



# Installation and Maintenance Manual VQ100 Series Solenoid Valve

For future reference, please keep this manual in a safe place

This manual should be read in conjunction with the current valve 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 (Note1), JIS B 8370 (Note2) and other safety practices.

Note 1: ISO 4414: Pneumatic fluid power – Recommendations for the installation 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

### 1. The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here 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.

## Main parts (Fig 1)

No.	Description	Material	Note
1	Solenoid coil	—	
2	Body	Resin	
3	Fixed iron core	SUS	
4	Movable iron core assembly	SUS - Resin	
5	Return spring	SUS	
6	Poppet	NBR	
7	Phillips/ordinary round head screw	Carbon steel	AXT632-7-3 (M1.7x14)
8	Interface gasket	NBR	AXT782-11
9	Subplate	ZDC	AXT662-1-1/2 (1: M5,2: M3)

## Valve specifications

Item	Specifications	1 wattage specifications		0.5 wattage specifications	
		0.7 MPa	0.7 MPa	0.7 MPa	0.7 MPa
Type		3 port direct operated poppet type (NC)			
Fluid		Air - inert gas			
Max. operating pressure		0.7MPa (8.2 kgf/cm <sup>2</sup> )		0.7MPa (7.1 kgf/cm <sup>2</sup> )	
Min. operating pressure		0MPa (0 kgf/cm <sup>2</sup> )			
Effective orifice	P→A	0.28mm <sup>2</sup> (Cv 0.016)		0.14mm <sup>2</sup> (Cv 0.008)	
	A→R	0.36mm <sup>2</sup> (Cv 0.02)		0.20mm <sup>2</sup> (Cv 0.011)	
Response time Note 1		ON: 3.5ms, OFF: 2ms		ON: 3.5ms, OFF: 2.5ms	
Ambient and fluid temperature		-10~+50°C Note 2			
Lubrication		Not required			
Manual override		Non-locking recessed type/Locking tool type Note 3			
Mounting orientation		Free			
Protection structure		IP40			
Weight		12.6g (L/M type connector, without subplate)			

Note 1: As per JISB8375-1981 (with indicator light and surge voltage suppressor; clean air), dispersion accuracy ±1ms.

Note 2: Use dry air to prevent dew condensation when operating at low temperature.

Note 3: Locking type is optional specification.

## Solenoid specifications

Item	Specifications	1 wattage specifications		0.5 wattage specifications	
		0.7 MPa	0.7 MPa	0.7 MPa	0.7 MPa
Coil rated voltage		24VDC, 12VDC			
Allowable voltage		±10% of rated voltage			
Type of coil insulation		Class B			
Power consumption		1WDC		0.5WDC	
Electrical entry		Plug-in, L/M type connector (with indicator light and surge voltage suppressor)			

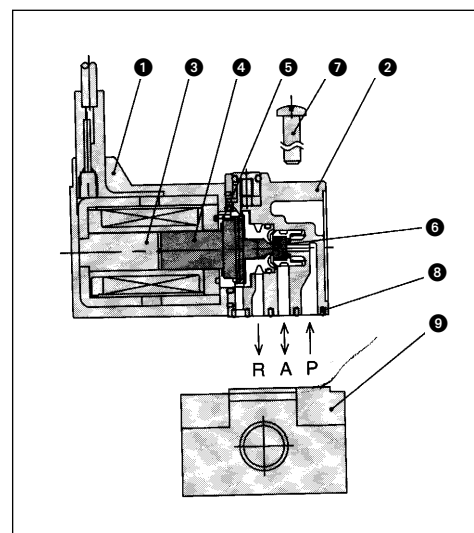


Fig 1

## Installation

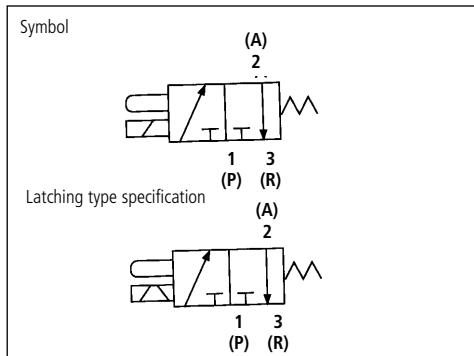
### CAUTION

Ensure all air and power supplies are isolated before commencing installation.

### WARNING

DO NOT INSTALL THESE VALVES IN EXPLOSIVE ATMOSPHERES. If these valves are exposed to water or oil droplets, ensure that the valves are protected.

If it is intended to energise a valve for an extended period please consult SMC.



## Tube connections-push-in fittings (Fig 2)

Ensure that the end of the tube 6 is cut square. Push the tube 6 firmly into the fitting 7 until it stops. Pull back on the tube 6 to ensure it is correctly gripped.

## Tube disconnection (Fig 2)

Push down on the collet flange 2, via the release button 4, hold down, and withdraw the tube 6.

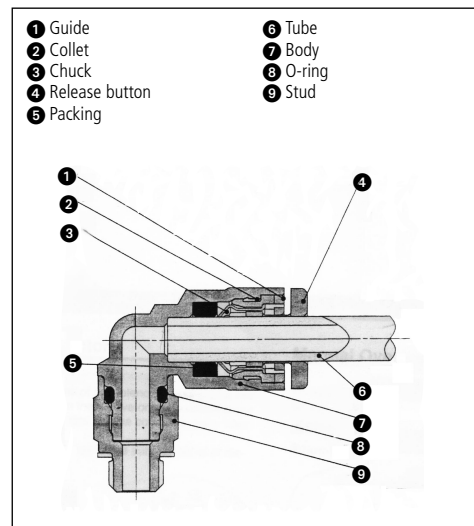


Fig 2

## Connection of plug connector (Fig 3)

Push the connector, in a straight line, onto the pins of the solenoid, ensuring that the lip of the lever is securely positioned in the groove of the solenoid cover.

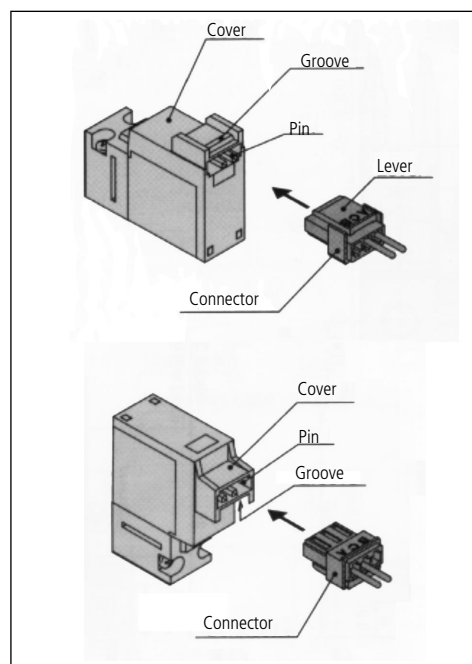


Fig 3

## Disconnection of plug connector (Fig 3)

Press the lever against the connector and pull the connector away from the solenoid.

### CAUTION

Do not exert excessive force on the wires, as this may cause contact failure.

## Wiring specifications (Fig 4)

The lead wires are connected to the valve as shown below. Connect each to the power supply side.

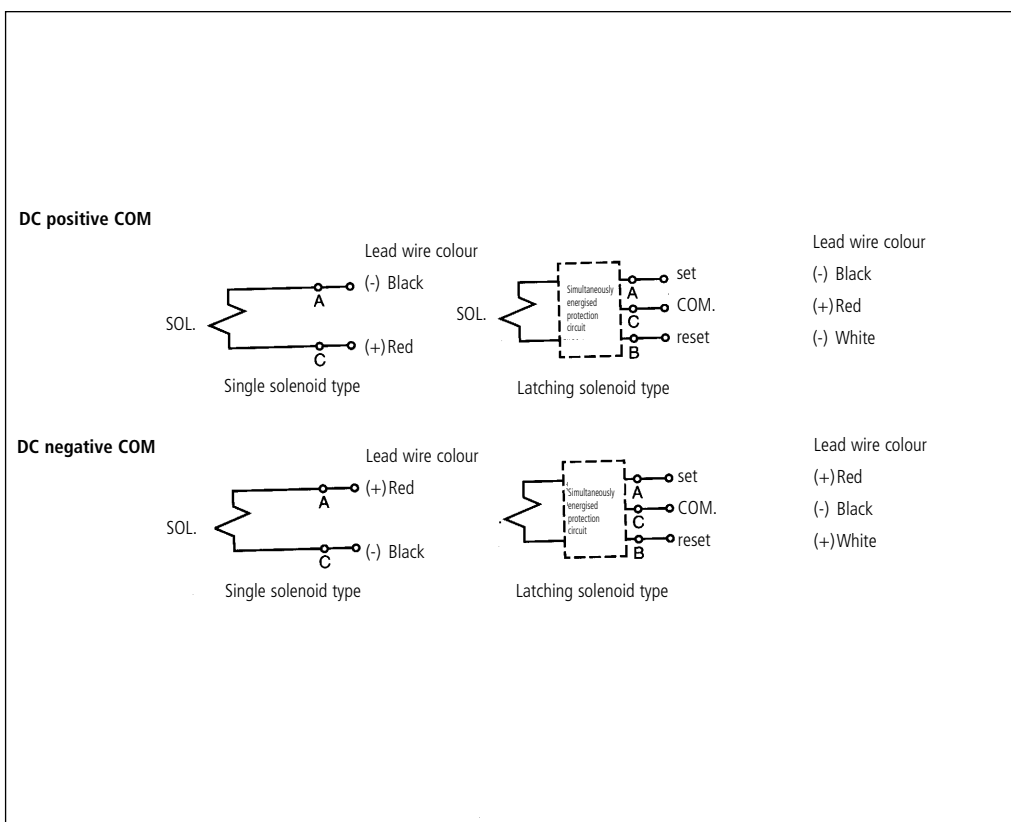


Fig 4

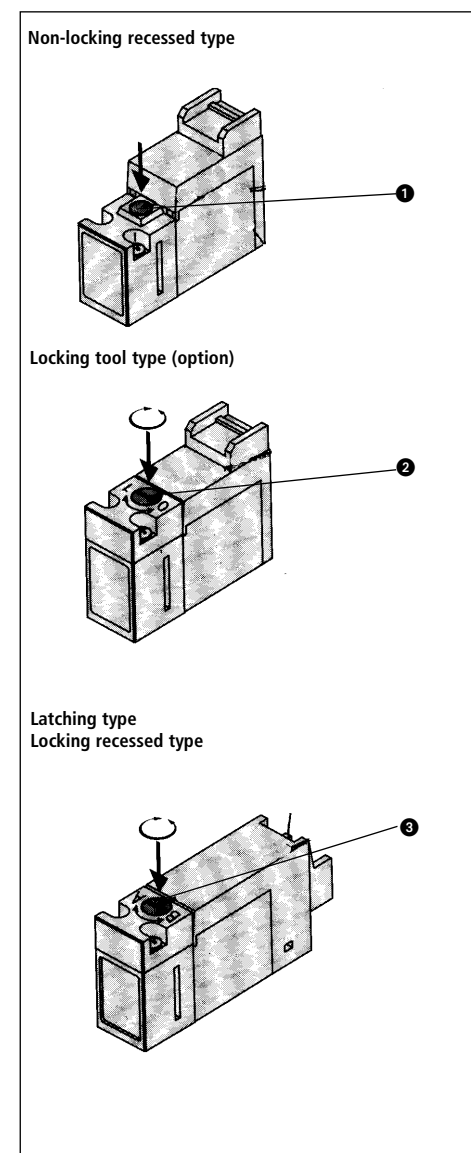


Fig 5

## Solenoid manual override (Fig 5)

### WARNING

Exercise extreme CAUTION when operating solenoid manual overrides, as connected equipment will commence operation.

### Push non-locking type

Push down on the manual button 1 (Fig 5) until it stops (ON). Hold this position whilst carrying out function checks. Release the manual override button and the override will re-set to the OFF position.

### Locking type manual override (Fig 5)

Turn the manual override clockwise through 180°, using a small slotted screwdriver, until the mark ► lines up with the No. 1. Push down on the button until the override locks (ON) position.

### WARNING

In this position the manual override is mechanically locked ON.

### Un-locking (Fig 5)

Turn the manual override anti-clockwise through 180°, using a small slotted screwdriver until the mark ► lines up with the No. 0. Remove the screwdriver and the manual override will re-set to the (OFF) position.

### Latching type (Fig 5)

Turn the manual override clockwise 180° using a small slotted screwdriver until the mark ► lines up with the letter A. Push the override button down until it locks in position (ON).

### WARNING

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

### Un-locking

Turn the manual override anti-clockwise through 180° until the mark ► lines up with the letter B. Remove the screwdriver, and the Manual override will re-set to the OFF position.

## Indicator light and surge suppressor (Fig 6a)

In the latching type, A (set) side and B (re-set) side energisation are indicated by two colours, which match the colours of the manual override buttons. See below (Fig 6a)

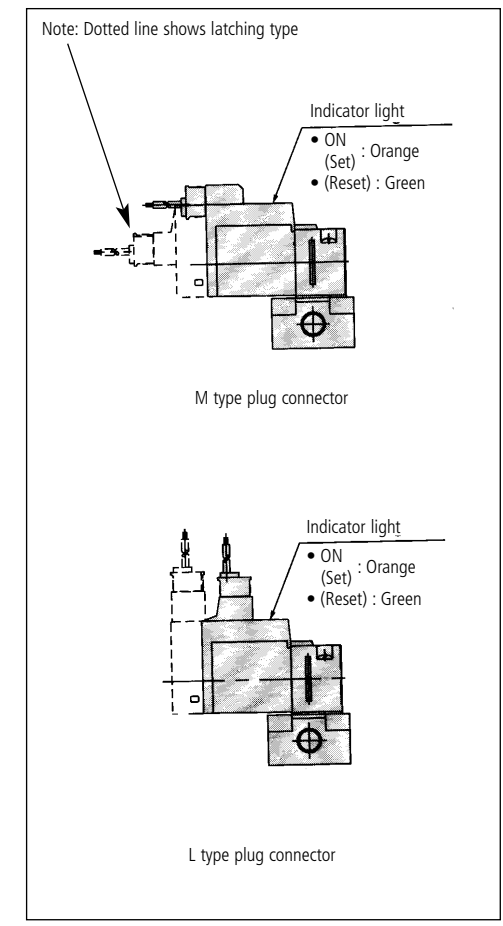
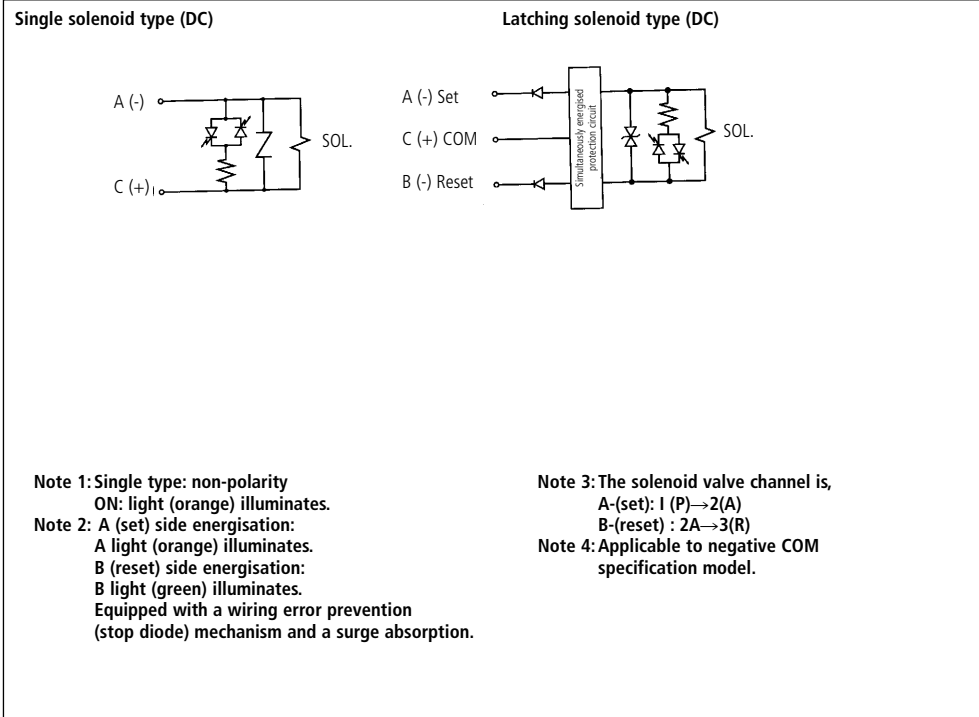


Fig 6a



**Fig 6b**

**Wiring specification (Fig 6b)**

**WARNING**

**Latching solenoid**  
 The latching solenoid is equipped with a self-latching mechanism, which permits a moveable iron core (4) (Fig 1), in the solenoid, to hold the 'set' position.

**CAUTION**

Do not employ simultaneous ON and OFF signals, as a 10ms energisation time is required for self-latching.  
 Avoid using these valves in applications involving excessive vibration (10G or more).  
 Do not use in high magnetic fields.  
 At despatch the valve is set in the 'un-latched' mode. However it is possible that it could move to the 'latch' position during transit. Before operating this valve ensure that it is set to the 'un-latch' position. See chart below (Fig 7).

Latching	Passage	Indicator light
A-C ON (Set)	1(P)→2(A)	Orange
B-C ON (Reset)	2(A)→3(R)	Green

Single	Passage	Indicator light
A-C ON	1(P)→2(A)	Orange
OFF	2(A)→3(R)	—

**Fig 7**

**Fittings**

Tighten fittings into the valve using the following torque figures (Fig 8).

Mounting thread	Correct clamping torque N-m (kgf-cm)
M5	1.5~2.0 (15~20)
M3	0.3~0.5 (3~5)

**Fig 8**

**Multi-connector (Fig 9)**

**Connection**

When fitting a connector align the positioning key (1) grooves and ensure that the connector is vertical when inserting and that it locks into position.

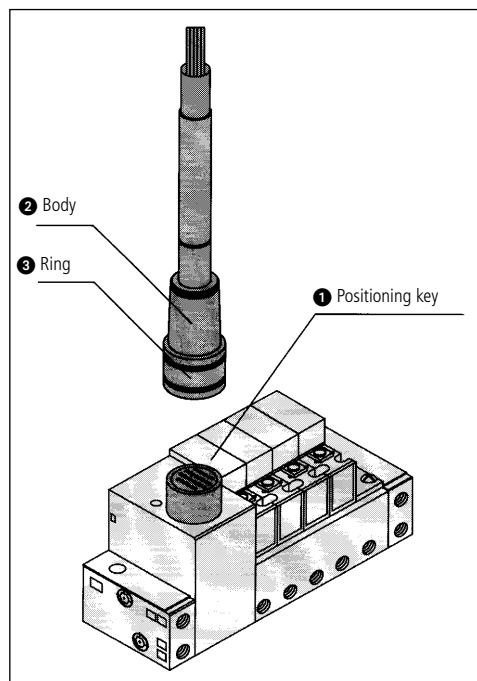
**Disconnection**

To disconnect the connector, lift the locking ring (3) and remove the body (2) in a straight line (vertically).

**Maintenance**

**WARNING**

Before carrying out any form of maintenance ensure all air and power supplies are isolated.



**Fig 9**

**Removing a valve from the sub-base (Fig 11)**

Disconnect the electrical connector (Fig 3).  
 Remove the valve holding down screws (7) (Fig 1).  
 Lift off the valve.  
 Retain the gasket.

**Refitting a valve to a sub-base**

Refit the gasket to the sub-base ensuring correct orientation.  
 Replace the valve.  
 Refit the valve holding down screws.  
 Torque screws to the following figure:  
 0.9 kgf/cm.

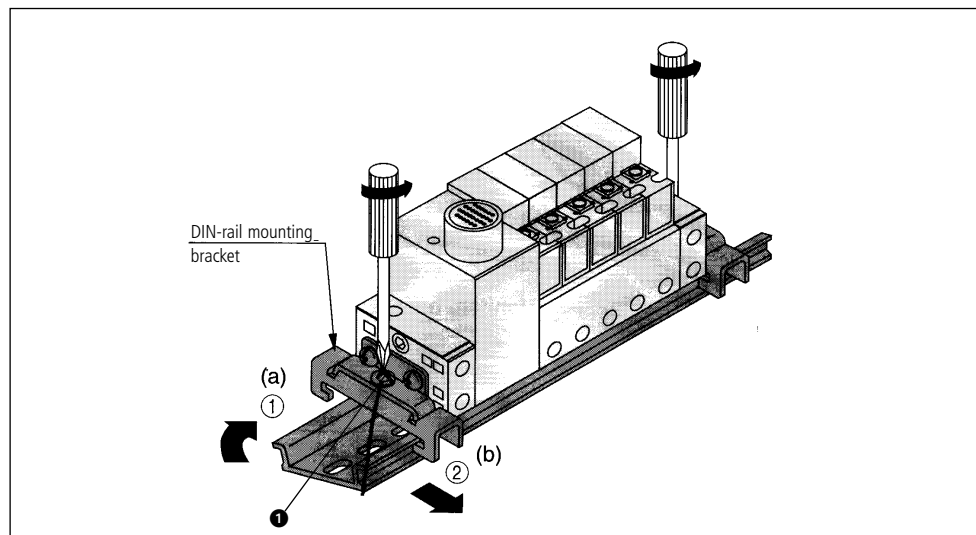
**Mounting/Removing from a DIN-rail (Fig 10)**

**Removing**

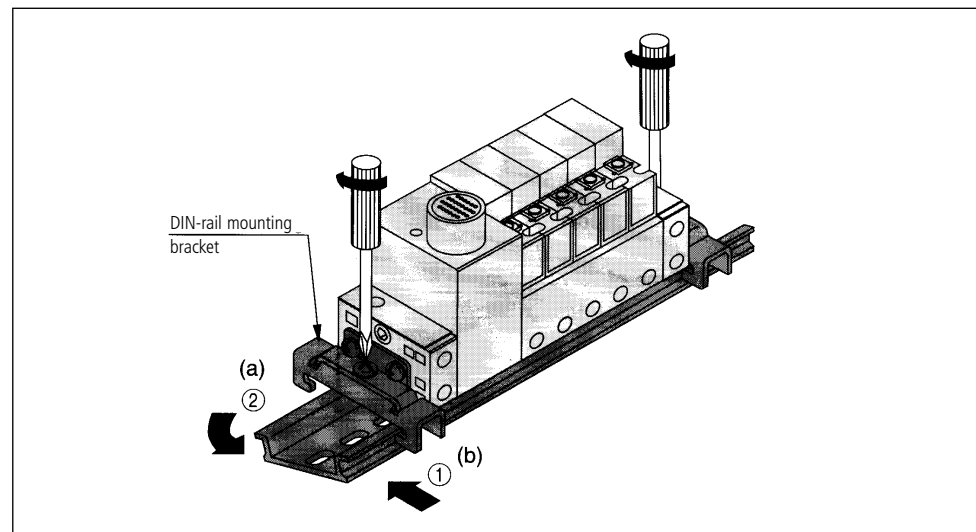
Loosen the clamp screw of the end plate (1) on both ends of the manifold. Lift side (a) of the manifold base, slide the end plate in the direction of 2 to remove.

**Mounting**

Hook side (b) of the manifold base onto the DIN-rail.  
 Press down side (a) and clip the end plate onto the DIN-rail.  
 Tighten the clamp screws to the following torque figures:  
 0.8 N-m~1.2 N-m (8~12 kgf/cm).



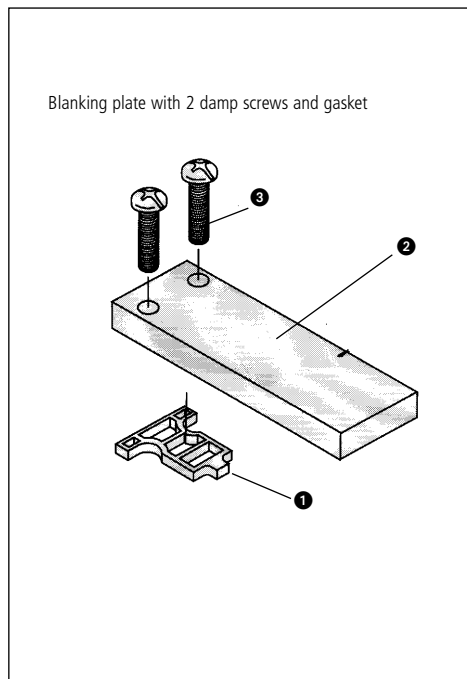
**Fig 10**



**Fig 11**

**Blanking plate (Fig 12) (VVQ100-10A-1)**

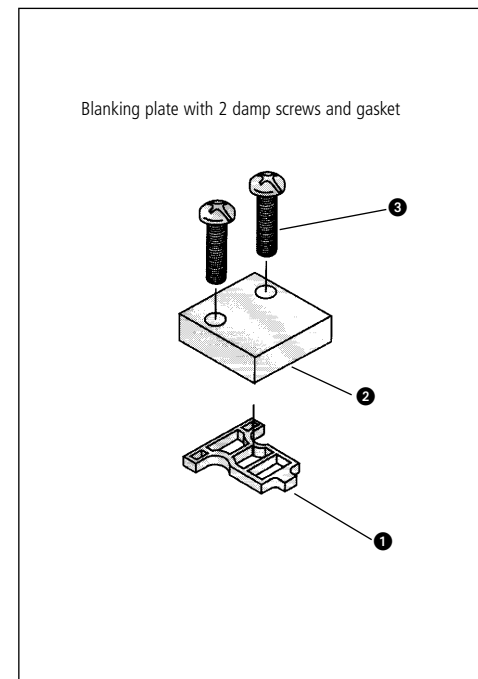
This type of blanking plate is fitted to multi-connector manifolds.  
 Ensure that the gasket (1) is correctly fitted.  
 Fit the blanking plate (2) onto the manifold station.  
 Fit and tighten the holding down screws (3) to the same torque figures as the valve holding down screws (see above).



**Fig 12**

**Blanking plate (Fig 13) (VVQ100-10A-2)**

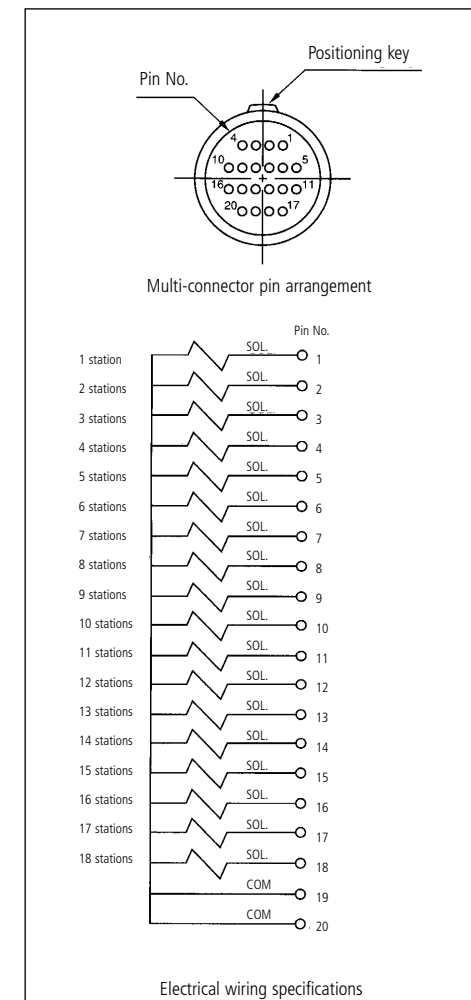
This type of blanking plug is fitted to standard multi-connector manifolds (plug lead).



**Fig 13**

Fitting as above.

**Wiring specifications**



**Terminal No./Lead wire colour**

Terminal No.	Lead wire colour	
	Lead wire colour	Dot marking
1	Black	---
2	Brown	---
3	Red	---
4	Orange	---
5	Yellow	---
6	Pink	---
7	Blue	---
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	---
18	Grey	---
19	Orange	Black
20	Red	White

**Fig 14**

When you enquire about the product, please contact the following

SMC Corporation:		
<b>ENGLAND</b>	Phone 01908-563888	<b>TURKEY</b> Phone 212-2211512
<b>ITALY</b>	Phone 02-92711	<b>GERMANY</b> Phone 6103-402-0
<b>HOLLAND</b>	Phone 020-5318888	<b>FRANCE</b> Phone 01-64-76-10-00
<b>SWITZERLAND</b>	Phone 052-34-0022	<b>SWEDEN</b> Phone 08-603 07 00
<b>SPAIN</b>	Phone 945-184100	<b>AUSTRIA</b> Phone 02262-62-280
	Phone 902-252555	<b>IRELAND</b> Phone 01-4501822
<b>GREECE</b>	Phone 01-3426076	<b>DENMARK</b> Phone 8738-0800
<b>FINLAND</b>	Phone 09-68 10 21	<b>NORWAY</b> Phone 67-12 90 20
<b>BELGIUM</b>	Phone 03-3551464	<b>POLAND</b> Phone 48-22-6131847