

# **BS Controller for AC SERVO PRESS Instruction Manual**

## **Volume Network**

### **Introduction**

Thank you very much for purchasing our Servo press.

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.

The product names, etc. are generally registered trademarks of various companies.

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

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## 1. Outline

Anybus is prepared for BS controller as an expansion bus. Anybus is the bus standard which HMS advocates and various network cards are offered. BS 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.

To Chapter 4, the specification by assignment of the device of the minimum composition is explained.

Subsequent to Chapter 5, the specification which extended the number of device assignment about 4 times is explained. If 4 times-extended specification is chosen, 5 times as much data as basic specification will be possible at an access. When a margin is in the number of assignment of a device, we recommend you selection of 4 times extended specification. 4 times extended specification can be used henceforth Ver1.02.31 of BS controller.

A setup about Anybus is possible on Anybus screen of BS Configurator.

### 1.1. Number of Devices Occupied

6 words is occupied about each input and output.

#### 1.1.1. CC-Link

Version:Remote Net Version1

Station Type:Remote Device

Occupied stations:1

#### 1.1.2. DeviceNet,EtherNet/IP

Please assign 12 bytes in I/O communication mode.

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

Please assign 16 bytes in IN/OUT .

### 1.2. 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 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                       |

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|   |               |        |        |
|---|---------------|--------|--------|
|   |               | 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 Work position/Spindle number | Specify Work position/Spindle number response |
| 4            | Data input low rank WORD             | Data output low rank WORD                     |
| 5            | Data input higher rank WORD          | Data output higher rank WORD                  |

The WORD addresses 0 and 1 are the portions used as bit-assigned I/O. **PIN/POUT assignment shall be referred BS CTRL for SP Instruction Manual 6-9 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.

### 1.3. 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          | JT No.0     | When rewriting a judgment Table ,the judgment Table number is specified by these 5 bits. The binary value +1 becomes a judgment Table number. |
| 9          | JT No.1     |   |
| 10         | JT No.2     |   |
| 11         | JT No.3     |   |
| 12         | JT 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   |

#### 1.3.1. About VALID bit

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

#### 1.3.2. About ERROR bit

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

**1.4. Bit assignment of “Specify Work position/Spindle number”**

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          | WP/SPN 0    | Since this is the specification for master controllers, it is disregarded in accessing to spindle controller.   |
| 1          | WP/SPN 1    |   |
| 2          | WP/SPN 2    |   |
| 3          | WP/SPN 3    |   |
| 4          | WP/SPN 4    |   |
| 5          | WP SELECT   | Since this is the specification for master controllers, it is disregarded in accessing to spindle controller.   |
| 6          | READ_TBL    | <b>When reading each tables, this is set as 1.</b> This function has an effective to controllers of version 1.02.26 or more.                              |
| 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.<br>BS controller always supervises the checksum. |
| 9          | Checksum 1  |   |
| 10         | Checksum 2  |   |
| 11         | Checksum 3  |   |
| 12         | Checksum 4  |   |
| 13         | Checksum 5  |   |
| 14         | Checksum 6  |   |
| 15         | Checksum 7  |   |

## 2. Definition of the data code

### 2.1. Result /maintenance information

These codes are only for read-out.

Please be sure to set bit 6 "READ\_TBL" of the WORD address 3 as 0.

| Data code | Name        | Meaning  |
|-----------|-------------|--|
| 0         | PRG NO      | Program number, Integer  |
| 1         | INDEX       | Spindle index, Integer   |
| 2         | DATE        | Date, BCD,MMDDHHmm   |
| 3         | P.LOAD      | Peak load, 2 figures of decimals[kN]   |
| 4         | P.STROKE    | Peak stroke, 2 figures of decimals[mm]   |
| 5         | P.LOADRATE  | Peak load rate ,<br>2 figures of decimals[kN/mm]   |
| 6         | F.LOAD      | Final load, 2 figures of decimals[kN]  |
| 7         | F.STROKE    | Final stroke, 2 figures of decimals[mm]  |
| 8         | F.LOADRATE  | Final load rate,<br>2 figures of decimals[kN/mm]   |
| 9         | B.LOAD      | Bottom load, 2 figures of decimals[kN]   |
| 10        | CYCLE TIME  | Cycle time, 2 figures of decimals[s]   |
| 11        | JUDGE CODE  | Judgment code  |
| 12        | R1.SPEED    | Speed register 1   |
| 13        | R1.STROKE   | Stroke register 1  |
| 14        | R1.LOAD     | Load register 1  |
| 15        | R1.LOADRATE | Load rate register 1   |
| 16        | R.PIO       | PIO register   |
| 17        | LAST STEP   | Last step  |
| 18        | USER HOME   | User home position,<br>2 figures of decimals[mm]   |
| 19        | SYSTEM HOME | System home position,<br>2 figures of decimals[mm]   |
| 20        | Z.NG LOAD   | Load of zone-NG, 2 figures of decimals[kN]   |
| 21        | Z.NG STROKE | Stroke of zone-NG,<br>2 figures of decimals[mm]  |
| 22        | R2.STROKE   | Stroke register 2  |
| 23        | R2.LOAD     | Load register 2  |
| 24        | R1.TIMER    | Timer register 1   |
| 25~27     | Reserved    |  |
| 28        | STROKE&LOAD | A stroke and load are simultaneously outputted by 16 bit data. The low rank WORD of output data is a stroke, and higher rank WORD is load. About a decimal point position, a stroke is 2 figures of decimal points in a tool 300mm or less. The tool with which a stroke exceeds 300mm is 1 figure of decimal points. About load, it is 2 figures of decimal points in the tool of 300 or less kN. In the tool exceeding 300kNs, it is 1 figure of decimal points. |



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|       |                                  |   |
|-------|----------------------------------|---|
| 29    | REAL LOAD                        | Real-time load, 2 figures of decimals[kN]                                     |
| 30    | REAL STROKE                      | Real-time stroke, 2 figures of decimals[mm]                                   |
| 31    | POST JUDGE NUMBER                | When a post judgment function is used, the binary value of 1-255 is inputted. |
| 32    | POST JUDGE CODE                  | Each judgment item of a post judgment is reflected in each bit.               |
| 33    | Regeneration load rate           | Real time regeneration load rate, Integer, [%]                                |
| 34    | Effective load rate              | Real time effective load rate, Integer, [%]                                   |
| 35-63 | Reserved                         |   |
| 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    | Reserved                         |   |
| 73    | Reserved                         |   |
| 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, lower WORD-detailed code                               |
| 81    | Alarm History-current            | Upper WORD-major code, lower WORD-detailed code                               |
| 82    | Alarm History-before current     | Upper WORD-major code, lower WORD-detailed code                               |
| 83    | Alarm History-after current      | Upper WORD-major code, lower WORD-detailed code                               |
| 84    | Alarm History-last               | Upper WORD-major code, lower WORD-detailed code                               |
| 85    | Alarm History-oldest             | Upper WORD-major code, lower WORD-detailed code                               |
| 86    | Date of current alarm History    | BCD 0xMMDDhmm   |

**2.1.1. Data Composition of JUDGE CODE**

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

| Word address | Bit address | Contents |           |                           |
|--------------|-------------|----------|-----------|---------------------------|
|              |             | +/-      | Name      | Explanation               |
| 4            | 0           | +NG      | ZONE_JDG  | Zone judging +NG          |
|              | 1           |          | P.LOAD    | Peak load +NG             |
|              | 2           |          | F.LOAD    | Final load +NG            |
|              | 3           |          | B.LOAD    | Bottom load +NG           |
|              | 4           |          | P.STRK    | Peak stroke +NG           |
|              | 5           |          | F.STRK    | Final stroke +NG          |
|              | 6           |          | P.LDRT    | Peak load rate +NG        |
|              | 7           |          | F.LDRT    | Final load rate +NG       |
|              | 8           |          | R1.LOAD   | Load register 1 +NG       |
|              | 9           |          | R1.STRK   | Stroke register 1 +NG     |
|              | 10          |          | R1.SPD    | Speed register 1 +NG      |
|              | 11          |          | R1.LDRT   | Load rate register 1 +NG  |
|              | 12          |          | R2.LOAD   | Load register 2 +NG       |
|              | 13          |          | R2.STRK   | Stroke register 2 +NG     |
|              | 14          |          | P.EX_STRK | Peak external stroke +NG  |
|              | 15          |          | F.EX_STRK | Final external stroke +NG |
| 5            | 0           | -NG      | ZONE_JDG  | Zone judging -NG          |
|              | 1           |          | P.LOAD    | Peak load -NG             |
|              | 2           |          | F.LOAD    | Final load -NG            |
|              | 3           |          | B.LOAD    | Bottom load -NG           |
|              | 4           |          | P.STRK    | Peak stroke -NG           |
|              | 5           |          | F.STRK    | Final stroke -NG          |
|              | 6           |          | P.LDRT    | Peak load rate -NG        |
|              | 7           |          | F.LDRT    | Final load rate -NG       |
|              | 8           |          | R1.LOAD   | Load register 1 -NG       |
|              | 9           |          | R1.STRK   | Stroke register 1 -NG     |
|              | 10          |          | R1.SPD    | Speed register 1 -NG      |
|              | 11          |          | R1.LDRT   | Load rate register 1 -NG  |
|              | 12          |          | R2.LOAD   | Load register 2 -NG       |
|              | 13          |          | R2.STRK   | Stroke register 2 -NG     |
|              | 14          |          | P.EX_STRK | Peak external stroke -NG  |
|              | 15          |          | F.EX_STRK | Final external stroke -NG |

## 2.2. Product information

Reading/writing is possible.

| Data code | Name                    | Meaning  |
|-----------|-------------------------|--|
| 192~207   | RESERVED                |  |
| 208       | 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.                          |
| 209       | Product name 2          |  |
| 210       | Product name 3          |  |
| 211       | Product name 4          |  |
| 212       | 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. |
| 213       | Product serial number 2 |  |
| 214       | Product serial number 3 |  |
| 215       | Product serial number 4 |  |
| 216       | Station number          | A station number is set up with binary value. This setup remains in the effective state, unless a power supply is turned off.  |
| 217       | 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.                    |
| 218       | Work position name 2    |  |
| 219       | POST JUDGE NUMBER       | When using a post judgment function, the post judgment number registered into PC is specified with binary value. 0 means "no-use a post-judgment." Maximum is 255. Unless a power supply is turned off, a setup remains.   |

**2.3. Table**

Reading/writing is possible.

Please set bit 6"READ\_TBL" of the WORD address 3 as 1. About the tables, it is 2 figures of decimal points altogether.

| Data code | Name              | Data code | Name              |
|-----------|-------------------|-----------|-------------------|
| 0         | Position Table 1  | 16        | Position Table 17 |
| 1         | Position Table 2  | 17        | Position Table 18 |
| 2         | Position Table 3  | 18        | Position Table 19 |
| 3         | Position Table 4  | 19        | Position Table 20 |
| 4         | Position Table 5  | 20        | Position Table 21 |
| 5         | Position Table 6  | 21        | Position Table 22 |
| 6         | Position Table 7  | 22        | Position Table 23 |
| 7         | Position Table 8  | 23        | Position Table 24 |
| 8         | Position Table 9  | 24        | Position Table 25 |
| 9         | Position Table 10 | 25        | Position Table 26 |
| 10        | Position Table 11 | 26        | Position Table 27 |
| 11        | Position Table 12 | 27        | Position Table 28 |
| 12        | Position Table 13 | 28        | Position Table 29 |
| 13        | Position Table 14 | 29        | Position Table 30 |
| 14        | Position Table 15 | 30        | Position Table 31 |
| 15        | Position Table 16 | 31        | Position Table 32 |

| Data code | Name          | Data code | Name          |
|-----------|---------------|-----------|---------------|
| 32        | Load Table 1  | 48        | Load Table 17 |
| 33        | Load Table 2  | 49        | Load Table 18 |
| 34        | Load Table 3  | 50        | Load Table 19 |
| 35        | Load Table 4  | 51        | Load Table 20 |
| 36        | Load Table 5  | 52        | Load Table 21 |
| 37        | Load Table 6  | 53        | Load Table 22 |
| 38        | Load Table 7  | 54        | Load Table 23 |
| 39        | Load Table 8  | 55        | Load Table 24 |
| 40        | Load Table 9  | 56        | Load Table 25 |
| 41        | Load Table 10 | 57        | Load Table 26 |
| 42        | Load Table 11 | 58        | Load Table 27 |
| 43        | Load Table 12 | 59        | Load Table 28 |
| 44        | Load Table 13 | 60        | Load Table 29 |
| 45        | Load Table 14 | 61        | Load Table 30 |
| 46        | Load Table 15 | 62        | Load Table 31 |
| 47        | Load Table 16 | 63        | Load Table 32 |

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| Data code | Name           | Data code | Name           |
|-----------|----------------|-----------|----------------|
| 64        | Speed Table 1  | 80        | Speed Table 17 |
| 65        | Speed Table 2  | 81        | Speed Table 18 |
| 66        | Speed Table 3  | 82        | Speed Table 19 |
| 67        | Speed Table 4  | 83        | Speed Table 20 |
| 68        | Speed Table 5  | 84        | Speed Table 21 |
| 69        | Speed Table 6  | 85        | Speed Table 22 |
| 70        | Speed Table 7  | 86        | Speed Table 23 |
| 71        | Speed Table 8  | 87        | Speed Table 24 |
| 72        | Speed Table 9  | 88        | Speed Table 25 |
| 73        | Speed Table 10 | 89        | Speed Table 26 |
| 74        | Speed Table 11 | 90        | Speed Table 27 |
| 75        | Speed Table 12 | 91        | Speed Table 28 |
| 76        | Speed Table 13 | 92        | Speed Table 29 |
| 77        | Speed Table 14 | 93        | Speed Table 30 |
| 78        | Speed Table 15 | 94        | Speed Table 31 |
| 79        | Speed Table 16 | 95        | Speed Table 32 |

| Data code | Name          | Data code | Name          |
|-----------|---------------|-----------|---------------|
| 96        | Home Table 1  | 112       | Home Table 17 |
| 97        | Home Table 2  | 113       | Home Table 18 |
| 98        | Home Table 3  | 114       | Home Table 19 |
| 99        | Home Table 4  | 115       | Home Table 20 |
| 100       | Home Table 5  | 116       | Home Table 21 |
| 101       | Home Table 6  | 117       | Home Table 22 |
| 102       | Home Table 7  | 118       | Home Table 23 |
| 103       | Home Table 8  | 119       | Home Table 24 |
| 104       | Home Table 9  | 120       | Home Table 25 |
| 105       | Home Table 10 | 121       | Home Table 26 |
| 106       | Home Table 11 | 122       | Home Table 27 |
| 107       | Home Table 12 | 123       | Home Table 28 |
| 108       | Home Table 13 | 124       | Home Table 29 |
| 109       | Home Table 14 | 125       | Home Table 30 |
| 110       | Home Table 15 | 126       | Home Table 31 |
| 111       | Home Table 16 | 127       | Home Table 32 |

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| Data code | Name   | Data code | Name                               |
|-----------|--|-----------|------------------------------------|
| 128       | Area signal 1 upper                              | 144       | RESERVED                           |
| 129       | Area signal 1 lower                              | 145       | RESERVED                           |
| 130       | JOG speed 0                                      | 146       | Judge Table Zone<br>Control Code   |
| 131       | JOG speed 1                                      | 147       | Judge Table P.LOAD<br>Lower Limit  |
| 132       | JOG speed 2                                      | 148       | Judge Table P.LOAD<br>Upper Limit  |
| 133       | JOG speed 3                                      | 149       | Judge Table P.LOAD<br>Control Code |
| 134       | JOG output limit<br>Range is 0-100(%)<br>Integer | 150       | Judge Table F.LOAD<br>Lower Limit  |
| 135       | Area signal 2 upper                              | 151       | Judge Table F.LOAD<br>Upper Limit  |
| 136       | Area signal 2 lower                              | 152       | Judge Table F.LOAD<br>Control Code |
| 137       | Area signal 3 upper                              | 153       | Judge Table B.LOAD<br>Lower Limit  |
| 138       | Area signal 3 lower                              | 154       | Judge Table B.LOAD<br>Upper Limit  |
| 139       | Area signal 4 upper                              | 155       | Judge Table B.LOAD<br>Control Code |
| 140       | Area signal 4 lower                              | 156       | Judge Table P.STRK<br>Lower Limit  |
| 141       | RESERVED   | 157       | Judge Table P.STRK<br>Upper Limit  |
| 142       | RESERVED   | 158       | Judge Table P.STRK<br>Control Code |
| 143       | RESERVED   | 159       | Judge Table F.STRK<br>Lower Limit  |

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| Data code | Name                                | Data code | Name                                  |
|-----------|-------------------------------------|-----------|---------------------------------------|
| 160       | Judge Table F.STRK<br>Upper Limit   | 176       | Judge Table R1.SPD<br>Control Code    |
| 161       | Judge Table F.STRK<br>Control Code  | 177       | Judge Table R1.LDRT<br>Lower Limit    |
| 162       | Judge Table P.LDRT<br>Lower Limit   | 178       | Judge Table R1.LDRT<br>Upper Limit    |
| 163       | Judge Table P.LDRT<br>Upper Limit   | 179       | Judge Table R1.LDRT<br>Control Code   |
| 164       | Judge Table P.LDRT<br>Control Code  | 180       | Judge Table R2.LOAD<br>Lower Limit    |
| 165       | Judge Table F.LDRT<br>Lower Limit   | 181       | Judge Table R2.LOAD<br>Upper Limit    |
| 166       | Judge Table F.LDRT<br>Upper Limit   | 182       | Judge Table R2.LOAD<br>Control Code   |
| 167       | Judge Table F.LDRT<br>Control Code  | 183       | Judge Table R2.STRK<br>Lower Limit    |
| 168       | Judge Table R1.LOAD<br>Lower Limit  | 184       | Judge Table R2.STRK<br>Upper Limit    |
| 169       | Judge Table R1.LOAD<br>Upper Limit  | 185       | Judge Table R2.STRK<br>Control Code   |
| 170       | Judge Table R1.LOAD<br>Control Code | 186       | Judge Table P.EX.STRK<br>Lower Limit  |
| 171       | Judge Table R1.STRK<br>Lower Limit  | 187       | Judge Table P.EX..STRK<br>Upper Limit |
| 172       | Judge Table R1.STRK<br>Upper Limit  | 188       | Judge Table P.EX.STRK<br>Control Code |
| 173       | Judge Table R1.STRK<br>Control Code | 189       | Judge Table F.EX.STRK<br>Lower Limit  |
| 174       | Judge Table R1.SOD<br>Lower Limit   | 190       | Judge Table F.EX..STRK<br>Upper Limit |
| 175       | Judge Table R1.SPD<br>Upper Limit   | 191       | Judge Table F.EX.STRK<br>Control Code |

### 2.3.1. Bit Assignment of Judge Table Control Code

| Bit number | Contents       | Explanation   |
|------------|----------------|---|
| 0          | Usage          | 0...Use 1...No use  |
| 1          | RESERVED       |   |
| 2          | RESERVED       |   |
| 3          | RESERVED       |   |
| 4          | RESERVED       |   |
| 5          | RESERVED       |   |
| 6          | RESERVED       |   |
| 7          | RESERVED       |   |
| 8          | Under NG Out 0 | The binary value of bits 8-11 is assumed to be "n".USER output is not used when "n" is zero. When n is except zero, U_OUT (n-1) is chosen.  |
| 9          | Under NG Out 1 |   |
| 10         | Under NG Out 2 |   |
| 11         | Under NG Out 3 |   |
| 12         | RESERVED       |   |
| 13         | RESERVED       |   |
| 14         | RESERVED       |   |
| 15         | RESERVED       |   |
| 16         | Over NG Out 0  | The binary value of bits 16-19 is assumed to be "n".USER output is not used when "n" is zero. When n is except zero, U_OUT (n-1) is chosen. |
| 17         | Over NG Out 1  |   |
| 18         | Over NG Out 2  |   |
| 19         | Over NG Out 3  |   |
| 20         | RESERVED       |   |
| 21         | RESERVED       |   |
| 22         | RESERVED       |   |
| 23         | RESERVED       |   |
| 24         | RESERVED       |   |
| 25         | RESERVED       |   |
| 26         | RESERVED       |   |
| 27         | RESERVED       |   |
| 28         | RESERVED       |   |
| 29         | RESERVED       |   |
| 30         | RESERVED       |   |
| 31         | RESERVED       |   |



### 3. 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.   |

#### 4. Data Access Procedure

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

##### 4.1. Read-out of Result

The procedure of reading the peak load(P. Load) 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.

##### 4.1.1. Setup of WORD Address 2

As shown in the following table, 0x4003 is set to the WORD address 2.

| Bit number | Name        | Setting value |      |
|------------|-------------|---------------|------|
|            |             | Bit           | Byte |
| 0          | Data code 0 | 1             | 0x03 |
| 1          | Data code 1 | 1             |      |
| 2          | Data code 2 | 0             |      |
| 3          | Data code 3 | 0             |      |
| 4          | Data code 4 | 0             |      |
| 5          | Data code 5 | 0             |      |
| 6          | Data code 6 | 0             |      |
| 7          | Data code 7 | 0             |      |
| 8          | JT No.0     | 0             | 0x40 |
| 9          | JT No.1     | 0             |      |
| 10         | JT No.2     | 0             |      |
| 11         | JT No.3     | 0             |      |
| 12         | JT No.4     | 0             |      |
| 13         | WRITE       | 0             |      |
| 14         | VALID       | 1             |      |
| 15         | ERROR bit   | 0             |      |

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

Please set up 0 altogether.

#### 4.1.3. 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          | WP/SPN 0    | 0             | 0    |
| 1          | WP/SPN 1    | 0             |      |
| 2          | WP/SPN 2    | 0             |      |
| 3          | WP/SPN 3    | 0             |      |
| 4          | WP/SPN 4    | 0             |      |
| 5          | WP SELECT   | 0             |      |
| 6          | READ_TBL    | 0             |      |
| 7          | Fixed value | 0             |      |

#### 4.1.4. 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   | 0x03           | 0x4003  |
|              | 5            | JT No. etc. | 0x40           |         |
| 3            | 6            | WP/SPN      | 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 0x43. 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   | 0x03          | 0x4003 |
|              | 5            | JT No. etc. | 0x40          |        |
| 3            | 6            | WP/SPN      | 0             | 0x4300 |
|              | 7            | Checksum    | 0x43          |        |
| 4            | 8            | Data        | 0             | 0      |
|              | 9            |             | 0             |        |
| 5            | 10           |             | 0             | 0      |
|              | 11           |             | 0             |        |

#### 4.1.5. Transmission to Link Area

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

#### 4.1.6. Check of Response

The receiving data expected when the Peak Load is 12.34kN is shown in the following table.

| Word Address | Byte Address | Contents    | Setting Value |          |
|--------------|--------------|-------------|---------------|----------|
|              |              |             | Byte          | Byte     |
| 2            | 4            | Data Code   | 0x03          | 0x4003   |
|              | 5            | JT No. etc. | 0x40          |          |
| 3            | 6            | WP/SPN      | 0             | 0x1900   |
|              | 7            | Checksum    | 0x19          |          |
| 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 0x119. Since carry is disregarded, the checksum of receiving data serves as 0x19.

#### 4.2. Writing of Load Table 1

The procedure which writes the Load Table 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.

##### 4.2.1. Setup of WORD Address 2

As shown in the following table, 0x6020 is set to the WORD address 2.

| Bit number | Name        | Setting value |                         |
|------------|-------------|---------------|-------------------------|
|            |             | Bit           | Byte                    |
| 0          | Data code 0 | 0             | 0x20=32 <sub>(10)</sub> |
| 1          | Data code 1 | 0             |                         |
| 2          | Data code 2 | 0             |                         |
| 3          | Data code 3 | 0             |                         |
| 4          | Data code 4 | 0             |                         |
| 5          | Data code 5 | 1             |                         |
| 6          | Data code 6 | 0             |                         |
| 7          | Data code 7 | 0             |                         |
| 8          | JT No.0     | 0             | 0x60                    |
| 9          | JT No.1     | 0             |                         |
| 10         | JT No.2     | 0             |                         |
| 11         | JT No.3     | 0             |                         |
| 12         | JT No.4     | 0             |                         |
| 13         | WRITE       | 1             |                         |
| 14         | VALID       | 1             |                         |
| 15         | ERROR bit   | 0             |                         |

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

A setup in the case of writing 12.34kN in the Load Table 1 is shown in the following table.

| Word Address | Byte Address | Contents | Setting Value |                             |
|--------------|--------------|----------|---------------|-----------------------------|
|              |              |          | Byte          | Byte                        |
| 4            | 8            | Data     | 0xD2          | 0x04D2=1234 <sub>(10)</sub> |
|              | 9            |          | 0x04          |                             |
| 5            | 10           |          | 0x00          | 0x0000                      |
|              | 11           |          | 0x00          |                             |

#### 4.2.3. 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          | WP/SPN 0    | 0             | 0    |
| 1          | WP/SPN 1    | 0             |      |
| 2          | WP/SPN 2    | 0             |      |
| 3          | WP/SPN 3    | 0             |      |
| 4          | WP/SPN 4    | 0             |      |
| 5          | WP SELECT   | 0             |      |
| 6          | READ_TBL    | 0             |      |
| 7          | Fixed value | 0             |      |

#### 4.2.4. 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   | 0x20           | 0x6020          |
|              | 5            | JT No. etc. | 0x60           |                 |
| 3            | 6            | WP/SPN      | 0              | Unfixed         |
|              | 7            | Checksum    | Un-setting up. |                 |
| 4            | 8            | Data        | 0xD2           | 0x04D2=1234(10) |
|              | 9            |             | 0x04           |                 |
| 5            | 10           |             | 0x00           | 0x0000          |
|              | 11           |             | 0x00           |                 |

A checksum is total in byte units other than byte address 7. Here, it is set to 0x156.

Since carry is disregarded, the setting value of the byte address 7 is 0x56.

The data finally created is shown in the following table.

| Word Address | Byte Address | Contents    | Setting Value |                 |
|--------------|--------------|-------------|---------------|-----------------|
|              |              |             | Byte          | Word            |
| 2            | 4            | Data Code   | 0x20          | 0x6020          |
|              | 5            | JT No. etc. | 0x60          |                 |
| 3            | 6            | WP/SPN      | 0             | 0x5600          |
|              | 7            | Checksum    | 0x56          |                 |
| 4            | 8            | Data        | 0xD2          | 0x04D2=1234(10) |
|              | 9            |             | 0x04          |                 |
| 5            | 10           |             | 0x00          | 0x0000          |
|              | 11           |             | 0x00          |                 |

#### 4.2.5. Transmission to Link Area

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

#### 4.2.6. 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   | 0x20          | 0x6020 |
|              | 5            | JT No. etc. | 0x60          |        |
| 3            | 6            | WP/SPN      | 0             | 0x5600 |
|              | 7            | Checksum    | 0x56          |        |
| 4            | 8            | Data        | 0xD2          | 0x04D2 |
|              | 9            |             | 0x04          |        |
| 5            | 10           |             | 0x00          | 0x0000 |
|              | 11           |             | 0x00          |        |

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.

#### 4.3. Monitor function

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

Please use it, when you start a system.

## 5. 4 times extension specification

From Chapter 1 to Chapter 4 i / f specification is explained which is consisted of the minimum device assignment. 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 BS Configurator. The details of a setup are referred to BS Configurator Operation Manual- Chapter 7 Functional details [7] setup (7) Anybus.

### 5.1. Number of Devices Occupied

#### 5.1.1. 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.

#### 5.1.2. DeviceNet,EtherNet/IP

Please assign 40 bytes in I/O communication mode.

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

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

### 5.2. 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 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                      |



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|    |                |        |        |
|----|----------------|--------|--------|
| 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 assignment shall be referred BS CTRL for SP Instruction Manual 6-9 Parallel I/O.

### 5.3. Bit assignment of POUT1

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

|                  | Bit address | Contents |           |                           |
|------------------|-------------|----------|-----------|---------------------------|
|                  |             | +/-      | Name      | Explanation               |
| Lower<br>16 bits | 0           | +NG      | ZONE_JDG  | Zone judging +NG          |
|                  | 1           |          | P.LOAD    | Peak load +NG             |
|                  | 2           |          | F.LOAD    | Final load +NG            |
|                  | 3           |          | B.LOAD    | Bottom load +NG           |
|                  | 4           |          | P.STRK    | Peak stroke +NG           |
|                  | 5           |          | F.STRK    | Final stroke +NG          |
|                  | 6           |          | P.LDRT    | Peak load rate +NG        |
|                  | 7           |          | F.LDRT    | Final load rate +NG       |
|                  | 8           |          | R1.LOAD   | Load register 1 +NG       |
|                  | 9           |          | R1.STRK   | Stroke register 1 +NG     |
|                  | 10          |          | R1.SPD    | Speed register 1 +NG      |
|                  | 11          |          | R1.LDRT   | Load rate register 1 +NG  |
|                  | 12          |          | R2.LOAD   | Load register 2 +NG       |
|                  | 13          |          | R2.STRK   | Stroke register 2 +NG     |
|                  | 14          |          | P.EX_STRK | Peak external stroke +NG  |
|                  | 15          |          | F.EX_STRK | Final external stroke +NG |
| Upper<br>16 bits | 0           | -NG      | ZONE_JDG  | Zone judging -NG          |
|                  | 1           |          | P.LOAD    | Peak load -NG             |
|                  | 2           |          | F.LOAD    | Final load -NG            |
|                  | 3           |          | B.LOAD    | Bottom load -NG           |
|                  | 4           |          | P.STRK    | Peak stroke -NG           |
|                  | 5           |          | F.STRK    | Final stroke -NG          |
|                  | 6           |          | P.LDRT    | Peak load rate -NG        |
|                  | 7           |          | F.LDRT    | Final load rate -NG       |
|                  | 8           |          | R1.LOAD   | Load register 1 -NG       |
|                  | 9           |          | R1.STRK   | Stroke register 1 -NG     |
|                  | 10          |          | R1.SPD    | Speed register 1 -NG      |
|                  | 11          |          | R1.LDRT   | Load rate register 1 -NG  |
|                  | 12          |          | R2.LOAD   | Load register 2 -NG       |
|                  | 13          |          | R2.STRK   | Stroke register 2 -NG     |
|                  | 14          |          | P.EX_STRK | Peak external stroke -NG  |
|                  | 15          |          | F.EX_STRK | Final external stroke -NG |

#### 5.4. Format of Data Communication

| Word address | Byte address | Name                        | Contents  |  |
|--------------|--------------|-----------------------------|---|--|
| 4            | 8            | Whole code                  | Fixed to 1.   |  |
|              | 9            | Common judging table number | The table number in the case of accessing a judgment table is specified. Please set up the judgment table number to access with binary value. |  |
| 5            | 10           | Control                     | Bit0 Read/write 1=write<br><b>Bit1 Table read 1=Read a table</b><br>Bit2 Valid bit 1=Data is valid<br>Bit3-7 RESERVED                         |  |
|              | 11           | Individual code 1           | Please Set Up the code shown Chapter 2 Definition of Data code. Please set up 0xFE, when you do not use it.                                   |  |
| 6            | 12           | Individual code 2           |   |  |
|              | 13           | Individual code 3           |   |  |
| 7            | 14           | Individual code 4           |   |  |
|              | 15           | Individual code 5           |   |  |
| 8            | 16           | Individual data1 lower word | The contents of the data specified in individual code 1.  |  |
|              | 17           | Individual data1 upper word |   |  |
| 9            | 18           | Individual data2 lower word |   | The contents of the data specified in individual code 2.   |
|              | 19           | Individual data2 upper word |   |  |
| 10           | 20           | Individual data3 lower word | The contents of the data specified in individual code 3.  |  |
|              | 21           | Individual data3 upper word |   |  |
| 11           | 22           | Individual data4 lower word |   | The contents of the data specified in individual code 4.   |
|              | 23           | Individual data4 upper word |   |  |
| 12           | 24           | Individual data5 lower word | The contents of the data specified in individual code 5.  |  |
|              | 25           | Individual data5 upper word |   |  |
| 13           | 26           | Individual error code       |   | The code which shows the abnormalities in a format of input data. Only the output side is effective. |
|              | 27           | Individual error            |   |  |
| 14           | 28           | 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.                       |  |
|              | 29           | Individual error            |   |  |
| 15           | 30           | Checksum                    | The sum of the WORD data of the WORD addresses 4-18.<br>Carry-over is disregarded.  |  |
|              | 31           | Checksum                    |   |  |
| 16           | 32           | Checksum                    | The sum of the WORD data of the WORD addresses 4-18.<br>Carry-over is disregarded.  |  |
|              | 33           | Checksum                    |   |  |
| 17           | 34           | Checksum                    | The sum of the WORD data of the WORD addresses 4-18.<br>Carry-over is disregarded.  |  |
|              | 35           | Checksum                    |   |  |
| 18           | 36           | Checksum                    | The sum of the WORD data of the WORD addresses 4-18.<br>Carry-over is disregarded.  |  |
|              | 37           | Checksum                    |   |  |
| 19           | 38           | Checksum                    | The sum of the WORD data of the WORD addresses 4-18.<br>Carry-over is disregarded.  |  |
|              | 39           | Checksum                    |   |  |

**5.5. 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.

**5.6. 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.            |