Robostar Robot

# N1 Series Option

# C-net

☑ Option Module

- C-net

Robostar

www.robostar.co.kr

ROBOSTAR ROBOT

# N1 Series Option

# C-net

☑ Option Module

- C-net

Robostar

www.robostar.co.kr

# Regarding Product Warranty

Robostar products are manufactured under strict quality control and all Robostar products are covered under one year warranty from the date of manufacture. We offer free services during this warranty period only for mechanical breakdowns caused by faults by Robostar or breakdowns which arise from problem in design and manufacturing faults during normal use.

No free service is provided to the following occasions.

(1) After the warranty period expires
(2) Mechanical troubles caused by inappropriate repairs, alteration, movement and other negligent handling directed by your company or a third party.
(3) Mechanical troubles caused by use of other products than the ones assigned by our company, such as components and grease
(4) Mechanical troubles caused by fires, disasters, earthquakes, storm and flooding and other natural disasters
(5) Malfunction due to use in environment beyond our product specifications, such as in excretions and flooding
(6) Malfunction due to normal wear of consumable parts
(7) Malfunction due to lack of carrying out maintenance work checklist as listed in User Manual and Handling Manual
(8) Damage not included in robot repair costs

## Address and Contact Details for Robostar Co., Ltd

- Head Office and Factory
  700, Suin-ro, Sangnok-gu,
  Ansan-City, Gyeonggi-do, Republic of
  South Korea (426-220)

- 2nd Factory
  108, Saneop-ro, Gwonseon-gu,
  Suwon-City, Gyeonggi-do, Republic of
  South Korea (441-813)

- Service Inquiry and Product Inquiry
  - Sales Inquiry
  TEL. 031-400-3600
  FAX. 031-419-4249
  - Customer Inquiry
  TEL. 1588-4428

Robostar

www.robostar.co.kr

# Composition of User Manual

The User Manual of this product is composed of the following. If this is the first time to use this product, fully understand each and every detail in the manual before use.

- **C-net**

  Explains how to connect a N1 series connector using a C-net as well as how to use it.

# Table of Contents

# Chapter 1. Overview

## 1.1 System Configuration

N1 controller makes use of C-net protocols to enable communication with such systems as PC or PLC. C-net protocol communication becomes possible through the use of Host Port on Main Board of N1 controller.

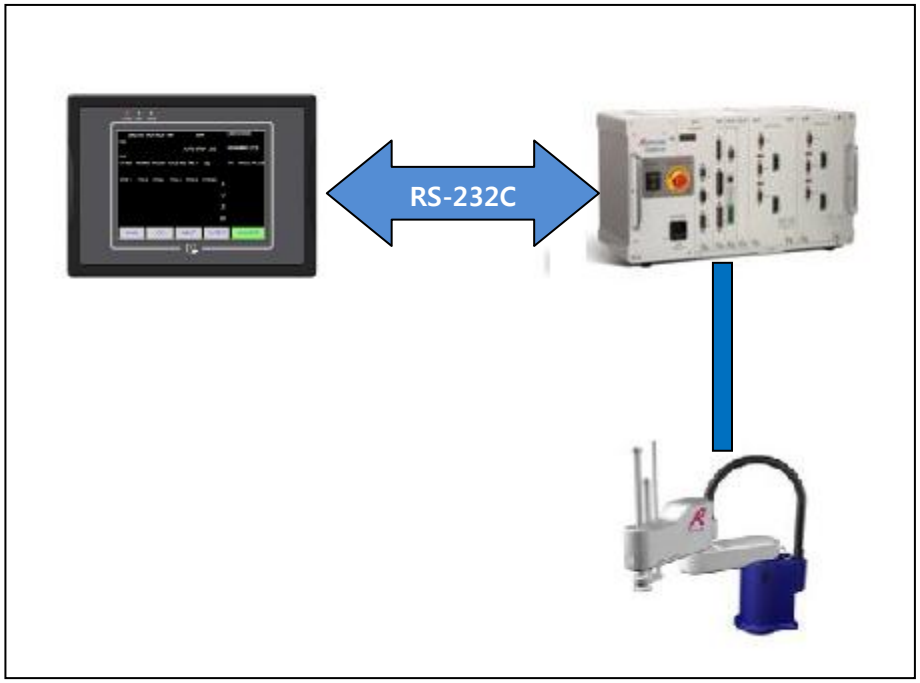



Fig. 1.1 C-net System Configuration

※ N1 controller supports C-net protocols for "Master-K"/"GLOFA" series.

# Chapter 2. Function

## 2.1 RS-232 Communication

RS232C communication distance is generally 15m, but the greater the communication speed gets, the shorter the distance becomes.

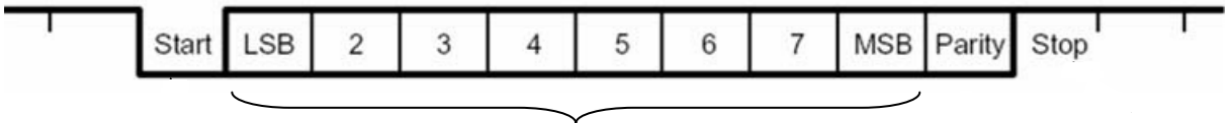
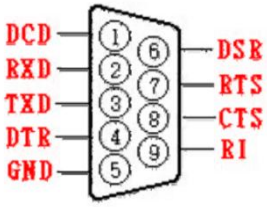



Fig. 2.1 Asynchronous Communications Format

- Start bit : Indicates the start of communications Format
- DATA bit : Configurable in bit sizes 5/6/7/8, indicating communication data value with LSB first
- Parity bit : Configurable to No/Even/Odd and detectable when 1 bit is changed by noise
- Stop bit: Configurable in sizes 1/1.5/2, indicating the end of data

## 2.2 D-SUB 9Pin Connector




| | Description |
|---|---|
| TXD | Transmit Data, communication data output signal |
| RXD | Receive Data, communication data input signal |
| RTS | Used for Ready To Send modem communication, displaying communication preparation status and applicable as a general-purpose output port |
| CTS | Used for Clear To Send modem communication, displaying communication preparation status and applicable as a general-purpose input port |
| DTR | Signals for preparing Data Terminal Ready modem communication, applicable as an output port |
| DSR | Signals for preparing Data Set Ready modem communication, applicable as an input port |
| DCD | Data Carrier Detect, input port |
| RI | Ring Indicator input port |
| GND | Ground |

Table 2.1 Description of Connector

# Chapter 3. Installation and Operation Setting

## 3.1 How to Install Hardware

Take the following procedure and you can use C-net protocols of N1 series controller.

1) Connect a Serial cable to N1 to communication port (HOST PORT) on controller's Main Board.

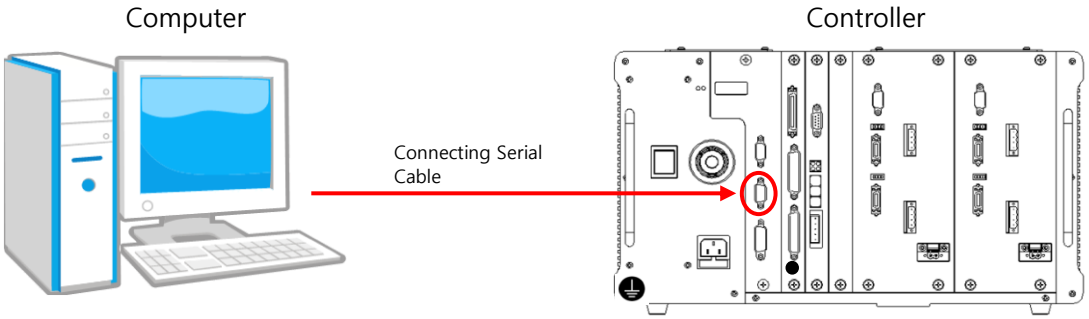



Fig. 3.1 How to Connect Serial Cable

## 3.2 How to Connect Cable

For how to connect cable, refer to Fig. "3.2 Cable Wiring Diagram".

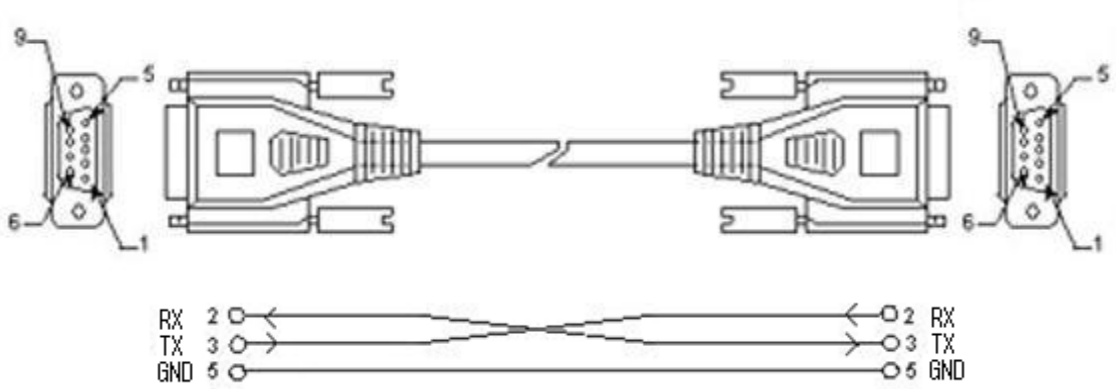



Fig. 3.2 Cable Wiring Diagram

| Pin No. | Name | Content | Description of Functions |
|---|---|---|---|
| 2 | RXD | Received Data | Receive Data Signal |
| 3 | TXD | Transmit Data | Transmit Data Signal |
| 5 | GND | Ground | Ground |

Table 3.1 Description of Wiring Pin Numbers

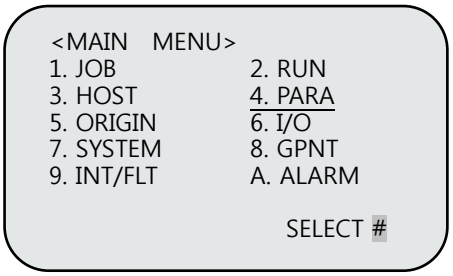
## 3.3 Controller Setting

To use C-net protocols in N1 series controller, you should set RS-232C communication. Default value for baud rate is set to 115,200bps.

### 3.3.1 RS-232C Communication Setting

1. Setup Procedure

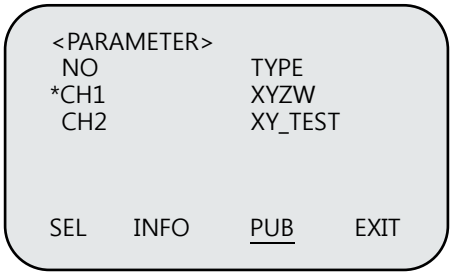
**Step 1.** **Move to PARA screen**




Open initial menu screen

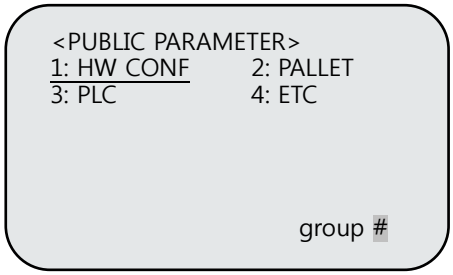
Select 4: PARA

4 L




Open PUBLIC PARAMETER group screen

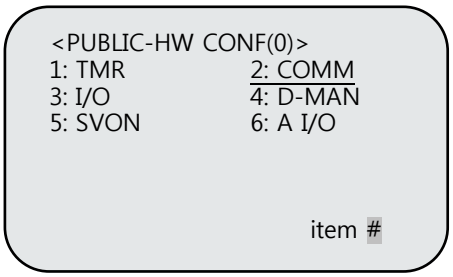
F3




Select 1:HW CONF

1 Q

**Step 2.** **Move to COMM screen**




Select 2: COMM

2 R

**Step 3.** **RS232 setup screen**

```
<HW CONF - COM>
    COMMUNICATION SET
1: COM PORT SET
2: FIELD BUS


                    group #
```

Select 1: RS232C

1
Q

```
<COM – PORT SET 1/2>
          PORT:HOST
PROTOCOL:         N1
BAUD RATE:        230400
SEPARATOR:        CR+LF
ID:               0

HOST    RS485
```

Pg Dn

Set C-Net protocol

```
<COM – PORT SET 2/2>
          PORT:HOST
LENGTH:           8   bits
STOP BIT:         1   bits
PARITY:           disable
FLOW:             NONE

HOST    RS485
```

Set C-Net protocol

| Item | Set Value | Default Value |
|---|---|---|
| PROTOCOL | C-Net | N1 |
| BAUD RATE | 115,200 | 115200 |
| LENGTH | 8 | 8 |
| STOP BIT | 1 | 1 |
| PARITY | disable | disable |
| FLOW | NONE | NONE |
| ID | 0 | 0 |

※ ID currently supports no functions.

# Chapter 4. Examples of C-net Setting on Touch Panel

This Manual uses the Easyview model MT8056T supporting "Master-K" and "GLOFA" C-net. (Also available for use are other Touch Panel products supporting "Master-K" and "GLOFA" C-net.) For how to set C-net communication of model MT8056T, EasyBuilder8000 program provided by Easyview was adopted for use.

## 4.1 Executing EasyBuilder8000 Program

Execute EasyBuilder8000 and a window comes up as shown in Fig. 4.1 below.

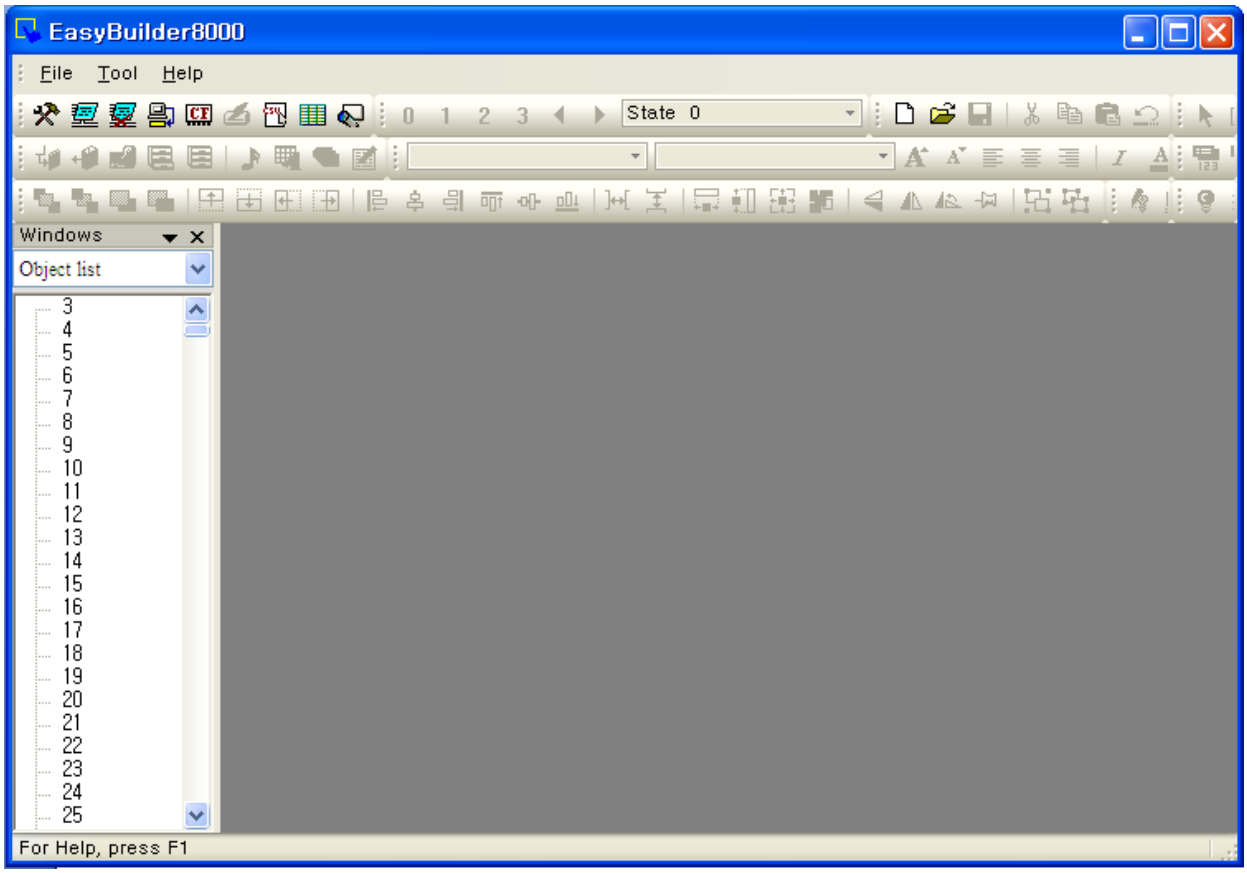



Fig. 4.1 Screen executing Easybuilder8000

## 4.2 Add New

Select File->New from menu.

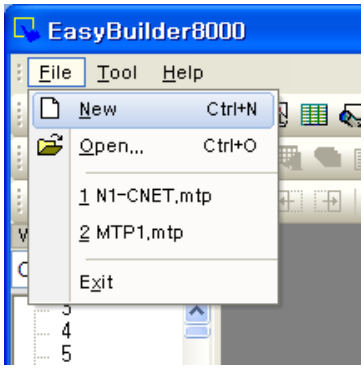



Fig. 4.2 Create Project

Select MT8056T from Model. (The product described in this Manual is a model MT8056T.)

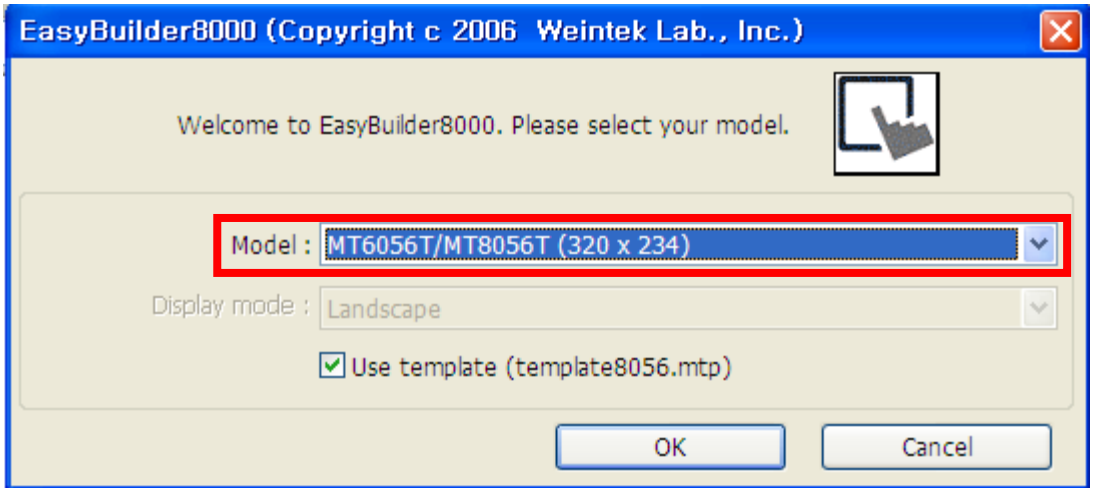



Fig. 4.3 Product Selection Screen

Click OK button and a window comes up as shown in Fig. 4.4.

### 4.3 System Parameter Setting

Click New... button at the center of the window.

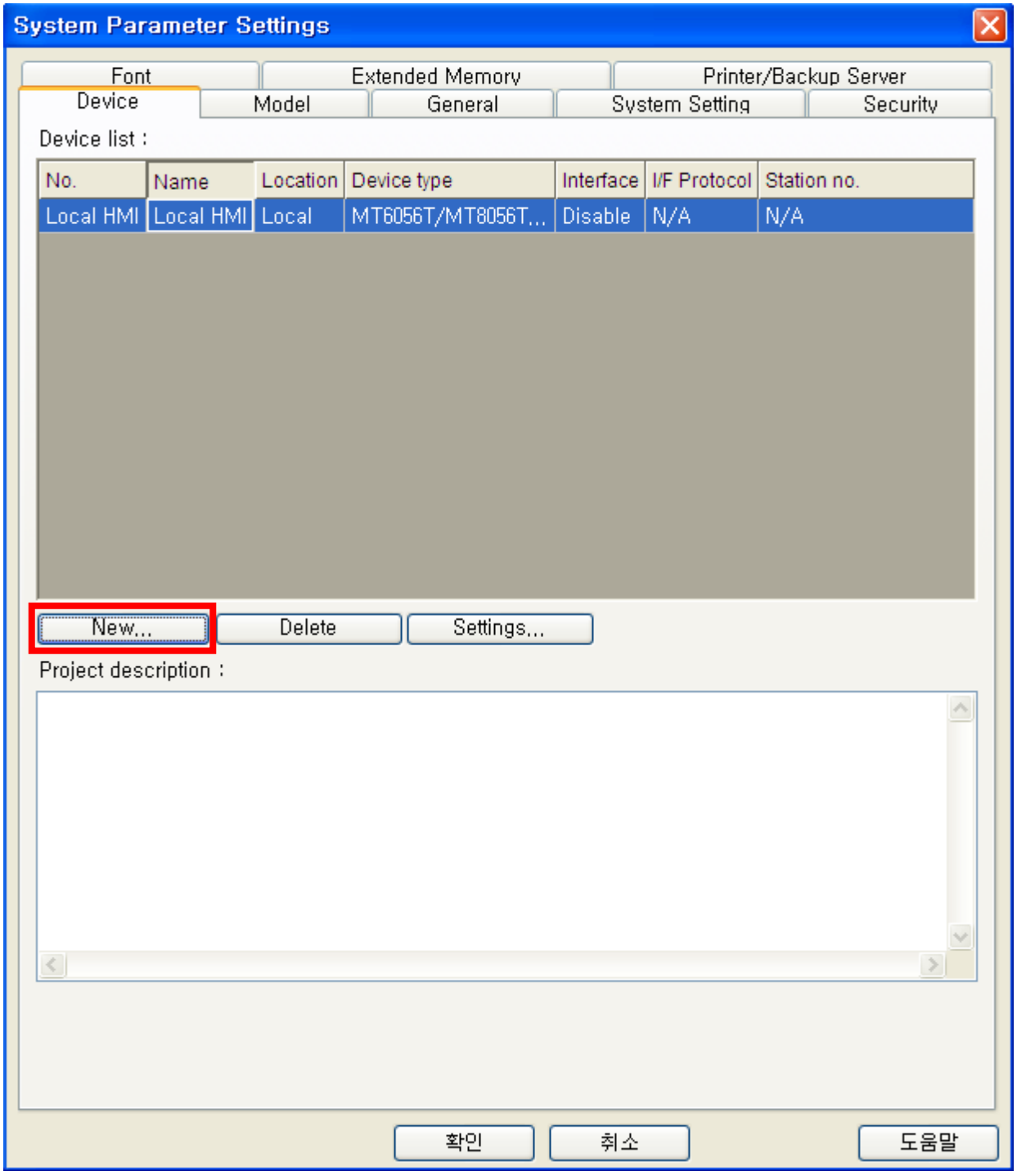



Fig. 4.4 Parameter Setting

Select PLC from the combo box at top of "Fig. 4.5".

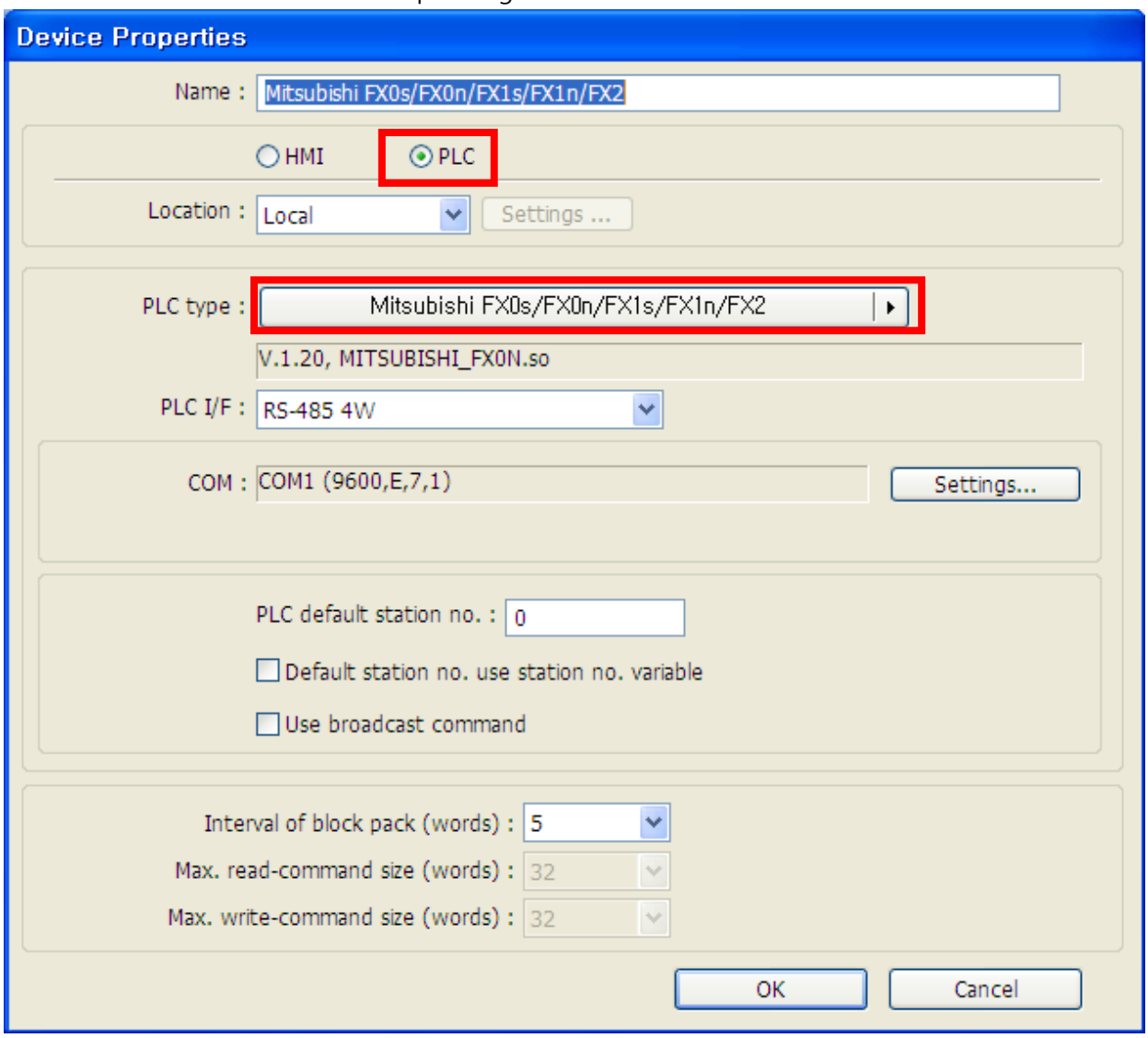



Fig. 4.5 Device Setting

Next, select PLC type and a "Fig. 4.6" window comes up.

Select LS industrial System.

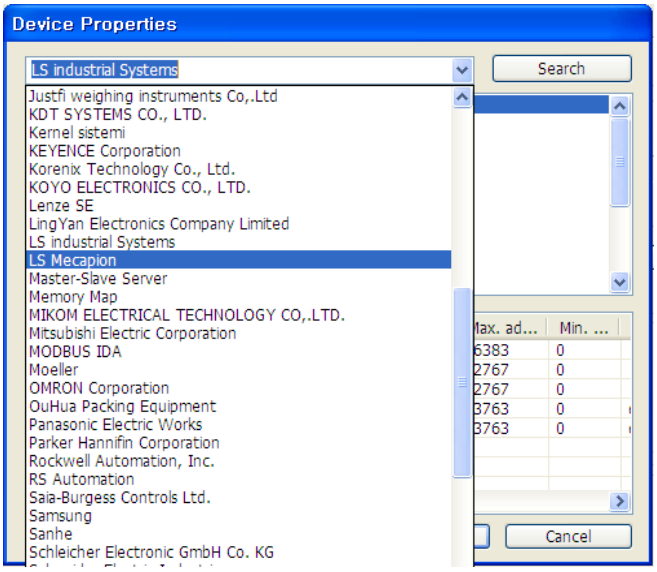



Fig. 4.6 Product Group Selection Screen

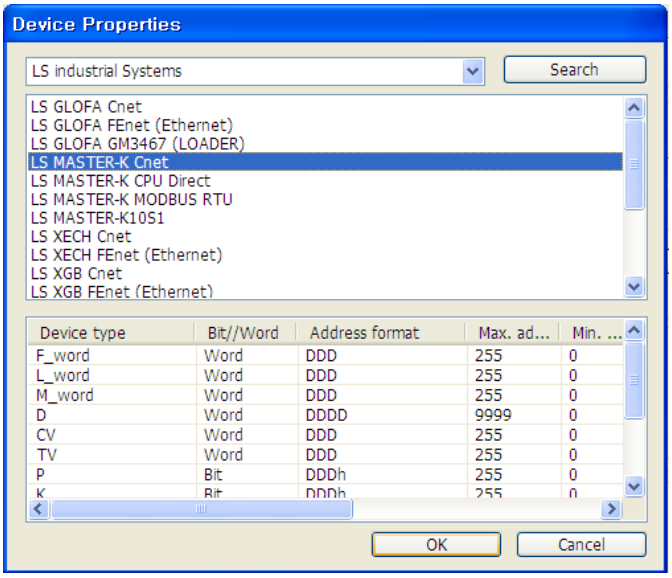



Fig. 4.7 Select PLC Type

For Device, select Master-K C-net or Glofa C-net.

**CAUTION**

- C-net protocols supported from N1 controller support "MASTER-K", "GLOFA" series ONLY.

Set COM PORT.

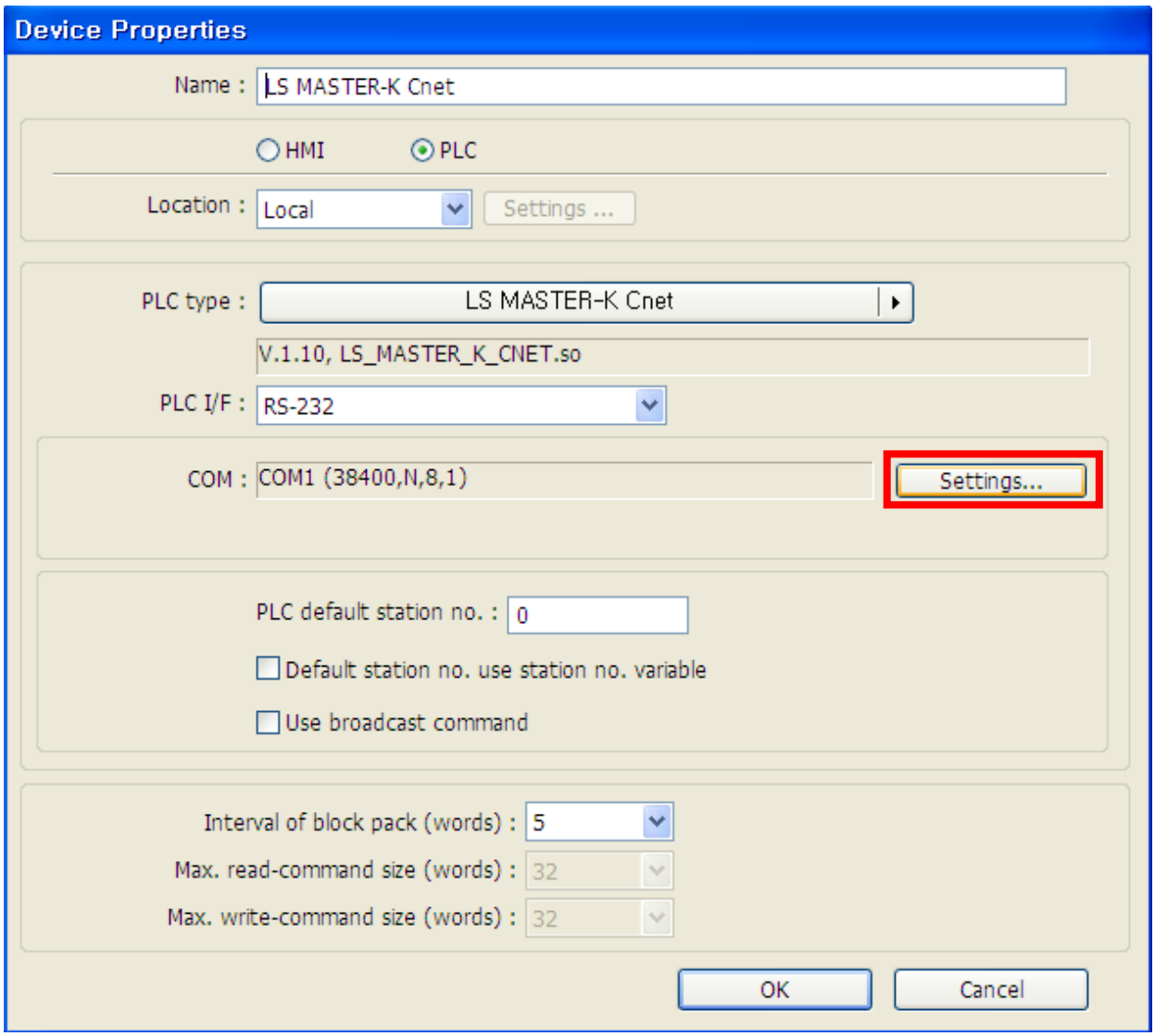



Fig. 4.8 Device Setting

Click Settings.... in "Fig. 4.8".

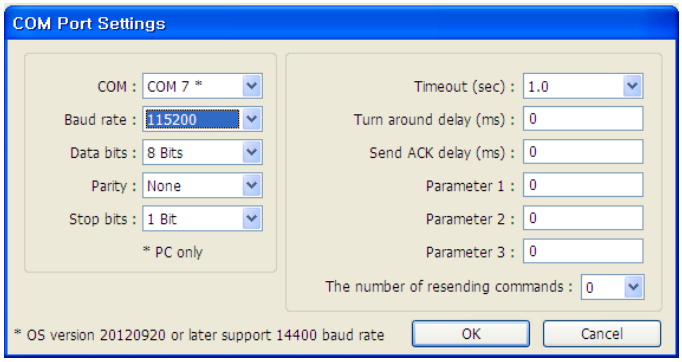



Fig. 4.9 COM PORT Setting

Set the communication speed with RS-232 communication PORT.

**CAUTION**

> ➢ For settings related to N1 controller communications, refer to "3.3 Controller Setting"

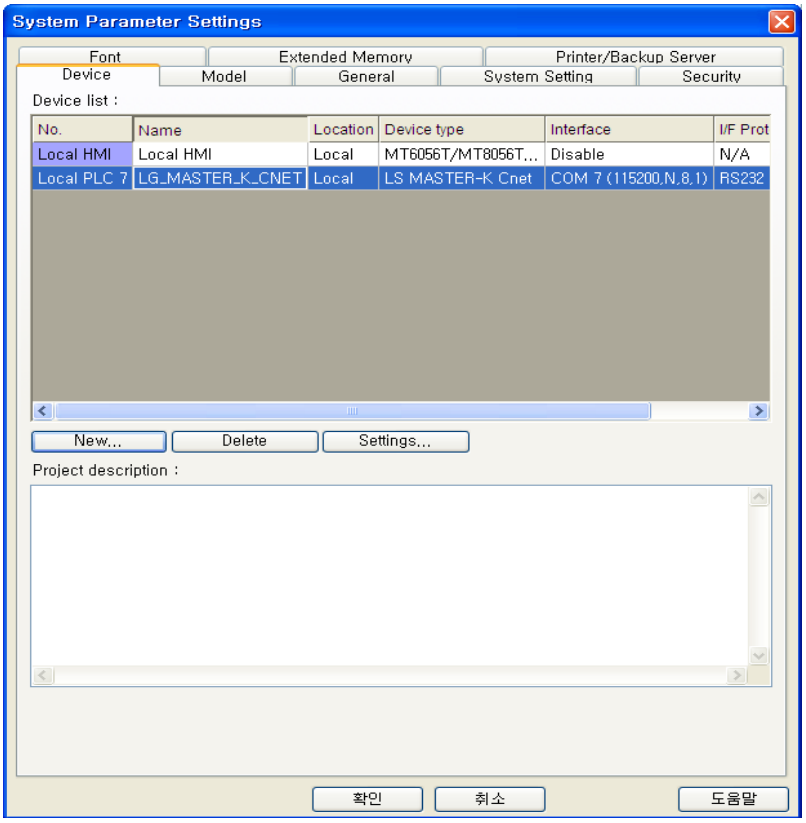



Fig. 4.10 System Parameter

Fig. 4.10 shows a window where System Parameter setup is complete for C-net protocols to be used.

# Chapter 5. Memory Mapping

## 5.1 N1 Controller Data Mapping

| Controller Data Mapping | | | | | |
|---|---|---|---|---|---|
| **Data** | **Description** | | **Data** | **Description** | |
| M0.0~0.F | IN | System Input #1 | M10.0~10.F | OUT | System Output #1 |
| M1.0~1.F | IN | User Input | M11.0~11.F | OUT | User Output |
| M2.0~2.F | IN | Option Input 0 | M12.0~12.F | OUT | Option Output 0 |
| M3.0~3.F | IN | System Input #2 | M13.0~13.F | OUT | Error Code Read |
| | IN | FieldBus Input #1 | | | |
| M4.0~4.F | IN | Option Input 1 | M14.0~14.F | OUT | Option Output 1 |
| M5.0~5.F | IN | Option Input 2 | M15.0~15.F | OUT | Option Output 2 |
| M6.0~6.F | IN | Option Input 3 | M16.0~16.F | OUT | Option Output 3 |
| M7.0~7.F | IN | FieldBus Input #2 | M17.0~17.F | OUT | FieldBus Output #1 |
| D0 | IN/OUT | Global Point Data X(A) | D80 | OUT | Current Position X(A) |
| D2 | IN/OUT | Global Point Data Y(B) | D82 | OUT | Current Position Y(B) |
| D4 | IN/OUT | Global Point Data Z | D84 | OUT | Current Position Z |
| D6 | IN/OUT | Global Point Data W | D86 | OUT | Current Position W |
| D8 | IN/OUT | Global Integer Input | D88 | OUT | ERROR CODE |
| D9 | IN | Global Integer Index | D89 | OUT | AUTO VEL |
| D10 | IN | JOG VEL Rate Input | D90 | IN | RESERVED |
| D11 | IN | Global Point Index | D91 | OUT | Info Data 1 Output |
| D12 | IN | Pull Up Value Input | D92 | OUT | Info Data 2 Output |
| D13 | IN/OUT | Global Float Input | D93 | OUT | Info Data 3 Output |
| | | | D94 | OUT | Info Data 4 Output |
| D15 | IN | Global Float Index | D95 | OUT | Running JOB Number |

**Note) When using Option I/O, change Parameter I/0 EXT B/D value to 2.**
**(Refer to Handling Manual "1.3.1.3 Extension I/O Board Setting".)**
**Note) JOG Velocity Rate Input in D10 applies in JOG Mode whose setup range is 1~100%. The values set are converted to percentage per axis based on Jv value for JOINT MOTION parameters.**

### 5.1.1 N1 Series System Input #1

N1 series holds the System Bits commonly used between Robot Channel 1 and 2, and these common Bits operate differently between channels depending on CH_SEL Bit settings.
When the set value for CH_SEL Bit is Low, it corresponds to Robot Channel 1, with High corresponding to Robot Channel 2.

| System Input #1 (M0.0 ~ M0.F) | | | |
|---|---|---|---|
| 0 | CH SEL | 8 | MODE 1 / AXIS 1 |
| 1 | PROG 0 | 9 | MODE SEL |
| 2 | PROG 1 | A | JOG VEL |
| 3 | PROG 2 | B | VEL+ / MOV+ |
| 4 | PROG 3 | C | VEL- / MOV- |
| 5 | PROG 4 | D | REBOOT |
| 6 | PROG SEL | E | ORG #1 |
| 7 | MODE 0 / AXIS 0 | F | START #1 |

Commonly-used bits are PROG_0 ~ PROG_4, PROG_SEL, MODE0/AXIS0, MODE1/AXIS1, MODE SEL, JOG VEL, VEL+/MOV+, and VEL-/MOV-. When using the common Bit, check the set value for CH SEL Bit. If the set value for CH SEL Bit is not correct, an unwanted robot channel may operate. The FieldBus timing diagram represented in this Manual is examples for Channel 1, and for handling and operating Channel 2, change the set value for CH_SEL Bit to High in Channel 1 timing diagram. Reading and writing Global Integer and Global Float Data can be used regardless of CH_SEL Bit setup.

**CAUTION**

- **For description of the functions of each Bit, refer to Handling Manual "3.3.4 System Input/Output Functions".**

### 5.1.2 N1 Series System Input #2 & FIELDBUS INPUT#1

| System Input #2 (M3.0 ~ M3.7) | | FieldBus Input #1 (M3.8 ~ M3.F) | |
|---|---|---|---|
| 0 | STOP #1 | 8 | DATA TYPE: XY좌표 |
| 1 | Reserved | 9 | DATA TYPE: Angle 좌표 |
| 2 | SERVO ON #1 | A | Data Type: Pulse (Read Only) |
| 3 | ORG #2 | B | Mode Select (/Current OR GPNT) |
| 4 | START #2 | C | Write Enable Flag(Position,GINT) |
| 5 | STOP #2 | D | READ Enable Flag(Position, GINT) |
| 6 | Reserved | E | Reserved |
| 7 | SERVO ON #2 | F | Reserved |

### 5.1.3 N1 Series FIELDBUS INPUT #2

| FieldBus Input #2 (M7.0 ~ M0.F) | | | |
|---|---|---|---|
| 0 | JOG A(X)+ | 8 | AUTO RUN MODE |
| 1 | JOG A(X)- | 9 | STEP RUN MODE |
| 2 | JOG B(Y)+ | A | JOG MODE |
| 3 | JOG B(Y)- | B | JOG Forward SEL |
| 4 | JOG Z+ | C | Reserved |
| 5 | JOG Z- | D | Reserved |
| 6 | JOG W+ | E | Info Data Mode SEL #0 |
| 7 | JOG W- | F | Info Data Mode SEL #1 |

### 5.1.4 N1 Series System Output #1

| System Output #1 (M10.0 ~ M10.F) | | | |
|---|---|---|---|
| 0 | CH SEL | 8 | ORG OK #2 |
| 1 | ALL ALARM | 9 | RUNNING #2 |
| 2 | READY #1 | A | INPOS/INRNG #2 |
| 3 | ORG OK #1 | B | SERVO ON #2 |
| 4 | RUNNING #1 | C | Reserved |
| 5 | INPOS/INRNG #1 | D | Reserved |
| 6 | SERVO ON #1 | E | Reserved |
| 7 | READY #2 | F | Reserved |

### 5.1.5 N1 Series FIELDBUS Output #2

| FieldBus Output #1 (M17.0 ~ M17.F) | | | |
|---|---|---|---|
| 0 | Write Complete Flag | 8 | Auto Run Mode DIS |
| 1 | Read Complete Flag | 9 | Step Run Mode DIS |
| 2 | Reserved | A | JOG Mode DIS |
| 3 | Forward Moving State DIS | B | Reserved |
| 4 | Reserved | C | Info Data Mode SEL #0 |
| 5 | Brake State DIS | D | Info Data Mode SEL #1 |
| 6 | Reserved | E | Reserved |
| 7 | Reserved | F | Reserved |

## 5.2 Precaution for Use in N1 Series System Mode

**1. < Precautions for Use in Auto Mode >**

**① GINT, GFLOAT and GPNT commonly use Read / Write Enable Flag so the Index value of an unused variable is allocated at a time no change is intended.**

**② Coordinate Write functions, among Data Types, allow XYZW and ABZW ONLY to be available for use.**

**③ Only PROGRAM NUM entered from SYSTEM MODE is sent out.**

**④ VEL output enables sending out robot's travel speed in JOG MODE and AUTO MODE.**

**2. < Precautions for Use in JOG Mode >**

**① JOG_VEL input is applicable only in JOG MODE and when the value is 0 it operates at 1% speed.**

**② VEL output enables sending out robot's travel speed in JOG MODE and AUTO MODE.**

**③ AUTO RUN MODE, STEP RUN MODE and JOG MODE in Field Bus Input #2 should be entered by pulse input. (When each mode is set to High, the Bit selected on Jog axis in FieldBus Input #2 operates in an abnormal manner.)**

| Rev. | Date of Revision | Content | Modifier | S/W Version |
|---|---|---|---|---|
| V.1 | **2012.12.31** | **First Edition Print** | | |

N1 ROBOT CONTROLLER

# CONTROLLER MANUAL

FIRST EDITION DECEMBER 2012

ROBOSTAR CO, LTD

ROBOT R&D CENTER