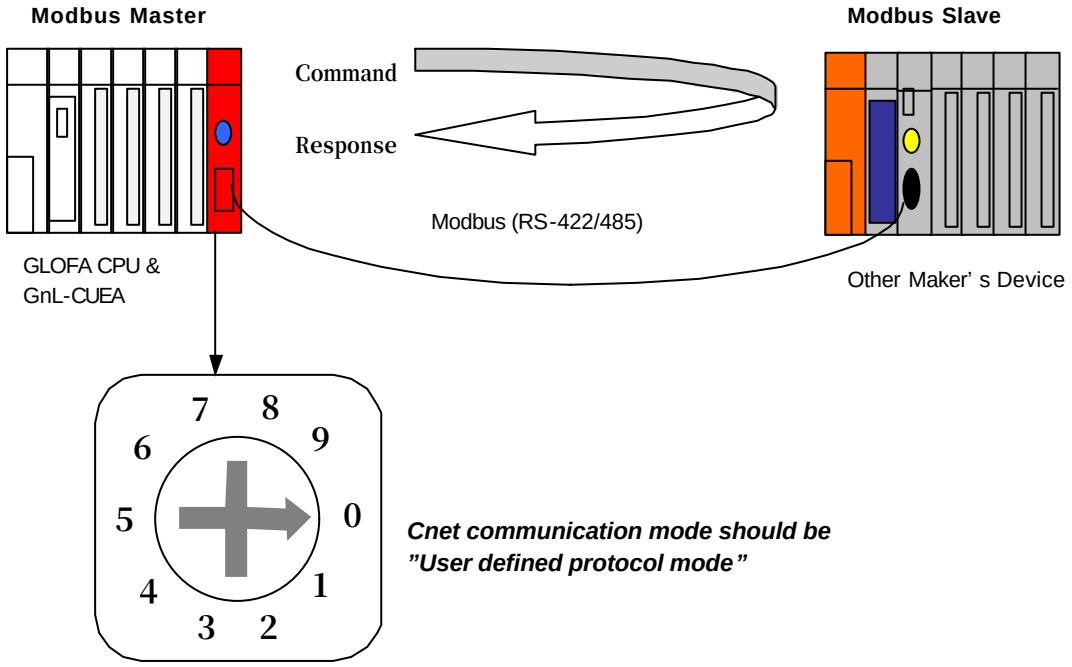
Function Block for Modbus Communication.

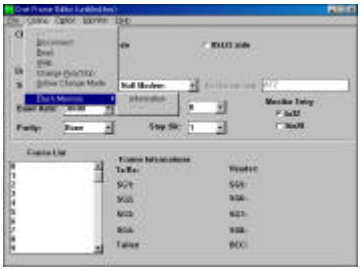
1. Features

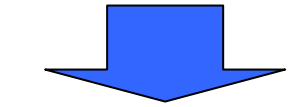
- ✓ By using this function block, GLOFA Cnet module operates as a Modbus master on Modbus network.
- ✓ Supporting command codes are as below.
  - Read coil status: 01
  - Read input status: 02
  - Read holding registers: 03
  - Read input registers: 04
  - Force single coil: 05
  - Preset single register: 06
  - Force multiple coils: 15 (Hex 0F)
  - Preset multiple register: 16 (Hex 10)
- ✓ This function block works on user-define protocol mode of Cnet.
- ✓ Basic Communication parameters (Baudrate, Data bit, Stop bit, Parity check, Station No.) are set by Cnet Editor and Frame editing is not required.
- ✓ Modbus RTU Protocol is supported (ASCII Protocol will be supported soon.)
- ✓ For using this function block, Cnet Module' s requirement is as below
  - Cnet module' s H/W version is higher than v2.0 (can be checked on GMWIN)
  - Cnet module' s Flash Rom OS version is higher than v1.01 (can be checked on Cnet Editor)

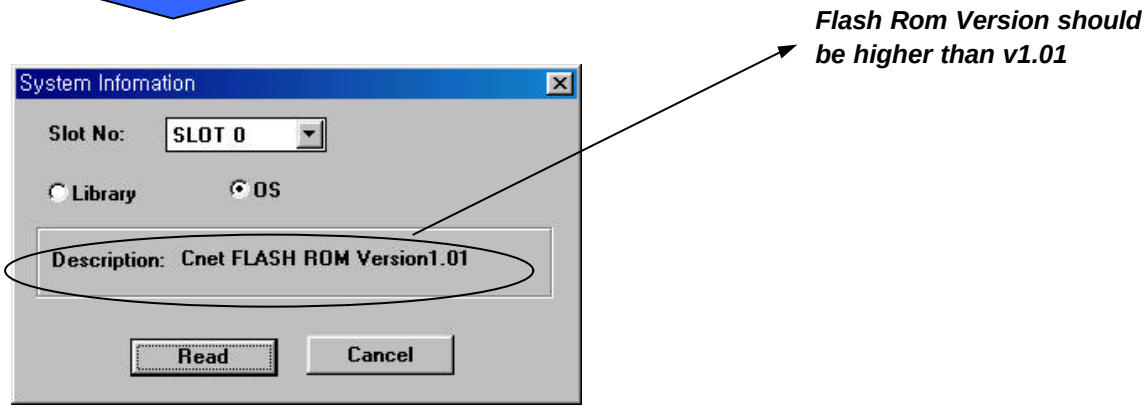


2. Checking Cnet Flash Rom OS version.

1) Run the frame editor and connect to the Cnet module.
2) Select ***Flash Memory – Information*** in Online menu

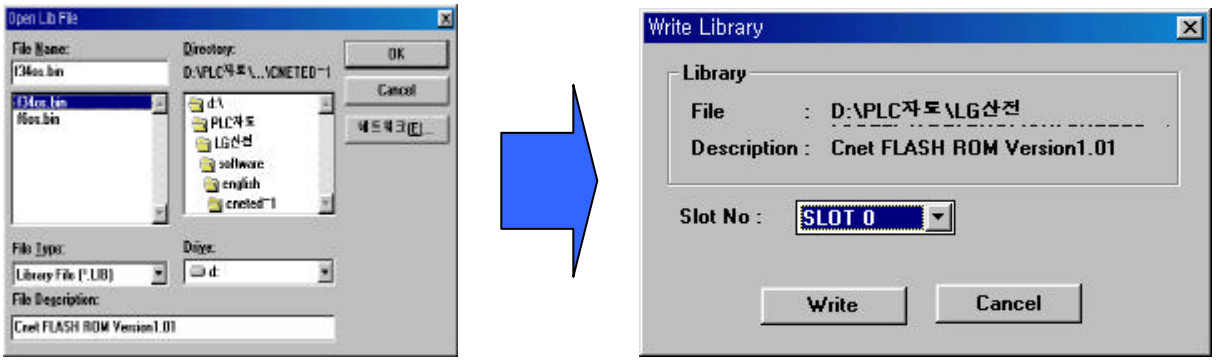






3. Upgrading Cnet Flash Rom OS (In case that version is lower than 1.01)

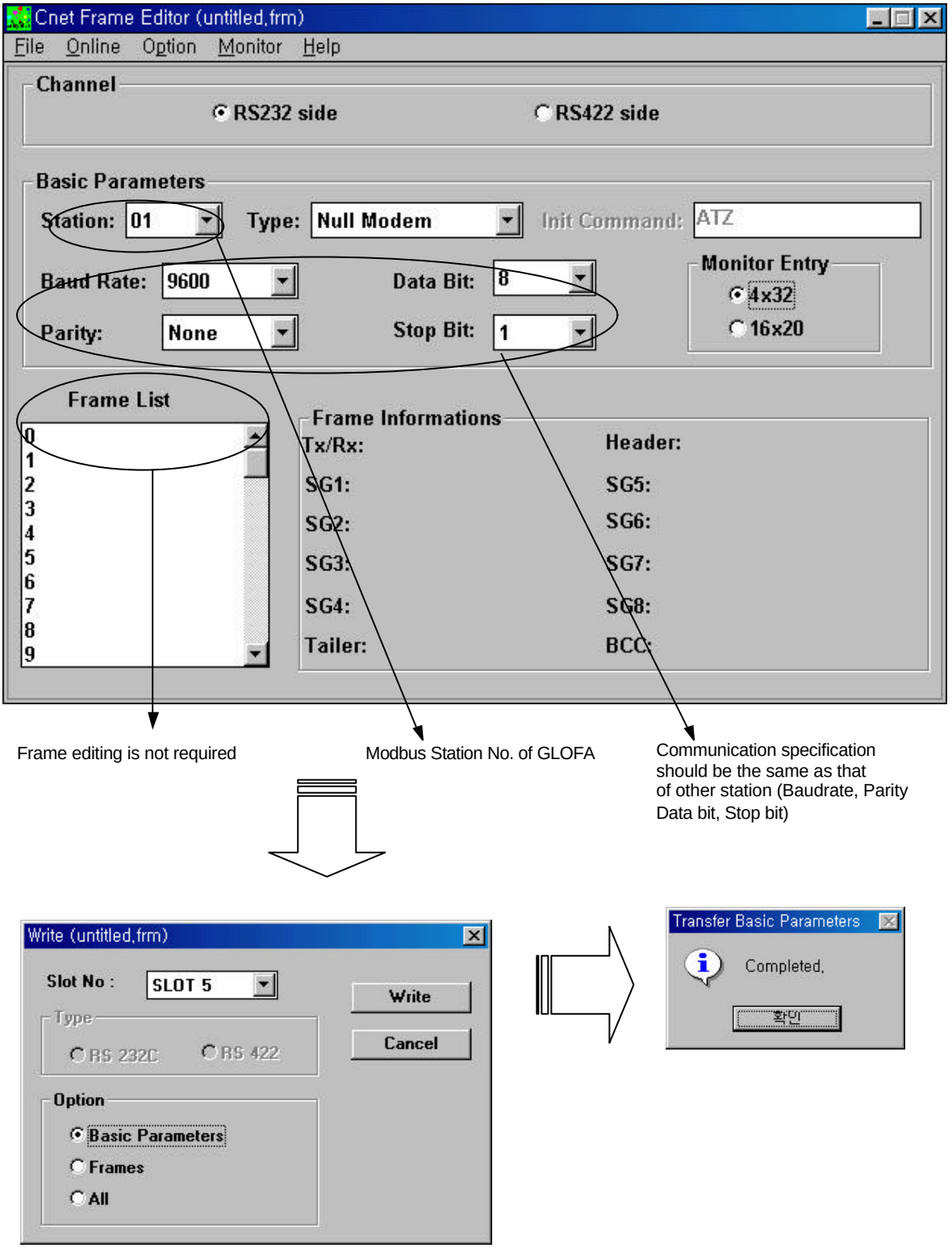
1) Set the Cnet module to ***' Flash memory write mode' (Mode 8)*** with the mode selection switch.
2) RUN LED of Cnet module will blink with 1 second period
3) Run the frame editor and connect to the Cnet module.
4) Select ' F6OS.BIN' (Cnet OS for G6L-CUEA) or ' F34OS.BIN' (Cnet OS for G3L-CUEA) in ***Open Lib*** menu.



5) Select ***Online – Flash Memory – Write*** in the menu, then type the slot number at which the Cnet module is mounted, and press ' Write' button.

4. Parameter

1) Basic Parameter

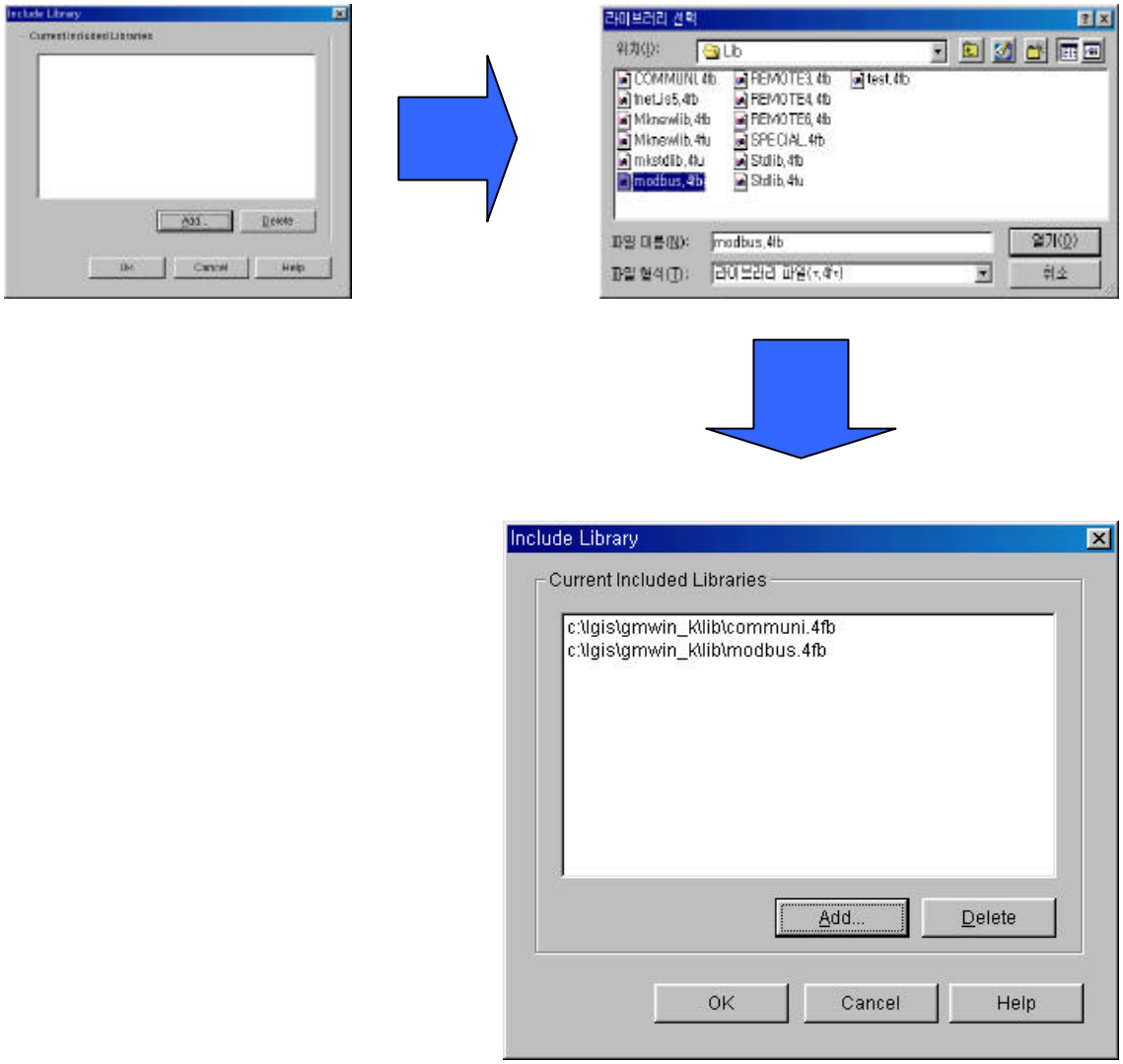


5. Programming

1) Library Inserting

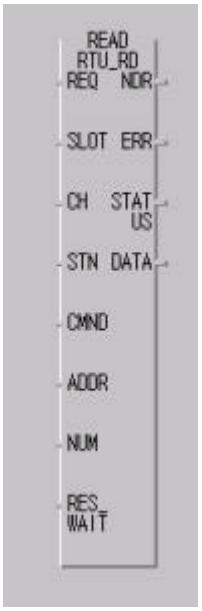
- Copy **"modbus.Nfb"** file to lib directory of GMWIN
- Select ***"Project → Library insert"*** on GMWIN menu
- Click ***Add*** then select **"communi.Nfb"** and **"modbus.Nfb"**

  (N=6: G6L-CUEA, N=4: G4L-CUEA, N=3: G3L-CUEA)



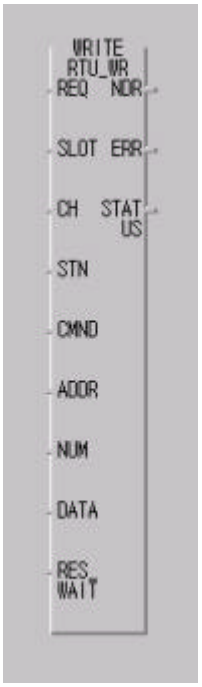
2) Function Block (RTU_RD, RTU_WR)

✓ **RTU_RD (Data read by using Modbus RTU protocol)**



	IN / OUT	Type	Description
	REQ	BOOL	Execution condition for function block (When condition changes 0 to 1, FB executes 1 time) **** Refer to note 1***
	SLOT	USINT	Slot Number cnet module installed (0 ~ 7)
	CH	USINT	0: RS-232C, 1: RS-422/485
	STN	USINT	Destination station to be read (0 ~ 32)
	CMND	USINT	Modbus Function command (1 ~4) 1: Read coil status (Bit) 2: Read input status (Bit) 3: Read holding register (Word) 4: Read input register (Word)
	ADDR	INT	Head address to be read (0 ~ 65535)
	NUM	USINT	Number of data to be read (1 ~ 64)
	RES_WAIT	TIME	Response wait time (After waiting for the time to be set, PLC CPU read the response from Cnet module) **** Refer to note 2***
	NDR	BOOL	Holds ' ON' status during 1 scan after communication Is completed successfully
	ERR	BOOL	Holds ' ON' status during 1 scan after communication Is completed abnormally
	STATUS	USINT	Communication status code (Error code) 0: Normal, Not 0: Error code **** Refer to note 3***
	DATA	USINT ARRY (256)	Area which received data is stored. Array [0]: High Byte of 1st received word Array [1]: Low Byte of 1st received word Array [2]: High Byte of 2nd received word Array [3]: Low Byte of 2nd received word ...

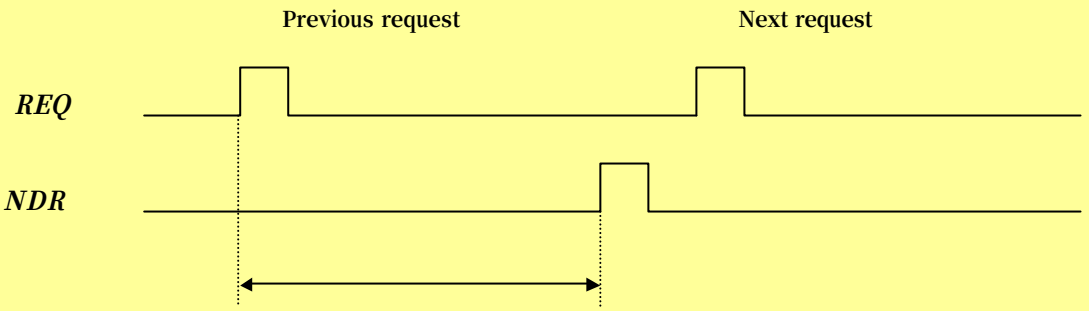
✓ **MBUS_WR (Data write by using Modbus RTU protocol)**

<table>
<tr><td></td><td>IN / OUT</td><td>Type</td><td>Description</td></tr>
<tr><td rowspan="14"> 
</td><td>REQ</td><td>BOOL</td><td>Execution condition for function block
(When condition changes 0 to 1, FB executes 1 time)
* Refer to note 1</td></tr>
<tr><td>SLOT</td><td>USINT</td><td>Slot Number cnet module installed (0 ~ 7)</td></tr>
<tr><td>CH</td><td>USINT</td><td>0: RS-232C, 1: RS-422/485</td></tr>
<tr><td>STN</td><td>USINT</td><td>Destination station to be written (0 ~ 32)</td></tr>
<tr><td>CMND</td><td>USINT</td><td>Modbus Command
05: Force single coil (Bit)
06: Preset single register (Word)
15: Force Multiple coils (Bit)
16: Preset Multiple register (Word)</td></tr>
<tr><td>ADDR</td><td>INT</td><td>Head address to be written (0 ~ 65535)</td></tr>
<tr><td>NUM</td><td>USINT</td><td>Number of data to be written (1 ~ 64)
* When using command 5 or 6 this value will be ignored.</td></tr>
<tr><td>RES_WAIT</td><td>TIME</td><td>Response wait time
(After waiting for the time to be set, PLC CPU read the response from cnet module) * Refer to note 2</td></tr>
<tr><td>NDR</td><td>BOOL</td><td>Holds ‘ ON’ status during 1 scan after communication Is completed successfully</td></tr>
<tr><td>ERR</td><td>BOOL</td><td>Holds ‘ ON’ status during 1 scan after communication Is completed abnormally</td></tr>
<tr><td>STATUS</td><td>USINT</td><td>Communication status code (Error code)
0: Normal, Not 0: Error code * Refer to note 3</td></tr>
<tr><td>DATA</td><td>USINT
ARRY
(256)</td><td>Area which writing data is stored.
<table><tr><td>Array [0]: High Byte of 1st writing word</td></tr><tr><td>Array [1]: Low Byte of 1st writing word</td></tr><tr><td>Array [2]: High Byte of 2nd writing word</td></tr><tr><td>Array [3]: Low Byte of 2nd writing word</td></tr><tr><td>…</td></tr></table>* When using command 05.
Array [0] = 1 → ON
Array [0] = 0 → OFF</td></tr>
</table>

Note 1

Execution Condition

- *Execution condition (REQ) of RTU_RD / RTU_WR should be turned on, after previous execution have been completed successfully. (after 'NDR' have been turned on)*



Communicating time = Internal processing time + response wait time
(Internal processing time: 50 ~ 60ms)

Note 2

Response Wait Time

- *After waiting for the time to be set, PLC CPU read the response from cnet module*
- *This value can be related with received data size, transmission speed (Baudrate) and other station ' s responding performance.*
- *Recommended minimum value is as below. (When an error occurs with this value, make the value longer.)*

Request data size / Baudrate	1 ~ 16 word	17 ~ 32 word	33 ~ 48 word	49 ~ 64 word
4800 bps	150ms	250ms	330ms	400ms
9600 bps	100ms	180ms	230ms	280ms
19200 bps	80ms	150ms	180ms	230ms

Note 3

Status Code

- ***Status code indicates communication status***

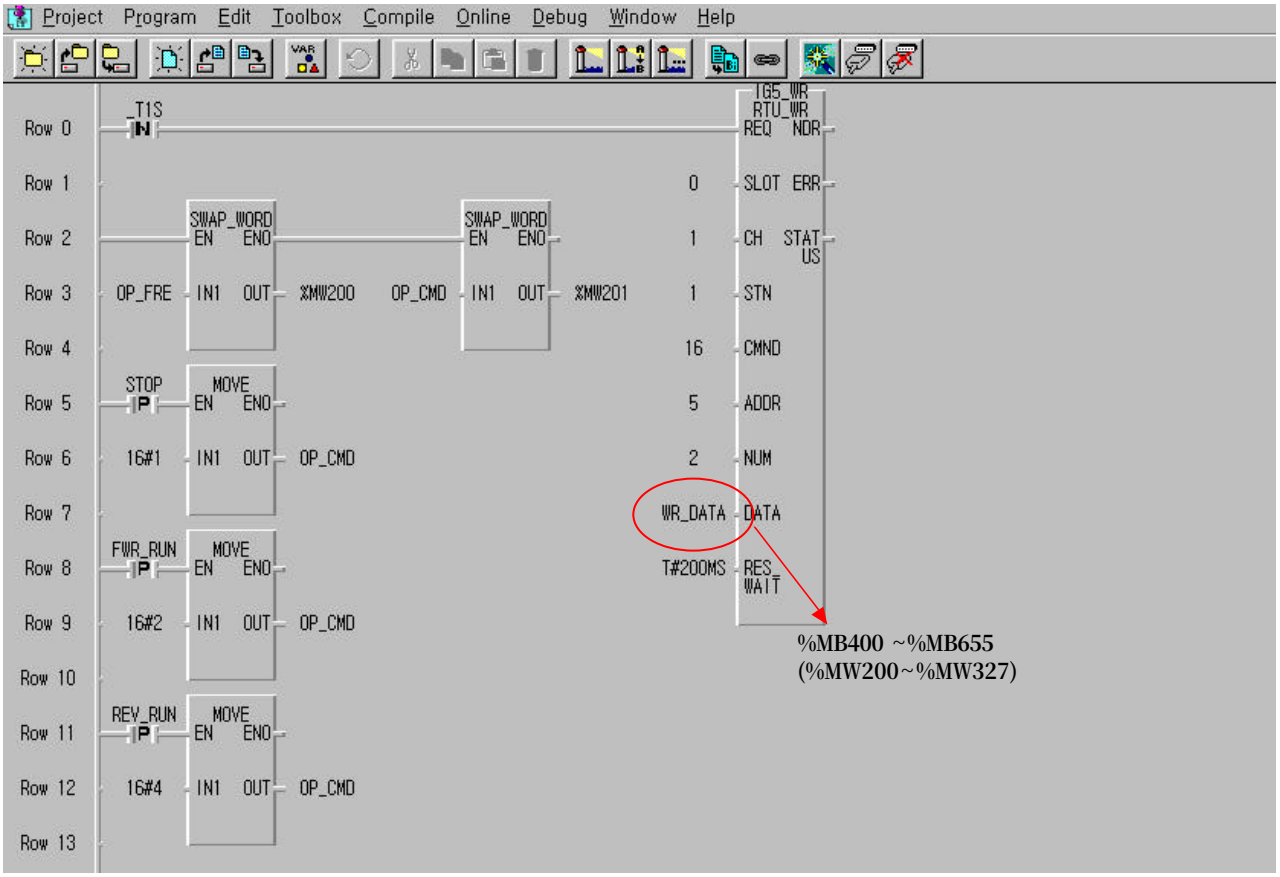
Status code (Dec)	Description	Solution	Remarks
0	Normal	No error	
1	Illegal command (Not allowable Command was requested to the slave)	1. Check the allowable command for the slave then change the command code In function block	Returning value from slave
2	Illegal address (Not allowable address was requested to the slave)	1. Check the allowable address for the slave then change the address In function block	
3	Illegal data value (Not allowable data value was requested to the slave)	1. Check the allowable data range for the slave then change the data value In function block	
4	Slave device failure (An unrecoverable error occurred while the slave was attempting to perform the requested action)	1. Check the slave status	
6	Slave device busy	1. Execute function block again later when the slave is free.	
10	Received Frame CRC error	1. Make the response wait time longer than previous value. 2. Check the cable and frame status	Value generated by function block
17 or 16	Cnet module I/F error	1. Check the slot no. designated on function block	
21 or 64	Channel(232c/422) stop	1. Make the cnet module run mode.	
74	Time out error	1. Check the basic parameter 2. Check destination the station no. 3. Check the cable status	
21 or 115	Communication mode error	1. Check the cnet mode then select user define protocol mode.	
255	FB input parameter error	1. Check the FB input value. (Slot,CH,Command,Number etc)	

6. Example

Communication between GLOFA GM6 and Inverter IG5

✓ Inverter Operation Command

- Using Command 16 (Preset Multiple register: Word).



✓ Inverter Operation Monitor

- Using Command 03 (Read holding register: Word).