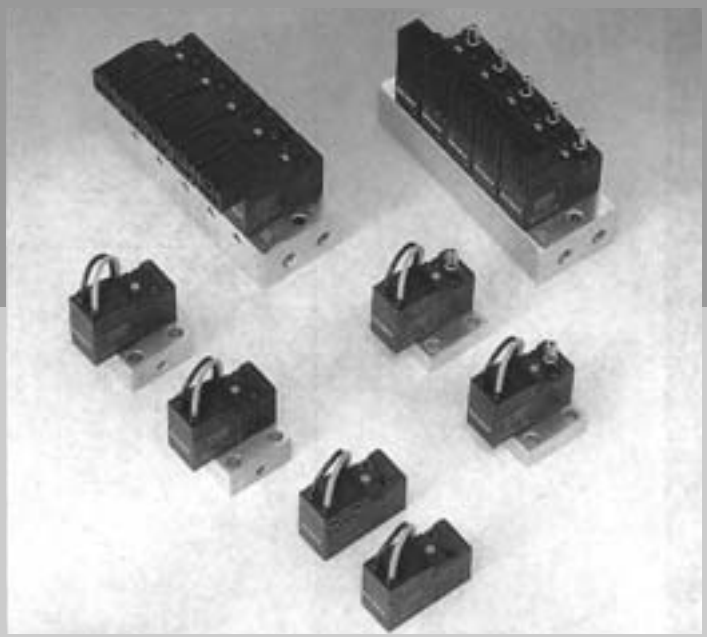
3MA0/3MB0

3 port direct acting valve

Small pneumatic valve



Overview

The 3MA0 and 3MB0 Series 3 port valve is a 10 mm wide miniature direct-acting poppet valve compatible with system downsizing.
A variety of types, including discrete and manifold, suitable for driving ø6 to ø16 cylinders, is available.

Features

Space saving

Valves are compactly designed with widths of 10 mm

Low wattage

The low-wattage design (25 mA at 24 VDC) allows connection to various electronic control circuits.

Wide variation of electric connection

The lead type, C-type connector, and D-type connectors are available in this series.
Combinations with lights and surge suppressors are available.

Ideal for semiconductor and precision fields

Compact, high-reliable, and low-wattage design is ideal for semiconductor manufacturing lines and precision fields.

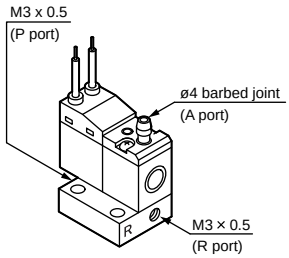
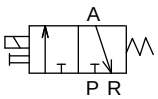
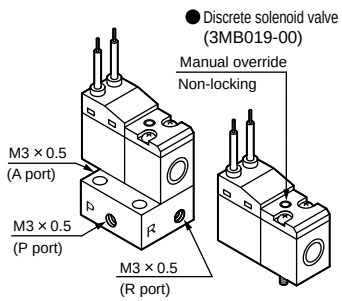
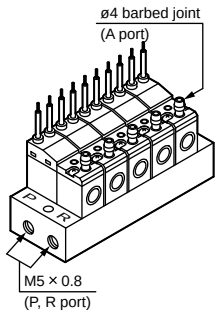
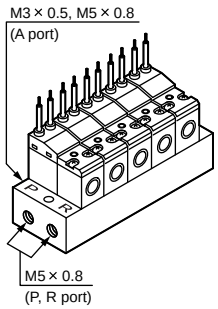
CONTENTS

Series variation 1048
Variation of electric connection (electric connection method / circuit diagram) 1049

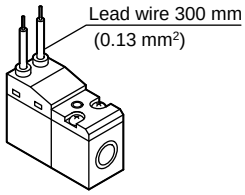
Discrete valve
- Body porting (3MA0) 1052
- Sub-plate porting (3MB0) 1052

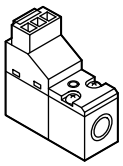
Individual wiring manifold
- Body porting (M3MA0) 1054
- Sub-plate porting (M3MB0) 1054

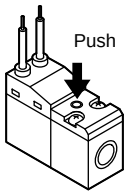
Technical data
(1) Flow characteristics, connector wiring method 1062

Series / piping method			No. of port	Position No. of solenoid JIS symbol	Valve performance: Effective sectional area (mm^2)	Valve performance: Applicable cylinder diameter	Voltage (V)	Solenoid position: 2-position single normally closed	Solenoid position: Mix manifold	A port size: Barbed joint: ø4 barbed joint	A port size: Barbed joint: ø6 barbed joint	A port size: Female thread: M3	A port size: Female thread: M5	A port size: ø4 push-in joint	Electric connection: Grommet lead wire	Electric connection: C-connector	Electric connection: D-connector	Page
Discrete	Body porting	**3MA0** 3 port valve 	3 port	● 2-position single solenoid (N.C. type) 	P → A 0.1 A → R 0.15	ø6 to ø16	24 DC 12 DC Option 6 DC 5 DC	●		●					●	●	●	1052
	Sub-plate porting	**3MB0** 3 port valve 						●				●			●	●	●	1052
Individual wiring manifold	Body porting	**M3MA0** 	3 port		P → A 0.1 A → R 0.15	ø6 to ø16	24 DC 12 DC Option 6 DC 5 DC	●	●	●					●	●	●	1054
	Sub-plate porting	**M3MB0** 						●	●	●	●	●	●	●	●	●	●	1054

Electric connection Discrete valve and individual wiring type manifold		Manual override
Blank Grommet lead wire	**D1** D-connector, without lead wire	Non-locking

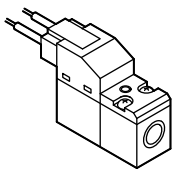




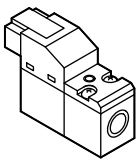


C C-connector, with lead wire

● Lead wire length
C : 300 mm
C00 : 500 mm
C01 : 1000 mm
C02 : 2000 mm

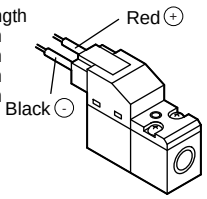


C1 C-connector, without lead wire

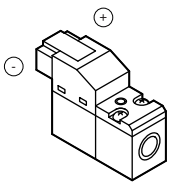


C2 C-connector, with lead wire with surge suppressor and light

● Lead wire length
C2 : 300 mm
C20 : 500 mm
C21 : 1000 mm
C22 : 2000 mm

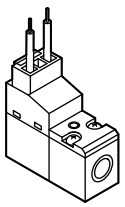


C3 C-connector, without lead wire with surge suppressor and light



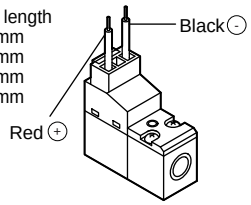
D D-connector, with lead wire

● Lead wire length
D : 300 mm
D00 : 500 mm
D01 : 1000 mm
D02 : 2000 mm

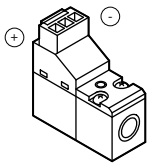


D2 D-connector, with lead wire with surge suppressor and light

● Lead wire length
D2 : 300 mm
D20 : 500 mm
D21 : 1000 mm
D22 : 2000 mm

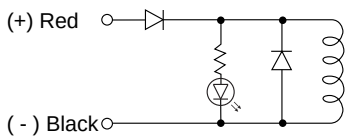


D3 D-connector, without lead wire with surge suppressor and light



* Note that there is polarity.

surge suppressor and light internal circuit diagram



*Diode is used for a surge suppressor.

3 port direct acting valve

Safety precautions

Always read this section before starting use.
Refer to Intro 63 for valve general precautions.

3 port direct acting valve small pneumatic valve 3MA0/3MB0 Series

Design & Selection

1. Surge suppressor

■The surge suppressor enclosed with the solenoid valve is to protect the output contact for that solenoid valve's drive. There is no significant protection for the other peripheral devices, and devices could be damaged or malfunction by the surge. Surge generated by other devices could be absorbed and cause damage such as burning. Care must be taken for points below.

⚠ CAUTION

● If another device or solenoid valve is connected in parallel to the solenoid valve, the inverse voltage surge generated when the valve is OFF would apply to those devices. Even when using the solenoid valve with surge suppressor for 24 VDC, the surge voltage may reach minus several ten V depending on the model. This inverse polarity voltage could damage or cause the other devices connected in parallel to malfunction. Avoid parallel connection of devices suspected of reversing polarity voltages, e.g., LED indicators.
When driving several solenoid valves in parallel, the surge from other solenoid valves could enter the surge suppressor of one solenoid valve with a surge suppressor. Depending on the current value, that surge suppressor could burn.
When driving several solenoid valves with surge suppressors in parallel, surge current could concentrate at the surge suppressor with the lowest limit voltage and cause similar burning. Even if the solenoid valve type is the same, the surge suppressor's limit voltage can be inconsistent, and in the worst case, could result in burning. Avoid driving several solenoid valves in parallel.

● The surge suppressor incorporated in the solenoid valve often short-circuits if damaged by excessive voltage or current from the other solenoid valves. If the surge suppressor fails, if a large current flows when output is on, the output circuit or solenoid valve could be damaged or ignite. Do not keep power on in a faulty state.
Provide an overcurrent protection circuit on the power or drive circuit or use a power supply with overcurrent protection so that a large current does not flow continuously.

During Use & Maintenance

1. Common

⚠ CAUTION

■Energizing for a long time could impair solenoid valve performance.
Similar caution is required in the following use.
· During intermittent energizing, it takes longer than non-energizing.
· During intermittent energizing, one energizing session exceeds 30 min.
Consider heat dissipating measures when installing.
Consult with CKD when using this device in a continuous energizing state.

MEMO

Discrete valve: Body porting, sub-plate porting 3 port direct acting valve small pneumatic valve

3MA0/3MB0 Series

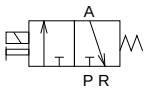
● Applicable cylinder bore size: ø6 to ø16

CE Refer to Intro 17 for details.

RoHS CAD

JIS symbol

● 3 port valve N.C. type



Common specifications

Descriptions	
Valve and operation type	Direct acting poppet valve
Working fluid	Compressed air
Max. working pressure MPa	0.70
Min. working pressure MPa	0.00
Withstanding pressure MPa	1.05
Ambient temperature °C	5 to 50
Fluid temperature °C	5 to 50
Lubrication	Not required
Protective structure	Dust proof
Vibration/impact m/s²	50 or less / 300 or less
Working environment	Containing corrosive gas is impermissible.

Electric specifications

Descriptions		
Rated voltage V	24 DC	12 DC
Rated voltage fluctuation range	±10%	
Rated current A Note 1	0.025 (0.029)	0.050 (0.058)
Power consumption W Note 2	0.6 (0.7)	0.6 (0.7)
Heat proof class	B	
Temperature rise °C	50	

Note 1: Value in ( ) are for types with light and surge suppressor.
Note 2: Power consumption of 6, 5 VDC is 0.9 (1.0) W.

Individual specifications

Descriptions		3MA0	3MB0
Port size	P/ R port	M3 Note 3	M3 Note 3
	A port	ø4 barbed joint	
Effective sectional area Note 1 mm²		P ⟶ A: 0.1, A ⟶ R: 0.15	
Response time Note 2 ms		10 or less	
Weight g		18	

Note 1: The effective sectional area is the value for the discrete solenoid valve.
Note 2: Response time is the value when ON for supply pressure 0.5 MPa, pre-lubricated. The value varies depending on pressure and quality of lubricant.
Note 3: Use the FTS4-M3 barbed joint with the port size M3 port.

Ozone specifications

** - Voltage - P11

How to order discrete valve

● Body porting

3MA0 1 0 – T4 – C2 – 3

● Sub-plate porting

3MB0 1 0 – M3 – C2 – 3

● Discrete solenoid valve (without sub-plate)

3MB0 1 9 – 00 – C2 – 3

Ⓐ Model no.

Solenoid position
2-position single solenoid
normally closed

Solenoid valve type

Ⓑ Port size

Ⓒ Electric connection
Note 2
* Refer to page 1049 for the circuit diagram of the type with light and surge suppressor.

Ⓓ Voltage

Symbol	Descriptions		Ⓐ Model no. Body porting 3MA0	Ⓐ Model no. Sub-plate porting 3MB0
Ⓑ Port size				
Port name	A port	P/ R port		
T4	ø4 barbed joint	M3 x 0.5	● Note 1	
M3	M3 x 0.5			●
Ⓒ Electric connection				
Blank	Grommet lead wire (300 mm)		●	●
C-connector (lead wire lateral)				
C	Lead wire (300 mm)		●	●
C00	Lead wire (500 mm)		●	●
C01	Lead wire (1000 mm)		●	●
C02	Lead wire (2000 mm)		●	●
C1	No lead wire		●	●
C2	Lead wire (300 mm)	with surge suppressor, light	●	●
C20	Lead wire (500 mm)	with surge suppressor, light	●	●
C21	Lead wire (1000 mm)	with surge suppressor, light	●	●
C22	Lead wire (2000 mm)	with surge suppressor, light	●	●
C3	No lead wire	with surge suppressor, light	●	●
D-connector (lead wire upward)				
D	Lead wire (300 mm)		●	●
D00	Lead wire (500 mm)		●	●
D01	Lead wire (1000 mm)		●	●
D02	Lead wire (2000 mm)		●	●
D1	No lead wire		●	●
D2	Lead wire (300 mm)	with surge suppressor, light	●	●
D20	Lead wire (500 mm)	with surge suppressor, light	●	●
D21	Lead wire (1000 mm)	with surge suppressor, light	●	●
D22	Lead wire (2000 mm)	with surge suppressor, light	●	●
D3	No lead wire	with surge suppressor, light	●	●
Ⓓ Voltage				
3	Standard	24 VDC	●	●
4		12 VDC	●	●
DC6V	Option	6 VDC	●	●
DC5V		5 VDC	●	●

Note on model no. selection

Note 1: Use the following tube models for the 3MA0 A port piping.
F-1532, F-1504, U-9532, U-9504

Note 2: AWG26 size lead is used.
(7/0.16, O.D. ø1.35, 0.13 mm²)

<Example of model number>

3MA010-T4-C-3

Ⓐ Model: 3MA0 (body porting)
Solenoid position: 2-position single solenoid, normally closed
Ⓑ Port size : ø4 barbed joint (A port), M3 (P/R port)
Ⓒ Electric connection : C-connector, with lead wire (300 mm)
Ⓓ Voltage : 24 VDC

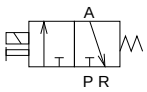
Individual wiring manifold: Body porting, sub-plate porting
3 port direct acting valve small pneumatic valve

M3MA0/M3MB0 Series

● Applicable cylinder bore size: ø6 to ø16 CE Refer to Intro 17 for details. RoHS CAD

JIS symbol

● 3 port valve N.C. type



Common specifications

Descriptions	
Manifold method	Manifold integrated
Manifold type	Common supply / common exhaust
Station number	2 to 20 stations
Valve and operation type	Direct acting poppet valve
Working fluid	Compressed air
Max. working pressure MPa	0.70
Min. working pressure MPa	0.00
Withstanding pressure MPa	1.05
Ambient temperature °C	5 to 50
Fluid temperature °C	5 to 50
Lubrication	Not required
Protective structure	Dust proof
Vibration/impact m/s²	50 or less / 300 or less
Working environment	Containing corrosive gas is impermissible.

Electric specifications

Descriptions		
Rated voltage V	24 DC	12 DC
Rated voltage fluctuation range	±10%	
Rated current A Note 1	0.025 (0.029)	0.050 (0.058)
Power consumption W Note 2	0.6 (0.7)	0.6 (0.7)
Heat proof class	B	
Temperature rise °C	50	

Note 1: Value in ( ) are for types with light and surge suppressor.
Note 2: Power consumption of 6/5 VDC is 0.9 (1.0) W.

Individual specifications

Descriptions		3MA0	3MB0
Port size	P port	M5	
	A port	ø4 barbed joint	M3, M5, ø4 push-in joint ø4, ø6 barbed joint
	R port	M5	
Effective sectional area Note 1 mm²		P ⟶ A: 0.1, A ⟶ R: 0.15	
Response time Note 2 ms		10 or less	

Note 1: The effective sectional area is the value for the discrete solenoid valve.
Note 2: Response time is the value when ON for supply pressure 0.5 MPa, pre-lubricated. The value varies depending on pressure and quality of lubricant.

Ozone specifications

** - Voltage - P11

(Mix manifold)

● How to indicate combinations

When selecting a combination manifold (8 selected for "B"), indicate the required functions with symbols (refer to right table) and layout number (start with 1 at the left and assign numbers to the designated number of stations) in the Remarks field at the bottom of the normal model indication. Refer to the example for details.

Symbol	Function
S1	2-position single solenoid
MP	Masking plate

1	2	3	4	5	6	7
2-position single (S1)	2-position single (S1)	2-position single (S1)	2-position single (S1)	2-position single (S1)	Masking plate (MP)	Masking plate (MP)

Example

The model number for a combination manifold with 7 stations, M3MB0, and 24VDC with the layout shown in the left is as follows:

M3MB080-M3-7-3- 5 2 **S1MP**

(S1 = 1 to 5, MP = 6, 7)

Indicate the required quantity. Indicate 0 even when not required.

● When using 10 or more actuators of the same model in a mixed manifold, designate with the following symbols.

Actuator quantity	10	11	12	13	14	15	16	17	18	19
Symbol	A	B	C	D	E	F	G	H	I	J

How to order individual wiring manifold

● Discrete solenoid valve for manifold (body porting)

3MA0 1 9 - T4 - C2 —— 3

● Individual wiring manifold (body porting)

M 3MA0 1 0 - T4 - C2 - 2 - 3 - 1 1

● Discrete solenoid valve for manifold (sub-plate porting)

3MB0 1 9 - 00 - C2 —— 3

● Individual wiring manifold (sub-plate porting)

M 3MB0 1 0 - M3 - C2 - 2 - 3 - 1 1

Indicate the quantity and display position of each valve function for the mixed manifold. Refer to page 1054.

Ⓐ Model no. | Solenoid valve type | Ⓑ Solenoid position | Ⓒ Port size | Ⓓ Electric connection | Ⓔ Station number | Ⓕ Voltage

● How to order a masking plate
Refer to page1062.

Symbol	Descriptions	Ⓐ Model no. Body porting 3MA0	Ⓐ Model no. Sub-plate porting 3MB0
Ⓑ Solenoid position			
1	2-position single solenoid normally closed	●	●
8	Mix manifold	●	●
Ⓒ Port size			
Port name	A port / P/ R port		
T4	ø4 barbed joint / M 5	● Note 1	● Note 2
T6	ø6 barbed joint / M 5		● Note 2
M3	M 3 / M 5		●
M5	M 5 / M 5		●
GS4	ø4 push-in joint / M 5		● Note 3
Ⓓ Electric connection			
Blank	Grommet lead wire (300 mm)	●	●
C-connector (lead wire lateral)			
C	Lead wire (300 mm)	●	●
C00	Lead wire (500 mm)	●	●
C01	Lead wire (1000 mm)	●	●
C02	Lead wire (2000 mm)	●	●
C1	No lead wire	●	●
C2	Lead wire (300 mm) with surge suppressor, light	●	●
C20	Lead wire (500 mm) with surge suppressor, light	●	●
C21	Lead wire (1000 mm) with surge suppressor, light	●	●
C22	Lead wire (2000 mm) with surge suppressor, light	●	●
C3	No lead wire with surge suppressor, light	●	●
D-connector (lead wire upward)			
D	Lead wire (300 mm)	●	●
D00	Lead wire (500 mm)	●	●
D01	Lead wire (1000 mm)	●	●
D02	Lead wire (2000 mm)	●	●
D1	No lead wire	●	●
D2	Lead wire (300 mm) with surge suppressor, light	●	●
D20	Lead wire (500 mm) with surge suppressor, light	●	●
D21	Lead wire (1000 mm) with surge suppressor, light	●	●
D22	Lead wire (2000 mm) with surge suppressor, light	●	●
D3	No lead wire with surge suppressor, light	●	●
Ⓔ Station number			
2	2 stations	●	●
to	to		
20	20 stations		
Ⓕ Voltage			
3	Standard 24 VDC	●	●
4	Standard 12 VDC	●	●
DC6V	Option 6 VDC	●	●
DC5V	Option 5 VDC	●	●

* Refer to page 1049 for the circuit diagram of the type with light and surge suppressor.

Note 4

Note on model no. selection

Note 1: Use the following tube models for the 3MA0 A port piping.
F-1532, F-1504, U-9532, U-9504

Note 2: With T4/T6, the barbed joints FTS4-M5 and FTS6-M5 are screwed in.

Note 3: With GS4, the push-in joint GWS4-M5-S is screwed into A port.

Note 4: AWG26 size lead is used. (7/0.16, ø1.35, 0.13 mm²)

<Example of model number>

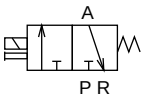
M3MA010-T4-C-7-3

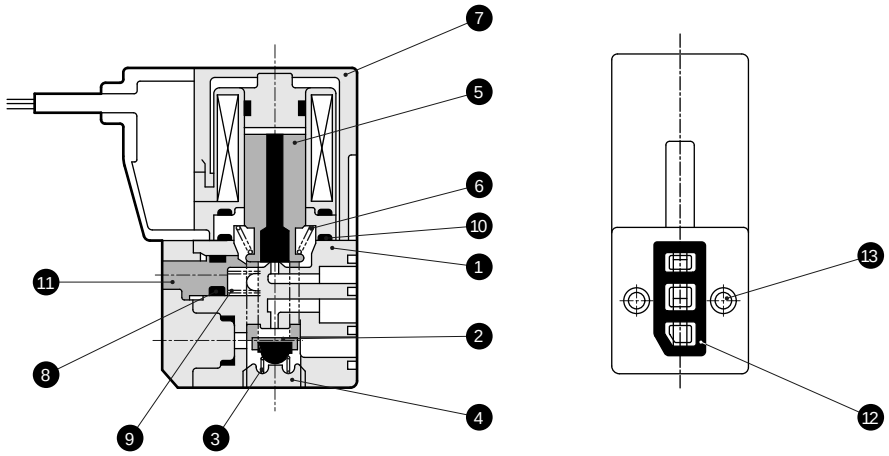
Ⓐ Model: M3MA0 (body porting)
Ⓑ Solenoid position : 2-position single solenoid normally closed
Ⓒ Port size : ø4 barbed joint (A port), M5 (P/R port)
Ⓓ Electric connection : C-connector, with lead wire (300 mm)
Ⓔ Station number : 7 stations
Ⓕ Voltage : 24 VDC

Internal structure and parts list

3MA0/3MB0

● 3 port N.C. type

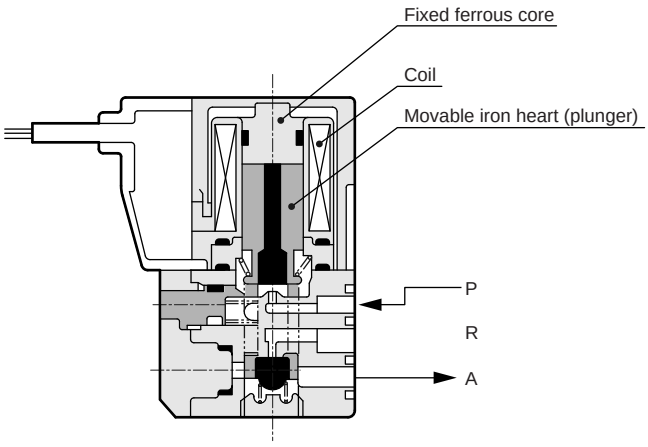




Main parts list

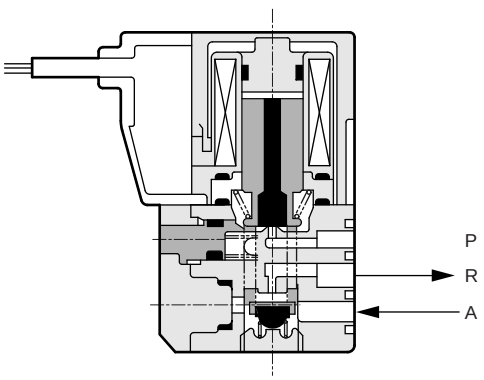
No.	Parts name	Material	No.	Parts name	Material
1	Body	Resin	8	O ring	Fluoro rubber
2	Valve seat	Nitrile rubber	9	Manual spring	Stainless steel
3	Valve spring	Stainless steel	10	O ring	Fluoro rubber
4	Bottom	Resin	11	Manual override	Resin
5	Plunger	Stainless steel, nitrile rubber	12	Body gasket	Fluoro rubber
6	Plunger spring	Stainless steel	13	Set screw	Steel
7	Coil assembly	-			

Operational principle



● When energized

When the coil is energized, the plunger is attracted to the fixed ferrous core, and the compressed air flows from P to A.



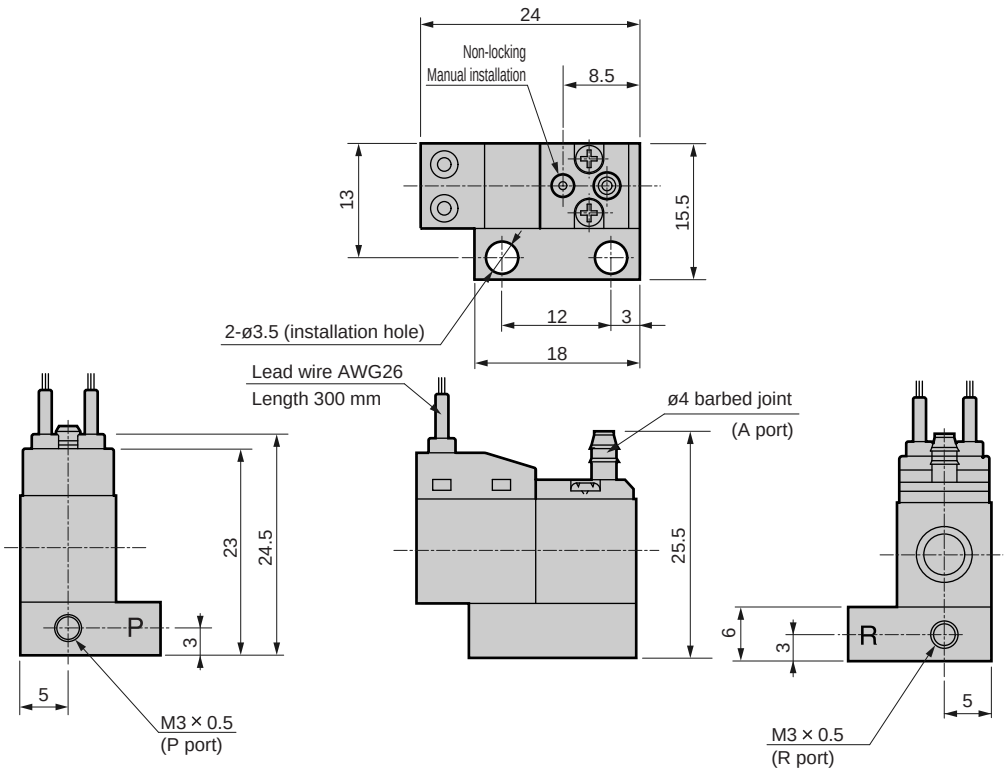
● When de-energized

When the power to the coil is stopped, the plunger separates from the fixed ferrous core, and the compressed air flows from A to R.

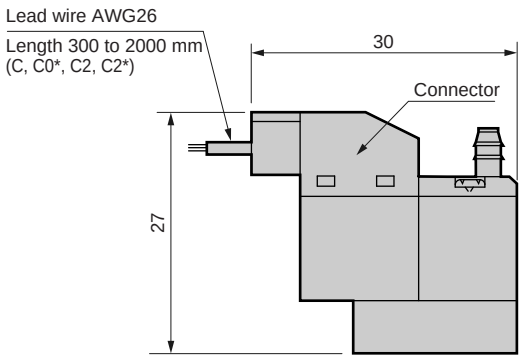
Dimensions CAD

3MA010-T4

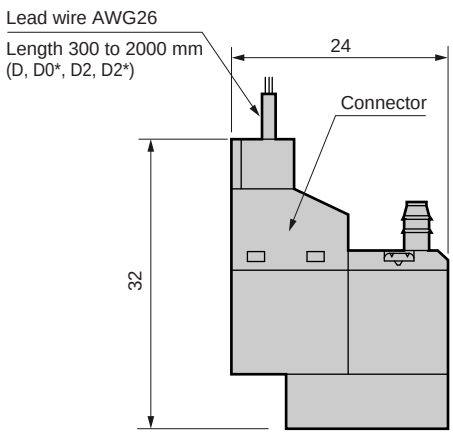
●3 port N.C. type: Grommet lead wire



●C-connector: (C, C0*, C1, C2, C2*, C3)



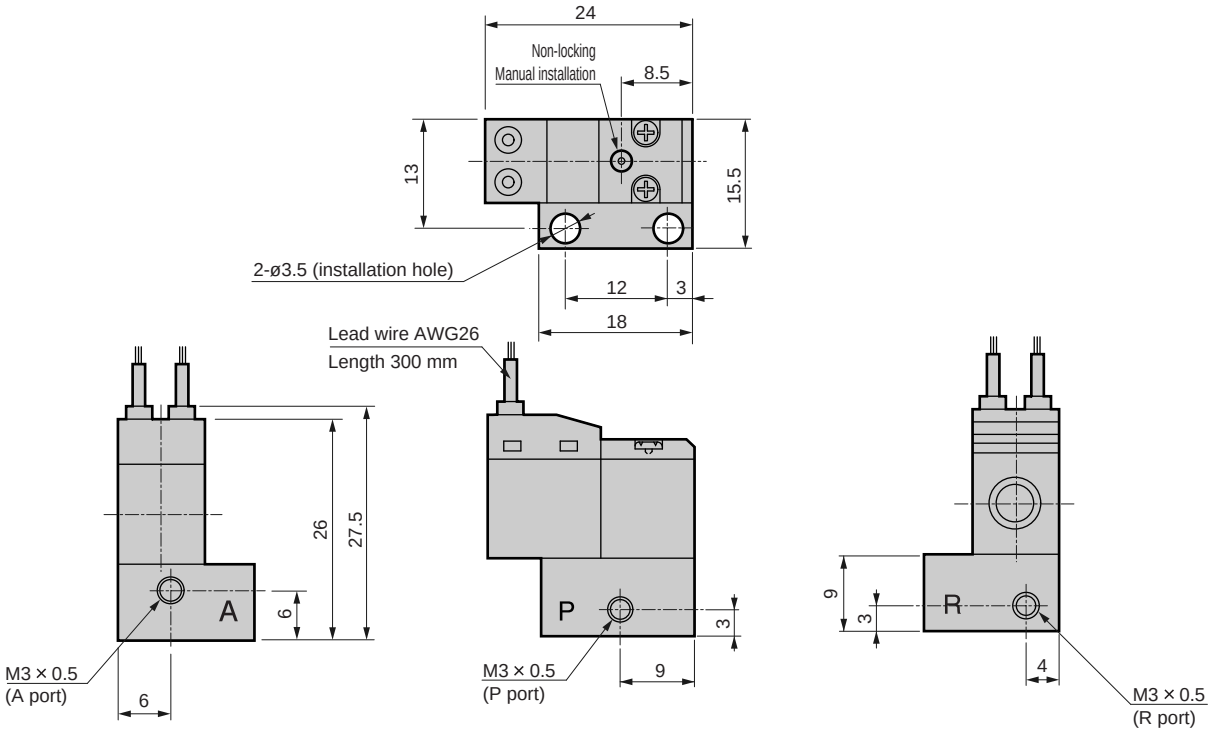
●D-connector: (D, D0*, D1, D2, D2*, D3)



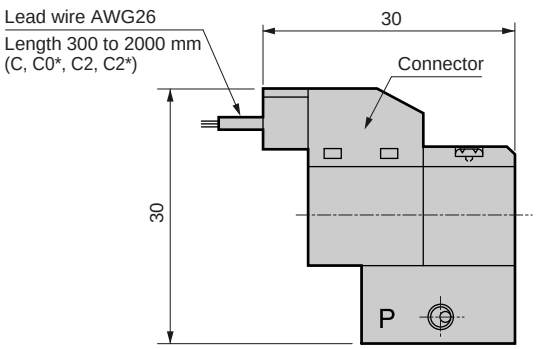
Dimensions CAD

3MB010-M3

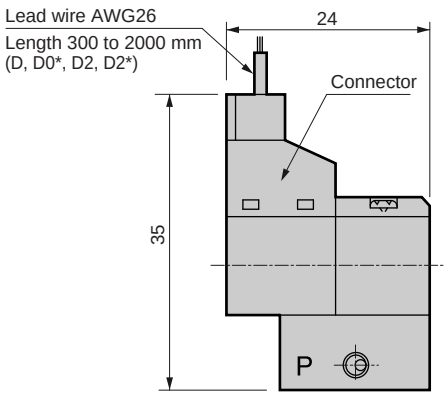
● 3 port N.C. type: Grommet lead wire



● C-connector: (C, C0*, C1, C2, C2*, C3)



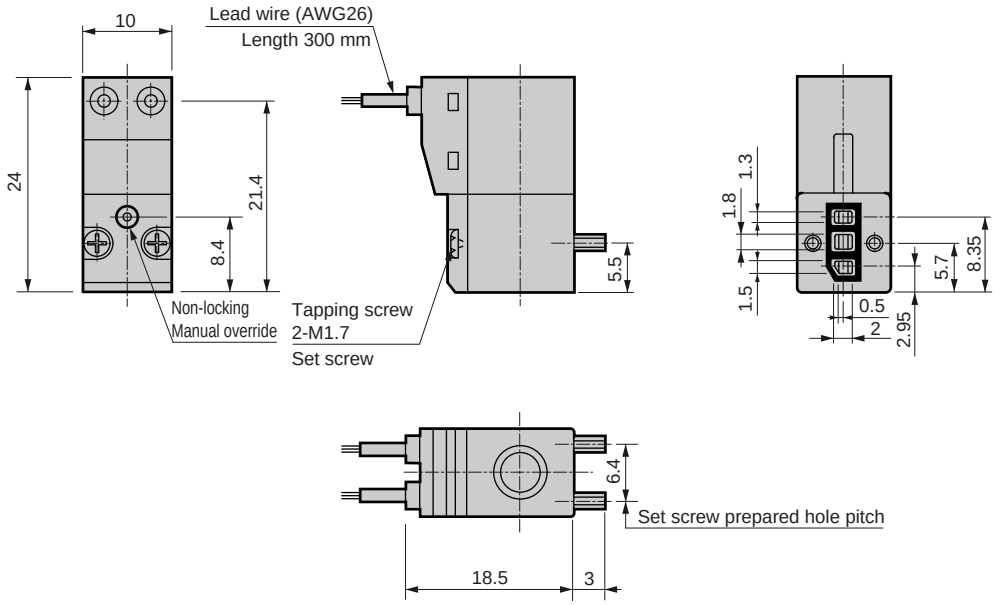
● D-connector: (D, D0*, D1, D2, D2*, D3)



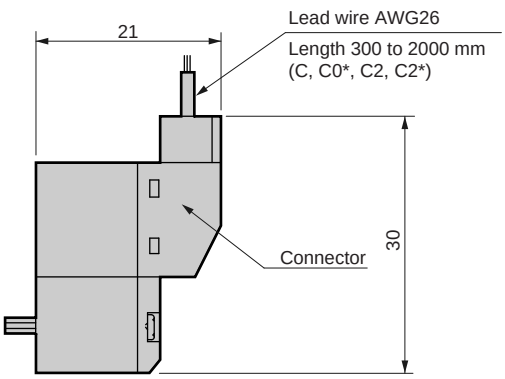
Dimensions

3MB019-00

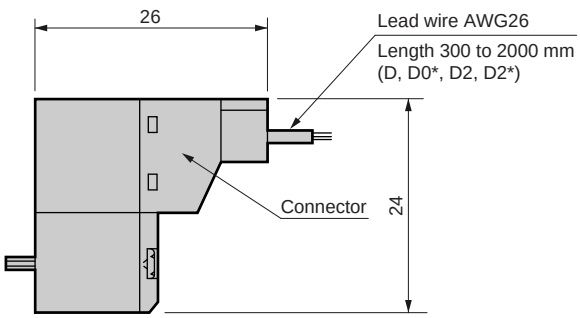
● Discrete solenoid valve for manifold: Grommet lead wire



● C-connector: (C, C0*, C1, C2, C2*, C3)



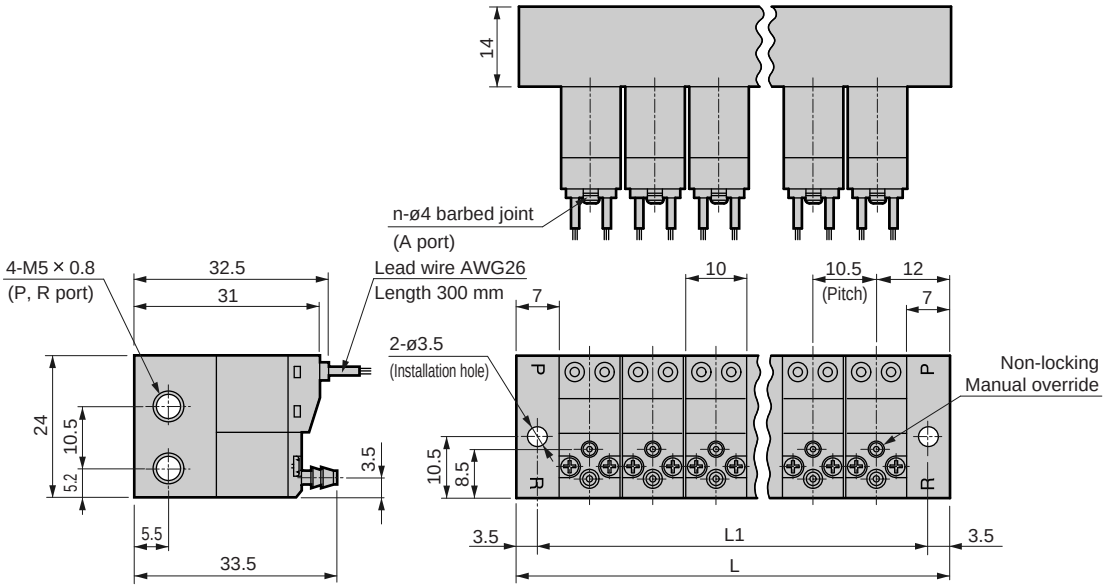
● D-connector: (D, D0*, D1, D2, D2*, D3)



Dimensions CAD

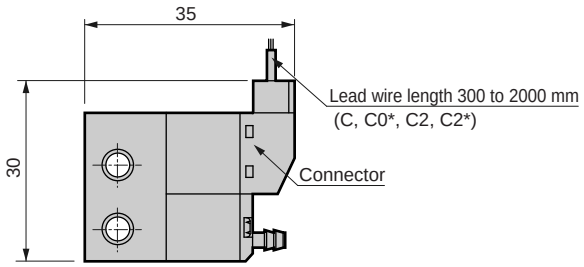
M3MA010-T4

● Body porting A type: Grommet lead wire

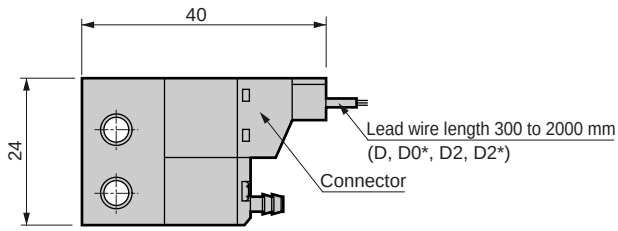


Sta. no.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
L1	27.5	38	48.5	59	69.5	80	90.5	101	111.5	122	132.5	143	153.5	164	174.5	185	195.5	206	216.5
L	34.5	45	55.5	66	76.5	87	97.5	108	118.5	129	139.5	150	160.5	171	181.5	192	202.5	213	223.5

● C-connector: (C, C0*, C1, C2, C2*, C3)



● D-connector: (D, D0*, D1, D2, D2*, D3)

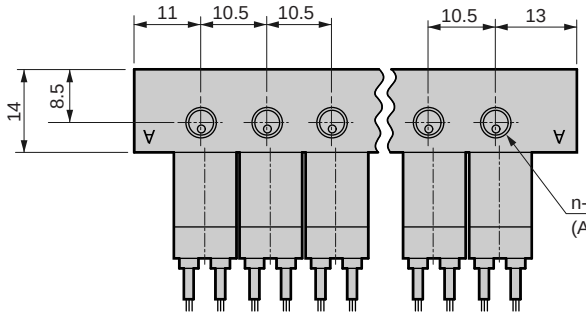


Dimensions CAD

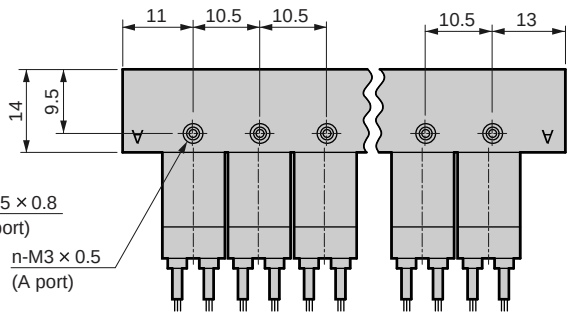
M3MB010-M3/M5

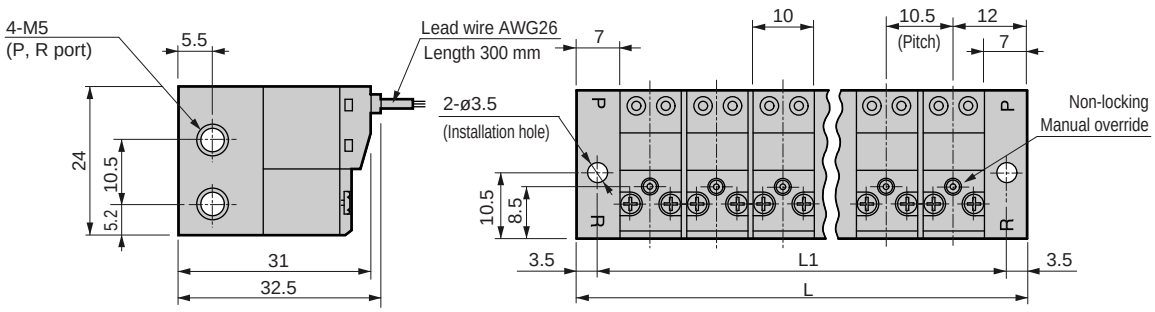
● Sub-plate porting B type: Grommet lead wire

A port: M5



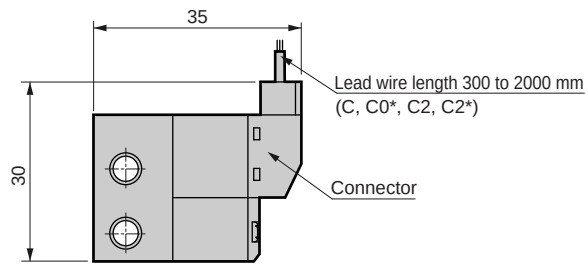
A port: M3



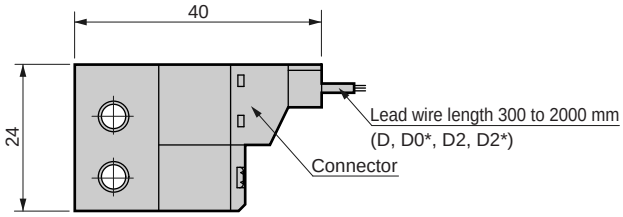


Sta. no.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
L1	27.5	38	48.5	59	69.5	80	90.5	101	111.5	122	132.5	143	153.5	164	174.5	185	195.5	206	216.5
L	34.5	45	55.5	66	76.5	87	97.5	108	118.5	129	139.5	150	160.5	171	181.5	192	202.5	213	223.5

● C-connector: (C, C0*, C1, C2, C2*, C3)



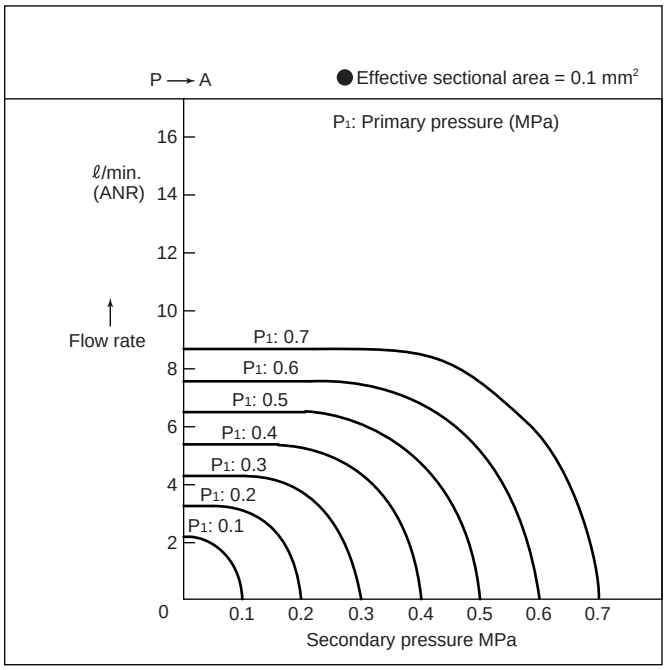
● D-connector: (D, D0*, D1, D2, D2*, D3)

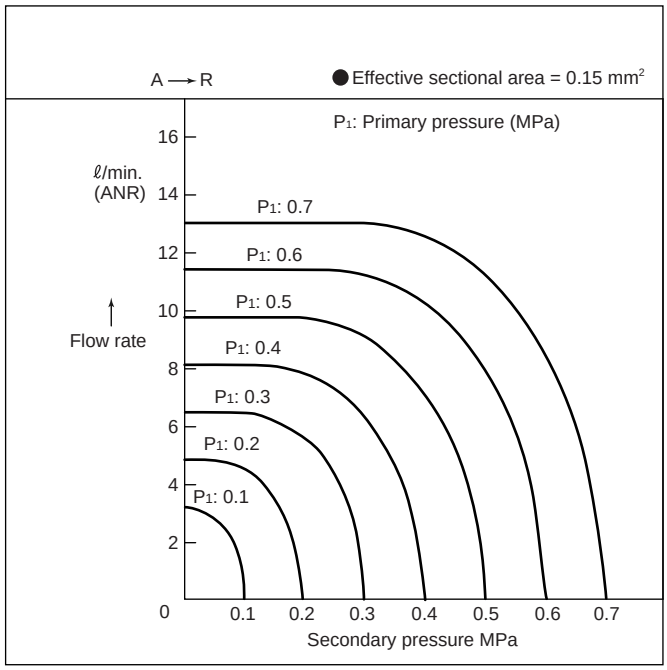


Flow characteristics

3MA0/3MB0

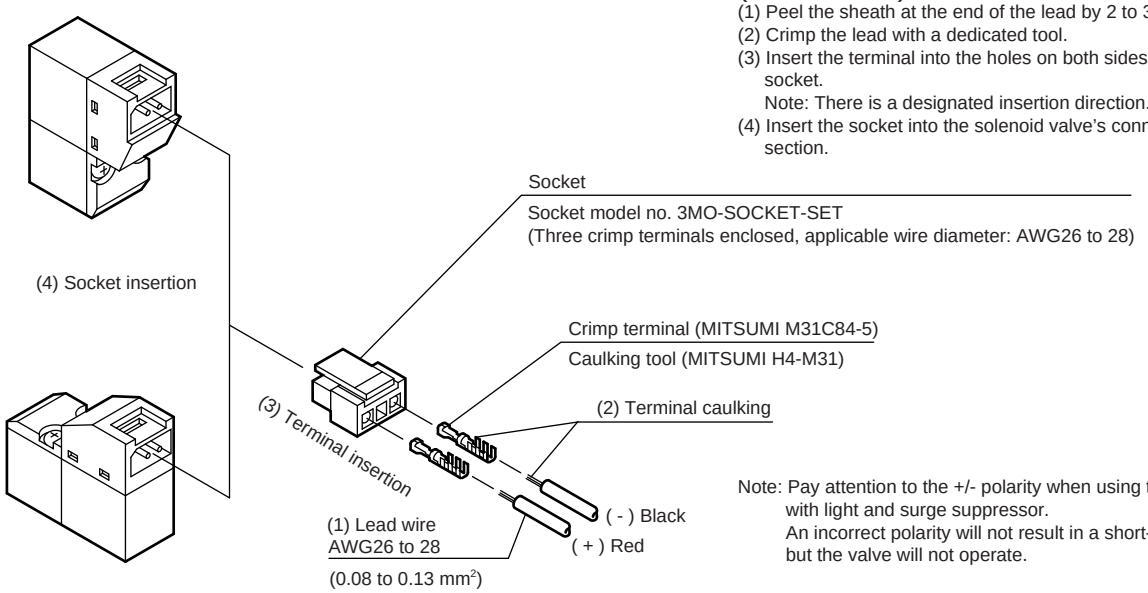
Note: The flow rate varies depending on sub base, joint and tube. Use this as a reference value.





C/D connector wiring methods

Wire the connector following steps (1) to (4) below.



(Procedures)

(1) Peel the sheath at the end of the lead by 2 to 3 mm.
(2) Crimp the lead with a dedicated tool.
(3) Insert the terminal into the holes on both sides of the socket.
Note: There is a designated insertion direction.
(4) Insert the socket into the solenoid valve's connector section.

Note: Pay attention to the +/- polarity when using the type with light and surge suppressor.
An incorrect polarity will not result in a short-circuit, but the valve will not operate.

How to order masking plate (gasket and set screw attached)

● Body porting

M3MA010 - MP - KIT

● Sub-plate porting

M3MB010 - MP - KIT