INSTRUCTION MANUAL

PNP DISCRETE INPUT & PNP TRANSISTOR OUTPUT MODULE, 8 points each (Modbus 115.2kbps)	MODEL R7M-DAC16D

BEFORE USE ....

Thank you for choosing us. Before use, please check contents of the package you received as outlined below.
If you have any problems or questions with the product, please contact our sales office or representatives.

■ PACKAGE INCLUDES:

Discrete I/O module ....(1)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ INSTRUCTION MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures.

POINTS OF CAUTION

■ CONFORMITY WITH EU DIRECTIVES

- The equipment must be mounted inside the instrument panel of a metal enclosure.
- The actual installation environments such as panel configurations, connected devices, connected wires, may affect the protection level of this unit when it is integrated in a panel system. The user may have to review the CE requirements in regard to the whole system and employ additional protective measures to ensure the CE conformity.
- Install lightning surge protectors for those wires connected to remote locations.

■ POWER INPUT RATING & OPERATIONAL RANGE

- Locate the power input rating marked on the product and confirm its operational range as indicated below:
  24V DC rating: 24V ±10%, approx. 40mA

■ GENERAL PRECAUTIONS

- Before you remove the unit or mount it, turn off the power supply, input and output signal for safety.
- Before you remove the terminal block or mount it, turn off the power supply, input and output signal for safety.
- DO NOT set the switches on the module while the power is supplied. The switches are used only for maintenance without the power.

■ ENVIRONMENT

- Indoor use.
- When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -10 to +55°C (14 to 131°F) with relative humidity within 30 to 90% RH in order to ensure adequate life span and operation.
- Be sure to close the terminal cover for safety.

■ WIRING

- Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

■ AND ....

- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet
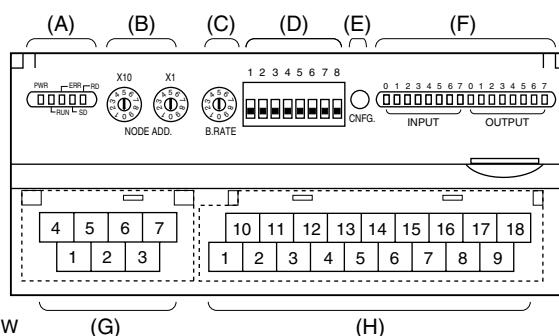
COMPONENT IDENTIFICATION

■ **SIDE VIEW**

■ **FRONT VIEW**

(A) (B) (C) (D) (E) (F)

(I)Terminating Resistor SW

(G) (H)
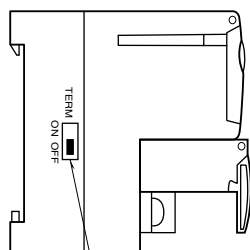
(A) Status Indicator LED
(B) Node Address Setting Rotary SW
(C) Baud Rate Setting Rotary SW
(D) Operating Mode Setting DIP SW (SW1)
(E) PC Configurator Jack
(F) Discrete I/O Status Indicator LED
(G) Modbus, Power Supply Terminals
(H) I/O Terminals
(I) Terminating Resistor SW

■ **STATUS INDICATOR LED**

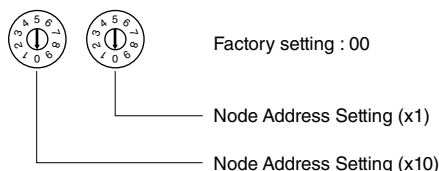| ID	COLOR	FUNCTION
PWR	Red	Turns on when the internal 5V is supplied normally.
RUN	Red	Turns on when the refresh data is received normally.
ERR	Red	Turns on when the received data is abnormal.
SD	Red	Turns on when the module is transmitting.
RD	Red	Turns on when the module is receiving.

■ **DISCRETE I/O STATUS INDICATOR LED**

LED indicators show the signal status.
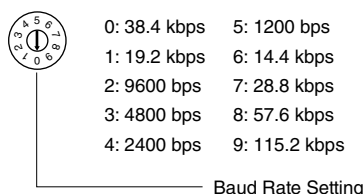   ON : LED ON
   OFF : LED OFF

■ **NODE ADDRESS**

Node Address is selected between 1 and 99 in decimal. The left switch determines the tenth place digit, while the right switch does the ones place digit of the address.

Factory setting : 00

Node Address Setting (x1)

Node Address Setting (x10)

■ **BAUD RATE**

Baud Rate is selected with the rotary switch.
(Factory setting: 0)

0: 38.4 kbps   5: 1200 bps
1: 19.2 kbps   6: 14.4 kbps
2: 9600 bps   7: 28.8 kbps
3: 4800 bps   8: 57.6 kbps
4: 2400 bps   9: 115.2 kbps

Baud Rate Setting

■ **OPERATING MODE**

(*) Factory setting

• **Extension (SW1-1, 1-2)**

SW1-1	SW1-2	EXTENSION
OFF	OFF	No extension (*)
ON	OFF	Discrete input 8 or 16 points
OFF	ON	Discrete output 8 or 16 points

• **Output of the extension module at the loss of communication**

Select "Output Clear (OFF)" or "Output Hold (factory default setting)" using the Configurator Software (model: R7CON).

• **Output of the extension module when the communication is restored**

"Output Clear": The output is reset to off when the communication is restored. However, if a query instructs ON or OFF about output of the extension module when the communication is restored, the instructed content is output.

"Output Hold": The output at the moment of communication loss is held.

• **Output Operation Mode (SW1-3)**

SW1-3	OUTPUT OPERATION MODE
OFF	Disable (*)
ON	Enable

Output switching mode can be independently selected by 2 outputs with PC Configuration software. An example of setting is given below.
   Output 0: Maintained output
   Output 1: Maintained output
   Output 2: Momentary output
   Output 3: Momentary output
   Output 4: Momentary output
   Output 5: Momentary output
   Output 6: Maintained output
   Output 7: Maintained output

• **Output at the Loss of Communication (SW1-4)**

SW1-4	OUTPUT AT THE LOSS OF COMMUNICATION
OFF	Reset the output (turned off)
ON	Hold the output (*) (maintains the last data received normally)

• Output Switching Mode (SW1-5)

SW1-5	OUTPUT SWITCHING MODE
OFF	Maintained Output Mode (*)
ON	Momentary Output Mode

SW1-5 setting is disregarded when SW1-3 is set to ON.

• Output ON Time (SW1-6, 1-7, 1-8)

SW1-6	SW1-7	SW1-8	OUTPUT ON TIME
OFF	OFF	OFF	100 ms (*)
ON	OFF	OFF	200 ms
OFF	ON	OFF	300 ms
ON	ON	OFF	500 ms
OFF	OFF	ON	1 s
ON	OFF	ON	2 s
OFF	ON	ON	5 s
ON	ON	ON	10 s

■ **POWER SUPPLY, MODBUS TERMINAL ASSIGNMENT**

4 DA	5 DG	6 +24V	7 0V
1 DB	2 SLD	3 FG	

(1) DB   –
(2) SLD   Shield
(3) FG   FG
(4) DA   –
(5) DG   –
(6) +24V   Power input (24V DC)
(7) 0V   Power input (0V)

■ **I/O TERMINAL ASSIGNMENT**

10 C+	11 X1	12 X3	13 X5	14 X7	15 Y1	16 Y3	17 Y5	18 Y7
1 C–	2 X0	3 X2	4 X4	5 X6	6 Y0	7 Y2	8 Y4	9 Y6

NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	C–	Common–	10	C+	Common+
2	X0	Input 0	11	X1	Input 1
3	X2	Input 2	12	X3	Input 3
4	X4	Input 4	13	X5	Input 5
5	X6	Input 6	14	X7	Input 7
6	Y0	Output 0	15	Y1	Output 1
7	Y2	Output 2	16	Y3	Output 3
8	Y4	Output 4	17	Y5	Output 5
9	Y6	Output 6	18	Y7	Output 7

■ **TERMINATING RESISTOR**

To use the terminating resistor, turn the switch ON, and OFF to invalidate.
(Factory setting: OFF)

■ **EXTENSION MODULE**

Combinations with all extension modules are available.

PC CONFIGURATOR

With configurator software, settings shown below are available.
Refer to the software manual of R7CON for detailed operation.

■ **INTERFACE MODULE SETTING**

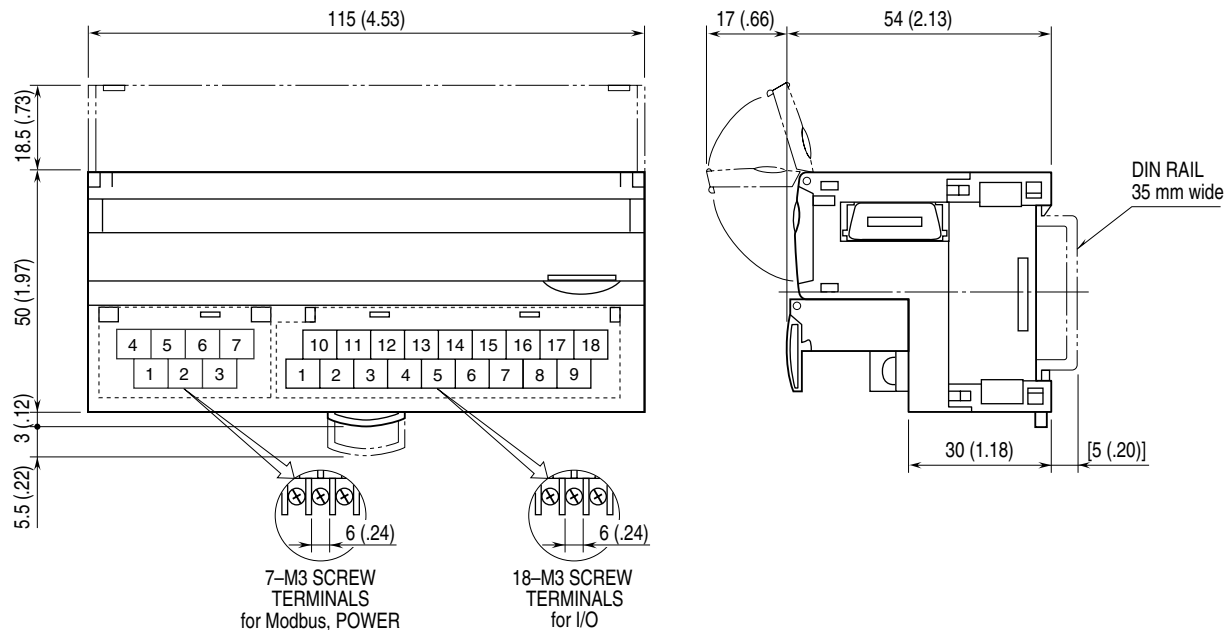| PARAMETER	AVAILABLE RANGE	DEFAULT SETTING
Communication Timeout	0.0 – 3276.7 (sec.)	1.0 (sec.)
Data Mode	RTU / ASCII	RTU
Parity	NONE / ODD / EVEN	NONE

■ **CHANNEL INDIVIDUAL SETTING**

PARAMETER	AVAILABLE RANGE	DEFAULT SETTING
Output Operation Mode	Maintained / Momentary	----

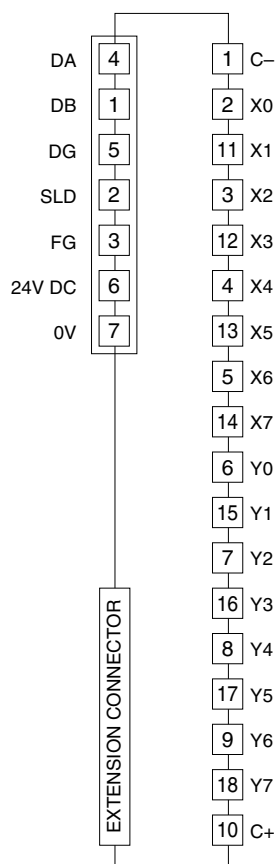# TERMINAL CONNECTIONS

Connect the unit as in the diagram below.

■ **EXTERNAL DIMENSIONS unit: mm (inch)**

115 (4.53)

18.5 (.73)

50 (1.97)

3 (.12)

5.5 (.22)

4	5	6	7
1	2	3	

10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9

6 (.24)

7–M3 SCREW
TERMINALS
for Modbus, POWER

6 (.24)

18–M3 SCREW
TERMINALS
for I/O

17 (.66)   54 (2.13)
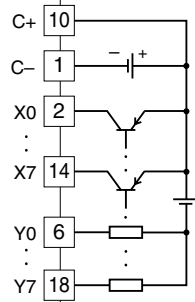
DIN RAIL
35 mm wide

30 (1.18)   [5 (.20)]

■ **CONNECTION DIAGRAM**

Note: In order to improve EMC performance, bond the FG terminal to ground.
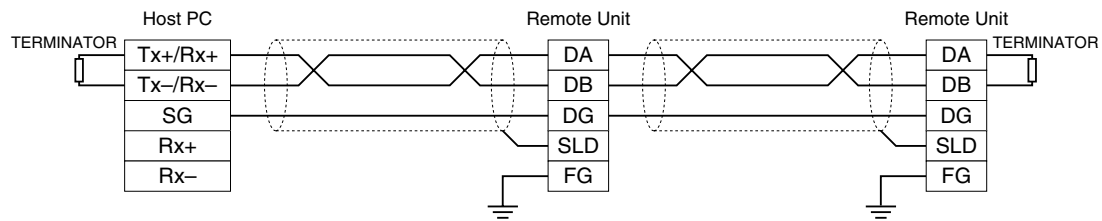Caution: FG terminal is NOT a protective conductor terminal.

DA	4	
DB	1	
DG	5	
SLD	2	
FG	3	
24V DC	6	
0V	7	

EXTENSION CONNECTOR

1	C–
2	X0
11	X1
3	X2
12	X3
4	X4
13	X5
5	X6
14	X7
6	Y0
15	Y1
7	Y2
16	Y3
8	Y4
17	Y5
9	Y6
18	Y7
10	C+

■ **I/O Connection Examples**

C+	10
C–	1
X0	2
X7	14
Y0	6
Y7	18

COMMUNICATION CABLE CONNECTIONS
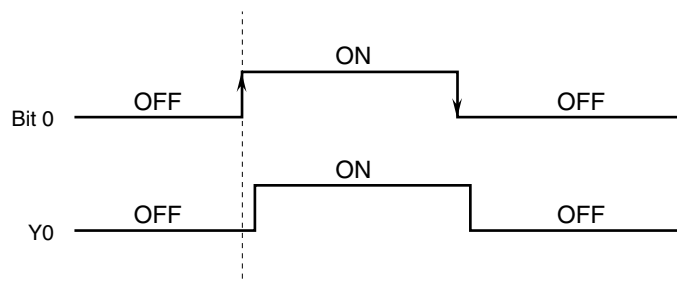
■ MASTER CONNECTION

Be sure to connect the terminating resistor included in the product package to the unit at both ends of transmission line.
The terminator must be connected across DA and DB.
The Host PC can be located other than at the extreme ends of transmission line.

EXAMPLE OF OPERATION MODES

■ MAINTAINED OUTPUT MODE

Example of Y0 is shown below.

■ MOMENTARY OUTPUT MODE

Y0 and Y1, Y2 and Y3, Y4 and Y5, Y6 and Y7 are respectively combined to realize momentary switching with one-shot output. Bit 0, 2, 4, 6 are used to control each set of outputs, while Bit 1, 3, 5, 7 are unused.
An example of Bit 0 controlling Y0 and Y1 outputs sequentially is shown below.

1) Output data Bit 0 is turned from 0 to 1.

2) Following the rising edge of Bit 0, Y0 one-shot output turns ON for a fixed period of time (SW1 time setting).

3) Bit 0 is turned from 1 to 0.

4) Following the sinking edge of Bit 0, Y1 one-shot output turns ON for a fixed period of time (SW1 time setting).
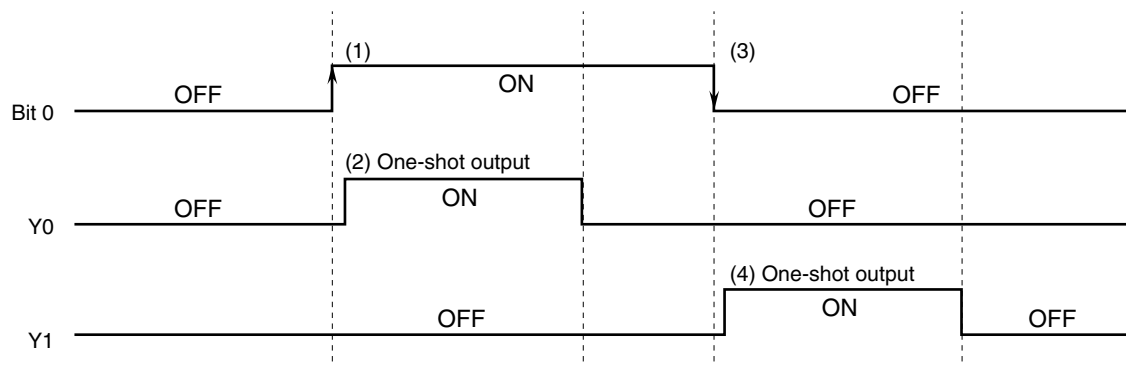
Note: If Bit 0 receives multiple data during the one-shot output time period, the Y0 provides only the last output data received within approx. 25 milliseconds after the period.

I/O DATA DESCRIPTIONS

■INPUT

BIT	INPUT	DATA	STATE
0	X0	0	OFF
		1	ON
1	X1	0	OFF
		1	ON
2	X2	0	OFF
		1	ON
3	X3	0	OFF
		1	ON
4	X4	0	OFF
		1	ON
5	X5	0	OFF
		1	ON
6	X6	0	OFF
		1	ON
7	X7	0	OFF
		1	ON
8	----	----	Unused
9	----	----	Unused
10	----	----	Unused
11	----	----	Unused
12	----	----	Unused
13	----	----	Unused
14	----	----	Unused
15	----	----	Unused

■OUTPUT

• Maintained Output Mode

| BIT	OUTPUT	DATA	STATE
0	Y0	0	OFF
		1	ON
1	Y1	0	OFF
		1	ON
2	Y2	0	OFF
		1	ON
3	Y3	0	OFF
		1	ON
4	Y4	0	OFF
		1	ON
5	Y5	0	OFF
		1	ON
6	Y6	0	OFF
		1	ON
7	Y7	0	OFF
		1	ON
8	----	----	Unused
9	----	----	Unused
10	----	----	Unused
11	----	----	Unused
12	----	----	Unused
13	----	----	Unused
14	----	----	Unused
15	----	----	Unused

• Momentary Output Mode

BIT	OUTPUT	DATA	STATE
0	Y0	1	One-shot output
	Y1	0	One-shot output
1	----	----	Unused
2	Y2	1	One-shot output
	Y3	0	One-shot output
3	----	----	Unused
4	Y4	1	One-shot output
	Y5	0	One-shot output
5	----	----	Unused
6	Y6	1	One-shot output
	Y7	0	One-shot output
7	----	----	Unused
8	----	----	Unused
9	----	----	Unused
10	----	----	Unused
11	----	----	Unused
12	----	----	Unused
13	----	----	Unused
14	----	----	Unused
15	----	----	Unused

Note: In Momentary Output Mode, one-shot output is operated also when the output data bit is set from 1 to 1.

[EXAMPLE]
1) Output data Bit 0 is turned from 0 to 1.
2) Following the rising edge of Bit 0, Y0 one-shot output turns ON for a fixed period of time (SW1 time setting).
3) Bit 0 is turned from 1 to 1.
4) Following the sinking edge of Bit 0, Y0 one-shot output turns ON for a fixed period of time (SW1 time setting).
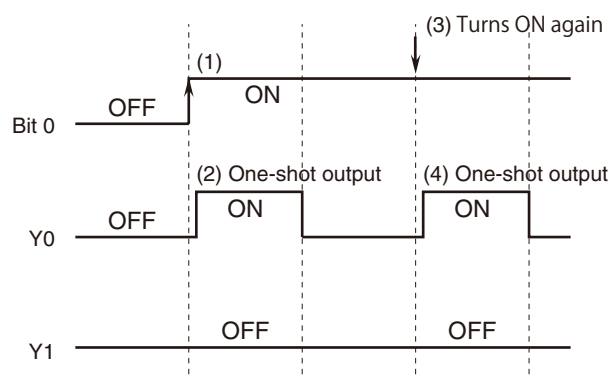
MODBUS FUNCTION CODES & SUPPORTED CODES

■ Data and Control Functions

CODE	NAME	
01	Read Coil Status	Digital output from the slave (read/write)
02	Read Input Status	Status of digital inputs to the slave (read only)
03	Read Holding Registers	General purpose register within the slave (read/write)
04	Read Input Registers	Collected data from the field by the slave (read only)
05	Force Single Coil	Digital output from the slave (read/write)
06	Preset Single Register	General purpose register within the slave (read/write)
08	Diagnostics	
11	Fetch Comm. Event Counter	Fetch a status word and an event counter
12	Fetch Comm. Event Log	A status word, an event counter, a message count and a field of event bytes
15	Force Multiple Coils	Digital output from the slave (read/write)
16	Preset Multiple Registers	General purpose register within the slave (read/write)
17	Report Slave ID	Slave type/ 'RUN' status

■ Exception Codes

CODE	NAME	
01	Illegal Function	Function code is not allowable for the slave
02	Illegal Data Address	Address is not available within the slave
03	Illegal Data Value	Data is not valid for the function

■ Diagnostic Subfunctions

CODE	NAME	
00	Return Query Data	Loop back test

MODBUS I/O ASSIGNMENT

	ADDRESS	DATA TYPE	DATA
Coil (0X)	1 – 16		Digital Output (discrete output of the basic module)
	17 – 32		Digital Output (discrete output of the extension module)
Inputs (1X)	1 – 16		Digital Input (discrete input of the basic module)
	17 – 32		Digital Input (discrete input of the extension module)
	33 – 48		Reserved (unused)
	49 – 64		Module Status
	65 – 80		Reserved (unused)
Input Registers (3X)	1 – 4	I	Analog Input
	5 – 16	----	Reserved (unused)
	17 – 24	F	Analog Input
	25 – 48	----	Reserved (unused)
Holding Registers (4X)	1 – 2	I	Analog Output
	3 – 16	----	Reserved (unused)
	17 – 20	F	Analog Output
	21 – 48	----	Reserved (unused)

I: Integer, -1500 – +11500 (-15 – +115%)
F: Floating
Note: DO NOT access addresses other than mentioned above. Such access may cause problems such as inadequate operation.

WIRING INSTRUCTIONS

■ SCREW TERMINAL

Torque: 0.5 N·m

■ SOLDERLESS TERMINAL

Refer to the drawing below for recommended ring tongue terminal size. Spade tongue type is also applicable.

Applicable wire size: 0.25 to 1.65 mm^2 (AWG 22 to 16)

Recommended manufacturer: Japan Solderless Terminal MFG. Co., Ltd, Nichifu Co., Ltd

3.3 (.13) max

6 (.24) max

mm (inch)