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# RUNZE FLUID SV-06 Mulitiport Selector Valve User Manual

**Contents**

**RUNZE FLUID SV-06 Mulitiport Selector Valve**

## Overview

### 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, selector valves, high-pressure valves, gastight syringes, peristaltic pumps, 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.. 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 always focuses on strategy and innovation, accurately grasps the general trend of the fluid equipment industry, and has made continuous and large R&D investment in the core technology. This has enabled the company to obtain a huge advantage in the production and sales of analysis instrument accessories and is always at the forefront of the industry. 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.. Runze adopts leading production technology, fully implement lean production concepts, and always maintain professional international first-class manufacturing capabilities.

## Technology and Function

### Product Features

1.  Name: The multiport selector valve is an electric selector valve independently developed by RUNZE Fluid Control Equipment Co., Ltd., also known as electric rotary valve;

2.  Control: The selector valve integrates motor control circuit. By receiving instructions from the host computer to control the operation of the stepper motor to make the rotor turn to the specified hole position to achieve the switching of the flow path. Serial communication protocol supports RS232/RS485/CAN bus.

3.  Corrosion Resistance: This type of selector valve adopts sapphire valve core, which can be applied to various

corrosive liquid. The valve head is made of PCTFE (polychlorotrifluoroethylene) and stainless steel 304, maintenance-free and the liquid is not in contact with the stainless steel.
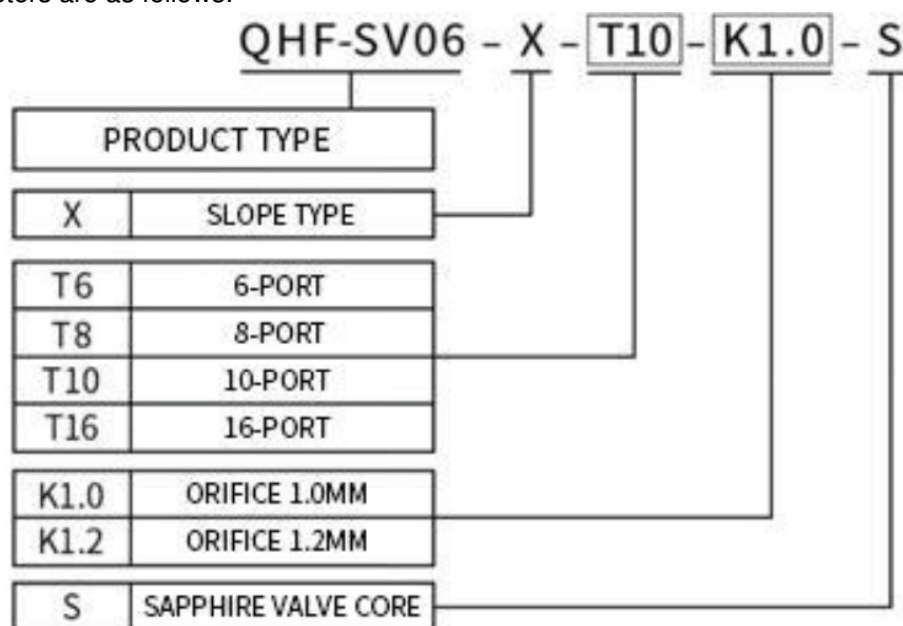
4. Valve Core Structure: The valve core adopts a multi-directional self-adaptive plane fitting method, which can extend the service life of the product effectively. (This structure has been applied for utility patent, patent number: CN204852471U)

5. Motive Power: The rotation of the valve body adopts the imported NMB planetary gearbox motor as the power plant, which is extremely reliable.

6. Orientation: The valve hole is oriented by optocoupler of code disc, which can effectively solve the problem of inaccurate positioning after the gearbox is worn down.

7. Drive: The drive module adopts a low-power drive chip. It can effectively reduce the heat generated when the chip is running which affects performance.

8. Control Unit Interface: XH terminal with 2.54mm pitch.

9. Mechanical Interface: 1/4-28UNF female thread.

10. Usage: Widely used in the collection and distribution of fluid samples.

11. Application: Environmental testing devices, experimental analysis instruments, medical analyzers, chromatographic instruments, etc.

**Note:**
Before using the selector valve, please read the "Instruction Manual" carefully and follow the provisions in it.
 **Naming Rules**
The model parameters are as follows:



QHF-SV06 – X – T10 – K1.0 – S

| | | |
|---|---|---|
| PRODUCT TYPE | | |
| X | SLOPE TYPE | |
| T6 | 6-PORT | |
| T8 | 8-PORT | |
| T10 | 10-PORT | |
| T16 | 16-PORT | |
| K1.0 | ORIFICE 1.0MM | |
| K1.2 | ORIFICE 1.2MM | |
| S | SAPPHIRE VALVE CORE | |

For example: slope type 6-port sapphire selector valve is named as QHF-SV06-X-T6-K1.2-S.
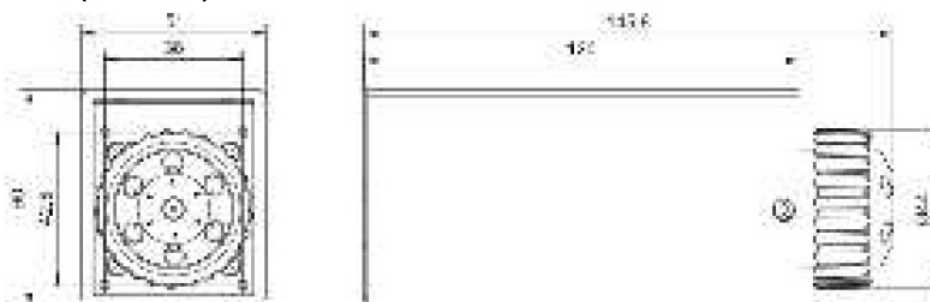**Product Specification**
The SV-06 selector valve can be divided into 6-port, 8-port, 10-port, 12-port and 16-port according to the number of ports.



The 6/8/10-port can be installed in place of other selector valves of RUNZE . The size of the mounting plate is shown in Figure 2-3-2 (unit: mm).
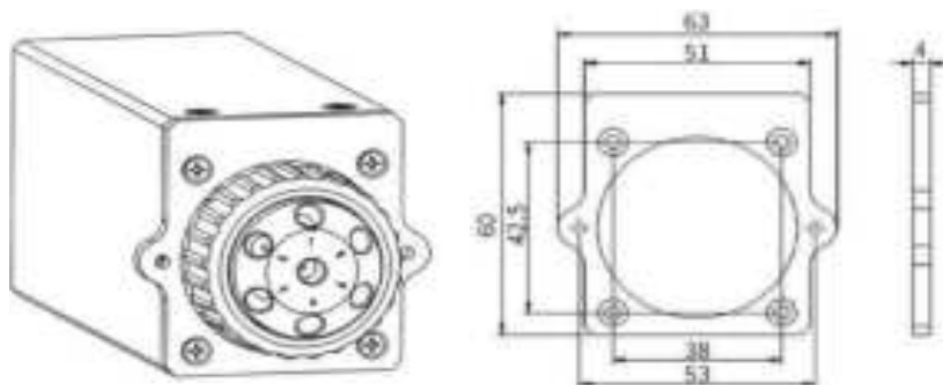
**Structure Dimensions (unit: mm)**



6 ports



8 ports

**Technical Parameters**

| Description | Parameter | | |
|---|---|---|---|
| Configuration | 6/8/10 ports | 12 ports | 16 ports |
| Orifice | 1.2 mm | 1.0 mm | 1.0 mm |
| Dead volume (port to port) | 27.5µL | 22.43µL | 33.68µL |
| Dead volume (sealed rotor) | 5.41µL | 6.08µL | 10.4µL |
| Wetted material | UPE, Sapphire | | |
| Pressure rating | 0-1.0Mpa (air)/ 0-1.6Mpa (water) | | |
| Origin detection | Automatically detect the initial position when power on. | | |
| Liquid temperature | 0℃ 150℃ | | |
| Connection | 1/4-28UNF female thread | | |
| Replaceable part | Stator replaceable and sealed rotor irreplaceable | | |
| Transposition | Random start to any specific port | | |
| Drive | Non-optional | | |
| Switching time | ≤5s/circle | | |
| Communication | RS232/RS485/CAN bus | | |
| Maximum drive force/torsion | 2.6N/m | 3N/m | 3.5N/m |
| Secondary drive force/torsion | 0.32N/m | 0.36N/m | 0.42N/m |
| Baud rate | RS232/ RS485: 9600bps, 19200bps, 38400bps, 57600bps, 115200bps<br>CAN: 100kbps, 200kbps, 500kbps, 1Mpbs | | |
| Address& Parameter setting | Via communication | | |
| Power supply | DC24V/3A | | |
| Maximum power | 60W | | |
| Working temperature | -10℃ 50℃ | | |
| Working humidity | ≤80% (relative humidity, non-condensing) | | |
| Dimension (L*W*H) | 60x51x145.8mm | 60x51x156.5mm | 60x51x175.5 mm |
| Weight | 0.73kg | 0.86kg | 1.02kg |
| Please consult for other special requirements. | | | |
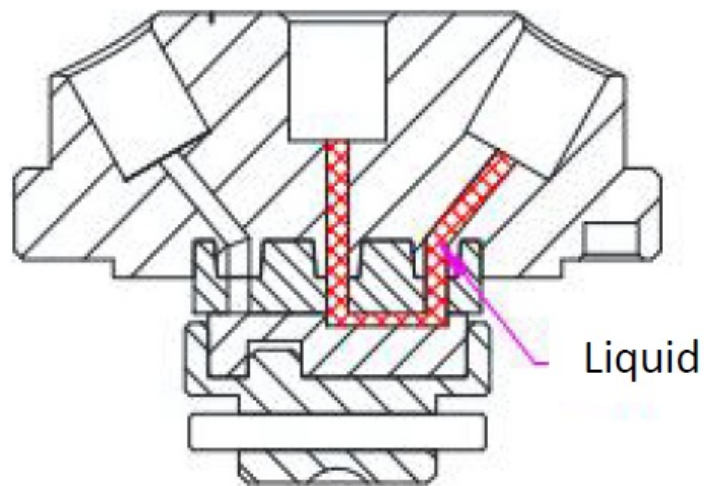
Dead volume (port to port)
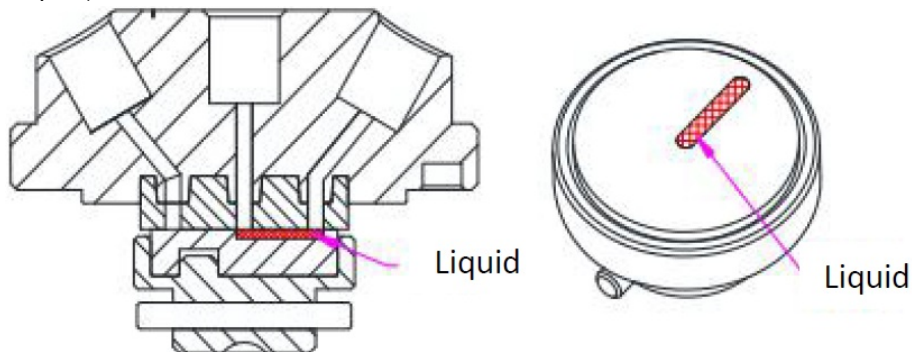


Dead volume (sealed rotor)

**Flow Configuration**

Center port is the common port and the valve can switch to any specific port by rotor. Flow configuration is shown
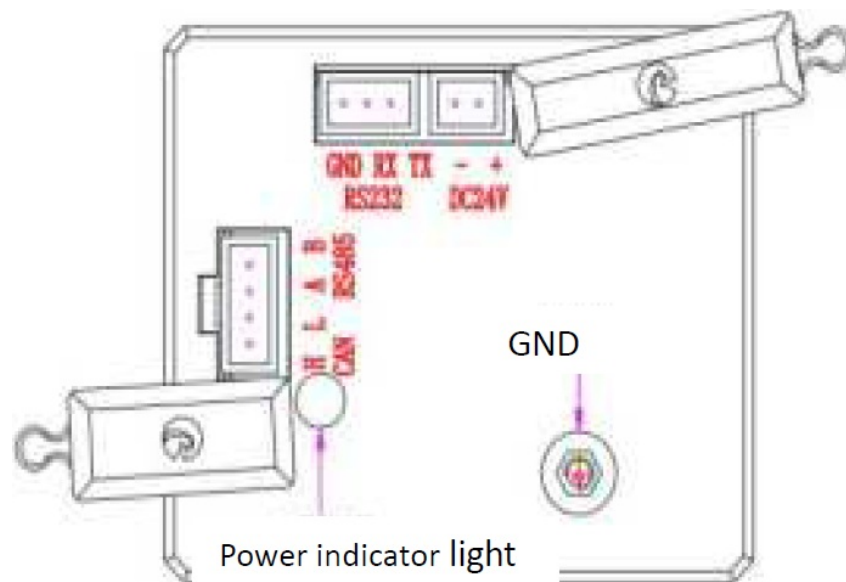.



**Reset Status**

Reset direction is counterclockwise (unchangeable). After reset, the rotor slot is between the port 1 and the port of
the maximum number. At this time, the center port and other ports are disconnected, as shown .



**Port Definition**

**Port diagram**

| Port | Description |
|------|-------------|
| + | DC24V positive |
| – | DC24V negative |
| TX | RS232 data input |
| RX | RS232 data output |
| GND | GND |
| H | CANH |
| L | CANL |
| A | RS485 A |
| B | RS485 B |

**Port definition of drive board**

## Description of Control Code

**Overview**

The data transmission between the selector valve and the host device (computer, single-chip computer, PLC, etc.) adopts serial communication (eg. RS-232/RS-485/CAN bus) and the following describes the communication format. The communication adopts asynchronous serial communication. Commands and data frames use sum check, and the sum check is two bytes (2 bytes). Commands and data in communication are in hexadecimal, and parameters are stored in little-endian mode.
Communication interface: RS-232, RS-485, CAN bus;
Communication mode: two-way asynchronous, master-slave mode;
Baud rate: RS232, RS485: 9600bps, 19200bps, 38400bps, 57600bps, 115200bps
CAN: 100Kbps, 200Kbps, 500Kbps, 1Mbps
Data bit: 8 bit
Parity: no check
Response time: <1 second

**Installation and Debugging**

1. Cable connection (including power supply and communication line) (see Figure 8 above);

2. Installation and debugging tools, see  Instructions for Debugging Tools for details.

3. Instructions for use, see  Quick Use Guide for details.


**Code Instructions**


**Common Command Format (send 8 bytes, return 8 bytes)**
**Byte send:**

| BO | B1 | B2 | B3 | B4 | B5 | B6 | B7 |
|---|---|---|---|---|---|---|---|
| FH (frame header) | Address code | Function code | Status parameter | | EOF (end of frame) | Cumulative sum | |
| STX | ADDR | FUNC | 1-8 bit | 9-16 bit | ETX | Low byte | High byte |


- The 1st byte STX :Frame header  CCH
- The 2nd byte ADDR   Slave address 0x00 0xFF
- The 3rd byte FUNC   Function code
- The 4th , 5th byte     :  Parameters corresponding to the function code
- The 6th byte ETX   :  End of frame DDH
- The 7th , 8th byte    Cumulative sum check code from byte 1 to 6


**Byte return:**

| BO | B1 | B2 | B3 | B4 | B5 | B6 | B7 |
|---|---|---|---|---|---|---|---|
| FH (frame header) | Address code | Status code | Status parameter | | EOF (end of frame) | Cumulative sum | |
| STX | ADDR | FUNC | 1-8 bit | 9-16 bit | ETX | Low byte | High byte |


- The 1st byte STX : Frame header  CCH
- The 2nd byte ADDR   Slave address 0x00 0xFF
- The 3rd byte FUNC   Status code
- The 4th , 5th byte     :  Parameters corresponding to the function code
- The 6th byte ETX  :End of frame DDH
- The 7th , 8th byte  :  Cumulative sum check code from byte 1 to 6


**Common command**

| Item | Command/Code (B2) | Description | Parameter (B3, B4) | Response parameter (B3, B4) |
|---|---|---|---|---|
| Query command | 0x21 0x22 | Query RS232 baud rate Query RS485 baud rate | 0x0000 0x0000 | Totally 5 baud rates: the factory default is 9600bps. (B4=0x00) B3=0x00 corresponding baud rate is 9600bps B3=0x01 corresponding baud rate is 19200bps B3=0x02 corresponding baud rate is 38400bps B3=0x03 corresponding baud rate is 57600bps B3=0x04 corresponding baud rate is 115200bps |
| | 0x23 | Query CAN baud rate | 0x0000 | Corresponding CAN baud rate: B3B4=0x0000 100Kbps B3B4=0x0001 200Kbps B3B4=0x0002 500Kbps B3B4=0x0003 1Mbps |

| Item | Command/Code (B2) | Description | Parameter (B3, B4) | Response parameter (B3, B4) |
|---|---|---|---|---|
| | 0x2e 0x30 0x3e 0x3f | Query automatic reset when power on  Query CAN destination address Query current port position Query current firmware version | 0x0000 0x0000 0x0000 0x0000 | B4=0x00) B3=0x00 indicates not automatic reset when power on. B3=0x01 indicates automatic reset when power on. B3=0xXX  B4=0x00) The value range of XX is 00 FF, and the default is 00. B3B4 the current position of code disc B3B4 software version number, in hexadecimal |
| | 0x44 | The motor rotates through the code disc and selects the optimal path automatically. | Port number (port1-max. port) | RS232 B2=0x00, B3B4 is internal data and appears randomly RS485: B2=0xFE, B3B4=0x0000 |
| Control | | | | RS232 B2=0x00, |
| Command | 0x45 | Reset | 0x0000 | B3B4 is internal data and appears randomly. RS485: B2=0xFE, |
| | | | | B3B4=0x0000 |
| | 0x49 | Stop forcibly | 0x0000 | B3B4 remaining steps |
| | 0x4a | Query motor status | 0x0000 | B3B4=0x0000 |

**Status list**

| Item | Status (B2) | Description of the response frame (B2) status |
|---|---|---|
| Response st atus | 0x00 | Normal status |
| | 0x01 | Frame error |
| | 0x02 | Parameter error |
| | 0x03 | Optocoupler error |
| | 0x04 | Motor busy |
| | 0x05 | Motor stalled |
| | 0x06 | Unknown location |
| | 0xfe | Task being executed |
| | 0xff | Unknown error |

**Note:**

In 485 communication, when sending an action command, the B2 byte in the response frame is FE, indicating that the command is received and is being executed. **Factory Command Format (send 14 bytes, return 8 bytes)** Factory commands need to be used with V0.6 debugging tools when RS232 or RS485 are used separately. See Quick Use Guide in detail.



**Byte send:**

| B0 | B1 | B2 | B3,B4,B5,B6 | B7 | B8 | B9 | B10 | B11 | B12 | B13 |
|---|---|---|---|---|---|---|---|---|---|---|
| FH (frame header) | Address code | Function code | Pass word | Function parameter | | | | EOF (end of frame) | Cumulative sum | |
| STX | ADDR | FUNC | | 1-8 bit | 9-16 bit | 17-24 bit | 25-32 bit | ETX | Low byte | High byte |

- The 1st byte STX: Frame header  CCH
- The 2nd byte ADDR: Slave address 0x00 0xFF
- The 3rd byte FUNC: Function code
- The 4th -7th byte: Factory command format
- The 8th -11th byte: Parameters corresponding to the function code

- The 12th byte ETX: End of frame  DDH
- The 13th, 14th byte: Cumulative sum check code from byte 1 to 12

**Byte return:**

| BO | B1 | B2 | B3 | B4 | B5 | B6 | B7 |
|---|---|---|---|---|---|---|---|
| FH (frame header) | Address code | Function code | Status parameter | | EOF (end of frame) | Cumulative sum | |
| STX | ADDR | FUNC | 1-8 bit | 9-16 bit | ETX | Low byte | High byte |

- The 1st byte STX: Frame header  CCH
- The 2nd byte ADDR: Slave address 0x00 0xFF
- The 3rd byte FUNC: Status code
- The 4th -5th byte: Parameters corresponding to the function code The 6th byte ETX: End of frame DDH
- The 7th, 8th byte: Cumulative sum check code from byte 1 to 6

**Factory Command/Status List**

| Item | Command/Status (B2) | Description | Operation command (B3, B4) Value range | Description of corresponding parameter |
|---|---|---|---|---|
| Factory command | 0x00 | Set device address Set RS232 | 0x0000~0x00FF | Address: 0~255 Totally 5 baud rates: the factory default is 9600bps (B4=0x00) B3=0x00 corresponding baud rate is 9600bps B3=0x01 corresponding baud rate is 19200bps B3=0x02 corresponding baud rate is 38400bps B3=0x03 corresponding baud rate is 57600bps B3=0x04 corresponding baud rate is 115200bps |
| | 0x01 | baud rate | 0x0000~0x0004 | |
| | 0x02 | Set RS485 baud rate | 0x0000~0x0004 | |
| | 0x03 | Set CAN baud rate | 0x0000~0x0003 | Corresponding CAN baud rate: B3B4=0x0000 100Kbps B3B4=0x0001 200Kbps B3B4=0x0002 500Kbps B3B4=0x0003 1Mbps |
| | 0x0E | Set automatic reset when power on | 0x0000~0x0001 | B3B4=0x0000 indicates not automatic reset when power on B3B4=0x0001 indicates automatic reset when power on |
| | Ox10 | Set CAN destination address | 0x0000~0x00FF | Address: 0~255 |

**Note:** The code B2 in the response command indicates the current running status of the motor. Only when B2=0x00, the motor is in normal operation, and other parameters are shown in the above table, corresponding to different abnormal status respectively. In principle, the motor should be send the 0X4A command to query the motor status at the end of the motor operation. Only when the B2 parameter in the response command is 00, other commands can be executed correctly.

**Note:**
The code parameters of all the above commands are set in little-endian mode. Low data is stored in the low bit of the address and high data is stored in the high bit of the address.

**Product safety precautions:**

- Please ensure that the voltage matches with the standard voltage of the instrument.
- Please use the original serial cable of this product to connect to the power supply.

- The three communication methods (RS232, RS485, CAN bus) of this product are in non- isolated mode; not hot-plug.
- Please cover the unused ports with suitable coned plugs when laid aside to avoid impurity substance and air.
- Do not disassemble the product parts at will. No warranty for tamper-evident label tearing.
- When operating the software, please refer to the operating instructions of the software and the communication protocol, and data input is not allowed to be fabricated without authorization.
- When using CAN bus protocol to connect multiple devices, please refer to the connection method shown below.
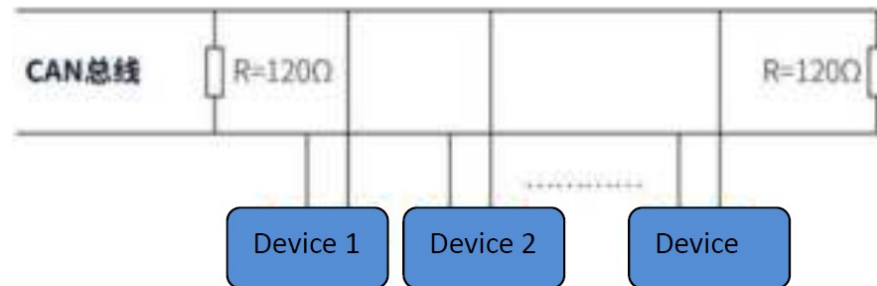


- When using RS485 protocol to connect multiple devices, please refer to the connection method shown
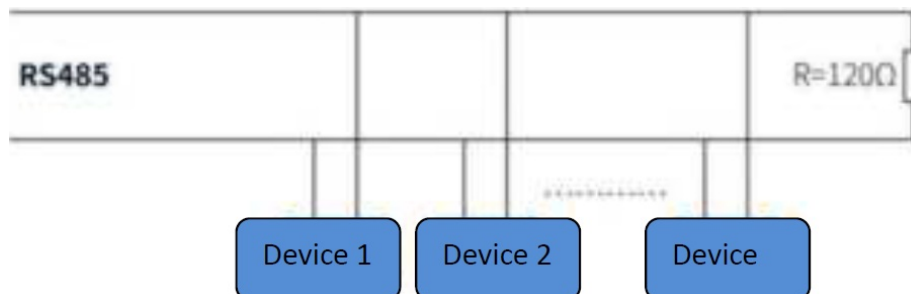


But the resistance value is determined by the number of devices connected by the user.

## Documents / Resources



**RUNZE FLUID SV-06 Mulitiport Selector Valve** [pdf] User Manual
SV-06 Mulitiport Selector Valve, SV-06, Mulitiport Selector Valve, Selector Valve, Valve

## References

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