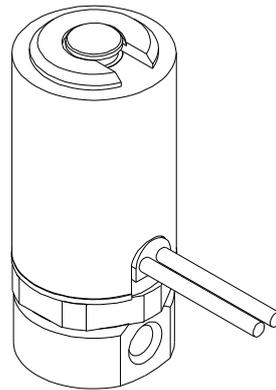


Instruction Manual

High Corrosion-Resistant 2- port Solenoid Valve

HB11 series

HB21 series



- Be sure to read this instruction manual before using the product.
- Read the safety instructions carefully.
- Keep this instruction manual in a safe place so that it can be taken out and read immediately when needed.

For Safe Use of This Product

When designing and manufacturing equipment using our products, you are obligated to ensure that the safety of the system operated by the equipment's mechanical mechanisms, pneumatic control circuits or water control circuits, and the electrical controls that control them can be ensured, and to manufacture safe equipment.

To use our products safely, it is important to select, use, handle them properly, and perform proper maintenance management for them.

To ensure the safety of equipment, be sure to observe the warnings and precautions.

We ask that you check that safety can be ensured in equipment and manufacture safe equipment.



Warning

1. **This product is designed and manufactured as equipment and component for general industrial machinery. Therefore, handling should be carried out by persons with sufficient knowledge and experience.**

2. **Be sure to use the product within its specifications.**

It cannot be used outside of the product's specific specifications. In addition, never modify or add to the product.

This product is intended for use in general industrial equipment and components, and is therefore not suitable for outdoor use or for use under the following conditions or in the following environments. (However, if you consult with us before adopting our product and understand the specifications, the product will be applicable, but take safety measures to avoid danger in the unlikely event of a failure.)

- ① Use in equipment and applications that come into direct contact with atomic energy, railways, aviation, ships, vehicles, medical equipment, beverages, food, etc., and applications requiring safety, such as entertainment equipment, emergency shutdown circuits, press machines, brake circuits, and equipment for safety measures.
- ② Use in applications where significant impacts on people and property are expected and where safety is particularly important.

3. **Be sure to observe all applicable organization standards, laws, regulations, etc. regarding safety related to equipment design and management.**

ISO 4414, JIS B 8370 (General rules for pneumatic systems)

JFPS 2008 (Principles for pneumatic cylinder selection and use)

High Pressure Gas Safety Act, Industrial Safety and Health Act and other safety regulations, organization standards, laws and regulations, etc.

4. **Never handle this product or remove any pipes or equipment until safety has been confirmed.**

- ① Before inspecting or maintaining machinery or equipment, be sure to confirm that all systems involving this product are safe.
- ② Even when machinery or equipment is not operating, there may be hot or live parts present, so be careful.
- ③ When inspecting or maintaining equipment, shut off the energy sources (air supply, water supply) and the power to the relevant equipment, exhaust any compressed air in the system, and take care to avoid water leakage and electrical leakage.
- ④ When starting or restarting machinery or equipment that uses pneumatic equipment, be sure to check that the safety of the system is ensured, including measures to prevent the machinery or equipment from jumping out, and proceed with caution.

5. **To prevent accidents, be sure to observe the warnings and precautions on the following pages.**

- The safety precautions shown here are categorized into three levels: "Danger," "Warning," and "Caution."



Danger: : Limited cases where improper handling is expected to result in a dangerous situation resulting in death or serious injury, and the urgency (degree of imminence) of the danger occurring is high.



Warning: : When improper handling may result in danger where death or serious injury occurs.



Caution: : When improper handling may result in a dangerous situation that may result in minor injury or property damage only.

Note that even the matters described in "Caution" may lead to serious consequences depending on the situation.

All safety precautions contain important information so be sure to observe them.

Warranty Notices

● Warranty period

The warranty period for this product is one year after delivery to your designated location.

However, if the durability limit is reached within one year, that period will be considered as the warranty period.

● Warranty coverage

- (1) If a failure occurs during the above warranty period that is clearly our responsibility, we will promptly provide a replacement product or necessary replacement parts for the product free of charge, or repair the product at our factory free of charge.

However, the following cases will be excluded from the scope of this warranty:

- ① Cases where the product is used outside the range of conditions and environments described in the specifications
- ② Cases where the failure is caused by improper use or mismanagement, such as careless handling
- ③ Cases where the cause of the failure is due to reasons other than the delivered product
- ④ Cases where the product is used in a way other than its intended use
- ⑤ Cases where the cause is a modification to the structure, performance, specifications, etc. that was made after delivery and that did not involve our company, or a repair not specified by our company
- ⑥ Cases where this product is used by being incorporated into your machinery or equipment, damage that could have been avoided if your machinery or equipment had the functions and structure that are generally accepted in the industry
- ⑦ Cases where the cause is unforeseeable with the technology in use at the time of delivery
- ⑧ Cases where the cause is a natural disaster or other disaster that is not our responsibility
- ⑨ Cases where the cause is the fluid used (including cases where the fluid penetrates the wetted parts)
- ⑩ Cases where the cause is rust caused by leaving the solenoid valve with moisture remaining inside
- ⑪ Cases where the cause is the freezing of the fluid
- ⑫ Cases where the cause is foreign matter
- ⑬ Changes in appearance such as scratches or discoloration that occur during use
- ⑭ Cases where the cause is vibration
- ⑮ Cases where a combination of parts between the supplier and the customer requires characteristics other than those specified in the specifications
- ⑯ Cases where the cause is disassembly or reassembly outside of our company

Note that the warranty here applies to the delivered product alone and excludes any damages caused by defects in the delivered product.

- (2) The product warranty is valid only in Japan. If the product is used overseas, we cannot provide free on-site service or repairs even within the warranty period. However, if you return the product to Japan at your expense, we will provide the same warranty as if the product had been used in Japan.
- (3) In the unlikely event that a defect occurs in the solenoid valve, take the necessary measures to prevent adverse effects or damage to people or surrounding equipment.
We cannot be held responsible for any adverse effects or damage to people or surrounding equipment caused by a defect of the solenoid valve.
- (4) This solenoid valve does not have an explosion-proof construction, so it cannot be used in hazardous atmospheres where explosive gases are present. Therefore, use it with sufficient caution so as to prevent the use environment from creating a hazardous atmosphere.
We will not be held responsible for any accidents or damages that may occur due to a hazardous atmosphere created in the use environment.
- **Checking compatibility**
It is the customer's responsibility to verify the compatibility of our products with the systems, machines, and equipment used by the customer.

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1. How to Unpack



Caution

Do not remove the packaging bag until just before piping.
If the packaging bag is removed before connecting the pipes, foreign matter may enter the inside through the piping port, causing failure or malfunction.

- (1) Check that the model number of the product you ordered is the same as the model number on the product nameplate.
- (2) Check that there is no external damage.
- (3) When storing the product, keep it in the individual box to prevent foreign matter from getting inside the product, and take it out from the box when piping.

2. Setting Method



Warning

If you are using the product outside of the specified specifications or for special purposes, contact us regarding specifications.

2.1 Installation environment



Warning

- a) Do not use the product in an explosion-proof atmosphere.
If you are using it in an explosion-proof atmosphere, select either an explosion-proof solenoid valve or an air-operated valve.
- b) Do not use the product in an atmosphere containing corrosive gases or gases that may damage the constituent materials.
- c) Do not use the product near heat sources or in places where it is exposed to radiant heat.
- d) Use the product within the specified ambient temperature range.
- e) If the fluid freezes, it may damage the product. Take appropriate anti-freeze measures.
When applying insulation materials to the solenoid valve, do not apply them to the coil part. Doing so can cause the coil to burn out.
- f) Avoid installing the product in a location that is exposed to rain, water, direct sunlight, or ultraviolet rays.
The product cannot be used outdoors.
- g) Take appropriate protective measures in locations where the product may come into contact with water, chemical liquids, etc.



Caution

- a) Install and use the product in a location that is free from vibration.

2.2 Setting method

2.2.1 Installation

 Caution	<ul style="list-style-type: none"> a) Read the instruction manual carefully and understand its contents before installing the product. b) When handling or installing the product, always hold the product body. Do not apply external force to the coil part. c) Install the product so that no tensile force is applied to the lead wire of the coil part. d) When carrying the product, hold it by its body. Do not hang the product by holding the lead wire. e) After installation, check for any leaks in the pipes to ensure that the installation is done correctly.
--	---

(1) The mounting orientation is free.

However, avoid installing the coil facing downwards, as this will cause foreign matter in the fluid to adhere to the electromagnetic core, resulting in malfunction.

2.2.2 Maintenance space

- Ensure sufficient space is available for safe maintenance and troubleshooting.

2.3 Piping method

 Caution	<ul style="list-style-type: none"> a) When tightening the pipes or redoing piping, make sure to secure the product in place. When securing the product, hold it by the product body. b) Secure and support the pipes so that their weights and vibrations are not directly applied to the valve. c) When connecting pipes, tighten them to the recommended torque (see Table 2-1). d) The length of the pipe thread must be within the effective thread length. Also, chamfer the screw about half a pitch from the tip. e) Before piping, perform flushing with air to remove foreign matter such as dust, metal powder, rust, and seal tape. f) If you use too much sealant (seal tape, jelly sealant) when piping, it may get inside the product and cause malfunction. g) When applying or wrapping sealant around piping materials, leave 1.5 to 2 threads from the end of the pipe. h) Dust and foreign matter in the fluid will prevent the product from functioning properly. Install a strainer (filter) of 80 mesh or more in front of the product. i) When connecting pipes to the product, be careful not to mistake the supply port.
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(1) Cleaning pipe materials

- Before piping, perform flushing with air to remove foreign matter such as dust, metal powder, rust, and seal tape.

(2) Removal of foreign matter

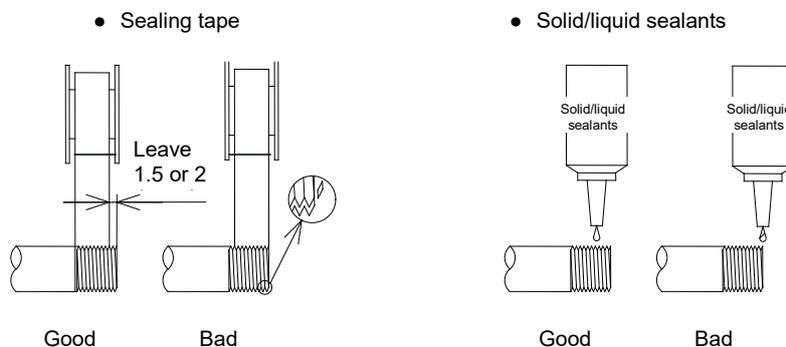
- Dust and other foreign matter in the fluid can cause malfunctions and valve seat leaks. Install a strainer (filter) of 80 mesh or more just before the product.

(3) Piping

- When piping, hold the product body.

(4) Sealant

- When using sealant, be careful not to let it get inside the pipes and ensure that it does not leak outside. When wrapping seal tape around threads, leave 1.5 or 2 threads at the tip of the screw. (Figure 2 -1) When using liquid sealant, be sure not to apply too much, leaving 1.5 or 2 threads at the tip of the screw.



(Figure 2-1)

(5) Tightening

- For tightening torque when piping, refer to Table 2-1.

Table 2-1. Recommended pipe tightening torque

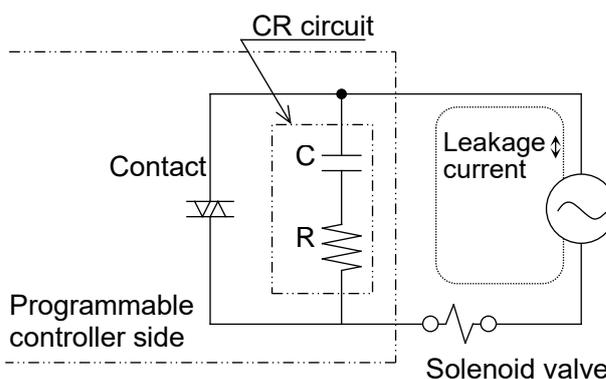
Nominal diameter of pipe	Recommended pipe tightening torque
M5	2. 1 to 3 [N·m]
Rc1/8	18 to 20 [N·m]

2.4 Wiring method



Caution

- Use within the voltage fluctuation range. Using the product outside the voltage fluctuation range may cause malfunction or damage to the coil.
- For electrical equipment maintenance, use a fuse or other circuit breaker on the control circuit side.
- If the electrical circuit system is sensitive to solenoid surges, install a surge absorber or similar in parallel with the solenoid.
- Use wires for wiring with a nominal cross-sectional area of 0.5 mm² or more as a guideline.
- The use of a switching circuit that does not cause contact chattering extends the durability of the solenoid valve.
- When operating a solenoid valve using a programmable controller, etc., make sure that the output leakage current of the programmable controller, etc. is within the specifications below. Failure to do so may lead to malfunction.



Rated voltage	Leakage current
12 VDC	2 mA or less
24 VDC	1 mA or less
100 VAC	0.2 mA or less
200 VAC	0.1 mA or less

(1) Lead-wire-type hard wiring method

This product uses the following lead wires.

When crimping wires, be sure to use appropriate conditions and ensure proper insulation.

Model No.	Conductor size	Insulator outer diameter
HB11	AWG24 (0.3 mm ²)	φ1.6 mm
HB21	AWG20 (0.5 mm ²)	φ1.9 mm

This product has no polarity.

3. Check before Use (Checking after Installation)

3.1 Checking the appearance



Warning

Stop the fluid flow. (Close the main valve)
Drain the fluid from the product.
Turn off the power.

- (1) Press the product by hand to make sure it is securely fastened to the pipes.
- (2) Make sure that the piping is secure.
- (3) Make sure that the threaded fasteners are not loose.
- (4) Check that the wiring is correct.

3.2 Checking for leaks

- (1) Pressurize the fluid and check connections for leaks.
To check for leaks, we recommend supplying compressed air, applying soapy water, and checking to see if bubbles form.

3.3 Checking the electricity



Warning

Turn off the power.
Be careful of electric shock when checking.

- (1) Check the power supply voltage.
Voltage fluctuations should be within the range of +/-10% of the rated voltage.
Using the product outside the voltage fluctuation range may cause malfunction or damage to the coil.
- (2) Checking the insulation resistance
Measure the insulation resistance between non-current-carrying metal parts, such as screw fasteners, and current-carrying metal parts, such as lead wires, assemble to the product.
Check that the resistance is 100 MΩ or more using a 1000 VDC megger.

4. Proper Use

4.1 Precautions for use

 Warning	<ul style="list-style-type: none"> a) Cannot be used as an emergency shutoff valve, etc. <ul style="list-style-type: none"> · It is not designed as an emergency shutoff valve or other safety valve. In such a system, take other measures to ensure safety before using it. b) Take necessary measures in advance to prevent any adverse effects on people or property in the event of a failure of this product. c) Fluids used <ul style="list-style-type: none"> · Check the compatibility of the product's constituent materials with the fluid used and the ambient atmosphere before use. In particular, if the fluid used is hydrochloric acid, hydrofluoric acid, nitric acid, or sodium hypochlorite (soda), use an air operated valve for chemical liquids. · Note that when the solenoid valve is in operation, the internal parts wear out, generating wear debris that may flow to the secondary side of the solenoid valve. d) Iron rust and other foreign matter in the fluid can cause malfunctions and leaks, hindering product performance, so be sure to take measures to remove them before use. e) Use the product within the specified fluid temperature range. f) Use the product within the specified ambient temperature range. g) Do not touch the coil part with your hands or body while it is powered or immediately after it is powered. The coil part of the solenoid valve generates heat when electricity is passed through it. Be careful as direct contact with the coil may cause burns. h) When the power is on, do not touch the electrical wiring (bare current-carrying parts) with your hands or body. Doing so may result in electric shock. i) Use the product within the maximum working pressure. j) Liquid seal <ul style="list-style-type: none"> · When making a liquid flow, if the circuit is liquid-sealed, the pressure may increase due to temperature changes and the product may not operate. Install a relief valve on the system to prevent it from becoming a liquid-sealed circuit.
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 Caution	<ul style="list-style-type: none"> a) Use the product within the specified pressure range. b) Do not use the product as a foothold or place heavy objects on it. c) If the product has not been used for a month or more, conduct a test run before starting work. d) If you will not be using the product for a month or more, be sure to completely remove any liquid remaining inside. If the liquid remains, rust may form, which may result in malfunctions or leaks. If you are unable to remove the residual liquid, run the product several times a day to allow water to flow through for optimal use. e) If you plan to use the product continuously or at low frequency, contact us. f) Be careful not to clog the strainer (filter).
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(1) If an abnormality occurs, see "6. Failures and Countermeasures."

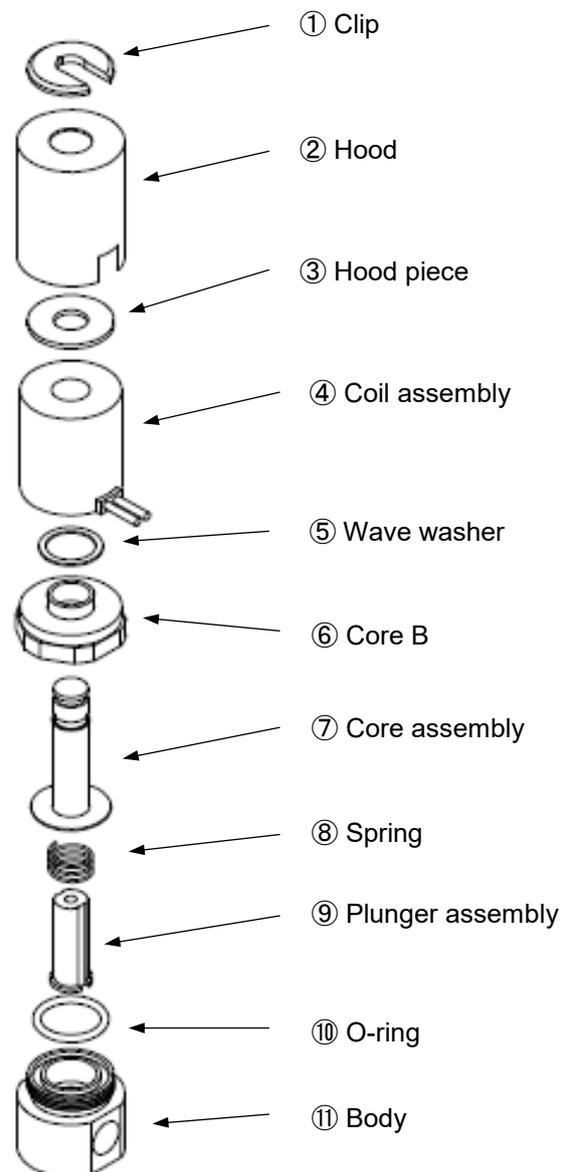
4.2 Disassembly and assembly

 Caution	<ul style="list-style-type: none"> a) Do not disassemble or modify the product. If disassembled, performance may not be satisfactory. b) We cannot guarantee the product if it has been disassembled. If disassembly is unavoidable, contact us. c) If disassembling, conduct a test run after reassembly to check that there are no abnormalities in operation or leakage performance.
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- (1) Disassembly procedure
- Remove clip ① to remove hood ② and wave washer ⑤.
 - Remove core B ⑥ to remove core assembly ⑦ and O-ring ⑩.
- (2) Assembly procedure
- Assemble in the reverse order of disassembly.
 - Make sure that O-ring ⑩ is securely inserted into the groove on body ⑪.
 - After temporarily tightening core B ⑥, tighten it with the tightening torque in Table 4-1.

Table 4-1. Recommended core B tightening torque

Model No.	Tightening torque (N·m)
HB11	10 to 22
HB21	18 to 32



(Figure 4-1)

5. Maintenance Failures and Countermeasures

5.1 Maintenance and inspection

**Caution**

Always turn off the power and remove the fluid and pressure before performing maintenance.

- (1) When performing maintenance or inspections, read the instruction manual carefully and understand its contents before performing the work.
- (2) To ensure optimal use of this product, inspect it periodically, usually once every six months.
- (3) If the product has not been used for a month or more, conduct a test run before starting work.
- (4) For the inspection details, see "3. Checking before Use."

If you notice anything abnormal, see "6. Failures and Countermeasures."

5.2 Maintenance parts

In principle, maintenance parts are not provided, so if any abnormalities such as leakage or malfunction are found during use, consult with our sales office or distributor.

6. Failures and Countermeasures

- (1) Carry out inspection operations in the event of a power outage or emergency such as an abnormal operation.
- (2) If the product does not function as intended, inspect it according to the table below.

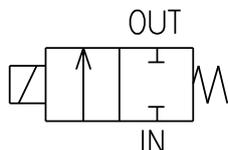
Failure condition	Cause	Remedy
The valve does not open	The power is not turned on.	Check the wiring, fuses, etc., and then turn on the power.
	The power supply voltage is below the rated voltage.	Check the power supply, input the rated voltage.
	The fluid pressure is outside the specified pressure range.	Adjust the pressure to within the specified range.
	Foreign matter is clogged in the flow path.	Replace the product.
The valve does not close	The power is not off.	Check the leakage current, etc., and correct the circuit so that the power is turned off properly.
	The fluid pressure is outside the specified pressure range.	Adjust the pressure to within the specified range.
	There is foreign matter stuck in the valve seat.	Replace the product.
	Foreign matter is clogged in the flow path.	Replace the product.
External leakage	The O-ring is damaged or deformed.	Replace the product.
	Core B is loose.	Tighten core B.
Internal leakage	The working pressure is outside the specified pressure range.	Adjust the pressure to within the specified range.
	The valve seat on the body is worn or scratched.	Replace the product.
	The sealing surface of the valve seat is worn or scratched.	Replace the product.
	Foreign matter is caught in the valve seat.	Replace the product.

- (3) If you have any other questions, contact our sales office or distributor.

7. Product Specifications and Model No. Display Method

JIS symbol

- NC (normally closed) type



Common specifications

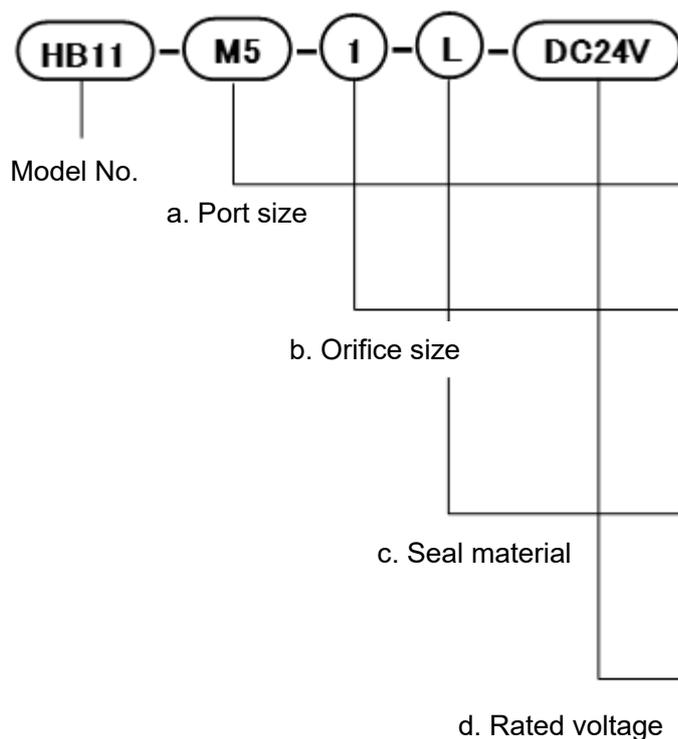
Item	HB11-HB21	
Working fluid	Water, pure water, chemical liquids (fluids that do not corrode wetted part materials)	
Working pressure	MPa	0 to 0.7 (refer to working pressure in individual specifications.)
Proof pressure	MPa	1.5 (HB11), 2 (HB21) (water pressure)
Fluid temperature	°C	-10 to 60 (no freezing)
Ambient temperature	°C	-20 to 50
Valve seat leakage	cm ³ /min	0 (water pressure), PTFE sealant: 300 or less (air)
Mounting orientation	Unrestricted	
Treatment	Oil-prohibited	
Electrical specifications		
Rated voltage	100 VAC (50/60 Hz), 200 VAC (50/60 Hz), 12 VDC, 24 VDC	
Voltage fluctuation range	±10%	
Thermal class	Class 130 (B)	

Note 1: The AC rated voltage will be converted to DC by the diode integrated into the coil.

Individual specifications

Model No.	Item	Port size	Orifice size (mm)	Cv	Working pressure (MPa)	Power consumption	Weight (kg)
HB11-M5-1		M5	1.0	0.03	0 to 0.7	AC: 4 DC: 3	0.10
HB11-M5-2			1.5	0.06	0 to 0.3		
HB21-6-1		Rc1/8	1.6	0.09	0 to 0.7	4	0.16
HB21-6-2			2.3	0.18	0 to 0.3		
HB21-6-3			3.2	0.3	0 to 0.08		

Model No. display method



		Model No.	
Code	Description	HB11	HB21
a. Port size			
M5	M5	●	
6	Rc1/8		●
b. Orifice size			
	HB11	HB21	
1	φ1	φ1.6	● ●
2	φ1.5	φ2.3	● ●
3	—	φ3.2	●
c. Seal material			
L	NBR	●	●
M	FKM	●	●
N	PTFE		●
d. Rated voltage			
AC100V	AC100V (50/60Hz)	●	●
DC24V	AC200V (50/60Hz)	●	●
DC24V	DC12V	●	●
DC24V	DC24V	●	●

〈Example of model No. display〉

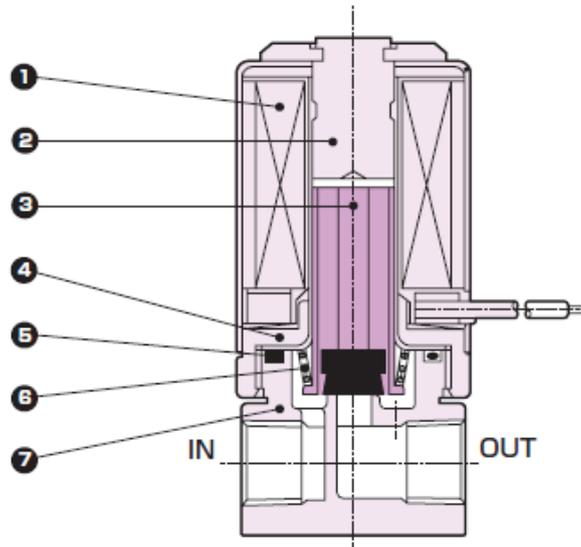
HB11-M5-1-L-DC24V

Model name: HB11

- a. Port size: M5
- b. Orifice size: φ1
- c. Seal material: NBR
- d. Rated voltage: 24 VDC

8. Internal Structure Diagram

- HB11
- HB21



Cannot be disassembled

Part No.	Part name	Material
1	Coil assembly	—
2	Core assembly	SUS316 or equiv. ; Stainless steel
3	Plunger assembly	SUS316 or equivalent/NBR (FKM/PTFE) ; Stainless steel, nitrile rubber (fluoro rubber/tetrafluoroethylene resin)
4	Core B	SUM22 ; Steel
5	O-ring	NBR (FKM/PTFE) ; Nitrile rubber (fluoro rubber/tetrafluoroethylene resin)
6	Spring	SUS316 ; Stainless steel
7	Body	SUS316 ; Stainless steel