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ΔELTA
DELTA ELECTRONICS, INC.

5011668000-RU00

RTU-485

INSTRUCTION SHEET

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安 装 说 明

▲ *Modbus Remote I/O Communication Module*
▲ *Modbus遠端I/O通訊模組*
▲ *Modbus远程I/O通讯模块*

www.delta.com.tw/industrialautomation

⚠ Warning ·· ENGLISH

✓ *Please read this instruction sheet carefully before use.*
✓ *Switch off the power before wiring.*
✓ *RTU-485 is an OPEN-TYPE device and therefore should be installed in an enclosure free of airborne dust, humidity, electric shock and vibration. The enclosure should prevent non-maintenance staff from operating the device (e.g. key or specific tools are required to open the enclosure) in case danger and damages on the device may occur.*
✓ *DO NOT touch the internal circuit in one minute after the power is switched off.*
✓ *DO NOT connect input AC power supply to any of the I/O terminals; otherwise serious damage may occur. Check all the wiring again before switching on the power and DO NOT touch any terminal when the power is switched on. Make sure the ground terminal ⏚ is correctly grounded in order to prevent electromagnetic interference.*

❶ Introduction

Thank you for choosing Delta RTU-485 communication module. RTU-485 is a Modbus remote I/O communication module for Delta's PLC to remote-control Slim series DI/DO and AI/AO extension units. As a standard Modbus slave, RTU-485 is compatible with other master station complying with Modbus protocol.

Product Profile & Outline

Unit: mm
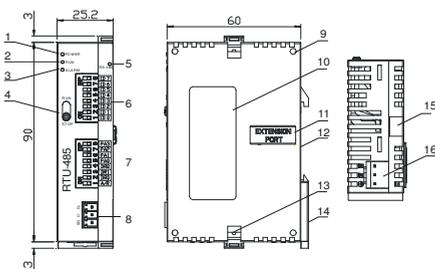
1. POWER indicator	9. Mounting hole for extension unit
2. RUN indicator	10. Nameplate
3. ALARM indicator	11. Extension port for extension unit
4. RUN/STOP switch	12. DIN rail slot (35mm)
5. Communication indicator	13. Fastening hole for extension unit
6. Address setup DIP switch	14. DIN rail clip
7. Communication mode setup DIP switch	15. Mounting rail for extension unit
8. RS-485 communication port	16. Power input

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❷ Specifications

■ RTU-485 Connector

Type	Removable 3-pin connector
Transmission method	RS-485
Transmission cable	2 twisted isolation cables
Electrical isolation	500V DC

■ Communication

Valid communication address	1 ~ F0 (decimal: 1 ~ 240)
Series transmission speed	1,200/2,400/4,800/9,600/19,200/38,400/57,600/115,200 bps (bits per second)
Communication mode	7,E,1-ASCII / 7,O,1-ASCII / 7,E,2-ASCII / 7,O,2-ASCII / 7,N,2-ASCII / 8,E,1-ASCII / 8,O,1-ASCII / 8,N,1-ASCII / 8,N,2-ASCII / 8,E,1-RTU / 8,O,1-RTU / 8,N,1-RTU/ 8,N,2-RTU

■ Electrical Specification

Power voltage	24V DC (-15% ~ 20%) (with DC input polarity reverse protection)

■ Environment

Noise immunity	ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge, 4KV Contact Discharge EFT (IEC 61131-2, IEC 61000-4-4): Power Li4ne: 2KV, Digital I/O: 1KV Analog & Communication I/O: 1KV Damped-Oscillatory Wave: Power Line: 1KV, Digital I/O: 1KV RS (IEC 61131-2, IEC 61000-4-3): 80MHz ~ 1000MHz , 1.4GHz ~ 2.0GHz , 10V/m
Operation/storage	Operation: 0ºC ~ 55ºC (temperature), 50 ~ 95% (humidity), pollution degree 2 Storage: -25ºC ~ 70ºC (temperature), 5 ~ 95% (humidity)
Shock/vibration immunity	International standards: IEC61131-2﹑IEC 68-2-6 (TEST Fc)/IEC61131-2 & IEC 68-2-27 (TEST Ea)
Standards	IEC 61131-2, UL508

❸ Components

■ RUN/STOP Switch

RUN

STOP

| Status	Explanation
RUN	1. RUN indicator on RTU-485 is On. 2. AI/AO extension unit in RUN status.
RUN ⬇ STOP	1. AI/AO extension unit switches from RUN to STOP status. 2. Y points on DI/DO extension unit are all Off.
STOP	1. RUN indicator on RTU-485 is Off. 2. AI/AO extension unit in STOP status. 3. Communication control is not allowed in AI/AO extension unit. 4. Communication control is not allowed in DI/DO extension unit.
STOP ⬇ RUN	1. RTU-485 re-detects the number of points in DI/DO unit and the number of AI/AO units. 2. AI/AO extension unit switches from STOP to RUN status.

■ Address Setup DIP Switch

DIP Switch Setting	Explanation
H'01 ~ H'F0	For valid RTU-485 address, the definition of ID0 ~ ID7 are: $2^0, 2^1, 2^2, \ldots 2^6, 2^7$.
H'00, H'F1 ~ H'FF	In the Modbus protocol, H'00 is defined as broadcast mode. H'F1 ~ H'FF are incorrect RTU-485 addresses.
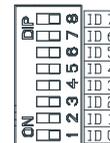
■ Communication Mode Setup DIP Switch

The communication setup switch is a set of 8-bit DIP switches. PA0 ~ PA3 are for setting up RTU-485 communication mode, DR0 ~ DR2 are for setting up the series transmission speed, and A/R is for setting up ASCII/RTU mode. There are 13 communication modes and 8 series transmission speeds available.

PA3	PA2	PA1	PA0	A/R	Communication mode
OFF	OFF	OFF	OFF	ON	7,E,1-ASCII
OFF	OFF	OFF	ON	ON	7,O,1-ASCII
OFF	OFF	ON	OFF	ON	7,E,2-ASCII
OFF	OFF	ON	ON	ON	7,O,2-ASCII
OFF	ON	OFF	OFF	ON	7,N,2-ASCII
OFF	ON	OFF	ON	ON	8,E,1-ASCII
OFF	ON	ON	OFF	ON	8,O,1-ASCII
OFF	ON	ON	ON	ON	8,N,1-ASCII
ON	OFF	OFF	OFF	ON	8,N,2-ASCII
OFF	ON	ON	ON	OFF	8,E,1-RTU
OFF	ON	ON	OFF	OFF	8,O,1-RTU
OFF	ON	ON	ON	OFF	8,N,1-RTU
ON	OFF	OFF	OFF	OFF	8,N,2-RTU

Other settings of PA3, PA2, PA1, PA0 and A/R will be regarded as invalid communication modes

DR2	DR1	DR0	Series Transmission speed
OFF	OFF	OFF	1,200 bit/s
OFF	OFF	ON	2,400 bit/s
OFF	ON	OFF	4,800 bit/s
OFF	ON	ON	9,600 bit/s
ON	OFF	OFF	19,200 bit/s
ON	OFF	ON	38,400 bit/s
ON	ON	OFF	57,600 bit/s
ON	ON	ON	115,200 bit/s

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❹ Function Codes Supported by RTU-485

RTU-485 complies with the standard Modbus protocol, supporting the 7 function codes, H'01, H'02, H'03, H'05, H'06, H'0F, and H'10. Please refer to the standard Modbus protocol for the specific data format of each function code.

Function code	Function	Data type	Applicable address
H'01	Read the output status of bit device	bit	DO area: H'0500 ~ H'057F
H'02	Read the input status of bit device.	bit	DI area: H'0400 ~ H'047F
H'03	Read register	word	Special function area: H'0000 ~ H'001F CR of the 1st AI/AO unit: H'1600 ~ H'1630 CR of the 2nd AI/AO unit: H'1640 ~ H'1670 CR of the 3rd AI/AO unit: H'1680 ~ H'16B0 CR of the 4th AI/AO unit: H'16C0 ~ H'16F0 CR of the 5th AI/AO unit: H'1700 ~ H'1730 CR of the 6th AI/AO unit: H'1740 ~ H'1770 CR of the 7th AI/AO unit: H'1780 ~ H'17B0 CR of the 8th AI/AO unit: H'17C0 ~ H'17F0
H'05	Write single datum into bit device	bit	DO area: H'0500 ~ H'057F
H'06	Write single datum into register	word	RUN/STOP RTU module: H'0003 Applicable to CR with write attribute in the 1st ~ 8th AI/AO extension unit.
H'0F	Write many data into bit device	bit	DO area: H'0500 ~ H'057F
H'10	Write many data into register	word	RUN/STOP RTU module: H'0003 Applicable to CR with write attribute in the 1st ~ 8th AI/AO extension unit.

Example: Use function code 03 to read CR0 and CR1 in the 1st AI/AO extension unit: (ASCII mode)
The request message sent from master PLC to RTU-485 is ": 01 03 16 00 00 02 E4 CR LF"
The responding message sent from RTU-485 to the master PLC is ": 01 03 04 00 88 00 00 70 CR LF"

🖉*Note:*
1. RTU-485 can only read and write one AI/AO extension unit at the same time.
2. RTU-485 is able to read/write maximum 16 words at a time in the communication control.

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❺ LED Indicators

■ POWER Indicator

LED status	Indication	How to deal with it
Off	No power	Check if the power and connection of RTU-485 work normally. If both work normally, your RTU-485 malfunctions. Please change to a new RTU-485.
Constantly On in green	RTU-485 module is powered	-

■ RUN Indicator

LED status	Indication	How to deal with it
Off	RTU-485 and the connected AI/AO extension unit are in STOP status.	-
Constantly On in green	RTU-485 and the connected AI/AO extension unit are in RUN status.	-

■ ALARM Indicator

LED status	Indication	How to deal with it
Red light flashes	Low power voltage	Adjust the voltage supplied to RTU-485 to normal voltage.
Constantly On in red	Incorrect communication format	Reset to the communication format supported by RTU-485 and re-power the module after the setup.
	Incorrect station No.	Check if the station No. is within H'01 ~ H'F0.
	1. No extension unit connected 2. More than 8 extension unit connected 3. More then 128 I/O points in the extension unit.	1. Make sure the extension unit is correctly connected. 2. Make sure the number of connected extension units is less than 8. 3. Make sure the number of I/O points is less than128.

■ RS-485 Indicator

LED status	Indication	How to deal with it
Red light flashes during communication	The LED will flash once when RTU-485 and the master completes the communication of 1 message.	-