

# MRV3 Multi-channel Rotary Valve

## Specification Sheet



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# 1 Introduction

## 1.1 Overview

Mechanical flow path switching valves, also known as multi-channel rotary valves, utilize planar sealing technology. They achieve flow path switching by controlling motor rotation and optocoupler positioning. They are widely used for the collection and distribution of fluid samples. They ensure pressure resistance up to 0.7MPa. Fluid-contact components are corrosion-resistant and high-temperature resistant, meeting liquid distribution and transfer needs in different applications. Beveled port distribution increases the number of ports, enabling tubing switching functions. They are easy to use and highly practical.

## 1.2 Features

- Small internal volume, reducing the risk of liquid mixing.
- Replaceable valve head, easily changed with a single screw.
- Compact and lightweight structure, reducing space occupancy, facilitating the use of multiple valves.
- Various channel counts, distribution type with multiple bore sizes, suitable for various tubing connections.
- Wetted materials can be used with various acidic and alkaline media, offering strong corrosion resistance and compatibility.
- Utilizes motor drive and optocoupler positioning technology, can be integrated with a driver for mechatronic control, short switching time, high switching precision.
- Valve head and rotor use high-performance special engineering materials: PCTFE, zirconia ceramic, sapphire. High strength, low wear, effectively reducing friction coefficient, improving lifespan.

### Foreach Warranty

Please refer to our General Terms of Sale (GTS)

## 2 Appearance and Dimensions

### 2.1 Distribution Type 10-Channel Rotary Valve

Unit:mm

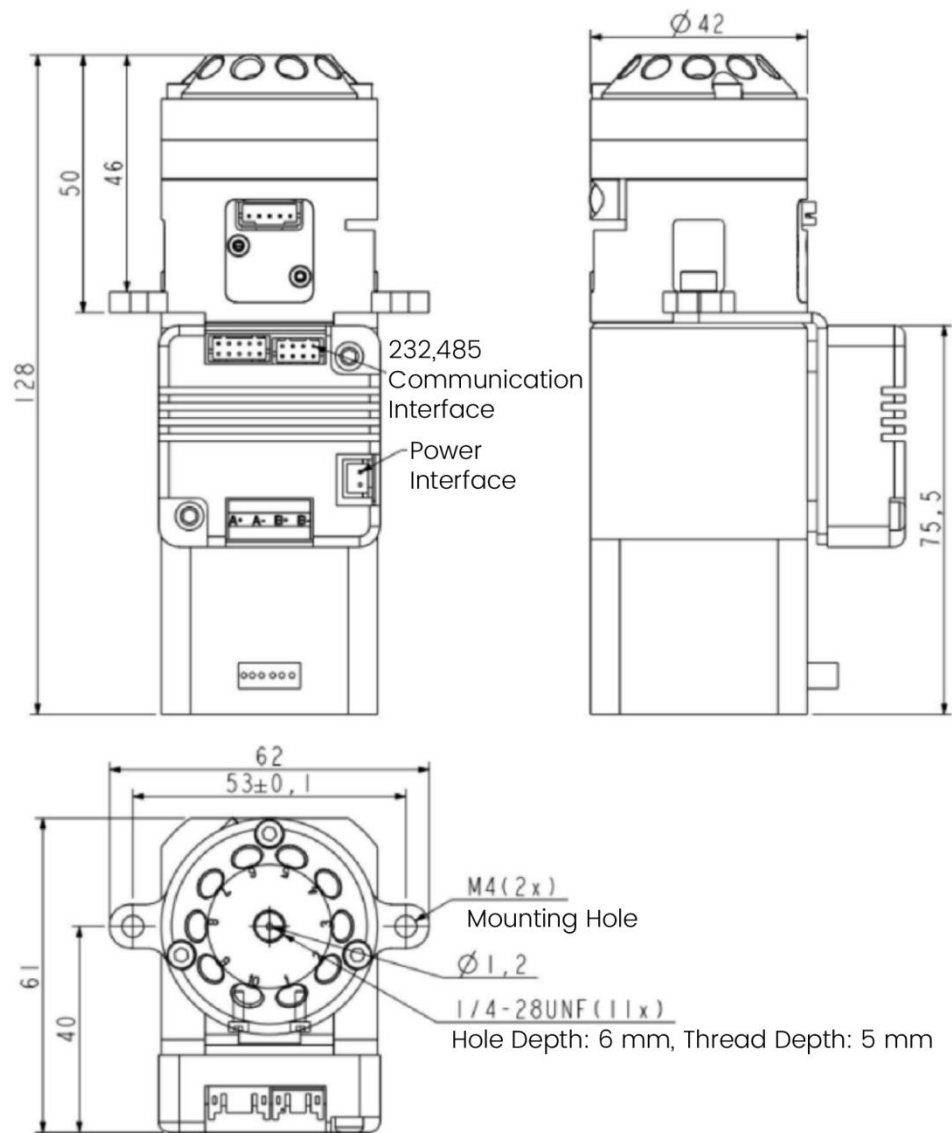


Figure 1 Distribution Type 10-Channel Rotary Valve Outline Dimensions

## 2.2 Distribution Type 16-Channel Rotary Valve

Unit:mm

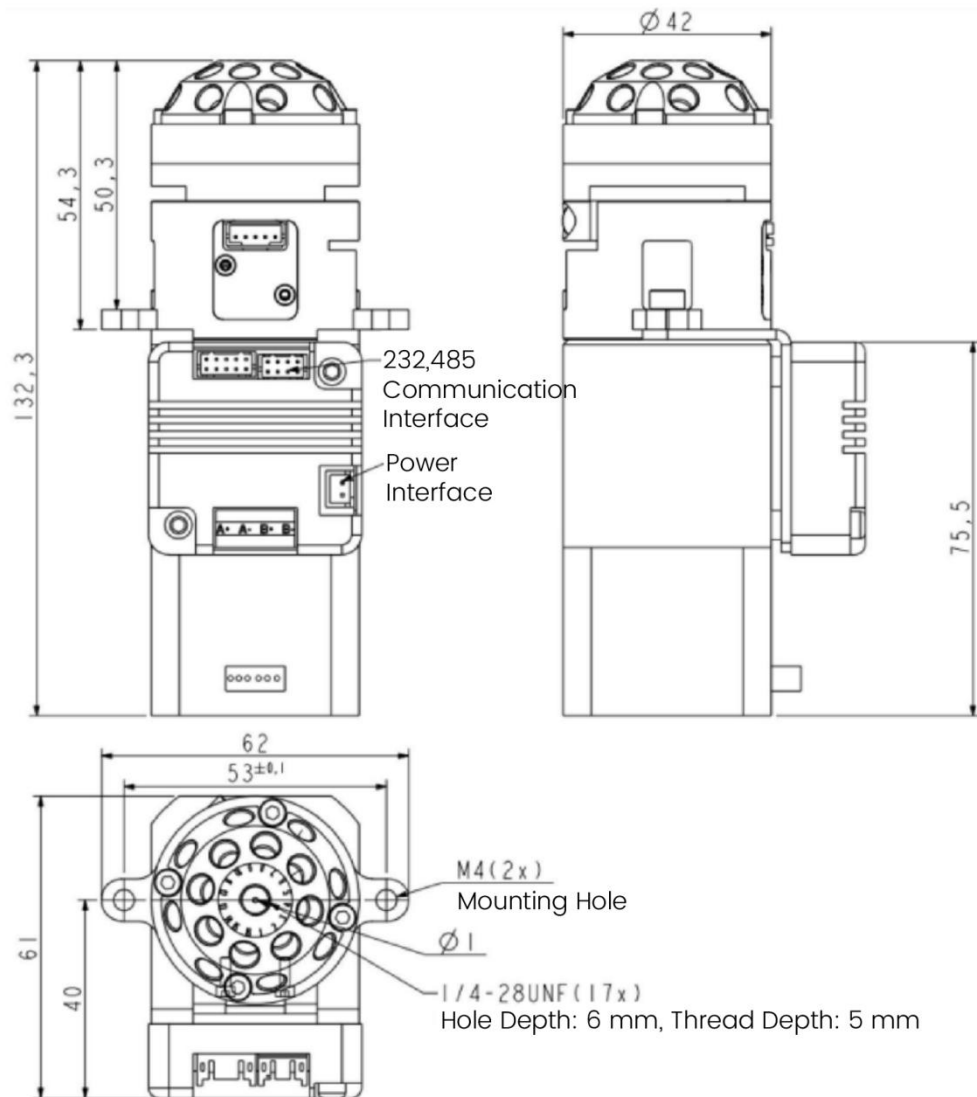


Figure 2 Distribution Type 16-Channel Rotary Valve Outline Dimensions

## 2.3 Distribution Type 24-Channel Rotary Valve

Unit:mm

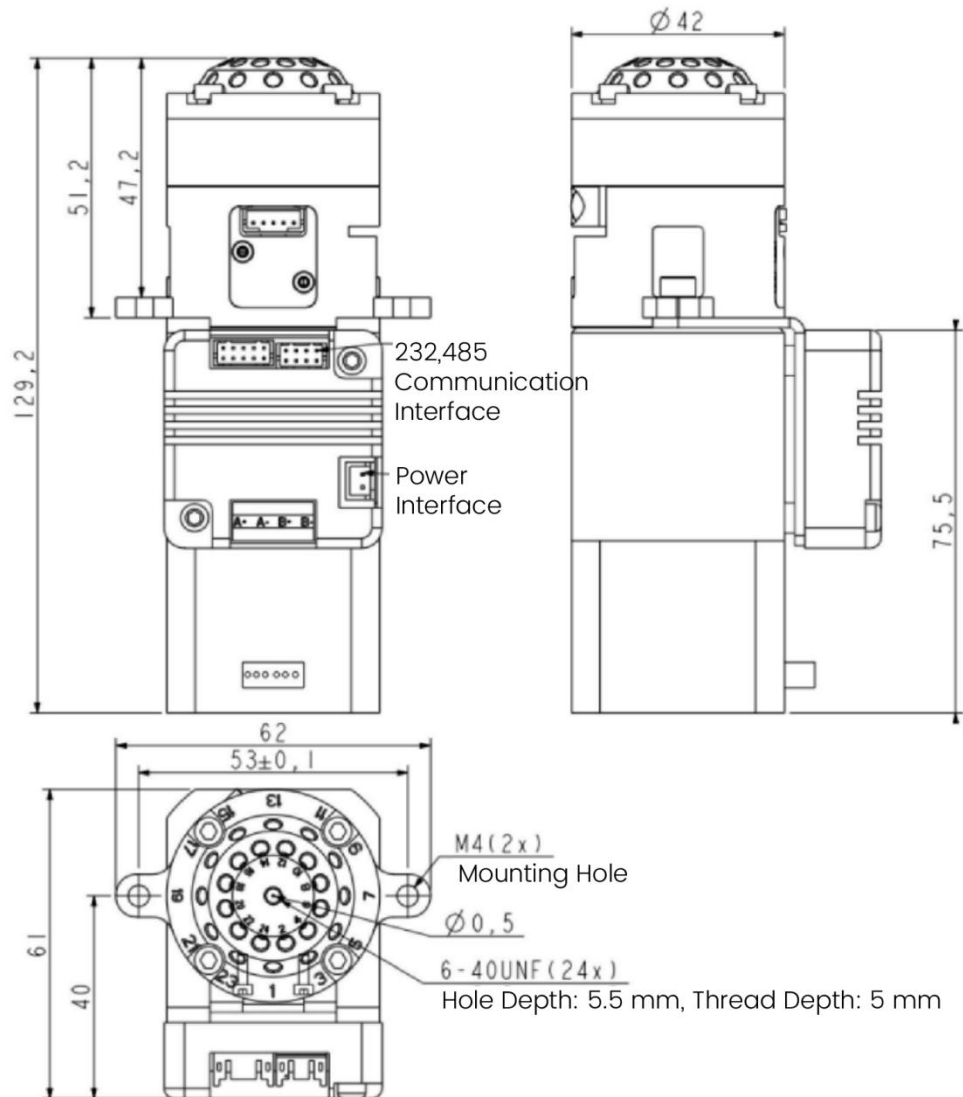


Figure 3 Distribution Type 24-Channel Rotary Valve Outline Dimensions

### 3 Electrical Parameters

#### 3.1 Motor Configuration

##### 3.1.1 Electrical Characteristics

Table 1 Motor Electrical Parameters

| Motor Electrical Parameters |               |         |
|-----------------------------|---------------|---------|
| Item                        | Specification | Remarks |
| Drive Voltage               | 24V DC        | /       |
| Rated Current               | 1.7A/Phase    | /       |
| Reduction Ratio             | 1:10          | /       |
| Step Angle                  | 0.18°         | /       |
| Number of Phases            | 2             | /       |
| Winding Resistance          | 1.3Ω±15%      | 25℃     |

##### 3.1.2 Motor Interface

Table 2 Motor Pin Connection

| Motor Pin Connection |             |
|----------------------|-------------|
| Wire No.             | Description |
| 6                    | A+          |
| 5                    |             |
| 4                    | A-          |
| 3                    | B+          |
| 2                    |             |
| 1                    | B-          |

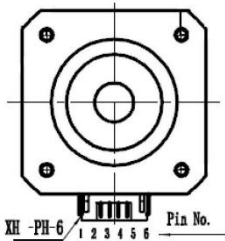


Figure 4 Motor Interface

#### 3.2 Driver Interface

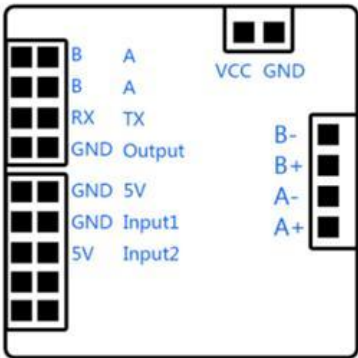


Figure 5 Driver Interface

### 3.3 Optocoupler Interface

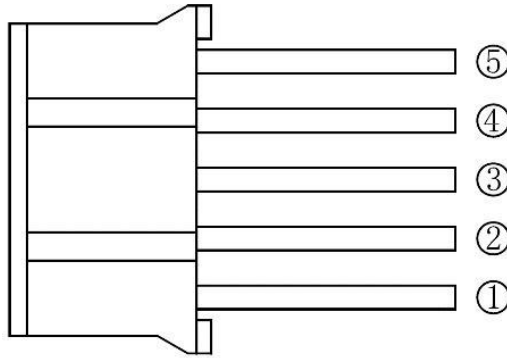


Figure 6 Connector Model: JST PHR-5

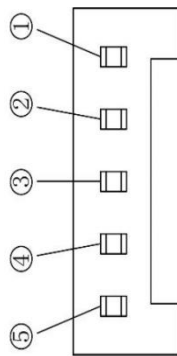


Figure 7 Receptacle Model: JST B5B-PH-K-S

Table 3 Optocoupler Pin Connection

| Optocoupler Pin Connection |                                         |
|----------------------------|-----------------------------------------|
| Wire No.                   | Description                             |
| 5                          | +5V (Optocoupler Power)                 |
| 4                          | Input 1 (Reset Optocoupler Input)       |
| 3                          | GND                                     |
| 2                          | +5V (Optocoupler Power)                 |
| 1                          | Input 2 (Positioning Optocoupler Input) |

When wiring the optocoupler, confirm that a current-limiting resistor is added from the Anode terminal to VCC, and the voltage at the Anode terminal should be within 1.0-1.2V. Too high will burn out the optocoupler, too low will prevent normal operation. Also, confirm the Collector signal output is connected to VCC via approximately 20K ohms.

**Note:**

*If a pre-configured driver is not purchased, please connect according to the motor and optocoupler configuration instructions.*



## 4 Specifications

Table 4 Specifications

| Specifications            |                                         |       |         |
|---------------------------|-----------------------------------------|-------|---------|
| Specification             | Parameter                               |       |         |
| Number of Channels        | 10                                      | 16    | 24      |
| Channel Diameter          | 1.2mm                                   | 1.0mm | 0.5mm   |
| Internal Volume(Note 1)   | 15.8μL                                  | 10μL  | 2.9μL   |
| Threaded Connection       | 1/4-28UNF                               |       | 6-40UNF |
| Pressure Resistance       | 0.7MPa                                  |       |         |
| Wetted Material           | PCTFE / Zirconia Ceramic / Sapphire     |       |         |
| Initial Position          | Auto-reset Upon Power-on                |       |         |
| Switching Time            | ≤25s/rev, Adjacent Ports <100ms         |       |         |
| Lifespan                  | 1 Million Cycles                        |       |         |
| Motor/Driver              | Optional                                |       |         |
| Motor Reduction Ratio     | 1:10                                    |       |         |
| Communication Interface   | RS232 / RS485                           |       |         |
| Baud Rate                 | 9600 / 57600 / 115200                   |       |         |
| Operating Voltage/Current | DC24V/2A±10%                            |       |         |
| Max Power                 | 48W                                     |       |         |
| Operating Temperature     | 0-50°C                                  |       |         |
| Operating Humidity        | 20-80%RH                                |       |         |
| Dimensions                | 42*61*132.3mm                           |       |         |
| Mounting Dimensions       | 2-φ3 Thru Holes, Spacing 43.5mm, 49.6mm |       |         |
| Weight                    | Approx. 600g                            |       |         |

**Note:**

1: Internal volume of the COM port flow path hole and rotor groove.

## 5 Ordering Information

### 5.1 Rotary Valve

Table 5 Rotary Valve Order List

| Product Code | Model                 | Description                               |
|--------------|-----------------------|-------------------------------------------|
| 689032       | MRV3-D10-12-U28APE-MD | Rotary Valve MRV3-D10-12-U28APE-MD 689032 |
| 689025       | MRV3-D16-10-U28APE-MD | Rotary Valve MRV3-D16-10-U28APE-MD 689025 |
| 689030       | MRV3-D24-05-U40APK-MD | Rotary Valve MRV3-D24-05-U40APK-MD 689030 |

### 5.2 Valve Head

Table 6 Valve Head Order List

| Product Code | Model              | Description                          |
|--------------|--------------------|--------------------------------------|
| 489005       | MRV3-D10-12-U28APE | Valve Head MRV3-D10-12-U28APE 489005 |
| 489006       | MRV3-D16-10-U28APE | Valve Head MRV3-D16-10-U28APE 489006 |
| 489007       | MRV3-D24-05-U40APK | Valve Head MRV3-D24-05-U40APK 489007 |

| MRV3   | -D                                                                   | 16                                                                                                                                                                       | -10                                                      | -U28                                                                         | A                                                                                           | PE                                  | -M                                               | D                                                                                                              | -XXX                                      |
|--------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Series | Valve Type                                                           | Number of Channels                                                                                                                                                       | Nominal Diameter                                         | Thread                                                                       | Rotor Material                                                                              | Valve Head Material                 | Motor                                            | Protocol                                                                                                       | Custom Requirement                        |
| MRV3   | <b>D:</b><br>Distribution Type<br><b>N:</b><br>Non-Distribution Type | <b>06:</b><br>6 Channels<br><b>08:</b><br>8 Channels<br><b>10:</b><br>10 Channels<br><b>12:</b><br>12 Channels<br><b>16:</b><br>16 Channels<br><b>24:</b><br>24 Channels | <b>05:</b> 0.5mm<br><b>10:</b> 1.0mm<br><b>12:</b> 1.2mm | <b>U40:</b> 6-40<br><b>U32:</b> 10-32<br><b>M6:</b> M6<br><b>U28:</b> 1/4-28 | <b>A:</b><br>Zirconia, Sapphire<br><b>B:</b><br>Alumina, Sapphire<br><b>C:</b><br>PEEK, UPE | <b>PK:</b> PEEK<br><b>PE:</b> PCTFE | <b>M:</b><br>Motor<br><b>M:</b><br>Encoder Motor | <b>D:</b><br>Standard Driver<br><b>C:</b><br>Custom Protocol Driver 1<br><b>C:</b><br>Custom Protocol Driver 2 | Standard (Leave Blank)<br>Custom Code=XXX |

Figure 8 MRV3 Selection Table

## 6 Appendices

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