

Thank you for choosing our product. Please read this instruction manual carefully before use and keep it properly.

Table of Content

Chapter 1 Overview	3
1.1 Company Introduction	3
Chapter 2 Main Technologies and Functions	4
2.1 Product Features	4
2.2 Naming Rules	5
2.2.1 Model parameters	5
2.2.2 Valve head selection	5
2.3 Appearance and structure	7
2.3.1 Product Structure (Unit: mm)	7
2.3.2 Product dimensions (Unit: mm).....	7
2.4 Product Technical Parameters	8
2.5 Product Function Introduction	8
2.6 Port Definition	9
Chapter 3 Control Instructions	10
3.1 Overview	10
3.2 Control Instructions.....	10
3.2.1 Mrv-01BM high pressure valve control method	10
3.2.2 Status output indication	10
Chapter 4 Switching Valve Control Code Description.....	11
4.1 Address Settings	11
4.2 Communication Protocol	12
4.2.1 Data Terminal (OEM) Protocol.....	12
4.2.2 Data Terminal (DT) Protocol	14
4.2.3 Use of DT Protocol and Microsoft Windows	15
4.3 Mrv-01BM instruction set.....	16
4.3.1 Notes on command operation.....	16
4.3.2 Valve Configuration Instructions	16
4.4 Setting initial values.....	17
4.4.1 Initialization Instructions.....	17
4.5 Operation Instructions	17

4.5.1 Valve action command	17
4.5.2 Control Instructions	18
4.5.3 Non-volatile memory (EEPROM) commands	20
4.5.4 Reporting Instructions	21
4.6 Error Code and Status Query	21
4.6.1 Report Command	22
4.6.2 Error Codes	22
4.6.3 Error Types.....	23
Chapter 5 Frequently Asked Questions.....	23
5.1 Common Problems and Solutions in Applications	23
5.2 Product Safety Precautions	24
Chapter 6 Version Description	25
Chapter 7 Technical Support.....	26

Chapter 1 Overview

1.1 Company Introduction

Nanjing Runze Fluid Control Equipment Co., Ltd. was established in 2014. It is a supplier of analytical instrument accessories and a national high-tech enterprise focusing on the research and development and production of fluid accessories. Its products include standard products such as syringe pumps, switching valves, high-pressure valves, airtight injectors, peristaltic pumps, and pipe connectors. It covers the entire industry chain from product customization, design and development, production and manufacturing, sales and after-sales, and consistently provides high-quality products and services for environmental monitoring, biopharmaceuticals, medical equipment, industrial automation, and laboratory instruments.

Since its founding, Runze has been ISO9001 certified, received various designations, including "National High-Tech Enterprise" and "Jiangsu Private Technology Enterprise", and has been awarded a 5A credit rating by the Bank of Nanjing. Through its commitment to advanced technologies and years of R&D investment, the company has secured hundreds of patents in the fluids field and numerous software copyrights.

Chapter 2 Main Technologies and Functions

2.1 Product Features

(1) **Name:** Mrv-01BM high pressure valve is an electric on-off displacement valve independently developed by Nanjing Runze Fluid Control Equipment Co., Ltd.

(2) **Control:** This high-pressure valve has two control modes, one is communication control mode and the other is trigger mode;

by receiving the short-circuit and open-circuit states of IN and G, thereby realizing the switching of the fluid path.

(3) **Application:** High-pressure valves are widely used in the collection and distribution of fluid samples.

(4) **Corrosion resistance:** The material of the liquid contact part of the high-pressure valve can be applied to various corrosive liquids and has strong corrosion resistance.

(5) **Application scenarios:** environmental monitoring and analysis instruments, laboratory analysis instruments, medical analysis instruments, chromatographs, etc.

(6) **Innovative functions:**

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

b. The valve will not generate liquid pulsation during operation, effectively solving the problems of liquid droplets and backflow at the outlet during micro-injection.

has a status output function when running and stopping, which can be used by the host computer to query the valve's on/off status.

(7) **Valve body composition:**

a. The valve head of this high-pressure valve is made of ceramic and is maintenance-free.

b. The high-pressure valve core adopts a multi-directional self-adaptive flat fitting method, which can effectively extend the product life. (This structure has applied for a utility patent, patent number: CN204852471U)

c. The valve body is powered by an NMB imported planetary reduction gearbox motor, which is extremely reliable.

d. The valve hole positioning adopts a unique absolute position encoder positioning method, which not only reduces the volume of the switching valve, but also effectively solves the positioning problem.

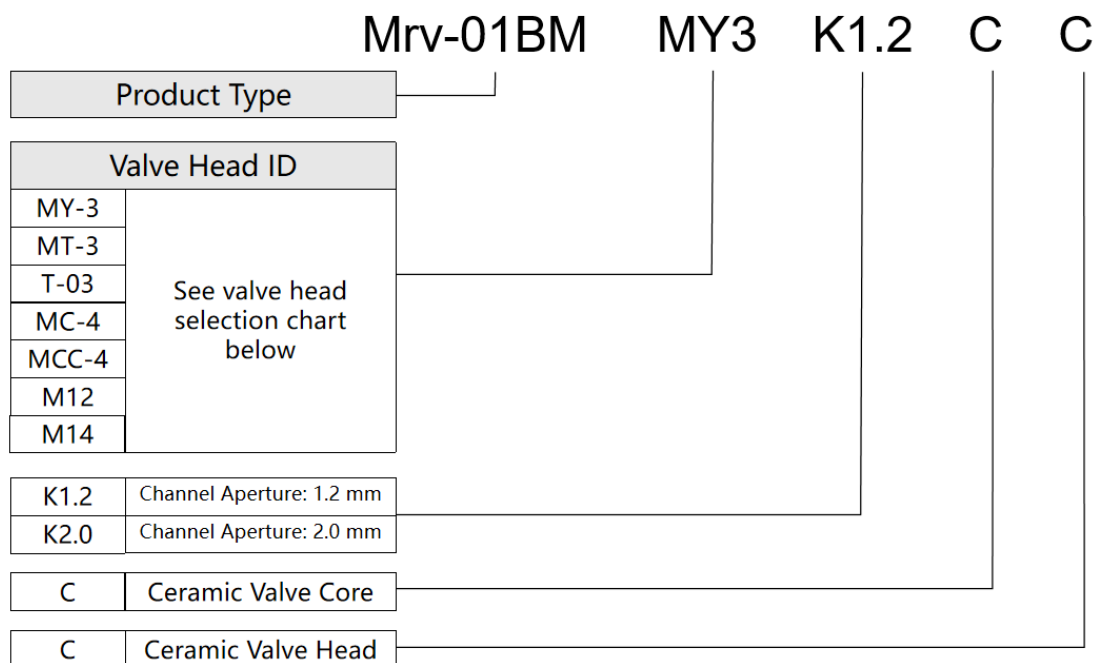
e. The driver module uses a low-power driver chip, which can effectively reduce the impact of heat generated during chip operation on performance.

f. This product has an integrated motor control circuit.

g. Controller interface: XH2.5 0 mm pitch terminal.

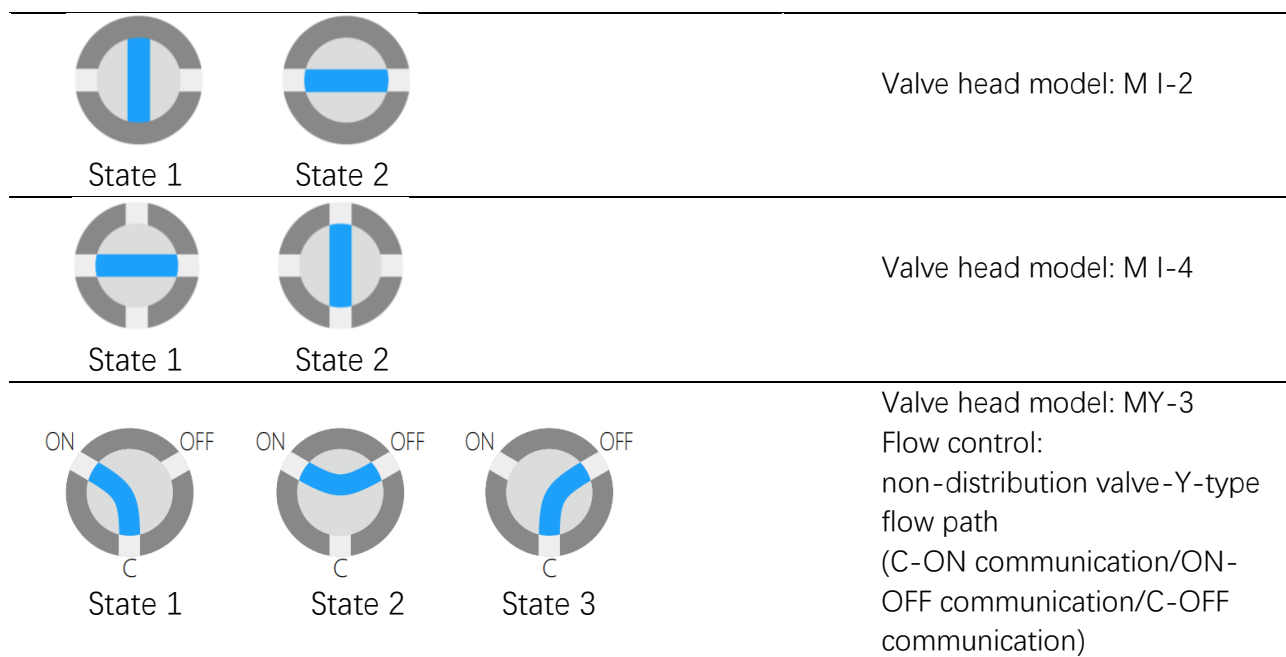
2.2 Naming Rules

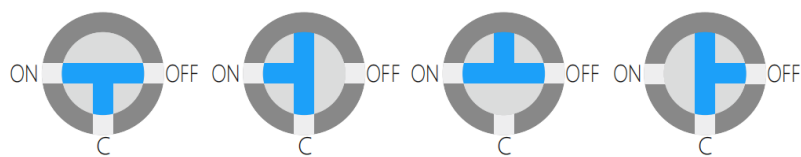
2.2.1 Model parameters



Example: Y-type 3-way ceramic high-pressure valve: Mrv-01BM-MY3-K1.2-CC

2.2.2 Valve head selection





State 1

State 2

State 3

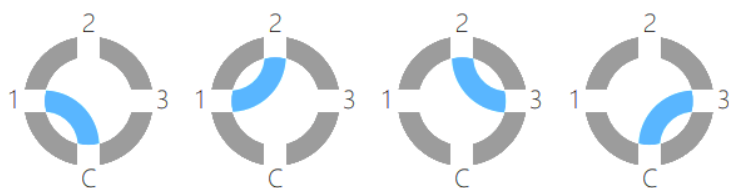
State 4

Valve head model: MT-3

Flow control:

non-distribution valve-T type flow

(C - ON-OFF communication / C - ON communication / ON-OFF communication / C -OFF communication)



State 1

State 2

State 3

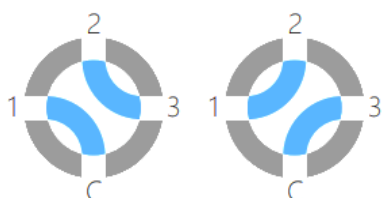
State 4

Valve head model: MC-4

Flow control:

non-distribution valve-single selection flow

(C-1 connected/1-2 connected/2-3 connected/C-3 connected)



State 1

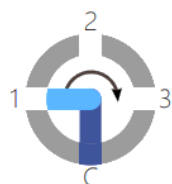
State 2

Valve head model: MCC-4

Flow control:

non-distribution valve-dual selection flow

(C-1/2-3 are connected, C-3/1-2 are connected)



Valve head model: T-03

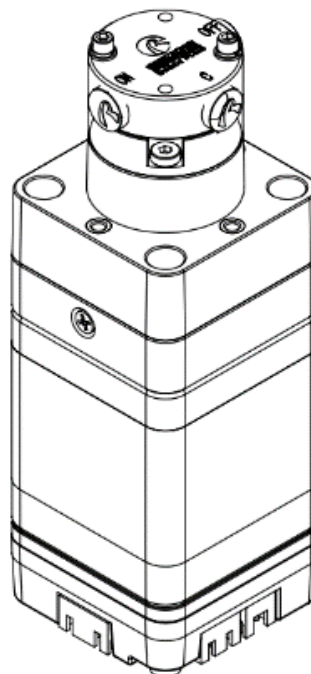
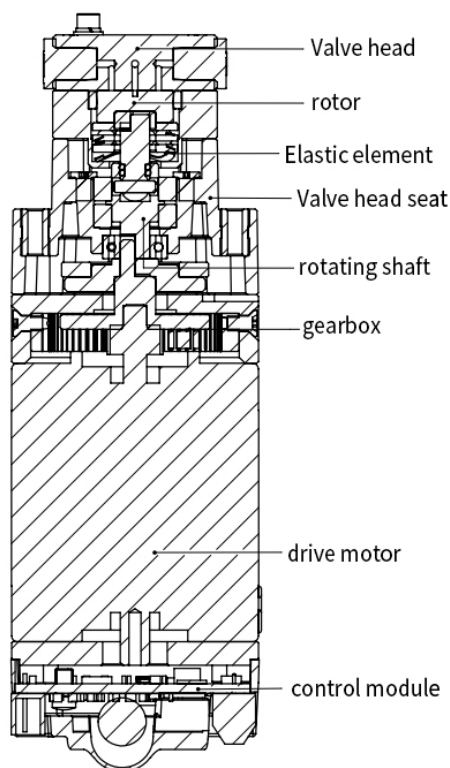
Flow control:

3-way distribution valve distribution type flow

(C-1 connected/C-2 connected/C-3 connected)

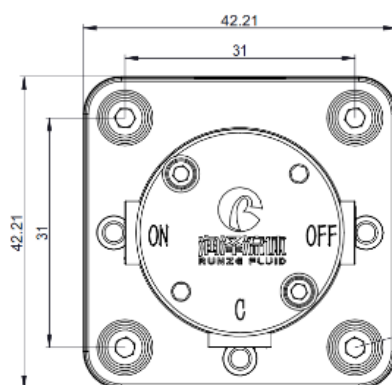
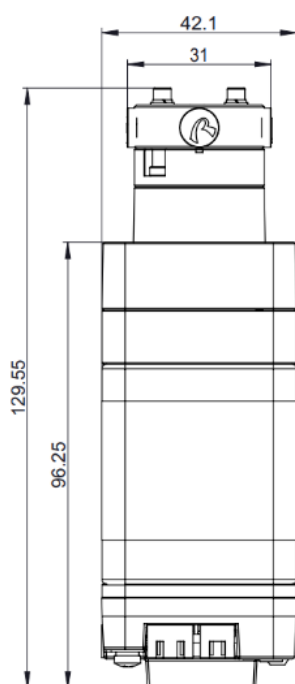
2.3 Appearance and structure

2.3.1 Product Structure (Unit: mm)



Two-way valve

2.3.2 Product dimensions (Unit: mm)



4-M3 mounting hole

2.4 Product Technical Parameters

Name	Specifications/Parameters						
Flow channel diameter	1.5mm						
Contact material	ceramics						
model	MY3	MT3	T03	MC4	MCC4	MI2	MI4
Port to port dead volume (μl)	52.93						
Pressure resistance	Air pressure: 0-1Mpa				Water pressure: 0-1.2Mpa		
Valve head liquid temperature	0-80℃						
Threaded interface	1/4-28 UNF thread						
Optional driver board	no						
Reaction time	≤ 600 ms						
Trigger signal	Are IN and G short-circuited?						
Status output signal	0V -5V high and low level output						
Rated voltage	DC24V						
Rated power	24 W						
Working temperature	0-50℃						
Working environment humidity	≤70%						
Overall dimensions (length*width*height)	42*42*129.55mm						
weight	/						

2.5 Product Function Introduction

Mrv-01BM high pressure valve features are as follows:

(1) The high-pressure valve has excellent performance in resisting high pressure. The maximum pressure resistance of the traditional three-way solenoid valve is 0.3Mpa, while the maximum pressure resistance of this high-pressure valve is 1Mpa, thus ensuring stable switching when there is pressure output.

(2) When the high-pressure valve switches the flow path, no liquid pulsation will occur, and no dripping will occur at the flow path outlet.

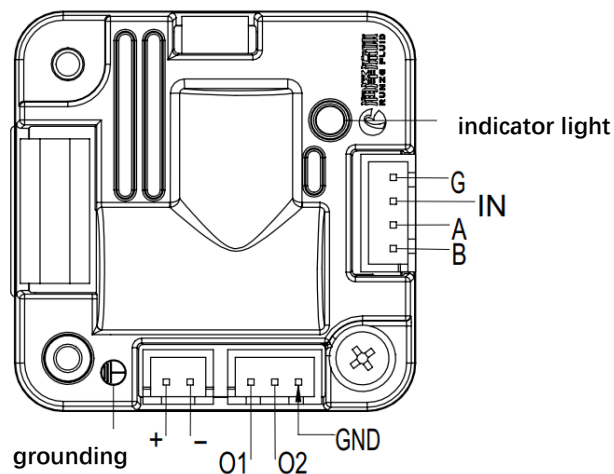
(3) The high-pressure valve has a status feedback signal output to ensure that the upper computer can accurately identify the status of the valve when the valve is open or closed, thereby ensuring that the flow path will not produce unpredictable consequences due to valve failure.

(4) The internal flow path switching mechanism of the high-pressure valve is a plane shear switching. When certain easily crystallized liquids crystallize, it will not affect the flow path switching, thereby improving the stability of the equipment.

(5) The high-pressure valve has good performance and excellent performance for the passage of high-

temperature liquids. When corrosive liquids at 0-80°C pass through , it can work normally and stably for a long time.

2.6 Port Definition



Port Name	describe	Port Name	describe
DC24V (+)	DC24 V positive	B	RS485B
DC24V (-)	DC24V negative pole	A	RS485A
O1	Auxiliary output 1#	IN	Trigger IN
O2	Auxiliary output 2#	G	Ground wire
GND	Ground wire		

Chapter 3 Control Instructions

3.1 Overview

The Mrv-01BM high-pressure valve is easy to operate. Under DC24V power supply conditions, switching between state 1 and state 2 /state 4 can be achieved by short-circuiting or opening IN and G. When IN and G are open, the high-pressure valve switches to state 1; when IN and G are short-circuited, the high-pressure valve switches to state 2 /state 4.

3.2 Control Instructions

3.2.1 Mrv-01BM high pressure valve control method

Example 1: As shown in Figure M I2

Two-way valve: When IN and G are in open circuit state, it switches to state 1 (the In-Out port is disconnected); when IN and G are in short circuit state, it switches to state 2 (the In-Out port is connected).



Example 2: As shown in M C4

Three-way valve: IN and G are in open state, switching to state 1 (C -1 is connected state); IN and G are in short-circuit state, switching to state 4 (C -3 is connected state).

3.2.2 Status output indication

IN -G state	O 2 voltage output	O 1 voltage output	High pressure valve output status As shown in Figure 1
open circuit	L (low)	H (high)	State 1
Short Circuit	H (high)	L (low)	Status 2 / Status 4

Table 3 Valve output status indication

Note: Due to the differences in hole positions of different types of valve heads, the switching time varies, approximately 400ms-600ms.

Chapter 4 Switching Valve Control Code Description

4.1 Address Settings

As part of the communication protocol, the address of each valve must be clearly defined. The user can select one, two (dual devices), four (quad devices), or 15 valves (all devices) by setting the address byte. Each physical address in the address switch corresponds to a hexadecimal value, see the table below.

Address (hexadecimal)	equipment
30	Host address (host controller, computer, etc.)
31-3F	Device address, single device control
41-4F	Device address, 2 devices can be controlled simultaneously
51-5D	Device address, 4 devices can be controlled simultaneously
5F	Device address, all devices controlled simultaneously

Table 4-1-2, Hexadecimal switch setting addresses (ASCII code), shows the different address settings for each device.

Note: When using a valve: Use the ASCII code address value in Table 4-1-2 to connect the software and send instructions to the specific device.

Single device		Two devices		Four devices		Fifteen devices	
Hexadecimal address	ASCII address	Hexadecimal address	ASCII address	Hexadecimal address	ASCII address	Hexadecimal address	ASCII address
31	1	41	A	51	Q	5F	—
32	2						
33	3	43	C				
34	4						
35	5	45	E	55	U		
36	6						
37	7	47	G				
38	8						
39	9	49	I	59	Y		
3A	:						
3B	;	4B	K				
3C	<						
3D	=	4D	M	5D	J		
3E	>						
3F	?	4F	O				

Table 4-1-2 Hexadecimal (ASCII) address setting *switch*

The user can connect all valves in the valve chain via address 5F, for example, to initialize all valves at the same time. Afterwards, the user can switch address 31 to 3F to operate a single valve independently.

Note: Multiple address commands cannot be used to detect device status or request to send a test report. To achieve this purpose, each valve needs to be given an independent address.

4.2 Communication Protocol

Two protocols are available:

- OEM communication protocol
- Data Terminal (DT) Protocol

4.2.1 Data Terminal (OEM) Protocol

Mrv-01BM firmware automatically detects communication protocol

Because the DT protocol does not use sequence numbers or checksums, it can be transmitted over ASCII data terminal serial lines. For instructions on using a Microsoft Windows terminal emulator, refer to "Using the Data Terminal (DT) Protocol in Microsoft Windows Systems" in this chapter.

Note: The Mrv-01BM system recommends using the OEM protocol for the RS-485 communication interface, which adds error checking by using a checksum and serial number.

Once Mrv-01BM detects the OEM or DT protocol, it will ignore other protocols until the next time it is plugged in.

OEM communication protocol

OEM communication is a powerful protocol that includes automatic recovery of transmission errors. Table 4-2 describes each setting of the OEM protocol in detail.

parameter	set up
Character format	
Baud rate	9600 or 38400
Data bits	8
Parity	none
Stop bits	1
Command area (see OEM protocol command sub-protocol for details)	
1	Start test (^B or 02h)
2	Valve address
3	Serial number
3+n	Data block (length n)
4+n	Terminate test (^C or 03h)
5+n	Checksum

Feedback area (see OEM protocol command sub-protocol for details)	
1	Start test (^B or 02h)
2	Host address (0 or 30h)
3	Status Code
3+n	Data block (length n)
4+n	Terminate test (^C or 03h)
5+n	Checksum

Table 4-2 OEM instructions

OEM protocol command area characters

The command area characters in the OEM communication protocol are described as follows. All characters outside the command area will be ignored.

When developing an analysis algorithm, programmers should focus on designing the start detection as the starting point of the module and the checksum (termination detection character) feedback module as the end point of the detection.

Start test (^B or 02h)

The STX character indicates the start of a command

Valve address

Each valve has a specific hexadecimal code

Sequence number/repeat flag

The sequence number is a single byte that transmits a sequence number (standard value: 0-7) and a bit flag indicating a repeat command due to a communication error. Because each message receives a different sequence number from the previous message (except for repeats due to some reason), the sequence number can switch between different values (such as 1 and 2). However, if a repeat signal is set, the valve will choose to execute or not execute the command received previously and the current command received.

NOTE: If the operator chooses not to use this option, the serial number can be set to a fixed value of 1 (31H).

Data block (length n)

The data block consists of data or commands sent to the valve or host. (This is an ASCII string.) When the valve responds to a move or [q] command, the data block length is 0 (i.e., no data string exists).

ETX

The ETX character indicates the end of a command string.

Checksum

The checksum is the last byte of the message string. All bytes (excluding the line synchronization checksum) together form an 8-bit checksum, which is appended as the last character of the data block. The

receiver compares the transmitted value with the calculated value. If the two values match, the transmission is assumed to be error-free; otherwise, the transmission is assumed to be erroneous.

OEM Communication Protocol Feedback Block Characters

The OEM Communication Protocol Feedback Block characters are described below.

Only unique answer block entries are listed in this section. For common command and answer block commands (characters), see the previous "OEM Protocol Command Block Characters" section.

Primary Address

The master address is the address of the host system. This value is fixed to 30h (ASCII value "0").

Status and error codes

Status and error codes define valve status and signal error conditions. For a description of status and error codes, see "Error Codes and Valve Status" in this chapter.

4.2.2 Data Terminal (DT) Protocol

The DT protocol can be easily used in any terminal or terminal emulator capable of generating ASCII characters at 9600 baud, 8 bits, and no parity.

parameter	set up
Character format	
Baud rate	9600 or 38400
Data bits	8
Parity	none
Stop bits	1
Command area (For details, see "DT Protocol Command Area Characters")	
1	Start test (ASCII '/' or 2Fh)
2	Valve address
2+n	Data block (length n)
3+n	Carriage Return ([CR] or 0Dh)
Feedback area (For details, see "DT Protocol Command Area Characters")	
1	Start test (ASCII '/' or 2Fh)
2	Host address (ASCII "0" or 30h)
3	Status Code
3+n	Data block (length n)
4+n	Termination (03h)
5+n	Enter (0Dh)
6+n	Line feed (0Ah)

Table 4-2-2 DT Protocol

DT protocol command area characters

The command area characteristics of the DT communication protocol are described as follows:

Starting Area

The start character indicates the beginning of a message block.

Valve address

The valve address is an ASCII character specific to each valve.

Data block (length n)

The data block contains ASCII data or instructions sent to the valve or host.

Terminal Module

The end character indicates the end of a message block.

DT protocol feedback block character

The feedback block character DT communication protocol is described as follows:

This section lists only unique answer block entries. For more information on commands and answer block commands (characters), see the previous section "OEM Protocol Command Block Characters".

Primary Address

The main address is the address of the host system, usually set to 30h (ASCII code "0").

state

Status and error codes define valve status and signal error conditions, see the description of the [Q] command in "Error Codes and Valve Status".

Data Block

This is the response to all report commands except the [Q] command.

Carriage return (0dh)/line feed (0AH to 0CH)

This character terminates a feedback block.

4.2.3 Use of DT Protocol and Microsoft Windows

Mrv-01BM can be directly set to DT protocol through Windows terminal.

Mrv-01BM via Windows, please follow the steps below:

- 1 Connect Mrv-01BM to the communication port of the host computer.
- 2 Open the SerialCommV1.3.0 application on the PC.
- 3 Select More Serial Port Settings.
- 4 Select the communication port (for example, COM1), baud rate 9600, 8 data bits, 1 stop bit, and no parity.
- 5 Click OK and then click Open Serial Port.

6 Set the valve address switch to 0.

7 Energize the valve.

8 Input /1wR Initialize valve.

the command set listed in Mrv-01BM commands" in this chapter.

4.3 Mrv-01BM instruction set

4.3.1 Notes on command operation

For better use, please note the following:

- Except for report and query instructions, other instructions must be followed by the [R] instruction.
- The valve can accept a single command or a string of commands.

For example:

- The valve's command buffer has a maximum capacity of 255 bytes. If a command string or instruction is sent without an [R] command, it is placed in the buffer and not executed. If a second command is sent before the first is executed, the second command overwrites the first.

- No new instructions are accepted during the execution of instructions. This rule does not include T stop instructions and report instructions.

- When a command is sent, the valve responds immediately. If the command contains an invalid instruction, the valve immediately reports an error. If it contains invalid parameters, the valve reports an error when it receives the next command. Regardless of the error, the command will not be executed.

- The switching valve cannot be run dry, otherwise the valve seal will be damaged.

4.3.2 Valve Configuration Instructions

> Set user data command

The [>] command loads one byte of user data into non-volatile memory:

[> <n1>, <n2>] Where: <n1> is 0...15 (in non-volatile memory).

<n2> is a string of 0...255 characters (data loaded into non-volatile memory).

U<n> Write valve configuration to non-volatile memory

The [U] command is used to write configuration information to non-volatile memory. The valve is configured during manufacturing but can be reconfigured at any time using the following [U] command:

<n> value	describe
30	Setting the non-volatile memory automatic mode
31	Clear non-volatile memory automatic mode
41	Set the RS-485 baud rate to 9600
47	Set the RS-485 baud rate to 38400
300	Set the device address

Table 4-3-2 Edit valve configuration command values

Note: The [U] command takes effect at the next start of the valve.

4.4 Setting initial values

4.4.1 Initialization Instructions

w<n1, n2> Initialize valve drive

The [w] command can only initialize the valve drive, and only the initialization port can be set.

n1 = Set port

n2 = Set valve home and port number direction

The parameter table is as follows:

w parameter	value	describe
<n1>	1...X	Set the initialization port, where X is the port number of the valve
<n2>	0	The valve body is in the clockwise direction, and the valve ports are numbered in the clockwise direction.
	1	The valve body is in the counterclockwise direction, and the valve ports are numbered in the counterclockwise direction.

4.5 Operation Instructions

4.5.1 Valve action command

O<n1> Cut to the hole in counterclockwise direction

n1 = Set port

The parameter table is as follows:

w parameter	value	describe
<n1>	1...X	Set the switching port, where X is the port number of the valve

I<n1> Cut to the hole in clockwise direction

n1 = Set port

The parameter table is as follows:

w parameter	value	describe
<n1>	1...X	Set the switching port, where X is the port number of the valve

4.5.2 Control Instructions

R Execute instruction

The [R] command tells the valve to execute a new command string or to load a previous but not executed command string. This command will also cause the resume of a suspended ("H") or terminated ("T") command string.

A command containing [R] at the end of the string will be executed immediately. If a command or program string is sent without [R], it will be placed in the command buffer.

Sending [R] alone will execute the last unexecuted command in the buffer. Sending another [R] will not repeat the program string (i.e. it is already executed).

X executes the previous command

The [x] command repeats the last executed command or program string.

G <n> loop instruction

This command repeats a specified number of command or program strings. If a GR or GOR is sent, the sequence is repeated until the termination command [T] is issued. The G command can be used to nest up to 10 loops and can be repeated up to 48,000 times.

The syntax of this command is:

[G<n>]

Where <n> = 0...48000

For example, [O2O4G10R] turns the switching valve counterclockwise to the 2-hole position and then counterclockwise to the 4-hole position, and repeats this sequence 10 times.

g Loop instruction start mark

The [g] command is used in conjunction with the [G] command. It serves as a marker for the start of a loop (i.e., not repeating the entire string). Both the [g] and [G] commands can be nested up to 10 times.

Table 4-5 - 2, the character strings of the sample program, shows the command strings of each link [I2gO3gl4G10G5R].

Command Splitting	describe
I2	Move the valve clockwise to the 2-hole position
g	Outer ring starts
O3	Move the valve counterclockwise to the 3-hole position
g	Inner loop starts
I4	Move the valve to position 4 and close the hole
G10	Repeat the inner loop 10 times
G5	Repeat the outer loop 5 times
R	Execute string

Table 4-5-2 Program String Example

M <n> Delay instruction

[M] The command delays the execution of the command in milliseconds, and the delay time is the nearest multiple of 5.

The syntax of this command is:

[M <n>]

Where <n> = 0...30000 milliseconds (5 is the default)

H <n> Pause command

The [H] command is used in a program string to stop the execution of the string. To resume execution, the [R] command must be sent.

T Terminate command

The [T] command terminates the valve in progress ([I], [O]) and delays [M].

NOTE: The [T] command will not terminate a valve move command. This command will terminate both the individual command and the program string. If the program string is terminated before completion, the [R] (Execute) command will resume the program string. If the command is terminated due to a problem or error, the valve must be reinitialized.

Regarding "H" and "T" instructions: When executing instructions in a string containing an "H" instruction, the string execution stops when the "H" instruction is encountered. The "R" instruction must be sent to execute the instructions following the "H" instruction. After executing the subsequent instructions, sending the "R" instruction will re-execute the instruction containing the "H" instruction. For an executing instruction, sending the "T" instruction will terminate the execution. At this time, sending the "R" instruction will re-execute the remaining instructions in the string.

J<n> Auxiliary output

[J] command sets auxiliary output.

The syntax of this directive is:

[J<n>]

Where <n> = 0 ... 7 (0 is the default)

The valve provides two auxiliary outputs, which are controlled as shown in the following table:

	OUT3	OUT2	OUT1
J Command	PB0 (ignored)	PB1	PB2
J0/J1	1 (*)	1	1
J2/J3	1 (*)	0	1
J4/J5	1 (*)	1	0
J6/J7	1 (*)	0	0

0 = Low, such as Gnd

1 = High, e.g. +5V DC

M02 (MC-4) high pressure valve: /1s0J2gH1J7I3J4H4J7O1J2GR

U300<n> Set device address

[U300] command sets the address of the device. The address cannot be queried after it is set.

[U300,<n>] where <n>=1...15

4.5.3 Non-volatile memory (EEPROM) commands

The Mrv-01BM non-volatile memory can store program strings, providing the user with the option of operating without a computer. The valve can be configured to run a stored program using the U < 30 > command. See "Valve Configuration Commands" earlier in this chapter.

s < n > Load program string into non-volatile memory

The [s] command is placed at the beginning of a program string to load the string into non-volatile memory. The syntax of this command is:

[s<n>]

Where <n> = 0...14

Up to 15 program strings (numbered 0 to 14) can be loaded into the non-volatile memory. Each string can contain up to 128 characters.

e < n > Execute non-volatile memory program string

Send [e] to execute the non-volatile memory command string. Use [T] command to terminate the execution of the program string.

[e<n>]

Where <n> = 0...14 (string number)

NOTE: If the valve is used in standalone mode, the initialization command should always be included in the non-volatile memory command string.

U30 is set to run in non-volatile memory automatic mode

The [U30] command sets the "Operate in automatic mode in non-volatile memory" flag in non-volatile memory and starts operating the valve in stand-alone mode.

Where <n> = 0...E

U31 Clear runs in non-volatile memory automatic mode

The [U31] command clears the "Operate in Non-Volatile Memory Automatic Mode" flag in the E²PROM and starts operating in the default mode.

Concatenate program strings in non-volatile memory

Link the nonvolatile memory program string by ending it with an [e] command that contains a second

program string.

4.5.4 Reporting Instructions

The report command does not require the [R] command.

?6 Reports the actual position of the valve

The [?6] command reports the position of the valve in increments.

?10 or F Report command buffer status

[?10] or [F] reports the command buffer status. If the buffer is empty, the valve returns a status code of 0. If the buffer is not empty, the valve returns a status code of 1. If a program string that does not contain an [R] command is sent to the valve, the program string will be loaded into the buffer and the buffer status will become 1. Sending an [R] command will execute the program string in the buffer.

0 = empty

1 = Command in buffer

?29 or Q Report device status

The [?29] command reports the device status (error code).

?200 Verify conf file

[?200] Check the checksum of the conf file. The checksums of products with the same specifications must be exactly the same.

?201 Query log

[?201] Log is used to record the current device status. The log can only be queried when an error occurs. Under normal circumstances, the log is 0.

?202 Query serial number

[?202] You can query the serial number of the current device. The serial number of each device is unique.

?300-?314 Query the program string in s0-s14

[?300] Query the program string written in s0.

*** Query voltage**

The [*] command reports the voltage of the device's power supply. This value is multiplied by 10. For example, if $V = 24.0$ VDC, the * command reports 240.

< Report User Data

The [<] command returns the user data stored in the EEPROM. The value of <n> is between 0 and 15, with 0 being the default.

?23 or & reports the current software version

The [?23] or [&] command can query the software version of the current device.

4.6 Error Code and Status Query

The [Q] command is used for serial communication and reports error codes and valve status (idle or busy). The user sends the [Q] command before sending a program string or a single command to ensure that the valve has successfully completed the previous command.

NOTE: [Q] is the only valid method to get the valve status in serial mode.

NOTE: The [Q] command (status byte) provides two pieces of information: valve status (5 bits) and an error code (0-3).

4.6.1 Report Command

Bit 5 is the status bit. It indicates whether the valve is busy or not. The names of these 5 bits are as follows:

5 status bits	describe
X=1	The valve is ready to accept new commands
X=0	Valve is busy, only accepting report and terminate commands

Note: Although the reply block of other commands contains a status bit, it should not be used to determine the status of the valve. The [Q] command is the only valid way to determine if the valve is busy. Error information is always valid in the reply block of the status byte.

4.6.2 Error Codes

Error codes describe situations where a problem may have been detected in the Mrv-01BM (excluding error code 0). Error codes are returned in the least significant four bits of the status byte. If an error occurs, the valve stops executing instructions, clears the instruction buffer, and inserts the error code into the status byte.

Error Code	describe
0 (00h)	No error conditions
1 (01h)	Initialization Error. This error occurs when the valve fails to initialize. This error can only be cleared by initializing the valve.
2 (02h)	Invalid command. This error occurs when an unrecognized command is issued. Correct the command and the operation will continue.
3 (03h)	Invalid operand. This error occurs when a command is issued with an invalid parameter <n>. Correct the command and the operation will continue.
6 (06h)	EPROM Failed. This error occurs when the EEPROM fails. If you receive this error, please call Mrv-01BM System Technical Support.
7 (07h)	Device not initialized. This error occurs when the valve has not been initialized. Clear the error and initialize the valve.
8 (08h)	Internal error. If this error occurs, please call system technical service.
9 (09h)	Valve overload, when this error occurs, the valve must be initialized to resume normal operation. This error can only be cleared by reinitializing the valve
11 (0Bh)	Valve movement is not allowed. When the value remaining in the valve is less than the value to be sent, the valve movement command is not allowed.
12 (0Ch)	Internal fault. If this error occurs, call system technical service.
14 (0Eh)	A/D converter failure. This error occurs when the A/D converter is faulty. If this error occurs, please call system technical service.
15 (0Fh)	Command overflow. This error occurs when an action command is sent before the current operation is completed. The commands in the buffer must be executed before further commands can be executed.

4.6.3 Error Types

The valve handles different error types. There are four error types, as described below:

Immediate Error

These include "Invalid Command" (Error 2) and "Invalid Operand" (Error 3). The answer block returns an error immediately after the command is sent. After a valid command is sent, the valve will continue to operate normally. Since the [Q] command is a valid command, the valve will not return an error. In this case, the [Q] command is not required. Note: The valve does not require initialization after these error types.

Initialization Error

These include "Initialization Error" (Error 1) and "Device Not Initialized" (Error 7). If the valve fails to initialize, or the initialization command is not sent, subsequent commands will not be executed.

To ensure successful valve initialization, send the [Q] command after sending the initialization command.

If the [Q] command indicates that initialization was successful and the valve is ready, subsequent movement commands can be sent.

If the [Q] command indicates that the valve is not initialized, the valve must be initialized until the [Q] command indicates that initialization is successful.

If initialization is unsuccessful, a "Device not initialized" error is returned immediately after the next command is sent. A successful initialization must be performed before subsequent commands can be sent.

Overload Error

This is a "Valve Overload" error (Error 9). If the valve returns a Valve Overload error, the valve must be initialized before continuing. If another command is sent without reinitializing, another "Overload Error" will be returned when the next "Move" command is issued. The [Q] command clears the error, but if initialization is unsuccessful, an Initialization Error will be returned.

Command overflow error

If a Move command or a Set command (except [V]) is sent while the valve is moving, an Error 15 will be issued. The valve will ignore the command and issue an Error 15. The [Q] command allows the controller to confirm when a command is complete and the valve is ready to accept a new command.

NOTE: The valve does not need to be initialized after this command.

NOTE: All errors reported by the valve should be captured by the user software and the physical cause corrected before continuing operation. Failure to do so may result in damage to the valve or adversely affect valve performance and void the warranty.

Chapter 5 Frequently Asked Questions

5.1 Common Problems and Solutions in Applications

Phenomenon	Possible issues	Solution
The motor does not rotate	Abnormal power supply voltage	Check whether the power supply voltage is within the appropriate range
	The power light is off	Check whether the power supply circuit is normal
	Drive Protected	Restart the power supply
	No response to external enable voltage	No power, check the circuit of the external enable voltage
Inaccurate location	Signal interference	Eliminate distractions
	The shield ground is not connected or not connected properly	Reliable grounding
	The motor line is broken	Check and connect
	Rotation is externally blocked	Eliminate the cause of the blockage
Liquid or gas line is blocked	The trigger signal is not connected or the status is incorrect	Confirm the connection and status of the trigger signal
	Pipeline interface is blocked	Remove the pump tube, remove foreign matter or replace the pump tube
	Particle blocking pathway	Use the matching interface from C-port injection flush

5.2 Product Safety Precautions

1. Please ensure that the voltage matches the standard voltage of the instrument.
2. Please use the original serial cable that comes with this product to connect to the power supply.
3. If there are any unused holes, please use the matching plugs and washers to plug them tightly to prevent impurities and airflow from entering the valve body and affecting normal use.
4. Do not disassemble product parts at will. The warranty will be void if the anti-tampering labels are torn.
5. When the instrument is scrapped, please dispose of it in accordance with the regulations for the disposal of waste instruments and equipment. When the instrument is used, please dispose of the waste in accordance with national environmental protection requirements.

Chapter 6 Version Description

Version	illustrate	Release Time
V1.0	Initial version	2025.7.20

Chapter 7 Technical Support

Nanjing Runze Fluid Control Equipment Co., Ltd.

Company landline (fax):	025-5119 7362
Sales Phone:	138 5195 4068
Technical Support:	198 2581 4316
Corporate Email:	runzeliuti@runzeliuti.com
Runze official website:	www.runzeliuti.com
Runze flagship store:	https://runze.tmall.com/
Company Address:	Building 3, Runjing International, No. 9 Tianxing West Road, Jiangning District, Nanjing, Jiangsu Province



润泽官网



手机淘宝扫一扫