CPS 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.

* 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 5. This is the fundamental specification which can access all data with the minimum number of occupancy devices.

Chapter 6 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. 4 times extended specification can be used with CPS controller Ver1.02.35 or later.

Chapter 7 explains the basic specification of a static system. The dynamic system has somewhat complicated procedure explained in Chapter 2 to 6. 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 Ver1.02.54 or later.

Chapter 8 explains the 4 times extension specification of a static system.

A setup about Anybus is possible on Anybus screen of CPS SP 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 I/O

Please assign 16 bytes in IN/OUT .

2.2. Assignment of devices

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

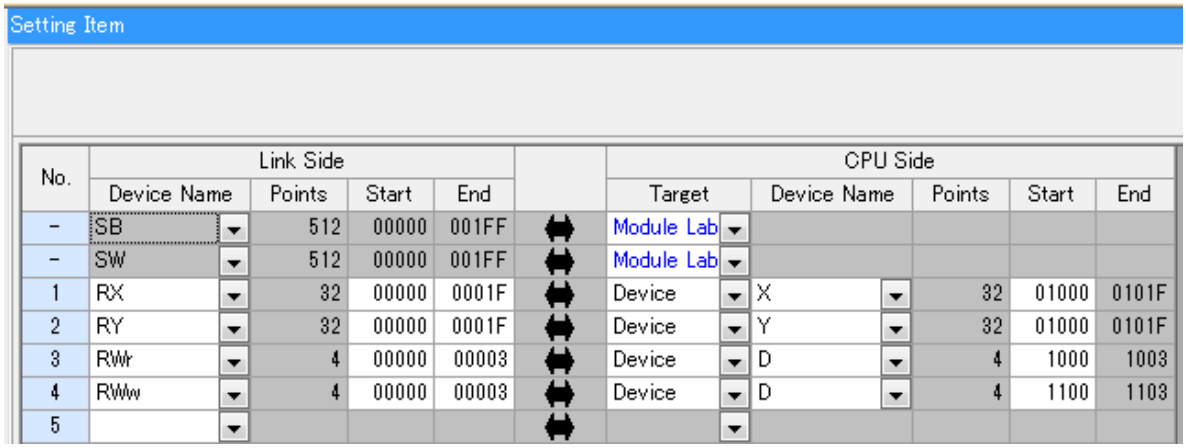
Word address	CC-Link	DeviceNet EtherNe/IP	Profibus-DP PROFINET I/O
0	Bits device 0-15	Byte0	Byte0
		Byte1	Byte1
1	Bits device 16-31	Byte2	Byte2
		Byte3	Byte3
2	Word device 0	Byte4	Byte4
		Byte5	Byte5
3	Word device 1	Byte6	Byte6
		Byte7	Byte7
4	Word device 2	Byte8	Byte8
		Byte9	Byte9
5	Word device 3	Byte10	Byte10
		Byte11	Byte11
			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 lower WORD	Data output lower WORD
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 SP 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 type	Address
CPS_STOP	Bool	%Q256.0
CPS_RESET	Bool	%Q256.1
CPS_ORIGIN	Bool	%Q256.2
CPS_START	Bool	%Q256.3
CPS_USER_SEL	Bool	%Q256.4
CPS_JOG_SPD1	Bool	%Q256.5
CPS_JOG_SPD2	Bool	%Q256.6
CPS_JOG_ENA	Bool	%Q256.7
CPS_PNO1	Bool	%Q257.0
CPS_PNO2	Bool	%Q257.1
CPS_PNO4	Bool	%Q257.2
CPS_PNO8	Bool	%Q257.3
CPS_PNO16	Bool	%Q257.4
CPS_U_IN2	Bool	%Q257.5
CPS_U_IN3	Bool	%Q257.6
CPS_U_IN4	Bool	%Q257.7
CPS_ALARM	Bool	%I256.0
CPS_READY_CTRL	Bool	%I256.1
CPS_READY_RUN	Bool	%I256.2
CPS_IN_ORIGIN	Bool	%I256.3
CPS_RUN	Bool	%I256.4
CPS_OK	Bool	%I256.5
CPS_NG	Bool	%I256.6
CPS_IN_JOG	Bool	%I256.7
CPS_ANS1	Bool	%I257.0
CPS_ANS2	Bool	%I257.1
CPS_ANS4	Bool	%I257.2
CPS_ANS8	Bool	%I257.3
CPS_ANS16	Bool	%I257.4
CPS_U_OUT5	Bool	%I257.5
CPS_U_OUT6	Bool	%I257.6
CPS_BAT_ALM	Bool	%I258.0
CPS_USER_SEL_ANS	Bool	%I257.7
CPS_ORIGIN_END	Bool	%I258.1

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	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

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 “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	**When reading each tables, this is set as 1.** This function has an effective to controllers of version 1.02.30 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. CPS 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	

3. Definition of the data code

3.1. 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 , 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, 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, 2 figures of decimals[mm]
19	SYSTEM HOME	System home position, 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, 2 figures of decimals[mm]
22	R2.STROKE	Stroke register 2
23	R2.LOAD	Load register 2
24	R1.TIMER	Timer register 1
25 to 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.

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.
64	Software version	BCD、0x00HHMMLL
65	FPGA version	BCD、0x0000HHLL
66	Manufacture date	BCD,0xYYMMDD00
67	Serial number 0 to 3	Serial number of a controller 0 to 3 figures, ASCII code
68	Serial number 4 to 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, 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 0xMMDDhhmm

3.1.1. 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

3.2. Product information

Reading/writing is possible.

Data code	Name	Meaning
192 to 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.

3.3. 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

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

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

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

3.3.1. 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	

4. 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.

5. Data Access Procedure

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

5.1. 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.

5.1.1. 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	

5.1.2. Setup of WORD Addresses 4 and 5

Please set up 0 altogether.

5.1.3. 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	

5.1.4. 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	

5.1.5. Transmission to Link Area

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

5.1.6. 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.

5.2. 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.

5.2.1. 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(10)
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	

5.2.2. 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(10)
	9		0x04	
5	10		0x00	0x0000
	11		0x00	

5.2.3. 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	

5.2.4. 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	

5.2.5. Transmission to Link Area

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

5.2.6. 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.

5.3. Monitor function

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

Please use it, when you start a system.

6. Dynamic System - 4 times extension specification

From Chapter 2 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 SP Configurator. The details of a setup are refered to CPS SP Configurator Operation Manual- Chapter 7 Functional details [7] setup (8) Anybus.

6.1. Number of Devices Occupied

6.1.1. 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.

6.1.2. DeviceNet,EtherNet/IP

Please assign 40 bytes in I/O communication mode.

6.1.3. Profibus DP,PROFINET I/O

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

6.2. Assignment of devices

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

Word address	CC-Link	DeviceNet EtherNet/IP	Profibus-DP 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

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 The format for accessing data is defined.	Data communication output 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 SP Instruction Manual 6-8 Parallel I/O.

6.3. Bit assignment of POUT1

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

	Bit address	Contents		
		+/-	Name	Explanation
Lower 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 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

6.4. Format of Data Communication

The format in the case of accessing data is explained.

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 **Bit1 Table read 1=Read a table** Bit2 Valid bit 1=Data is valid 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		
9	18	Individual data1 upper word	
	19		
10	20	Individual data2 lower word	The contents of the data specified in individual code 2.
	21		
11	22	Individual data2 upper word	
	23		
12	24	Individual data3 lower word	The contents of the data specified in individual code 3.
	25		
13	26	Individual data3 upper word	
	27		
14	28	Individual data4 lower word	The contents of the data specified in individual code 4.
	29		
15	30	Individual data4 upper word	
	31		
16	32	Individual data5 lower word	The contents of the data specified in individual code 5.
	33		
17	34	Individual data5 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. Bit0=1 Individual code/data 1 is wrong.
19	38	Checksum	The sum of the WORD data of the WORD addresses 4-18. Carry-over is disregarded.
	39		

6.5. 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.

6.6. 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.

7. 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 Ver1.02.54 or later.

7.1. 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.

7.2. Number of Devices Occupied

6 words are occupied about each input and output.

7.2.1. CC-Link

Version:Remote Net Version1

Station Type:Remote Device

Occupied stations:1

7.2.2. DeviceNet,EtherNet/IP

Please assign 12 bytes in I/O communication mode.

7.2.3. Profibus-DP,PROFINET I/O

Please assign 16 bytes in IN/OUT .

7.3. Assignment of devices

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

Word address	CC-Link	DeviceNet EtherNe/IP	Profibus-DP 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 (only PROFI system)	n=0 to 7 (only PROFI system)

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

7.4. 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	

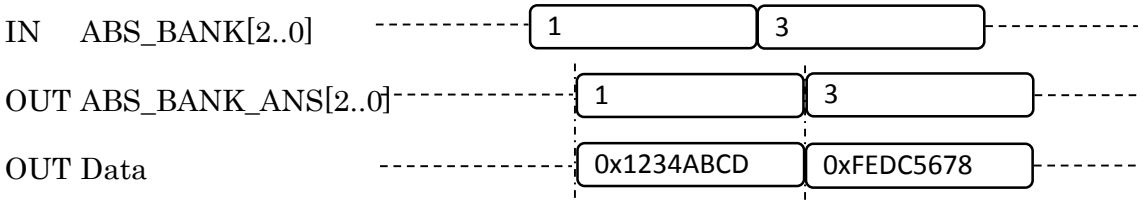
Output

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 SP Instruction Manual 6-8 Parallel I/O.

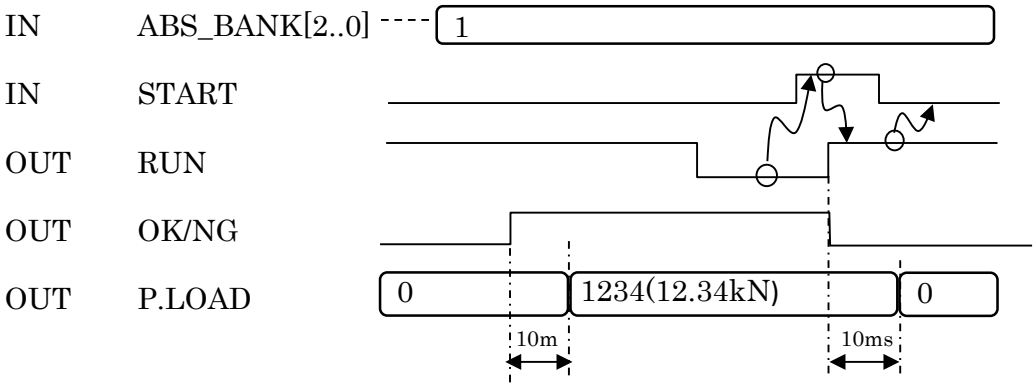
7.5. Timing chart

7.5.1. Bank change and Read



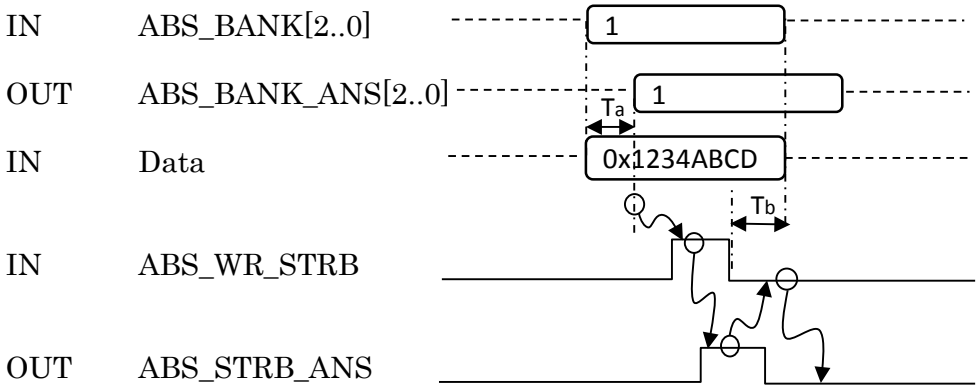
Please read data after checking the coincidence with ABS_BANK[2..0] and ABS_BANK_ANS[2..0].

7.5.2. Raed Result



The case where peak load (P. LOAD) 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 P.LOAD, 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.

7.5.3. 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.

8. 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 Ver1.02.54 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

8.2.1. 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.

8.2.2. DeviceNet,EtherNet/IP

Please assign 40 bytes in I/O communication mode.

8.2.3. Profibus DP,PROFINET I/O

Please assign 64 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 EtherNet/IP	Profibus-DP 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 SP Configurator is used to assign each input-and-output data.

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

8.4. Bit assignment of POUT1

Refer to 6.3 Bit assignment of POUT1.

8.5. Assignment of bank-switching signals

Refer to 7.4 Assignment of bank-switching signals.

8.6. Timig chart

Refer to 7.5 Timing chart.

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