DAUDIN CO., LTD.

2301TW
V2.0.0

iO-GRID M

Relay Output Module

User's Manual

Table of Contents

1. Relay Output Module List

Product No.	Description	Remarks
GFAR-RM11	8-Channel relay module, grounded	
GFAR-RM21	4-Channel relay module, grounded	

Product Description

The GFAR relay module series is designed specifically for industrial applications. It has a 4-channel and 8-channel model, both can control AC/DC load through communication

Caution (ATTENTION):

1. THIS DEVICE IS FOR INDOOR USE ONLY, DON'T PUT OR USE IT IN HIGH TEMPERATURE AND HIGH MOISTURE ENVIRONMENT.
   CET EQUIPEMENT EST DESTINE A UN USAGE INTERIEUR UNIQUEMENT NE PAS STOCKER OU UTILISER DANS UN ENVIRONNEMENT A HAUTE TEMPERATURE ET HAUTE HUMIDITE.
2. AVOID FALLING AND BUMPING OTHERWISE THE ELECTRICAL COMPONENTS WILL BE DAMAGED.
   ÉVITEZ DE TOMBER ET DE VOUS ÉCRASER, SINON LES COMPOSANTS ÉLECTRIQUES SERONT ENDOMMAGÉS
3. DON'T TRY TO DISASSEMBLE OR OPEN THE COVER UNDER ANY CIRCUMSTANCE IN ORDER TO AVOID DANGER.
   NE TENTEZ JAMAIS DE DEBALLER OU D'OUVRIR LE COUVERCLE POUR EVITER TOUT DANGER.
4. IF THE EQUIPMENT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED.
   SI L'APPAREIL N'EST PAS UTILISE DE LA MANIERE INDIQUEE PAR LE FABRICANT, LA PROTECTION FOURNIE PAR L'APPAREIL PEUT ETRE ALTEREE.
5. THE INSTALLATION THAT THE SAFETY OF ANY SYSTEM INCORPORATING THE EQUIPMENT IS THE RESPONSIBILITY OF THE ASSEMBLER OF THE SYSTEM.
   L'INSTALLATION DE TOUT SYSTÈME INTÉGRANT CET ÉQUIPEMENT EST LA RESPONSABILITÉ DU CONSTRUCTEUR DU SYSTÈME.
6. USE WITH COPPER CONDUCTORS ONLY. INPUT WIRING: MINIMUM 28 AWG, 85°C, OUTPUT WIRING: MINIMUM 28 AWG, 85°C
   DESTINÉ À ÊTRE UTILISÉ AVEC DES CONDUCTEURS EN CUIVRE SEULEMENT. CABLAGE D'ENTREE: MINIMUM 24 AWG, 85 ° C. CABLAGE DE SORTIE: MINIMUM 28 AWG, 85 ° C.
7. FOR USE IN A CONTROLLED ENVIRONMENT. REFER TO MANUAL FOR ENVIRONMENTAL CONDITIONS.
   POUR UN ENVIRONNEMENT CONTROLE. REPORTEZ-VOUS AU MANUEL DES CONDITIONS ENVIRONNEMENTALES.
8. DISCONNECT ALL SOURCES OF SUPPLY BEFORE SERVICING.
   COUPER TOUTES LES SOURCES D'ALIMENTATION AVANT DE FAIRE L'ENTRETIEN ET LES RÉPARATIONS.
9. PROPER VENTILATION IS REQUIRED TO REDUCE THE RISK OF HAZARDOUS OR EXPLOSIVE GAS BUILDUP DURING INDOOR CHARGING. SEE OWNERS MANUAL.
   UNE VENTILATION ADÉQUATE EST NÉCESSAIRE AFIN DE RÉDUIRE LES RISQUES D'ACCUMULATION DE GAZ DANGEREUX OU EXPLOSIFS DURANT LA RECHARGE À L'INTÉRIEUR. VOIR LE MANUEL D'ENTRETIEN.

2. Relay Output Module Specification

2.1 GFAR-RM11

Technical Specification	
Number Of Outputs	8
Voltage Supply	24 VDC / 5 VDC
Current Consumption	<200 mA at 24 VDC"
Max Output Voltage	250 VAC / 30 VDC
Max Output Current	10 A
Actuation Time	10 ms maximum
Reoperate Time	5 ms maximum
Communication Specification	
Fieldbus Protocol	Modbus RTU
Format	N, 8, 1
Baud Rate Range	1200-1.5 Mbps
General Specification	
Dimension (W*D*H)	134 x 121 x 60.5mm
Weight	358g
Ambient temperature (operation)	-10…+60 ˚C
Storage Temp.	-25 ˚C…+85 ˚C
Permissible Humidity(non-condensing)	RH 95%, non-condensing
Altitude Limit	< 2000 m
Ingress Protection (IP)	IP 20
Pollution Severity	II
Safety Approval	CE
Wiring Range (IEC / UL)	0.2 mm2~2.5 mm2 / AWG 24~12
Wiring Ferrules	DN00508D、DN00708D、DN01008D、DN01510D

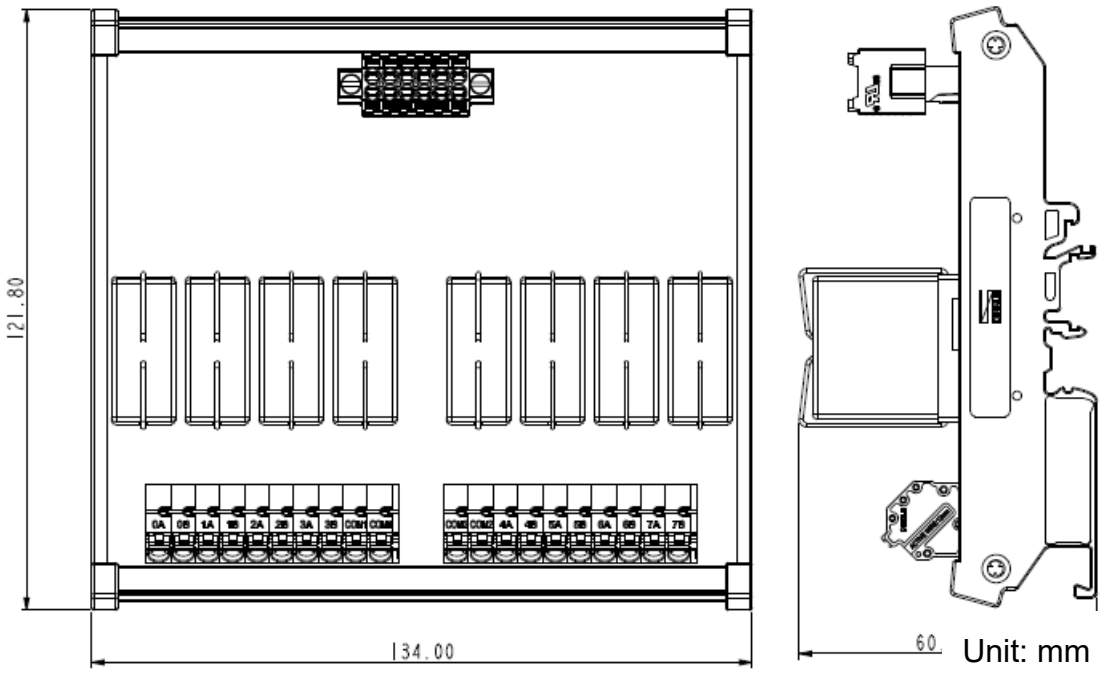
2.1 GFAR-RM21

Technical Specification	
Number of Outputs	4
Voltage Supply	24 VDC
Current Consumption	<109 mA at 24 VDC"
Max Output Voltage	250 VAC / 30 VDC
Max Output Current	10A
Actuation Time	10 ms maximum
Reoperate Time	5 ms maximum
Communication Specification	
Fieldbus Protocol	Modbus RTU
Format	N, 8, 1
Baud Rate Range	1200-1.5 Mbps
General Specification	
Dimension (W*D*H)	68 x 121.8 x 60.5mm
Weight	195g
Ambient temperature (operation)	-10…+60 ˚C
Storage Temp.	-25 ˚C…+85 ˚C
Permissible Humidity(non-condensing)	RH 95%, non-condensing
Altitude Limit	< 2000 m
Ingress Protection (IP)	IP 20
Pollution Severity	II
Safety Approval	CE
Wiring Range (IEC / UL)	0.2 mm2~2.5 mm2 / AWG 24~12
Wiring Ferrules	DN00508D、DN00708D、DN01008D、DN01510D

3. Relay Output Module Information

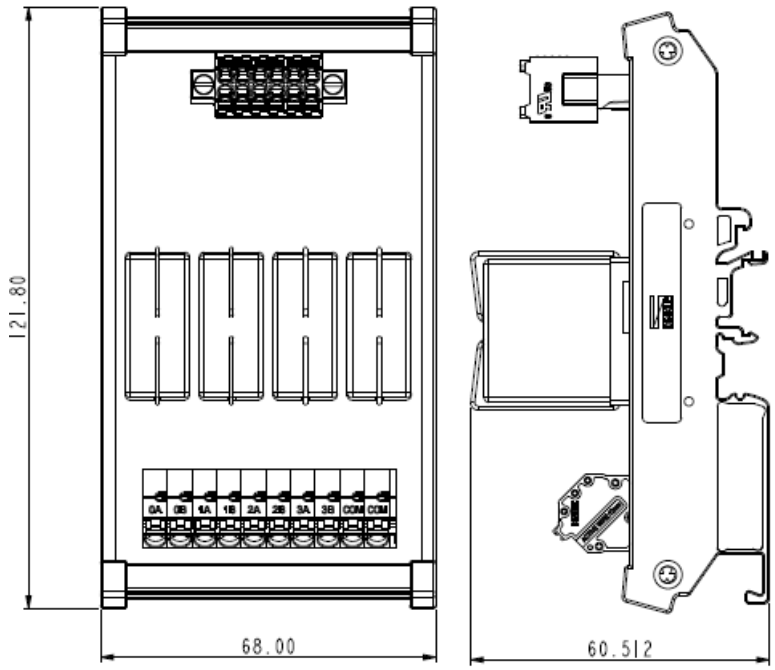
3.1 Relay Output Module Dimension

I. GFAR-RM11



Unit: mm

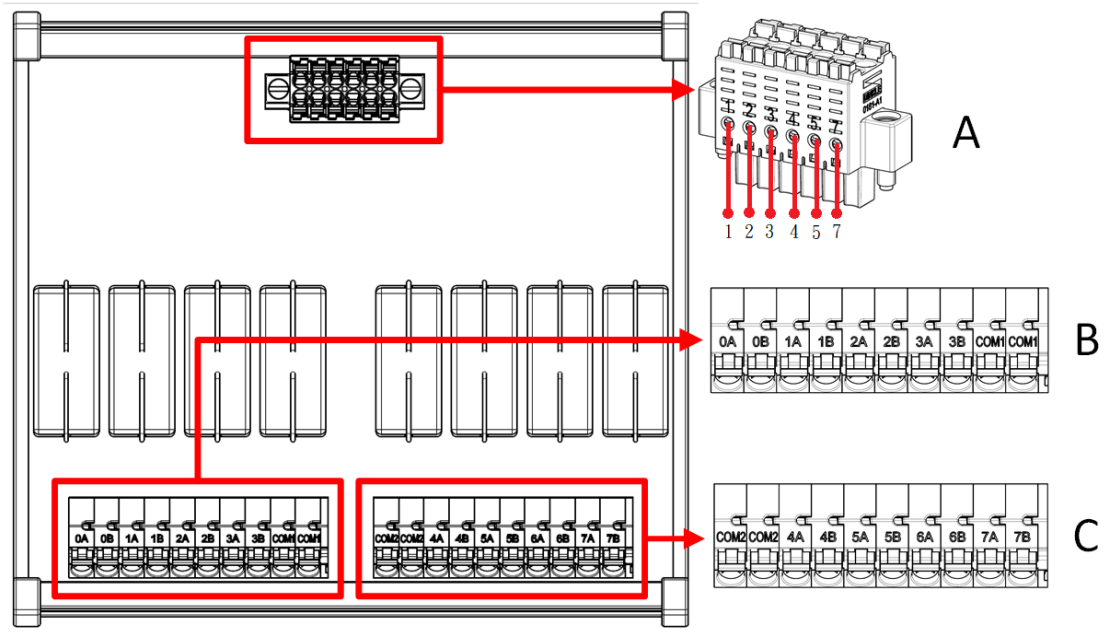
II. GFAR-RM21



Unit: mm

3.2 Relay Output Module Panel Information

I. GFAR-RM11



Terminal block A port definitions:

Terminal block labeling	**1**	**2**	**3**	**4**	**5**	**7**
Port definitions	24V	0V	5V	0V	RS485A	RS485B

Terminal block B port definitions:

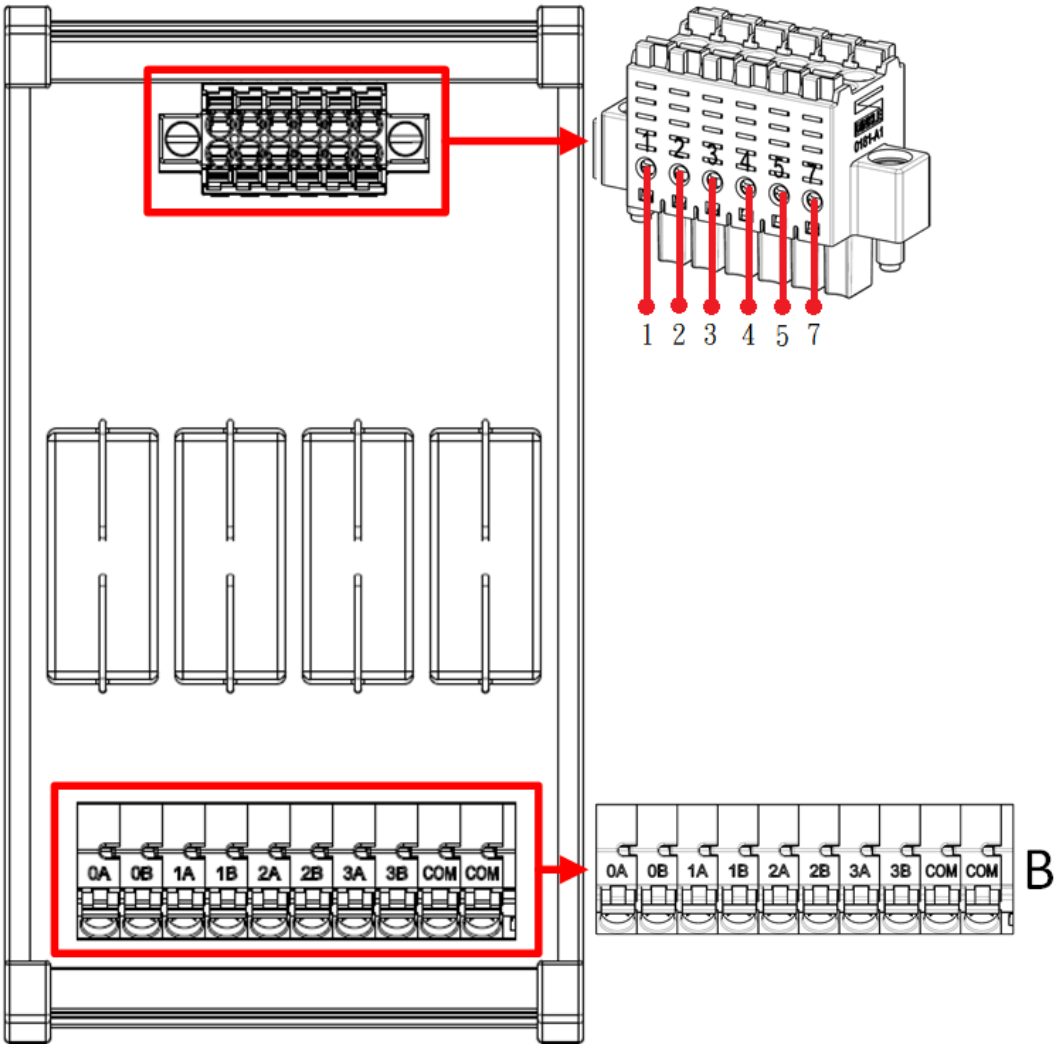
Terminal block labeling	**0 A**	**0B**	**1 A**	**1B**	**2 A**	**2B**
Port definitions	NO 1	NC 1	NO 2	NC 2	NO 3	NC 3
Terminal block labeling	**3A**	**3B**	**COM1**	**COM1**		
Port definitions	NO 4	NC 4	Common port	Common port		

Terminal block C port definitions:

Terminal block labeling	COM2	COM2	**4A**	**4B**	**5A**	**5B**
Port definitions	Common port	Common port	NO 5	NC 5	NO 6	NC 6
Terminal block labeling	**6A**	**6B**	**7A**	**7B**		
Port definitions	NO 7	NC 7	NO 8	NC 8		

Note: NO stands for “Normally Open”. NC stands for “Normally Closed”

II. GFAR-RM21



Terminal block A port definitions:

Terminal block labeling	**1**	**2**	**3**	**4**	**5**	**7**
Port definitions	24V	0V	5V	0V	RS485A	RS485B

Terminal block B port definitions:

Terminal block labeling	**0A**	**0B**	**1A**	**1B**	**2A**	**2B**
Port definitions	NO 1	NC 1	NO 2	NC 2	NO 3	NC 3
Terminal block labeling	**3A**	**3B**	**COM**	**COM**		
Connector definitions	NO 4	NC 4	Common port	Common port		

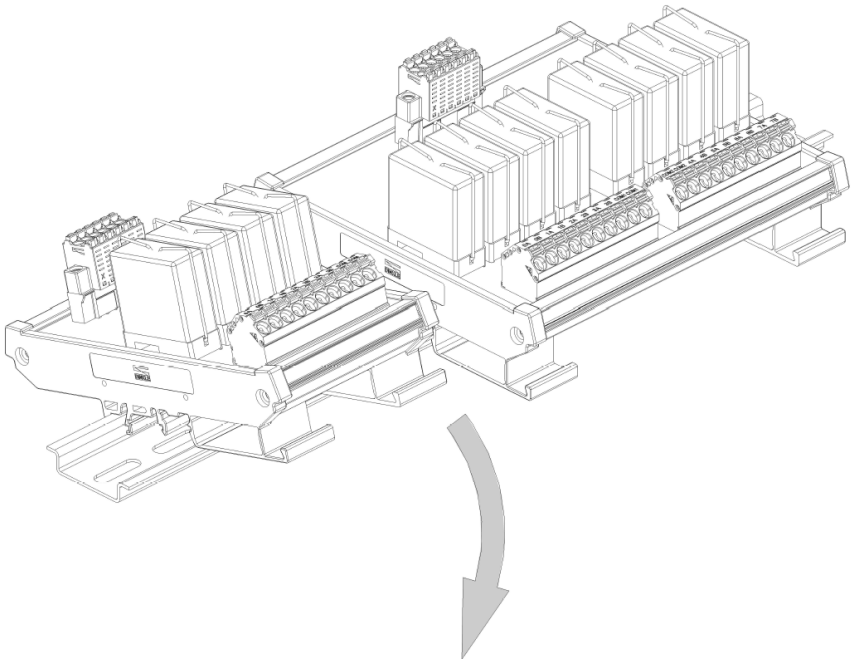
Note: NO stands for “Normally Open”. NC stands for “Normally Closed”

4. Module Installation/Disassembly

4.1 Installation

I. **With the front of the relay output module facing you, press the module down with the signal input ports against the upper side of the DIN rail.**

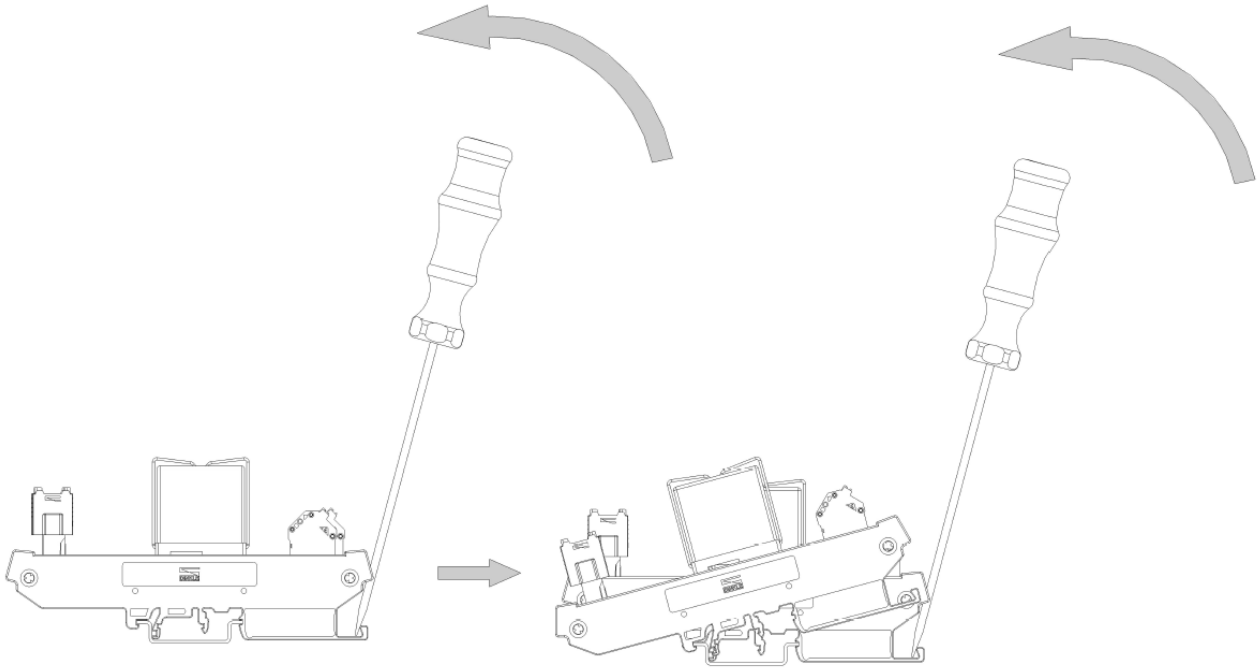
II. **Press the module down and the plastic clamp will slide.**
Continue to push down until the plastic clamp "clicks".



4.2 Removal

I. **Use a screwdriver to pull the plastic clamp sideways and detach the module from the DIN rail.**

II. **Remove the relay output module from the DIN rail in reverse order of installation.**



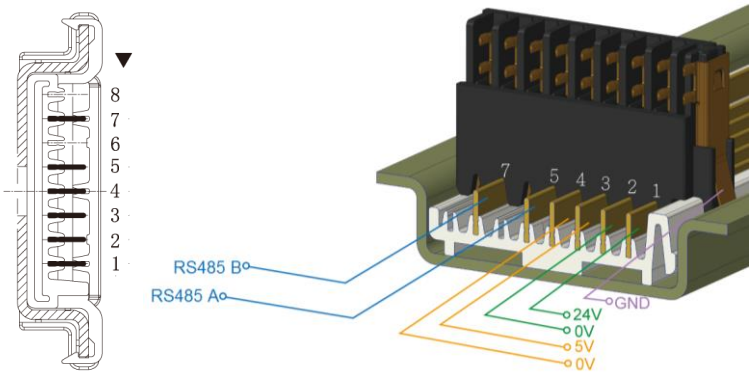
5. iO-GRID M Series Introduction

iO-GRID M series utilizes the standard Modbus communication protocol and supports Modbus RTU/ASCII and Modbus TCP. Please choose products and factory controllers to figure your system based on your communication protocol.

5.1 iO-GRID M Components

I. DINKLE Bus

Rail 1 to 4 are defined for power supply and rail 5 to 7 are defined for communication.



DINKLE Bus Rail Definitions:

Rail	Definition	Rail	Definition
8	—	**4**	0V
7	RS485B	**3**	5V
6	—	**2**	0V
5	RS485A	**1**	24V

II. Gateway Module

A gateway module converts between Modbus TCP and Modbus RTU/ASCII. The module provides two sets of external Ethernet ports to connect to the controller and the Internet

There are two types of gateway modules available:

4-channel gateway module: Provides 4 RS485 ports to connect to a control module

Single-channel gateway module: No external connectivity for the RS485 ports. The RS485 signals are transmitted via DINKLE Bus and I/O module.

Gateway module products information:

Product No.	Description
GFGW-RM01N	Modbus TCP-to-Modbus RTU/ASCII gateway module. 4 Ports
GFGW-RM02N	Modbus TCP-to-Modbus RTU/ASCII gateway module. 1 Port

III. Control module

The control module manages I/O modules and sets up the configuration. Provides external RS485 ports to connect to the controller.

There are two types of control modules available:

3-channel control module:

Provides 3 external RS485 ports, suitable stations with 2 or more control modules. Among the RS485 ports, 2 of them will be connected to the controller and the control module of the next station.

Single-channel control module:

Provides one single RS485 port to connect to the controller, suitable for single-module stations.

Control module products information:

Product No.	Description
GFMS-RM01N	RS485 control module, Modbus RTU/ASCII 3 Ports
GFMS-RM01S	RS485 control module, Modbus RTU/ASCII 1 Port

IV. I/O Module

Dinkle offers different types of I/O modules with different functions:

Product No.	Description
GFDI-RM01N	16-channel digital input module (source/sink)
GFDO-RM01N	16-channel digital output module (sink)
GFDO-RM02N	16-channel digital output module (Source)
GFAR-RM11	8-Channel relay module, grounded
GFAR-RM21	4-Channel relay module, grounded
GFAI-RM10	4-channel analog input module (±10VDC)
GFAI-RM11	4-channel analog input module (0…10VDC)
GFAI-RM20	4-channel analog input module (0… 20mA)
GFAI-RM21	4-channel analog input module (4… 20mA)
GFAO-RM10	4-channel analog output module (±10VDC)
GFAO-RM11	4-channel analog output module (0…10VDC)
GFAO-RM20	4-channel analog output module (0… 20mA)
GFAO-RM21	4-channel analog output module (4… 20mA)

6. I/O Module Parameter Settings and Introduction

6.1 I/O Module Settings and Connections

I. I/O Module System Configuration List

Name/Product No.	Description
GFDO-RM01N	16-channel digital output module (sink)
GFDO-RM02N	16-channel digital output module (Source)
GFTK-RM01	USB-to-RS232 converter
Micro USB cable	Must have data transfer functionality
Computer	BSB-compatible

II. Module Initial Setting List

Product No.	Description	Station No.	Baud rate	Format
GFMS-RM01N	RS485 control module, RTU/ASCII	1	115200	RTU(8,N,1)
GFDI-RM01N	16-channel digital input module (source/sink)	1	115200	RTU(8,N,1)
GFDO-RM01N	16-channel digital output module (sink)	1	115200	RTU(8,N,1)
GFDO-RM02N	16-channel digital output module (Source)	1	115200	RTU(8,N,1)
GFAR-RM11	8-Channel relay module, grounded	1	115200	RTU(8,N,1)
GFAR-RM21	4-Channel relay module, grounded	1	115200	RTU(8,N,1)
GFAI-RM10	4-channel analog input module (±10VDC)	1	115200	RTU(8,N,1)
GFAI-RM11	4-channel analog input module (0…10VDC)	1	115200	RTU(8,N,1)
GFAI-RM20	4-channel analog input module (0… 20mA)	1	115200	RTU(8,N,1)
GFAI-RM21	4-channel analog input module (4… 20mA)	1	115200	RTU(8,N,1)
GFAO-RM10	4-channel analog output module (±10VDC)	1	115200	RTU(8,N,1)
GFAO-RM11	4-channel analog output module (0…10VDC)	1	115200	RTU(8,N,1)
GFAO-RM20	4-channel analog output module (0… 20mA)	1	115200	RTU(8,N,1)
GFAO-RM21	4-channel analog output module (4… 20mA)	1	115200	RTU(8,N,1)

III. Setup Software Functions:

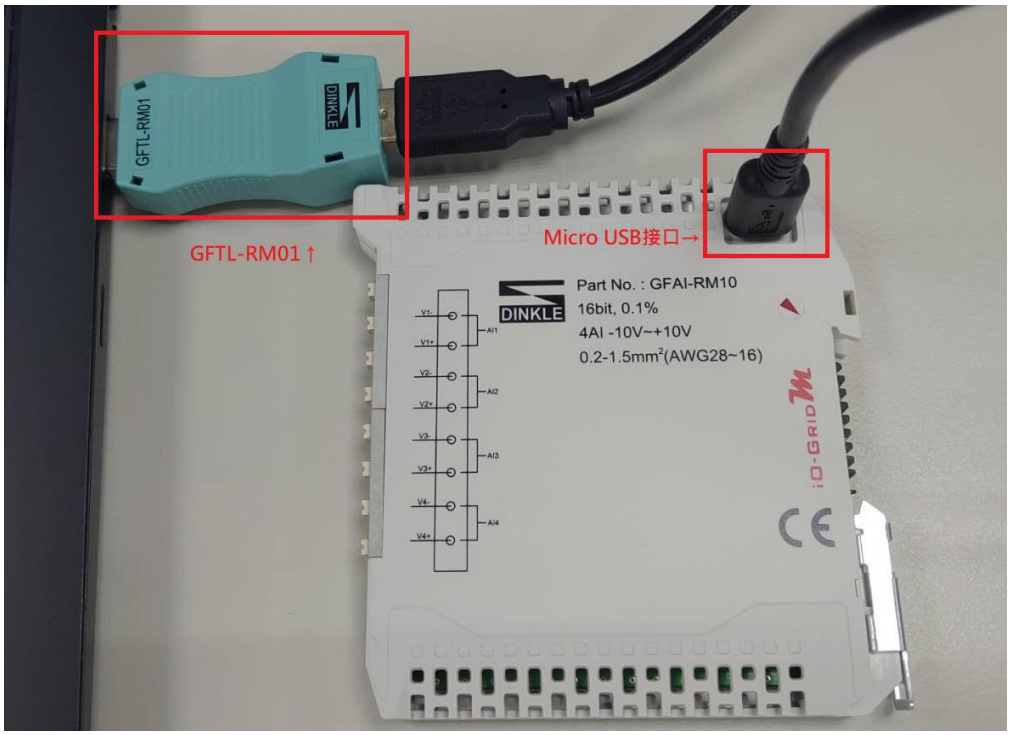
The setup software shows the I/O module station numbers, baud rates and data formats.

IV. I/O Module Settings and Connections

Connect the Micro USB port and GFTL-RM01 (RS232 converter) to your computer and open the iO-Grid M Utility program to set up I/O module parameters

I/O module connection illustration:

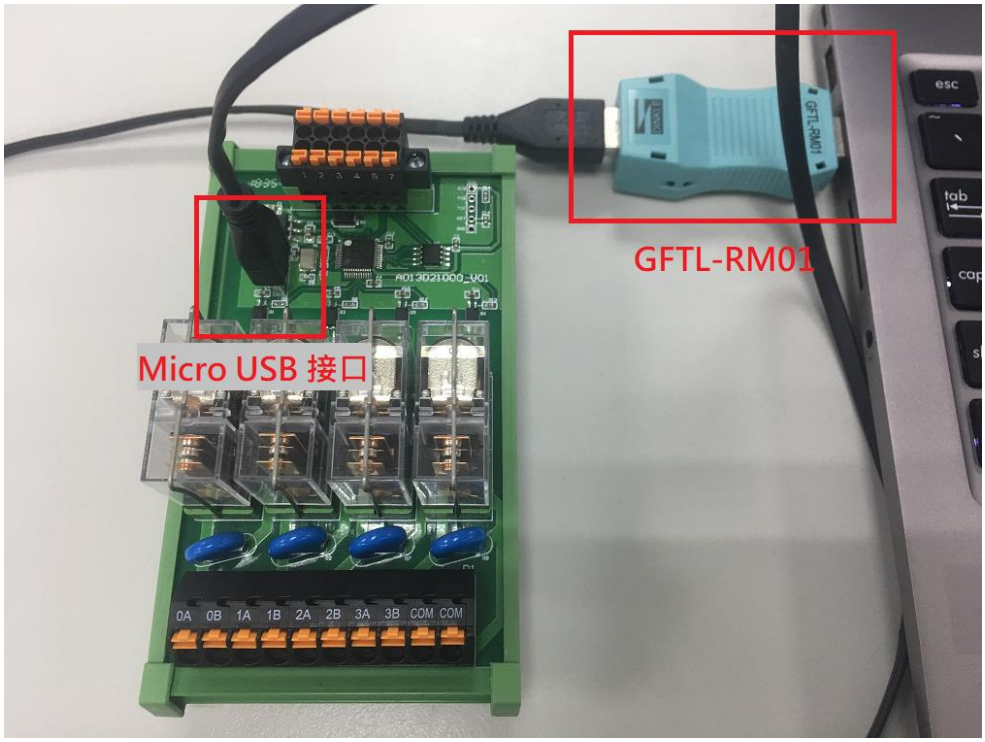
I/O module connection image:



※ Please do now power the I/O module during the setup

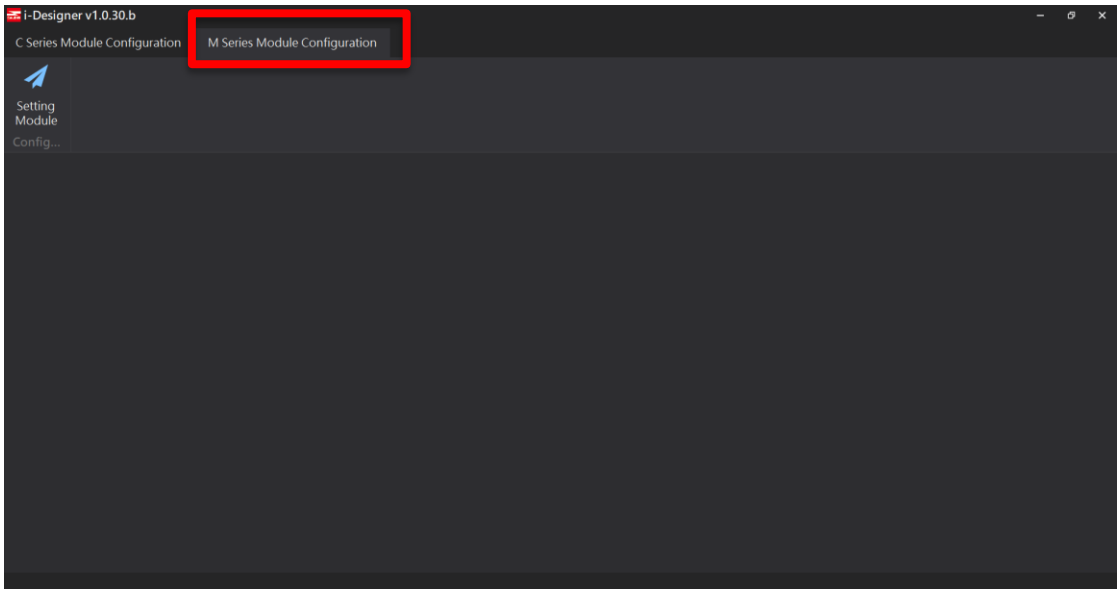
6.2 i-Designer Program Tutorial

I. Connect to the I/O module using GFTL-RM01 and a Micro USB cable

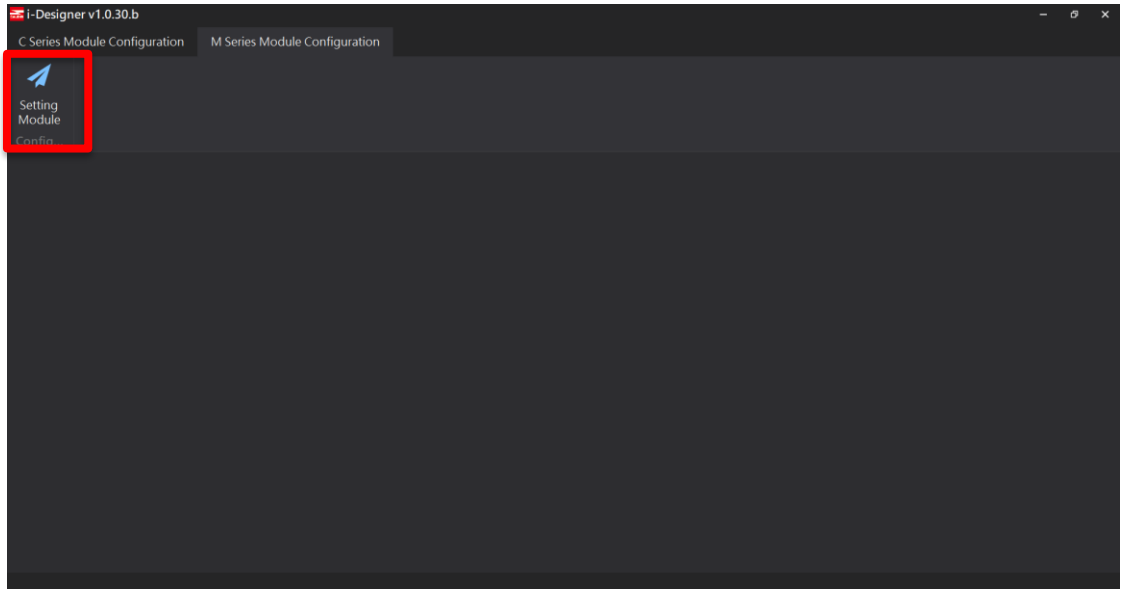


II. Click to launch the software

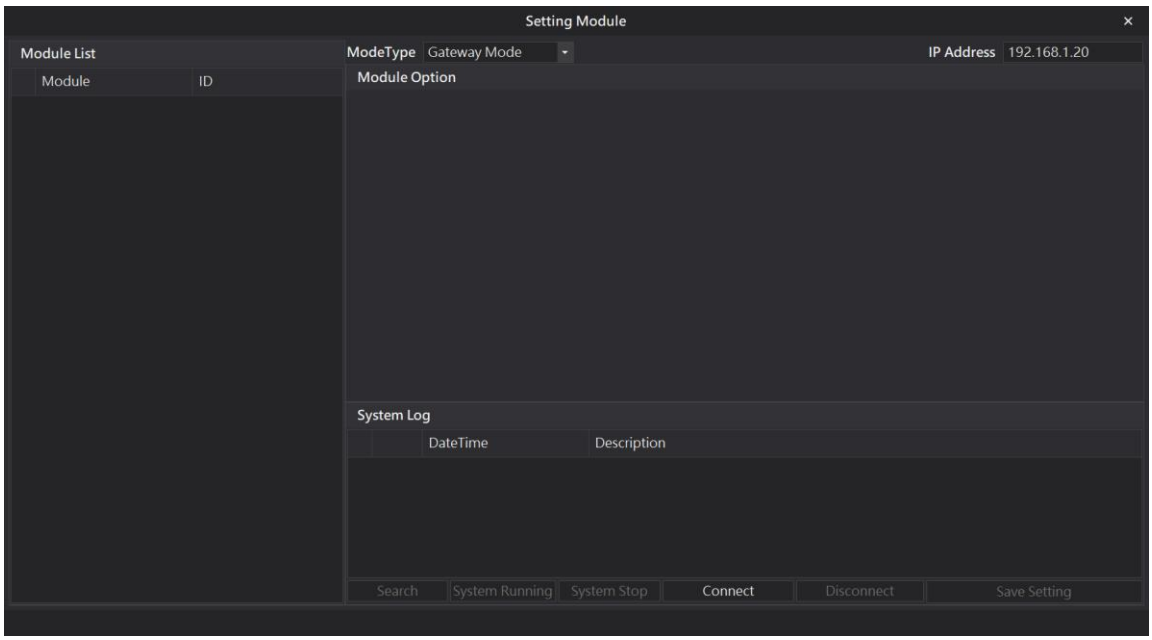
III. Select “M Series Module Configuration”



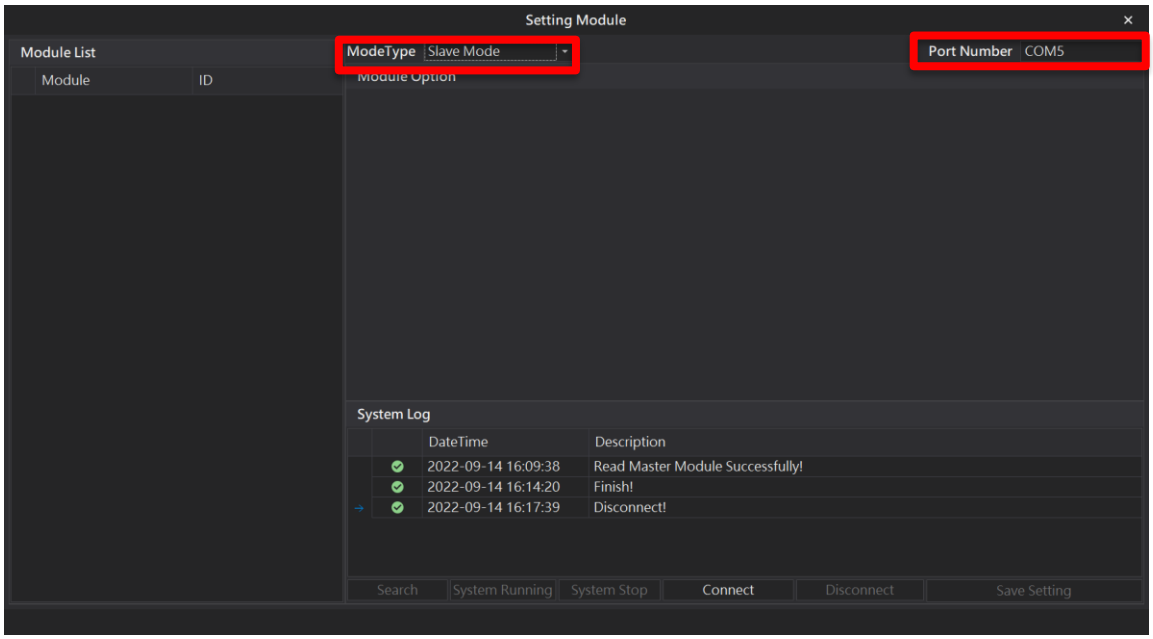
IV. Click on the “Setting Module” icon



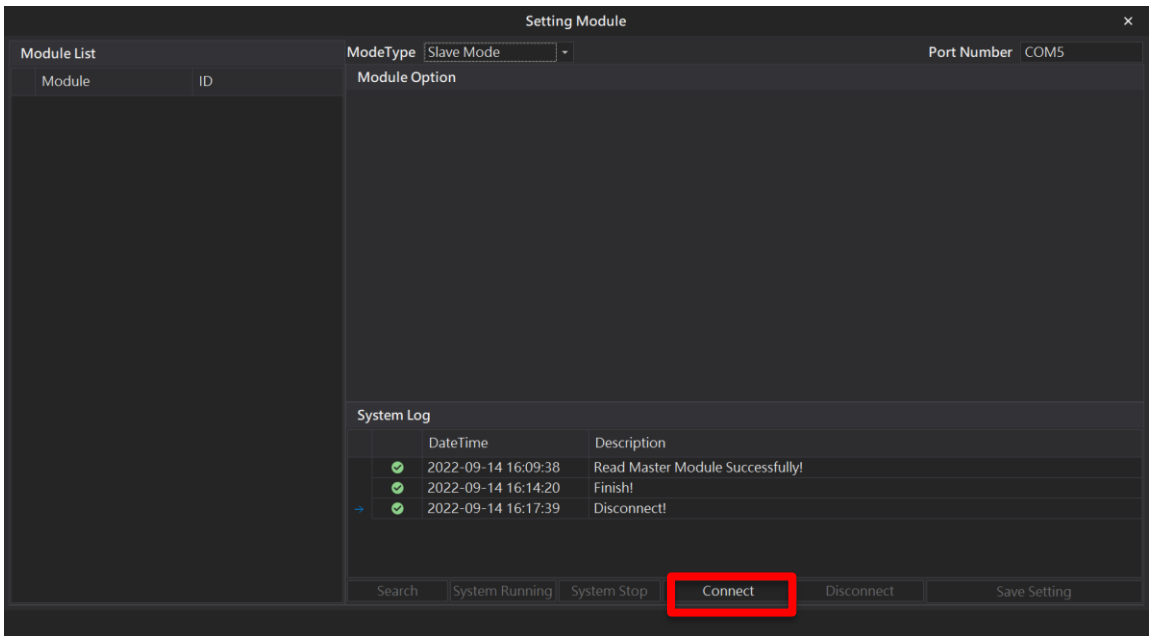
V. Enter the “Setting Module” page for M-series



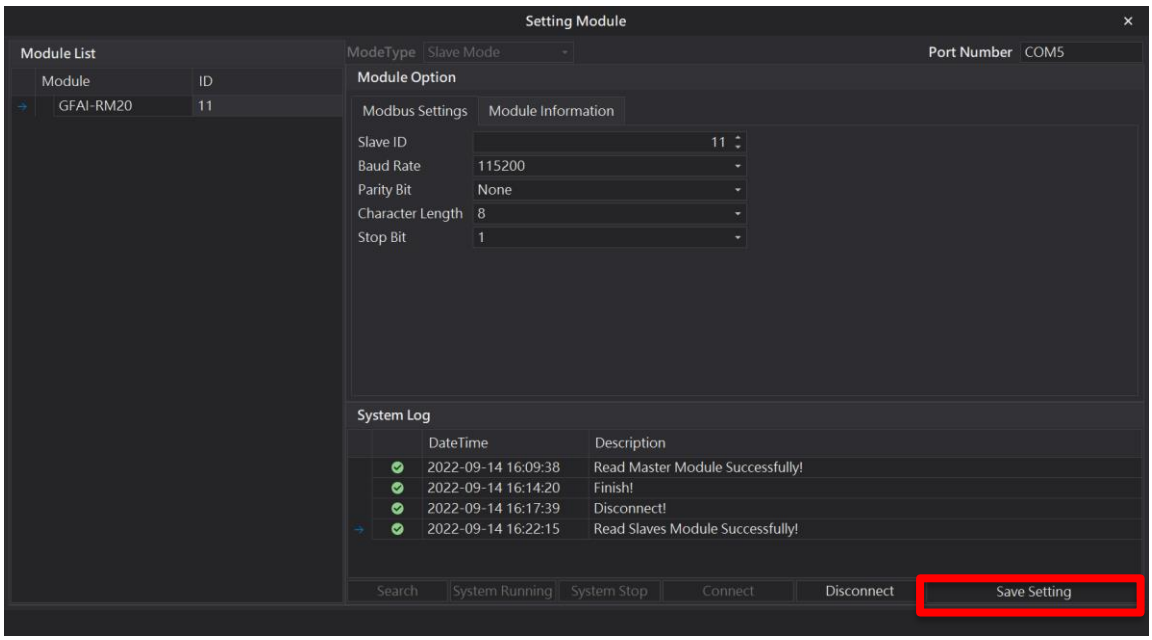
VI. Select the mode type based on the connected module



VII. Click on “Connect”



VIII. Set up I/O modules’ station numbers and communication format (must click on “Save” after changing them)

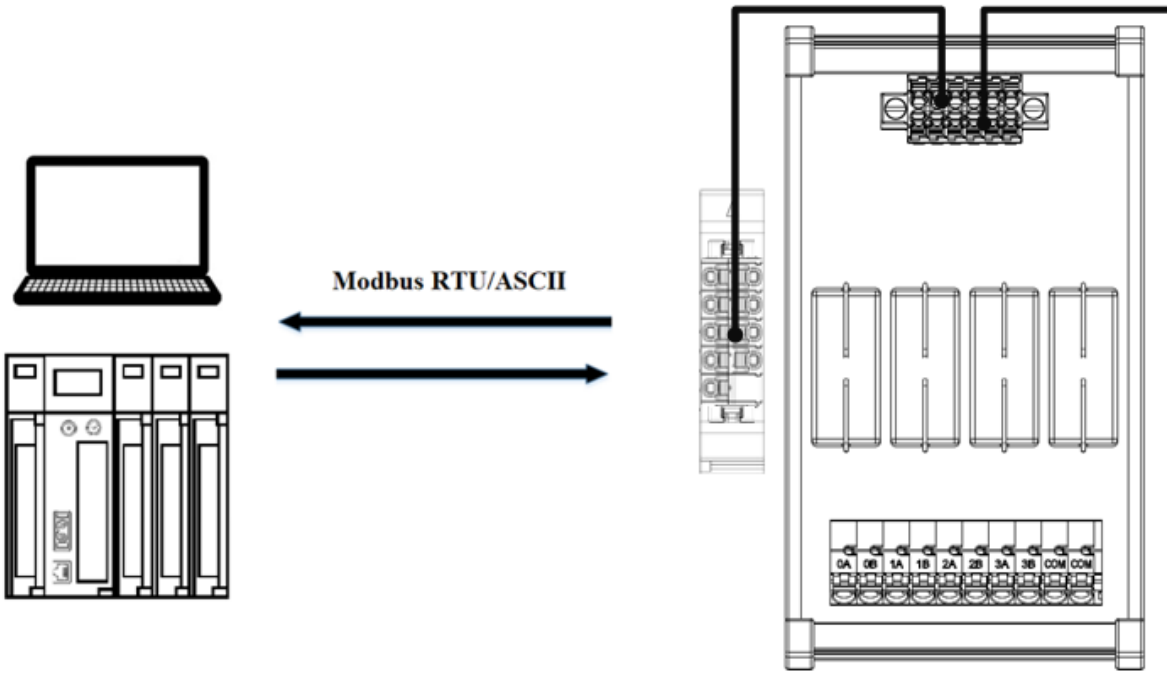


7. Relay Output Module Control Register Description

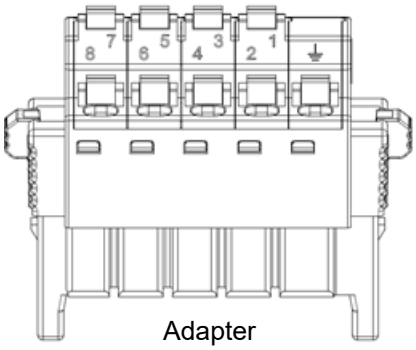
7.1 Relay Output Module Register Communication Method

I. Use Modbus RTU/ASCII to write in single-chip relay output module registers

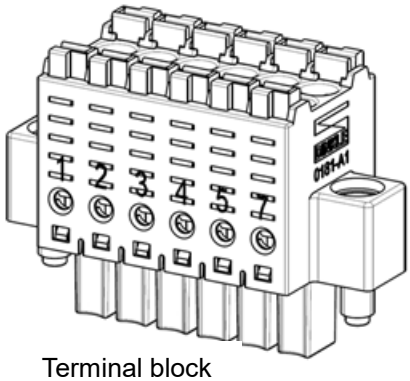
The address for the relay output module register to be written is: 0x2000



※With no control module, RS485's physical wire must be connected with an adapter to send the signal to the power and relay output module



Adapter
BS-211



Terminal block
0181-A106

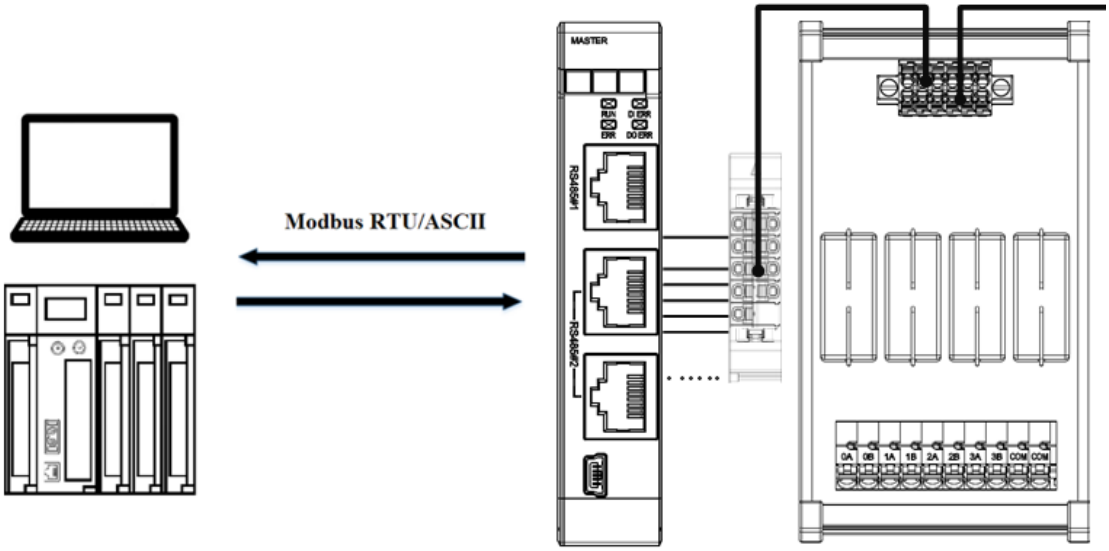
	1	2	3	4	5	6	7	8
Adapter BS-211	24V	0V	5V	0V	485A	–	485B	–
Terminal block 0181-A106	24V	0V	5VDC	0V	485A		485B	

II. Use Modbus RTU/ASCII with control modules to write in relay output registers

Once a relay output module is set up with a control module, it will automatically assign the relay output modules' output records registers at the address of 0x2000

Example:

Two relay output module registers will be between 0x2000 and 0x2001



※When using control modules, RS485 can connect to control modules with BS-210 and BS-211.

The configuration that uses Modbus RTU/ASCII with a control module to write in relay output modules is listed below:

Name/Product No.	Description
GFMS-RM01S	Master Modbus RTU, 1 Port
GFAR-RM11	8-Channel relay module, grounded
GFAR-RM21	4-Channel relay module, grounded
0170-0101	RS485(2W)-to-RS485(RJ45 interface)

7.2 Relay Output Module Register Format Information (0x2000, rewritable)

GFAR-RM11 Register Format: Channel open-1; channel closed - 0; reserved value - 0.

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved								8A	7A	6A	5A	4A	3A	2A	1A

Example: With channel 1 to 8 open:0000 0000 1111 1111 (0x00 0xFF); with all channels closed: 0000 0000 0000 0000 (0x00 0x00).

GFAR-RM11 Register Format: Channel open-1; channel closed - 0; reserved value - 0.

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved												4A	3A	2A	1A

Example: With channel 1 to 4 open:0000 0000 0000 1111 (0x00 0x0F); with all channels closed: 0000 0000 0000 0000 (0x00 0x00).

GFAR-RM20 Register Format: Channel open-1; channel closed - 0; reserved value - 0.

7.3 Modbus function code 0x10 Demonstration

I. Use Modbus RTU/ASCII to write in single-chip relay output module registers

Modbus function code	Code sent example (ID:0x01)	Code replied example (ID:0x01)
0x10	01 10 20 00 00 01 02 00 FF	01 01 10 20 00 00

※In this example, we are writing in "0x2000" with the I/O module ID of "01"

※When not using control modules for communications, the registers will be at 0x2000

II. Use Modbus RTU/ASCII with control modules to write in relay output registers

Modbus function code	Code sent sample (ID:0x01)	Code replied sample (ID:0x01)
0x10	01 10 20 00 00 01 02 00 FF	01 01 10 20 00 00

※In this example, we are writing in "0x2000" with the control module ID of "01"

※When using control modules for communications, the registers will start at 0x2000