



V3.0

Mrv-01B High Pressure Valve Manual

南京润泽流体控制设备有限公司
NANJING RUNZE FLUID CONTROL EQUIPMENT CO.LTD

Thank you very much for choosing our product, please read and keep this manual carefully before use.

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Chapter 1 Getting Started

1.1 Company Profile

Nanjing Runze Fluid Control Equipment Co., Ltd. was established in 2014, We are a national high-tech enterprise focusing on R&D and production of fluid accessories for numerous analytical instruments. We engineer, manufacture and market differentiated standard products such as syringe pumps, multiport valves, peristaltic pumps, gastight syringes, plastic fittings, etc.. We persevere in providing our customers with best quality and service in the fields of environmental monitoring, biopharmaceuticals, medical equipment, industrial automation and laboratory instruments, etc.

RUNZE attracted experienced talents with strong capability on integrating software and hard-ware at electronic research, mechanical design, mold manufacturing. In past years, we have accumulated rich technical and practical experience that bring us honors of ISO9001, National High-tech Enterprise, Jiangsu Province Private Science and Technology Enterprise, 5A Bank Credit Assessment, 38 technical patents and multiple software copyright including 8 invention patents, 17 utility model patents, 13 design patents.

RUNZE Technology Center has a reliable EMC laboratory and a series of advanced processing equipment and testing instruments, such as imported white light interferometer, Keens plane rapid detector, five-axis machining center, high-precision nano-grinding machine, etc., Continuous and substantial investment in research and development, which enabled the company to obtain a huge advantage in the manufacture and sales of analytical instrument accessories.

Chapter 2 Product Introduction

2.1 Product Features

1. Name: Mrv-01 high pressure solenoid valve, self-researched by RUNZE FLUID, a type of electric displacement control valve.

2. Control: Mrv-01 high pressure solenoid valves switch position (fluid path) through external voltage trigger signals

3. Function: Fluid sampling, collection and distribution

4. Corrosion Resistance: Liquid contact material, such as PCTFE, ceramic or sapphire, etc. can be applied to a variety of corrosive liquids, with strong corrosion resistance

5. Application: Environmental monitoring and analysis instruments, laboratory and medical analyzers, etc.

6. Innovative function:

a. This two-way\three-way valve can withstand 1MPa air pressure.

b. The valve does not produce liquid pulsation during operation, which effectively solves the problem of droplets and backflow at the outlet during micro-injection.

c. The valve has the status output function when running and stopping, which can be used to query the on-off state of the valve by the upper computer.

7. Valve Configuration:

a. This high-pressure valve is made of special fluoroplastics, ceramics or sapphire, and maintenance-free.

b. Liquid will not touch stainless steel part

c. The high-pressure valve core adopts a multi-directional self-applicable plane bonding method, which can effectively extend the life of the product. (This structure has been applied for practical type patent, patent number: CN204852471U)

d. Valve was equipped with high reliability NMB stepper motor

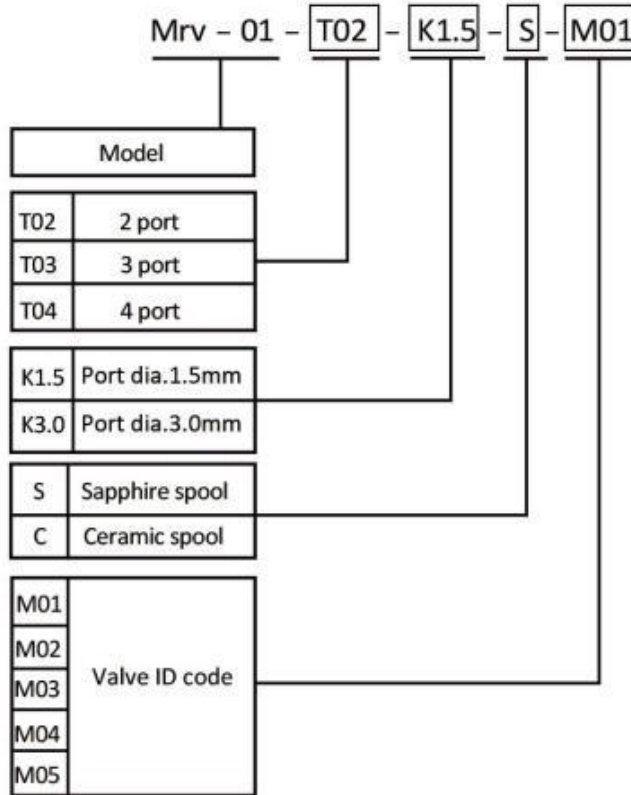
e. Valve positions by Encoder Optocoupler with compact size and accurate position

f. Driver module uses low power consumption driver chip which effectively reduce the working heat to ensure the highest performance and service life

g. Valve was integrated with control circuit for stepper motor

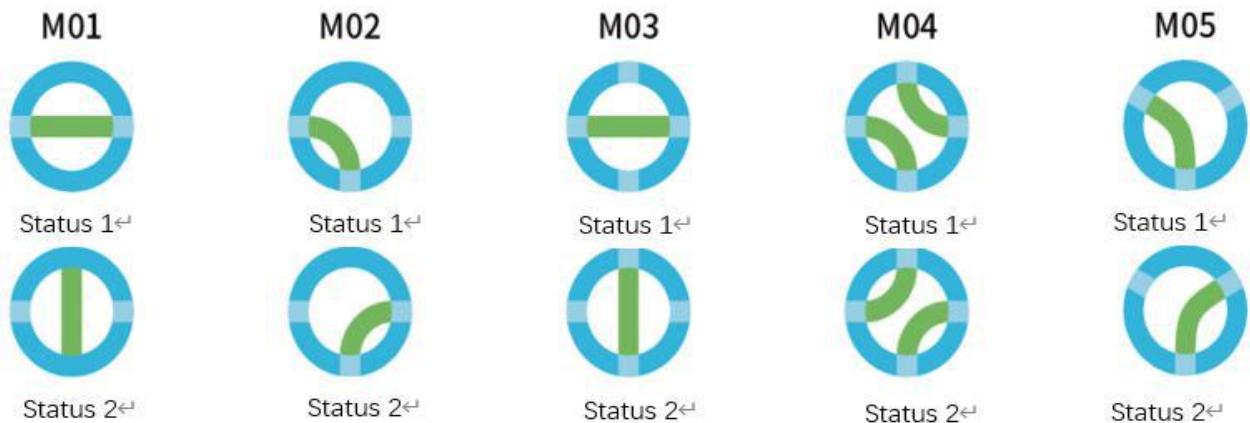
h. Controller interface: XH terminal with spacing 2.54mm

2.2 Naming Rules

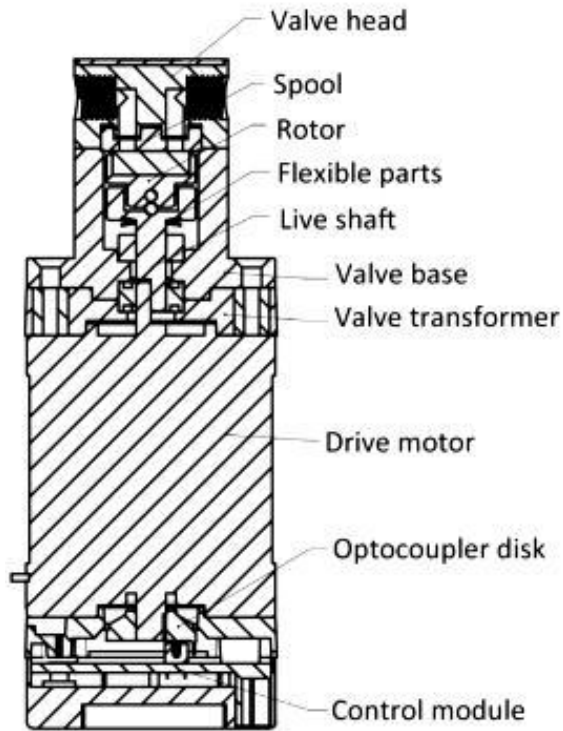


E.g. Mrv-01-T02-K1.5-S-M01: two-way valve, orifice 1.5mm, sapphire spool, M01 flow path

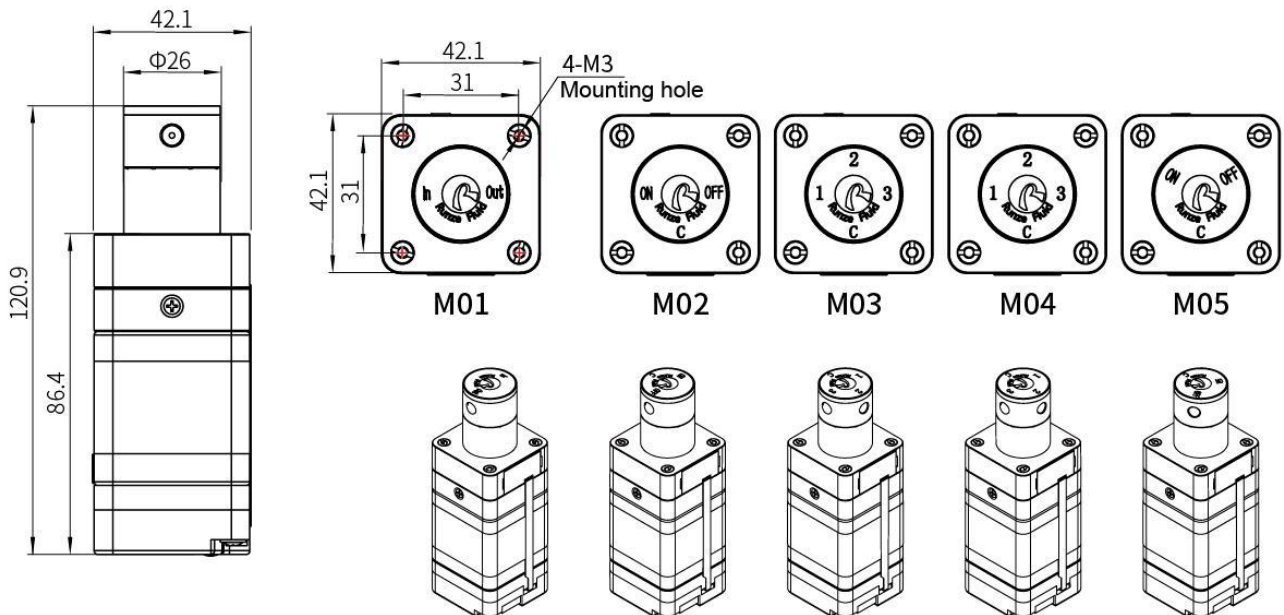
Mrv-01-T03-K1.5-S-M02: three-way valve, orifice 1.5mm, sapphire spool, M02 flow path



2.3 Product Structure



2.3.1 Dimensions (unit: mm)



Note: Mrv-01B M01 M02 M03 M04 M05 share the same dimension

2.4 Technical Parameters

Item	Parameters				
Fluid path	1.5mm				
Wetted Material	PCTFE, Ceramic/Sapphire				
Configuration	M01	M02	M03	M04	M05
Dead volume (Port to Port)	52.93ul	50.68 ul	52.93 ul	101.35 ul	51.32 ul
Pressure	0-1.0Mpa(air)		0-1.2Mpa (water)		
Working temperature	0-50C°				
Liquid temperature	0-80C°				
Connection	1/4-28UNF Female Thread				
Replaceable parts	Stator replaceable, rotor sealed irreplaceable				
Driver	Non-optional				
Valve drive	≤530ms(response time, switch speed)				
Power supply	DC24V/1A				
Trigger signal	DC7-33V				
Status output signal	3.3V-24V high low-level output				
Max. current	2A				
Max. power	48W				
Working humidity	≤70%				
Dimension (L*W*H)	42*42*113mm				
Net weight	0.487kg				

2.5 Product Function

1. Mrv-01 has excellent high-pressure resistance. The traditional three-way solenoid valve has a maximum pressure resistance of 0.3Mpa, while this high-pressure valve has the largest

withstand pressure 1Mpa, so as to ensure stable switching when there is pressure output.

2. Mrv-01 will not produce liquid pulsation during the process of switching the flow path, and there will be no dripping phenomenon at the outlet of the flow path.

3. With state feedback signal output, Mrv-01 ensures that the upper computer can accurately identify when the valve is opened or closed so as to ensure that the flow path will not have

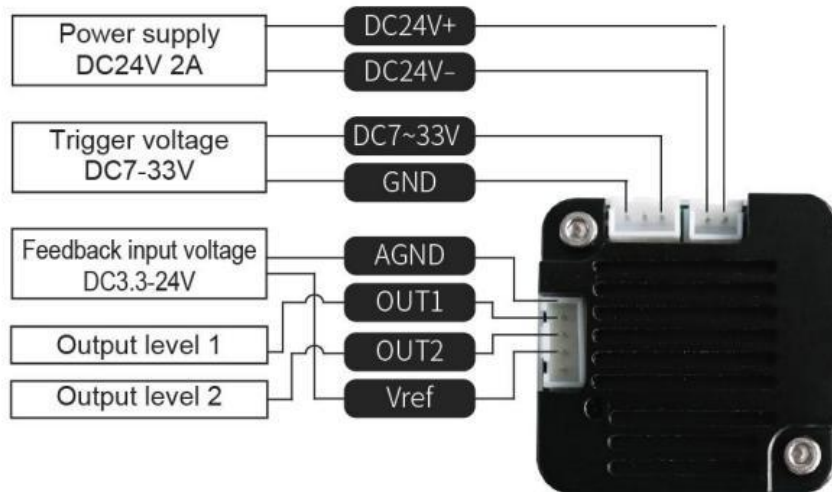
unpredictable consequences due to valve failures

4. Mrv-01 high pressure valve was designed with plane switching structure so that it can also be used for crystallizing liquid or liquid with small particles.

5. Mrv-01 high pressure valve can be used for high temperature liquid, it works stably and constantly for 0-80C° corrosive liquid.

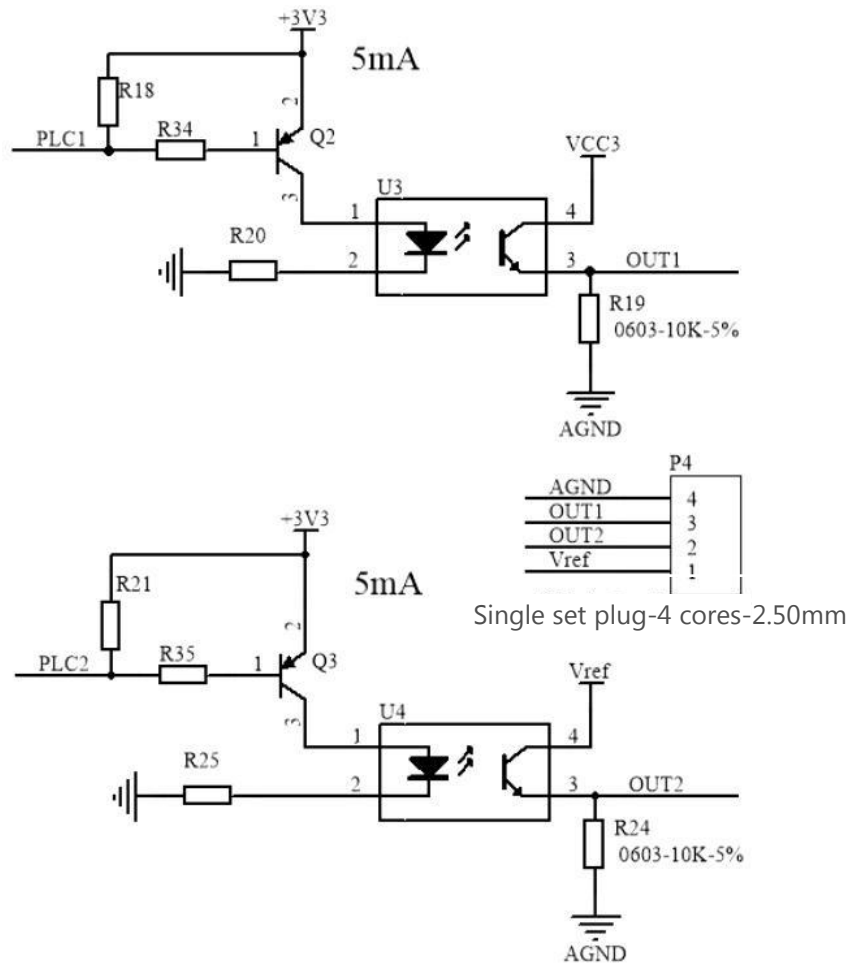
6. Internal rotor can be customized to different materials according to different application requirements

2.6 Port Definition



Port name	Definition
DC24V (+)	DC24V positive
DC24V (-)	DC24V negative
V-Tin (DC7-33V)	External voltage trigger signal DC7~33V
GND	Ground wire (shared with DC24V)
AGND	External reference voltage earth (-)
OUT1	Output level 1
OUT2	Output level 2
Vref	External reference input voltage (+)

2.7 Mrv-01B Internal Structure of Output Port



The advantages and disadvantages of the output method using this pull-down resistor are as follows:

Advantage: Avoid the possibility of false triggering of the subsequent circuit at the moment of power-on.

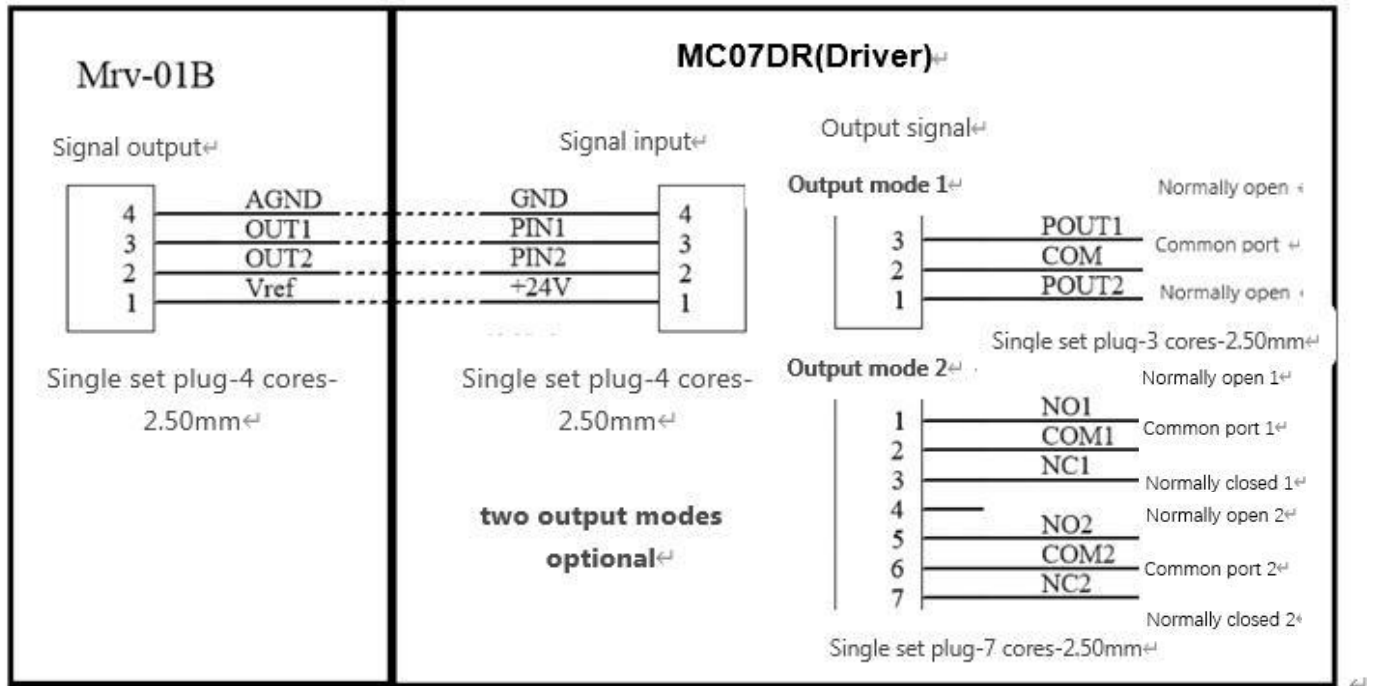
Disadvantage: Insufficient drive capability, especially for current input loads such as PLC.

When $V_{ref}=5V$ or $V_{ref}=3.3V$, OUT1 and OUT2 are directly connected to the SINGLE-chip I/O port, which can be detected.

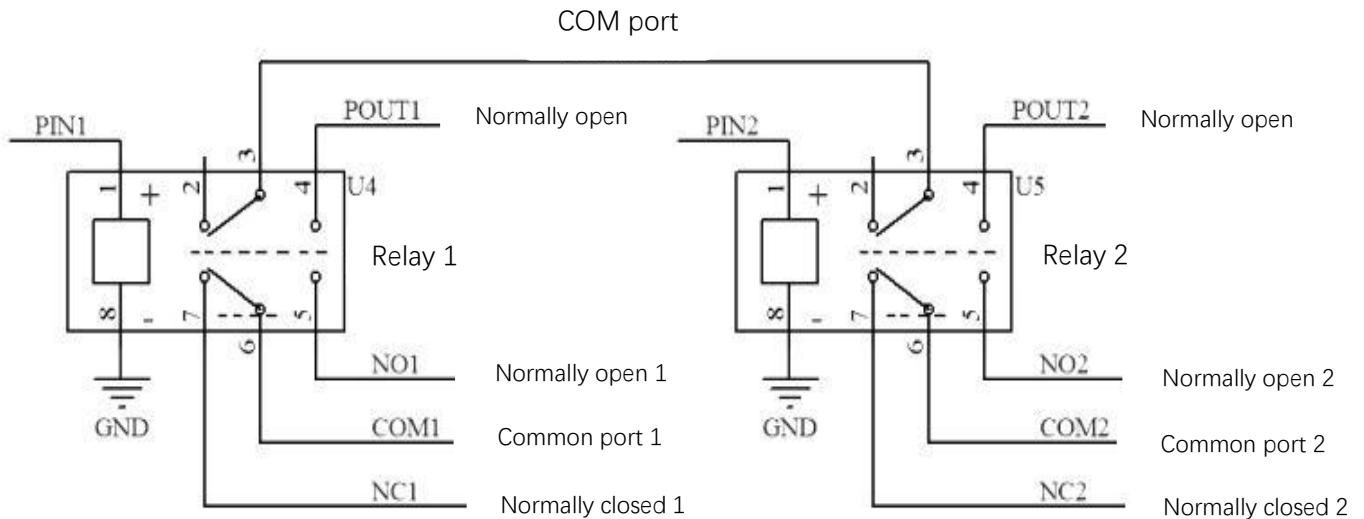
When $V_{ref}=24V$ and the load is PLC, the output capacity of optocoupler is not enough since PLC is mostly current sink type, so the output capacity needs to be strengthened. You can add a first-level amplifier circuit by yourself, or buy our accessory products MC07DR (driver). MC07DR (driver) is connected with Mrv-01B high pressure valve, and the output is converted into passive contact, with strong load capacity & flexible usage.

2.8 MC07DR(Driver) Instructions

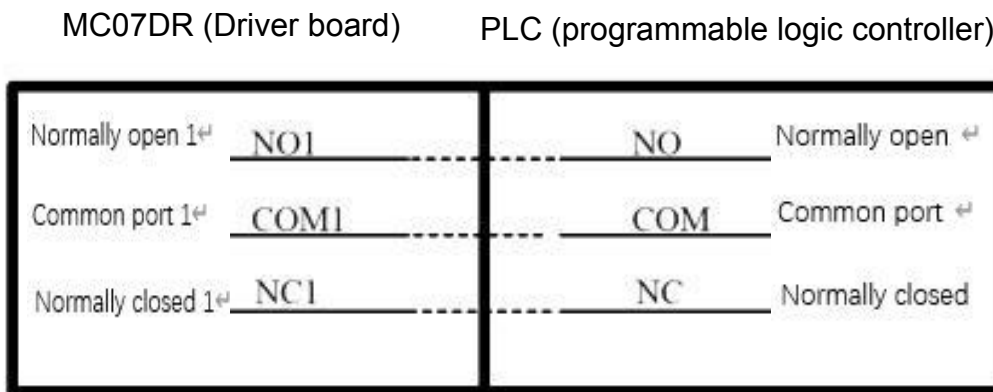
Wiring diagram and port definition of MC07DR(Driver) & Mrv-01B



2.9 Function Diagram of MC07DR(Driver) Relay



2.10 Examples of Docking Usage of MC07DR(Driver) with Customer Products



Connection description:

The passive common port of MC07DR (driver board) is connected to the common port of PLC

The passive normally open port of MC07DR (driver board) is connected to the normally open port of PLC

The passive normally closed port of MC07DR (driver board) is connected to the normally closed port of PLC

The figure above shows only one way, and the other way is the same connection.

Chapter 3 Control Instructions

3.1 Working Principle

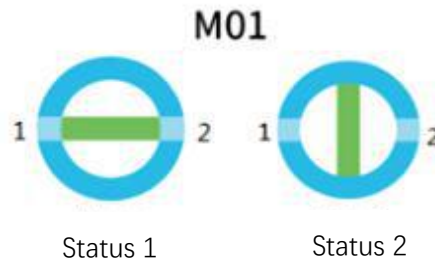
Mrv-01 high pressure valve works the same as traditional solenoid valve by DC24V input power supply. External trigger voltage signal DC7-33V switched on or off to realize valve switching status 1 and 2.

3.2 Driver Control Instruction

3.2.1 Valve Control Instruction

Example 1: Two-way valve as shown in Figure M01

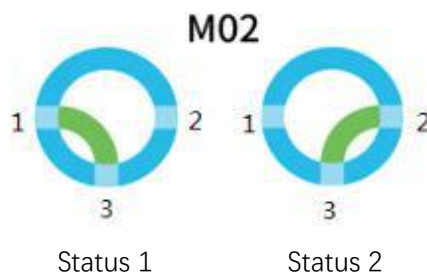
DC24v (+/-) powered on, valve keep original status 2 (port 1-2 disconnected), when external trigger signal DC7-33V switched on, valve turns to status 1(port 1-2 connected).



Example 1: T Three-way valve as shown in Figure M02

DC24v (+/-) powered on, valve keep original status 1 (port 1-3 connected, port2-3 disconnected), when external trigger signal DC7-33V switched on, valve turns to status 2 (port 2-3 connected, port 1-3 disconnected).

Note: External trigger voltage must be less than 33V, or the circuit will be burned out; trigger voltage must be higher than 7v, or the valve control will not be reliable.



3.2.2 Status Output Instruction

Figure 3 Two Way Valve Status

Vt Status	OUT1 voltage output	OUT2 voltage output	Output Status	Remark
No external enable voltage status	H(high)	L(low)	Status 2	Relay 1 operates, relay 2 does not operate
With external enable Voltage status	L(low)	H(high)	Status 1	Relay 1 does not operate, relay 2 operates

Note: The switching time is about 400ms

Chapter 4 Common Problems & Solutions

4.1 Common Problems & Solutions in Application

Phenomenon	Possible problems	Solutions
Motor non-rotation	Abnormal power supply	Ensure power voltage supply is normally supplied
	Power light is off	
	Driver has been protected	Re-power and restart
	No response to external trigger voltage signal	Ensure external trigger voltage signal is normally supplied
Inaccurate location	Signal interfered	Suppress signal interference
	Shield earth wire disconnected or loosen	Ensure earth wire well connected
	Broken circuit motor wire	Ensure motor wire well connected
	External obstruction influence the rotation	Ensure no external obstructions
Fluid or air Path blocked	Trigger signal obstructed, lower than 7V or higher than 33V	Check connection and status of trigger signal
	Tubes or connectors obstructed	Remove the particles inside the tubing or replace a new tubing
	Particles blocked fluid path	Flush flow path from port C after connected with suitable connectors

4.2 Safety Precautions

- Please ensure input voltage is required standard voltage
- Please connect and power on with original wirelines and power supply
- Please cover the used port with suitable coned plugs to avoid impurity substance and air into the valve port.
- Please don't depart all parts of the valve and keep labels on for warranty.
- Please dispose the device as concerned national environmental protection regulations.

Chapter 5 Technical Service



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