

OPERATION MANUAL FOR M208
THREE-WAY SOLENOID VALVES

General purpose Type Solenoid(D11)
Explosion-proof Type Solenoid(AE55, DE11)

KANEKO SANGYO CO.,LTD.

- Please read this manual carefully before installation, operation, maintenance or test of the product. Make sure that you have got enough knowledge about the product and can use it in a safe way by reading the caution and warning information in this manual.
- Please keep this operation manual in an accessible place for daily reference.

Notice: The contents of this manual may be upgraded into a new version without any notice in the future.

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1. Cautions & warning marks for safety

1.1 Types and meanings of the marks.

Types and meanings of the symbols are as follows.

 WARNING	Applying to those cases which may cause human deaths or serious injuries when operated incorrectly.
 CAUTION	Applying to those cases which may cause damages to things and, in some cases, serious results.
 PROHIBITION	Indicating the prohibited actions.
 ENFORCEMENT	Indicating the actions which must be taken.

1.2 General safety rules for the product

Since the notes here indicate the important contents about handling and using the product, read them carefully before handling and using the product.

 ENFORCEMENT	Identify the actual specifications of the products arrived as those you have ordered. If the actual specifications are not same as those you have ordered, do not use it but ask the manufacturer. Otherwise, it will cause accidents.
 PROHIBITION	Do not use the product at a voltage value beyond the allowable voltage range. Using the product with the voltage value beyond the allowable range may cause the coil's burnout.
 ENFORCEMENT	Flashing. Before installing the valve, clean inside the pipe connection by flashing. Otherwise, it may cause seat leakage, malfunction or coil's burnout.
 ENFORCEMENT	Fix the solenoid valve tightly while installing. Make sure to fix the solenoid valve tightly while installing. The operators will be injured by falling of the product.
 ENFORCEMENT	Use filters. Filter should be 40 μm or less. The valve does not operate, causing coil burnout.
 PROHIBITION	Do not give an excessive power to the product Do not give an excessive power to the joint pipe of the connection. A transformation of the valve will occur and make it unable to open and close.
 PROHIBITION	Do not let the sealing compound enter inside the valve. Do not let the seal-tape or sealing-bond enter inside the valve. Otherwise, it will cause leakage or malfunction.

 PROHIBITION	Do not insert the electric wire into the cover. Do not insert the electric wire into the lid. It will cause an electrical shock or earth fault.
 ENFORCEMENT	Turn off the power Make sure that the power is off before operating the product because connecting wires which are electrically energized will cause an electrical shock, short circuit or ignition by the earth fault of the live part.
 ENFORCEMENT	Follow the explosion-proof safety guide for the explosion-proof wiring work Carry out the explosion-proof wiring work according to the explosion-proof safety guide. There is fear of explosion or a fire because of the use in a hazardous area.
 PROHIBITION	Do not convert the explosion-proof solenoid. Since the explosion-proof solenoid is a qualified product, do not change and reconstruct the internal wire connection. Explosion-proof performance falls and so there is fear of explosion or fire.
 ENFORCEMENT	Check the safety before operation. Before supplying fluid to or operating the machine, check the safety of the product's operating area (e.g. the operating area of the cylinder). There is fear of electric shock or injury by touching the machine.
 PROHIBITION	Do not touch hands Do not touch hands or do manual operation when the solenoid valve is operating. There is a risk of injury.
 ENFORCEMENT	Close the original valve and turn off the power When abnormality occurs, please close the original valve and turn off the power supply before conducting inspection. There is a risk of injury.
 ENFORCEMENT	Get instruction. Contact and get instruction from the manufacturer if a trouble is found by daily check or periodic check. Otherwise, there is fear that failure will occur.

2 Descriptions of the products

The M208 type valve is a three-way solenoid valve with three ports which serves to change the flow direction of fluids by energizing or de-energizing the solenoid.

The solenoid is a packed type not exposed directly to the fluid, so it is excellent in resistance to heat and corrosion.

Two types of protective structure, general type and explosion-proof type, are available for solenoids.

3 Check when receiving the product

Check the identification plate with its specifications mentioned on the surface of the product.

There must be a model No., operating pressure range, electrical voltage, frequency (for AC power only), and exciting current on the identification plate.

Please identify the items above as the specifications you have ordered.

! ENFORCEMENT	If the actual specifications are not same as those you have ordered, do not use it but ask the manufacturer. Otherwise, it will cause accidents.
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4 Functions and its available applications

4.1 Nominal model number General specification

The specifications of the product are indicated at the drawings when they are available with the product.

If there are no drawings, refer to the description below:

M208① - ②③ - ④ - ⑤⑥⑦ - ⑧

Model No.											Specification
	①		②	③		④		⑤	⑥	⑦	⑧
M208											Series
FUNCTION	U2										Universal (2-stage spool type)
	U3										Universal (3-stage spool type)
SIZE	-	10									3/8"
	-	15									1/2"
	-	20									3/4"
FITTING			Blank								RC
			N								NPT
			JR								JIS10KRF
			PR								JPI150RF
			AR								ANSI150RF
SOLENOID TYPE			-	AE55							Explosion-proof type for AC [※1]
			-	D11							General type for DC
			-	DE11(T)							Explosion-proof type for DC T: With packing gland
BODY MATERIAL			-	S							SUS304
CONNECTION TYPE				S							Screwed
				F							Flange
INSIDE MATERIAL									2		SUS304
TERMINAL BOX			-	TF							With terminal box (Only general type)
			-	ST							WITH TERMINAL BOX ST (Only general type)

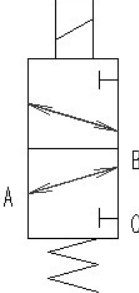
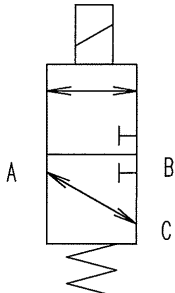
[※1] Can be used as a general type (In this case, explosion-proof certification is not applied)

4.2 General specification

Specification of valve	
Fluid	Turbine oil ISO VG32, 46&68 or Clean water
Working pressure	0 ~ 1.5 MPa
Fluid temperature	5 ~ +60 °C
Ambient temperature	-10 ~ +60 °C
Fluid viscosity	$1.5 \times 10^{-4} \text{ m}^2/\text{s}$
Specification of solenoid	
Allowable voltage fluctuation	For rated voltage: upper limit + 10%, lower limit -15%
Rating	Continuous
Insulation	Class B (In case a class B insulation was specified, or the class of insulation was not specified, at the time of ordering)
	Class H (In case a class H insulation was specified at the time of ordering, or used at an ambient temperature of 40°C or higher.)
General type	
Cable Connection Type	Lead-wire
	With Terminal Box
Cable Used	In the case with terminal box used: JIS F 8801 : 15(a/b/c), 20(a/b/c)
Explosion-proof type	
Certification	TIIS
Certification No.	DE11(Class B): T22721
	DE11(Class H): T59314
	AE55(Class B): T13633
Explosion-proof mark	d2G4
Cable Connection Type	Using Wiring Pipe G1/2
	Flame-proof Packing (Option)
Cable Used	In the case with wiring pipe used: Maximum 3.5mm ²
	In the case of flame-proof 9 ~ 12 mm (Cable Diameter)

⊘ PROHIBITION	Using the product with the voltage value beyond the allowable range may cause the coil's burnout.
⊘ PROHIBITION	The fluid should not freeze. Otherwise, the valve will fail to operate, causing the coil to burn out.

4.3 Explanation of function

	U2: Universal (2-stage spool type)		U3: Universal (3-stage spool type)	
State	Energized	De-energized	Energized	De-energized
Flow Direction	A ⇔ C	A ⇔ B	A ⇔ B	A ⇔ C
JIS Graphical symbol				

5. Principle of Operation (see the attached drawing)

The Principle of operation is described below with the “U2: Universal (2-stage spool type)” type function as an example.

In the solenoid power failure state, ⑦ spool is pushed upward by the force of ② spring,

If IN is port A, pressure will flow to port B

If IN is port B, pressure will flow to port A

If IN is C port, the pressure will be closed

When the solenoid is energized, the ⑦ spool is pushed downward by the force of the ⑪ solenoid.

If IN is port A, pressure will flow to port C

If IN is port B, the pressure will be closed

If IN is port C, pressure will flow to port A

As spool ⑦ operates only by the force of the solenoid and the force of spring, valve operations is possible without pressure.

6. Mounting

Install the valve the solenoid upward on piping.

Pipe the inlets, outlet and exhaust ports according to the function to be used.

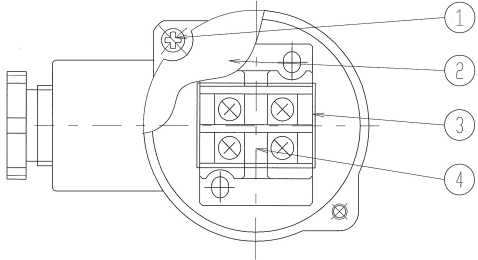
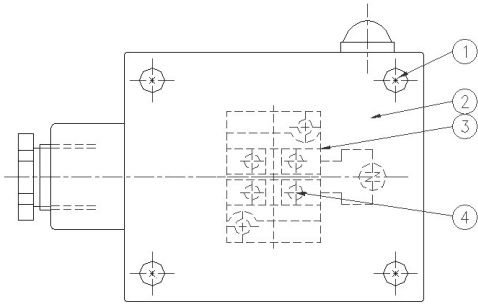
❗ ENFORCEMENT	Before installing the valve, clean inside the pipe connection by flashing. Otherwise, it may cause seat leakage, malfunction or coil's burnout.
❗ ENFORCEMENT	Make sure to fix the solenoid valve tightly while installing. The operators will be injured by falling of the product.
❗ ENFORCEMENT	Filter should be 40 μm or less. The valve does not operate, causing coil burnout.

⊘ PROHIBITION	Do not give an excessive power to the joint pipe of the connection. A transformation of the valve will occur and make it unable to open and close.
⊘ PROHIBITION	Do not let the seal-tape or sealing-bond enter inside the valve. Otherwise, it will cause leakage or malfunction.

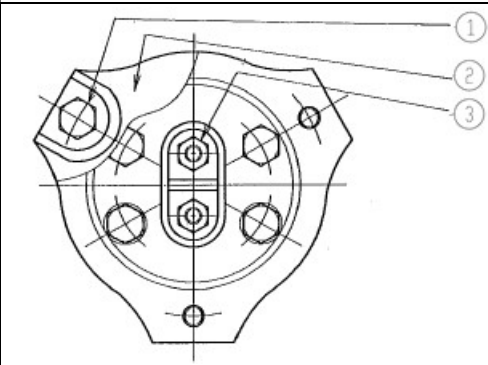
7. Electronic wire connection

There are two types of wire connection (general terminal box connection type and explosion-proof terminal box connection type). Connect the electric wire according to the way written below. Notice that the solenoid has neither plus polarity (+) nor minus polarity (-).

In the case of a general type solenoid valve, operate the wire connection according to the wiring method for general-use electric equipment. Carry out the wire connection of an explosion-proof type solenoid valve according to the Recommended Practice for Explosion-protected Electrical Installations in General Industries.

In the case of general type	
	① Take two small screws stopping the terminal box cover off ② Take the cover off ③ Take the terminal stand cover (transparent plastic) off. ④ After taking two M3.5 screws off, connect the terminals of the wire with crimped terminals to each screw, and then tighten the screws. ⑤ After finishing the connection, put on the terminal box cover, and then tighten two screws.
	① Take Four small screws stopping the terminal box cover off ② Take the cover off ③ Take the terminal stand cover (transparent plastic) off. ④ After taking two M3.5 screws off, connect the terminals of the wire with crimped terminals to each screw, and then tighten the screws. ⑤ After finishing the connection, put on the terminal box cover, and then tighten four screws.

In the case of explosion-proof type



- ① Take three M6 bolts stopping the terminal box cover off.
- ② Take the cover off.
- ③ After taking two M6 nuts of the terminal stand cover off, connect the terminals of the wire with crimped terminals to each screw, and then tighten the screws.
- ④ After finishing the connection, please put on the terminal box cover, and then tighten three bolts.

⊘ PROHIBITION	Do not insert the electric wire into the lid. It will cause an electrical shock or earth fault.
❗ ENFORCEMENT	Make sure that the power is off before operating the product because connecting wires which are electrically energized will cause an electrical shock, short circuit or ignition by the earth fault of the live part.
❗ ENFORCEMENT	Carry out the explosion-proof wiring work according to the explosion-proof safety guide. There is fear of explosion or a fire because of the use in a hazardous area.
⊘ PROHIBITION	Since the explosion-proof solenoid is a qualified product, do not change and reconstruct the internal wire connection. Explosion-proof performance falls and so there is fear of explosion or fire.

8. Running

8.1 Preparation of running

- (1) Identify the actual power voltage as the rated voltage specification of the solenoid valve
- (2) The working pressure range must be within the limits of the rated pressure of the valve.
- (3) Loose bolts must be tight, so that there may be no slack.
- (4) Identify the pipe connections as its correct function.
- (5) To check valve operation with no power supply, proceed as follow.

That is, push the manual button on the solenoid head and the valve will be brought into the same state as it is energized. Then stop pushing and the manual button will be automatically reset and the valve will be brought into the same state as it is de-energized.

❗ ENFORCEMENT	Before supplying fluid to or operating the machine, check the safety of the product's operating area (e.g. the operating area of the cylinder). There is fear of electric shock or injury by touching the machine.
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8.2 Normal running

No adjustment work is required during operation.

 PROHIBITION	Do not touch hands or do manual operation when the solenoid valve is operating. There is a risk of injury.
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9. Trouble Shooting

Please refer to the appendix table.

 ENFORCEMENT	When abnormality occurs, please close the original valve and turn off the power supply before conducting inspection. There is a risk of injury.
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10. Maintenance / daily inspection

10.1 Contents of daily inspection:

- (1) Check whether the solenoid valve works normally by inspecting the operations of the cylinder.
- (2) Check whether there is a fluid leakage out from the solenoid valve by hearing the sounds.
- (3) Check whether bolts are loose or falling off by a visual inspection.
- (4) Check whether there is undulation sound from solenoid valve by hearing the sounds.
- (5) Check whether the surface temperature is not higher than 70° C by using a surface thermometer.

 ENFORCEMENT	Contact and get instruction from the manufacturer if a trouble is found by daily check. Otherwise, there is fear that failure will occur.
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10.2 Contents of the Periodic inspection and its period:

10.2.1 Period

Please set the period as either 2 years after receiving the product or as 1 year after beginning to use it.

10.2.2 Inspection items

- (1) Check the insulation resistance by using an insulation resistance indicator. The normal value must be more than 100MΩ in normal temperature
- (2) If the resistance value is out of that range, it will be necessary to change the coil or carry out maintenance.
- (3) Check the outward appearance of the product whether it is clean by a visual inspection. If it's dirty, cleaning is necessary.
- (4) Operate the manual button to confirm that no abnormal force is required for operation.

In case an abnormal force is required, it is necessary to disassemble and inspect the valve and to perform maintenance such as repairs of non-conforming parts.

! ENFORCEMENT

Contact and get instruction from the manufacturer if a trouble is found by periodic check. Otherwise, there is fear that failure will occur.

11. Transportation and preservation

- (1) While transporting the product, please keep it from excessive shock or falling down from somewhere, take it carefully just as taking a precise machinery.
- (2) While preserve the product, please give it a package to rid it of invasion of dust or trash, and take care not to load heavy things on it. Please take it carefully to keep it in good status.

12. Warranty period

Within 2 years after delivery or within 1 year after starting use whichever is short.

In the event of failure due to reasons attributable to our company's responsibility.

13. Sales representatives

【Kaneko Sangyo Co., Ltd. Headquarters】

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● Appendix Table Troubleshooting

Trouble	Operation	Phenomenon of the trouble	Causes	Remedies
Flow direction of fluid does not change.	Electric operation	There is operating sound heard of the solenoid head when energized	ON-OFF switching of power supply not done.	Inspect power circuit.
			Voltage on nameplate different from supply voltage.	Replace with solenoid suited to supply voltage
			Great voltage drop due to cable	Replace with cable of large diameter.
		There is no operating sound heard of the solenoid head when energized Spool does not operate.	Sticking of spool due to entrance of foreign matter. Fluid pressure exceeding pressure range on name-plate.	Disassemble, inspect or repair Replace with type suited to fluid pressure.

- Attached drawing 1

