



Installation and Maintenance Manual
VZS2000 and VZS3000 5 Port Metal Seal Solenoid Valves
Base Mounted Type (Plug-in, Non Plug-in)
 For future reference, please keep this manual in a safe place

This manual should be read in conjunction with the current catalogue

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO4414 (1984), JIS B 8370 (1984) and other safety practices.
 Note 1: ISO 4414: Pneumatic fluid power - Recommendations for the application of equipment to transmission and control systems.
 Note 2: JIS B 8370: Pneumatic system axiom.

- CAUTION :** Operator error could result in injury or equipment damage.
- WARNING:** Operator error could result in serious injury or loss of life.
- DANGER :** In extreme conditions, there is a possible result of serious injury or loss of life.

WARNING

Compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.
 Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.

2. **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 operators.
3. **Do not service machinery/equipment or attempt to remove component 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. (Bleed air into the system gradually to create back-pressure, i.e. incorporate a soft-start valve).
4. **Contact SMC if the product is to be used in any of the following conditions:**
 - 1) Conditions and environments beyond the given specifications, or if product is 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 micron.

Standard specifications (Fig 1)

Valve	Fluid	Air and inert gas
	Max. operating pressure	9.9 kgf/cm ² (990kPa)
	Min. operating pressure	1.0kgf/cm ² (100kPa)
	Proof pressure	15kgf/cm ² (1500kPa)
	Ambient and fluid temperature	(Note 1) -10~+50°C
Electricity	Lubrication	(Note 2) Not required
	Pilot operator manual override	Non-locking push type (Flush type)
	Protection structure	Dust proof
	Rated voltage	100VAC, 200VAC (50/60Hz), 24VDC
	Allowance voltage range	-15%~+10% rated voltage
	Coil insulation	Class E or equivalent (120°C)
	Apparent power AC (Power consumption)	Inrush 4.5VA/50Hz, 4.2 VA/60Hz Holding 3.5VA/50Hz, 3VA/60Hz
	Power consumption DC	1.8W
	Electrical entry	Plug-in base type (FZ) Non plug-in base type Grommet(G), Plug connector(L,M,KZ)

Note 1: Use dry-air at low temperature.
 Note 2: Use turbine oil No. 1 (ISO VG 32), if lubricated.

Installation

WARNING

Ensure all air and power supplies are ISOLATED before commencing installation.
 Do not install these valves in explosive atmospheres.
 If these valves are exposed to water or oil droplets, ensure that they are protected.
 If it is intended to energise a valve for an extended period, please consult SMC.
 If air leakage causes associated equipment to malfunction cease using valve and inspect for cause.
 Check fixings while pressure and power are applied. Initial function and leakage tests should be performed after installation.
 Install only once safety instructions have been read and understood.

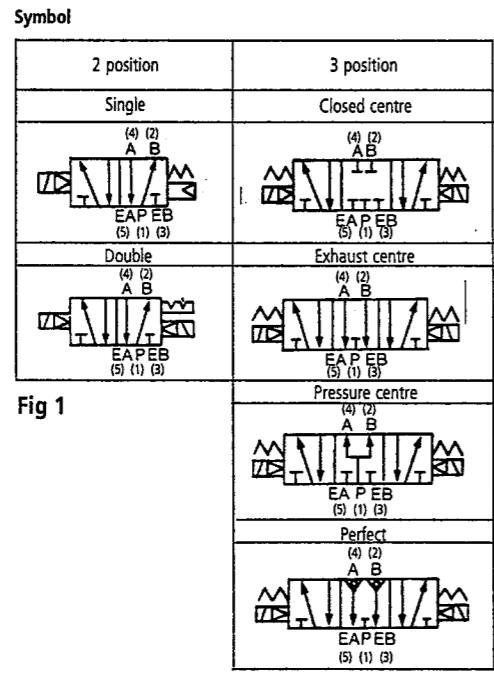


Fig 1

Construction and parts (Fig 2)

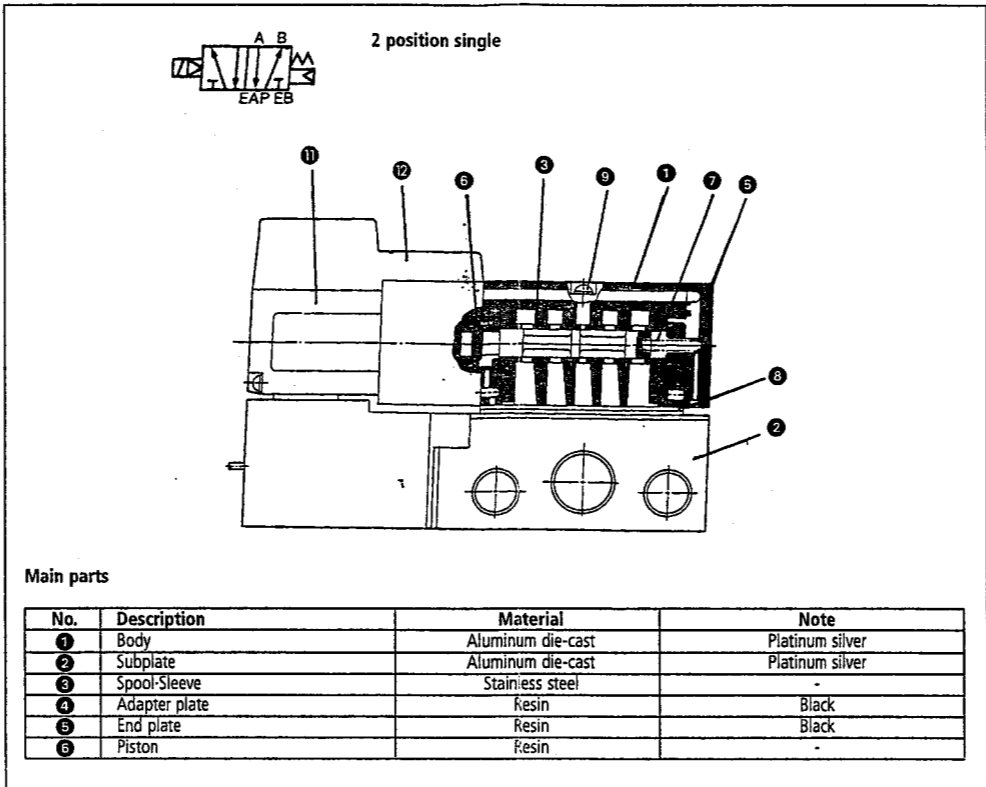


Fig 2

Electrical connection

Wiring
CAUTION
 Isolate both power and air supplies before removing/replacing connector.

Connection/Disconnection of plug (Fig 3)

- 1 Connection: Push the connector straight onto the pins of the solenoid, making sure the lip of the lever is securely positioned in the groove on the solenoid cover.
- 2 Disconnection: Pinch the lever against the connector and pull the connector away from the solenoid.

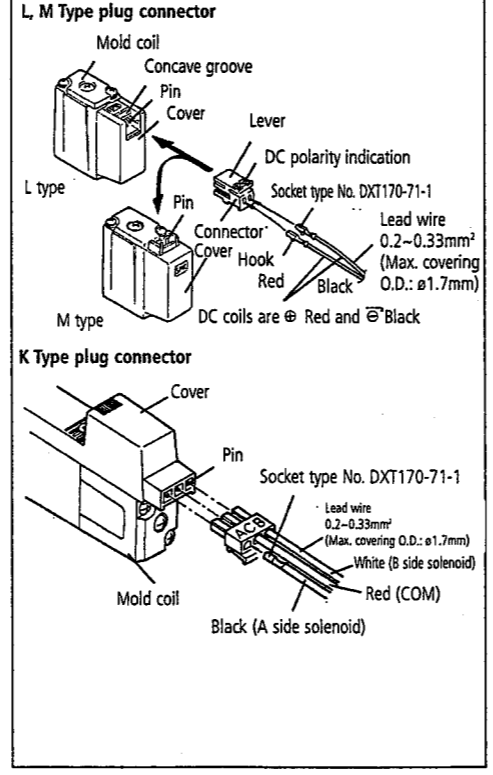


Fig 3

Press contacting of lead wire and socket (Fig 4)

Peel 3.2 to 3.7mm of the tip of lead wire, enter the core wires neatly into a socket and press contact it by a press tool. Be careful so that the cover of lead wire does not enter into the core press contacting part. (Press contacting tool type No. DXT170-75-1).

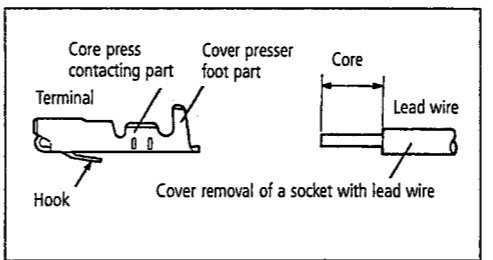


Fig 4

Connection/Disconnection of socket with lead wire (Fig 5)

- 1 **Connection**
 Insert a socket into the square hole (indicated as +, -) of connector, push fully the lead wire and lock by hanging the hook of socket to the seat of connector (pushing-in can open the hook and lock it automatically). Then confirm the locking by lightly pulling the lead wire.
- 2 **Disconnection**
 For pulling-out the socket from the connector, pull out the lead wire by pushing the hook of the socket with a stick with a fine point (ca. 1mm). If the socket is re-used as it is, spread the hook to the outside.

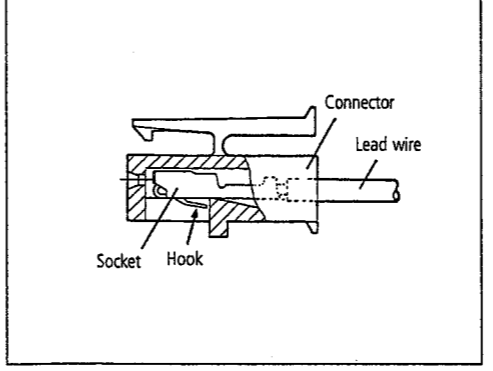


Fig 5

Compact type (Fig 6)

Since the subplate of plug-in base type and the lead wire of K type plug connector type are connected with valves as shown in the following table, they should be connected with each power side. Since DC has no polarity, the polarity of COM is possible for either + or -.

Lead wire colour

Type of valve	Single type	Double - 3 position type	
	A side solenoid	A side solenoid	B side solenoid
Lead wire colour	Black: A Red: COM	Black: A Red: COM	White: B Red: COM

Plug-in base type subplate

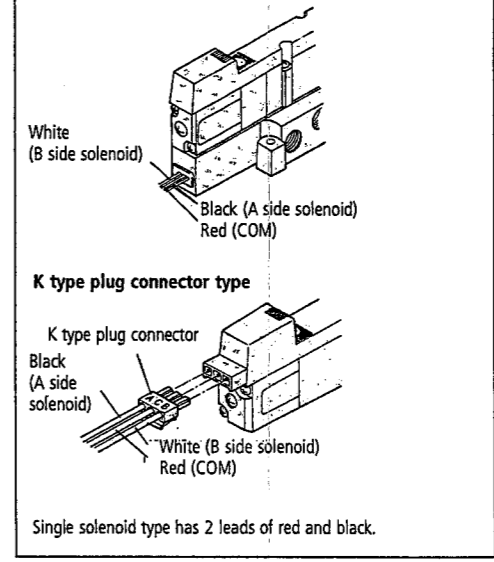


Fig 6

Manifold base (Fig 7, 8)

With 51G type attachment plug lead wire
How to open a junction cover
 Open the cover by inserting a minus screwdriver to the upper part of junction cover as shown in the figure. For closing, close by pushing the cover up to sound for application of the hook.
 Note: No forced pulling of the cover may remove it. In this case, there is no problem by closing the cover to put the projection into the groove.
Connection

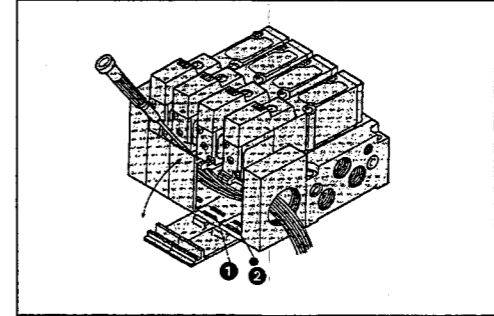


Fig 7

Manifold block is equipped with attachment plug and lead wire is connected (plug-in) with the valve side as shown in the following table. The lead wires should be connected with each power side. Since DC has no polarity, the polarity of COM is possible for either + or -.

Lead wire colour

Type of valve	Single type	Double - 3 position type	
	A side solenoid	A side solenoid	B side solenoid
Lead wire colour	Black: A Red: COM	Black: A Red: COM	White: B Red: COM

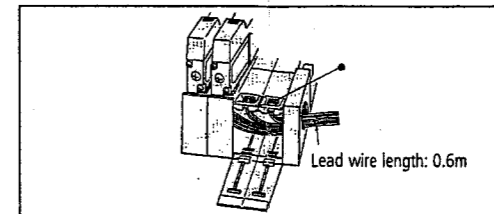


Fig 8

Replacement

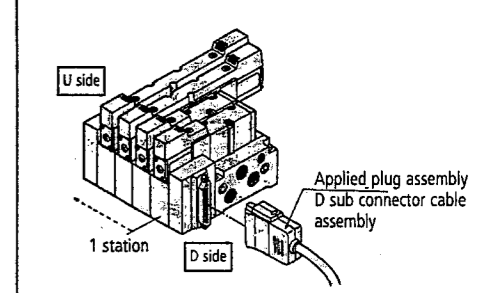
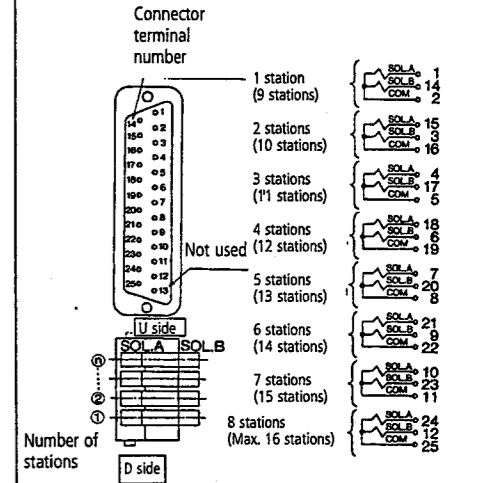
Replacement of solenoid valve
 Loosen the fitting machine screws of solenoid valve and then pull out the solenoid valve body in a straight line. A clamping torque of the fitting machine screws should be 4~7 kgf-cm.

With 51F type D sub connector
 Use of D sub connector for electric connection system leads to rationalisation and labour saving in the connection work. Because MIL standard D sub connector (25 terminals) is used to the connector, a wide interchangeability is obtainable.

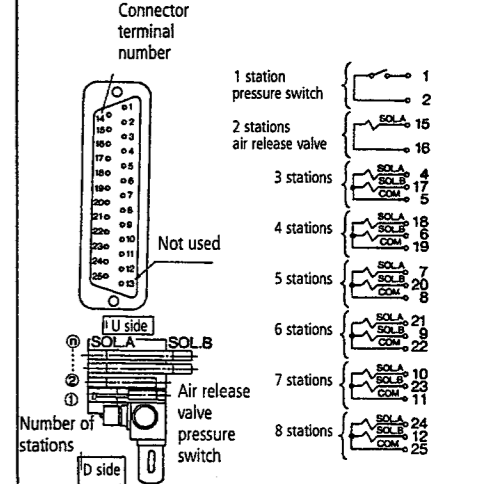
Wiring specifications (Fig 9)

The inside of the manifold is wired with connector terminals in the solenoid A side and B side according to COM specification as shown in the following. Since DC has no polarity, the polarity of COM is possible for either + or -.

Manifold internal wiring



Inside wiring of manifold with control unit



Note 1: Regardless of the mounting position of D sub connector, the number of stations is accounted and taken as one station from D side.
 Note 2: The maximum number of stations is 8 stations in D sub connector one side fitting (F type) and is 16 stations in both side fitting (FB type). By all COM specifications, maximum 24 stations are possible.

Fig 9

Wire colour table by terminal number of VVZS3000-21A-D subconnector cable assembly

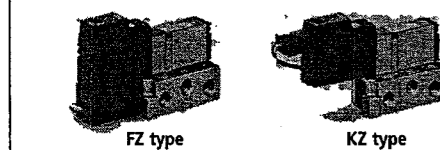
Terminal No.	Lead wire colour	Dot marking
1	Black	None
2	Brown	None
3	Red	None
4	Orange	None
5	Yellow	None
6	Pink	None
7	Blue	None
8	Violet	White
9	Grey	Black
10	White	Black
11	White	Red
12	Yellow	Red
13	Orange	Red
14	Yellow	Black
15	Pink	Black
16	Blue	White
17	Violet	None
18	Grey	None
19	Orange	Black
20	Red	White
21	Brown	White
22	Pink	Red
23	Grey	Red
24	Black	White
25	White	None

Applied plug assembly (D sub connector cable assembly) (option)

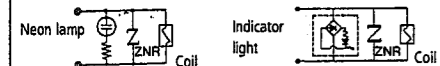
Cable length	Assembly No.	Component
n	VVZS3000-21A-1	Plug MIL standard
5m	VVZS3000-21A-2	D sub connector
5m	VVZS3000-21A-3	Number of terminal: 25
8m	VVZS3000-21A-4	Cable: 25 cores x 0.3mm ²

Indicator lamp and surge voltage suppressor (Fig 10)

Plug-in base type/K type plug connector type



FZ type With indicator light (at AC) at DC



No polarity because of use of no-polarity lamp.

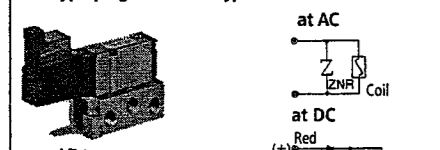
Grommet type



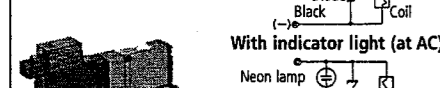
at AC at DC



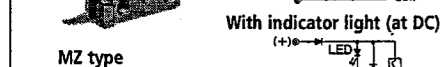
LM type plug connector type



at AC at DC



With indicator light (at AC)



With indicator light (at DC)

In applications where the supply voltage is DC, correctly connect the lead wires to ⊕ (plus) and ⊖ (minus) indications on the connector. For those on which the lead wires have been pre-wired, the plus side is red and minus side is black.

Leakage voltage (Fig 11)

Note that when using a C-R device (surge voltage suppresser) for contact protection, the voltage leakage may increase due to the current leakage flowing through the C-R device.

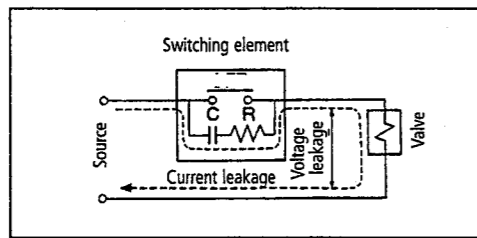


Fig 11

Suppress residual voltage leakage as follows:
DC Coil 2% or less of rated voltage
AC Coil 15% or less of rated voltage

Lubrication

These valves have been lubricated for life during manufacture and as such require no further lubrication.

CAUTION

However, if a lubricant is to be used, a turbine oil type #1, (ISO VG32) should be used, continuous lubrication must be carried out, as the original lubricant will be washed away.

Manual override operation. (Fig 12)

WARNING

Exercise EXTREME CAUTION when operating a solenoid manual override as connected equipment will commence operation. Ensure all safety measures are in place.

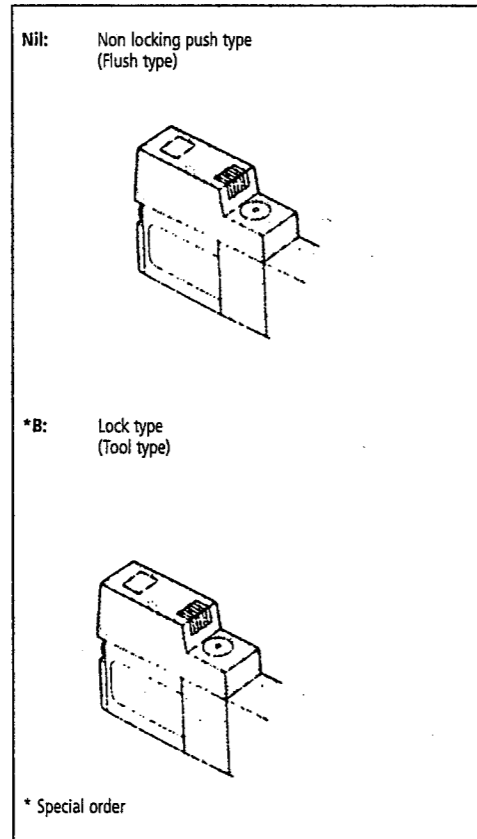


Fig 12

Non-locking push type

1. Push down the manual override button (Orange), until it stops, using a small-bladed screwdriver.
2. Hold this position for the duration of the check (ON position).
3. Release the button and the override will re-set to the off position.

Slotted locking type

To lock

1. Insert a small-bladed screwdriver into the slot.
2. Turn the override through 90° (ON position)
3. Remove screwdriver

WARNING

In this position the manual override is in the locked 'ON' position.

To Unlock

1. Insert small-bladed screwdriver into the slot of the manual override.
2. Turn the screwdriver 90° in the reverse direction.
3. Remove the screwdriver, the manual override will re-set to the 'OFF' position.

Maintenance

WARNING

Ensure air and electrical supplies are isolated before commencing any maintenance work.

1. The ingress of carbon and oil present in the air supply (mostly from the compressor) into the valve can sometimes lead to increased resistance between the spool and sleeve. In the worst case it can lead to the spool adhering to the sleeve. Therefore it is

important to check the quality of the air often. In order to minimise the risk of the above, it is recommended that a Mist Separator (Series AM) is installed upstream of the valve after a Standard Filter (Series AF). Also selecting a compressor oil with minimal oxidation characteristics would elevate any such problems.

2. Should the valve and sleeve adhere to each other then disassemble the valve and clean the assembly in a solvent based chemical taking care not to contaminate any O-rings with cleaning agent.

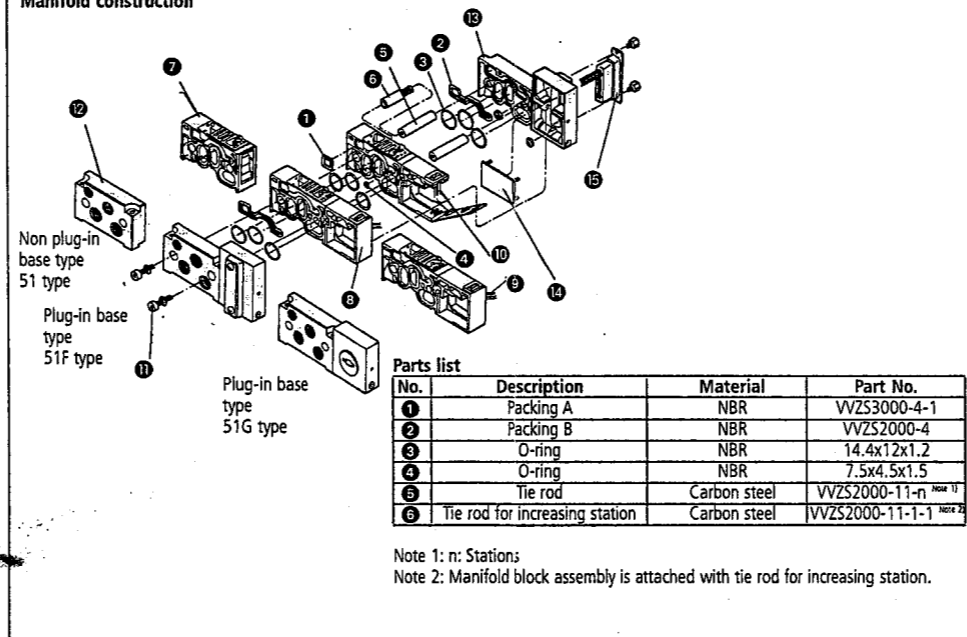
Mounting

When disassembling and reassembling ensure that all components are in their proper positions. Prevent gaskets from moving and torque screws down equally. Single solenoid operated valves may be mounted in any attitude. However, double solenoid should be mounted so the spool is horizontal. If valves are subjected to vibration ensure spool is aligned perpendicular to the vibration. Never use in conditions where vibrations exceed 5G. Completely flush dust and scale from the inside of both supply and secondary ports before connecting.

Manifolds

Base construction: Plug-in Type/Non Plug-in Type

**Series VZS2000
Manifold construction**



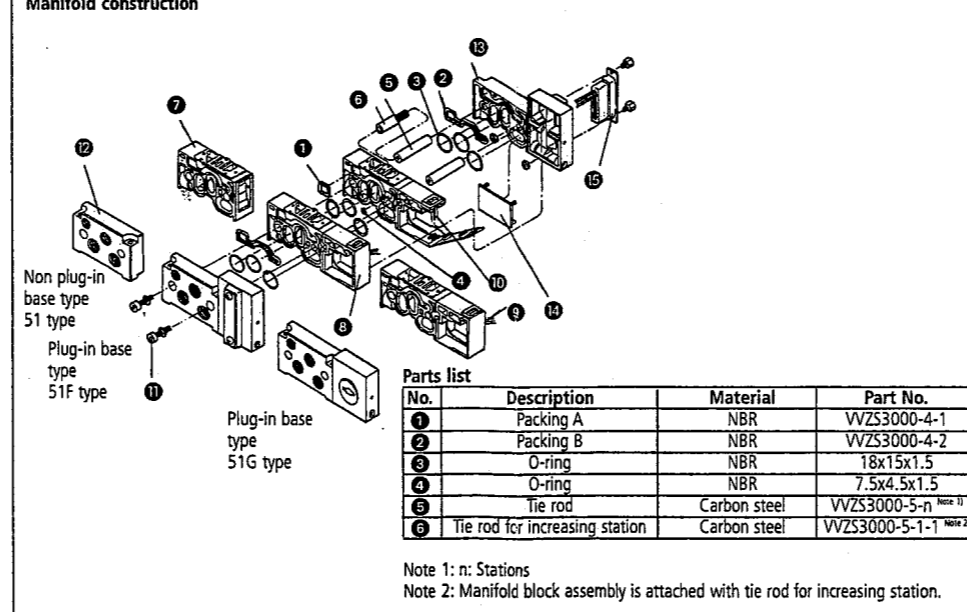
No.	Description	Material	Part No.
1	Packing A	NBR	VVZS3000-4-1
2	Packing B	NBR	VVZS2000-4
3	O-ring	NBR	14.4x12x1.2
4	O-ring	NBR	7.5x4.5x1.5
5	Tie rod	Carbon steel	VVZS2000-11-n
6	Tie rod for increasing station	Carbon steel	VVZS2000-11-1

Note 1: n: Stations
Note 2: Manifold block assembly is attached with tie rod for increasing station.

Fig 13

Base construction: Plug-in Type/Non Plug-in Type

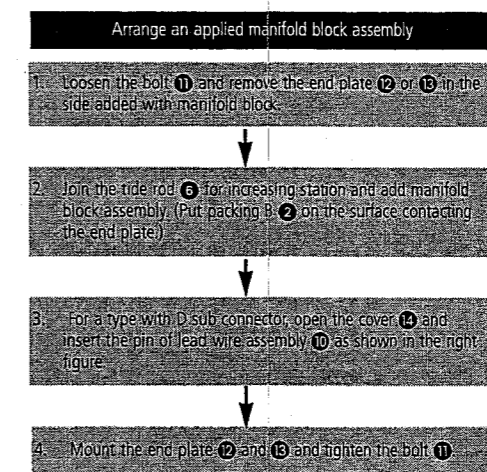
**Series VZS3000
Manifold construction**



No.	Description	Material	Part No.
1	Packing A	NBR	VVZS3000-4-1
2	Packing B	NBR	VVZS3000-4-2
3	O-ring	NBR	18x15x1.5
4	O-ring	NBR	7.5x4.5x1.5
5	Tie rod	Carbon steel	VVZS3000-5-n
6	Tie rod for increasing station	Carbon steel	VVZS3000-5-1

Note 1: n: Stations
Note 2: Manifold block assembly is attached with tie rod.

Increasing number of stations



Note 1: Be careful that the packing and the O-ring do not fall out of the groove.
Note 2: The clamping torque of bolt 1 should be 20-22 kgf-cm.

Insertion method of pin to 'D' type sub connector (Fig 15)

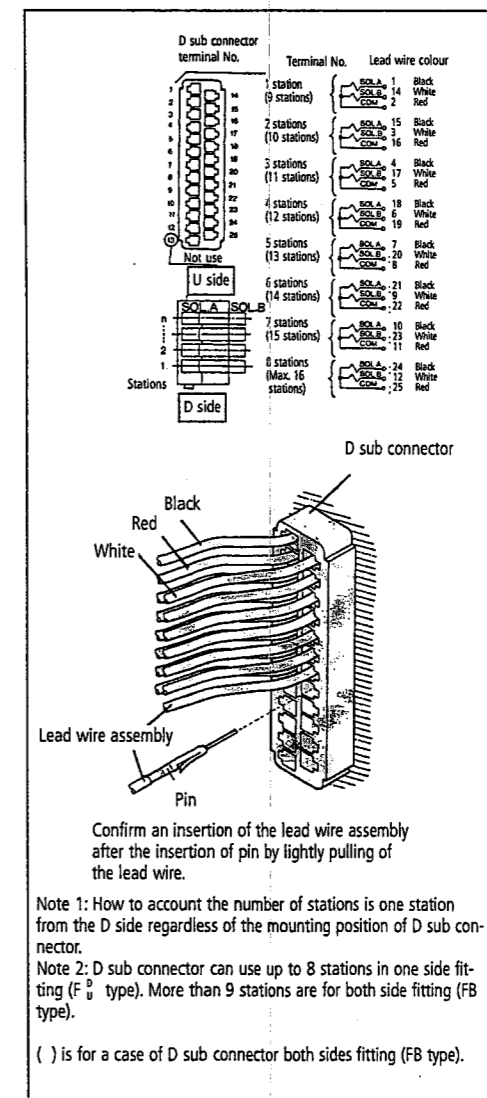


Fig 15

Accessories

Individual supply spacer (Fig 16)

An individual supply spacer complete with gasket may be fixed between valve and subplate so as to provide an individual pressure supply to any valve.

Individual exhaust spacer (Fig 17)

An individual exhaust spacer complete with gasket may be fixed between valve and subplate so as to provide an individual exhaust for any valve.

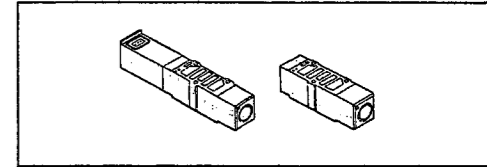


Fig 16

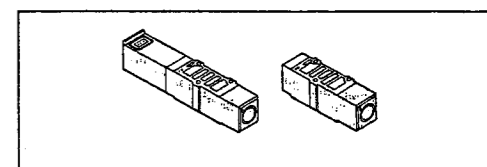


Fig 17

Exhaust block disk (Fig 18)

If valve exhaust affects the function of other valves on the manifold then an exhaust block disk may be fitted between the sub plates so as to occlude exhaust galleries.

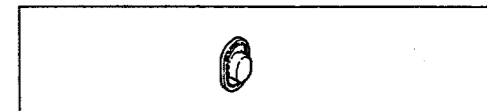


Fig 18

Supply block disk (Fig 19)

If supplying a manifold with more than one pressure a supply block disk can be used between stations that are subjected to different pressures.

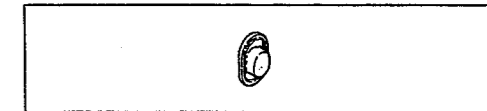


Fig 19

Perfect spacer (Fig 20)

A perfect spacer used in conjunction with a built in double check valve can stop the cylinder at a mid position and hold it there for a period of time with the possibility of air leaking across the spool.

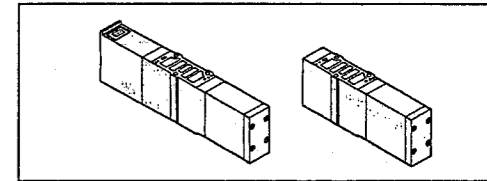


Fig 20

Blanking plate (Fig 21)

Where spare manifold stations are required a blanking plate can be fixed to the manifold.

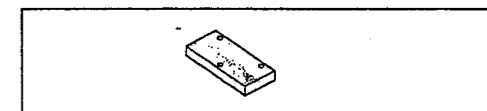


Fig 21

Environment

When valve is mounted in a control panel or is energised for long periods of time, make sure the ambient temperature is within the specified range.

When used in temperatures higher than 60° please contact SMC.

When you enquire about the product, please contact the following

SMC Corporation:	
ENGLAND Phone 01908-563888	TURKEY Phone 212-2211512
ITALY Phone 02-92711	GERMANY Phone 6103-402-0
HOLLAND Phone 020-5318888	FRANCE Phone 01-64-76-10-00
SWITZERLAND Phone 052-34-0022	SWEDEN Phone 08-603 07 00
SPAIN Phone 945-184100	AUSTRIA Phone 02262-62-280
	IRELAND Phone 01-4501822
GREECE Phone 01-3426076	DENMARK Phone 8738-0800
FINLAND Phone 09-68 10 21	NORWAY Phone 67-12 90 20
BELGIUM Phone 03-3551464	POLAND Phone 48-22-6131847