# CPS CONTROLLER for AC SERVO NUT RUNNER Instruction Manual - Volume Network

## Introduction

Thank you very much for purchasing our Nut runner.

This manual describes the hardware scheme, installation procedures, connections, running, operations, communication, status display and daily inspections.

Make sure to thoroughly understand the contents and use the product properly.

## Request

We have taken all possible measures to ensure the contents of this instruction manual, however, please contact us if you have any questions or find any errors.



* To secure safety and quality, never fail to refer to this manual.

Table of contents

# 1. Outline

Anybus is prepared for CPS controller as an expansion bus. Anybus is the bus standard which HMS advocates and various network cards are offered. CPS controller corresponds to DeviceNet and CC-Link etc. in the product group called Anybus-S. If Anybus is used, read-out of numerical data and writing of parameters will be attained besides PI/O function. Here, specifications other than PIO function are mainly explained. There are a dynamic system and a static system in the access method of data. About the number of devices to use, there are basic specification and 4 times extension specification.

The basic specification of a dynamic system is explained at Chapter 2 to chapter 6. This is the fundamental specification which can access all data with the minimum number of occupancy devices.

Chapter 7 explains the 4 times extension specification of a dynamic system. 4 times extended specification can access 5 times as much data as basic specification. When a margin is in the number of allotment of a device, we recommend you to selecti 4 times extension specification.

Chapter 8 explains the basic specification of a static system. The dynamic system has somewhat complicated procedure explained in Chapter 2 to 7. Then, the static system was added so that access of data could be performed in easier procedure. The static system can be used with CPS controller Ver1.02.44 or later.

Chapter 9 explains the 4 times extension specification of a static system.

A setup about Anybus is possible on Anybus screen of CPS NR Configurator.

# 2. Dynamic System-Standard Specification

## 2.1. Number of Devices Occupied

6 words are occupied about each input and output.

### 2.1.1. CC-Link

Version:Remote Net Version1

Station Type:Remote Device

occupied stations:1

### 2.1.2. DeviceNet,EtherNet/IP

Please assign 12 bytes in I/O communication mode.

### 2.1.3. Profibus-DP, PROFINET IO

Please assign 16 bytes in IN/OUT .

## 2.2. Assignment of devices

Device assignment to word address of each communication format is as follows.

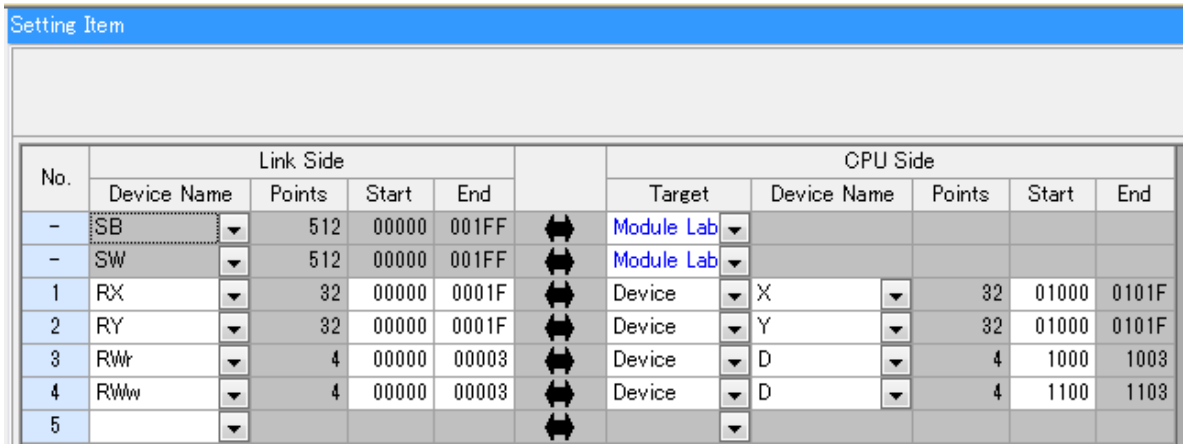
| Word address | CC-Link | DeviceNet<br>EtherNet/IP | Profibus-DP<br>PROFINET IO |
|---|---|---|---|
| 0 | Bits device 0-15 | Byte0 | Byte0 |
| | | Byte1 | Byte1 |
| 1 | Bits device 16-31 | Byte2 | Byte2 |
| | | Byte3 | Byte3 |
| 2 | Word device 0 | Byte4 | Byte4 |
| | | Byte5 | Byte5 |
| 3 | Word device 1 | Byte6 | Byte6 |
| | | Byte7 | Byte7 |
| 4 | Word device 2 | Byte8 | Byte8 |
| | | Byte9 | Byte9 |
| 5 | Word device 3 | Byte10 | Byte10 |
| | | Byte11 | Byte11 |
| | | | Byte12 |
| | | | Byte13 |
| | | | Byte14 |
| | | | Byte15 |

The contents of each address are defined as follows.

| Word address | Input | Output |
|---|---|---|
| 0 | PIN 16 bits of lower | POUT 16 bits of lower |
| 1 | PIN 16 bits of upper. Not used | POUT 16 bits of upper |
| 2 | Control data | Control data response |
| 3 | Specify Program number | Specify Program number response |
| 4 | Data input lower WORD | Data output lowerWORD |
| 5 | Data input upper WORD | Data output upper WORD |

The WORD addresses 0 and 1 are the portions used as bit-assigned I/O. **PIN/POUT assigment shall be refered CPS CTRL for NR Instruction Manual 6-8 Parallel I/O**.
The WORD address 2-5 are used for data access. A numerical result can be read or a product name can be set by using that. The WORD addresses 2 and 3 are used in order to specify the kind of data to access. The WORD addresses 4 and 5 are the contents of the data to access. When data is inputted into the WORD addresses 2 and 3 in a predetermined form, the controller sets the same data as what was inputted into the WORD addresses 2 and 3. Moreover, the data according to the contents of a demand is set to the WORD addresses 4 and 5.

### 2.2.1. Example of Setting in GX Works3 of MITSUBISHI




| Word address | Input | | Output | |
|---|---|---|---|---|
| 0 | PIN 16 bits of lower | Y1000 | POUT 16 bits of lower | X1000 |
| 1 | PIN 16 bits of upper. Not used | Y1010 | POUT 16 bits of upper | X1010 |
| 2 | Control data | D1100 | Control data response | D1000 |
| 3 | Specify Work position/Spindle number | D1101 | Specify Work position/Spindle number response | D1001 |
| 4 | Data input low rank WORD | D1102 | Data output low rank WORD | D1002 |
| 5 | Data input higher rank WORD | D1103 | Data output higher rank WORD | D1003 |

### 2.2.2. Example of a setting in TIA V11 of Siemens

| Name | ... | Data type | Address |
|---|---|---|---|
| POUT_2_CPS2 | ... | Byte | %QB258 |
| POUT_2_CPS3 | ... | Byte | %QB259 |
| POUT_2_CPS4 | ... | Byte | %QB260 |
| POUT_2_CPS5 | ... | Byte | %QB261 |
| POUT_2_CPS6 | ... | Byte | %QB262 |
| POUT_2_CPS7 | ... | Byte | %QB263 |
| POUT_2_CPS8 | ... | Byte | %QB264 |
| POUT_2_CPS9 | ... | Byte | %QB265 |
| POUT_2_CPS10 | ... | Byte | %QB266 |
| POUT_2_CPS11 | ... | Byte | %QB267 |
| POUT_2_CPS12 | ... | Byte | %QB268 |
| POUT_2_CPS13 | ... | Byte | %QB269 |
| POUT_2_CPS14 | ... | Byte | %QB270 |
| POUT_2_CPS15 | ... | Byte | %QB271 |
| Frm_CPS_Byte0 | ... | Byte | %IB256 |
| Frm_CPS_Byte1 | ... | Byte | %IB257 |
| Frm_CPS_Byte2 | ... | Byte | %IB258 |
| Frm_CPS_Byte3 | ... | Byte | %IB259 |
| Frm_CPS_Byte4 | ... | Byte | %IB260 |
| Frm_CPS_Byte5 | ... | Byte | %IB261 |
| Frm_CPS_Byte6 | ... | Byte | %IB262 |
| Frm_CPS_Byte7 | ... | Byte | %IB263 |
| Frm_CPS_Byte8 | ... | Byte | %IB264 |
| Frm_CPS_Byte9 | ... | Byte | %IB265 |
| Frm_CPS_Byte10 | ... | Byte | %IB266 |
| Frm_CPS_Byte11 | ... | Byte | %IB267 |
| Frm_CPS_Byte12 | ... | Byte | %IB268 |
| Frm_CPS_Byte13 | ... | Byte | %IB269 |
| Frm_CPS_Byte14 | ... | Byte | %IB270 |
| Frm_CPS_Byte15 | ... | Byte | %IB271 |

| Name | Data t... | Address |
|---|---|---|
| RESET(1) | Bool | %Q256.0 |
| START | Bool | %Q256.1 |
| PRG1 | Bool | %Q256.2 |
| PRG2 | Bool | %Q256.3 |
| PRG4 | Bool | %Q256.4 |
| PRG8 | Bool | %Q256.5 |
| PRG16 | Bool | %Q256.6 |
| STOP | Bool | %Q256.7 |
| USER_IN1 | Bool | %Q257.0 |
| USER_IN2 | Bool | %Q257.1 |
| USER_IN4 | Bool | %Q257.2 |
| USER_IN8 | Bool | %Q257.3 |
| READY_RUN | Bool | %I256.0 |
| RUN | Bool | %I256.1 |
| ALARM | Bool | %I256.2 |
| +NG | Bool | %I256.3 |
| -NG | Bool | %I256.4 |
| OK | Bool | %I256.5 |
| DRMT | Bool | %I256.6 |
| READY_CTRL | Bool | %I256.7 |
| USER_OUT1 | Bool | %I257.0 |
| USER_OUT2 | Bool | %I257.1 |
| USER_OUT4 | Bool | %I257.2 |
| ANS1 | Bool | %I257.3 |
| ANS2 | Bool | %I257.4 |
| ANS4 | Bool | %I257.5 |
| ANS8 | Bool | %I257.6 |
| ANS16 | Bool | %I257.7 |
| BAT ALAM | Bool | %I258.0 |

| Word address | Byte address | Input | | Output | |
|---|---|---|---|---|---|
| 0 | 0 | PIN 16 bits of lower | %QB256 | POUT 16 bits of lower | %IB256 |
| | 1 | | %QB257 | | %IB257 |
| 1 | 2 | PIN 16 bits of upper. Not used | %QB258 | POUT 16 bits of upper | %IB258 |
| | 3 | | %QB259 | | %IB259 |
| 2 | 4 | Control data | %QB260 | Control data response | %IB260 |
| | 5 | | %QB261 | | %IB261 |
| 3 | 6 | Specify Work position/Spindle number | %QB262 | Specify Work position/Spindle number response | %IB262 |
| | 7 | Chechk sum | %QB263 | Check sum | %IB263 |
| 4 | 8 | Data input lower WORD | %QB264 | Data output lower WORD | %IB264 |
| | 9 | | %QB265 | | %IB265 |
| 5 | 10 | Data input upper WORD | %QB266 | Data output upper WORD | %IB266 |
| | 11 | | %QB267 | | %IB267 |

## 2.3. Bit assignment of control data

Word address 2

| Bit number | Name | Meaning |
|---|---|---|
| 0 | Data code 0 | 256 kinds of data are specified by 8 bits binary value of data code 0-7. |
| 1 | Data code 1 | |
| 2 | Data code 2 | |
| 3 | Data code 3 | |
| 4 | Data code 4 | |
| 5 | Data code 5 | |
| 6 | Data code 6 | |
| 7 | Data code 7 | |
| 8 | Parameter No.0 | The parameter number is specified when accessing a program. About the parameter number,please refer to Chapter 2 Definition of the data code [5] Program access (2) Parameter number. It is ignored except program access. |
| 9 | Parameter No.1 | |
| 10 | Parameter No.2 | |
| 11 | Parameter No.3 | |
| 12 | Parameter No.4 | |
| 13 | WRITE | 1 ... Write-in specification 0 ... Numerical data read-out specification. |
| 14 | VALID | 1 ... The contents are effective. 0 ... The contents are invalid. |
| 15 | ERROR bit | It is used only for a response. It is 0 fixation at the time of writing. 0 ... Normal 1 ... Error |

### 2.3.1. About VALID bit

Please reset the VALID bit after transmitting and receiving required data. A controller returns control data by invalid specification.

### 2.3.2. About ERROR bit

When an error is contained in the contents of data, an error bit id set, and an error code is returned to a Data code code.

## 2.4. Bit assignment of Program number and checksum

It is the specification about a master controller the first half of this WORD address. It is the domain which specifies an axial number or a work position, when the data of a spindle controller is demanded via a master controller.

Word address 3

| Bit number | Name | Meaning |
|---|---|---|
| 0 | Program number 0 | Please specify a program number as a binary value.<br>It is ignored except program access. |
| 1 | Program number 1 | |
| 2 | Program number 2 | |
| 3 | Program number 3 | |
| 4 | Program number 4 | |
| 5 | Fixed value | 0 |
| 6 | Fixed value | 0 |
| 7 | Fixed value | 0 |
| 8 | Checksum 0 | This is the sum in the byte unit of the WORD addresses 2-5.(except this byte) Carry-over is disregarded. |
| 9 | Checksum 1 | |
| 10 | Checksum 2 | |
| 11 | Checksum 3 | |
| 12 | Checksum 4 | |
| 13 | Checksum 5 | |
| 14 | Checksum 6 | |
| 15 | Checksum 7 | |

# 3. Definition of the data code

## 3.1. Raed Result

These codes are only for read-out.

| Data code | Name | Meaning |
|---|---|---|
| 0 | PRG NO | Program number, Integer |
| 1 | INDEX | Spindle index, Integer |
| 2 | DATE | Date, BCD,MMDDHHmm |
| 3 | JUDGE | Judgment |
| 4 | JUDGE CODE | Judgment code |
| 5 | END STEP | The step number which the program stopped,Integer |
| 6 | END ITEM | The item which terminated the program |
| 7 | CYCLE TIME | Cycle time, 2 figures of decimals[s] |
| 8 | F.TORQUE | Final torque,<br>2 figures of decimals[Nm] |
| 9 | F.TIME | Final time, 2 figures of decimals[s] |
| 10 | F.ANGLE | Final angle, 1 figures of decimals[deg] |
| 11 | TORUQUE 1 | Torque 1, 2 figures of decimals[Nm] |
| 12 | TIME 1 | Time 1, 2 figures of decimals[s] |
| 13 | ANGLE 1 | Angle 1, 1 figures of decimals[deg] |
| 14 | TORQUE 2 | Torque 2, 2 figures of decimals[Nm] |
| 15 | TIME 2 | Time 2, 2 figures of decimals[s] |
| 16 | ANGLE 2 | Angle 2, 1 figures of decimals[deg] |
| 17 | TORQUE 3 | Torque 3, 2 figures of decimals[Nm] |
| 18 | TIME 3 | Time 3, 2 figures of decimals[s] |
| 19 | ANGLE 3 | Angle 3, 1 figures of decimals[deg] |
| 20 | STD TR | The rate of change of the torque used as a standard, 2 figures of decimals[Nm/deg] |
| 21 | F.TR(Nm/deg) | The final torque rate, 2 figures of decimals[Nm/deg] |
| 22 | F.TR(%) | The final torque rate, Integer [%]<br>It is expressed by the ratio to STD TR.. |
| 23 | IN | User input bit |
| 24 | OUT | User output bit |
| 25 | I.TORQUE | Final torque value calculated from motor current, 2 figures of decimals[Nm] |
| 26,27 | Reserved | |

### 3.1.1. Data Structure of JUDGE

| Word address | Bit address | Contents |
|---|---|---|
| 4 | 0 | ALARM occurred.:1 |
| | 1 | STOP signal was inputted.:1 |
| | 2 | OK:1 |
| | 3 | NG:1 |
| | 4 | Limits acted.:1 |
| | 5-15 | RESERVED |
| 5 | 0-15 | Fixed to 0 |

### 3.1.2. Data Structure of JUDGE CODE

As for the item of NG, the bit of relevance is set to 1.

| Word address | Bit address | Contents | | |
|---|---|---|---|---|
| | | +/- | Judge | Item name |
| 4 | 0 | -NG | Final | F.TORQUE |
| | 1 | | | F.TIME |
| | 2 | | | F.ANGLE |
| | 3 | | | STD TR |
| | 4 | | | F.TR(Nm/deg) |
| | 5 | | | F.TR(%) |
| | 6 | | | I.TORQUE |
| | 7 | | Judge1 | TORQUE 1 |
| | 8 | | | TIME 1 |
| | 9 | | | ANGLE 1 |
| | 10 | | Judge2 | TORQUE 2 |
| | 11 | | | TIME 2 |
| | 12 | | | ANGLE 2 |
| | 13 | | Judge3 | TORQUE 3 |
| | 14 | | | TIME 3 |
| | 15 | | | ANGLE 3 |
| 5 | 0 | +NG | Final | F.TORQUE |
| | 1 | | | F.TIME |
| | 2 | | | F.ANGLE |
| | 3 | | | STD TR |
| | 4 | | | F.TR(Nm/deg) |
| | 5 | | | F.TR(%) |
| | 6 | | | I.TORQUE |
| | 7 | | Judge1 | TORQUE 1 |
| | 8 | | | TIME 1 |
| | 9 | | | ANGLE 1 |
| | 10 | | Judge2 | TORQUE 2 |
| | 11 | | | TIME 2 |
| | 12 | | | ANGLE 2 |
| | 13 | | Judge3 | TORQUE 3 |
| | 14 | | | TIME 3 |
| | 15 | | | ANGLE 3 |

### 3.1.3. Code Definition of END ITEM

END ITEM is the item of the result which shows whether which branch conditions (COND) in a program terminated the program.

| Code | Contents |
|---|---|
| 0 | None |
| 1 | Torque |
| 2 | Angle |
| 3 | Time |
| 4 | In |
| 5 | TR(Final)(%) |
| 6 | TR(Final)(Nm/deg) |
| 7 | TR(Standard) |

## 3.2. Real time data

| Data code | Name | Meaning |
|---|---|---|
| 28 | REAL TORQUE | Real time torque,<br>2 figures of decimals[Nm] |
| 29 | REAL ANGLE | Real time angle, 1 figures of decimals[deg] |
| 30～37 | RESERVED | |

## 3.3. Product information

Reading/writing is possible.

| Data code | Name | Meaning |
|---|---|---|
| 38 | Product name 1 | A product name is set up by the ASCII code. The maximum is 16 characters. It is ignored after NULL. The product name 1 comes to the head of a character sequence. This setup remains in the effective state, unless a power supply is turned off. |
| 39 | Product name 2 | |
| 40 | Product name 3 | |
| 41 | Product name 4 | |
| 42 | Product serial number 1 | The serial number of a product is set up by the ASCII code. The maximum is 16 characters. It is ignored after NULL. The product serial number 1 comes to the head of a character sequence. This setup remains in the effective state, unless a power supply is turned off. |
| 43 | Product serial number 2 | |
| 44 | Product serial number 3 | |
| 45 | Product serial number 4 | |
| 46 | Utility | It is 16 bits in binary value which can be used arbitrarily. |
| 47 | Work position name 1 | A work position name is set up by the ASCII code. The maximum is 8 characters. It is ignored after NULL. The Work position 1 comes to the head of a character sequence. This setup remains in the effective state, unless a power supply is turned off. |
| 48 | Work position name 2 | |
| 49～63 | | |

### 3.4. Maintenance Information

| Data code | Name | Meaning |
|---|---|---|
| 64 | Software version | BCD、0x00HHMMLL |
| 65 | FPGA version | BCD、0x0000HHLL |
| 66 | Manufacture date | BCD,0xYYMMDD00 |
| 67 | Serial number 0～3 | Serial number of a controller 0 to 3 figures, ASCII code |
| 68 | Serial number 4～7 | Serial number of a controller 4 to 7 figures, ASCII code |
| 69 | Serial number 8,9 | Serial number of a controller 8 to 9 figures, ASCII code |
| 70 | Battery exchange date | The date which exchanged the backup battery, BCD,0xYYMMDD00 |
| 71 | Backup time | Backup operation time of a backup battery, Integer [h] |
| 72 | The total AC-on time | The total of ON time of AC power supply, Integer [h] |
| 73 | FAN hours worked | A cooling fan's total hours worked, Integer [h] |
| 74 | The number of times of operation | It is the total of the number of times of execution to programs.Integer |
| 75 | Mileage | The total of the mileage of ram,Integer[mm] |
| 76 | Hardware version | ASCII code |
| 77 | Reserved | |
| 78 | Reserved | |
| 79 | Reserved | |
| 80 | Alarm code | Upper WORD-major code,<br>lower WORD-detailed code |
| 81 | Alarm History-current | Upper WORD-major code,<br>lower WORD-detailed code |
| 82 | Alarm History-before current | Upper WORD-major code,<br>lower WORD-detailed code |
| 83 | Alarm History-after current | Upper WORD-major code,<br>lower WORD-detailed code |
| 84 | Alarm History-last | Upper WORD-major code,<br>lower WORD-detailed code |
| 85 | Alarm History-oldest | Upper WORD-major code,<br>lower WORD-detailed code |
| 86 | Date of current alarm History | BCD 0xMMDDhhmm |
| 87～127 | RESERVED | |

## 3.5. Program access

Reading/writing is possible.

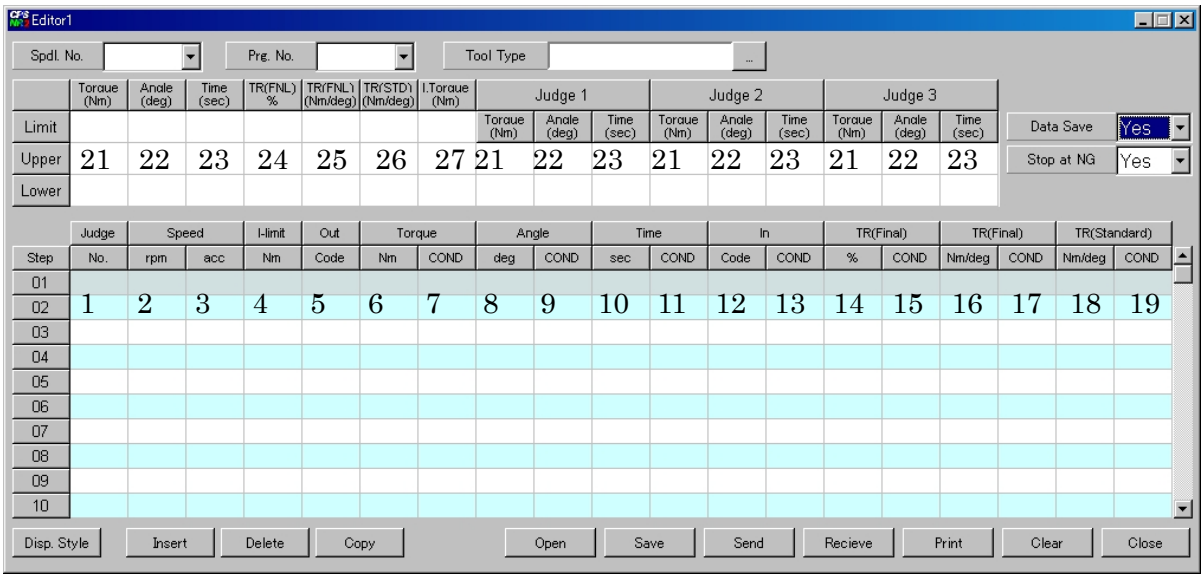
### 3.5.1. Data code

| Data code | Name | Meaning |
|---|---|---|
| 128 | RESERVED | |
| 129 | Access to Step 1 | Data reading / writing of step "n" specified by the parameter number. |
| 130 | Access to Step 2 | Same as the above. |
| 131 | Access to Step 3 | Same as the above. |
| 132 | Access to Step 4 | Same as the above. |
| 133 | Access to Step 5 | Same as the above. |
| 134 | Access to Step 6 | Same as the above. |
| 135 | Access to Step 7 | Same as the above. |
| 136 | Access to Step 8 | Same as the above. |
| 137 | Access to Step 9 | Same as the above. |
| 138 | Access to Step 10 | Same as the above. |
| 139 | Access to Step 11 | Same as the above. |
| 140 | Access to Step 12 | Same as the above. |
| 141 | Access to Step 13 | Same as the above. |
| 142 | Access to Step 14 | Same as the above. |
| 143 | Access to Step 15 | Same as the above. |
| 144 | Access to Step 16 | Same as the above. |
| 145 | Access to Step 17 | Same as the above. |
| 146 | Access to Step 18 | Same as the above. |
| 147 | Access to Step 19 | Same as the above. |
| 148 | Access to Step 20 | Same as the above. |
| 149 | Access to Step 21 | Same as the above. |
| 150 | Access to Step 22 | Same as the above. |
| 151 | Access to Step 23 | Same as the above. |
| 152 | Access to Step 24 | Same as the above. |
| 153 | Access to Step 25 | Same as the above. |
| 154 | Access to Step 26 | Same as the above. |
| 155 | Access to Step 27 | Same as the above. |
| 156 | Access to Step 28 | Same as the above. |
| 157 | Access to Step 29 | Same as the above. |
| 158 | Access to Step 30 | Same as the above. |
| 159 | Access to Step 31 | Same as the above. |
| 160 | Access to Step 32 | Same as the above. |
| 161 | Access to Limit | Reading/writing of Limit value specified by the parameter number |
| 162 | Access to Final Upper | Reading/writing of Final Upper value specified by the parameter number |
| 163 | Access to Final Lower | Reading/writing of Final Lower value specified by the parameter number |
| 164 | Access to Judge1 Upper | Reading/writing of Judge1 Upper value specified by the parameter number |
| 165 | Access to Judge1 Lower | Reading/writing of Judge1 Lower value specified by the parameter number |
| 166 | Access to Judge2 Upper | Reading/writing of Judge2 Upper value specified by the parameter number |

| | | |
|---|---|---|
| 167 | Access to Judge2 Lower | Reading/writing of Judge2 Lower value specified by the parameter number |
| 168 | Access to Judge3 Upper | Reading/writing of Judge3 Upper value specified by the parameter number |
| 169 | Access to Judge3 Lower | Reading/writing of Judge3 Lower value specified by the parameter number |
| 170～191 | RESERVED | |

### 3.5.2. Parameter number

The parameter number used in program access is assigned as shown in the following figure.



# 4. Details of Data in Program

The structure of each data required at the time of access of a program is explained.

## 4.1. Numerical Value

### 4.1.1. General Numerical Value

The data length of a general numerical value is 2 words, and the data type is 2 figures of decimal points.

### 4.1.2. Speed

The data length of speed is 2 words and the data type is an integer.

### 4.1.3. Angle

The data length of Angle is 2 words and the data type is 1 figure of decimal points.

### 4.1.4. IN/OUT

Only lower WORD is used. It is binary value.

### 4.1.5. Judge

Only lower WORD is used The binary value is difined as follows.

| Code | Description | Contents |
|---|---|---|
| 0 | None | A judgment is not made. |
| 1 | Judge1 | A judgment is made by Judge1. |
| 2 | Judge2 | A judgment is made by Judge2. |
| 3 | Judge3 | A judgment is made by Judge3. |
| 4 | Final | A judgment is made by Final. |

### 4.1.6. Acc

Only lower WORD is used The binary value is difined as follows.

| Code | Description | Contents |
|---|---|---|
| 0 | None | A nut runner shifts to specification speed directly without acceleration. |
| 1 | Yes | A nut runner shifts to specification speed using acceleration. |

## 4.2. Branch conditions (COND)

Branch conditions have the data structure as shown in the following table.

| Word address | Bit address | Contents |
|---|---|---|
| 4 | 0-15 | Branch destination step number. Binary value. |
| 5 | 0-3 | Branch control code. Binary value. |
| | 4-7 | Branch destination code. Binary value. |
| | 8-11 | Numerical control code. Binary value. |
| | 12-15 | Fixed to 0. |

### 4.2.1. Branch control code

| Code | Description | Contents |
|---|---|---|
| 0 | N | No control. |
| 1 | H | In the case of object item >= setting value, branch is done. |

| | | |
|---|---|---|
| 2 | L | In the case of object item < setting value, branch is done. |
| 3 | E | In the case of object item = setting value, branch is done. This is applied only to IN. |
| 4 | P | Positioning is done, using installation value as an absolute value. Branch is done by positioning end. This is applied only to Angle. |
| 5 | R | Positioning is done, using installation value as a relative value. Branch is done by positioning end. This is applied only to Angle. |

### 4.2.2. Branch destination code

| Code | Description | Contents |
|---|---|---|
| 0 | N | **N**o control. |
| 1 | E | A program is ended. |
| 2 | C | Next step.(**C**ontinue) |
| 3 | P | The following next step.(**P**ass the next step) |
| 4 | B | Previous step.(**B**efore) |
| 5 | L | **L**ast step. |
| 6 | A | Branch destination step number (**A**bsolute value). |
| 7 | R | Branch destination step number (**R**elative value). |

### 4.2.3. Numerical control code

| Code | Description | Contents |
|---|---|---|
| 0 | N | No control. |
| 1 | A | Object is reset to 0. |
| 2 | I | In the case of Time: The (Time value-counted value) in a previous step is added to the Time value of this step.<br>Except Time: Real-time value is used. |
| 3 | S | A sampling of the changing rate of torque is started. This is applied only to TR (Standard). |
| 4 | E | A sampling of the changing rate of torque is ended and an average of the changing rate of torque is calculated. This is applied only to TR (Standard). |

## 5. Assignment of Error Code

When abnormalities are in a Data code code or data, an error code returns to control data.

| Data code | Contents |
|---|---|
| 252 | Other errors. |
| 253 | There are no work position and spindle number which were specified. |
| 254 | The Data code code besides a definition. |
| 255 | Checksum error. |

# 6. Data Access Procedure

The concrete procedure which accesses data using the WORD address 2-5 is explained.

## 6.1. Read-out of Result

The procedure of reading the final torque (F. TORQUE) as an example is explained.If data is created in the area linked to the network, there is a possibility that inaccurate data may be outputted. Please use a work area for creation of data. Please transmit the completed data to link area collectively.

### 6.1.1. Setup of WORD Address 2

As shown in the following table, 0x4008 is set to the WORD address 2.

| Bit number | Name | Setting value | |
|---|---|---|---|
| | | Bit | Byte |
| 0 | Data code 0 | 0 | 0x08 |
| 1 | Data code 1 | 0 | |
| 2 | Data code 2 | 0 | |
| 3 | Data code 3 | 1 | |
| 4 | Data code 4 | 0 | |
| 5 | Data code 5 | 0 | |
| 6 | Data code 6 | 0 | |
| 7 | Data code 7 | 0 | |
| 8 | Parameter No.0 | 0 | 0x40 |
| 9 | Parameter No.1 | 0 | |
| 10 | Parameter No.2 | 0 | |
| 11 | Parameter No.3 | 0 | |
| 12 | Parameter No.4 | 0 | |
| 13 | WRITE | 0 | |
| 14 | VALID | 1 | |
| 15 | ERROR bit | 0 | |

### 6.1.2. Setup of WORD Addresses 4 and 5

Please set up 0 altogether.

### 6.1.3. Setup of WORD Address 3 Lower Byte

As shown in the following table, please set up 0x00.

| Bit number | Name | Setting value | |
|---|---|---|---|
| | | Bit | Byte |
| 0 | Program number 0 | 0 | 0 |
| 1 | Program number 1 | 0 | |
| 2 | Program number 2 | 0 | |
| 3 | Program number 3 | 0 | |
| 4 | Program number 4 | 0 | |
| 5 | Fixed value | 0 | |
| 6 | Fixed value | 0 | |
| 7 | Fixed value | 0 | |

### 6.1.4. Calculation of Checksum (WORD Address 3 Upper Byte)

The data created even here is shown in the following table.

| Word Address | Byte Address | Contents | Setting Value | |
|---|---|---|---|---|
| | | | Byte | Word |
| 2 | 4 | Data Code | 0x08 | 0x4008 |
| | 5 | Parameter No. etc. | 0x40 | |
| 3 | 6 | Program number | 0 | Unfixed |
| | 7 | Checksum | Un-setting up. | |
| 4 | 8 | Data | 0 | 0 |
| | 9 | | 0 | |
| 5 | 10 | | 0 | 0 |
| | 11 | | 0 | |

A checksum is total in byte units other than byte address 7. Here, it is set to 0x48. Although carry is not generated in this case, carry should be disregarded in the case where carry occurs.

The data finally created is shown in the following table.

| Word Address | Byte Address | Contents | Setting Value | |
|---|---|---|---|---|
| | | | Byte | Word |
| 2 | 4 | Data Code | 0x08 | 0x4008 |
| | 5 | Parameter No. etc. | 0x40 | |
| 3 | 6 | Program number | 0 | 0x4800 |
| | 7 | Checksum | 0x48 | |
| 4 | 8 | Data | 0 | 0 |
| | 9 | | 0 | |
| 5 | 10 | | 0 | 0 |
| | 11 | | 0 | |

### 6.1.5. Transmission to Link Area

Please transmit the created data to the output side link area of PLC collectively.

### 6.1.6. Check of Response

The receiving data expected when the Final Torque is 12.34Nm is shown in the following table.

| Word Address | Byte Address | Contents | Setting Value | |
|---|---|---|---|---|
| | | | Byte | Byte |
| 2 | 4 | Data Code | 0x08 | 0x4008 |
| | 5 | Parameter No. etc. | 0x40 | |
| 3 | 6 | Program number | 0 | 0x1E00 |
| | 7 | Checksum | 0x1E | |
| 4 | 8 | Data | 0xD2 | 0x04D2 |
| | 9 | | 0x04 | 1234(10) |
| 5 | 10 | | 0 | 0 |
| | 11 | | 0 | |

The point which checks that reception has been performed normally is the two following points.

**Coincidence of the contents of the WORD addresses 2 and 3 of input and output**

**Receiving checksum**

Total in byte units other than byte address 7 of receiving data is 0x11E. Since carry is disregarded, the checksum of receiving data serves as 0x1E.

## 6.2. Writing of Product serial number 1

The procedure which writes the product serial number 1 is explained as an example. If data is created in the area linked to the network, there is a possibility that inaccurate data may be outputted. Please use a work area for creation of data. Please transmit the completed data to link area collectively.

### 6.2.1. Setup of WORD Address 2

As shown in the following table, 0x602A is set to the WORD address 2.

| Bit number | Name | Setting value | |
|---|---|---|---|
| | | Bit | Byte |
| 0 | Data code 0 | 0 | 0x2A=42(10) |
| 1 | Data code 1 | 1 | |
| 2 | Data code 2 | 0 | |
| 3 | Data code 3 | 1 | |
| 4 | Data code 4 | 0 | |
| 5 | Data code 5 | 1 | |
| 6 | Data code 6 | 0 | |
| 7 | Data code 7 | 0 | |
| 8 | Parameter No.0 | 0 | 0x60 |
| 9 | Parameter No.1 | 0 | |
| 10 | Parameter No.2 | 0 | |
| 11 | Parameter No.3 | 0 | |
| 12 | Parameter No.4 | 0 | |
| 13 | WRITE | 1 | |
| 14 | VALID | 1 | |
| 15 | ERROR bit | 0 | |

### 6.2.2. Setup of WORD Addresses 4 and 5

A setup in the case of writing "1234" in the product serial number 1 is shown in the following table.

| Word Address | Byte Address | Contents | Setting Value | |
|---|---|---|---|---|
| | | | Byte | Byte |
| 4 | 8 | Data | 0x31 | 0x3231 |
| | 9 | | 0x32 | |
| 5 | 10 | | 0x33 | 0x3433 |
| | 11 | | 0x34 | |

### 6.2.3. Setup of WORD Address 3 Lower Byte

As shown in the following table, please set up 0x00.

| Bit number | Name | Setting value | |
|---|---|---|---|
| | | Bit | Byte |
| 0 | Program number 0 | 0 | 0 |
| 1 | Program number 1 | 0 | |
| 2 | Program number 2 | 0 | |
| 3 | Program number 3 | 0 | |
| 4 | Program number 4 | 0 | |
| 5 | Fixed value | 0 | |
| 6 | Fixed value | 0 | |
| 7 | Fixed value | 0 | |

### 6.2.4. Calculation of Checksum (WORD Address 3 Upper Byte)

The data created even here is shown in the following table.

| Word Address | Byte Address | Contents | Setting Value | |
|---|---|---|---|---|
| | | | Byte | Word |
| 2 | 4 | Data Code | 0x2A | 0x602A |
| | 5 | Parameter No. etc. | 0x60 | |
| 3 | 6 | Program number | 0 | Unfixed |
| | 7 | Checksum | Un-setting up. | |
| 4 | 8 | Data | 0x31 | 0x3231 |
| | 9 | | 0x32 | |
| 5 | 10 | | 0x33 | 0x3433 |
| | 11 | | 0x34 | |

A checksum is total in byte units other than byte address 7. Here, it is set to 0x154.

Since carry is disregarded, the setting value of the byte address 7 is 0x54.

The data finally created is shown in the following table.

| Word Address | Byte Address | Contents | Setting Value | |
|---|---|---|---|---|
| | | | Byte | Word |
| 2 | 4 | Data Code | 0x2A | 0x602A |
| | 5 | Parameter No. etc. | 0x60 | |
| 3 | 6 | Program number | 0 | 0x5400 |
| | 7 | Checksum | 0x54 | |
| 4 | 8 | Data | 0x31 | 0x3231 |
| | 9 | | 0x32 | |
| 5 | 10 | | 0x33 | 0x3433 |
| | 11 | | 0x34 | |

### 6.2.5. Transmission to Link Area

Please transmit the created data to the output side link area of PLC collectively.

### 6.2.6. Check of Response

The receiving data expected is shown in the following table.

| Word Address | Byte Address | Contents | Setting Value | |
|---|---|---|---|---|
| | | | Byte | Byte |
| 2 | 4 | Data Code | 0x2A | 0x602A |
| | 5 | Parameter No. etc. | 0x60 | |
| 3 | 6 | Program number | 0 | 0x5400 |
| | 7 | Checksum | 0x54 | |
| 4 | 8 | Data | 0x31 | 0x3231 |
| | 9 | | 0x32 | |
| 5 | 10 | | 0x33 | 0x3433 |
| | 11 | | 0x34 | |

The point which checks that reception has been performed normally is the two following points.

**Coincidence of the contents of the WORD addresses 2 -5 of input and output**

**Receiving checksum**

When writing in data, the contents of the WORD addresses 4 and 5 are returned as it is.

## 6.3. Monitor function

The contents of data on the network can be monitored with Anybus monitor of CPS NR Configurator.

Please use it, when you start a system.

# 7. Dynamic System - 4 times extension specification

From Chapter 1 to Chapter 5 i / f specification is explained which is consisted of the minimum device assigment. Here, the specification in which the number of device assignment is extended to 4 times is explained. When a margin is in network composition, please choose 4 times extended specification. Data transmission is possible at high speed.

In order to use a controller with 4 times extended specification, please change a setup of the network in a master side (PLC etc.). Furthermore, Anybus setup needs to be changed in the controller side. Please set up Anybus on Anybus screen of CPS NR Configurator. The details of a setup are refered to CPS NR Configurator Operation Manual- Chapter 7　Functional details　[7] setup　(7) Anybus.

## 7.1. Number of Devices Occupied

### 7.1.1. CC-Link

Version:Remote Net Version1

Station Type:Remote Device

Occupied stations:4

128 bits of bit device and 16 words of WORD device are occupied. As for the bit device, only 64 bits of the first half are used.

### 7.1.2. DeviceNet,EtherNet/IP

Please assign 40 bytes in I/O communication mode.

### 7.1.3. Profibus-DP,PROFINET IO

Please assign 64 bytes in IN/OUT. Back 24 bytes are not used.

## 7.2. Assignment of devices

Device assignment to word address of each communication format is as follows.

| Word address | CC-Link | DeviceNet<br>EtherNet/IP | Profibus-DP<br>PROFINET IO |
|---|---|---|---|
| 0 | Bits device 0-15 | Byte0 | Byte0 |
| | | Byte1 | Byte1 |
| 1 | Bits device 16-31 | Byte2 | Byte2 |
| | | Byte3 | Byte3 |
| 2 | Bits device 32-47 | Byte4 | Byte4 |
| | | Byte5 | Byte5 |
| 3 | Bits device 48-63 | Byte6 | Byte6 |
| | | Byte7 | Byte7 |
| 4 | Word device 0 | Byte8 | Byte8 |
| | | Byte9 | Byte9 |
| 5 | Word device 1 | Byte10 | Byte10 |
| | | Byte11 | Byte11 |
| 6 | Word device 2 | Byte12 | Byte12 |
| | | Byte13 | Byte13 |

| | | | |
|---|---|---|---|
| 7 | Word device 3 | Byte14 | Byte14 |
| | | Byte15 | Byte15 |
| 8 | Word device 4 | Byte16 | Byte16 |
| | | Byte17 | Byte17 |
| 9 | Word device 5 | Byte18 | Byte18 |
| | | Byte19 | Byte19 |
| 10 | Word device 6 | Byte20 | Byte20 |
| | | Byte21 | Byte21 |
| 11 | Word device 7 | Byte22 | Byte22 |
| | | Byte23 | Byte23 |
| 12 | Word device 8 | Byte24 | Byte24 |
| | | Byte25 | Byte25 |
| 13 | Word device 9 | Byte26 | Byte26 |
| | | Byte27 | Byte27 |
| 14 | Word device 10 | Byte28 | Byte28 |
| | | Byte29 | Byte29 |
| 15 | Word device 11 | Byte30 | Byte30 |
| | | Byte31 | Byte31 |
| 16 | Word device 12 | Byte32 | Byte32 |
| | | Byte33 | Byte33 |
| 17 | Word device 13 | Byte34 | Byte34 |
| | | Byte35 | Byte35 |
| 18 | Word device 14 | Byte36 | Byte36 |
| | | Byte37 | Byte37 |
| 19 | Word device 15 | Byte38 | Byte38 |
| | | Byte39 | Byte39 |

The contents of each address are defined as follows.

| Word address | Input | Output |
|---|---|---|
| 0 | PIN0 16 bits of lower | POUT0 16 bits of lower |
| 1 | PIN0 16 bits of upper. Not used | POUT0 16 bits of upper |
| 2 | PIN1 16 bits of lower. Not used | POUT1 16 bits of lower |
| 3 | PIN1 16 bits of upper. Not used | POUT1 16 bits of upper |
| 4-19 | Data communication input<br>The format for accessing data is defined. | Data communication output<br>When communication is normal, the same contents as the input from PLC are outputted as a response as it is. |

**PIN0/POUT0 assigment shall be refered CPS CTRL for NR Instruction Manual 6-8 Parallel I/O**.

### 7.3. Bit assignment of POUT1

As for POUT1, a judgment code is assigned as follows.

| | Bit address | Contents | | |
|---|---|---|---|---|
| | | +/- | Judge | Item |
| Lower 16 bits | 0 | -NG | Final | F.TORQUE |
| | 1 | | | F.TIME |
| | 2 | | | F.ANGLE |
| | 3 | | | STD TR |
| | 4 | | | F.TR(Nm/deg) |
| | 5 | | | F.TR(%) |
| | 6 | | | I.TORQUE |
| | 7 | | Judge1 | TORQUE 1 |
| | 8 | | | TIME 1 |
| | 9 | | | ANGLE 1 |
| | 10 | | Judge2 | TORQUE 2 |
| | 11 | | | TIME 2 |
| | 12 | | | ANGLE 2 |
| | 13 | | Judge3 | TORQUE 3 |
| | 14 | | | TIME 3 |
| | 15 | | | ANGLE 3 |
| Upper 16 bits | 0 | ＋NG | Final | F.TORQUE |
| | 1 | | | F.TIME |
| | 2 | | | F.ANGLE |
| | 3 | | | STD TR |
| | 4 | | | F.TR(Nm/deg) |
| | 5 | | | F.TR(%) |
| | 6 | | | I.TORQUE |
| | 7 | | Judge1 | TORQUE 1 |
| | 8 | | | TIME 1 |
| | 9 | | | ANGLE 1 |
| | 10 | | Judge2 | TORQUE 2 |
| | 11 | | | TIME 2 |
| | 12 | | | ANGLE 2 |
| | 13 | | Judge3 | TORQUE 3 |
| | 14 | | | TIME 3 |
| | 15 | | | ANGLE 3 |

## 7.4. Format of Data Communication

### 7.4.1. Program access

The format in the case of accessing a program is explained.

| Word address | Byte address | Name | Contents |
|---|---|---|---|
| 4 | 8 | Whole code | Fixed to 2. |
| | 9 | Read/write | 0:Read 1:Write |
| 5 | 10 | Validty | 0: Data is invalid<br>1: Data is valid |
| | 11 | Common program number | The program number to access is set up. The setting range is 1 to 31. |
| 6 | 12 | Individual step code 1 | Setup a code shown in 2 Definition of the data code 5 Program access 1 Data code.<br>0xFE is set up when not using this. |
| | 13 | Individual parameter number 1 | Setup a code shown in 2 Definition of the data code 5 Program access 2 Parameter number.<br>0xFE is set up when not using this. |
| 7 | 14 | Individual step code 2 | Same as the above. |
| | 15 | Individual parameter number 2 | Same as the above. |
| 8 | 16 | Individual step code 3 | Same as the above. |
| | 17 | Individual parameter number 3 | Same as the above. |
| 9 | 18 | Individual step code 4 | Same as the above. |
| | 19 | Individual parameter number 4 | Same as the above. |
| 10 | 20 | Individual data 1 lower word | The contents of the data specified in individual step code 1 and individual parameter number 1. |
| | 21 | | |
| 11 | 22 | Individual data 1 upper word | |
| | 23 | | |
| 12 | 24 | Individual data 2 lower word | The contents of the data specified in individual step code 2 and individual parameter number 2. |
| | 25 | | |
| 13 | 26 | Individual data 2 upper word | |
| | 27 | | |
| 14 | 28 | Individual data 3 lower word | The contents of the data specified in individual step code 3 and individual parameter number 3. |
| | 29 | | |
| 15 | 30 | Individual data 3 upper word | |
| | 31 | | |
| 16 | 32 | Individual data 4 lower word | The contents of the data specified in individual step code 4 and individual parameter number 4. |
| | 33 | | |
| 17 | 34 | Individual data 4 upper word | |
| | 35 | | |
| 18 | 36 | Whole error code | The code which shows the abnormalities in a format of input data. Only the output side is effective. |
| | 37 | Individual error | The abnormalities of the individual code od data are told in a bit position.<br>Bit0=1 Individual code/data 1 is wrong. |
| 19 | 38 | Check sum | The sum of the WORD data of the WORD addresses 4-18.<br>Carry-over is disregarded. |
| | 39 | | |

### 7.4.2. General

The format in the case of accessing general data is explained.

| Word address | Byte address | Name | Contents |
|---|---|---|---|
| 4 | 8 | Whole code | Fixed to 1. |
| | 9 | Read/write | 0:Read 1:Write |
| 5 | 10 | Validty | 0: Data is invalid<br>1: Data is valid |
| | 11 | Individual code 1 | Setup codes other than program access shown in 2 Definition of the data code. 0xFE is set up when not using this. |
| 6 | 12 | Individual code 2 | |
| | 13 | Individual code 3 | |
| 7 | 14 | Individual code 4 | |
| | 15 | Individual code 5 | |
| 8 | 16 | Individual data 1 lower word | The contents of the data specified in individual code 1. |
| | 17 | | |
| 9 | 18 | Individual data 1 upper word | |
| | 19 | | |
| 10 | 20 | Individual data 2 lower word | The contents of the data specified in individual code 2. |
| | 21 | | |
| 11 | 22 | Individual data 2 upper word | |
| | 23 | | |
| 12 | 24 | Individual data 3 lower word | The contents of the data specified in individual code 3. |
| | 25 | | |
| 13 | 26 | Individual data 3 upper word | |
| | 27 | | |
| 14 | 28 | Individual data 4 lower word | The contents of the data specified in individual code 4. |
| | 29 | | |
| 15 | 30 | Individual data 4 upper word | |
| | 31 | | |
| 16 | 32 | Individual data 5 lower word | The contents of the data specified in individual code 5. |
| | 33 | | |
| 17 | 34 | Individual data 5 upper word | |
| | 35 | | |
| 18 | 36 | Whole error code | The code which shows the abnormalities in a format of input data. Only the output side is effective. |
| | 37 | Individual error | The abnormalities of the individual code od data are told in a bit position.<br>Bit0=1 Individual code/data 1 is wrong. |
| 19 | 38 | Check sum | The sum of the WORD data of the WORD addresses 4-18.<br>Carry-over is disregarded. |
| | 39 | | |

### 7.5. Input and output timing except PIN/POUT

In PLC side, please write in link area collectively after processing output data in a work area. A controller side returns the WORD address 4-19 collectively to it.

### 7.6. Assignment of Error Code

When abnormalities are in a data address code or data, an error code returns to whole code address.

| Error code | Contents |
|---|---|
| 252 | Other errors. |
| 253 | Individual code/data error |
| 254 | Whole code error. |
| 255 | Checksum error. |

# 8. Static System-Standard Specification

The dynamic system has somewhat complicated procedure. Then, the static system was added so that access of data could be performed in easier procedure. Except Profi system, PLC can access 16 kinds of data each for input and output. In Profi system PLC can access 24 kinds of data.The static system can be used with CPS controller Ver1.02.44 or later.

## 8.1. Bank switching

In the case of a static system, if it remains as it is, there is few data to treat. In order to compensate the fault, the bank-switching system was adopted. The number of data treated increases 8 times with a 3-bit bank-switching signal.

## 8.2. Number of Devices Occupied

6 words are occupied about each input and output.

### 8.2.1. CC-Link

Version:Remote Net Version1

Station Type:Remote Device

Occupied stations:1

### 8.2.2. DeviceNet,EtherNet/IP

Please assign 12 bytes in I/O communication mode.

### 8.2.3. Profibus-DP,PROFINET I/O

Please assign 16 bytes in IN/OUT .

## 8.3. Assignment of devices

Device assignment to word address of each communication format is as follows.

| Word address | CC-Link | DeviceNet<br>EtherNe/IP | Profibus-DP<br>PROFINET I/O |
|---|---|---|---|
| 0 | Bits device 0-15 | Byte0 | Byte0 |
| | | Byte1 | Byte1 |
| 1 | Bits device 16-31 | Byte2 | Byte2 |
| | | Byte3 | Byte3 |
| 2 | Word device 0 | Byte4 | Byte4 |
| | | Byte5 | Byte5 |
| 3 | Word device 1 | Byte6 | Byte6 |
| | | Byte7 | Byte7 |
| 4 | Word device 2 | Byte8 | Byte8 |
| | | Byte9 | Byte9 |
| 5 | Word device 3 | Byte10 | Byte10 |
| | | Byte11 | Byte11 |
| 6 | | | Byte12 |

| | | | |
|---|---|---|---|
| | | | Byte13 |
| 7 | | | Byte14 |
| | | | Byte15 |

The contents of each address are defined as follows.

| Word address | Input | Output |
|---|---|---|
| 0 | PIN0 16 bits of lower | POUT0 16 bits of lower |
| 1 | PIN0 16 bits of upper. | POUT0 16 bits of upper |
| 2 | Bank n input data 0 | Bank n output data 0 |
| 3 | n=0 to 7 | n=0 to 7 |
| 4 | Bank n input data 1 | Bank n output data 1 |
| 5 | n=0 to 7 | n=0 to 7 |
| 6 | Bank n input data 2 | Bank n output data 2 |
| 7 | n=0 to 7<br>(only PROFI system) | n=0 to 7<br>(only PROFI system) |

CPS NR Configurator is used to assign each input-and-output data.

## 8.4. Assignment of bank-switching signals

Bank-switching signals are assigned to the WORD address 1.

Input

| Bit No. | Signal name | Contents |
|---|---|---|
| 12 | ABS_WR_STRB | Write strobe signal. All data are taken in on the specified bank at the time of ON. |
| 13 | ABS_BANK0 | Bank specification signal. A bank 0-7 is specified by the 3-bit signal. |
| 14 | ABS_BANK1 | |
| 15 | ABS_BANK2 | |

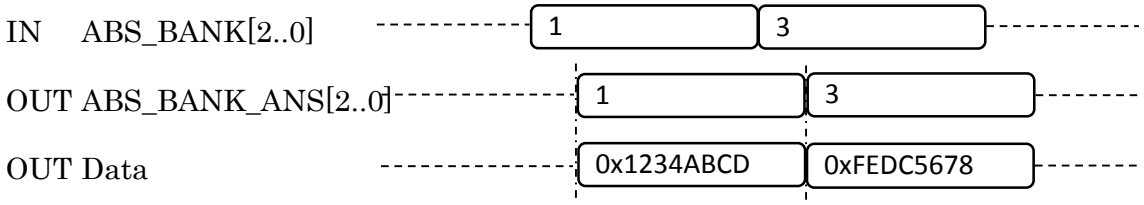
Output

| Bit No. | Signal name | Contents |
|---|---|---|
| 12 | ABS_STRB_ANS | Answer of ABS_WR_STRB.Use for handshake with ABS_WR_STRB. |
| 13 | ABS_BANK0_ANS | The answer to bank specification signals. |
| 14 | ABS_BANK1_ANS | |
| 15 | ABS_BANK2_ANS | |

PIN/POUT assigment shall be refered CPS CTRL for NR Instruction Manual 6-8 Parallel I/O.

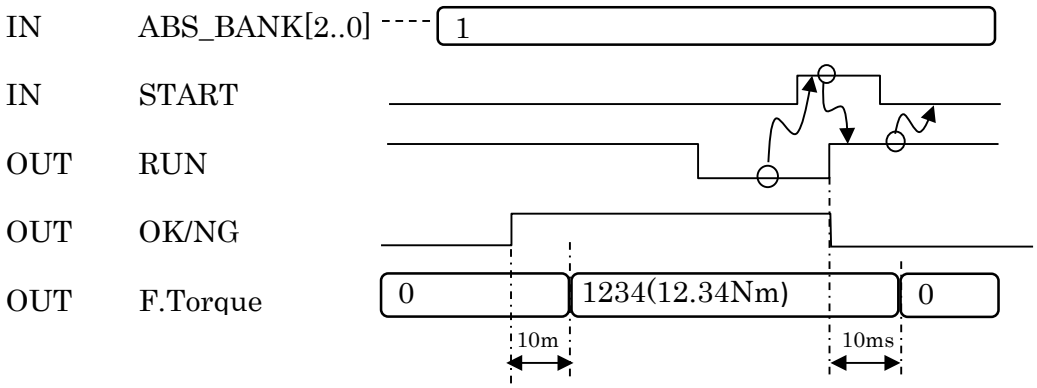
## 8.5. Timing chart

### 8.5.1. Bank change and Read



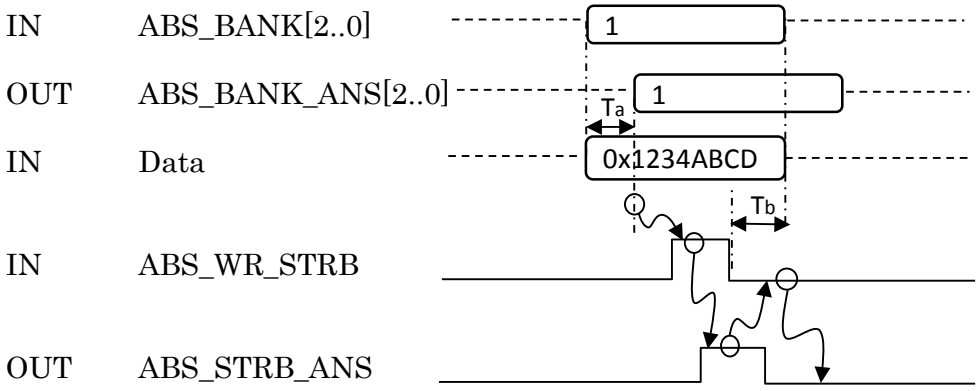

Please read data after checking the coincidence with ABS_BANK[2..0] and ABS_BANK_ANS[2..0].

### 8.5.2. Raed Result




The case where Final Torque (F.Torque) is read as a numerical result is shown in an example. Please wait 10ms or more from the judgment output On of O.K./NG, and read data into PLC. In F.Torque, zero may be read if it reads to timing earlier than this. Although the zero clearance of the numerical result is simultaneously carried out internally with On of RUN, the zero clearance of the Anybus output is carried out behind time for 10ms.

### 8.5.3. Write




Ta: Delay of a network+processing delay in a controller

Tb:Data hold time from ABS_WR_STRB off.

1.Please output simultaneously the input data to a controller and ABS_BANK [2..0] from PLC.

2. Please turn on ABS_WR_STRB after checking the coincidence with ABS_BANK [2..0] and ABS_BANK_ANS [2..0]

3. Tb should be equivalent to Ta.

# 9. Static System-4 times extension specification

The dynamic system has somewhat complicated procedure . Then, the static system was added so that access of data could be performed in easier procedure. Except Profi system, PLC can access 64 kinds of data each for input and output. In Profi system PLC can access 112 kinds of data.The static system can be used with CPS controller Ver1.02.44 or later.

## 9.1. Bank switching

In the case of a static system, if it remains as it is, there is few data to treat. In order to compensate the fault, the bank-switching system was adopted. The number of data treated increases 8 times with a 3-bit bank-switching signal.

## 9.2. Number of Devices Occupied

### 9.2.1. CC-Link

Version:Remote Net Version1

Station Type:Remote Device

Occupied stations:4

128 bits of bit device and 16 words of WORD device are occupied. As for the bit device, only 64 bits of the first half are used.

### 9.2.2. DeviceNet,EtherNet/IP

Please assign 40 bytes in I/O communication mode.

### 9.2.3. Profibus DP,PROFINET I/O

Please assign 64 bytes in IN/OUT.

## 9.3. Assignment of devices

Device assignment to word address of each communication format is as follows.

| Word address | CC-Link | DeviceNet<br>EtherNet/IP | Profibus-DP<br>PROFINET I/O |
|---|---|---|---|
| 0 | Bits device 0-15 | Byte0 | Byte0 |
| | | Byte1 | Byte1 |
| 1 | Bits device 16-31 | Byte2 | Byte2 |
| | | Byte3 | Byte3 |
| 2 | Bits device 32-47 | Byte4 | Byte4 |
| | | Byte5 | Byte5 |
| 3 | Bits device 48-63 | Byte6 | Byte6 |
| | | Byte7 | Byte7 |
| 4 | Word device 0 | Byte8 | Byte8 |
| | | Byte9 | Byte9 |
| 5 | Word device 1 | Byte10 | Byte10 |
| | | Byte11 | Byte11 |
| 6 | Word device 2 | Byte12 | Byte12 |
| | | Byte13 | Byte13 |
| 7 | Word device 3 | Byte14 | Byte14 |
| | | Byte15 | Byte15 |

| | | | |
|---|---|---|---|
| 8 | Word device 4 | Byte16 | Byte16 |
| | | Byte17 | Byte17 |
| 9 | Word device 5 | Byte18 | Byte18 |
| | | Byte19 | Byte19 |
| 10 | Word device 6 | Byte20 | Byte20 |
| | | Byte21 | Byte21 |
| 11 | Word device 7 | Byte22 | Byte22 |
| | | Byte23 | Byte23 |
| 12 | Word device 8 | Byte24 | Byte24 |
| | | Byte25 | Byte25 |
| 13 | Word device 9 | Byte26 | Byte26 |
| | | Byte27 | Byte27 |
| 14 | Word device 10 | Byte28 | Byte28 |
| | | Byte29 | Byte29 |
| 15 | Word device 11 | Byte30 | Byte30 |
| | | Byte31 | Byte31 |
| 16 | Word device 12 | Byte32 | Byte32 |
| | | Byte33 | Byte33 |
| 17 | Word device 13 | Byte34 | Byte34 |
| | | Byte35 | Byte35 |
| 18 | Word device 14 | Byte36 | Byte36 |
| | | Byte37 | Byte37 |
| 19 | Word device 15 | Byte38 | Byte38 |
| | | Byte39 | Byte39 |
| 20 | | | Byte40 |
| | | | Byte41 |
| 21 | | | Byte42 |
| | | | Byte43 |
| 22 | | | Byte44 |
| | | | Byte45 |
| 23 | | | Byte46 |
| | | | Byte47 |
| 24 | | | Byte48 |
| | | | Byte49 |
| 25 | | | Byte50 |
| | | | Byte51 |
| 26 | | | Byte52 |
| | | | Byte53 |
| 27 | | | Byte54 |
| | | | Byte55 |
| 28 | | | Byte56 |
| | | | Byte57 |
| 29 | | | Byte58 |
| | | | Byte59 |
| 30 | | | Byte60 |
| | | | Byte61 |
| 31 | | | Byte62 |
| | | | Byte63 |

The contents of each address are defined as follows.

| Word address | Input | Output |
|---|---|---|
| 0 | PIN0 lower 16bit | POUT0 lower 16bit |
| 1 | PIN0 upper 16bit | POUT0 upper 16bit |
| 2 | PIN1 lower 16bit | POUT1 lower 16bit |
| 3 | PIN1 upper 16bit | POUT1 upper 16bit |
| 4 | Bank nInput data0 | Bank n Output data0 |
| 5 | n=0 to 7 | n=0 to 7 |
| 6 | Bank n Input data1 | Bank nOutput data1 |
| 7 | n=0 to 7 | n=0 to 7 |
| 8 | Bank n Input data2 | Bank n Output data2 |
| 9 | n=0 to 7 | n=0 to 7 |
| 10 | Bank n Input data3 | Bank n Output data3 |
| 11 | n=0 to 7 | n=0 to 7 |
| 12 | Bank n Input data4 | Bank n Output data4 |
| 13 | n=0 to 7 | n=0 to 7 |
| 14 | Bank n Input data5 | Bank n Output data5 |
| 15 | n=0 to 7 | n=0 to 7 |
| 16 | Bank n Input data6 | Bank n Output data6 |
| 17 | n=0 to 7 | n=0 to 7 |
| 18 | Bank n Input data7 | Bank n Output data7 |
| 19 | n=0 to 7 | n=0 to 7 |
| 20 | Bank n Input data8 | Bank n Output data8 |
| 21 | n=0 to 7(Only Profi system) | n=0 to 7(Only Profi system) |
| 22 | Bank n Input data9 | Bank n Output data9 |
| 23 | n=0 to 7(Only Profi system) | n=0 to 7(Only Profi system) |
| 24 | Bank n Input data10 | Bank n Output data10 |
| 25 | n=0 to 7(Only Profi system) | n=0 to 7(Only Profi system) |
| 26 | Bank n Input data11 | Bank n Output data11 |
| 27 | n=0 to 7(Only Profi system) | n=0 to 7(Only Profi system) |
| 28 | Bank n Input data12 | Bank n Output data12 |
| 29 | n=0 to 7(Only Profi system) | n=0 to 7(Only Profi system) |
| 30 | Bank n Input data13 | Bank n Output data13 |
| 31 | n=0 to 7(Only Profi system) | n=0 to 7(Only Profi system) |

CPS NR Configurator is used to assign each input-and-output data.

PIN/POUT assigment shall be refered CPS CTRL for NR Instruction Manual 6-8 Parallel I/O.

### 9.4. Bit assignment of POUT1

Refer to 7.3 Bit assignment of POUT1.

### 9.5. Assignment of bank-switching signals

Refer to 8.4 Assignment of bank-switching signals.

### 9.6. Timig chart

Refer to 8.5 Timing chart.