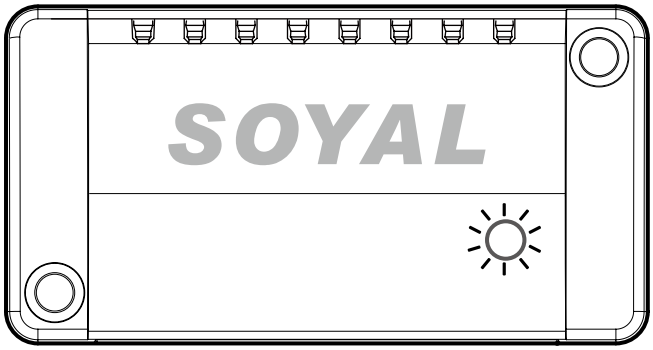
Universal Modbus I/O Module

AR-403-IO- 0404M (General-purpose MOSFET)
0404P (Optical Isolation)
0202M-IR (Smart Mailbox)



1. Product Features

4-Port Optically Isolated Digital Input / 4-Port Digital Output I/O Module - AR-403-IO-0404M

- 4 digital inputs and 4 digital outputs, suitable for various IoT applications
- Supports four selectable function modes: Standard Modbus I/O / Multi-Function Output Delay Module / Directional Detection for Vehicle Entry/Exit

4-Port Optically Isolated Digital Input / 4-Port Digital Output Isolated I/O Module - AR-403-IO-0404P

- Includes optocoupler protection, which can effectively achieve electrical isolation, high voltage protection, lightning strike protection.
- Suitable for multi-party integrated applications that require high stability, such as automation control and safety monitoring.

2-Port Digital Input / 2-Port Digital Output with IR Infrared I/O Module - AR-403-IO-0202M-IR

- 2 digital inputs (including IR infrared) and 2 digital outputs, suitable for various IoT applications
- Universal I/O module available in four different modes such as standard (Modbus/SOYAL), Mailbox, multiple-delay function, Rear Detection, Front Detection.

2. Application

- **Parking Lot Application**
  - Car Parking Management
- **Mailbox Application**
  - Various Mailbox / Locker Solutions Summary

3. How to Order

AR-403-IO	-XXXX	X	-X



Output Type
M = Mosfet
P = Pro

Input Qty / Output Qty
0202 = 2 Input & 2 Output
0404 = 4 Input & 4 Output

Additional Features
N/A = No Additional Features
R = RTC

Table of Contents

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- Mode I : Standard Modbus I/O Module 01
- Mode II : Mailbox Module 01
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SOYAL®

AR-403-IO Series

Universal I/O module(Option: Infrared sensor module)

(Up to 24VDC/2000mA High Power MOSFET output)

01. Product Four Major Modes Introduction

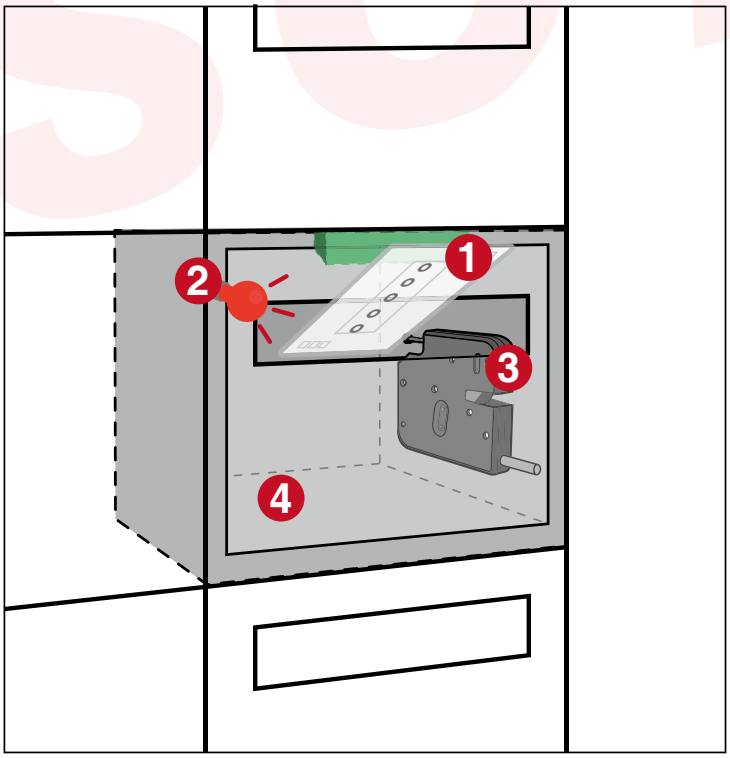
AR-403 Series built-in four different mode to choose, and the setting mode can be adjusted on Commview tools:

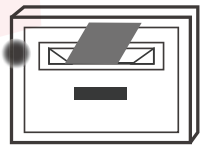
- Mode I. Standard Modbus I/O module (suitable for all AR-403 series)
- Mode II. Mailbox Module (suitable for AR-403-IO-0202M-IR)
- Mode III. Single Input Trigger Multiple Output Mode (suitable for AR-403-IO-0404M & AR-403-IO-0404P)
- Mode IV/V. Front Detection/Rear Detection (suitable for all AR-403 series)

Mode I : Standard Modbus I/O Module

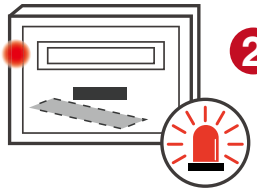
- Compatible with PLC products for logic control functionality
- Supports Modbus RTU / SOYAL protocol
- Compatible with Modbus SCADA software

Mode II : Mailbox Module (※Applicable only to AR-403-IO-0202M-IR)

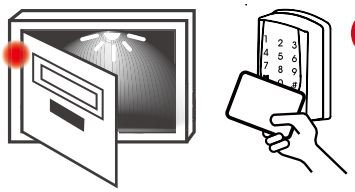




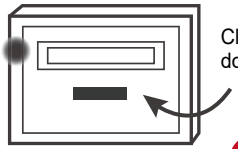
1 Mail Delivery Detector



2 Mail Presence Indicator Light



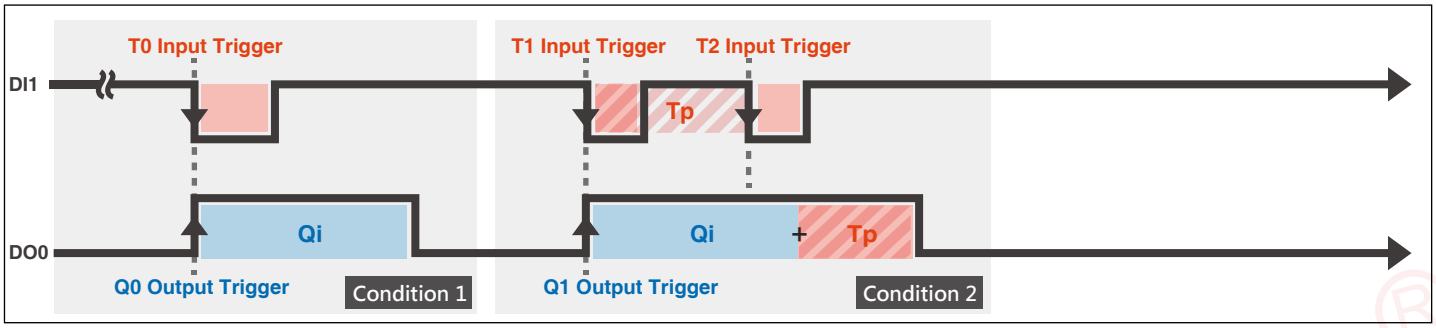
3 Card-activated Mailbox Opening and Built-in Light



4 Mailbox Door Closed Detection, Indicator Light Off

Mode III : Single Input Trigger Multiple Output Mode

● 3-1 DI0→DO0 --> Interval Operation, Falling Edge Mode



- **T =** Input Trigger
- **Q =** Output Trigger
- **Tp =** Interval delay betweeninput T0 and T1
- **Qi =** Output time (set value on Commview tools)

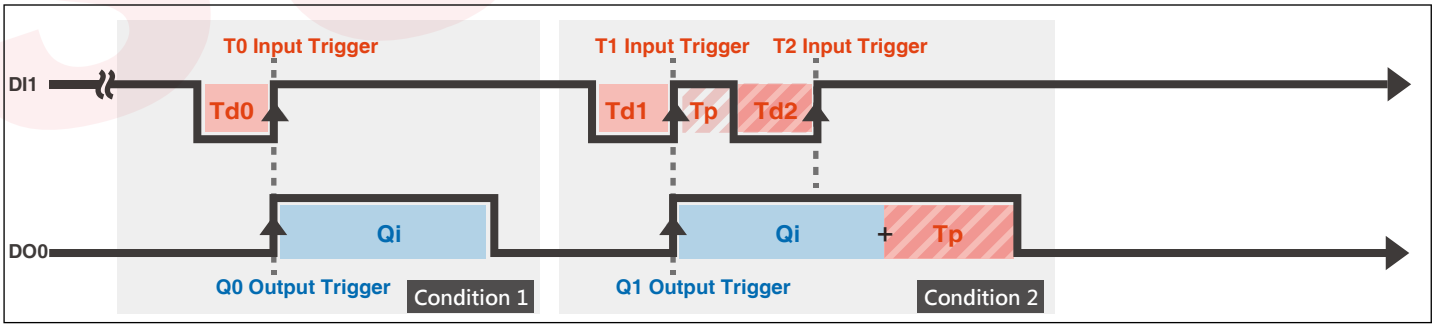
Condition 1

- The output turn ON at the same time as the input turned ON
- Output OFF after a set of time (Qi)
- Input trigger (T) in Output 1 mode does not have delay time

Condition 2

- When continuous input (T) is triggered before output time (Qi) is time out, the output time (Qi) will be accumulated at the same time last trigger input (T2) is ON

● 3-2 DI0→DO1 --> Trigger-at-Release Timer, Rising Edge Mode



- **T =** Input Trigger
- **Q =** Output Trigger
- **Td =** Input delay time (pulse)
- **Tp =** Interval delay between input T1 and T2
- **Qi =** Output time (set value on Commview tools)

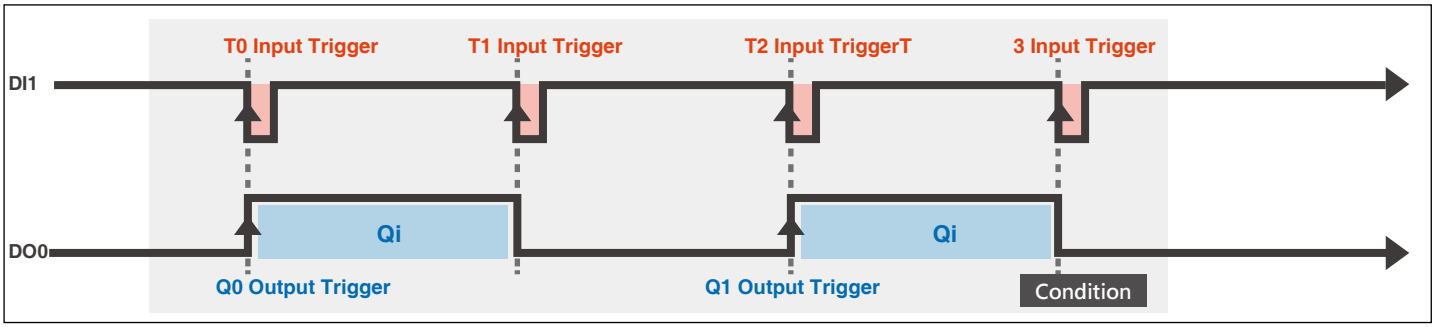
Condition 1

- The output turns ON after input (T) triggered
- Output OFF after a set of output time (Qi)

Condition 2

- When continuous trigger output (Q) is triggered before output time (Qi) is OFF, the total output time will be accumulated after the last trigger input (T1) is release, with condition output time value (Qi) is less than interval delay Tp + last trigger input T1 combined.

● 3-3 DI0→DO2 --> Toggle Mode

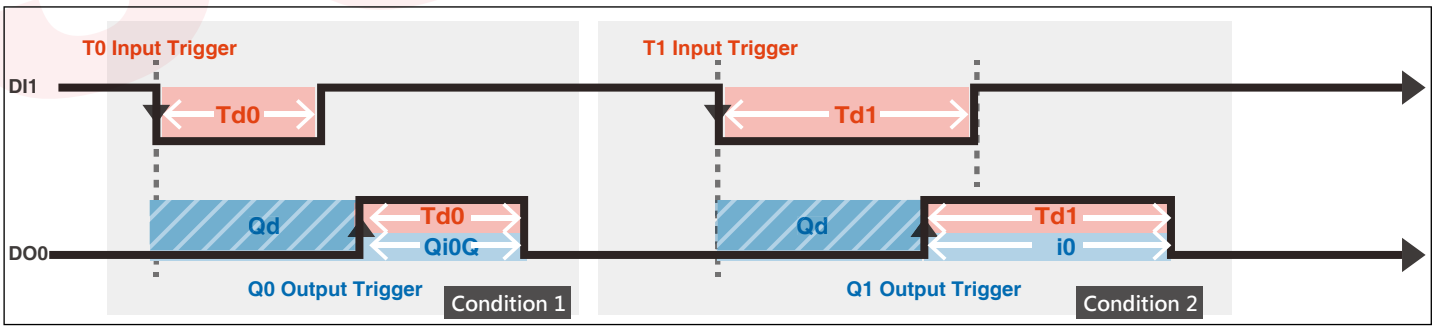


- **T =** Input Trigger
- **Q =** Output Trigger
- **Qi =** Output time (set value on Commview tools)

Condition

- The output ON/OFF is determine by DI1 (T) status until DI1 (T) switch to another mode (ON become OFF, OFF become ON)

● 3-4 DI0→DO3 --> Undistorted Output Delay



- **T =** Input Trigger
- **Td =** Input delay time (pulse)
- **Q =** Output Trigger
- **Qi =** Output time
- **Qd =** Output delay time (set value on Commview tools)

Condition 1

- When delay output time (Qd) less than output delay time (Qi), output time is predetermined by input delay time (Qi=Td)

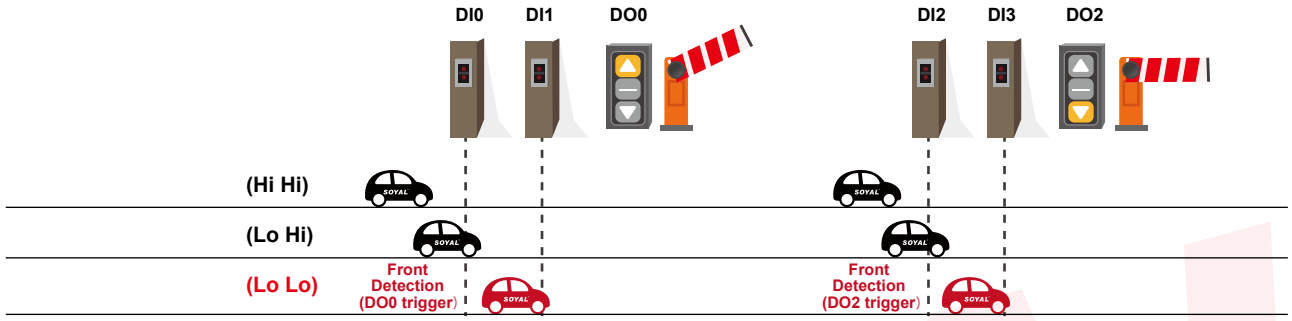
Condition 2

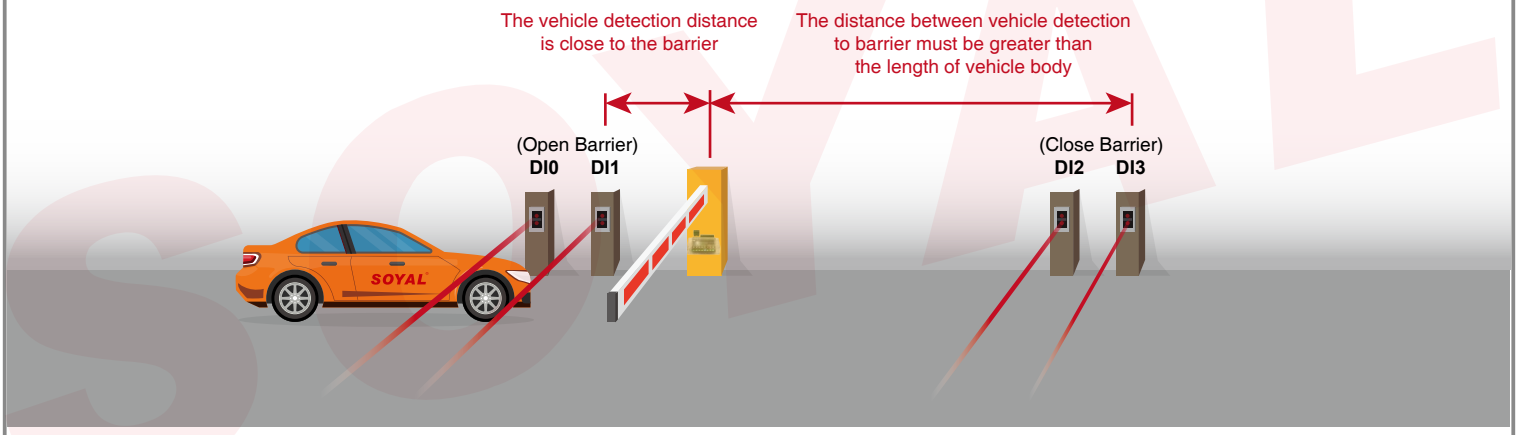
- When input delay time is (Td) is greater than the output delay time (Qd), total output time (Qi) is equivalent to input delay time (Td).
  ※ This is under the condition output will still triggering after output delay time is time out.

Mode IV : Front Detection(Remain direction detection)

Direction recognition - Leading edge entry immediate trigger

Barrier gate detection using FF/RF Rising mode (requires only 1 AR-403-IO)





• Action table

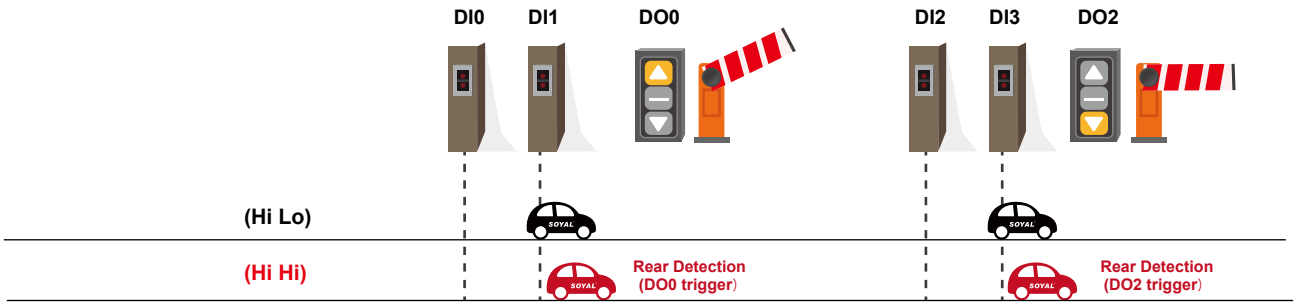
Can trigger different output points based on the sensor's activation sequence.

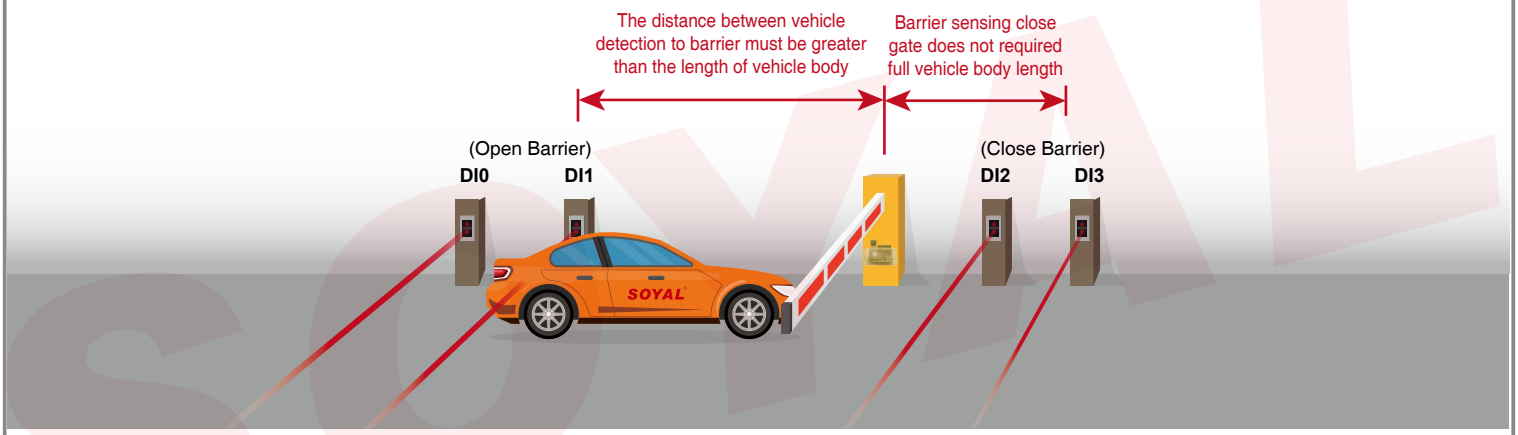
Item	Trigger process	Output	Applicable scenarios	Remarks
1	DI0 → DI1	DO0	Direction recognition for lane entry/exit, triggering the barrier gate upon encountering the second RF sensor	Modify the output duration in Commview. (Please refer to this manual → Software Setup Instructions)
2	DI1 → DI0	DO1		
3	DI2 → DI3	DO2		
4	DI3 → DI2	DO3		

Mode V : Rear Detection (Remain direction detection)

Direction recognition - Trailing edge exit trigger

Barrier gate detection using FF/RF Falling mode (requires only 1 AR-403-IO)





• Action table

Can trigger different output points based on the sensor's activation sequence.

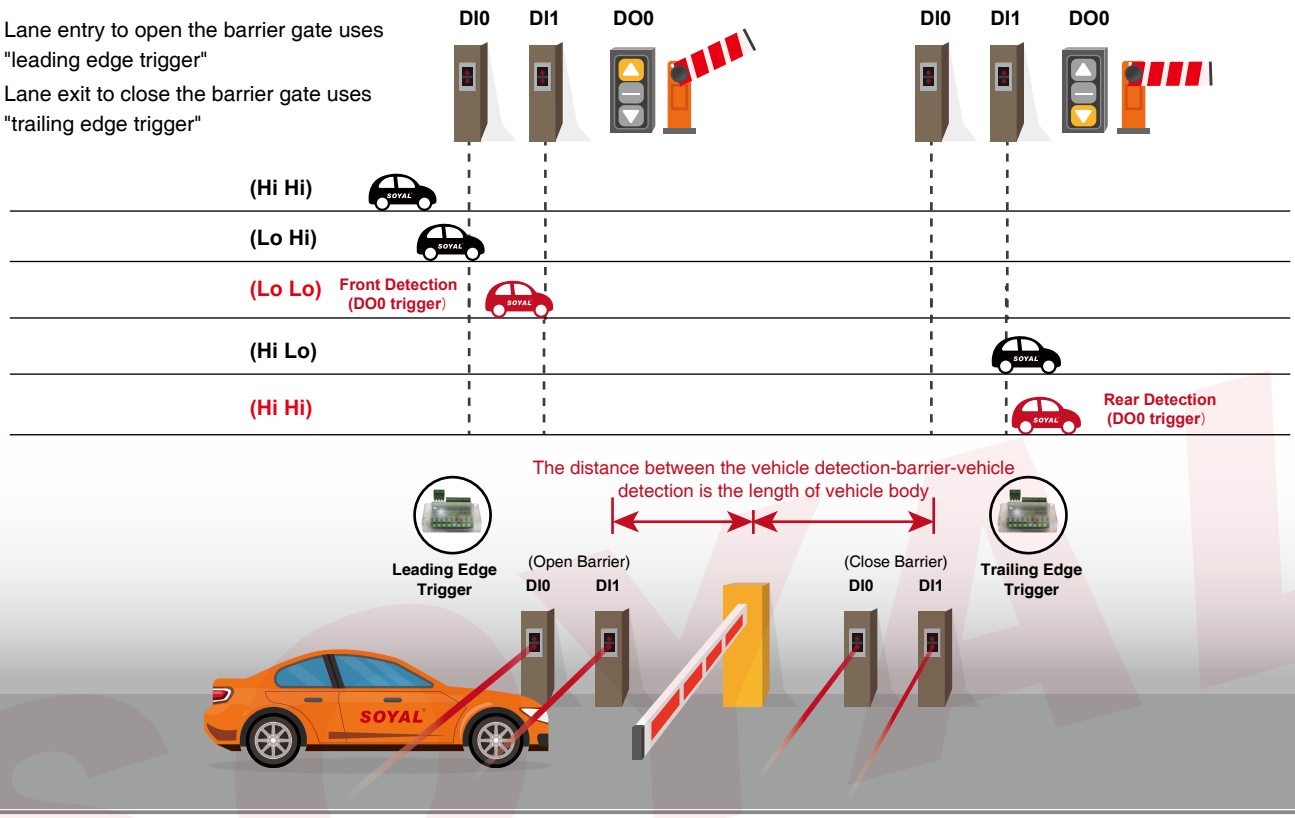
Item	Trigger process	Output	Applicable scenarios	Remarks
1	DI0 → DI1	DO0	Lane entry/exit gate closing Direction recognition, triggered only after exiting the second RF.	Modify the output duration in Commview. (Please refer to this manual → Software Setup Instructions)
2	DI1 → DI0	DO1		
3	DI2 → DI3	DO2		
4	DI3 → DI2	DO3		

Mode IV/V : Front Detection(FF/RF Rising)/Rear Detection(FF/RF falling) (Remain direction detection)

Comprehensive Application Example (Leading Edge Trigger + Trailing Edge Trigger)

Each AR-403-IO module only supports one mode, either leading edge or trailing edge, so if the entry and exit lanes of the barrier gate use different trigger methods, two AR-403-IO modules must be used, each set to a different mode.

- Lane entry to open the barrier gate uses "leading edge trigger"
- Lane exit to close the barrier gate uses "trailing edge trigger"



02. Software Setting

※ Support Firmware version **401_MBox_V0301_210324.ISP** and after.

- **Commview Software Update**

  Please download software 【SoyalDeviceTool】from Soyal website

  Download Firmware

- **Commview Setting steps:**

  (1) Select COM Port

  (2) Click “Read” to get Node number

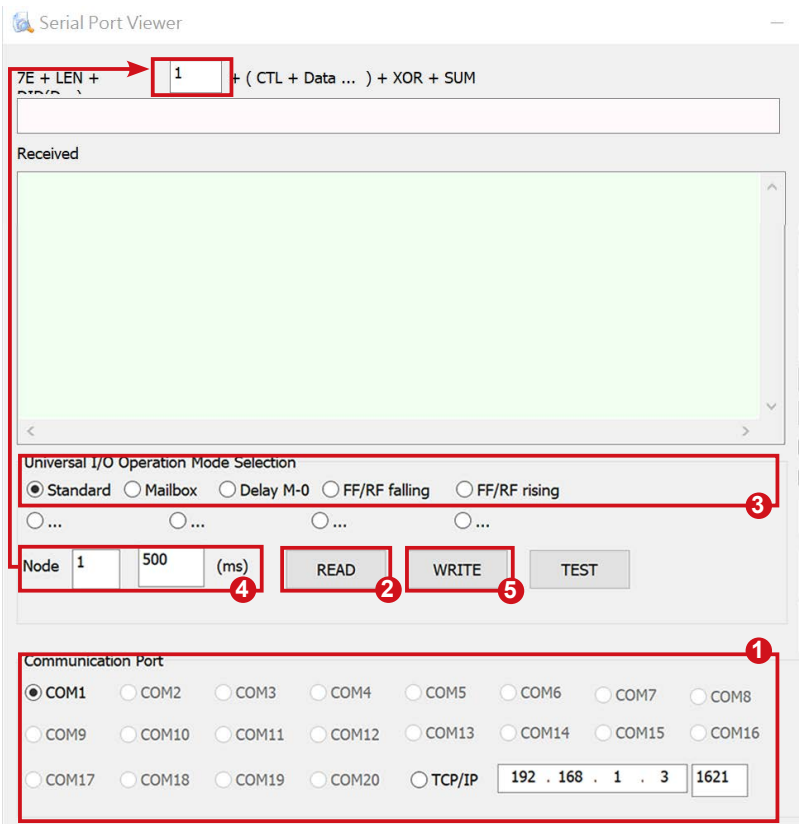
  (3) Select Mode

  - **Standard**----- Mode I: Standard Modbus I/O Module
  - **Mailbox**------- Mode II: Mailbox Module
  - **Delay M-0**--- Mode III: Multiple delay function
  - **FF/RF falling**----- Mode IV: Front Detection
  - **FF/RF rising**----- Mode V: Rear Detection

  (4) Enter delay time (Mode 3/Mode 4)

  Make sure Nord number is consistent as above

  (5) Click “Write”, finish setting.



Modify Station Number

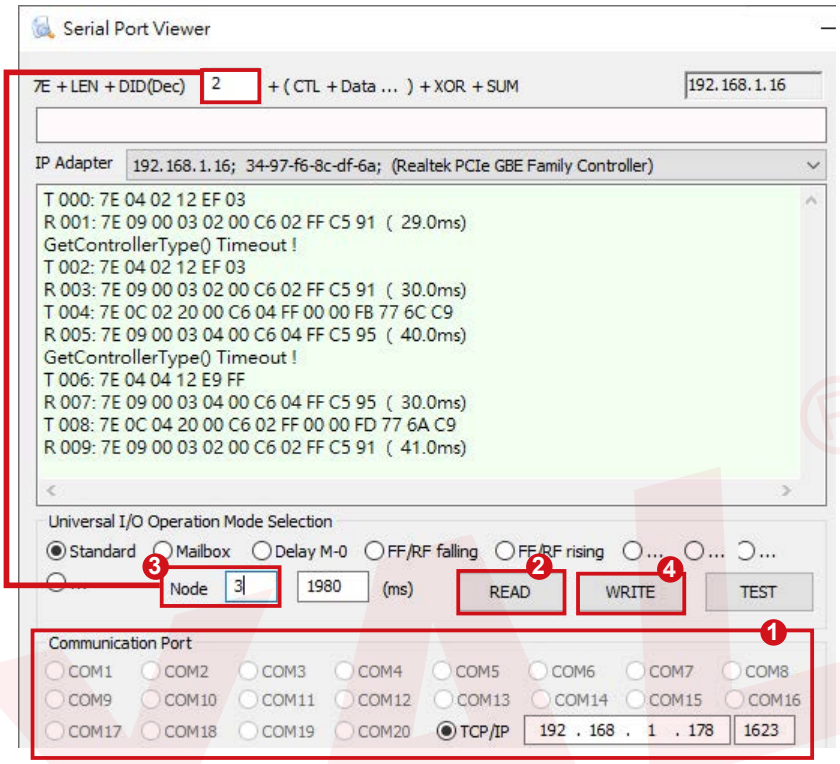
- **Commview Station Number Change Procedure::**

1. Select COM Port
2. Press "Read" to read the current station number
3. Enter the new station number "3"

(If you forget the original station number, please see Note 1 below for the setup steps)

4. After entering the new station number, press "Write" to save the changes

※When using CommView to read data, the station numbers at the top and bottom must be the same. To change the station number, the top should display the original station number, and the bottom should display the new station number, otherwise it will not read correctly.

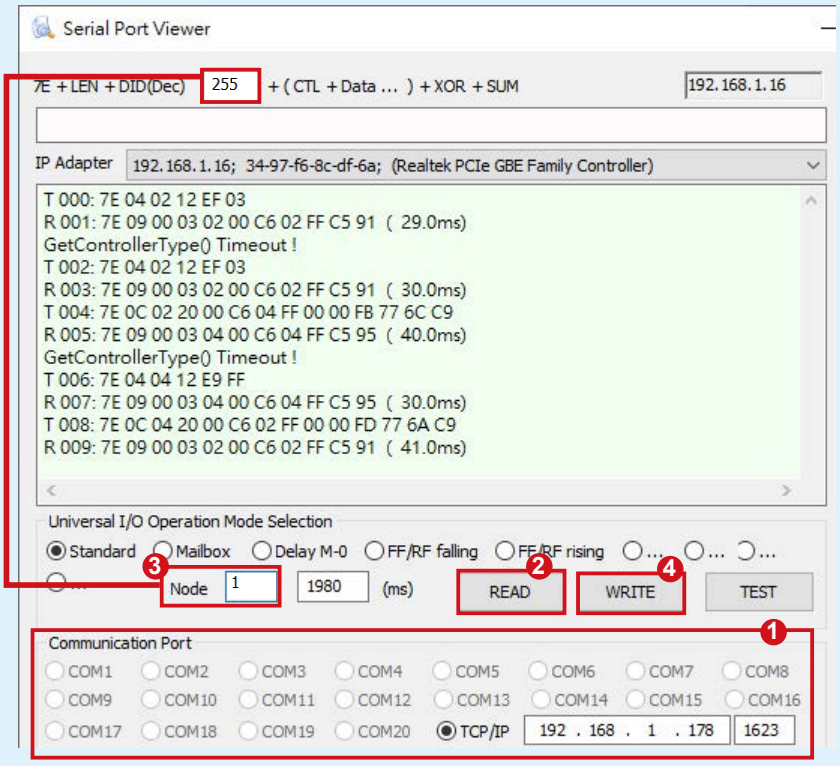


Note 1:

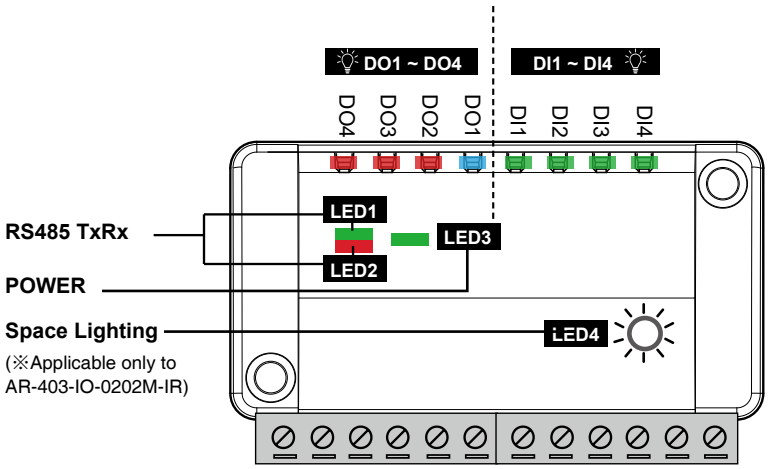
- **Commview Forgot Station Number Setup Steps:**

1. Select COM Port
2. Press "Read" to read the station number
3. Enter station number "1" and input "255" at the top
4. After setting is completed, press "Write" to save the settings

※Please ensure the device is in a 1-to-1 state and the station number cannot be changed



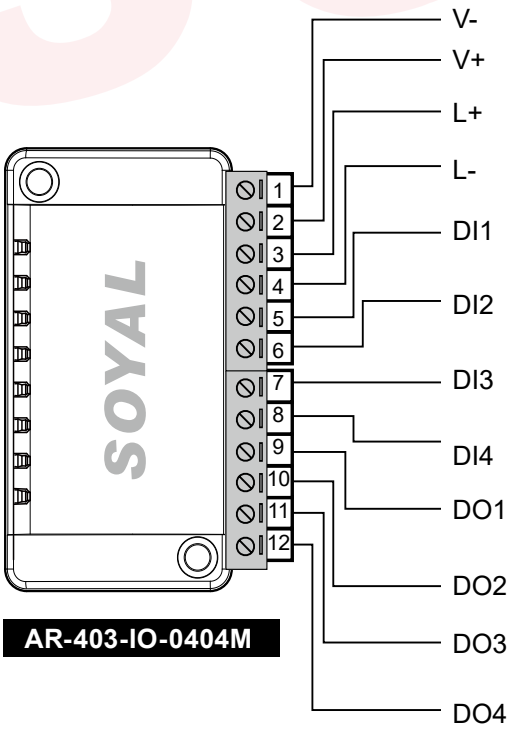
03. Indicator Lights



Indicator	Color	Description
LED1	Green	POWER
LED2	Green	RS485 TxRx Communication indicator
LED3	Red	
LED4	White	
DO1	Red	DO1，Action indicator(Mailbox mode: letter indicator, blue LED)
DO2		DO2，Action indicator
DO3		DO3，Action indicator
DO4		DO4，Action indicator
DI 1	Green	DI1， Action indicator
DI 2		DI2， Action indicator
DI 3		DI3， Action indicator
DI 4		DI4， Action indicator

04. Cable Instruction

AR-403-IO-0404M Standard Model



※ **Note :** 701ClientSQL Graphic Animation I/O mapping starts from 00 (Physical IO Address DI1 -->Symbol IO Nr.:00, Physical IO Address DI4 -->Symbol IO Nr.:03)

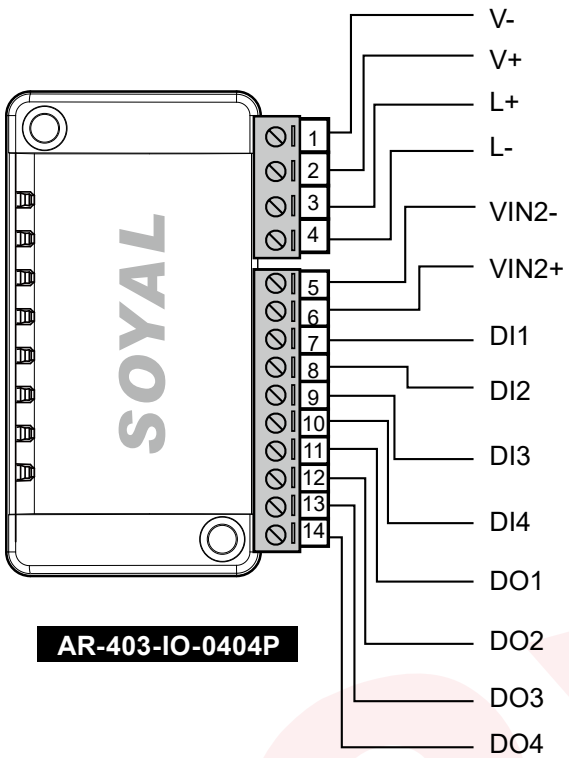
Function	Cable	AR-403-IO-0404M (Standard mode) Description
V- Input	1	Power GND
VIN Input	2	Positive power supply, range of volt: 9~24V
RS-485 LA	3	RS-485 L+ contact
RS-485 LB	4	RS-485 L- contact
DI1	5	Input point, triggered by the low electric potential
DI2	6	
DI3	7	
DI4	8	
DO1	9	MOSFET output, driven by 24VDC / 2A
DO2	10	
DO3	11	
DO4	12	

AR-403-IO Series

Universal I/O module(Option: Infrared sensor module)

(Up to 24VDC/2000mA High Power MOSFET output)

AR-403-IO-0404P Isolated Model

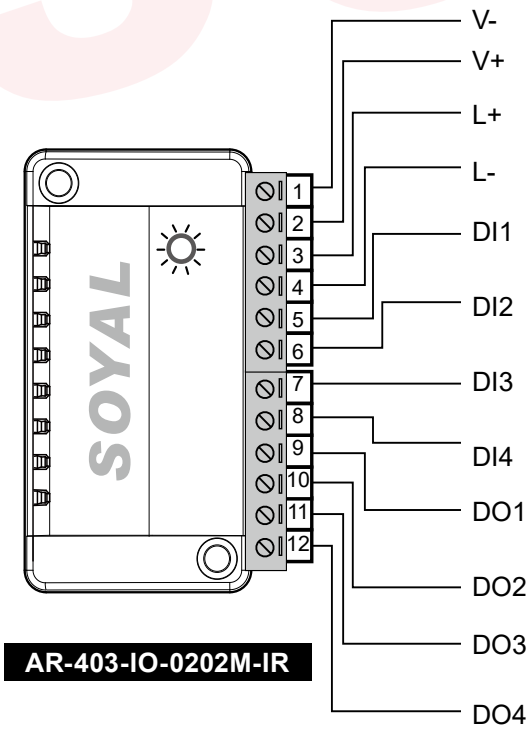


AR-403-IO-0404P

※ **Note :** 701ClientSQL Graphic Animation I/O mapping starts from 00 (Physical IO Address DI1 -->Symbol IO Nr.:00, Physical IO Address DI4 -->Symbol IO Nr.:03)

Function	Cable	AR-403-IO-0404P (Standard mode) Description
VIN- Input	1	Power GND
VIN+ Input	2	Positive power supply, range of volt: 9~24V
RS-485 LA	3	RS-485 L+ contact
RS-485 LB	4	RS-485 L- contact
VIN2- Input (-Vio)	5	I/O Power GND
VIN2+ Input (+Vio)	6	I/O Positive power supply, range of volt: 9~24V
DI1	7	Input point, triggered by the low electric potential
DI2	8	
DI3	9	
DI4	10	
DO1	11	MOSFET output, driven by 24VDC / 2A
DO2	12	
DO3	13	
DO4	14	

AR-403-IO-0202M-IR Mailbox-Specific Model



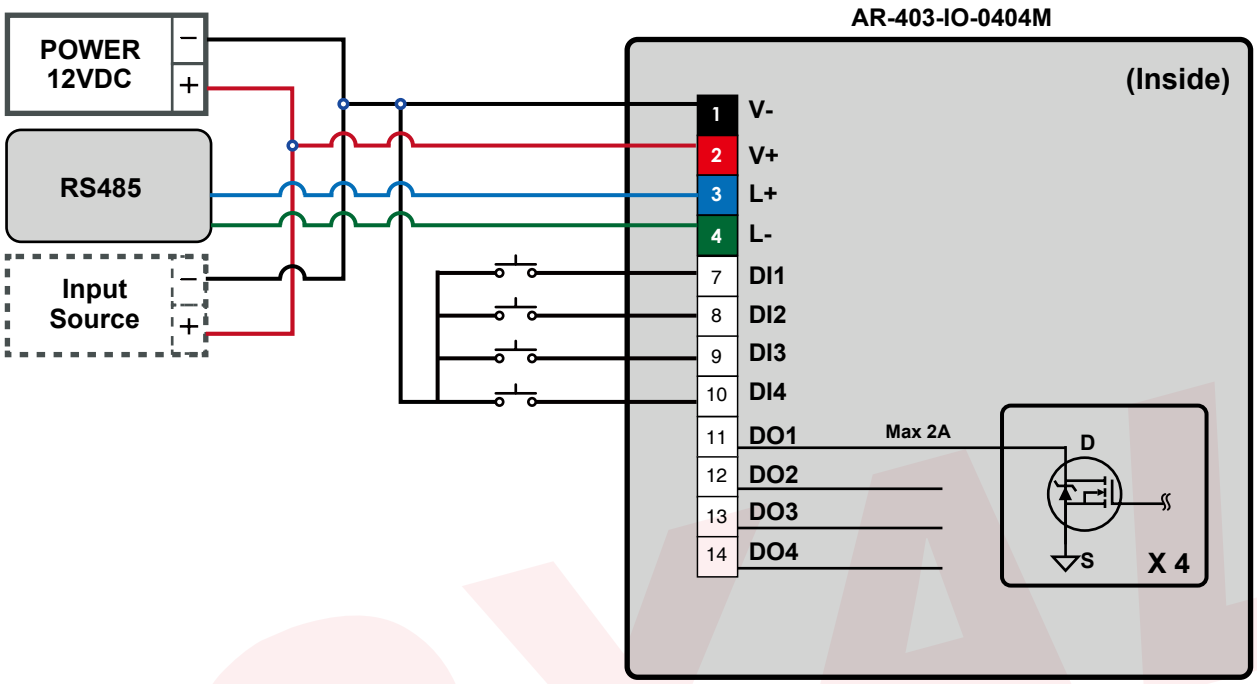
AR-403-IO-0202M-IR

※ **Note :** 701ClientSQL Graphic Animation I/O mapping starts from 00 (Physical IO Address DI1 -->Symbol IO Nr.:00, Physical IO Address DI4 -->Symbol IO Nr.:03)

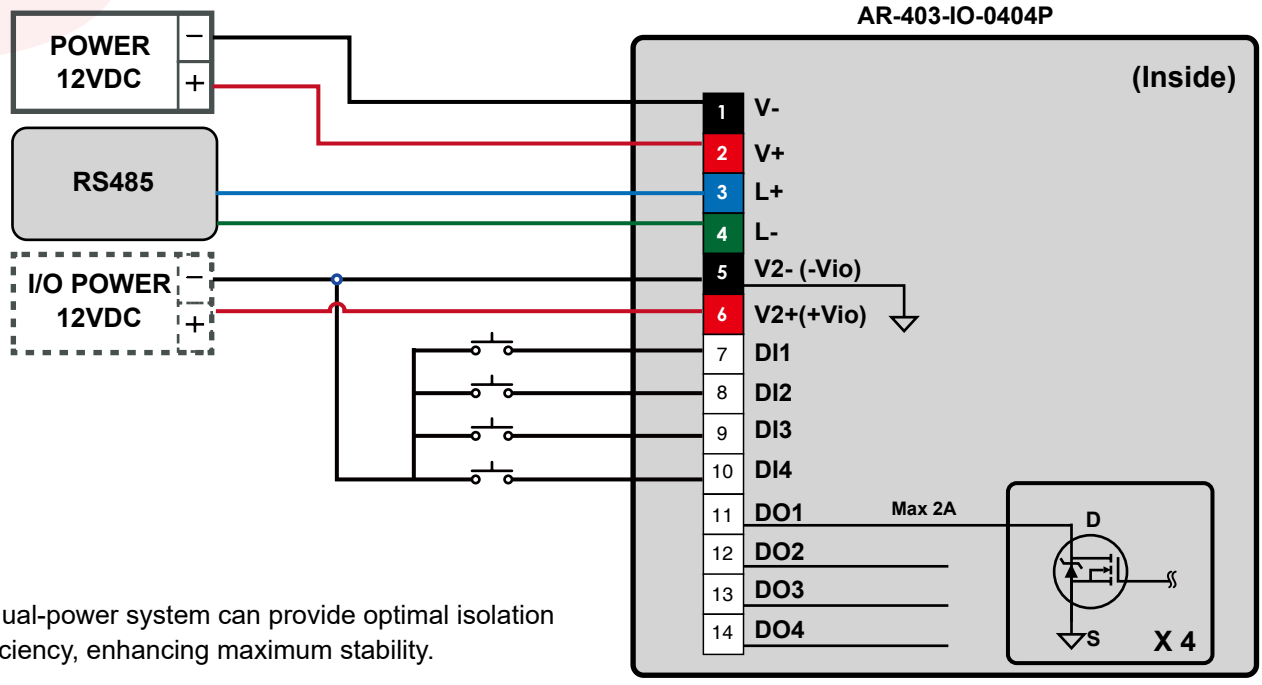
Function	Cable	AR-403-IO-0202M-IR (Mailbox mode)
V- Input	1	Power GND
VIN Input	2	Positive power supply, range of volt: 9~24V
RS-485 LA	3	RS-485 L+ contact
RS-485 LB	4	RS-485 L- contact
DI1	5	**Delivering Letters Detection**：When DI1 detect the letters are dropped, DO1 will be active to light on indicator.
DI2	6	**Door Status Detection:** When DI2 door sensor detects that the door is closed, the indicator will light off
DI3	7	
DI4	8	
DO1	9	**Letters Indicator Output:** When DI1 detects the letters are dropped and it will output 1Hz ON/OFF flashing signal; Stop the output till DI2 detects OFF-ON-OFF motion of the door.
DO2	10	**Cabinet Lock Output:** DO2 connect Lock to open the mailbox
DO3	11	
DO4	12	

05. Wiring & Application

AR-403-IO-0404M Standard Model



AR-403-IO-0404P Isolated Model



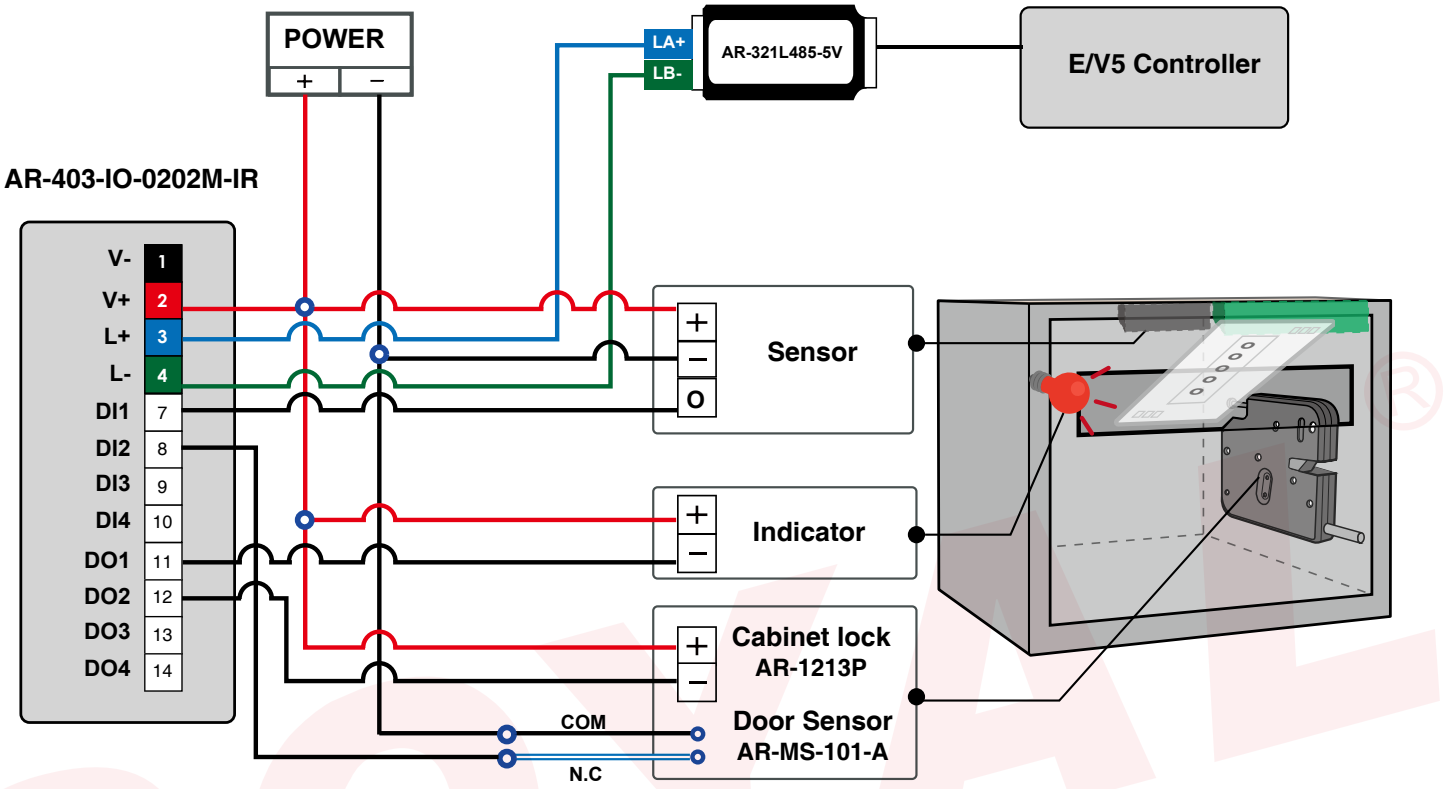
- A dual-power system can provide optimal isolation efficiency, enhancing maximum stability.
- If cost considerations are present, a single-power method can also be used, but it will lack optical isolation functionality.

AR-403-IO Series

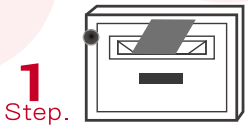
Universal I/O module(Option: Infrared sensor module)

(Up to 24VDC/2000mA High Power MOSFET output)

AR-403-IO-0202M-IR Mailbox-Specific Model

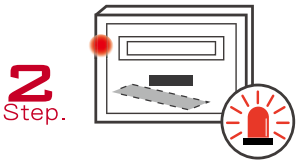


- **Direction for use :**



DI1/3: Mail Delivery Detector

When the letters are dropped, the sensor will detect the motion.



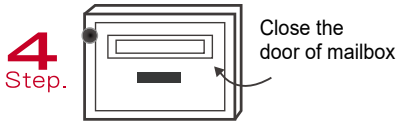
DO1/3: Mail Presence Indicator Light

The Indicator will light up when there are letters in the mailbox



DO2/4: Card-activated Mailbox Opening and Built-in Light

The mailbox will open after the card is presented



DI2/4: Mailbox Door Closed Detection, Indicator Light Off

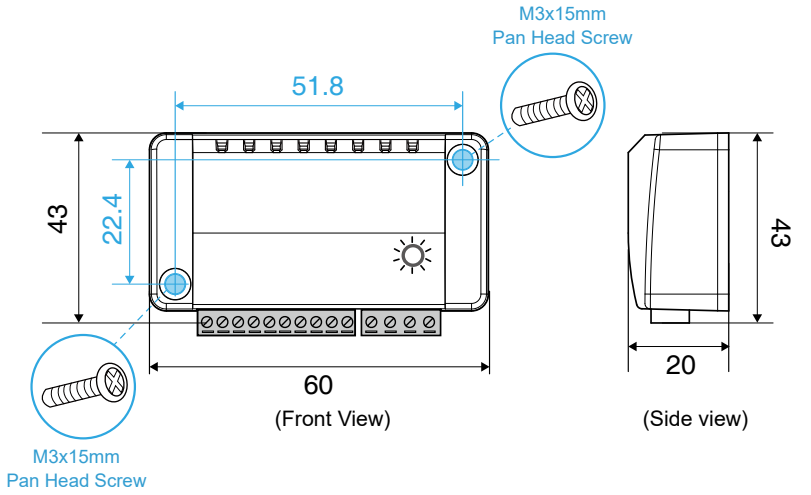
Close the door after taking out the letters. Door Sensor detects the door is closed and the indicator will be off.

AR-403-IO Series

Universal I/O module(Option: Infrared sensor module)

(Up to 24VDC/2000mA High Power MOSFET output)

06. Installation(mm)



0 Product



AR-403-IO-0404M
AR-403-IO-0202M-IR



AR-403-IO-0404P

08. Specification

Model no.			AR-403-IO-0404P	AR-403-IO-0404M	AR-403-IO-0202M-IR
Product Images					
Serial port			RS485x1		
Baud Rate			9600 bps (N,8,1)		
Protocol			Modbus, Soyal		
LED Indicator			Power: Tx/Rx, D.O./D.I		
Fuses			Power & RS485 both with PTC Protector		
Isolation			2500 VDC	--	--
Power Supply			24VDC		
I/O isolation power supply			24VDC	--	--
Power Consumption			<1W		
Dimension(mm)			60(H)x43(W)x20(D)		
Net Weight (g)			approx. 31		
Operating Temperature			-20℃ ~ +70℃		
DI	Quantity		4	4	2
	Source Input mode				
	Sink Input mode				
	Optical Isolation		●		
DO	Quantity		4	4	2
	MosFet		●	●	●
	Relay	TypeA			
		TypeC			
Independent I/O Power Supply			●		