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Multi-CH Modular Type Temperature Controller

TM-Q02H(RS485)

Technical Support Manual

TM Series

Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

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Preface

Thank you very much for selecting Autonics products.

Please familiarize yourself with the information contained in the **Safety Precautions** section before using this product.

This user manual contains information about the product and its proper use, and should be kept in a place where it will be easy to access.

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Technical Support Manual Guide

- Please familiarize yourself with the information in this manual before using the product.
- This manual provides detailed information on the product's features. It does not offer any guarantee concerning matters beyond the scope of this manual.
- This manual may not be edited or reproduced in either part or whole without permission.
- This manual is not provided as part of the product package. Please visit our home-page (www.autonics.com) to download a copy.
- The manual's content may vary depending on changes to the product's software and other unforeseen developments within Autonics, and is subject to change without prior notice. Upgrade notice is provided through our homepage.
- We contrived to describe this manual more easily and correctly. However, if there are any corrections or questions, please notify us these on our homepage.

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Technical Support Manual Symbols

Symbol	Description
 Note	Supplementary information for a particular feature.
 Warning	Failure to follow instructions can result in serious injury or death.
 Caution	Failure to follow instructions can lead to a minor injury or product damage.
 Ex.	An example of the concerned feature's use.
※1	Annotation mark.

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Safety Precautions

- Following these safety precautions will ensure the safe and proper use of the product and help prevent accidents, as well as minimizing possible hazards.
- Safety precautions are categorized as Warnings and Cautions, as defined below:

Warning	**Warning**	Failure to follow the instructions may lead to a serious injury or accident.
Caution	**Caution**	Failure to follow the instructions may lead to a minor injury or accident.

Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
  Failure to follow this instruction may result in personal injury, fire, or economic loss.
- The unit must be installed on a device panel before use.
  Failure to follow this instruction may result in electric shock.
- Do not connect, repair, or inspect the unit while connected to a power source.
  Failure to follow this instruction may result in electric shock.
- Check the input power specifications and terminal polarity for correct connecting the power source.
  Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit. Please contact us if necessary.
  Failure to follow this instruction may result in electric shock or fire.

Caution

- Do not use the unit outdoors.
  Failure to follow this instruction may result in shortening the life cycle of the unit, or electric shock.
- When connecting the power input and relay output cables, use AWG20 (0.5mm^2) cables.
  Failure to follow this instruction may result in fire due to contact failure.
- Use the unit within the rated specifications.
  Failure to follow this instruction may result in shortening the life cycle of the unit, or fire.
- Do not use loads beyond the rated switching capacity of the relay contact.
  Do not use water or oil-based detergent when cleaning the unit. Use dry cloth to clean the unit.
- Do not use water or oil-based detergent when cleaning the unit. Use dry cloth to clean the unit.
  Failure to follow this instruction may result in electric shock or fire.

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- Do not use the unit where flammable or explosive gas, humidity, direct sunlight, radiant heat, vibration, or impact may be present.
  Failure to follow this instruction may result in fire or explosion.
- Keep dust and wire residue from flowing into the unit.
  Failure to follow this instruction may result in fire or product damage.
- Check the polarity of the measurement input contact before wiring the temperature sensor.
  Failure to follow this instruction may result in fire or explosion.
- For installing the unit with reinforced insulation, use the power supply unit which basic level is ensured.

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Table of Contents

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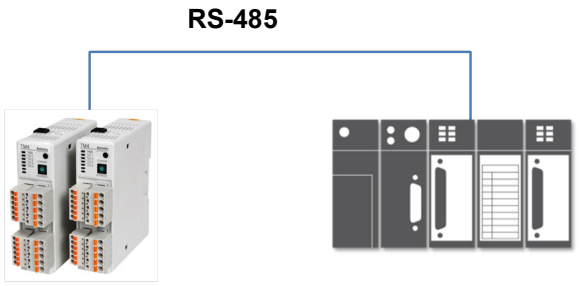
1 System

1.1 Version

Software	Version	Note
Operations	Windows 7	—
GX Works2	1.545T	Release : 2016.03.29

1.2 Connections



TM4

CPU: Q02H

Module: QJ71C24N

1.3 Communication cable connection

TM4 Series	Cable connection	PLC (QJ71C24N)
RS – 485 (-)		SDB
		SDA
RS – 485 (+)		RDB
		RDA

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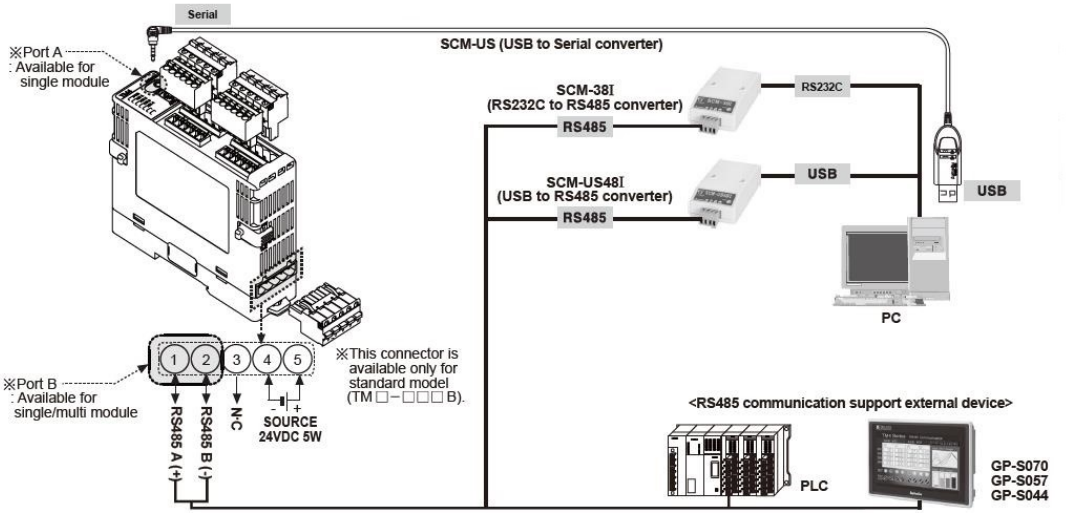
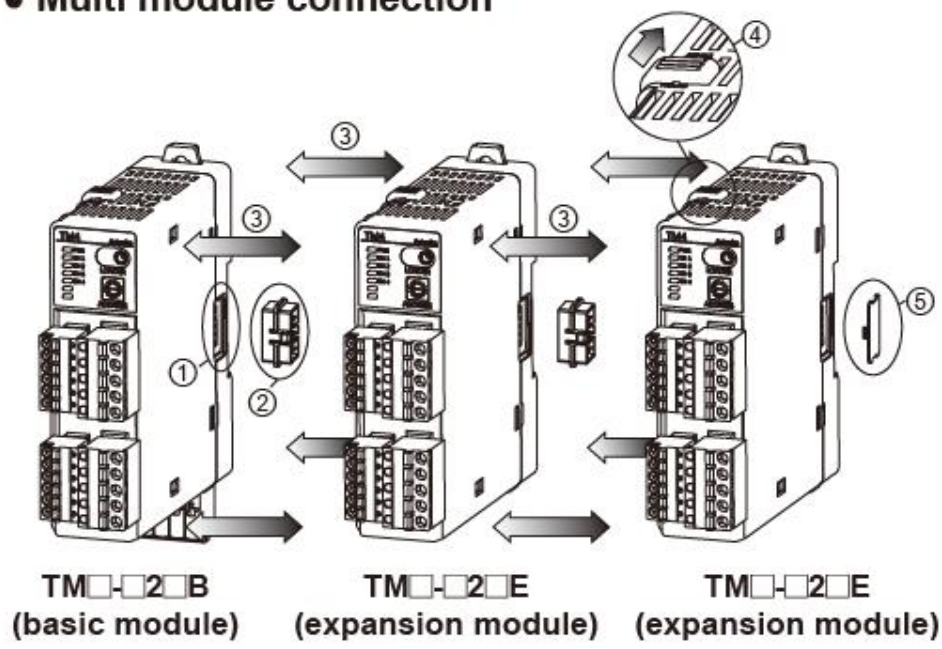
1.4 Communication connection and multi module connection



When using the port A, only single module is available.

For using single/multi module, use the port B.

• Multi module connection



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2 Communication Setting

2.1 TM4 Series Setting

1st TM4 is multi-channel temperature controller. You can set the parameter settings by DAQMaster, the dedicated comprehensive device management program. (address setting is available to adjust by the communication address setting switch (SW1), communication address group switch (SW2) of the unit)

2nd Indicators for initial power ON

Status / Indicator	Initial power ON	Control output	Auto-tuning
PWR (green)	ON	ON	ON
CH1 (red)	Flash (2400bps)	ON	Flash
CH2 (red)	Flash (4800bps)	ON	Flash
CH3 (red)	Flash (9600bps)	ON	Flash
CH4 (red)	Flash (19200bps)	ON	Flash
	Flash (38400bps)	-	-

* When power is supplied initially, the set communication speed LED flashes for 5 sec.
* The auto-tuning CH LED flashes for 1 sec in turn.
* The PWR LED flashes during communication for 1 sec in turn.

3rd Communication settings are available at Communication Setting of at DAQMaster.

Item	Setting	Note
Baudrate	38400	Same as PLC
Parity Bit	None	Same as PLC
Stop Bit	2	Same as PLC
Response Waiting Time	20	User setting
Communication Write	Enable	Fixed

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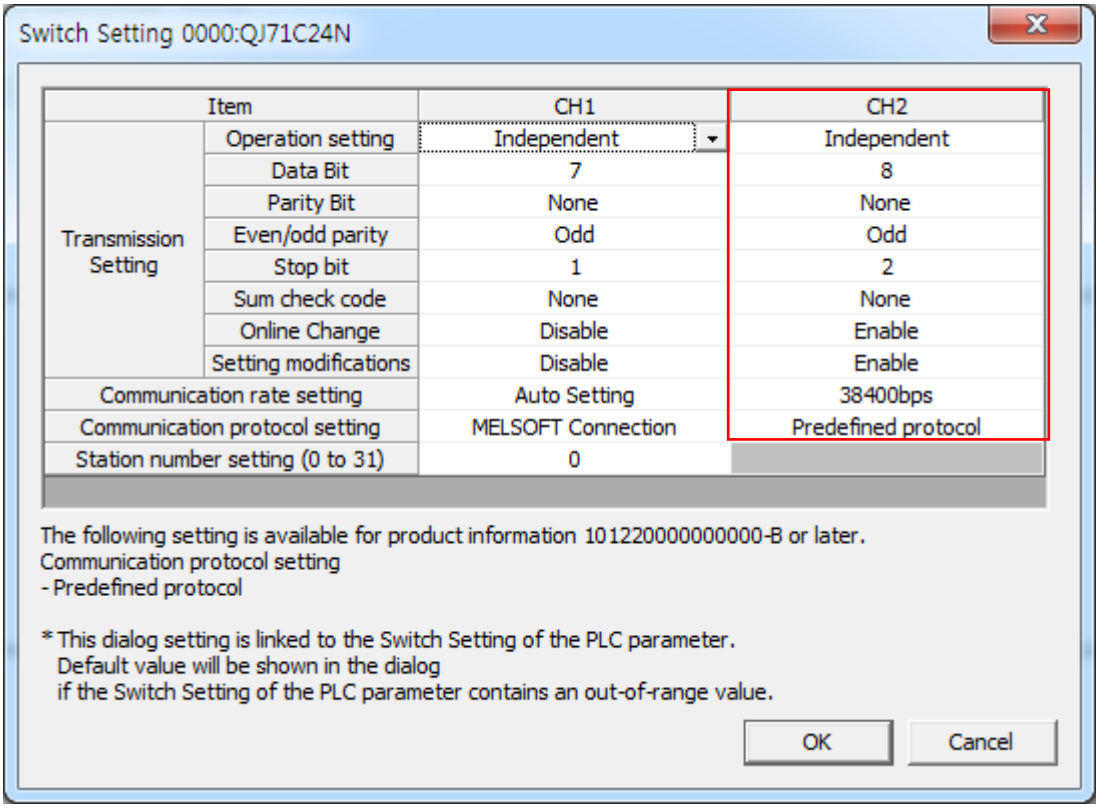
2.2 GX-Works2 Setting (Network)

1st Add I/F Module as “QJ71C24N” and set communication setting at “Switch setting”.



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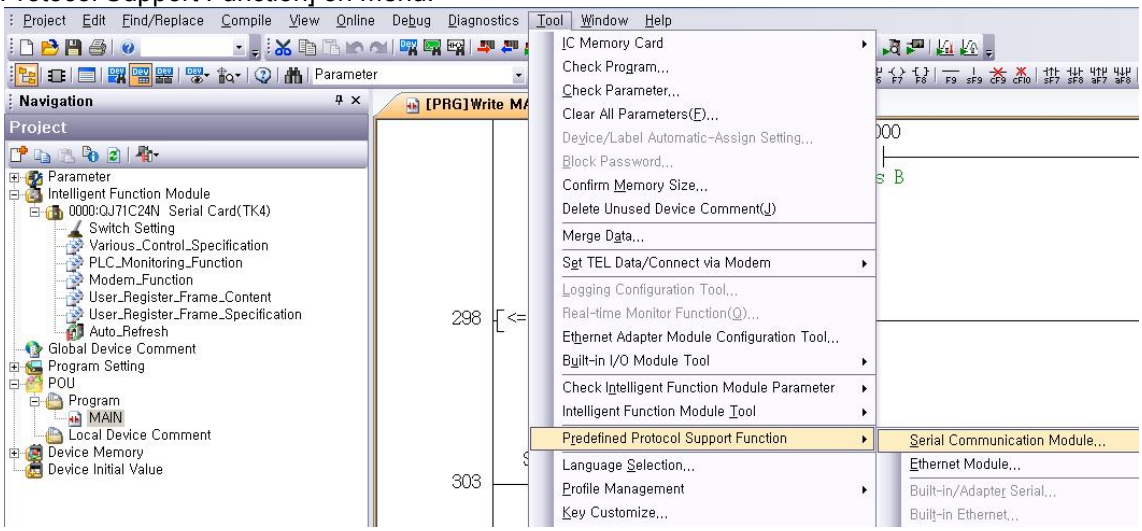
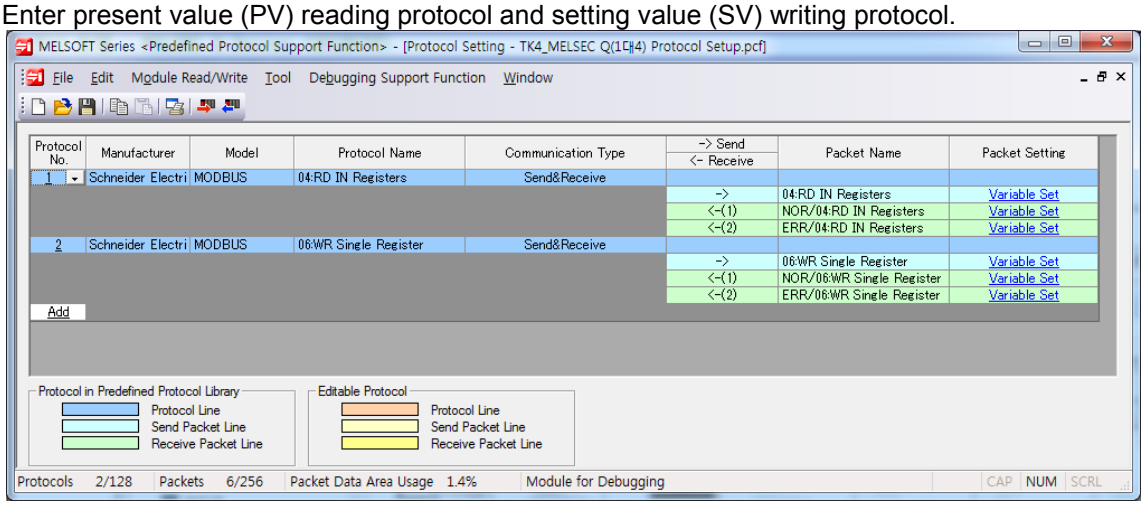
2nd Run [Tool - intelligent Function Module Tool – Serial Communication Module – Predefined Protocol Support Function] on menu.



3rd Enter present value (PV) reading protocol and setting value (SV) writing protocol.



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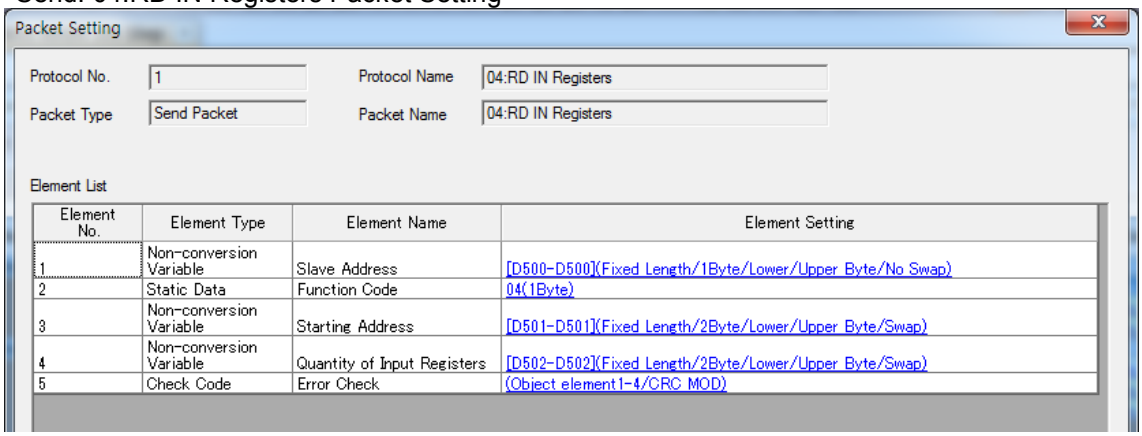
4th Packet setting

▶ PV reading transmiting/receving protocol: 04. RD IN Registers Setting

<Send. 04:RD IN Registers Packet Setting>



Element No.	Element Name	Setting	Note
1	Slave Address	D500	Target address (device)
2	Function Code	04(HEX)	Function Code
3	Starting Address	D501	Start address (memory)
4	Quantity of Input Registers	D502	No. of requested readings
5	Error Check	Fixed	CRC16

E.g.) When reading 2 values within Input Register 301001(03E8 H) to 301002(03E9 H) of Slave(address 1) at Master,

Slave Address	Function	Starting Address		No. of Points		Error Check(CRC16)	
		High	Low	High	Low	Low	High
01H	04H	03H	E8H	00H	02H	F1 H	BB H

CRC16

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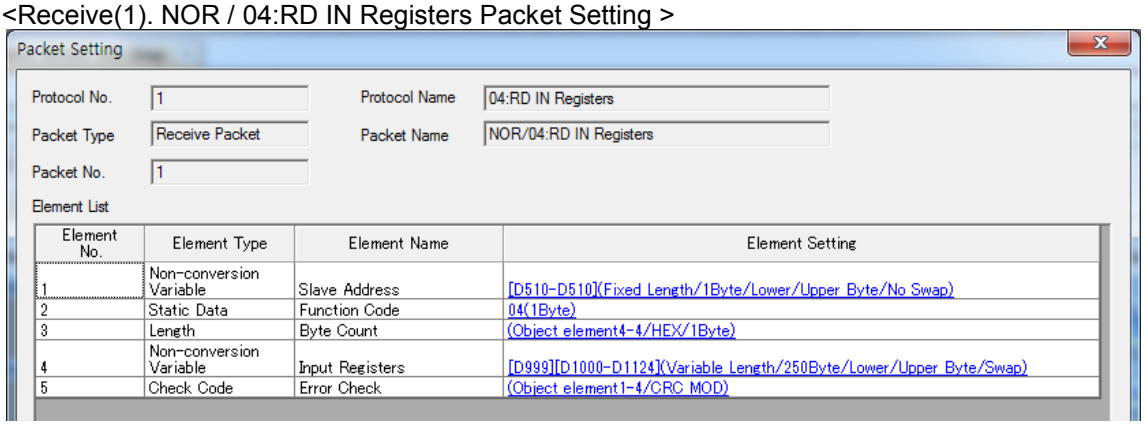
<Receive(1). NOR / 04:RD IN Registers Packet Setting >



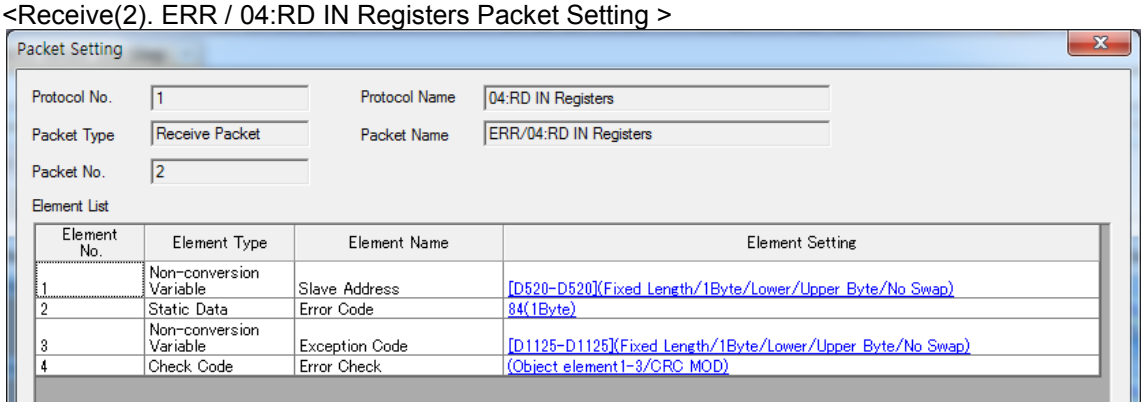
Element No.	Element Name	Setting	Note
1	Slave Address	D510	Target address (device)
2	Function Code	04(HEX)	Function Code
3	Byte Count	Fixed	No. of received byte
4	Input Registers	D999	Data length
		D1000	Received data
5	Error Check	Fixed	CRC16

E.g.) When 301001(03E8 H) value of Slave(address 1) is “10” and 301002(03E9 H) value is “20”,

Slave Address	Function	Byte Count	Data		Data		Error Check(CRC16)	
			High	Low	High	Low	Low	High
01 H	04 H	04 H	00 H	0A H	00 H	14 H	DB H	89 H

CRC16

<Receive(2). ERR / 04:RD IN Registers Packet Setting >



Element No.	Element Name	Setting	Note
1	Slave Address	D520	Target address (device)
2	Error Code	84(HEX)	Error Code
3	Exception Code	D1125	Error content
4	Error Check	Fixed	CRC16

* Exception Response - Error code

Code number	Error	Description
01 H	ILLEGAL FUNCTION	Not supported command.
02 H	ILLEGAL DATA ADDRESS	Starting Address of the queried data is inconsistent with transmittable address from the device.
03 H	ILLEGAL DATA VALUE	Numbers of queried data are inconsistent with the numbers of transferable data from device.
04 H	SLAVE DEVICE FAILURE	Not properly complete the queried command.

E.g.) Output status response of the not-exist coil 01001(03E8 H) about address 1

Slave Address	Function +80 H	Exception Code	Error Check(CRC16)	
			Low	High
01 H	81 H	02 H	C1	91

CRC16

As the above table, the response of Exception Code is 02H.

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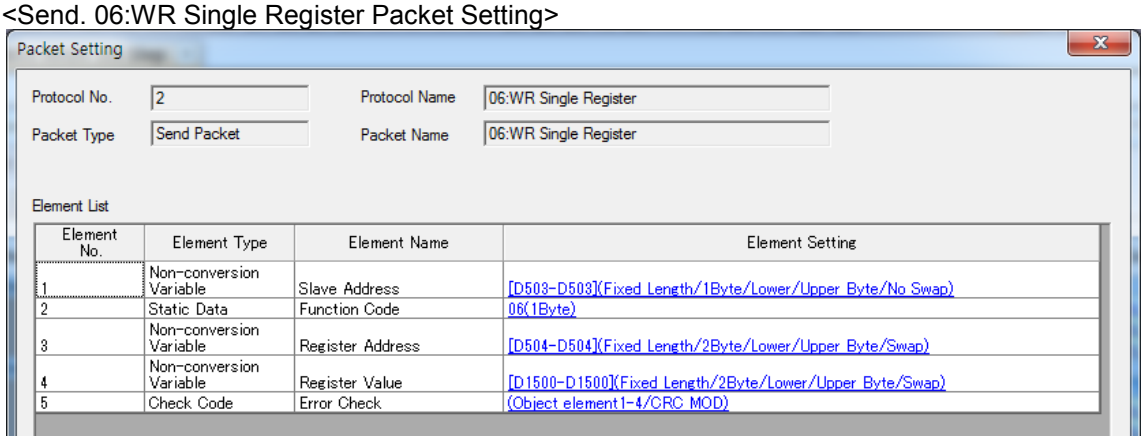
▶ SV reading transmint/receive protocol: 06. WR Single Register

<Send. 06:WR Single Register Packet Setting>



Element No.	Element Name	Setting	Note
1	Slave Address	D503	Target address (device)
2	Function Code	06(HEX)	Function Code
3	Register Address	D504	Target address (memory)
4	Register Value	D1500	Write data
5	Error Check	Fixed	CRC16

E.g.) When writing “10” on Holding Register 400001(0000 H) of Slave(address 1) at Master,

Slave Address	Function	Register Address		Preset Data		Error Check(CRC16)	
		High	Low	High	Low	Low	High
01 H	06 H	00 H	00 H	00 H	0A H	09 H	CD H

CRC16

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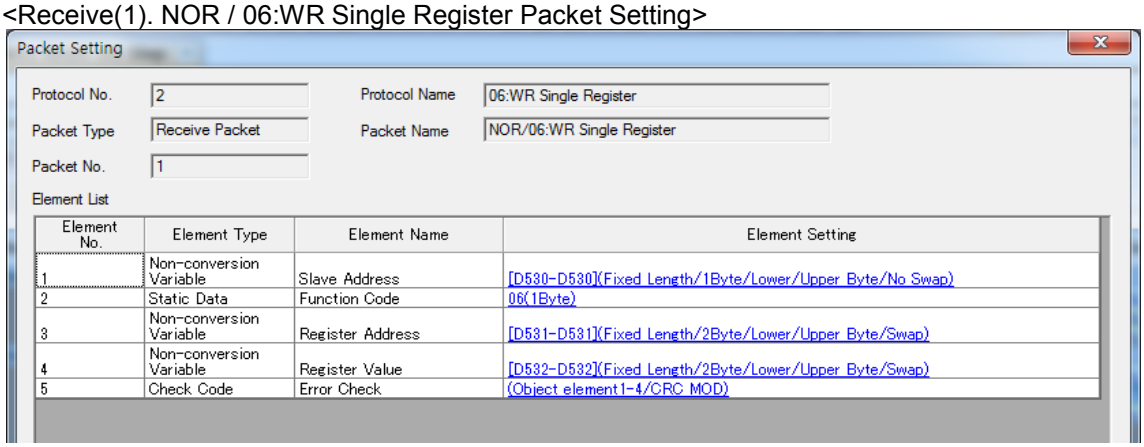
<Receive(1). NOR / 06:WR Single Register Packet Setting>



Element No.	Element Name	Setting	Note
1	Slave Address	D530	Target address (device)
2	Function Code	06(HEX)	Function Code
3	Register Address	D531	Target address (memory)
4	Register Value	D532	Write data
5	Error Check	Fixed	CRC16

When single writing (F/C 06) is completed normally, the received response packet from low device is same as the transmit packet of Master device.

E.g.) When writing “10” on Holding Register 400001(0000 H) of Slave(address 1) at Master,

Slave Address	Function	Register Address		Preset Data		Error Check(CRC16)	
		High	Low	High	Low	Low	High
01 H	06 H	00 H	00 H	00 H	0A H	09 H	CD H

CRC16

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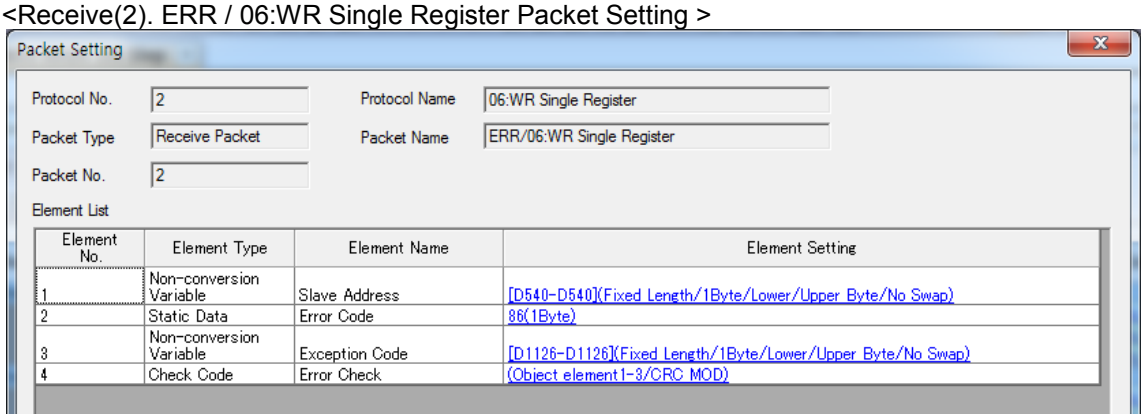
<Receive(2). ERR / 06:WR Single Register Packet Setting >



Element No.	Element Name	Setting	Note
1	Slave Address	D540	Target address (device)
2	Error Code	86(HEX)	Error Code
3	Exception Code	D1126	Error content
4	Error Check	Fixed	CRC16

* Exception Response - Error code

Code number	Error name	Description
01 H	ILLEGAL FUNCTION	Not supported command.
02 H	ILLEGAL DATA ADDRESS	Starting Address of the queried data is inconsistent with transmittable address from the device.
03 H	ILLEGAL DATA VALUE	Numbers of queried data are inconsistent with the numbers of transferable data from device.
04 H	SLAVE DEVICE FAILURE	Not properly complete the queried command.

E.g.) Output status response of the not-exist coil 01001(03E8 H) about address 1

Slave Address	Function +80 H	Exception Code	Error Check(CRC16)	
			Low	High
01 H	81 H	02 H	C1	91

CRC16

As the above table, the response of Exception Code is 02H.

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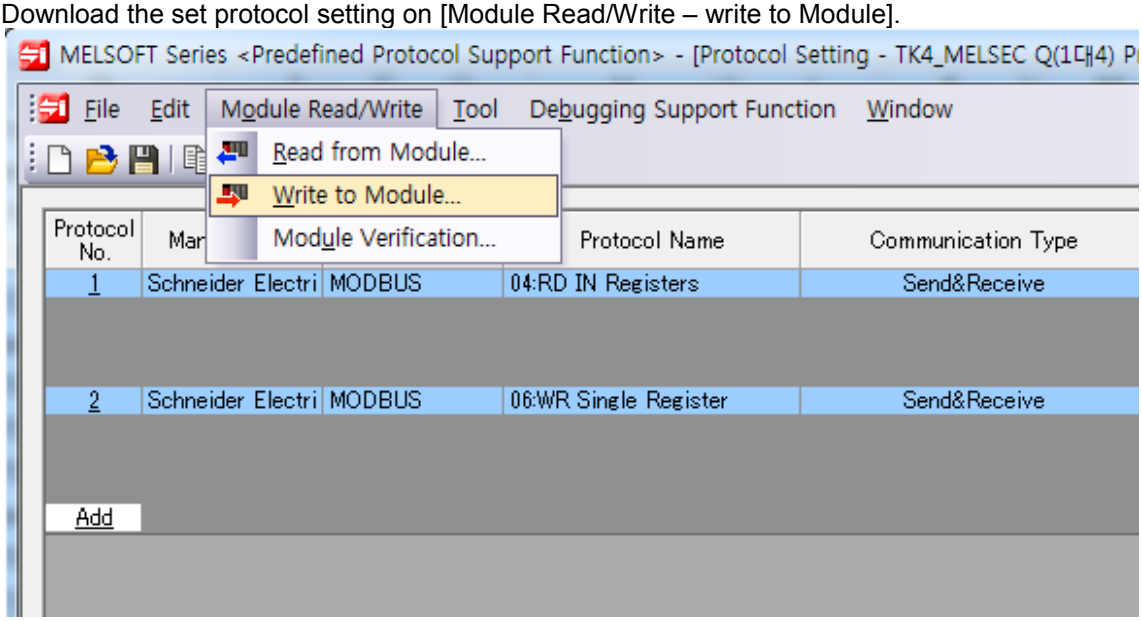
5th Download the set protocol setting on [Module Read/Write – write to Module].



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2.3 GX-Works2 Program

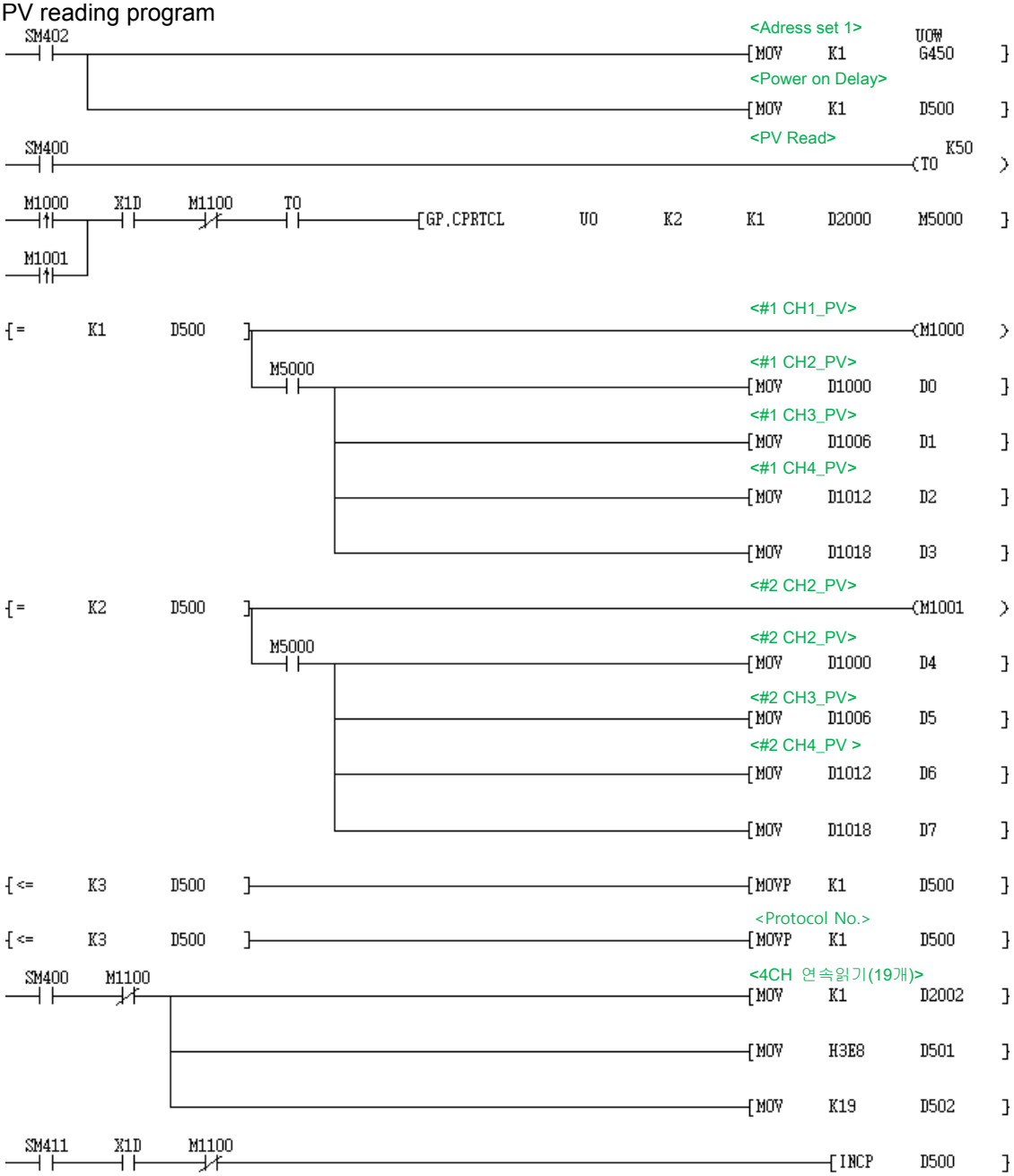
1st The order of communication program is as below.

[Requests reading address 1 CH1 to CH4_PV]→[Receiving address 1 CH1_PV]→[Receiving address 1 CH2_PV]→ ••• →[Requests reading address 2 CH1 to CH4_PV]→[Receiving address 2 CH1_PV]→[Receiving address 2 CH2_PV] (repeat continously)

※ Requests writing SV: occurs one time when SV Trigger is on.

E.g.) M1200 : [#1 CH1_SV] → M1201 : [#1 CH2_SV] → M1202 [#1 CH3_SV] →•••
M1204 : [#2 CH1_SV] → ••• → M1207 : [#2 CH4_SV]

2nd PV reading program



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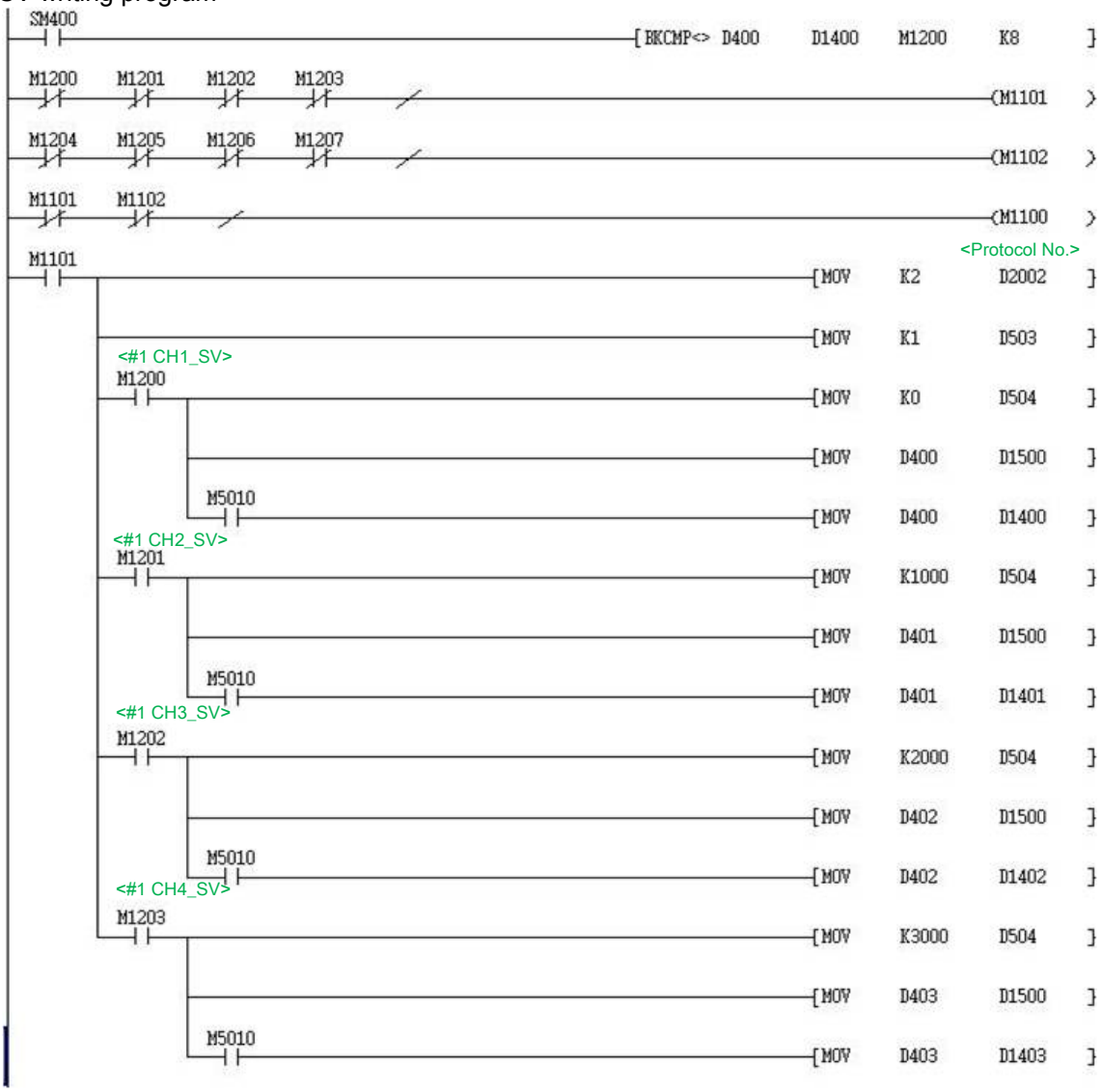
3rd SV writing program



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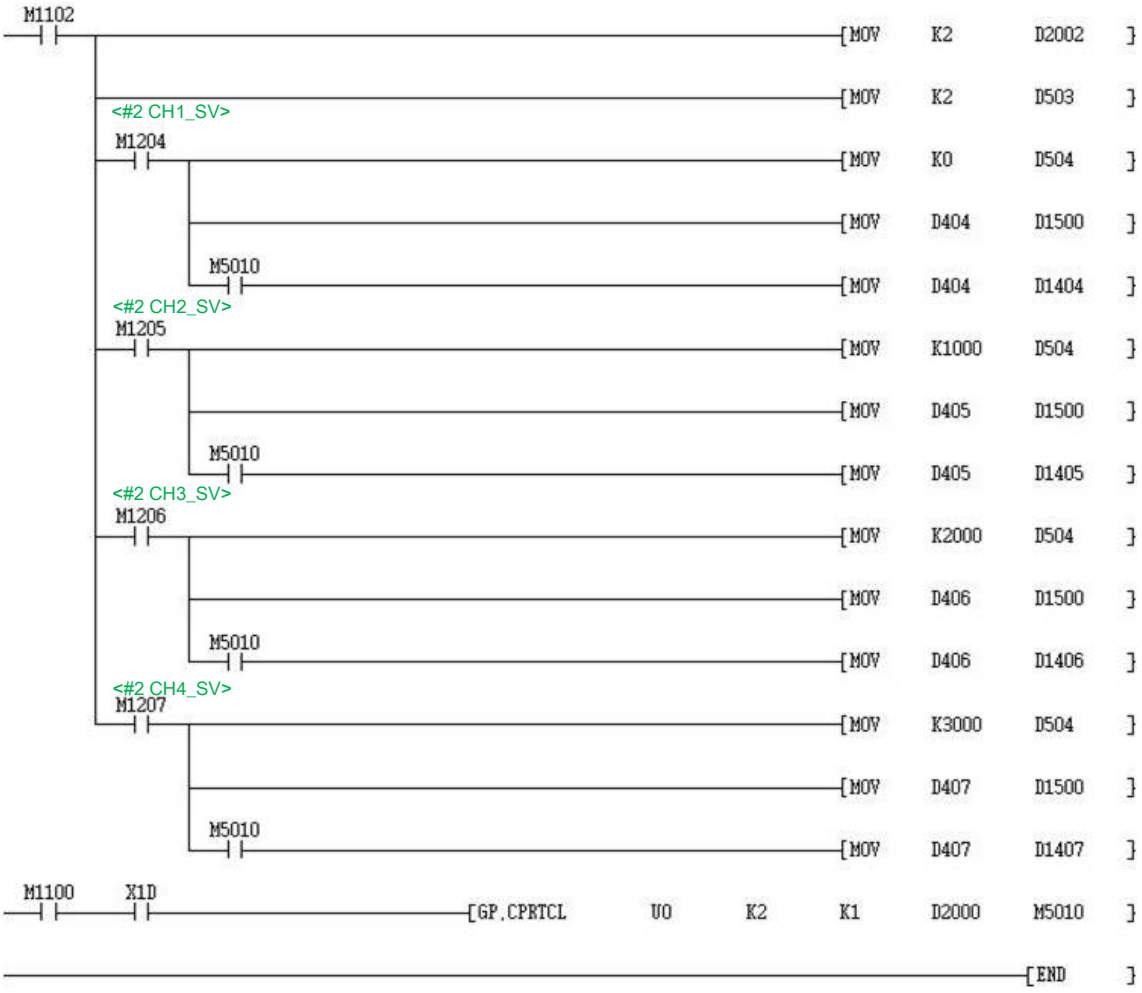

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