# Modbus-RTU to CC-Link Communication Board Card

# User Guide

Code：3101A006
Issue：V1.0
Date: 2020.08.10

# Catalogue

# 1. Product Overview

## 1.1    Product function

This communication board could realize the conversion between MODBUS-RTU and CC-Link of field bus, and it could be applied with VFD NE-300/600. The RS485 interface of the board works as the Modbus master while the CC-Link interface works as the slave.

## 1.2    Main technical parameters

1. Supports CC-Link Ver.2

2. CC-Link communication rate :( 10M/5M/ 2.5M /625K/156Kbps)

3. Number of memory stations occupied by CC-Link communication: 3 stations (not modifiable)

4. CC-link communication extended loop station setting: 8 times (not modifiable)

5. Modbus function code supported by ModbusRTU communication board: 03/06

6. Modbus slave address read by ModbusRTU communication board: 1 (not modifiable)

7. Baud rate of ModbusRTU communication board: 19200bps (not modifiable)

8. ModbusRTU communication setting on the communication board: data bit is 8, even check, 1 stop bit (not modifiable)

9. Working voltage: 24VDC, 5VDC

10. Working environment temperature: -40 ~ 85℃, relative humidity: 5 ~ 95% (no condensation)

11. Storage temperature: -55 ~ 125℃

12. Installation: Fix it in the VFD with 3 pc of screws

13. Dimensions: 90.37*22*182(L * W * H, unit: mm)

14. Protection level: IP20

Note: Before using the board card, the VFD parameters should be set as follows:

| Function code | Name | Set Value |
| --- | --- | --- |
| F0.02 | Run command control mode settings | 2 |
| F0.03 | Frequency setting 1 | 4 |
| F0.04 | Frequency setting 1 | 4 |
| Fd.00 | 485 communication function | 1 |
| Fd.01 | IP Address | 1 |
| Fd.02 | Baud rate selection | 4 |

| Fd.03 | Parity check selection | 0 |
|-------|------------------------|---|

# 1.3 The correspondence example illustration between PLC address and Modbus address
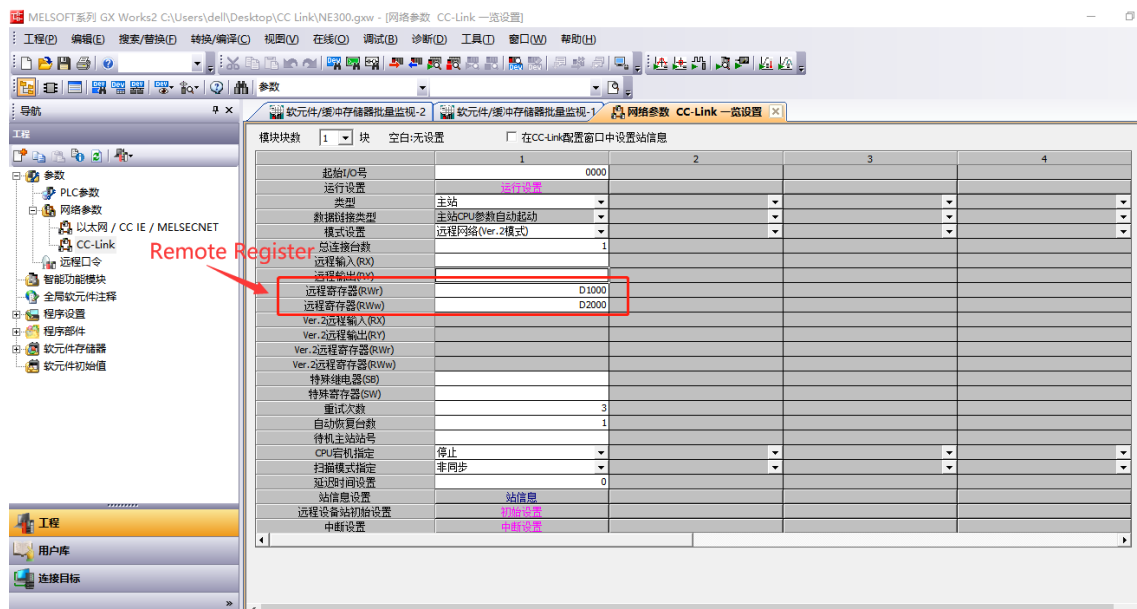


1. For example, D1000-D1029 read the data address of NE300/600 for PLC, and D2000-D2003 wrote the data address of NE300/600 for PLC. See the table below:

| **D1000-D1029 IW Input address, D2000-D2006 QW Output address Description** | | | | |
|---|---|---|---|---|
| | PLC data address | Data type | Modbus RTU address | Description |
| **P r o c e s s  D a t a** | D2000 | WORD | Write area 4 address 40001 | write communication commands |
| | D2001 | WORD | Write area 4 address 40002 | Write communication set value address |
| | D2002 | WORD | Write area 4 address 40003 | Write output terminal definition |
| | D2003 | WORD | Write area 4 address 40004 | Write Analog Output Setting |
| | D1000 | WORD | Read area 4 address 40001 | Read communication control commands |
| | D1001 | WORD | Read area 4 address 40002 | Read communication set value address |
| | D1002 | WORD | Read area 4 address 40003 | Read output terminal definition |
| | D1003 | WORD | Read area 4 address 40004 | read analog output setting |
| | D1004 | WORD | Read area 4 address 40020 | Read VFD state |
| | D1005 | WORD | Read area 4 address 40021 | read failure content |
| | D1006 | WORD | Read area 4 address 40022 | read alarm content |

| D1007 | WORD | Read area 4 address 40023 | Read running frequency |
|---|---|---|---|
| D1008 | WORD | Read area 4 address 40024 | Read set frequency |
| D1009 | WORD | Read area 4 address 40025 | Read bus bar voltage |
| D1010 | WORD | Read area 4 address 40026 | Read output voltage |
| D1011 | WORD | Read area 4 address 40027 | Read output current |
| D1012 | WORD | Read area 4 address 40028 | Read operating rotate speed |
| D1013 | WORD | Read area 4 address 40029 | read output frequency |
| D1014 | WORD | Read area 4 address 4002A | read output torque |
| D1015 | WORD | Read area 4 address 4002B | Read PID set value |
| D1016 | WORD | Read area 4 address 4002C | Read PID feedback value |
| D1017 | WORD | Read area 4 address 4002D | Read analog AI1 |
| D1018 | WORD | Read area 4 address 4002E | Read analog AI2 |
| D1019 | WORD | Read area 4 address 4002F | Reserved |
| D1020 | WORD | Read area 4 address 40030 | Read terminal state |
| D1021 | WORD | Read area 4 address 40031 | Reserved |
| D1022 | WORD | Read area 4 address 40032 | Reserved |
| D1023 | WORD | Read area 4 address 40033 | Reserved |
| D1024 | WORD | Read area 4 address 40034 | Read external counting |
| D1025 | WORD | Read area 4 address 40035 | Read X1 state |
| D1026 | WORD | Read area 4 address 40036 | Read X2 state |
| D1027 | WORD | Read area 4 address 40037 | Read X3 state |
| D1028 | WORD | Read area 4 address 40038 | Read X4 state |
| D1029 | WORD | Read area 4 address 40039 | Read X5 state |

2. Address read of D1030-D1033

| D1030 Input Data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| | 1 means IB9 write error | 1 means IB8write error | 1means IB7write error | 1 means IB9 write error | 1 means IB5 read error | 1 means IB4 read error | 1 means IB3 read error |

| Data address | Data bit | Data type | Description | |
|---|---|---|---|---|
| D1030 | 8-F | Byte | Command 1 error code(read area 4 1-4) | Error |

| D1031 | 0-7 | Byte | Command 2 error code(read area 4 20-2F) | code see 1.4 |
|-------|-----|------|------------------------------------------|--------------|
| D1031 | 8-F | Byte | Command 3 error code(read area 4 30-39) | |
| D1032 | 0-7 | Byte | Command 4 error code(write 40001) | |
| D1032 | 8-F | Byte | Command 5 error code(write 40002) | |
| D1033 | 0-7 | Byte | Command 6 error code(write 40003) | |
| D1033 | 8-F | Byte | Command 7 error code(write 40004) | |

3. Read address D1034-D1037 of NE300/600, and wrote to address D2004-D2006 of NE300/600.

| Slot 3 IW Input Address, QW output address description | | | |
|------------------|--------------|-----------|-------------------------------------|
| | Data Address | Data Type | Description |
| EEPROM Control | D2004 | WORD | Wrote to EEPROM parameter address |
| | D2005 | WORD | Wrote to EEPROM parameter data |
| | D2006 | WORD | Wrote to EEPROM enable(1 valid) |
| | D1034 | WORD | Read address which was written to EEPROM |
| | D1035 | WORD | Read data which was written to EEPROM |
| | D1036 | WORD | Read enable state(1 is normal) |
| | D1037 | WORD | Read and wrote state(0 is normal) |

# 1.4 Error Code

| Error Code | Failure Description | Troubleshooting |
|------------|---------------------|-----------------|
| 0x00 | Slave works normally | N/A |
| 0x01 | Illegal function code | Slave does not support the current function code, please refer the slave user manual and choose relevant function code. |
| 0x02 | Illegal data address | Slave address exceeds its address range |
| 0x03 | Illegal data value | Data length error |
| 0x04 | Slave device failure | Checking slave device state |
| 0x06 | Slave device busy | Checking slave device state |
| 0x07 0x02 | Parity checking error | Checking parity checking, baud rate and stop bit |
| 0x08 | Reserved | Reserved |
| 0x09 | CRC checking error | Slave response message CRC calculation error, checking slave state. |
| 0x0B | Slave device responding timeout | Increasing timeout time, check hardware connection state, check baud rate and other communication parameter Settings. |

| 0x0E | Error in response message length | Increasing the receiving character spacing |
|------|----------------------------------|--------------------------------------------|
| 0x0F | Writing slave device response error | Checking hardware connection state |

# 2. Hardware Description

## 2.1 Product Appearance
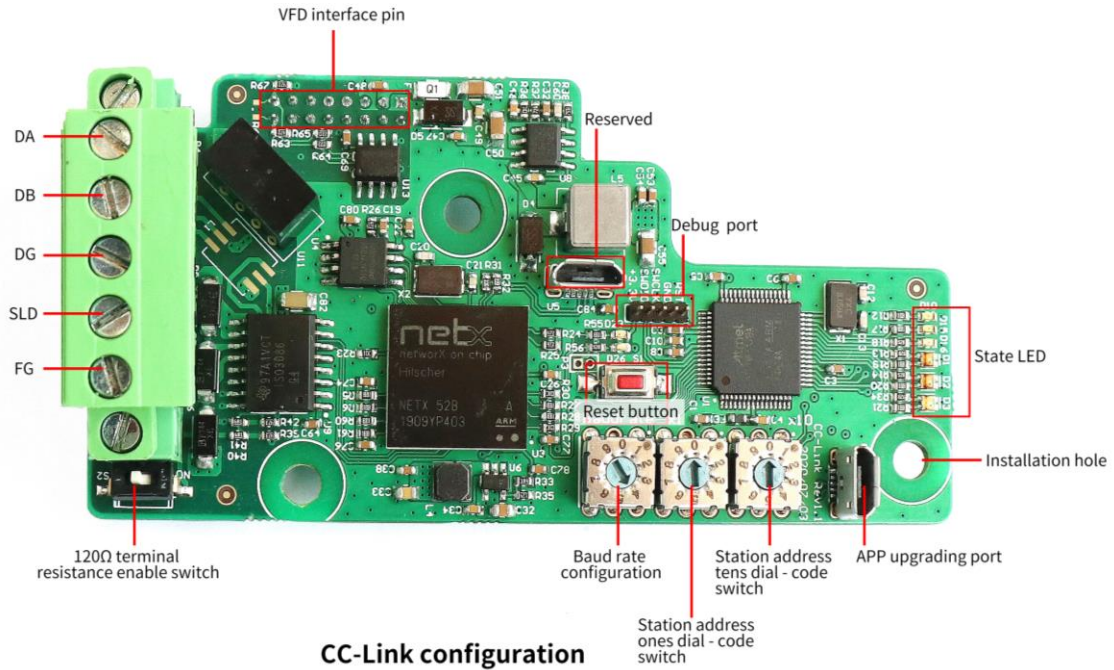


## 2.2 LED Indicator Description

The equipment has five LED state indicators, whose symbol definition and state description are shown in "Table 2.2".

Table2.2        LED Indicator Description

| Symbol | Definition | State | Description |
|---|---|---|---|
| D2 | CC Link is normal | Green LED on | CC Link Bus communication is normal |
| D1 | CC Link is in error | Red LED on | CC Link Bus communication is in error |
| D9 | Serial port sending data | Green LED flashing | Serial port is sending data |
| | | Green LED not flashing | Serial port is not sending data |
| D8 | Serial port receiving data | Green LED flashing | Serial port is receiving data |
| | | Green LED not flashing | Serial port is not receiving data |

| D10 | Power Indicator | Red LED on | Power connected |
|-----|-----------------|------------|-----------------|
|     |                 | Red LED off | Power not connected |

## 2.3 Setting CC-Link Slave transmission rate dial - code switch



Transmission rate
dial - code switch

CC-Link supports transmission rate as：156kbps, 625kbps, 2.5Mbps, 5Mbps, 10Mbps

When the dial code switch is dialed to 0, the transmission rate is：156kbps

When the dial code switch is dialed to 1, the transmission rate is：625kbps

When the dial code switch is dialed to 2, the transmission rate is：2.5Mbps

When the dial code switch is dialed to 3, the transmission rate is：5Mbps

When the dial code switch is dialed to 4, the transmission rate is： 10Mbps

When the dial code switch is dialed to 5, 6, 7, 8, 9 and the transmission rate is：156kbps

## 2.4 Setting CC-Link Slave Address Dial - code Switch



Slave ones   Slave tens
dialing       dialing

As shown in the above PIC, the high-order dial-code switch (X10) set by CC-Link slave address is dialed to 0, and the low-order dial-code switch (X1) is dialed to 2, so this is indicating that the slave address of this module in CC-Link network is set as:

0*10+2=2.

Cc-link slave valid address range is 1-64, after the dial code exceeds the range, the default setting of the board card is: 1.

## 2.5    CC-Link Interface
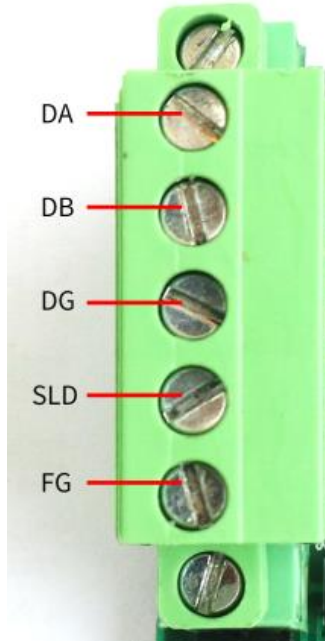


CC-Link communication interface pin definition is as below：

| DA | Signal DA |
|-----|-----|
| DB | Signal DB |
| DG | Signal Ground |
| SLD | Shielding Ground |
| FG | Grounding |

## 2.6 VFD interface pin definition

| Pin No. | Signal Name | Definition |
|-----|-----|-----|
| 1 | COM | GND of 24V |
| 2 | VCC | +5V output voltage |
| 3 | P24 | +24V output voltage |
| 4 | GND | GND of 5V |
| 12 | GND | GND of 5V |
| 15 | 485+ | Receiving and sending data –P (Modbus-RTU interface) |
| 16 | 485- | Receiving and sending data –N (Modbus-RTU interface) |
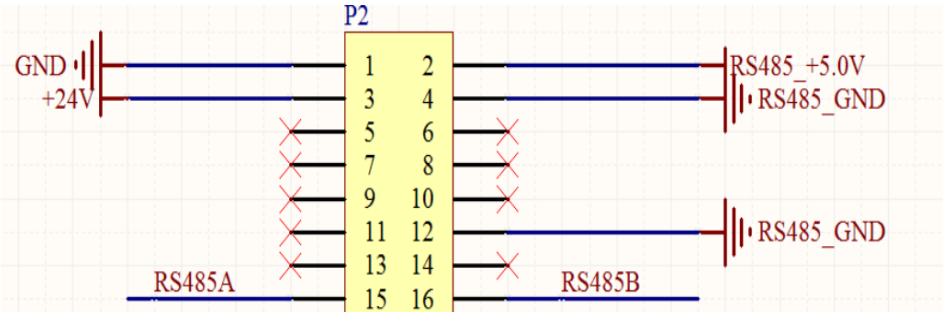
## 2.7 Installation Dimension
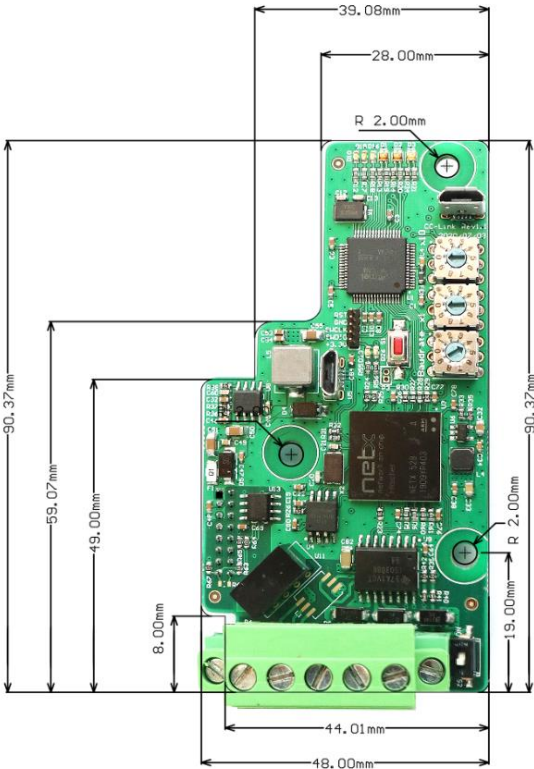


# 3. Product Application Topology
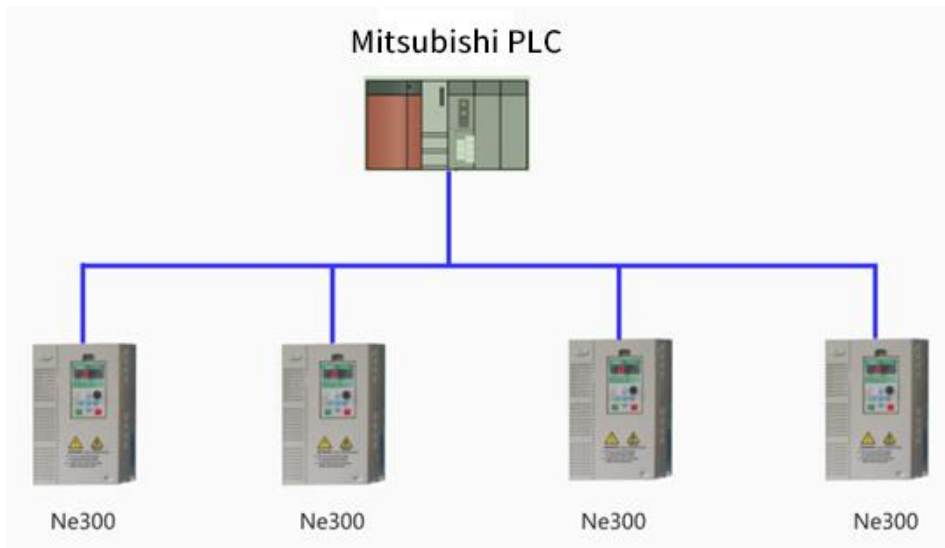
# 4. Test with Mitsubishi QJ61BT11N

4.1．Opening the GX Works2 software, and create a new project, then select the CPU series and model.
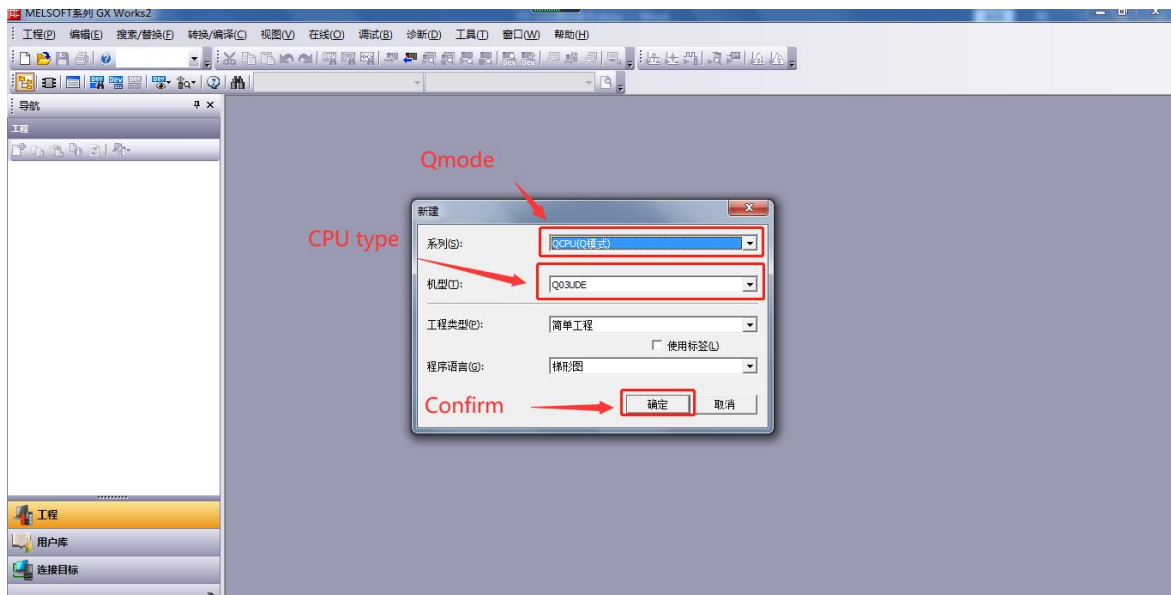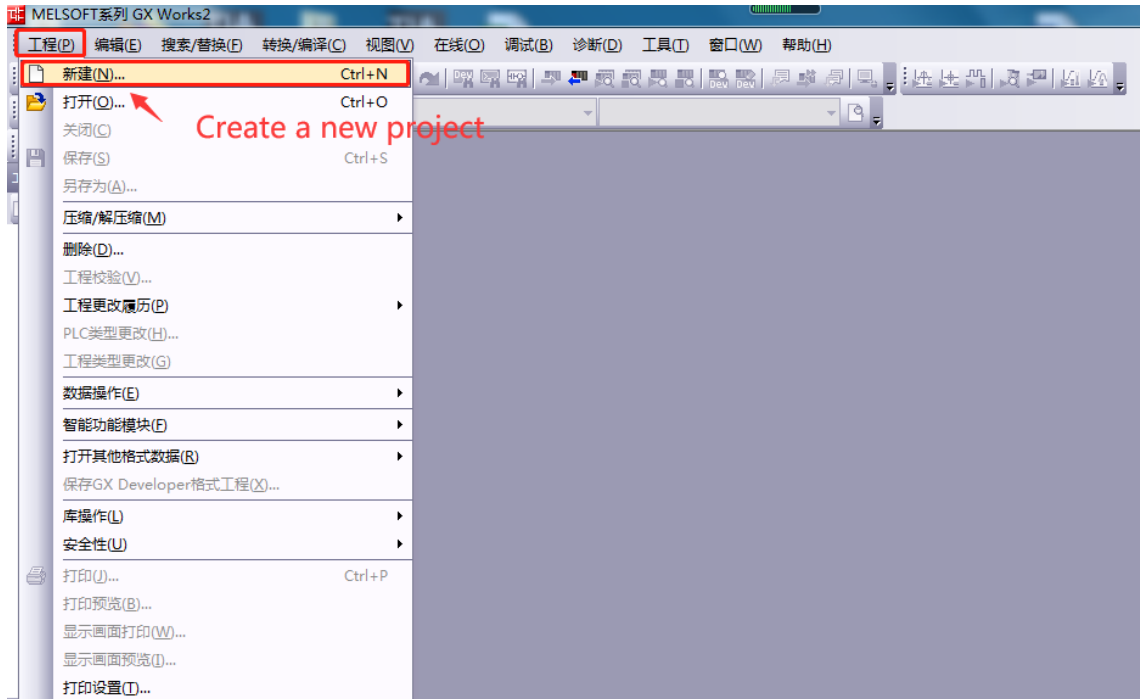




4.2．Clicking "Parameters" under the left project tree → "Network Parameters" → double-clicking "CC Link" to configure CC Link communication parameters.

Number of modules: 1

Type: Master

Mode Setting: Remote Network (Ver 2 mode)

Total number of connections: 1

Remote register (RWr): set to D1000 (programmatically defined)

Remote register (RWw): Set to D2000 (programmatically defined)

Station information: Ver.2 Remote equipment station (fixed 8 times setting,

occupying 3 stations)

4.3．After the configuration is finished →clicking  in the menu bar to

download to the PLC.
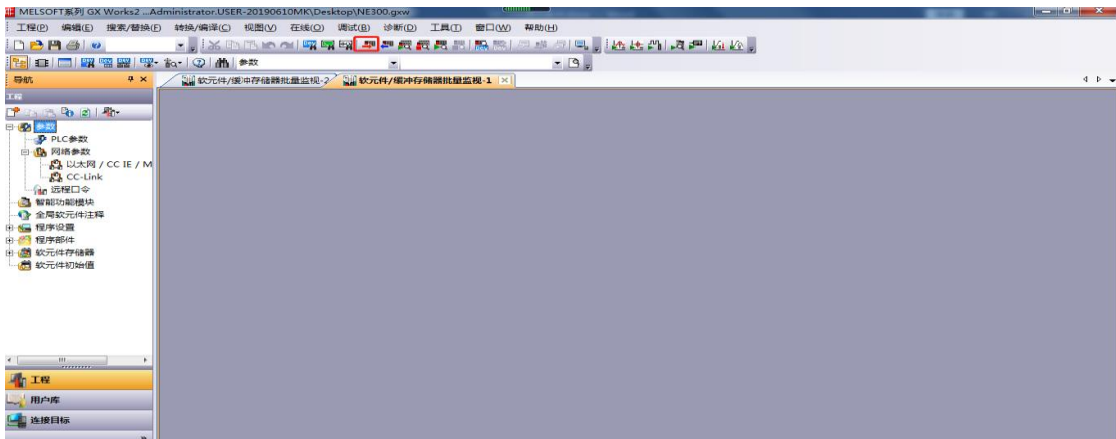


4.4．Clicking the "Online" in the toolbar → the "Monitor" in the drop - down menu
→ Soft Component/Buffer Bulk Monitoring in the drop - down menu.

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