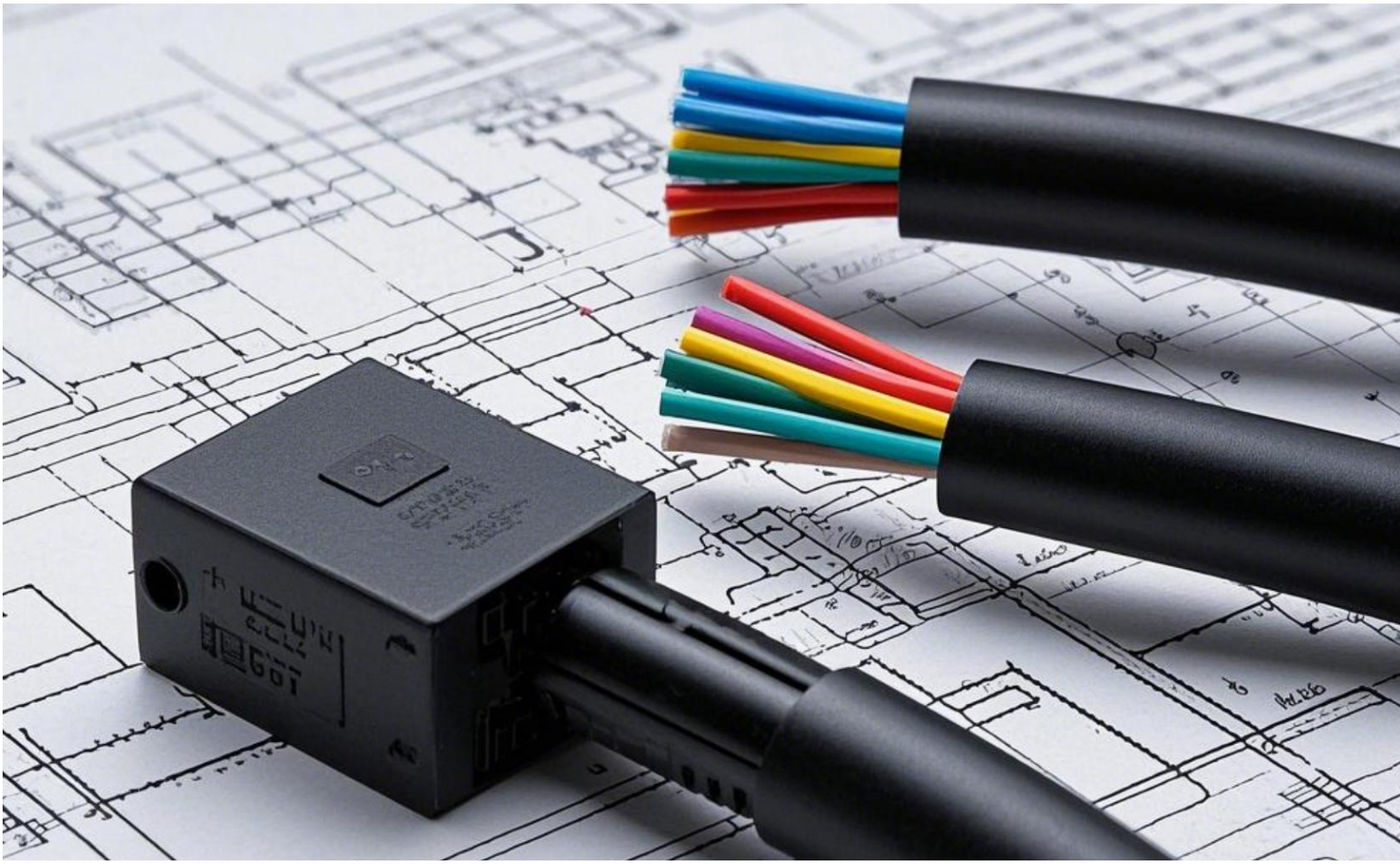
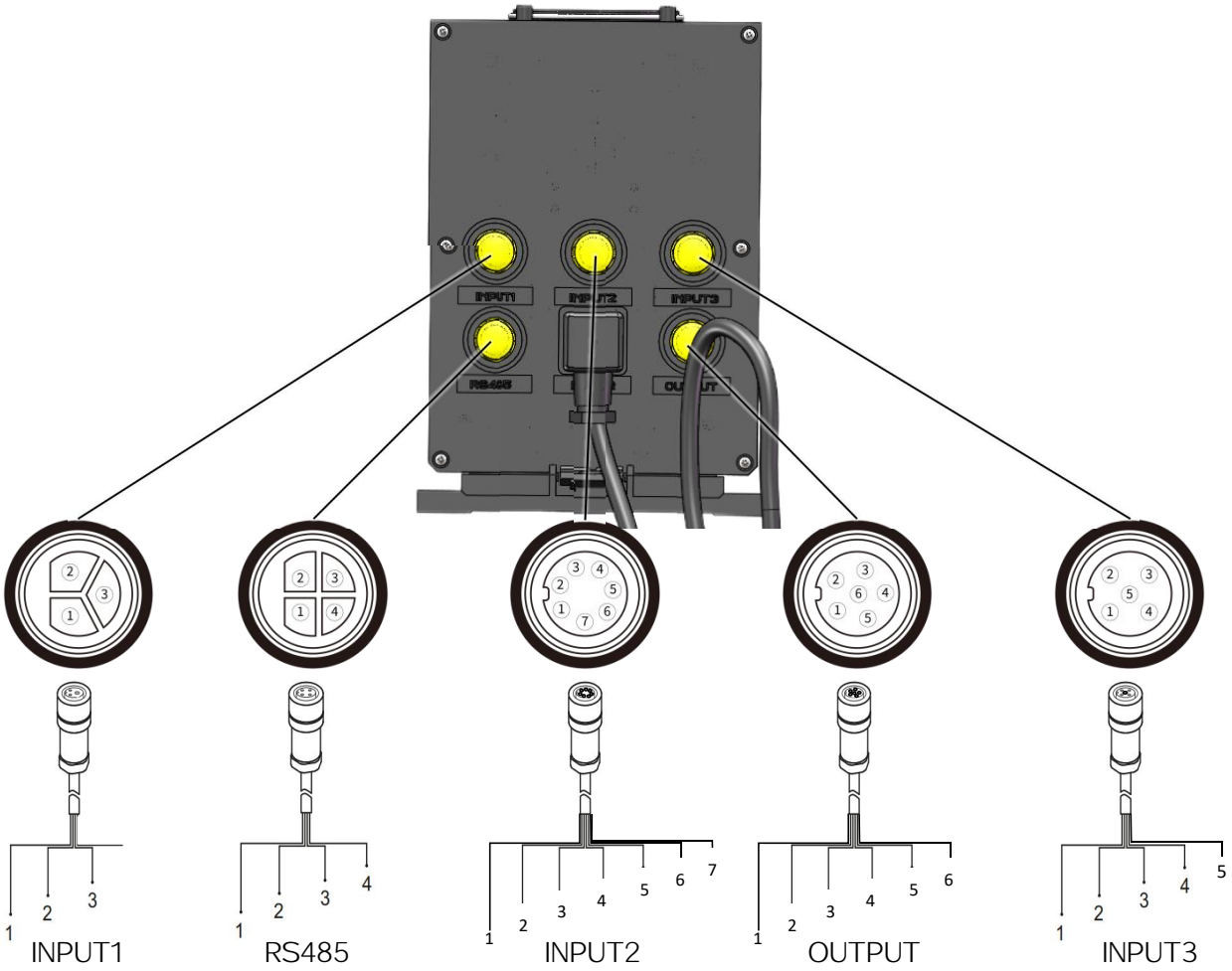


E01
DESIGN BY WEARABLE
Explore the unknown and create something unprecedented

E01 Digital Dosing Pump Interface and Operating Mode Application Instructions

Table of Contents

1. Digital Dosing Pump Interface Usage Instructions



Name	Joint	Function	分配						
INPUT1	3cores	LDC sensor	1	2	3				
			5V	Input signal	GND				
INPUT2	7cores	Remote Start/Stop and Output	1	2	3	4	5	6	7
			5V	Input signal	GND	empty	empty	Current output	GND
INPUT3	5cores	External Control	1	2	3	4	5		
			Pulse+	Pulse –	Current input	GND	Voltage input		
RS485	4cores	Remote Communication Control	1	2	3	4			
			485A	485B	GND	5V			
OUTPUT	6cores	External Signal Output	1	2	3	4	5	6	
		Relay 1				COM	NO	NC	
		Relay 2	COM	NO	NC				

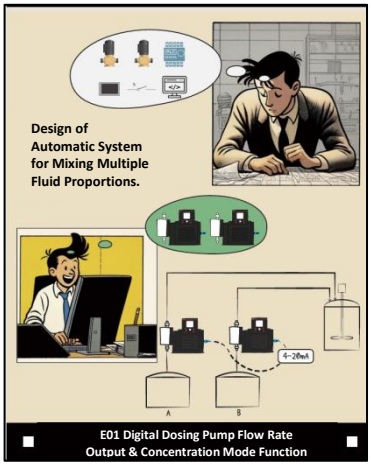
Note: External control cables, except for the 485 cable, are optional. You may purchase them from our distributors based on your actual needs.

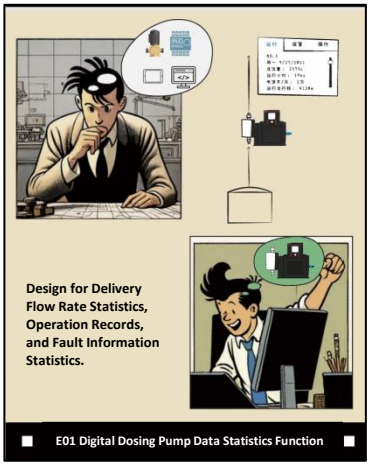
2. Overview of Interface Usage

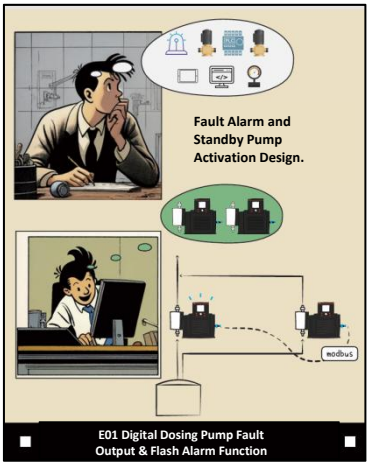
By utilizing the different operating modes and multiple interfaces of the E01 Digital Dosing Pump, you can achieve various automation controls without the need for a PLC:

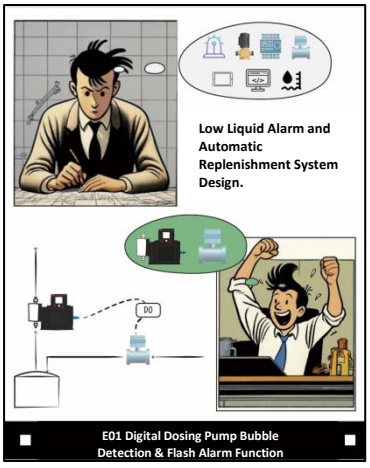
☐RS485 Remote Control
☐4–20mACurrent Signal Control
☐0–10VVoltage Signal Control
☐Passive Contact Start/Stop Control
☐Automatic Start/Stop Control for Standby Pump
☐Automatic Dual Pump Proportional Control
☐Automatic Concentration Proportional Control
☐Automatic Liquid Level Control
☐Automatic pH Value Adjustment Control
☐Automatic Pressure Relief Control for Overpressure Valve
☐External Equipment Control for Liquid Leak

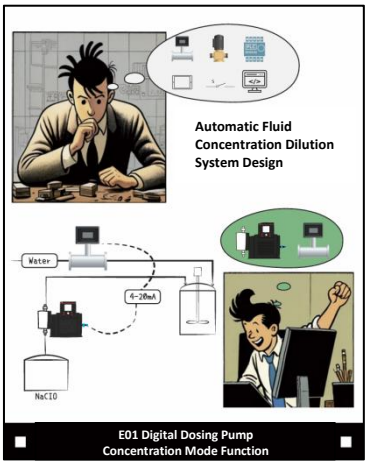
You can fully unleash your imagination and, based on the on-site usage scenario, use our Digital Dosing Pump to easily implement various automated fluid delivery control designs.

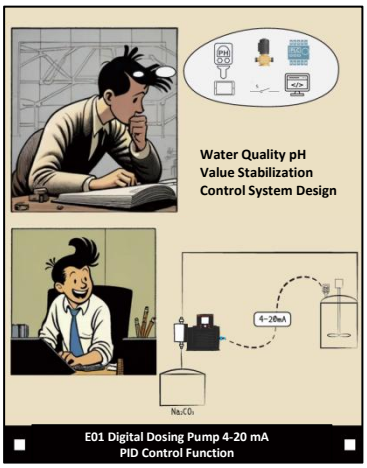












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3. C0NC Mode

3.1 Concentration Mode

The concentration mode enables automatic percentage-level concentration adjustments. For example, in scenarios where chemicals need to be diluted automatically, such as diluting a 100% concentrated solution to 10%, follow these steps:

1. Enter the concentration mode and set the chemical concentration to 100% and the dilution concentration to 10%.
2. Go to the flowmeter settings interface and configure the 4-20mA analog signal to correspond with the maximum and minimum flow rates of the flowmeter.
3. After confirming the settings, return to the main interface and connect the flowmeter signal wire to the pump's INPUT3 (4-20mA interface).
4. Press the "Start/Run" button. The pump will automatically calculate the required chemical dosage based on the flowmeter feedback and dispense accordingly.

3.2 MLQ Concentration Mode

The MLQ mode supports automatic dilution at parts-per-ten-thousand levels. For example, in a sodium hypochlorite dosing scenario, where you need to add 240ml of 10% sodium hypochlorite solution to 100,000ml of water, follow these steps:

1. Calculate the required dosage of 100% sodium hypochlorite concentrate: 24ml for 100,000ml of water.
2. Enter the MLQ mode, set the MLQ value to 24, and set the chemical concentration to 10%.
3. Go to the flowmeter settings interface and configure the 4-20mA analog signal according to the maximum and minimum flow rates of the flowmeter (ensure that the flowmeter's flow units match the pump's flow units).
4. After confirming the settings, return to the main interface and connect the flowmeter signal wire to the pump's INPUT3 (4-20mA interface).
5. Press the "Run" button. The pump will automatically calculate the chemical dosage based on the received flowmeter signals and dispense accordingly.

3.3 PPM Concentration Mode

The PPM mode supports automatic dilution at parts-per-million levels. For instance, in a sodium hypochlorite dosing scenario, where you need to add 24ml of 10% sodium hypochlorite solution to 1,000,000ml of water, follow these steps:

1. Calculate the required dosage of 100% sodium hypochlorite concentrate: 2.4ml for 1,000,000ml of water.
2. Enter the PPM mode, set the PPM value to 2.4, and set the chemical concentration to 10%.
3. Go to the flowmeter settings interface and configure the 4–20mA analog signal according to the maximum and minimum flow rates of the flowmeter (ensure that the flowmeter’s flow units match the pump’s flow units).
4. After confirming the settings, return to the main interface and connect the flowmeter signal wire to the pump’s INPUT3 (4–20mA interface).
5. Press the "Run" button. The pump will automatically calculate the chemical dosage based on the received flowmeter signals and dispense accordingly.

---

4. Pulse Mode

4.1 Pulse Dosing Mode

When the pump is directly connected to a water meter with pulse output, it enables automatic chemical dosing synchronization. For example, if 10ml of chemical needs to be added to 10L of water, first set the water meter to output one pulse signal for every 10L of water. Then, in the pump's pulse dosing mode, set 1 pulse to equal 10ml of chemical.

Next, connect the water meter's pulse output signal wire to the pump’s INPUT3 pulse signal interface. Press the pump’s "Run" button, and the pump will automatically dispense 10ml of chemical upon receiving the pulse signal from the water meter.

Note: Based on the actual flow rate of the water meter with pulse output in the field, choose: pulse/L, pulse/10L, pulse/100L, or pulse/m3.

Selection Requirement: The pulse interval between two pulses from the flow meter must be less than 60 seconds and greater than 1 second.

4.2 Pulse Control Mode

In Pulse Control Mode, the flow rate of the pump is controlled by the frequency of the pulse signal. For example, when the PLC's maximum pulse output is 1000 and the pump's maximum flow rate is 1000ml/min, the pump’s pulse control interface can be set as follows:

High: 1000 pulses/min for 1000ml/min.

Low: 0 pulses/min for 0L/min.

Connect the pulse signal to the pump's INPUT3 pulse input interface. The pump will automatically adjust to the linear relationship between flow rate and pulse count. When the PLC sends 10 pulses/min, the pump will output 10ml/min of flow.

---

5. Batch Mode

Batch mode allows for rapid and precise dosing. For example, in a laboratory setting, if an operator needs to add 0.1L of reactant to a reaction flask, follow these steps:

1. **Enter Batch Mode Interface**: Navigate to the Batch Mode interface and set the flow rate to 0.1L.
2. **Return to Main Interface**: Go back to the main screen.
3. **Start Pump Operation**: Press the "Run" button. The pump will deliver the reactant to the flask at maximum speed and return to standby mode once dosing is complete.

Batch Mode External Control

To utilize Batch Mode with external control, adhere to the following procedure:

1. **Set Desired Flow Rate**: Enter the Batch Mode interface and configure the required flow rate.
2. **Return to Main Interface**: Navigate back to the main screen.
3. **Initiate Pump Operation**: Press the "Start/Stop" button. The digital dosing pump will operate at maximum speed, and the flow rate value will begin counting down until it reaches 0ml, at which point the pump will stop and the flow rate will reset to the preset value.

This mode can work in conjunction with external start/stop controls. For instance, in liquid filling applications, install a sensor on the filling line to detect the presence of a bottle. When a bottle is detected, the sensor sends a signal to the digital dosing pump. Upon receiving this signal, the pump begins operating at the preset flow rate. After dispensing the specified amount, the pump stops and sends a signal back to the sensor, allowing the filling line to continue until the next bottle is detected. This creates a continuous cycle, enabling automatic liquid filling.

---

6. Voltage Control

The E01 digital dosing pump can control the output flow rate through an external input voltage range of 0–10V. The pump automatically calculates the corresponding flow rate based on the input voltage using a linear relationship and adjusts the output flow accordingly. Setting the voltage to 0V corresponds to a flow rate of 0ml/min, while setting it to 10V corresponds to the maximum flow rate per minute. For instance, if the maximum flow rate is 800ml/min, a voltage of 5V results in a flow rate of 400ml/min.

If the external input voltage exceeds 11V, the system displays an overpressure alarm and sets the flow rate to the maximum output rate.

7. Current Control

In Current Control mode, the E01 digital dosing pump operates based on external analog signals. The pump's flow rate maintains a linear relationship with the input current ranging from 4–20mA. Specifically, at 4mA, the flow rate is 0ml/min, and at 20mA, it reaches the pump's maximum flow rate per minute. For instance, if the maximum flow rate is set to 800ml/min, a 12mA input will result in a flow rate of 400ml/min.

Should the input current exceed 22mA, the pump will trigger an alarm displaying "Overpressure and Overflow," and it will operate at the maximum flow rate to ensure safety. Conversely, if the input current drops below 2mA, the pump will cease operation and trigger an alarm indicating "Insufficient Current/Voltage."

When using the 0–20mA signal control option, the pump automatically establishes a linear relationship between the set minimum and maximum flow rates and the 0–20mA current range. This means that an input of 0mA corresponds to a flow rate of 0ml/min, while an input of 20mA corresponds to 100% of the pump's maximum flow rate.

8. External Start/Stop

The E01 digital dosing pump features an external start/stop function that allows you to control the pump by shorting or disconnecting two cables on the external interface. When activated, the pump runs at a pre-set flow rate. This capability can be combined with various passive switches to facilitate automatic liquid replenishment in storage tanks, batch filling processes, automatic refilling of water tanks, and other automated application scenarios.

9. Inputs and Outputs

Alarm Output

The standard version of the E01 digital dosing pump comes with two programmable interfaces. These interfaces use passive output control signals, allowing them to trigger the closure or disconnection of output interfaces based on the predefined signal types. For example, if the pump detects a diaphragm rupture leading to a leak, Relay 1 can be set to send a closed signal to activate an external alarm light, alerting maintenance personnel to promptly service the pump.

Setup Instructions:

- Connect the Alarm Light:
  - Use a dedicated AP multi-core cable to connect to the pump's OUTPUT interface.
  - Connect cable #4 (common) to the negative terminal of the 24V DC power supply for the alarm light.
  - Connect cable #5 (NO) to the negative terminal of the alarm light.
  - Connect the positive terminal of the alarm light to the positive terminal of the power supply.
- Configure the Alarm Output:
  - After completing the connections, navigate to the Inputs and Outputs interface.
  - In the Relay 1 selection submenu, check the Output Alarm option to enable it.
  - Confirm the settings to complete the configuration.

Simulation Example:

Let's simulate a diaphragm rupture where liquid enters the leak sensor. Upon detecting a leak, the pump triggers the leak alarm, and the indicator light turns on to notify maintenance personnel. Additionally, you can connect an alarm light with sound and light indicators for enhanced alerting.

Other Inputs and Outputs Functions:

Pressure Threshold Alarm: If the output pipeline becomes blocked, it can cause a disruption in chemical dosing, leading to production waste or the risk of shutdown. To mitigate this, you can connect an external alarm using Relay 2. By enabling the Pressure Threshold Alarm option on Relay 2, the system can issue a pre-alert for pipeline blockage.

Pressure Fluctuation Difference Alarm: When a damper in the output pipeline fails, it increases the water hammer effect. If this occurs, the pump will trigger an alarm and activate the output interface to close or disconnect. By connecting an alarm light, maintenance personnel can be alerted to check the damper. Additionally, by controlling the damper's drainage valve, you can enable automatic drainage functionality to maintain system stability.

Start/Stop Output: When the pump stops, it triggers the output interface to close or disconnect. This feature can be used to automatically start a backup pump. Detailed instructions will be provided in the next section.

---

10. Automatic Start/Stop Function for Backup Pump

In many industrial-grade application scenarios, the stable delivery of chemicals is extremely important. We can use the backup pump chain control function of two E01 digital dosing pumps to achieve the automatic start function of the backup pump when the main pump fails. The specific implementation method is as follows:

- **Connection Setup:**
  - External Control Signal Connection:
    Connect the external 4–20 mA current signal to both the main pump and the backup pump using a 1-to-2 splitter/isolation device. Connect to the current input terminals (Input3 ports 3 and 4).
  - Relay Connection:
    Connect the main pump's Output Relay 1 (Output ports 4 and 5) to the backup pump's external start/stop control input interface (Input2 ports 2 and 3).
- **Configuration:**
  - Main Pump Settings:
    In the main pump's Inputs and Outputs interface, navigate to the Relay 1 selection submenu and check the "Start/Stop Output" option.
  - Backup Pump Settings:
    Enable the backup pump's external start/stop operating mode.
- **Flow Rate Transmission:**
  - The external 4–20 mA control signal is simultaneously transmitted to both the main pump and the backup pump through the 1-to-2 splitter/isolation device.
- **Automatic Activation:**
  - When the main pump fails and stops operating, the backup pump will automatically start running based on the current external signal flow rate.

This configuration ensures that the chemical dosing process is not interrupted, maintains production efficiency, and reduces downtime.

Functionality Overview:

- **Redundancy:**
  Utilizing two E01 digital dosing pumps with backup pump chain control ensures continuous operation even if the main pump encounters a failure.
- **Automatic Response:**
  The backup pump automatically responds to main pump failures without the need for manual intervention, enhancing system reliability.
- **Seamless Integration:**
  The setup allows for easy integration with existing control systems, utilizing standard 4–20 mA signaling for effective communication between pumps.
- **Efficiency and Safety:**
  By preventing interruptions in chemical dosing, this configuration maintains production efficiency and minimizes the risk of process disruptions.

Advantages:

- **Reliability:**
  Ensures uninterrupted chemical delivery, crucial for maintaining consistent production quality and avoiding downtime.
- **Ease of Setup:**
  Simple connection and configuration steps make it easy to implement without extensive modifications to existing systems.
- **Scalability:**
  The system can be expanded with additional pumps if needed, providing flexibility for varying production demands.
- **Cost-Effective:**
  Reduces the need for manual monitoring and intervention, lowering operational costs and improving overall productivity.

By following these steps, engineers can effectively set up and utilize the automatic start/stop function for backup pumps with the E01 digital dosing pump, ensuring precise and reliable chemical dosing in various industrial processes.

11. Leak Monitoring

The digital version of the E01 digital dosing pump is equipped with an LDC sensor. This sensor is designed to detect when the diaphragm within the pump head ruptures, causing the chemical to leak out from the pump head's discharge port. Upon sensing the leaking chemical, the LDC sensor sends a signal to the pump, triggering an alarm and stopping the pump.

Installation Method for the LDC Sensor:

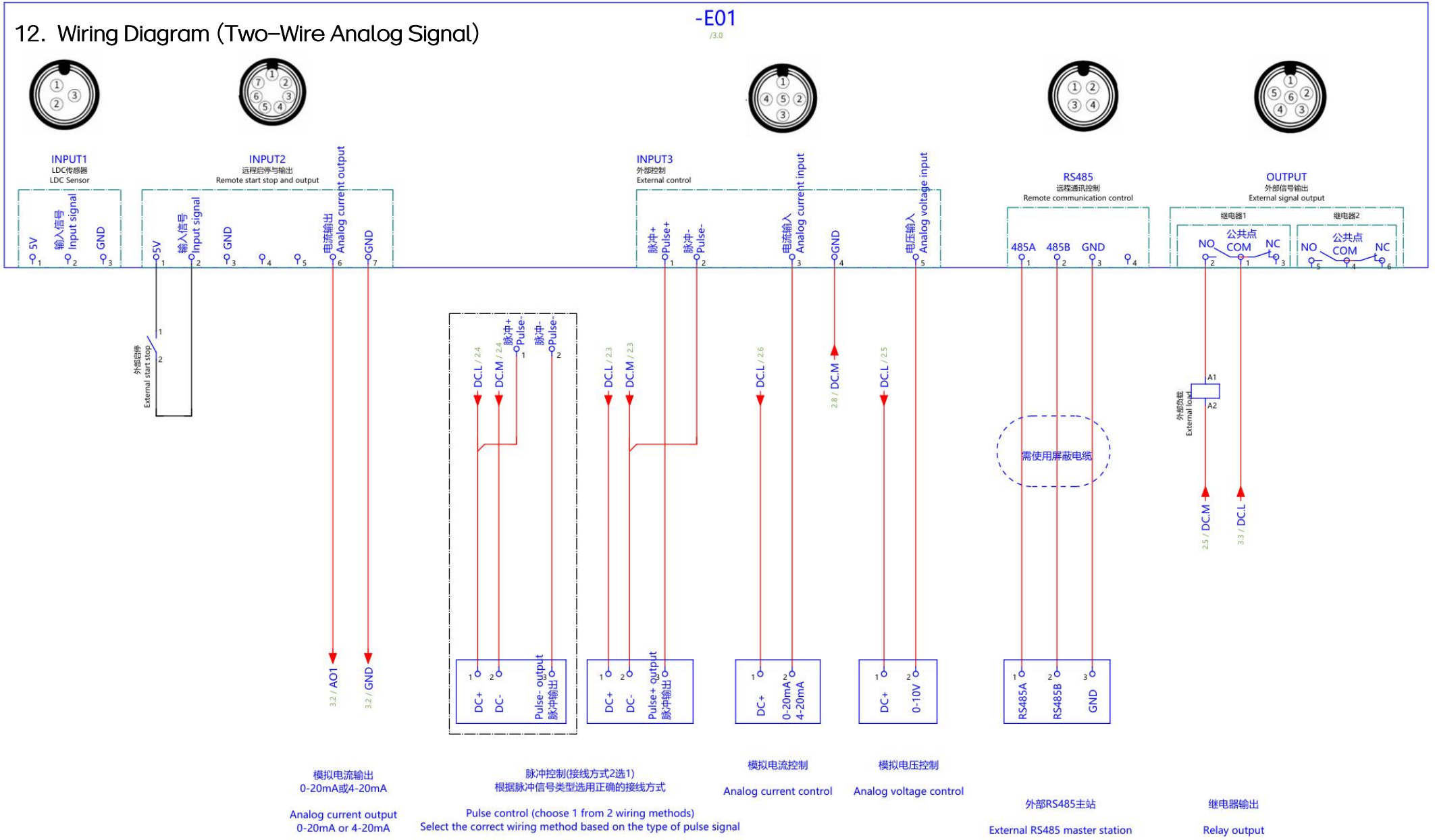
1. Insert the Flow Guide Tube:
   Insert the flow guide tube into the pump head's discharge port.
2. Connect to INPUT1 Interface:
   Connect the sensor's interface to the pump’s INPUT1 interface.

Testing the Leak Monitoring Function:

1. Simulate Diaphragm Rupture:
   Submerge the sensor in liquid to simulate a diaphragm rupture.
2. Detect Leak and Trigger Alarm:
   When the sensor detects the leaking chemical, it sends a signal to the pump, causing the pump to trigger an alarm and stop operation.
3. Clear Alarm and Resume Operation:
   After replacing the ruptured diaphragm, clear the alarm in the alarm information section and resume pump operation.

Configuration: In the Leak Monitoring interface, you can set whether the pump should stop when a leak is detected.

12. Wiring Diagram (Two-Wire Analog Signal)



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13. Wiring Diagram (Three-Wire Analog Signal)

-E01
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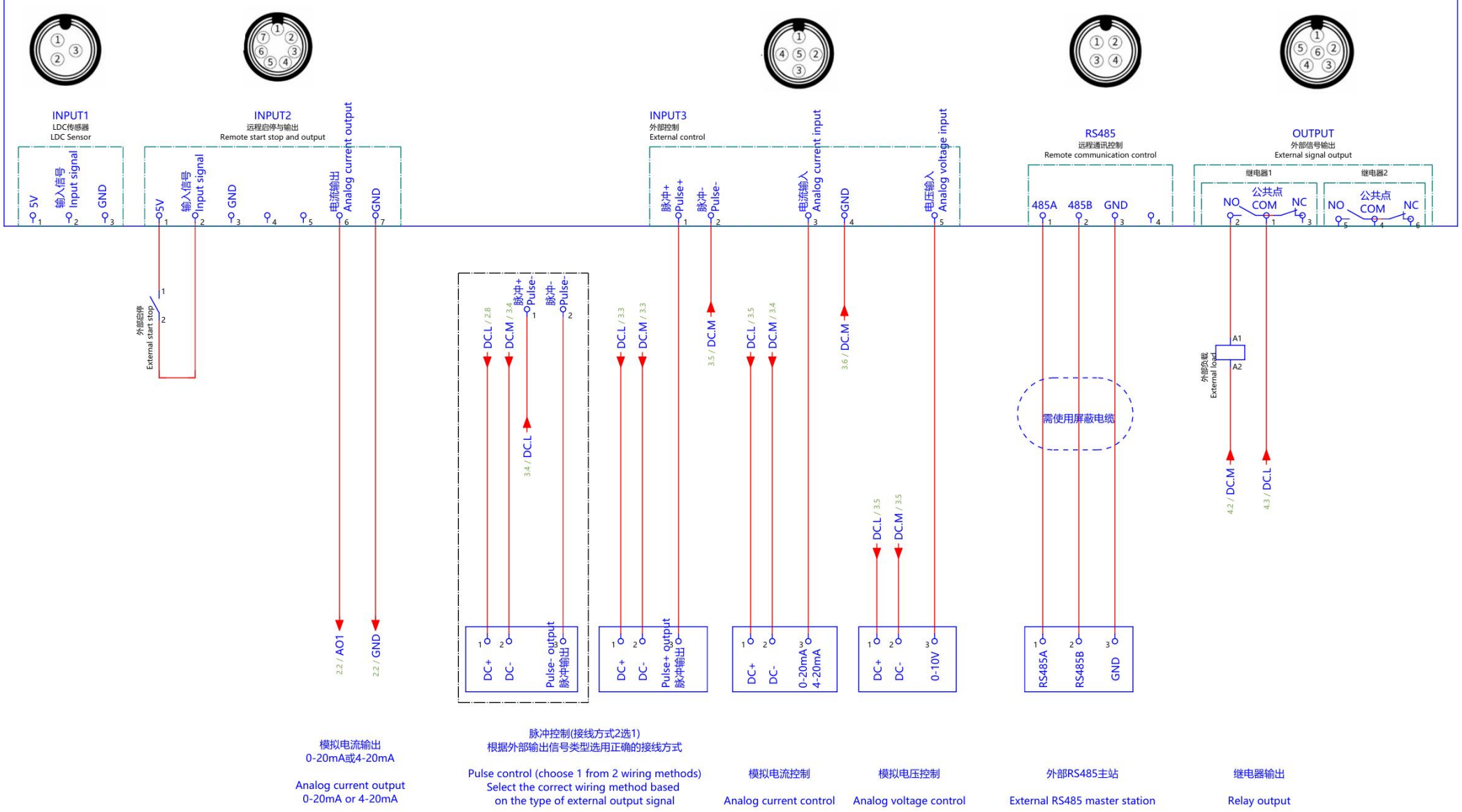

模拟电流输出
0-20mA或4-20mA

Analog current output
0-20mA or 4-20mA

脉冲控制(接线方式2选1)
根据外部输出信号类型选用正确的接线方式

Pulse control (choose 1 from 2 wiring methods)
Select the correct wiring method based
on the type of external output signal

模拟电流控制

Analog current control

模拟电压控制

Analog voltage control

外部RS485主站

External RS485 master station

继电器输出

Relay output

2

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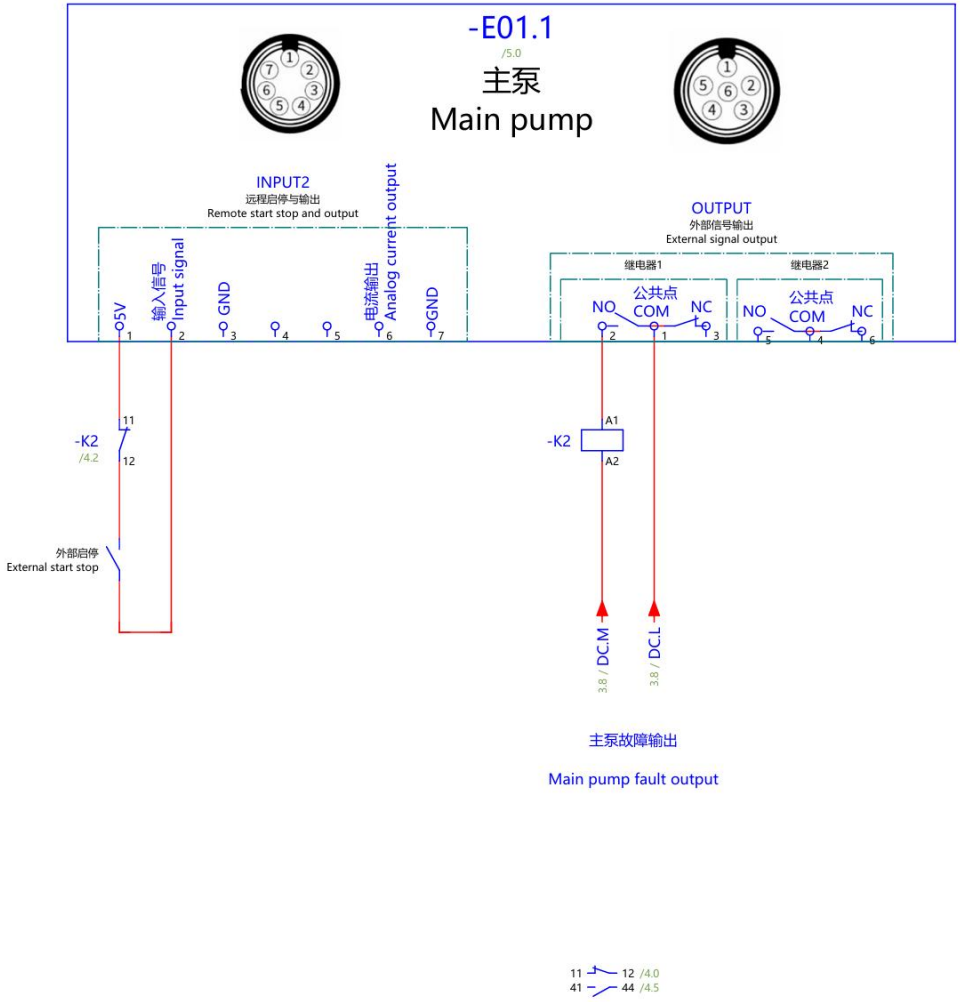
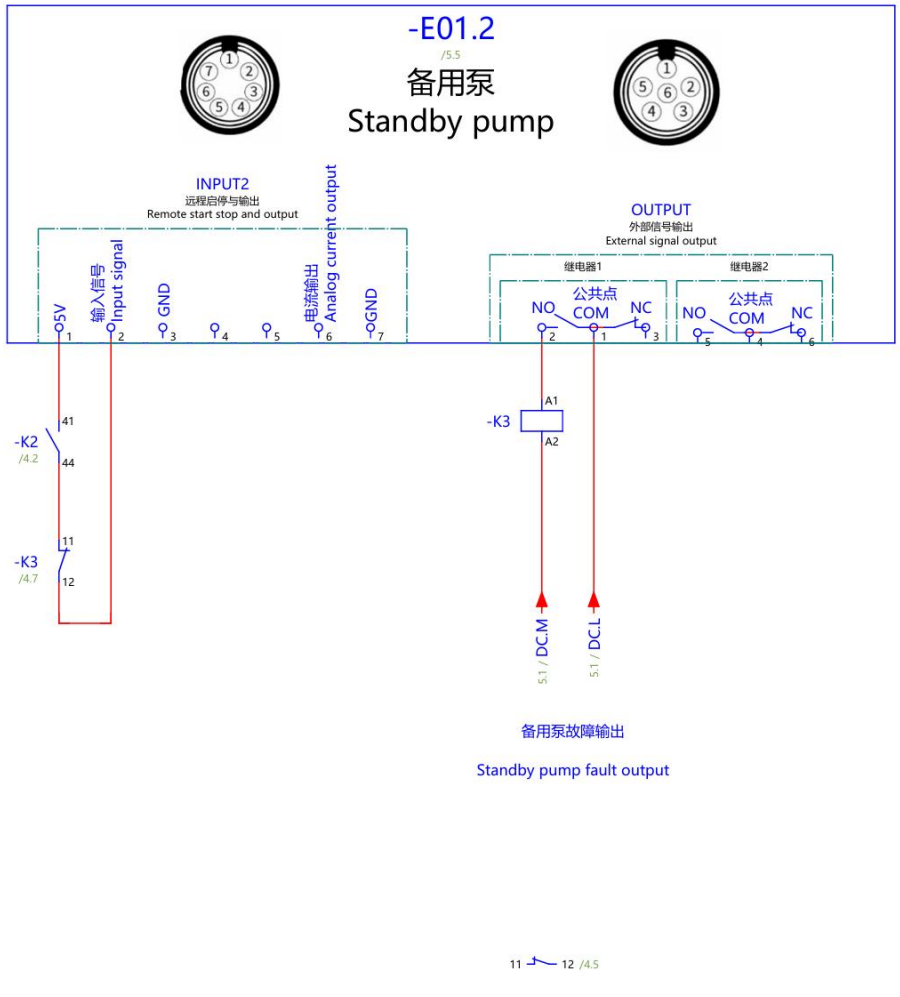
14. Wiring Diagram for Backup Pump Start/Stop





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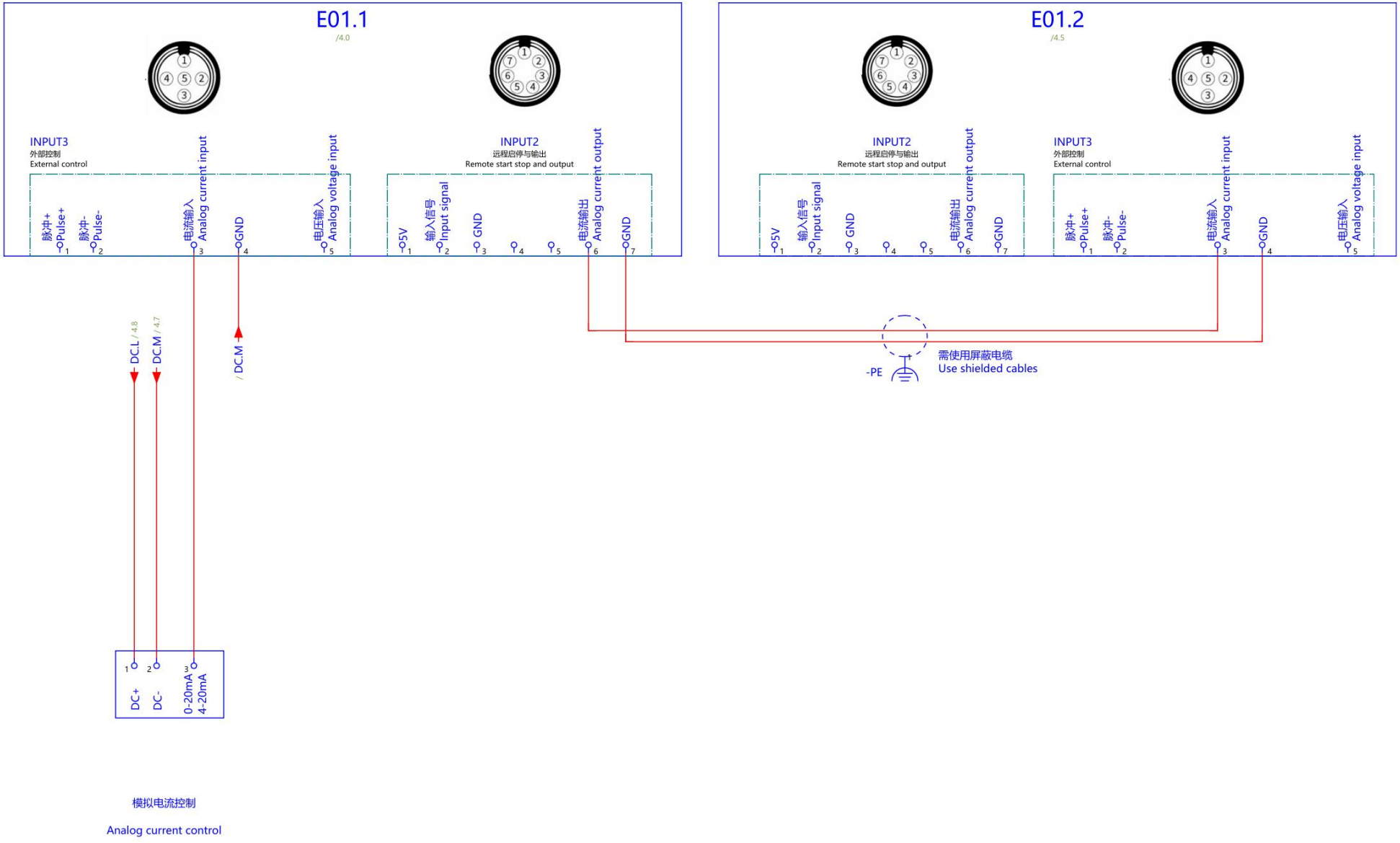
15. Wiring Diagram for Dual Pump Flow Ratio Control



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16. Q&A about MODBUS RTU

Example of Remote Control System Using Siemens S7-200 SMART PLC

Q1.The digital dosing pump cannot connect to the remote control system via Modbus.

Response:

Check if there are any duplicate pump IDs.

Inspect the communication cables for short circuits、poor connections、open circuits or reversed polarity.

Q2.When the remote control system writes data to the pump via Modbus, the screen freezes, turns white, or displays garbled text.

Response:

Frequent Modbus command transmissions can cause communication overload. It is recommended to set the minimum interval between write commands to 60 seconds or establish a change threshold for the analog signal. Only when the analog signal change exceeds this threshold should a Modbus write command be triggered. This can prevent frequent communications caused by minor signal fluctuations.

If you wish for the pump to adjust flow rate in real-time according to a 4-20 mA signal, it is advisable to select a pump model equipped with an analog control mode.

Q3.The data read via Modbus does not match the data displayed on the digital dosing pump's screen.

Response:

Different PLCs may have address offsets when reading Modbus addresses. For example, the setpoint address might be 40013, but during reading, it could shift forward by one to 40012. Since there are differences among various PLC brands, adjustments should be made based on the actual situation.

Q4.The pump's flow rate is 0 and cannot be modified; it can start and stop normally, but even after disconnecting Modbus communication, the pump's flow rate still cannot be changed.

Response:

This issue may occur if the stroke volume (address: 40015) was mistakenly set to 0. Restoring the pump to factory settings can resolve the problem.

Q5.The total flow data read by the remote control system does not match the total flow displayed on the pump.

Response:

The total flow data is a double-word value. You should read data from addresses

40020 and 40021, with the high word first and the low word second.

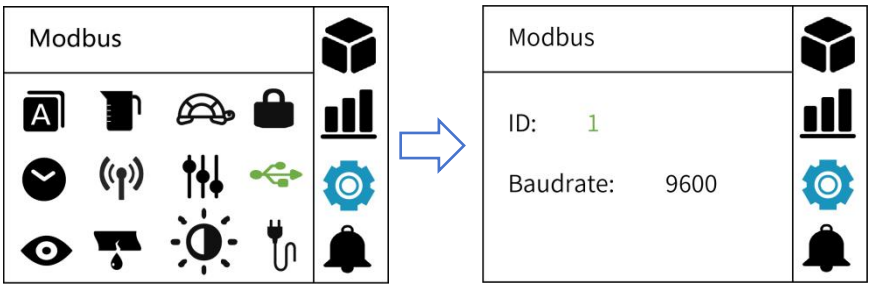
E01 Digital Dosing Pump ModBus RTU Communication

The E01 digital dosing pump supports the Modbus RTU communication protocol.
The communication parameters are:
Baud Rate: 9600
Data Bits: 8
Parity Bit: N (None)
Stop Bits: 1
The ModBus RTU port address can be set within the pump according to actual needs. For the setting method, please refer to the manual.
The ModBus communication data address table is as follows:

ModBus Register	Name	Access type	Range	unit	Date type	description
40013	Start/stop	r/w	0 or 1		INT	Read or Write the "Start" and "Stop" status of the electronic dosing pump. Read/Write data "0" or "1"; "0" means Stop, "1" means Start.
40014	Flow rate	r/w	0–max	ml/min	INT	Read or write the operating flow rate value of the pump.
40015	stroke volume	r/w	0–100	ml	INT	Read or write the pump's stroke volume. When reading, you need to divide the read value by 100. For example, if the current value read from the pump is 1256, calculate 1256 ÷ 100 = 12.56. The resulting value 12.56 is the stroke volume. When writing, you need to multiply the stroke volume by 100. For example, if you need to write a stroke volume of 13.45 into the pump, then 13.45 × 100 = 1345, so the value to be written is 1345.

40016	Slow speed	r/w	0，1，2		INT	Read or write the pump's suction speed. The data correspondence is as follows: 0：100% 1：50% 2：25%
40017	Alarm message	r	101–601		INT	Refer to the 'Alarm Information Code Table'
40019	pressure	r	0–1MPa	M.pa	INT	Read the pressure of the pump. You need to divide the read value by 100. For example, if the value read from the pump is 27, then 27 ÷ 100 = 0.27, which means the current pressure is 0.27 MPa.
40020	Total flow	r	0–max	L	DWORD	Read the total flow of the pump.
40022	Remaining diaphragm lifespan	r	0–100	%	INT	Read the remaining usage time of the pump's diaphragm. When reading, you need to divide the read value by 100. For example, if the value read from the pump is 8512, then 8512 ÷ 100 = 85.12, which means the current remaining diaphragm lifespan is 85.12%.
40023	operating current	r	0–10	mA	INT	Read the operating current of the pump. Divide the read value by 100. For example, if the current value read from the pump is 132, then 132 ÷ 100 = 1.32, which means the current is 1.32 A.

ID SET for Digital dosing pump



Multiple pumps within the same communication system must not have duplicate ID numbers; otherwise, communication conflicts will occur.

Alarm Information Code Table:

Code	Meaning
101	Hall Sensor Fault
201	Overpressure
202	Inlet Pipe Fault
203	Suction Valve Leakage
204	Suction Valve Blockage
301	Liquid Leakage
401	Insufficient Current/Voltage
402	Overcurrent/Overvoltage
501	Motor Overload
601	Consumable Parts Lifespan Expired

17. Case Video Tutorial

1	E01+ Digital Dosing Pump Diaphragm Replacement	
2	E01 Digital Dosing Pump Diaphragm Replacement	
3	E01M1. Series Connection Wiring	
4	E01+ Compatible pH Kit Video	
5	More Courses	

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