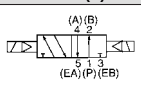
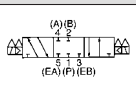
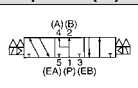
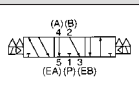
- **Enclosure**
  IEC (International Electrical Committee) standards (IEC60529) define the protection degree against the ingress of a solid foreign object as the 1st characteristics and against the ingress of water as the 2nd characteristics. With both of these characteristics, IP number is defined to show the protection degree.

IP 5 0

- Symbol for protection characteristics
- Protection degree (1st characteristics) against a solid foreign object.
  - 5: Dusttight
- Protection degree (2nd characteristics) against water
  - 0: Not protected

* For IP65 or more, see pages 18 to 21 on operating environment.

Type of Actuation

Single (S)	Double (D)	3 position (3P)		
				
2 position single	2 position double	3 position closed center	3 position pressure center	3 position exhaust center

Seal Method

Rubber seal
Strong against particles because it has the spool valve with seal to slide.

Metal seal
Long service life because the metal spool slides.

Optimum Size for Driving Air Cylinders

Main valve seal method	Series	Flow characteristics A, B→E (2 position/ Single) Cv factor	Applicable cylinder Speed: 100 mm/s or less ø6 ø10 ø16 ø20 ø25 ø32 ø40 ø50 ø63 ø80 ø100 ø125 ø140 ø160 ø180 ø200 ø250 ø300	Power consumption W	Connection size: Thread piping (Rc)	Connection size: One-touch fittings (ø) Applicable tubing size (mm)
Rubber seal	SJ	0.04 to 0.12	SJ2000 SJ3000	0.55/0.4 (0.23/0.15)*3	M3, M5	2, 4, 6
	SY	0.26 to 2.5	SY3000 SY5000 SY7000 SY9000 Example 1)	0.35 (0.1)*3	M5, 1/8, 1/4, 3/8, 1/2	4, 6, 8, 10, 12
	SV	0.28 to 1.6	SV1000 SV2000 SV3000 SV4000	0.6	1/8, 1/4, 3/8, 1/2	3.2, 4, 6, 8, 10, 12
	SYJ	0.12 to 0.74	SYJ3000 SYJ5000 SYJ7000	0.35 (0.1)*3	M3, M5, 1/8, 1/4	4, 6, 8
	SZ	0.19	SZ3000	0.6	M5	4, 6
	VP4	5.6 to 16.7	VP4□50 VP4□70	12	3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2	—
	S0700	0.08 to 0.10	S0700	0.35	M3, M5	2, 3.2, 4
	VQ	0.25 to 4.7	VQ1000 VQ2000 VQ4000 VQ5000	1,0.5	M5	3.2, 4, 6, 8
	VQC	0.25 to 2	VQC1000 VQC2000 VQC4000	1,0.5	M5	3.2, 4, 6, 8, 10, 12
	VQZ	0.32 to 1.2	VQZ1000 VQZ2000 VQZ3000	0.35	M5, 1/8, 1/4, 3/8	3.2, 4, 6, 8, 10
	SQ	0.19 to 0.71	SQ1000 SQ2000	1,0.5	M5	3.2, 4, 6, 8
	VFR	0.7 to 10.6	VFR2000 VFR3000 VFR4000 VFR5000 VFR6000	1.8	1/8, 1/4, 3/8, 1/2, 3/4, 1	—
	VQ7	1.4 to 3.3	VQ7-6 VQ7-8	1	1/4, 3/8, 1/2, 3/4	6, 8, 10, 12
	VQD	0.07	VQD1000	3.2 (2.4)*3	M5	4
	VK*1	0.12	VK3000	4	M5, 1/8	—
Metal seal	VQ	0.18 to 3.4	VQ1000 VQ2000 VQ4000 VQ5000	1,0.5	M5	3.2, 4, 6, 8
	VQC	0.18 to 1.7	VQC1000 VQC2000 VQC4000	1,0.5	M5, 1/4, 3/8	3.2, 4, 6, 8, 10, 12
	VQZ	0.17 to 0.74	VQZ1000 VQZ2000 VQZ3000	0.35	M5, 1/8, 1/4, 3/8	3.2, 4, 6, 8, 10
	SQ	0.14 to 0.57	SQ1000 SQ2000	1,0.5	M5	3.2, 4, 6, 8
	VFS	0.4 to 9	VFS1000 VFS2000 VFS3000 VFS4000 VFS5000 VFS6000	1.8	1/8, 1/4, 3/8, 1/2, 3/4, 1	—
	VQ7	1.1 to 3	VQ7-6 VQ7-8	1	1/4, 3/8, 1/2, 3/4	6, 8, 10, 12
	VS4	1	VS4□10	5.5	1/8, 1/4, 3/8	—

∗ 1: Available with single solenoid (S) only.
∗ 2: Can be used even below the optimum size of a cylinder.
∗ 3: ( ) stands for power saving circuit.

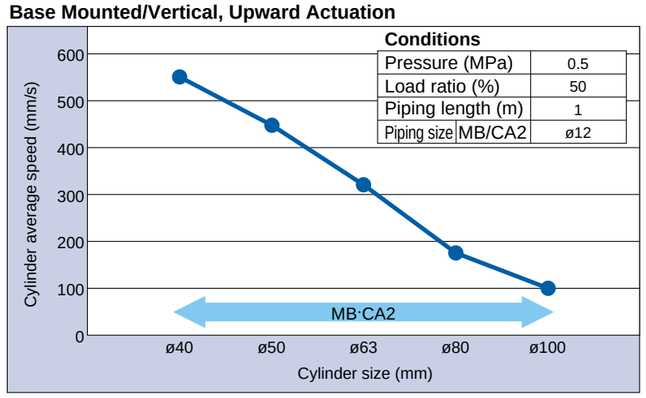
Conditions

- Pressure: 0.5 MPa
- Piping length: 1 m
- Load ratio: 50%
- Stroke: 200 mm
- Speed: 100 mm/s or less

Size of Air Cylinder and Its Speed

Example 1) Using the SY9000 series (Cv 2.5), the average speed of air cylinder is obtained under the below condition for driving cylinders ranged ø40 to ø100.

Base Mounted/Vertical, Upward Actuation



For details about the respective condition, make use of the SMC's Model Selection Program for air cylinder driving system for your reference.

Optimum Size for Driving Air Cylinders

Main valve seal method	Series	Flow characteristics A, B→E (2 position/ Single) Cv factor	Applicable cylinder Speed: 300 mm/s or less ø6 ø10 ø16 ø20 ø25 ø32 ø40 ø50 ø63 ø80 ø100 ø125 ø140 ø160 ø180 ø200 ø250 ø300	Power consumption W	Connection size: Thread piping (Rc)	Connection size: One-touch fittings (ø) Applicable tubing size (mm)
Rubber seal	SJ	0.04 to 0.12	SJ2000 SJ3000	0.55/0.4 (0.23/0.15)*3	M3, M5	2, 4, 6
	SY	0.26 to 2.5	SY3000 SY5000 SY7000 SY9000 Example 1)	0.35 (0.1)*3	M5, 1/8, 1/4, 3/8, 1/2	4, 6, 8, 10, 12
	SV	0.28 to 1.6	SV1000 SV2000 SV3000 SV4000	0.6	1/8, 1/4, 3/8, 1/2	3.2, 4, 6, 8, 10, 12
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	SZ	0.19	SZ3000	0.6	M5	4, 6
	VP4	5.6 to 16.7	VP4□50 VP4□70	12	3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2	—
	S0700	0.08 to 0.10	S0700	0.35	M3, M5	2, 3.2, 4
	VQ	0.25 to 4.7	VQ1000 VQ2000 VQ4000 VQ5000	1,0.5	M5	3.2, 4, 6, 8
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	VQD	0.07	VQD1000	3.2 (2.4)*3	M5	4
	VK*1	0.12	VK3000	4	M5, 1/8	—
Metal seal	VQ	0.18 to 3.4	VQ1000 VQ2000 VQ4000 VQ5000	1,0.5	M5	3.2, 4, 6, 8
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	VQZ	0.17 to 0.74	VQZ1000 VQZ2000 VQZ3000	0.35	M5, 1/8, 1/4, 3/8	3.2, 4, 6, 8, 10
	SQ	0.14 to 0.57	SQ1000 SQ2000	1,0.5	M5	3.2, 4, 6, 8
	VFS	0.4 to 9	VFS1000 VFS2000 VFS3000 VFS4000 VFS5000 VFS6000	1.8	1/8, 1/4, 3/8, 1/2, 3/4, 1	—
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	VS4	1	VS4□10	5.5	1/8, 1/4, 3/8	—

*1: Available with single solenoid (S) only.
*2: Can be used even below the optimum size of a cylinder.
*3: ( ) stands for power saving circuit.

Conditions

- Pressure: 0.5 MPa
- Piping length: 1 m
- Load ratio: 50%
- Stroke: 200 mm
- Speed: 300 mm/s or less

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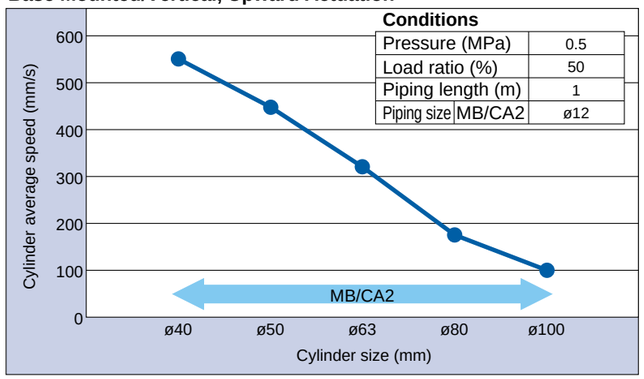

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Optimum Size for Driving Air Cylinders

Main valve seal method	Series	Flow characteristics A, B→E (2 position/ Single) Cv factor	Applicable cylinder Speed: 500 mm/s or less ø6 ø10 ø16 ø20 ø25 ø32 ø40 ø50 ø63 ø80 ø100 ø125 ø140 ø160 ø180 ø200 ø250 ø300	Power consumption W	Connection size: Thread piping (Rc)	Connection size: One-touch fittings (ø) Applicable tubing size (mm)
Rubber seal	SJ	0.04 to 0.12	SJ3000	0.55/0.4 (0.23/0.15)*3	M3, M5	2, 4, 6
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	VS4	1	VS4□10	5.5	1/8, 1/4, 3/8	—

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*3: ( ) stands for power saving circuit.

Conditions

- Pressure: 0.5 MPa
- Piping length: 1 m
- Load ratio: 50%
- Stroke: 200 mm
- Speed: 500 mm/s or less

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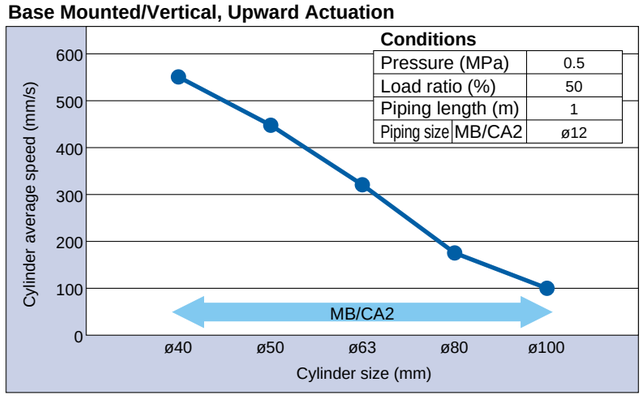

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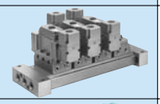
Pneumatics 4/5 Port Solenoid Valves

SJ P.11
S0700 ..... P.609
SY P.101
VQ P.681
SV P.343
VQC P.851
SYJ P.435
VQZ P.907
SZ P.557
SQ P.983
VFR P.1229
VP4 ..... P.597
VFS P.1111
VQ7 ..... P.1327

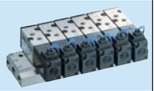
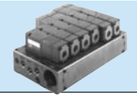
Series	① Power consumption (W)		Operating pressure range	② Operating method		③ Type of valve body			④ Replacing pilot valves	⑤ Exchanging piping (A, B port)		⑥ Piping specification				Electrical specification		⑨ Dual 3 port valve	⑦ With back pressure check valve	Option		⑪ Nominal service life (million cycles) Single/double solenoid	
	Standard	With power saving circuit		Internal pilot	External pilot	Direct ported	Base mounted	Cassette				Plug-in	Individual wiring: Grommet	Individual wiring: Plug connector	Individual wiring: DIN connector	DC	AC			⑧ Lead wire length 1 m or longer	⑩ Bracket	Rubber seal	Metal seal
SJ2000 	0.55	0.23	Max. 0.7 MPa	●	●	—	—	●	—	●		●	—	●	—	●	—	●	○	—	—	50	—
SJ3000	0.4	0.15																					
SY 	0.4	0.1		●	●	●	●	●	●	●		●	● M8 connector type is also available.	●	○	●	●	▲	▲	●	●	50	—
SV 	0.65	—		●	●	—	●	—	—	●		●	— M8 connector type is also available.	—	—	●	—	○	○	●	—	50	—
SYJ 	0.4	0.1		●	▲	●	●	—	●	—		—	● M8 connector type is also available.	●	○	●	●	—	—	●	●	30	—
SZ 	0.65	—		●	●	—	—	●	—	●		●	—	●	—	●	—	●	○	●	—	50	—
VP4 	12	—	Max. 0.9 MPa	●	▲	—	●	—	●	—		—	●	—	●	●	●	—	—	▲	—	10	—
S0700 	0.35	—	Max. 0.7 MPa	●	●	—	●	—	○	●		●	●	●	—	●	—	●	○	●	—	50	—
VQ 	1.01	—	Max. 1.0 MPa	●	●	—	●	—	●	●		●	—	—	—	●	●	●	●	●	—	50	200
VQC 	1.01	—		●	●	—	●	—	●	●		●	—	—	—	●	●	●	●	●	—	50	200
VQZ 	0.4	—		●	○	●	●	—	●	●		—	●	●	●	●	●	—	—	●	●	50	200
SQ 	1.01	—		●	●	●	—	●	●	●		●	—	●	—	●	—	●	●	●	—	50	200
VFS 	1.8	—		●	●	●	●	—	●	—		●	●	—	●	●	●	—	—	▲	●	—	30
VFR 	1.85	—	Max. 0.9 MPa	●	●	—	●	—	●	—		●	●	—	●	●	●	—	—	▲	—	20	—
VQ7 	1	—	Max. 1.0 MPa	●	▲	—	●	—	●	○		—	—	—	●	●	●	—	●	—	—	50	100

●: Available with standard products ○: Available depending on a model ▲: Made-to-order —: Not available

Refer to pages 10 and 11 for details of ① to ⑪.

Pneumatics 4/5 Port **Solenoid Valves**

VQD ····· 1 P.1549
VK ····· 1 P.1589
VS4 ····· 1 P.1623

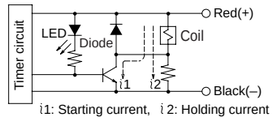
Series	① Power consumption (W)		Operating pressure range	② Operating method		③ Type of valve body			④ Replacing pilot valves	⑤ Exchanging piping (A, B port)		⑥ Piping specification				Electrical specification		⑨ Dual 3 port valve	⑦ With back pressure check valve	Option		⑪ Nominal service life (million cycles) Single/double solenoid	
	Standard	With power saving circuit		Internal pilot	External pilot	Direct ported	Base mounted	Cassette				Plug-in	Individual wiring: Grommet	Individual wiring: Plug connector	Individual wiring: DIN connector	DC	AC			⑧ Lead wire length 1 m or longer	⑩ Bracket	Rubber seal	Metal seal
VQD 	3.2 (Large flow) /2.0	2.4 (Large flow)	Max. 0.7 MPa	Direct operated	Direct operated	●	●	—	—	—		—	—	●	—	●	—	—	—	●	—	50	—
VK 	4.3/ 2.3	—		Direct operated	Direct operated	●	●	—	—	—		—	●	—	●	●	●	—	—	▲	●	20	—
VS4 	5.5	—	Max. 1.0 MPa	Direct operated	Direct operated	—	●	—	—	—		—	●	—	●	●	●	—	—	▲	—	—	20

●: Available with standard products ○: Available depending on a model ▲: Made-to-order —: Not available

① Power Consumption

Electrical power needed to drive a circuit.

- **With energy-saving circuits**
  Power consumption is reduced by about 1/4 compared with standard products by reducing needless electricity holding. (This is possible at 24 VDC and an energizing time of 62 ms or more.)

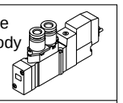
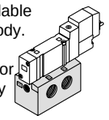
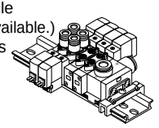


i1: Starting current, i2: Holding current

② Operating Method

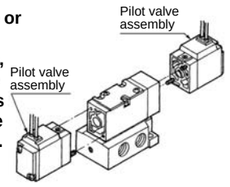
- **Internal pilot (Standard)**
  Allows supply pressure to run through the inside of a solenoid valve to act on pilot valve.
- **External pilot**
  Separating from supply pressure, the another pressure for pilot valve is obtained from external. Used when the main pressure is less than the minimum operating pressure or vacuum application.
- **Direct operated**
  Drives the main valve by acting force of a solenoid.

③ Type of Body

Direct ported	Port is available on the valve body for piping directly. 
Base mounted	No port is available on the valve body. Used with the manifold base or sub-plate. Easy maintenance. 
Cassette type (SMC original)	Air passage of the valve body is connected directly and mounted on DIN rail. (No single unit is available.) Baseless and low profile. 

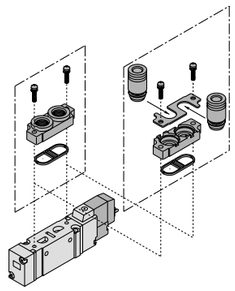
④ Replacing Pilot Valves

In maintenace or changing specifications, the pilot valve which switches the main valve is replaceable.



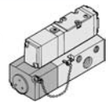
⑤ Changing Piping (A, B port)

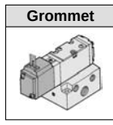
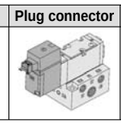
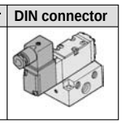
When piping specification is needed to change, fittings for A, B port are replaceable.



⑥ Wiring Specification

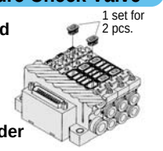
- **Plug-in**
  Insert a valve into connector in the base side to integrate the wiring parts.
  Easy maintenance.
- **Individual wiring (Non-plug in)**
  Electrical wiring is all done in the valve side.



Grommet	Plug connector	DIN connector
		

⑦ With Back Pressure Check Valve

Valve exhaust released from the same base cannot be returned to the cylinder ports. Prevention of malfunction of a cylinder by back pressure.

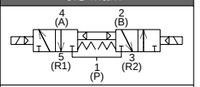
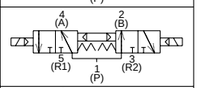
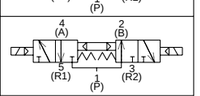


⑧ Lead Wire Length

- **Standard: 300 mm, 600 mm**
- **Option: 1000 mm, 1500 mm, 2000 mm 2500 mm, 3000 mm, 5000 mm**

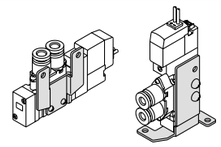
⑨ Dual 3 Port Valve

2 pcs of 3 port valve are integrated in one body. If used as a 3 port valve, half the number of stations are only needed, compared with the conventional model and ideal for space saving.

A side	B side	JIS mark
N.C.	N.C.	
N.O.	N.O.	
N.C.	N.C.	

∗ JIS symbols are compatible with Series VQC.

⑩ Bracket/Mounting Bracket



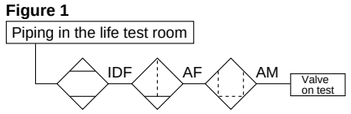
⑪ Nominal Service Life

Endurance was tested under SMC condition.
Number of service life of solenoid valve is based on our test results and no guarantee is assured for everything.

SMC Test Condition

Supply pressure	0.5 MPa
Quality of air	Dryer (Figure 1)
Place	In life test room

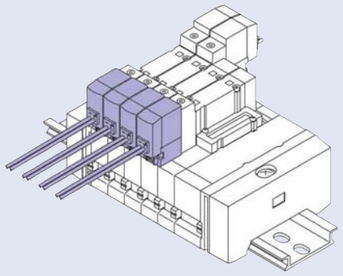
Figure 1



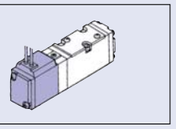
Piping Specifications

Direct Wiring (for individual wiring)

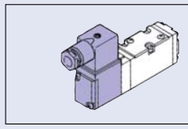
Individual wiring type (grommet, connector, etc.) It requires to wire a valve individually.



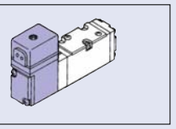
Grommet



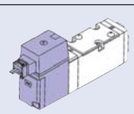
DIN terminal



Connector

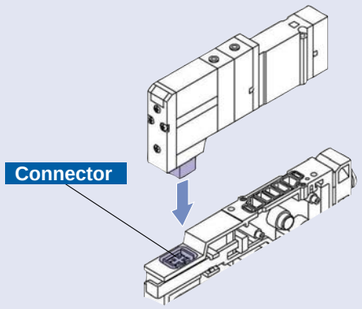


Terminal



Plug-in (for centralized wiring)

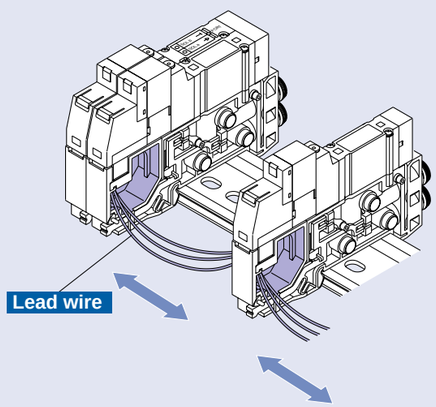
Manifold in which valve and manifold are connected with an electrical connector.



Manifold Internal Wiring

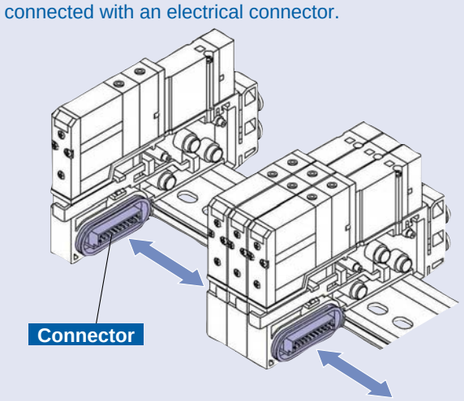
Individual connection

Wiring encasing the lead wire in a manifold block



Connector connection

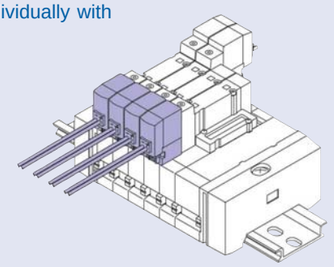
Manifold in which lead wires inside a manifold block are also connected with an electrical connector.

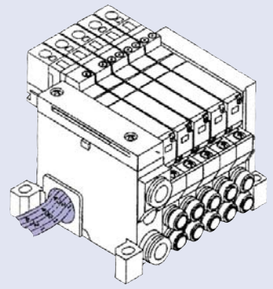


Wiring Specifications with External Device

Individual Wiring

Wiring a valve individually with external device

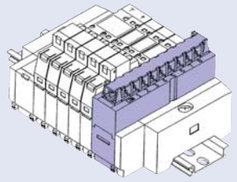




Centralized Wiring

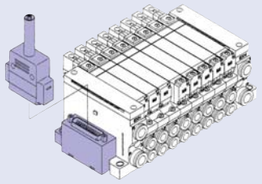
Wiring with external device, integrating lead wire from each valve into a manifold

Terminal block



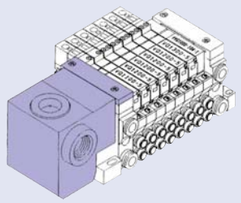
Wiring individually to a terminal block.

D-sub connector



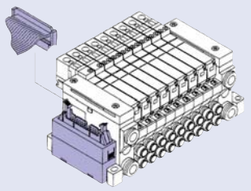
MIL standards (MIL-C-24308, 25 poles)

Connector box



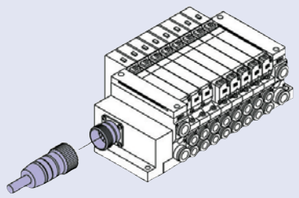
A small terminal block is installed inside a box. IP65 rated

Flat ribbon cable



MIL standards (MIL-C-83503, 10, 16, 20, 26 poles, etc.)

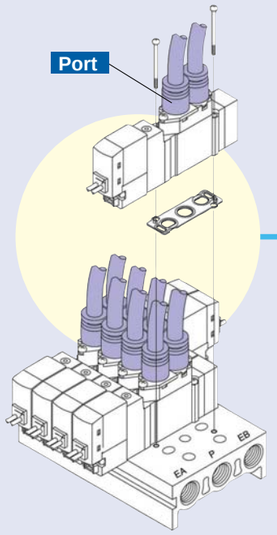
Multi-connector



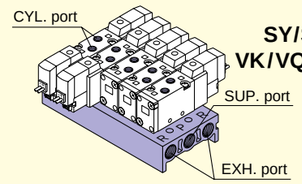
Available with multi-connector (26 poles). IP67 rated

Piping Specifications/Body Ported

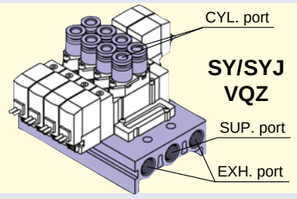
Port is available on the valve body for piping directly.



With base — **Upright piping** — **Normal type**

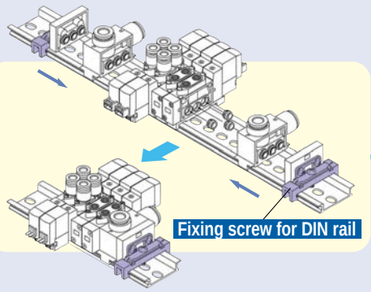


SY/SYJ VK/VQZ/VFS



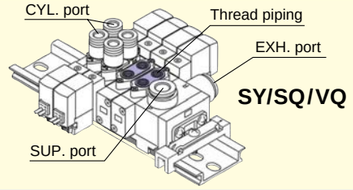
SY/SYJ VQZ

Without base — **Cassette type, low profile**

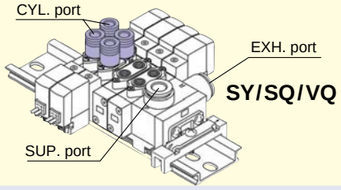


Valves are sandwiched between brackets to fix them onto DIN rail.

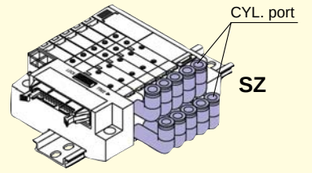
Upright piping — **Normal type**



SY/SQ/VQ

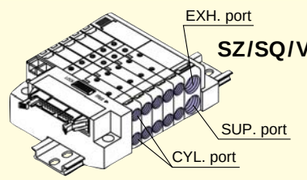


SY/SQ/VQ

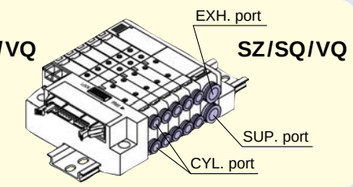


SZ

Side piping — **Horizontal piping**

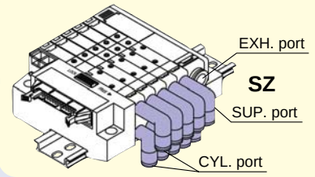


SZ/SQ/VQ



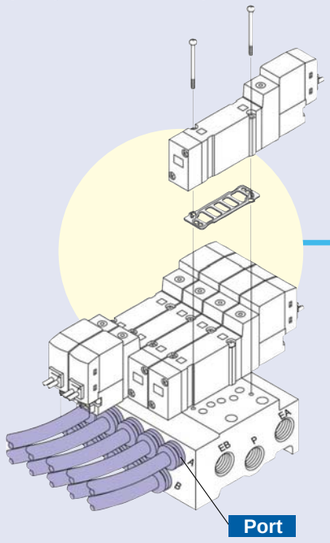
SZ/SQ/VQ

Rear piping

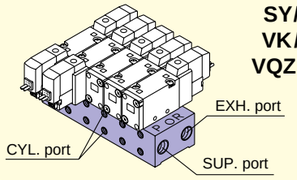


Piping Specifications/Base Mounted

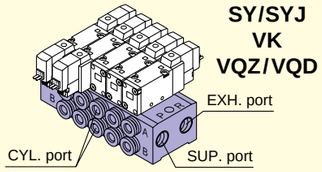
Piping with the ports on the manifold base
A solenoid valve itself can be replaced regardless of the air piping. (Easy maintenance)



Base mounted — **Unchangeable station type** — **Side piping** — **Horizontal piping**

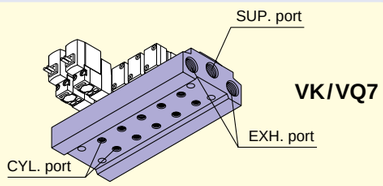


SY/SYJ VK/VP4 VQZ/VQD



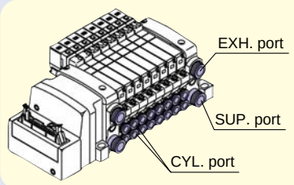
SY/SYJ VK VQZ/VQD

Bottom piping



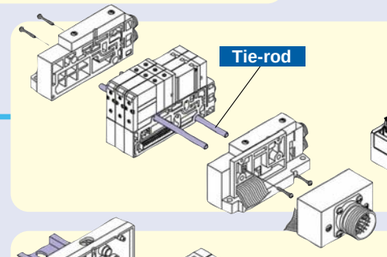
VK/VQ7

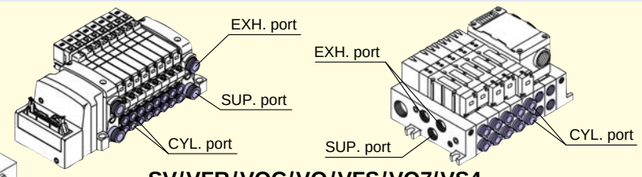
Stacking base — **Changeable station type** — **Side piping** — **Horizontal piping**



Metal joint type Tie-rod type

Each manifold is connected with the tie-rod and the metal joint. Strong against the torsion of a manifold

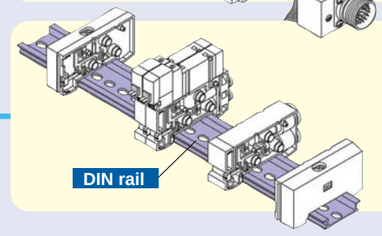


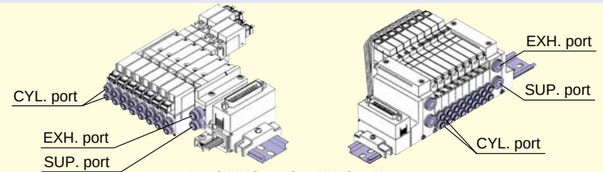


SV/VFR/VQC/VQ/VFS/VQ7/VS4

DIN rail type

Each manifold is connected on the DIN rail.
Easy to change the number of stations.





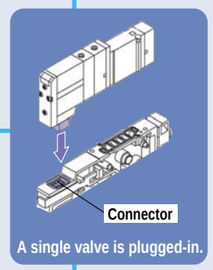
SV/SY/VZ/VQC/VQ

Pneumatics 4/5 Port **Manifold**

Points for Selection	Description	Compliant Series

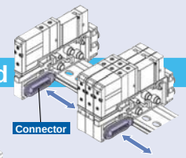
Point 1 — Reduced wiring type

Wiring inside the manifold

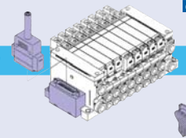


A single valve is plugged-in.

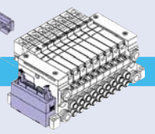
- Connector connection manifold



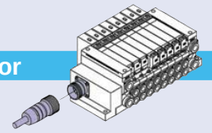
- D-sub connector



- Flat ribbon cable



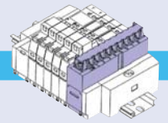
- Multi-connector



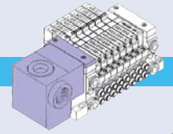
Centralized wiring with external device

Wired individually inside the manifold.
Connector connection

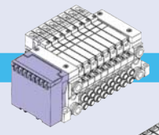
- Terminal block



- Connector box



- Serial transmission

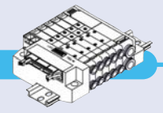


Point 2 — Space saving type

A single valve is plugged-in. Direct wiring is possible.

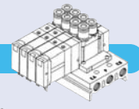
Height direction

- Low profile cassette type



Around the valve

- Single side solenoid type

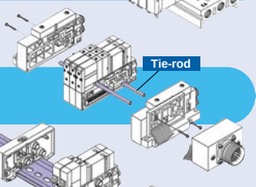


Point 3 — Stations changeable type

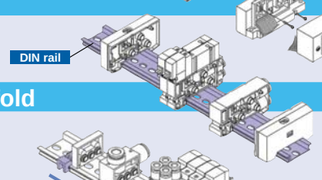
A single valve is plugged-in. Direct wiring is possible.

Number of stations

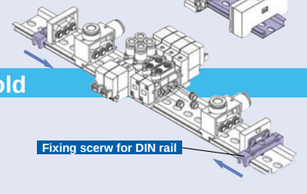
- Tie-rod type Metal joint type manifold



- DIN rail type manifold



- Cassette type manifold



Compliant Series

SJ · SY · SV · SYJ · SZ · S0700 · VQ · VQC · VQZ · SQ · VFS · VFR · VQ7 · VS4

SJ P.11 · S0700 P.609 · SY P.101 · VQ P.681 · VFR P.1229 · SV P.343 · VQC P.851 · VQ7 P.1327 · SYJ P.453 · VQZ P.907 · VQD P.1549 · SZ P.557 · SQ P.983 · VK P.1589 · VP4 P.597 · VFS P.1111 · VS4 P.1623

Series	Features	Connection method	Space	Max. operating pressure		Life expectancy (Million cycles)		Single unit Cv factor	Centralized piping	Serial transmission	Power consumption (0.1 W)	Electrical spec. AC compatibility	Clean compatibility	Enclosure (IP65, 67 or greater)	Vacuum compatibility	Back pressure prevention
						Rubber seal	Metal seal									
SJ	• Can be mounted with SJ2000 and SJ3000. • Connectors make changing the number of stations easy.	• Stacking type	Low profile with the base-free structure	0.7		50	—	0.04 to 0.12	○	○	—	—	—	—	○	○ Possible with spacers.
SY	• 3-port and 5-port valves can be mounted together.	• Aluminum bar type manifold • DIN rail, stacking type	—	0.7		50	—	0.26 to 2.5	○	○	○	○	○	○	○	○ Possible with spacers.
SV	• Changing the number of stations and/or specifications are easily possible. • Dual 3-port valve with 4-positions.	• Connectivity is fine with the attachment/detachment lever.	Solenoid on a single side	0.7		50	—	0.28 to 1.6	○	○	—	—	○	○	○	○
SYJ	• 3-port and 4/5-port valves can be mounted together.	• Aluminum bar type manifold	The most smallest size in a single unit	0.7		30	—	0.12 to 0.74	○	○	○	○	○	○	—	○ Possible with spacers.
SZ	• Cassette type method enables the easier valve replacement. • Safety maintenance is ensured by the valve with switch.	• Directly connected on the body and can change the number of stations.	Low profile with the base-free structure	0.7		50	—	0.19	○	○	—	—	○	—	○	○
VP4	• For driving the large sized cylinders	• Aluminum bar type manifold	—	0.9		10	—	5.6 to 16.7	—	—	—	○	—	○	○	—
S0700	• Low profile valve with 7 mm width. • Space-saving design with valves on a single side. • Dual 3-port valves can be used.	• Aluminum bar type manifold • Stacking type manifold	Solenoid on a single side	0.7		50	—	0.08 to 0.10	○	○	—	—	○	—	○	○
VQ	• Space-saving design with valves on a single side. • Numerous manifold options. • Dual 3-port valves can be used.	• Valves can be clamped using one screw. • Stacking type manifold	Solenoid on a single side	1.0		50	200	0.11 to 4.7	○	○	—	○	○	○	○	○
VQC	• Connectors make changing the number of stations easy. • Space-saving design with valves on a single side. • Numerous manifold options. • Dual 3-port valves can be used.	• Valves can be clamped using one screw. • Stacking type manifold	Solenoid on a single side	1.0		50	200	0.18 to 2	○	○	—	—	○	○	○	○
VQZ	• 3-port and 5-port valves can be mounted together. • Can be mounted on DIN rails.	• Aluminum bar type manifold	—	1.0		50	200	0.17 to 1.2	—	—	○	○	○	○	○	○ Possible with spacers.
SQ	• Cassette type with valves and manifolds makes changing the number of stations easy. • Space-saving design with valves on a single side. • Dual 3-port valves can be used.	• Valves can be clamped using one screw. • Stacking type manifold	Low profile solenoid on a single side	1.0		50	200	0.14 to 0.71	○	○	—	—	○	—	○	○
VFS	• For driving the middle to large sized cylinders	• Aluminum bar type manifold • Stacking type	—	1.0		—	30	0.4 to 9	—	○	—	○	○	○	○	—
VFR	• For driving the middle to large sized cylinders	• Aluminum bar type manifold • Stacking type	—	0.9		20	—	0.7 to 10.6	○	—	—	○	—	○	—	—
VQ7	• Valves conforming to ISO standards	• Stacking type	—	1.0		50	100	1.1 to 3.3	—	—	—	○	—	○	○	○
VQD	• 4-port, direct poppet type	• Aluminum bar type manifold	—	0.7		50	—	0.05 to 0.07	—	—	—	—	○	—	○	—
VK	• Direct poppet type	• Aluminum bar type manifold	—	0.7		20	—	0.09 to 0.20	—	—	—	○	○	○	○	—
VS4	• Direct operated type • Usable from pressure 0.	• Stacking type	—	1.0		—	200	1	—	—	—	○	—	—	—	—

SJ P.11 S0700 P.609 SY P.101 VQ P.681 VFR P.1229 SV P.343 VQC P.851 VQ7 P.1327 SYJ P.453 VQZ P.907 VQD P.1549 SZ P.557 SQ P.983 VK P.1589 VP4 P.597 VFS P.1111 VS4 P.1623

Series	① Clean series	For CRT manufacturing ② Copper-free, Fluorine-free	For PDP manufacturing ③ Copper-free, Fluorine-free and Silicon-free	④ Intrinsically safety explosion proof		⑤ Ozone resistant	⑥ Enclosure (IP65, 67 or greater)	⑦ International standards CE	CSA	UL	ATEX
SJ	—	—	—	—		●	—	○	—	—	—
SY	○	○	—	○		●	○	○	—	○	—
SV	○	—	○	—		●	●	●	—	●	○
SYJ	○	○	—	—		●	○	○	○	○	—
SZ	○	—	○	—		●	—	○	—	—	—
VP4	—	—	—	—		○	○	—	—	—	—
S0700	○	○	○	—		●	—	●	—	—	—
VQ	○	○	○	—		●	○	○	○	—	—
VQC	○	—	○	—		●	●	●	—	—	○
VQZ	—	—	○	—		●	○	○	—	—	—
SQ	○	○	○	—		●	—	○	—	—	—
VFS	—	○	○	—		○	○	○	○	—	—
VFR	—	○	—	—		○	○	○	○	—	—
VQ7	—	○	—	—		○	○	○	—	—	—
VQD	○	○	○	—		●	—	○	—	—	—
VK	○	○	—	—		○	○	○	—	—	—
VS4	—	—	—	—		○	—	—	—	—	—

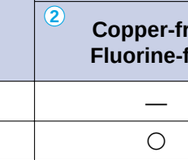
●: Available with standard products. ○: Available depending on a model. —: Not available.

① Clean Series

No particle generation because external leakage is zero. After blowing the external surface, double packaging to shut out the dust.

Exhaust of main valve and pilot valve are common exhaust and released to the outside of clean room.

Each series is suited to "Grade 1".

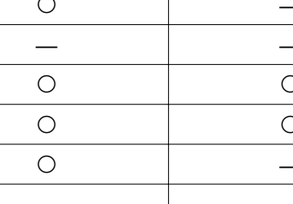


Where to locate the pneumatic equipment in relation to a work will be decided, depending on the ratio of dust generation.

Grade number of dust generation amount by pneumatic equipment ≦ Grade number of particle density around a work

∗The grade classification in the right graph is the SMC original method. The smaller the number is, the smaller the dust generation amount exists.

Grade classification



② Copper-free, Fluorine-free

Copper and halogen-based materials are not used.
Grease: Lithium soap-based grease

③ Copper-free, Fluorine-free and Silicon-free

Copper and halogen and silicon-based materials are not used.
No dust generation because of zero external leakage.
Grease: Lithium soap-based grease

④ Intrinsically Safety Explosion Proof

Products that can be used in an explosive atmosphere.
Depending on an atmospheric level, specifications are different.

⑤ Ozone Resistant

Using rubber material (H-NBR or FKM) resistant for ozone in the compressed air.

⑥ Enclosure

Enclosure for the electrical equipment against an external solid foreign object or water ingress.

·Enclosure

IEC (International Electrical Committee) standards (IEC60529) define the protection degree against the ingress of a solid foreign object as the 1st characteristics and against the ingress of water as the 2nd characteristics. With both of these characteristics, IP number is defined to show the protection degree.

IP20: Protection against fingers entering the enclosure but not specifically against water.
IP65: Protection against dust entering the enclosure and not greatly affected by jets of water from all directions.
IP67: Protection against dust entering the enclosure and immersion in water at a specific pressure and time.

⑦ International Standards

Name	Contents	Mark
CE	Mark needed to market products in Europe. Signifies the suitability to the directive needed to obtain.	CE
CSA	Canadian accreditation authority, No interchangeability with UL.	SA
UL	U.S. acceditation authority, No interchangeability with CSA.	UL
ATEX	Directive of explosion proof in Europe	Ex

Applicable Protocols for Units

EX ····· P.1650

Family model no.	Integrated type, for output						Integrated type, for input/output		Decentralized type (GW system, 4-branch)		Family model no.
	EX120				EX140	EX180	EX240	EX250	EX500	EX510	
Product part no.	EX120 EX121 EX122	EX123	EX124	EX126							Product part no.
											
Page	P.1650	P.1653	P.1653	P.1653	P.1656	P.1658	P.1661	P.1664	P.1680	P.1696	Page
Basic functions: No. of output points (Max.)	16-point output	16-point output			16-point output	32-point output	32-point output		64-point output (16-point x 4-branch)		No. of output points (Max.)
Basic functions: No. of input points (Max.)	—	—			—		32-point input		64-point input (16-point x 4-branch)		No. of input points (Max.)
Basic functions: Power supply for communications and valves	Common/Separated	Common	Separated		Common/Separated	Separated	Separated	Common/Separated Note 1)	Separated	Separated	Power supply for communications and valves
Complies with the open network (Offered by several manufacturers): DeviceNet™											DeviceNet™
Complies with the open network (Offered by several manufacturers): PROFIBUS DP											PROFIBUS DP
Complies with the open network (Offered by several manufacturers): CC-Link											CC-Link
Complies with the open network (Offered by several manufacturers): AS-Interface											AS-Interface
Complies with the open network (Offered by several manufacturers): CANopen											CANopen
Complies with the open network (Offered by several manufacturers): ControlNet											ControlNet
Complies with the open network (Offered by several manufacturers): EtherNet/IP™											EtherNet/IP™
Other than open network: Complies with a respective PLC manufacturer: OMRON Corp.: CompoBus/S											CompoBus/S: OMRON Corp.: Complies with a respective PLC manufacturer
Other than open network: Complies with several PLC manufacturers: SUNX Corp.: S-LINK											S-LINK: SUNX Corp.: Complies with several PLC manufacturers
Other than open network: Complies with several PLC manufacturers: NKE Corp.: Reduced-wiring system											Reduced-wiring system: NKE Corp.: Complies with several PLC manufacturers
Other than open network: Complies with several PLC manufacturers: NKE Corp.: Reduced-wiring H system											Reduced-wiring H system: NKE Corp.: Complies with several PLC manufacturers

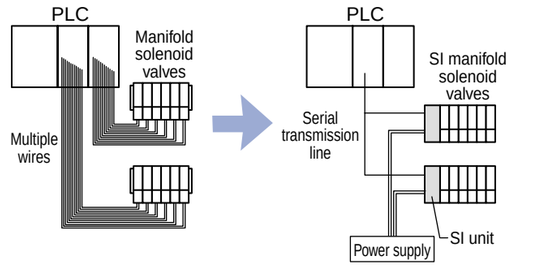
∗ DeviceNet™ and EtherNet/IP™ are trademarks used under licence by ODVA.
∗ ControlNet is a trademark of ControlNet, International, Ltd.
∗ Product names listed in this catalog may be used as a trademark by manufacturers.

Note 1) 1 power supply system is compatible with some of the AS-Interface models only.

Glossary of terms — Serial transmission system and SI unit

A **serial transmission system** can control multiple solenoid valves by using only the communication line from the PLC's communication module (master module) or it can read the signal from the various sensors. This system can also be called a "**Fieldbus system**".
Wiring the coil of each solenoid valve, one by one, to the output unit on the PLC is called "Parallel wiring". Each valve in use needs to be connected. Therefore, wiring in accordance with the number of solenoid valves or sensors in use is required.
A **SI unit** is a device which can control the solenoid valve through serial communication.

<Conventional method> <Serial transmission method>



Glossary of terms — Number of outputs, Number of inputs Output compatibility, Input/Output compatibility

Number of outputs is the number of solenoid or output devices that can be controlled.
Number of inputs is the number of various sensors such as an auto switch, pressure switch, etc. that can be connected.
Output refers to the control device for turning on/off the solenoid coil.
Input/Output refers to the ability for ON-OFF control (output) of a solenoid valve, as well as the reading (input) of a sensor signal, such as from an auto switch or pressure switch.

Protocol and Open network

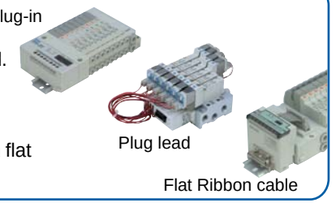
Protocol means the serial data is sent and/or received in accordance with a named specification.
Open network means a standard that has been made public and is widely accepted.

Glossary of terms — Integrated and Decentralized type (GW system)

The **integrated type** means the SI unit and solenoid valve's manifold are integrated. An SI unit is necessary for every protocol.
The **decentralized type** refers to the **GW (Gateway) system**.
From the Gateway, the solenoid valve's manifold and the input devices can be located remotely. The replacement of the Gateway enables changing between the various protocols.

Glossary of terms — Valve interface

The **valve interface** is the connection between the SI unit and the solenoid valve's manifold.
Plug-in: The connector on the SI unit and the solenoid valve's manifold directly plug into each other.
Plug lead: The SI unit and the solenoid coil are connected with wires having a connector.
Flat ribbon cable: The SI unit and solenoid valve's manifold are connected together with a flat ribbon cable having a MIL connector.



Applicable Valve Series for Units

EX ····· P.1650

Family model no.			Integrated type, Output compatibility						Integrated type, for output		Integrated type, for input/output		Decentralized type (GW system, 4-branch)		Family model no.		
			EX120						EX140	EX180	EX240	EX250	EX500	EX510			
Product part no.			EX120	EX121	EX122	EX123	EX124	EX126							Product part no.		
Basic function	Enclosure		IP20			IP65		IP67	IP20		IP65	IP67	IP65	IP20	Enclosure		Basic function
	Operating environment and industry		Usable in locations where it is not exposed to water or dust. Automobile industry, semiconductor industry, etc.			Usable in locations where it may be exposed to water or dust. Automobile industry, machine tool industry, etc.			Usable in locations where it is not exposed to water or dust. Automobile industry, semiconductor industry, etc.		Usable in locations where it may be exposed to water or dust. Automobile industry, machine tool industry, etc.		Usable in locations where it may be exposed to water or dust. Automobile industry, machine tool industry, etc.	Usable in locations where it is not exposed to water or dust. Semiconductor industry, etc.	Operating environment and industry		
	Mounting		Direct	DIN rail		Direct			DIN rail		Direct/DIN rail		Direct/DIN rail	Direct/DIN rail	Mounting		
	Valve interface		Plug-in	Flat ribbon cable	Plug-in	Plug-in			Plug-in		Plug-in		Plug-in	Non plug-in (Plug lead), Flat ribbon cable	Valve interface		
Applicable valves	SV	Stacking type	1000	P.378				P.372			P.366	P.356			1000	Stacking type	SV
			2000	P.378				P.372			P.366	P.356			2000		
			3000	P.378				P.372			P.366	P.356			3000		
			4000	P.378								P.356			4000		
	SZ	Stacking type	3000						P.584					P.588	3000	Stacking type	SZ
	SY	Bar stock type	3000											P.164, 228	3000	Bar stock type	SY
			5000											P.164, 228	5000		
			7000											P.164, 228	7000		
		Stacking type	3000		P.305	P.302								P.264, 312	3000	Stacking type	
			5000		P.305	P.302								P.264, 312	5000		
			9000											P.170, 233	9000		
	SYJ	Bar stock type	3000											P.472, 473	3000	Bar stock type	SYJ
			5000											P.500, 501	5000		
			7000											P.532, 533	7000		
	SJ	Stacking type	2000						P.50					P.58	2000	Stacking type	SJ
			3000						P.50					P.58	3000		
	VQC	Stacking type	1000				P.858				P.858	P.858			1000	Stacking type	VQC
			2000				P.862				P.862	P.862			2000		
			4000				P.866				P.866	P.866			4000		
	SQ	Stacking type	1000						P.990					P.986	1000	Stacking type	SQ
			2000						P.1010					P.1006	2000		
	VQ	Stacking type	1000	P.726										P.722	1000	Stacking type	VQ
			2000	P.726		P.726	P.726				P.730			P.722	2000		
			4000			P.778	P.778				P.782				4000		
			5000			P.830	P.830								5000		
	VQZ	Bar stock type	1000											P.936, 969	1000	Bar stock type	VQZ
			2000											P.936, 969	2000		
			3000											P.936, 969	3000		
	S0700	Bar stock type	0700											P.662	0700	Bar stock type	S0700
		Stacking type	0700								P.620	P.618			0700	Stacking type	
	VFS	Stacking type	2000			P.1158	P.1158								2000	Stacking type	VFS
			3000			P.1178	P.1178								3000		
			4000			P.1198	P.1198								4000		
			5000			P.1214	P.1214								5000		
Power supply for communications and valves			Common/Separated			Separated		Common									