CPS CONTROLLER for AC SERVO PRESS Instruction Manual

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 For safe use

1 - 1 Regarding symbols

Symbols are used to provide warnings in this instruction manual and for indication for proper product use and to prevent danger to the user or other people and damage to property from occurring. Understand the indication meanings before reading this manual.

1 - 2 Observe the following for safety

 DANGER	**This symbol assumes the possibility that accidental death or serious injury may occur immediately to the user, if the symbol is neglected and the product is incorrectly handled.**
The power source is as high as 200V. Look out for electric shock.	

 WARNING	**This symbol assumes that there is a potential for personal death or injury if this expression is ignored and this product is mishandled.**
In a case where the product is used in an application in which an accident resulting in death or injury or a serious expansion of damage is predictable, take safety measures such as installing a fail-safe device.	
Do not use around combustible gas. If disregarded, it may lead to an explosion.	
In a case of handling cables and connectors, etc., cut off the power temporarily without fail. If disregarded, it may lead to an electric shock.	
Do not remove the cover, disassemble, repair or modify the product. If disregarded, it may lead to an electric shock.	
Make sure to connect the protection conductor terminal to ground. Electric shock might be caused.	
Do not touch the power supply terminal in this equipment within five seconds after the power is turned off. It could cause the electric shock.	
Do not forcibly twist, pull or scratch the power cord or cord of the AC plug.	

CAUTION	**This symbol assumes that there is a potential for personal death or injury if this expression is ignored and this product is mishandled.**
Please use this product under the environment of overvoltage category II specified in IEC 60664-1.	
Please use this product under the environment of Pollution Degree II specified in IEC 60664-1.	
For the operation, stop, and emergency stop shall be done in the final machinery into which this equipment is incorporated.	
This product will surely be in a servo off state, when it is in an alarm state. However, battery alarm is excepted.	
Set up the emergency stop and interlock circuit with the external circuit. This allows to prevent expansion of damage.	
Use the input voltage, frequency and output voltage, and current within the standard. If disregarded, it may lead to an accident or electric shock.	
Do not use the product at over the specified ambient temperature. If disregarded, it may lead to fire or electric shock.	
Use in an environment without condensation due to water or moisture. If disregarded, it may lead to an electric shock.	
When output cannot be obtained, or any other abnormality is found during operation, stop use immediately. It may lead to electric shock. Contact the distributor where you purchased the product or our company's sales office without fail.	

1 - 3 Caution on attachment and use.

WARNING	**This symbol assumes that there is a potential for personal death or injury if this expression is ignored and this product is mishandled.**
Installation, connection, driving and operation, check and failure diagnosis shall be done by a qualified technician.	
Do not move, install, connect and check this equipment while the power is on. Please make sure the power is turned off for conducting these works.	
For installation requirements of this equipment, protection against electric shock is class Ⅰ, and equipment mobility is a stationery equipment for indoor installation. Please make sure this equipment is grounded when installed. (PE should be marked at the protective earthing terminal.)	
This equipment shall be stored in a dustproof and drip-proof controlled box. (IP54 class) If the performance of dustproof and drip-proof is not strong enough, dielectric strength shall be decreased, and the potential of dielectric breakdown shall be increased.	
The cross-sectional area of the protective bonding conductor shall be the same size as the input power wire for this equipment.	
Do not tighten the Servo press control cable excessively with binding band. Malfunction might be caused.	
The electric shock protection from the power supply terminal block of this equipment to final machinery shall be provided in the final machinery.	
For 24 VDC power supply, use SELV power supply which comply with IEC standard.	
A breaker that comply with IEC Standard shall be installed in the final machinery into which this equipment is incorporated,for the short-circuit protection of this equipment. As installation requirements, the inrush current of this equipment is 30 Ap(20 ms) and maximum constant current is 10 Arms. For ratings of the breaker, 15A ratings class shall be selected so that the breaker shall not be intercepted by this current.	

In this case, the short-circuit current is calculated from the short-circuit impedance of the power supply actually connected. Also, determine the size of wires which can endure the short-circuit current during the time taken for interruption of the breaker, before the electric wire is damaged by a fire. For the time taken for the interruption, confirm each performance characteristics of the breaker. (The decision of the size of the electric wire should be followed Table 5 and appendix D of EN60204-1)
The methods of the ground fault protection of this equipment are as follows: a) For the TT grounded system: Use an earth leakage breaker (Type A or B shall be used) b) For the TN grounded system: Use an over current breaker generally. (The fault loop impedance in the final equipment shall satisfy the overcurrent characteristics of the breaker so that the breaker shall be interrupted within 0.4s or less when earth fault is occurred.)

 CAUTION	**This symbol assumes that there is a potential for personal death or injury if this expression is ignored and this product is mishandled.**
When attaching the CPS body, allow a space of 25 mm or more for the right and left directions and 80 mm or more for up and down directions for cooling.	
Do not apply more load on the Servo press tool than allowed. The life might be considerably shortened.	
For connection to the protective earthing terminal, one wire should be provided for each terminal.	
The insulation's color of the protective earthing conductor shall be green-and-yellow.	
Design the sequencer circuit under consideration of safety measure such as emergency stop.	

1 - 4 Make sure to observe for sequencer circuit

Safety measure

 WARNING	**This symbol assumes that there is a potential for personal death or injury if this expression is ignored and this product is mishandled.**
Insert or pull off the connector only after turning off the power. Otherwise, controller might fail.	
Improper understanding of stroke might cause serious accident. Please understand the Section 8 in this manual to handle.	

1 - 5 EMC directive

The EMC directive applies not to the servo units alone but to servo-incorporated machines and equipment.

This requires the EMC filters to be used with the servo-incorporated machines and equipment to comply with the EMC directive.

Please ask a concrete solution to our office.

1 - 6 Others

This equipment is classified into the partly completed equipment according to Machinery Directive (2006/42/EC). Therefore, after this equipment is incorporated into the final machinery, conformity with Machinery Directive (2006/42/EC) shall be needed in the final machinery.

CE marking based on Machinery Directive is not done to the partly completed machinery. Therefore, for the case that circulates by the partly completed machinery until this equipment is incorporater into the final machinery in Europe. It is necessary for the declaration of incorporation and the manual of this equipment to be appended to this equipment

2 Before use

2-1 Characteristics of Servo press

The Servo press provides new production controls, press methods and other actions by programmable operations, controls and monitoring of the load and stroke amount. The characteristics are given below.

2-1-1 Possible to record program execution result

Up to 2700 pieces of data of press results can be recorded inside the CPS.
By using communications software, infinite data can be recorded.

2-1-2 Programmable action possible

Among factors such as speed, load,stroke, time and communications with external I/O, the programmable factor is what primarily concerns the customer.
(Refer to the CPS SP Configurator Instruction Manual)

2-1-3 Display of load and stroke during program execution and Graph display

By using special communications software, the values of load and stroke can be monitored. The electric current can also be monitored by selecting the details screen. A graph can be displayed after actions and detailed information can be obtained.

2-2 The suiting tool

CPS type controller CPS-SP-75 suits the tool of 5-75kN by 1 model.

2-3 Accompanying items

- CPS main body ×1
- Operating manual×1(CD-R)
- A set of a plug for CN1(AC power supply)
  Maker: Phoenix contact Type :PC4/3-ST-7.62
- A set of a plug for CN11(DC power supply)
  Maker: Phoenix contact Type : MC1.5/3-STF-3.81
- Backup battery ×1 Type :CR2032 WK13
- A plug for Anybus (in the case of CC-Link and DeviceNet specification)

2-4 About the model name and the version

The characters which follow the basic model name are explained. At CPS-SP-75xy-zz, x expresses a hardware version, y expresses a software

version and zz expresses Anybus option.

2-4-1 Anybus option

Code	説明
None	No Anybus option,PIO
CC	CC-Link
DV	DeviceNet
PF	Profibus DP
EI	EtherNet/IP
PN	PROFINET I/O

2-4-2 Hardware version

Code	Explanation
A	It un-corresponds to a Europe safe standard (CE Marking).
B	It corresponds to a Europe safe standard (CE Marking).
C	It corresponds to power interception.
D	PIO function is omitted.
E	Measure in serge noise is strengthened.
F	Measure in serge noise is strengthened. PIO function is omitted.

2-4-3 Software version

Code	Explanation
A/None	1.01._ _
B	1.02._ _

In version 1.02 the function has been extended so that a product name, product serial numbers, etc. can be collected as numerical data. As for the controller before a version 1.01, a model name is distinguished as CPS-SP-75xA. Since CPS SP Configurator 1.02.xx is maintaining the upper compatibility, although operation of CPS-SP-75xA is also possible, the numerical data file or waveform data file of CPS SP Configurator 1.01.xx cannot be displayed by CPS SP Configurator 1.02.xx.

3 Specifications

3 - 1 Controller common specification

Items		Contents
Outline		Refer to outline diagram on the Appendix(Section 4 [2])
Environment	Temperature	0～50℃
	Humidity	85% or less (No condensation)
	Altitude	Altitude 1000 m or lower
	Installing location	Harmful places with corrosive gas, cutting oil, metal powder, oil etc., are not allowed.
Power for drive		3 or 1 phases AC100～230V±10%、50/60Hz *1
Grounding		D-class earth work (Preferably 30Ω or less)
Power for control		DC24V±10%
Power consumption of control [W]		15 *2
Cooling procedures		Compulsive air cooling
Installing procedures		Installing on back panel
Vibration proof		0.5G（10～50Hz）
Shock proof		5G
Controlling scheme		Semi-closed loop by encoder feedback
Serial communications RS-485		19.2～76.8kbps dedicated protocol multi-drop connection
Serial communications RS-232C		19.2～76.8kbps dedicated protocol
Ethernet		UDP/IP Fixed IP address
Load cell accuracy		±1.5%@Tool rating (in a state without an overhang load)
Load sensor resolution		12Bit
Input signals		Start,Reset,P-No. Select,User in etc. Capacity of photo coupler 24V, 4.8mA, Filter time constant 50ms
Output signals		Ready,Run,Judge,Alarm,User out etc. Capacity of photo coupler 24V、30mA
Status indicator		LEDs(Charge,Status,Code,OK,NG,DC Power,Ethernet)
Cable length		Maximum 30 m
Executing program		31 points
Executing result storingfunction		For 2700 times

*1 In use by AC100V, regular top speed is not reached.
Moreover, use in single phase is not recommended except SP08 series. It is because short life-ization of an electrolysis capacitor is caused because of generation of heat accompanied by increase of ripple current. As for the use beyond AC220V, the number of times of regeneration electric discharge increases. Please be careful of overheating of regeneration resistance enough.

*2 It is the power consumption in a stationary state. Please expect the rushes

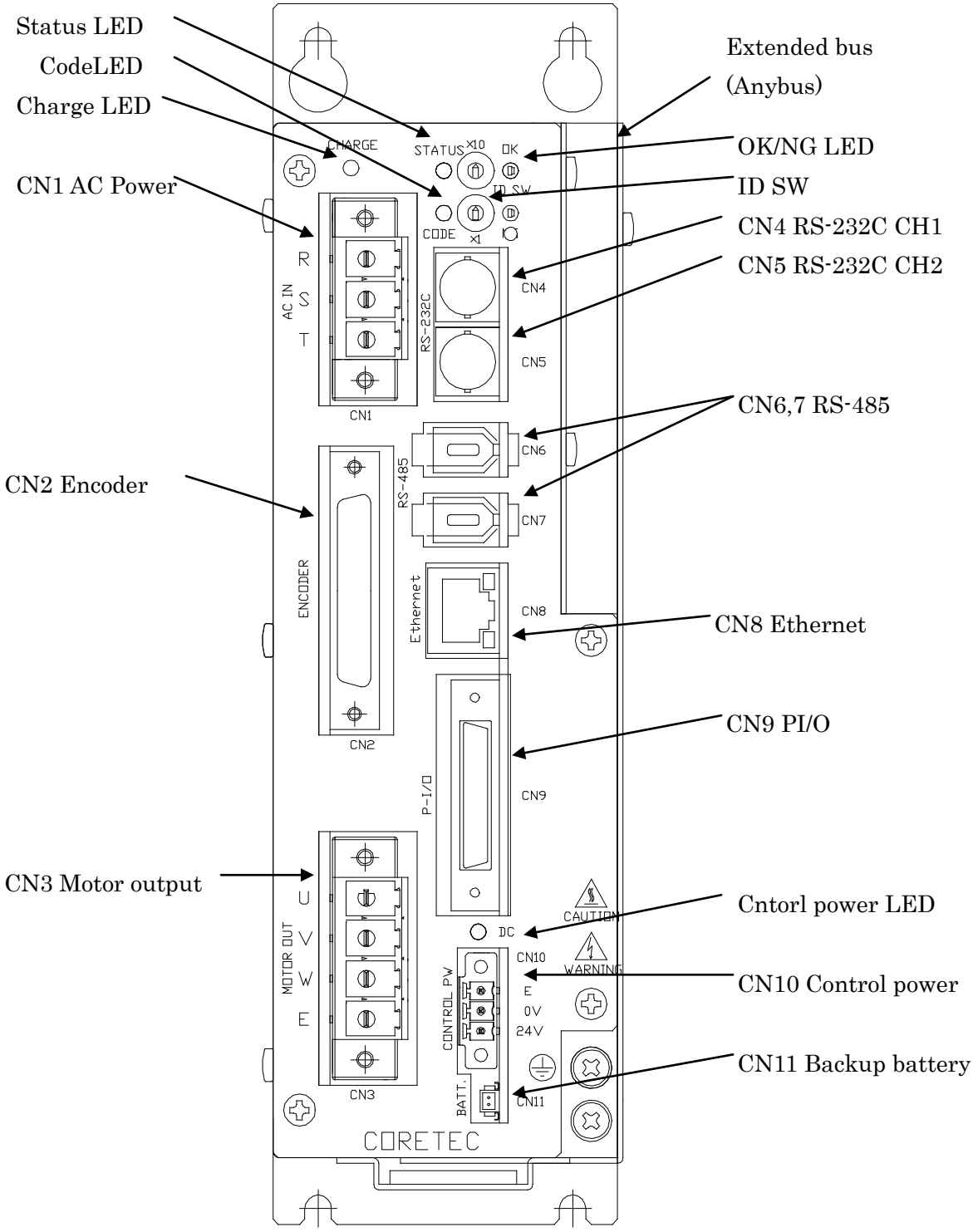
current at the time of a power supply injection, and secure about 2-time power supply capacity.

3 - 2 Specification by the tool

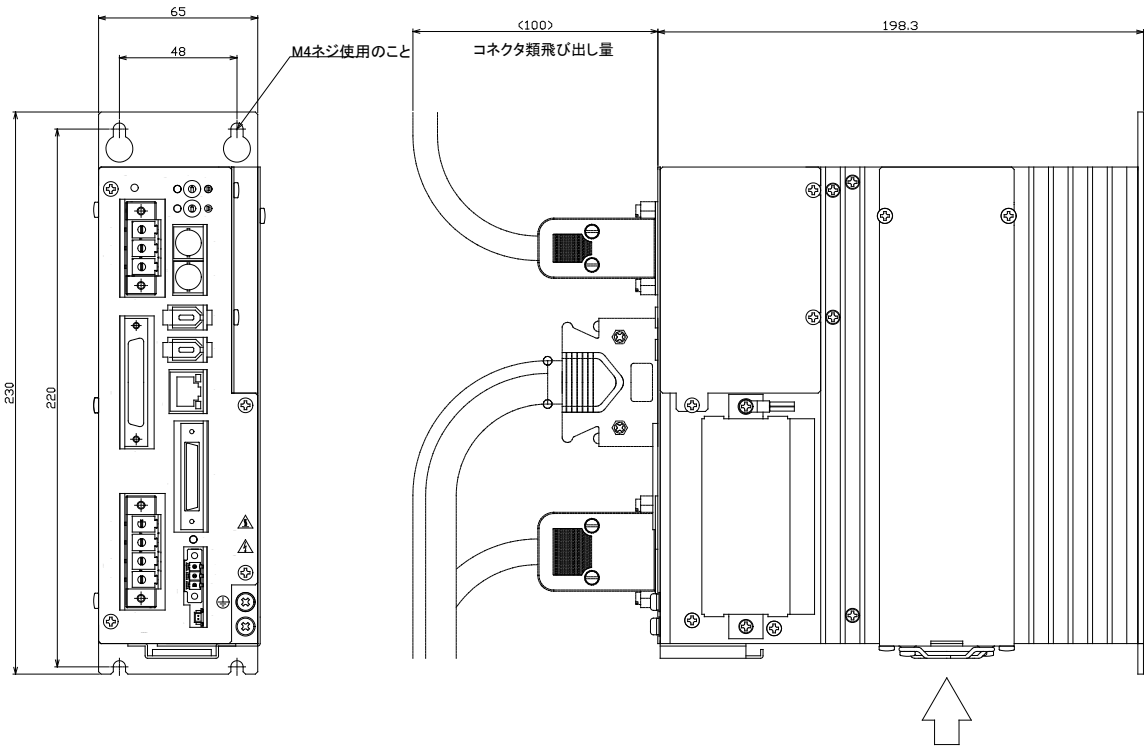
Tool type	Rated power consumption of AC power[kVA]	Maximum power consumption of AC power[kVA]
SP08/CS05/CS10	0.15	0.75
SP20/CS20	0.36	1.85
SP30/CS30	0.5	2.5
SP75/CS60	0.7	3.5

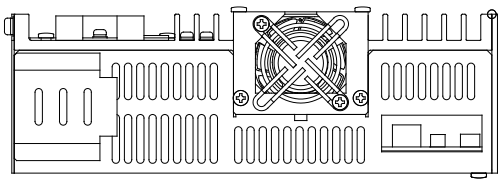
4 Construction

4 - 1 Name of each part of the controller

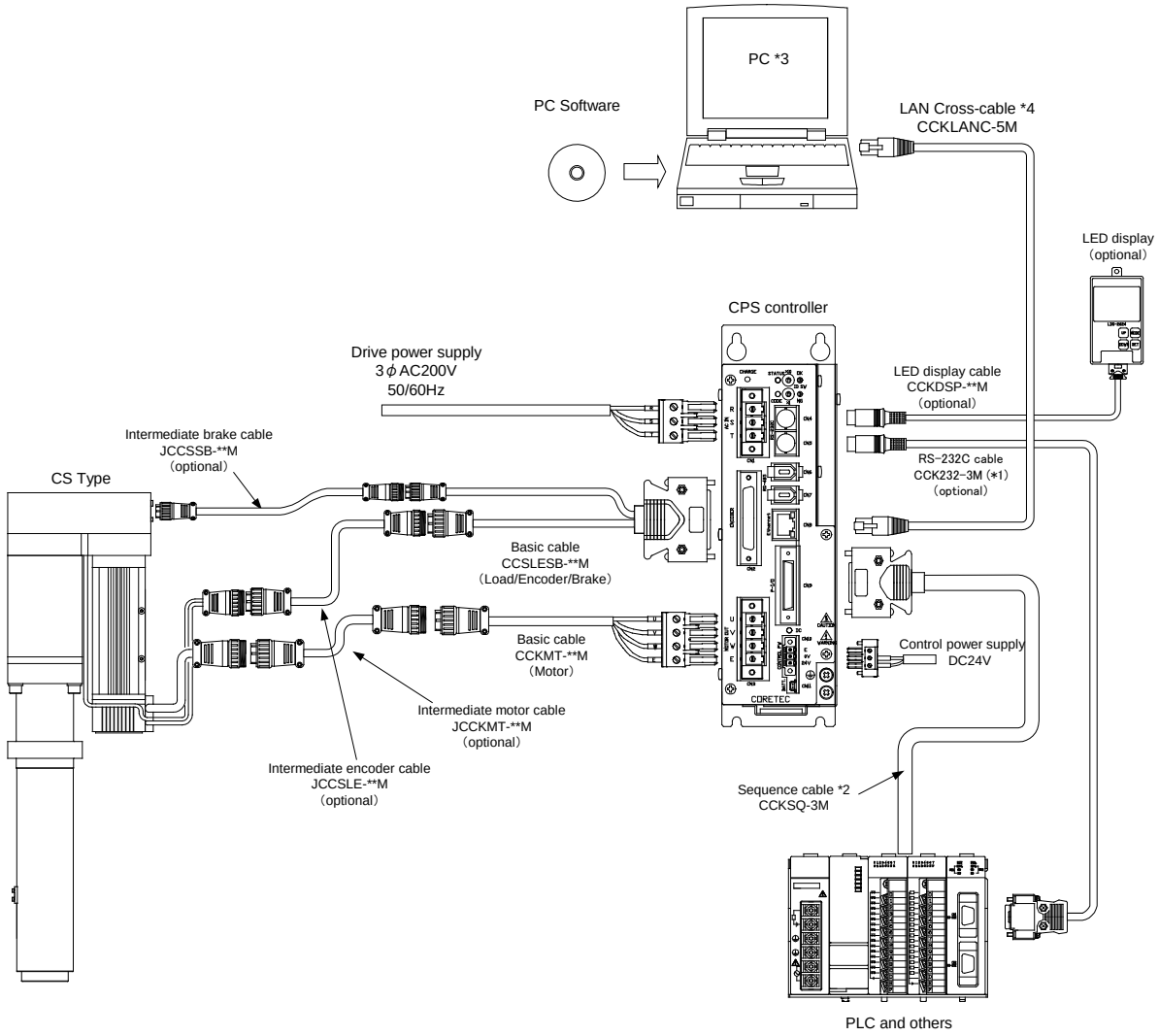


4 - 2 Outline





4 - 3 Connection figure- Single spindle construction (include options)

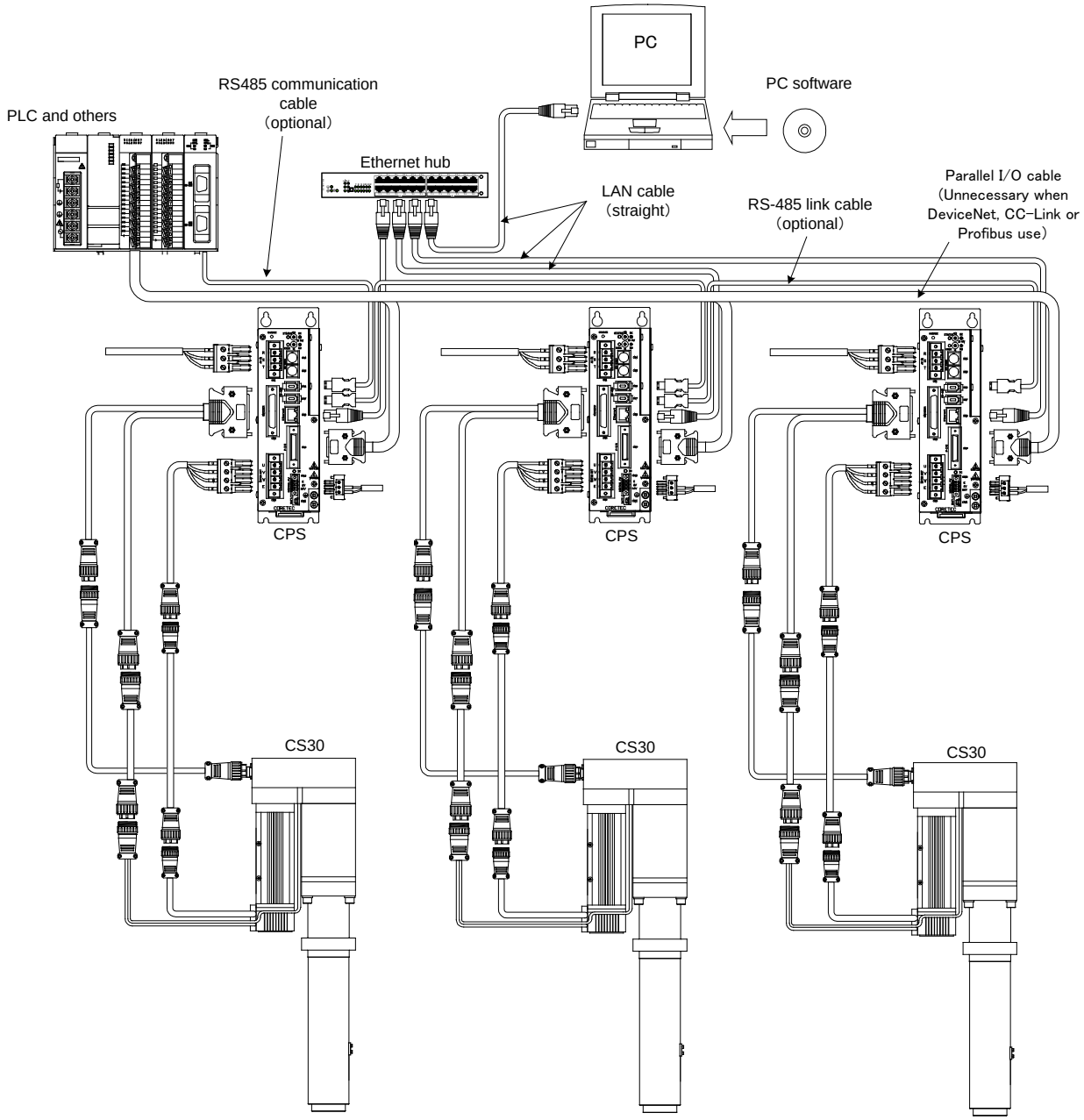


*1 Depend on PLC type, cable names are different as below
For PC : CCK232-3M
For Mitsubishi PLC : CCK232M-3M
For Omron PLC : CCK232R-3M
For Sharp(15P) PLC : CCK232S15-3M
For Sharp(25P) PLC : CCK232S25-3M
None connector type : CCK232N-3M

*2 Unnecessary when DeviceNet, CC-Link or Profibus use
*3 Provided by the user
*4 Use CCKLANS-5M when connected to HUB

- 1. The cables to a tool and peripheral equipment are options.
- 2. A controller will be damaged if AC power supply is turned on when a control power supply is off. Please be careful enough about the turn of an injection/cutting of a control power supply and AC power supply. We will recommend you to design so that AC power supply may turn off ,if a control power supply turns off.

4－4 Connection figure- Multi spindles construction (include options)



- 1. The cables to a tool and peripheral equipment are options.
- 2. A controller will be damaged if AC power supply is turned on when a control power supply is off. Please be careful enough about the turn of an injection/cutting of a control power supply and AC power supply. We will recommend you to design so that AC power supply may turn off ,if a control power supply turns off.

5 Installation

5-1 Procedures for installing to control panel

5-1-1 Designing conditions for control box

Please be advised that the control box meets the general safety specifications.

Take the following into consideration.

1. The control box to house the CPS should be a dustproof and drip-proof structure.
2. Temperature in the control box should be from 0 to 50°C.

   Heat generating amount of the CPS depends on the operating status of the Servo press. Install a fan, heat exchanger and heat radiation fin according to the heat generating amount in the control panel.
3. Make sure to apply sealing to the cable outlet and window portion.
4. Consider mounting of the CPS so that maintenance such as inspection and removal is easily carried out.

5-1-2 Cautions when installing CPS

When installing the main body of the CPS, secure space of more than 25 mm (for cooling) on both sides and more than 80 mm (for removal) above and under the main body. Moreover, space 100mm or more is required for a front side because of connectors.

6 Installing lines

6-1 AC power(CN1)

CAUTION

6-1-1 Supply voltage

Please supply 3 or 1-phase 50/60Hz AC100-230V±10%. However, nominal tool top speed is as under the condition of AC200V, and top speed is limited to 50% in AC100V. Moreover, for the tool of 20 or more kNs of thrusts, we do not recommend you use in single phase. It is because there is a possibility of causing short life-ization by generation of heat of the electrolysis capacitor by ripple current.

Since the frequency of regeneration electric discharge increases, use near AC maximum cannot be recommended. We recommend you use at AC200V strongly.

6-1-2 The interlock by the control power supply

The recommendation circuit of AC power supply is shown in Fig. 6-1. **In order to avoid noise radiation and noise disturbance, please insert a line noise filter.** When a control power supply turns off, please constitute a circuit to turn off AC power supply. CPS will be damaged if AC power supply is switched on when a control power supply is off.

Moreover, please prepare an interlock to intercept AC power supply by off of parallel output READY_CTRL.

Wiring in parallel should be avoided AC power supply line and other signal lines, and detach them as much as possible.

If you use electro-magnetic contact switches,it is better to put serge absorbers with them. Because those drive power supply and a driven circuit generate a powerful serge noise.

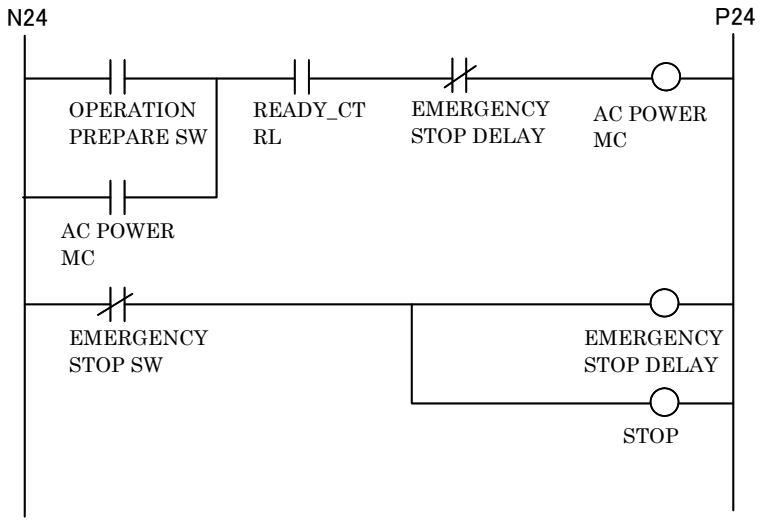


Fig.6-1 The recommendation circuit of AC power supply

6-1-3 AC power supply at the time of an emergency stop

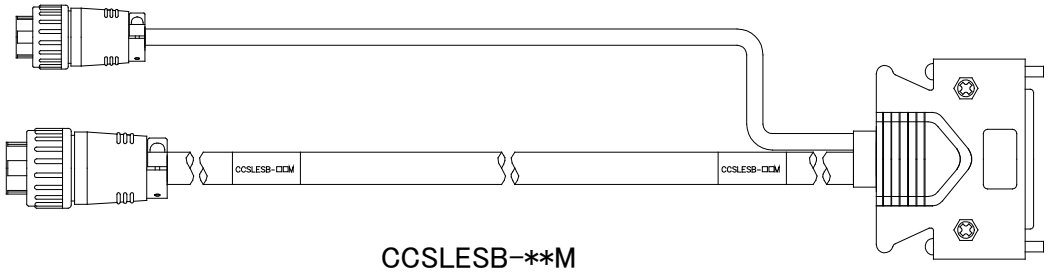
Execution of a program is interrupted by parallel input STOP,and a tool goes into a scram. At this time, internal processing of CPS is as follows. Speed zero are performed for 0.2 seconds in the speed mode, and it will be in servo off state after that. Therefore, if power supply is intercepted simultaneously with STOP input, LAM cannot carry out a sudden stop. When you perform an emergency stop, please design a power supply circuit to intercept a power supply after the delay for 0.2 seconds or more after STOP input.

6-2 Encoder i/f(CN2)

The encoder cable of a tool is connected. The origin sensor signal and the control signal of an optional brake are also included in the encoder cable in addition to the encoder signal.

Cable type:CCSLESB-**M

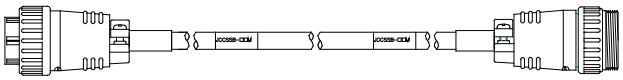
Suiting tool : CS series (Basic cable)



CCSLESB-**M

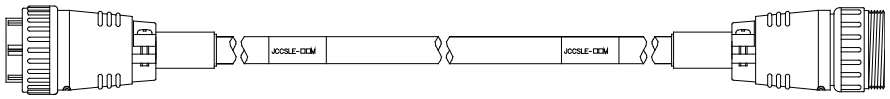
Cable type:JCCSSB-**M

Suiting tool：CS series (Junction cable for sensor and brake)



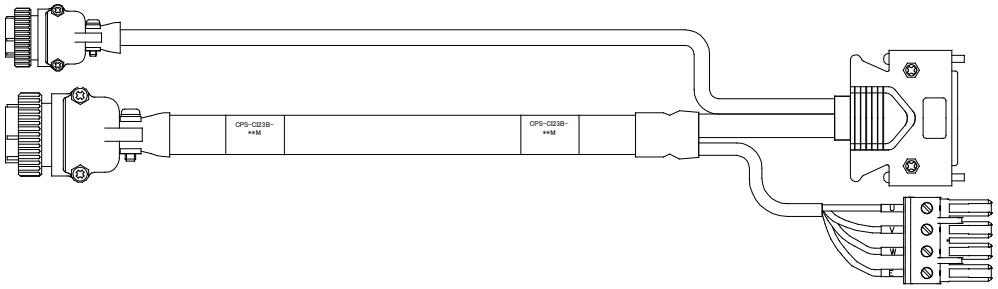
Cable type:CCSLE-**M

Suiting tool：CS series (Junction cable for encoder and load cell)



Cable type:CPS-CI23B-**M

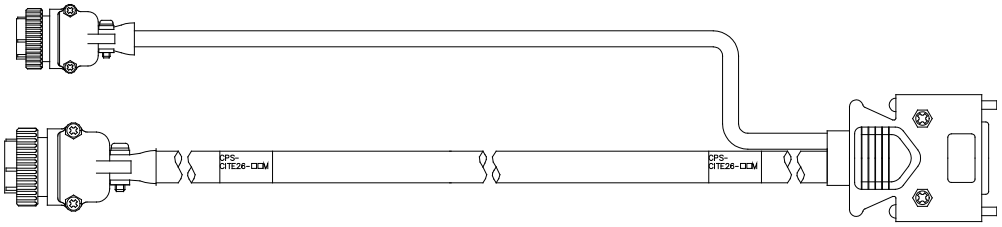
Suiting tool：SP08 series



Notice: In the case of SP08 series, the encoder cable and the motor cable are united.

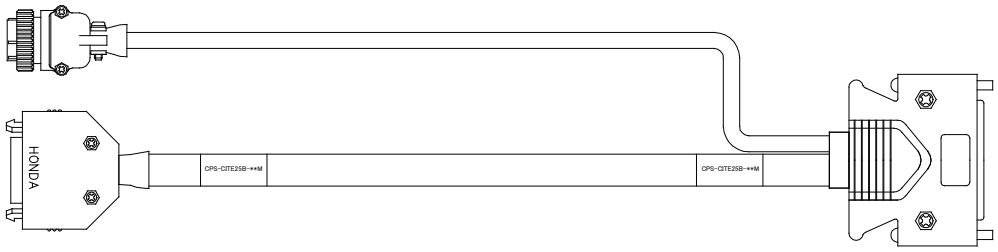
Cable type:CPS-CITE26B-**M

Suiting tool：SP20/30 series



Cable type：CPS-CITE25B-**M

Suiting tool：SP75 series

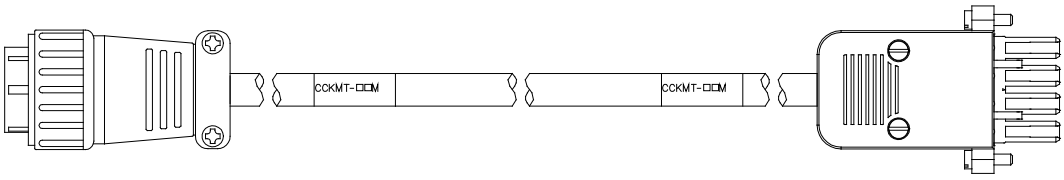


6-3 Motor cable i/f(CN3)

The motor cable of a tool is connected. A genuine motor cable is shield specification. Please use a shield cable, when you relay a motor cable, and be sure to ground a shield to frame GND.

Cable type：CCKMT-**M

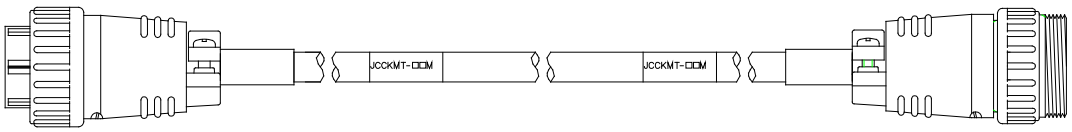
Suiting tool：CS series (Basic cable)



CCKMT-**M

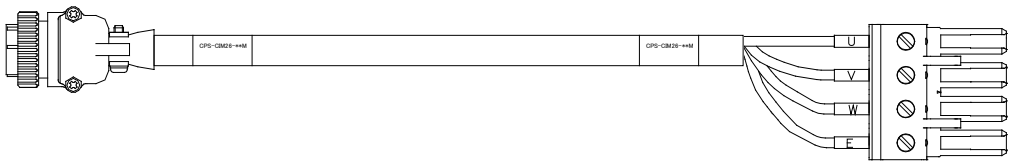
Cable type：JCCKMT-**M

Suiting tool：CS series (Junction cable)



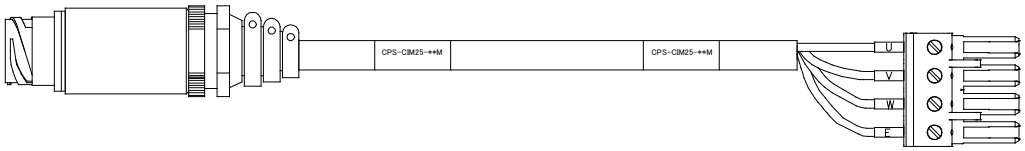
Cable type：CPS-CIM26-**M

Suiting tool：SP20/30 series



Cable type：CPS-CIM25-**M

Suiting tool：SP75 series



6-4 RS-232C(CN4)

It is a general-purpose serial communication port. Since DC24V power supply is assigned, it is dangerous if it connects except an exclusive cable here. A setup of a protocol and a baud rate is performed from CPS SP Configurator.

Controller side connector type：HR12-10R-8SDL（HIROSE）

Pin number	Signal name	Contents
1	Rxd	
2	Txd	
3	RTS	
4	CTS	
5	S-GND	Signal GND
6		
7	P-GND	Power GND
8	24V	Power

Cable type：CCK232-**M(General)

：CCK232M-**M(Only for Mitsubishi Electric PLCs)

Usage：Connection with RS-232C unit of PLC etc.

6-5 RS-232C(CN5)

It is a general-purpose serial communication port. Since DC24V power supply is assigned, it is dangerous if it connects except an exclusive cable here. A setup of a protocol and a baud rate is performed from CPS SP Configurator.

Controller side connector type：HR12-10R-8SDL（HIROSE）

Pin number	Signal name	Contents
1	Rxd	
2	Txd	
3		
4		
5	S-GND	Signal GND
6		
7	P-GND	Power GND
8	24V	Power

6-6 RS-485(CN6,7)

It is a general-purpose serial communication port. Two connectors are prepared for cascade connection. The potential difference of GND for signals is permissible to 7V. When communication is not stabilized, please confirm GND for signals of the pin numbers 5 and 6. If the metal cover of a right-hand side is removed toward CPS controller and 3 of dip SW SW4 on a substrate and 4 are turned on (up), GND for signals will become effective.

Terminus resistance is built in the controller. Terminus resistance will become effective if 1 (most front panel slippage) of dip SW SW4 on a substrate is turned on (up).

Controller side connector type：53462(Molex)

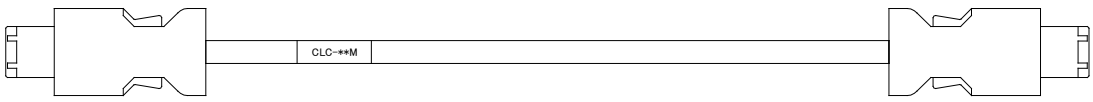
Pin number	Signal name	Contents
1	TD+	
2	TD-	
3	RD＋	
4	RD-	
5	S-GND	Signal GND
6	S-GND	Signal GND

Cable type：CC485N-**M

Use：Connection with RS-485 unit of PLC etc.

Cable type：CLC-**M

Use：RS-485 cascade connection between controllers



6-7 Ethernet(CN8)

It connects with a personal computer and exclusive application CPS SP Configurator performs a setup of CPS controller etc. The protocol is UDP/IP.

They are 10 / 100M automatic change. It is necessary to make LAN setup of a personal computer into a fixed IP address.

The example of a setting IP address 192:168:1:1

Subnet mask 255:255:0:0

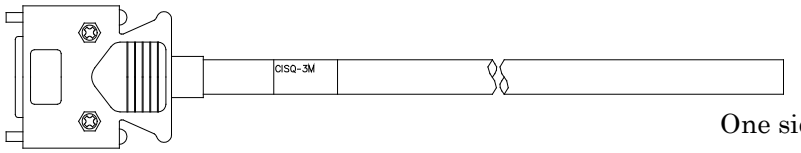
Please use a cross cable, when you connect a personal computer and CPS controller directly. Please use a straight cable, when you connect via a HUB.

6-8 Parallel I/O(CN9)

It connects with a sequencer etc. and CPS is controlled.

Cable type：CCKSQ-**M

（Refer to the wiring diagram for CPS<=>PLC connection.）



One side is cut.

Connector：54306-3611(MOLEX)

6-8-1 Bit assignment

Input

Bit number	Signal name	Contents
0	STOP	Program execution is interrupted, then a scram is carried out. After performing speed zero for 0.2 seconds, it will be in a servo off state. This input is always effective even if Anybus is used.*
1	RESET	Alarm release and judgment output reset.
2	ORIGIN	Origin is started. Original position information disappears by start of origin.
3	START	Program execution is started.
4	USER_SEL	User output selection.
5	JOG_SPD1/U_IN0	Bit 0 of JOG speed specification binaries/user input 0, are superposed. When JOG_ENA is ON, JOG speed is specified in four stages with the input bit 6. When JOG_ENA is off, it becomes the user input 0.
6	JOG_SPD2/U_IN1	Bit 1 of JOG speed specification binaries/user input 1, are superposed.
7	JOG_ENA	JOG operation is permitted. Moreover, the output bit 3 is changed to BAT.ALARM.
8	PNO1/JOG+	The bit 0 of the binary value which specifies an execution program number/+ Direction JOG are superposed. When JOG_ENA is ON, JOG operation is carried out in the direction of +.
9	PNO2/JOG-	The bit 1 of the binary value which specifies an execution program number/- Direction JOG are superposed. When JOG_ENA is ON, JOG operation is carried out in the direction of -.
10	PNO4	The bit 2 of the binary value which specifies an execution program number.
11	PNO8	The bit 3 of the binary value which specifies an execution program number.
12	PNO16	The bit 4 of the binary value which specifies an execution program number.
13	U_IN2	User input 2.
14	U_IN3	User input 3.
15	U_IN4	User input 4.
16-27	RESERVED	
28	ABS_WR_STRB	Write strobe signal. All data are taken in on the specified bank at the time of ON.
29	ABS_BANK0	Bank specification signal. A bank 0-7 is specified by the 3-bit signal.
30	ABS_BANK1	
31	ABS_BANK2	

Output

Bit number	Signal name	Contents
0	ALARM(N.C)	Alarm. It is a normal closing. It turns off in the state of alarm.
1	READY_CTRL	The completion of control side preparation. It turns on by control power supply injection. **Please use it for the interlock of AC power supply.**
2	READY_RUN	The completion of operation preparation.
3	IN_ORIGIN/BAT.ALARM	In origin mode/Battery alarm are superposed. BAT.ALARM is chosen when JOG_ENA is ON.
4	RUN	It turns on during program execution.
5	OK	O.K. judging output. The output timing of O.K./NG is a moment of executing jdg command in a program.
6	NG	NG judging output.
7	IN_JOG/AREA1	Under JOG operation/Area signal 1 are superposed. IN_JOG is chosen when JOG_ENA is ON.
8	P_ANS1/U_OUT0	The response of the bit 0 of binary value which specifies an execution program number/User output 0 are superposed. User outputs are chosen when USER_SEL is ON. It is the same to the bit 12.
9	P_ANS2/U_OUT1	The response of the bit 0 of binary value which specifies an execution program number/User output 1 are superposed.
10	P_ANS4/U_OUT2	The response of the bit 1 of binary value which specifies an execution program number/User output 2 are superposed.
11	P_ANS8/U_OUT3	The response of the bit 2 of binary value which specifies an execution program number/User output 3 are superposed.
12	P_ANS16/U_OUT4	The response of the bit 3 of binary value which specifies an execution program number/User output 4 are superposed.
13	U_OUT5	User output 5.
14	U_OUT6	User output 6.
15	USER_SEL_ANS	The response of USER_SEL.
16	BAT.ALARM	It is the exclusive output of battery alarm.
17	ORIGIN_END	It turns on, when origin is completed. It is turned off when origin is required.
18	PJ_WAIT	When using a post judgment, it turns on in the state of waiting a judgement from a PC.
19	AREA2	Area signal 2.
20	AREA3	Area signal 3.
21	AREA4	Area signal 4.
22-27	RESERVED	
28	ABS_STRB_ANS	Answer of ABS_WR_STRB.Use for handshake with ABS_WR_STRB.

29	ABS_BANK0_ANS	The answer to bank specification signals.
30	ABS_BANK1_ANS	
31	ABS_BANK2_ANS	

* Above bit16 can be used only when Anybus option is chosen. It is that PI/O (CN9) suits from bit0 to bit15.

CPS controller of version 1.02.25 or more is needed to use bit16 to bit18.

CPS controller of version 1.02.36 or more is needed to use bit19 to bit21.

CPS controller of version 1.02.54 or more is needed to use bit28 to bit31.

PIN STOP signal is always effective in CPS controller of version 1.02.59 or more.

Please refer to CPS CTRL for SP Instruction Manual Vol Network1.06 about the details of bit28 to bit31.

PIO connector pin assignment

A pin number, the wiring color of PIO cable, and a signal name are shown.

The shield line of a cable is connected to the connector shell by the side of a controller.

Connector (MOLEX : 54306-3611)

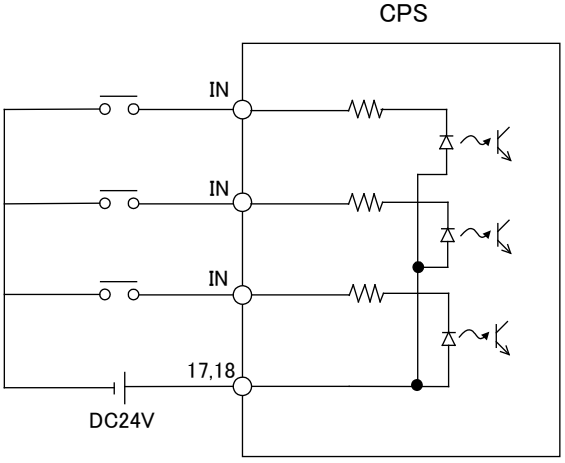
Connector shell (MOLEX : 54331-0361)

Cable (SUN LIGHTSX 0.2×18P)

PIN No.	Bit	Color	Signal name	PIN No.	Bit	Color	Signal name
1	0	Gn	STOP	19	0	LB/W	ALARM(N.C)
2	1	Br	RESET	20	1	R/Bk	READY_CTRL
3	2	Bl	ORIGIN	21	2	Gn/Bk	READY_RUN
4	3	Gy	START	22	3	Br/Bk	IN_ORIGIN/BAT.ALRM
5	4	Or	USER_SEL	23	4	Bl/Bk	RUN
6	5	Pr	JOG_SPD1/U_IN0	24	5	Gy/Bk	OK
7	6	Pn	JOG_SPD2/U_IN1	25	6	Or/Bk	NG
8	7	LB	JOG_ENA	26	7	Pn/Bk	IN_JOG/AREA
9	8	W	PNO1/JOG+	27	8	LB/Bk	P_ANS1/U_OUT0
10	9	Gn/W	PNO2/JOG-	28	9	W/Bk	P_ANS2/U_OUT1
11	10	Bw/W	PNO4	29	10	Gn/R	P_ANS4/U_OUT2
12	11	Bl/W	PNO8	30	11	Br/R	P_ANS8/U_OUT3
13	12	Gy/W	PNO16/U_IN4	31	12	Bl/R	P_ANS16/U_OUT4
14	13	Or/W	SERVO_ON	32	13	Gy/R	U_OUT5
15	14	Pr/W	U_IN2	33	14	Or/R	U_OUT6
16	15	Pn/W	U_IN3	34	15	Pn/R	USER_SEL_ANS
17		R	+24V	35		Bk	0V
18		R/W	+24V	36		Bk/W	0V

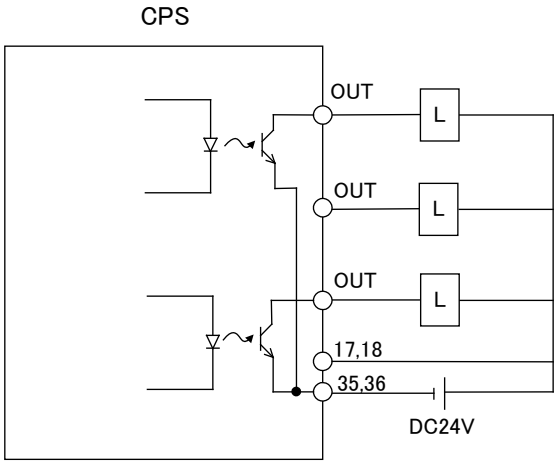
6-8-2 Wiring by the side of input

Common voltage is DC24V and serves as a photo-coupler input. (Current is about 5mA / 1 circuit.)



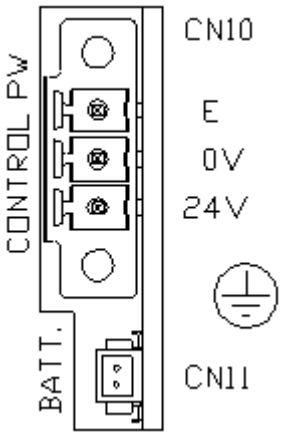
6-8-3 Wiring by the side of output

Open collector output (30mA / 1 circuit)



6-9 Control power supply (CN10)

Control power supply 24V are connected. Please constitute the main power supply circuit to turn off AC power supply by off of the control power supply. CPS will be damaged if AC power supply is switched on in the state of control power supply off.



6-10 Backup battery (CN11)

The exclusive battery for SRAM backup is connected. Please connect a backup battery in the state of control power supply ON. Although the life of a battery is about five years, it changes a lot according to a use state and environment. If

battery voltage is less than 2.1V, BAT.ALARM (parallel output 3) turns on. Even in such a case, inside information is held unless a control power supply is turned off.

Please attach for a red lead to turn up.

6-11 Anybus

If the metal cover of the right side is removed toward CPS controller, the connector for Anybus will appear. If it equips with Anybus card which HMS offers, control equivalent to PI/O will be attained by networks, such as DeviceNet,Profibus-DP.

6-12 Regeneration resister(CN14)

The foremost connector in the controller bottom is CN14. When capability is insufficient in standard regeneration resister, please connect option regeneration resister to CN14. In this case, overheating protection is independently required because the original temperature monitoring function of a controller dose not work.

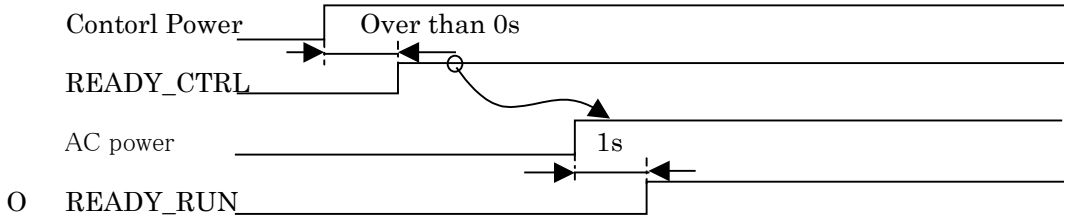
DANGER

When you exchange regeneration resister, please check that a power supply is off and that CHARGE lamp of the front panel upper part has gone out. If these checks are neglected, there is fear of an electric shock.

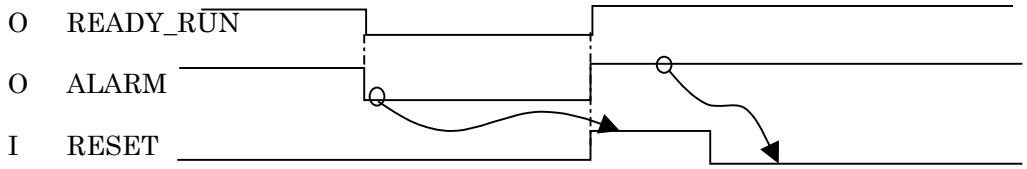
7 Timing Chart and Flow Chart

The timing chart of fundamental operation is shown.

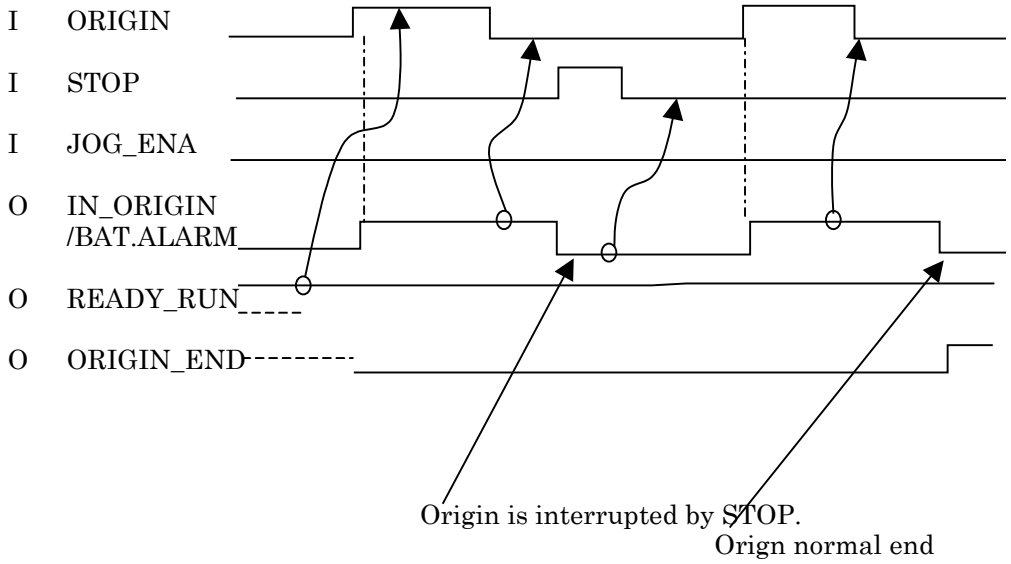
7-1 Power supply injection



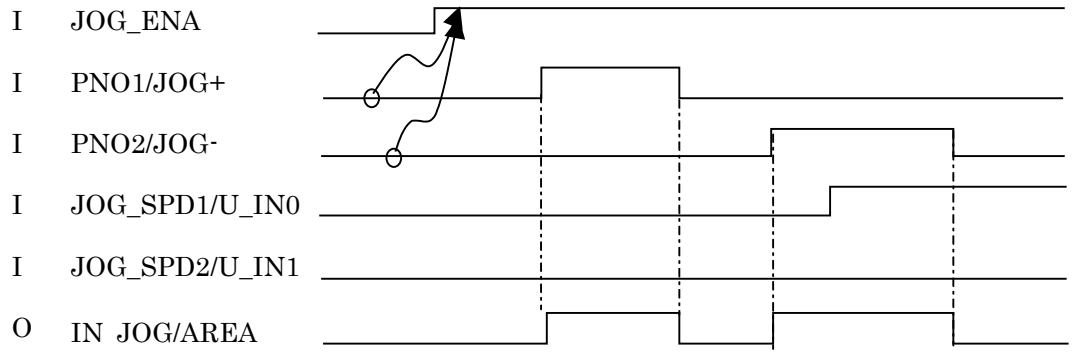
7-2 Alarm reset



7-3 Origin

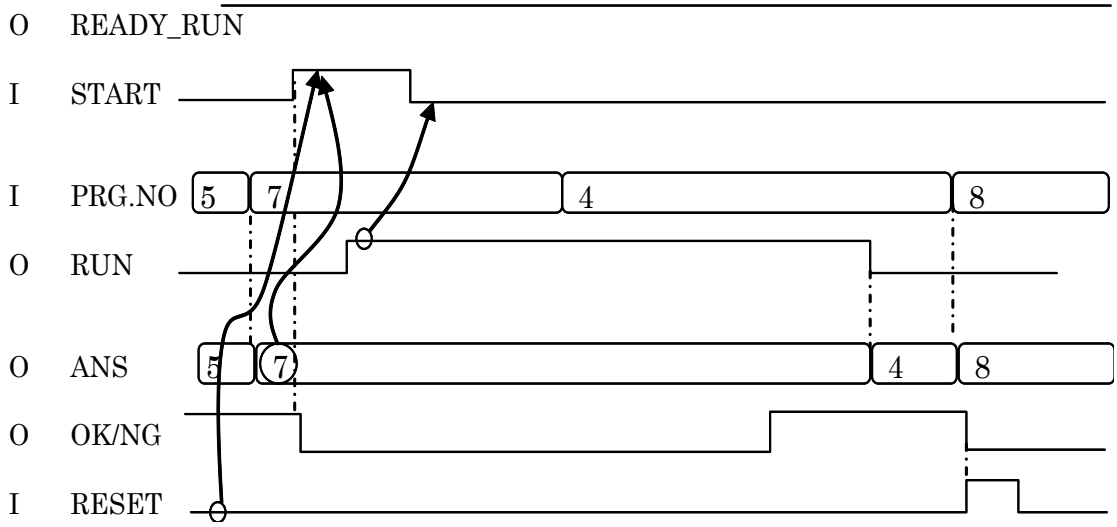


7-4 JOG

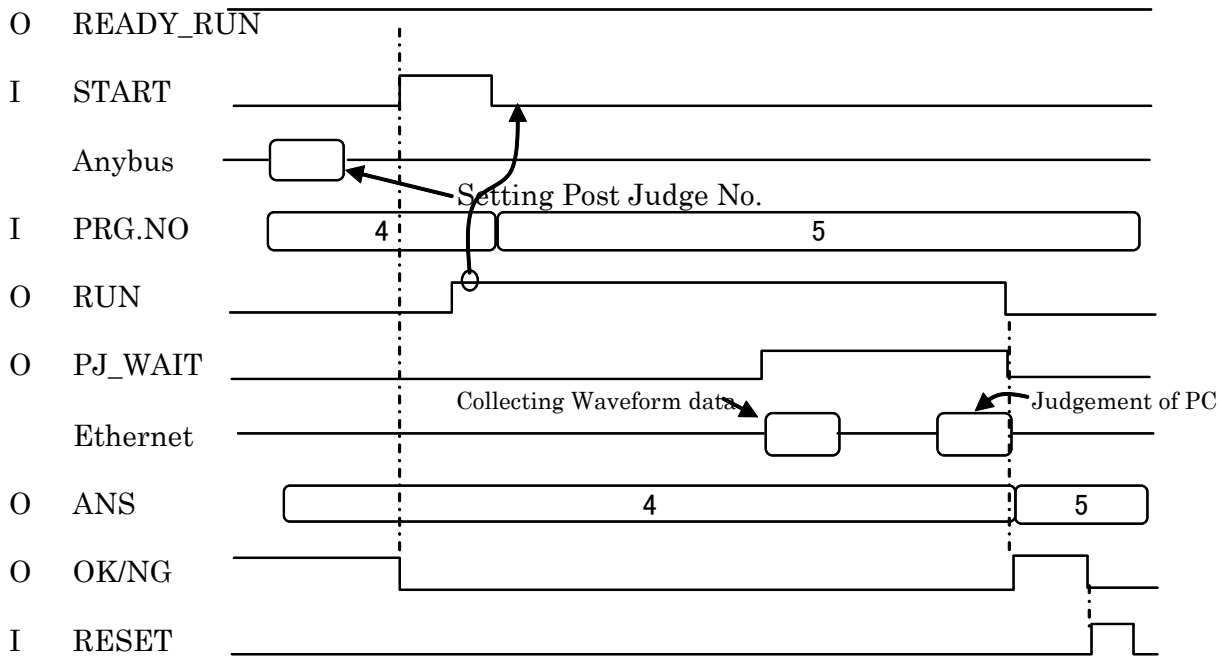


When you turns on JOG_ENA, it is required for PNO1/JOG+, and PNO2/JOG- to be in the state of off. It will become alarm if JOG_ENA is turned ON when either of those signals is ON.

7-5 Program execution



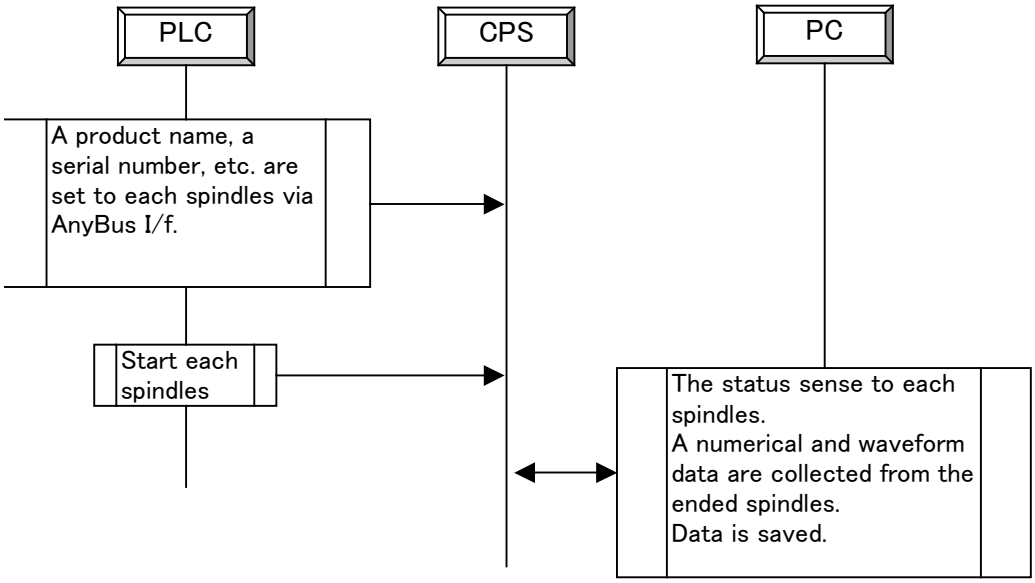
7 - 6 Program execution using Post Judge



"Post Judge" is the function to take in waveform data to PC, to perform a special analysis in PC, and to return judgment to CPS controller. This function can perform judgment processing which cannot be realized only by the real-time operation within CPS controller. Please refer to a CPS_SP_Configurator handling description for details.

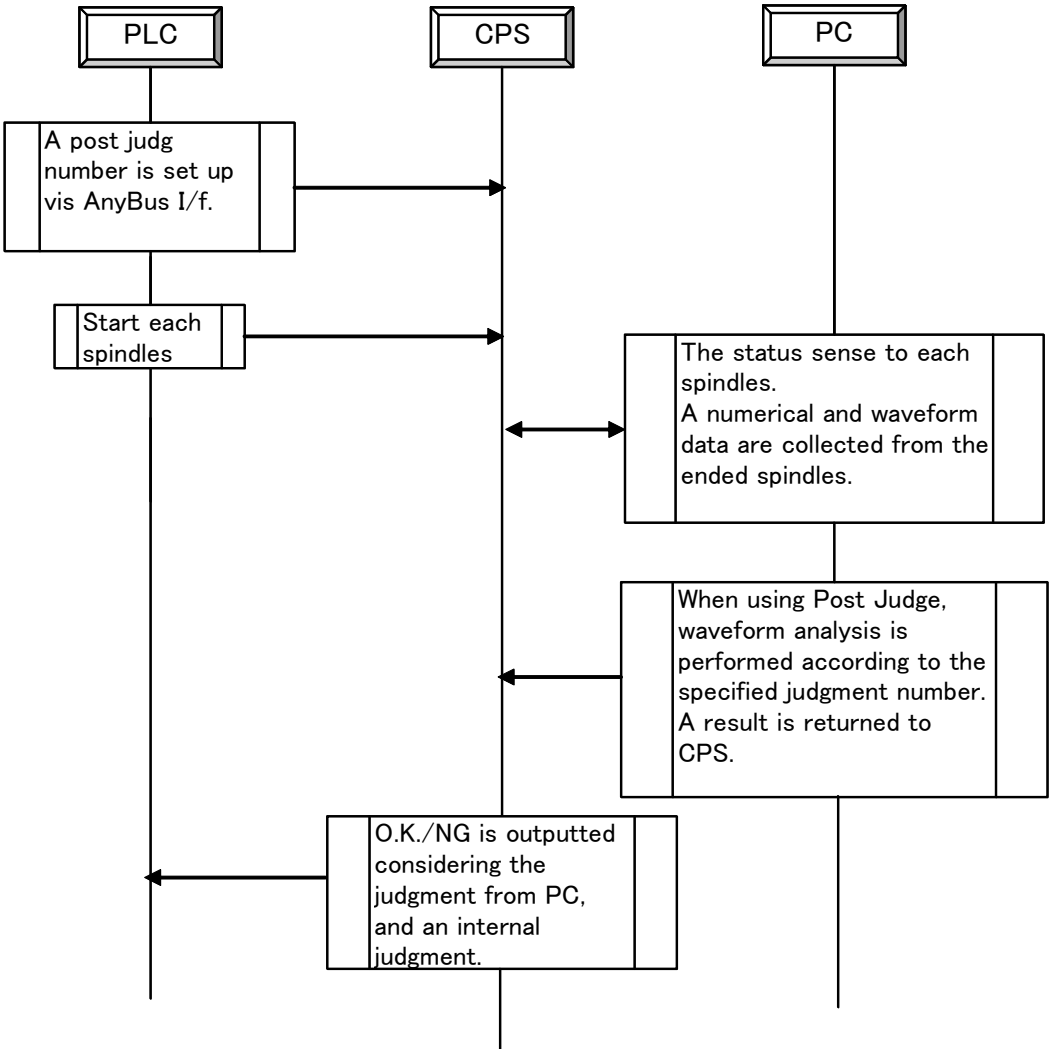
7 - 7 Writing of a product name and a serial number

The flow chart in the case of recording a product name, a serial number, etc. to numerical data using Anybus i/f is shown



7 - 8 Post Judge

"Post Judge" is the function to take in waveform data to PC, to perform speciall analysis in PC, and to return a judgementt to CPS controller. This function can perform judgment processing which cannot be realized only by the real-time operation within CPS controller. Please refer to a CPS_SP_Configurator handling description for details.



8 Concept of stroke

When using the Servo press, an incorrect setting of stroke will cause a serious accident.Please be sure to understand concept of stroke well before using the servo press. then design user programs, sequence, and system after that.

8 - 1 Semi closed loop

The stroke value of a servo press is calculated from the encoder pulse of a motor, and may not show the exact position of the ram always.

The right stroke value cannot be outputted before an origin return.

In proportion to load, a tool is distorted slightly. It is about 0.3mm at the maximum load

When the mechanism of a timing belt or others breaks down, the actual position and stroke value of the ram are-less correlating.

When the position of the ram has serious influence for operation of a system, we recommend you to form the sensor which detects the position of the ram uniquely.

8-2 Direction

The direction where ram is extended is the direction of +.

8-3 System home position

It is used when adjusting offset of the whole system. It is set as a controller using CPS SP Configurator. When tools are exchanged, adjustment of an attachment position can be easily performed by change of a system home position.

8-4 User home position

It is the offset which can be arbitrarily set up in a user program. It specifies using a home position table. It is set up on the basis of a system home position. The stroke value of 32 pieces is prepared for the home position table. The contents of a home position table can be changed by CPS SP Configurator.

The stroke value treated in a user program starts from a user home position.

8-5 System stroke limit

It is the maximum stroke value set to the tool table.*1 A setup can be arbitrarily changed in the range exceeding it. The stroke value starts from an origin sensor.

8-6 User stroke limit

It is the stroke limit which can be described in a user program. The stroke

value starts from a user home position.

8-7 If the stroke limit is exceeded

If one of stroke limits is exceeded, a controller turns off READY_RUN and will be in a servo off state. Please input RESET, in order to restore. If ON of READY_RUN is checked, please move ram into a stroke limit by manual operation.

8 - 8 Motion of the ram at the time of servo off

At the moment of servo-off, a ram may shift from various factors slightly. The amount of shift is 1mm or less. In order to prevent the shift, please stop servo-off or use the brake for position keeping.

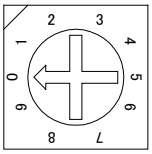
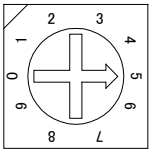
*1 A tool table is the file various setting value about a tool is indicated to be. It exists under the installation folder of CPS SP Configurator. If a tool type is chosen on a tool selection screen, the contents of a tool table will be displayed.

9 Connection with Personal Computer

In order to set up CPS controller, exclusive application CPS SP Configurator is started, and it is necessary to connect with a personal computer. The procedure is explained.

9-1 Spindle number setup

CPS controller is connectable with the same communication system to 31 sets. In this case, in order to discriminate each controller, it is necessary to set up a spindle number.

The spindle number setting method	
Controller front **ID x10**  **ID x 1** 	In the left figure, the spindle number is set as 5. ID x 10 is 10 digits. ID x 1 is 1 digit. Please set up a spindle number in one communication system not to overlap. Duplication of a spindle number causes a communication error. Please set up the number between 01-31.In the other setup, it becomes an error.

When a spindle number is changed, a spindle new number becomes effective after a re-injection of a power supply.

9-2 An IP address setup of CPS controller

The IP address of CPS controller is set up like this 192:168:55:(spindle number).

Arbitrary IP addresses can be set up now by the controller after a version 1.02.31. Please refer to 9-8 Arbitrary IP address setup.

The default gateway is 192.168.1.1.

9-3 An IP address setup of a personal computer

In order to communicate with CPS controller, it is necessary to set a fixed IP address for a personal computer in the communication method of Ethernet. Since the setting methods of a fixed IP address differ for every OS, refer to other data for them.

An example of a setting of an IP address

IP address 192.168.1.1(The default gateway of CPS)

Subnet mask 255.255.0.0

A subnet mask is set up with 255.255.255.0 by the default. This setup can also communicate normally except for a part of function. A part of function means functions which uses broadcasting commands, such as alarm reset and battery reset.

Since it is not connectable with the Internet environment in almost all cases, the personal computer set as the fixed IP address should be careful.

9-4 LAN cable

Please use a cross cable, when you link a CPS controller and a personal computer directly. Please use a straight cable, when you go via a hub.

9-5 A communicative check

If connection is completed, CPS SP Configurator will be started and communication will be checked. In the following explanation, the spindle number shall be set as No. 1.

9-5-1 Setup of receive filter

If a setup-data collection-receiving filter is chosen with a pull down menu, a receiving filter screen will be displayed. Please set up, as shown in Fig. 9-1.

The items of numericall data is added in the version 1.02.Please check the version of a controller and set up correctly. If an error is in a setup of a version, data collection cannot be performed correctly. The version of a controller can be checked on a maintenance information screen or a connection spindles list screen.

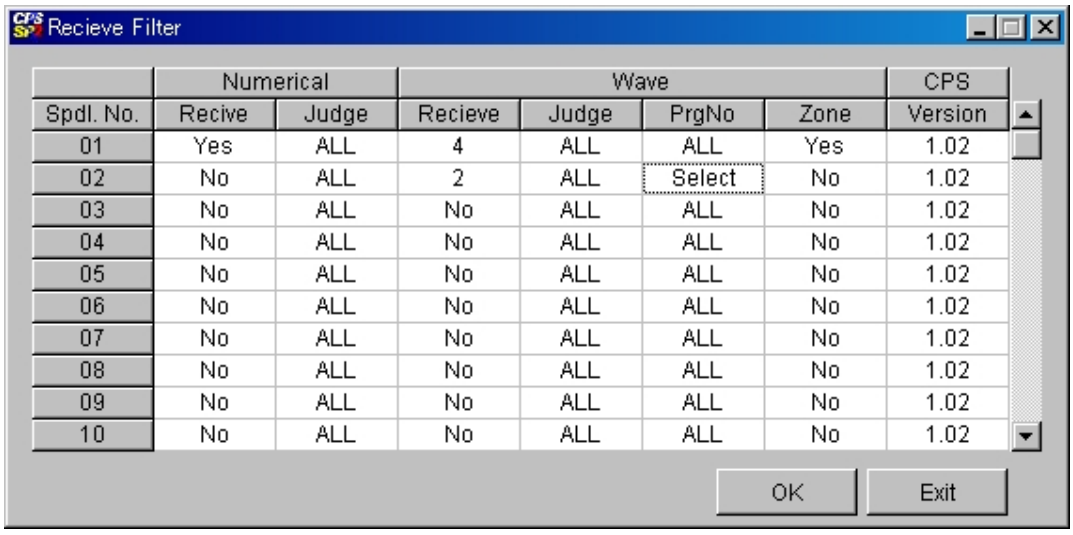


Fig. 9-1 Receive filter screen

9-5-2 Collection setup

At the pull down menu, check is put into setup-data collection-collection. (refer to Fig. 9-2.)

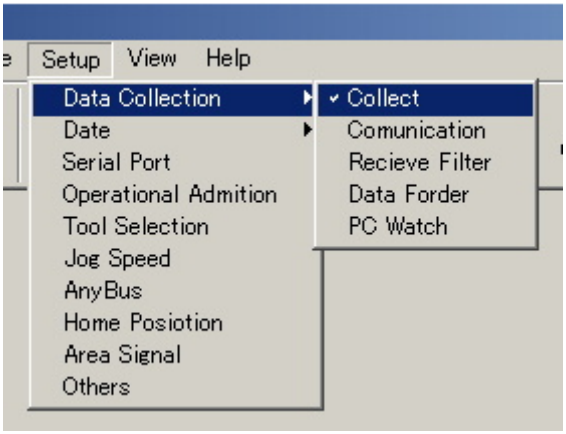


Fig.9-2 Collection setup

9-5-3 Check of status

If the status bar of the screen lower part is displayed as shown in Fig. 9-3, communication is performed normally. Although various alarms are displayed when no setup for CPS controller is performed, there is no problem. As shown in Fig. 9-4, when status is displayed, communication is not performed normally. Please improve a setup from the beginning of Chapter 9.

Fig. 9-3 Status bar Alarm state

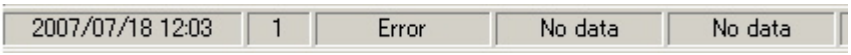


Fig. 9-4 Status bar Communication error state

9 - 6 Starting of two Configurators

It is also possible to install two CPS SP Configurators in one PC, and to start simultaneously. Starting of the 2nd Configurator displays the message "the port cannot be used." It is because the 1st Configurator has already used the port number 5004 (default value). Then, at the 2nd Configurator, it is set up so that the port number except 5004 may be used. In the menu of the 2nd Configurator,Setup-Data collection-Communication is chosen, and the communication setting screen is opened.

Please choose 5005 at the list-box of All Port No. button, and click O.K. button. Please re-start the 2nd Configurator. Two Configurators can be used if the message about a port is not displayed. If two Configurators are used, data can be displayed by the station.

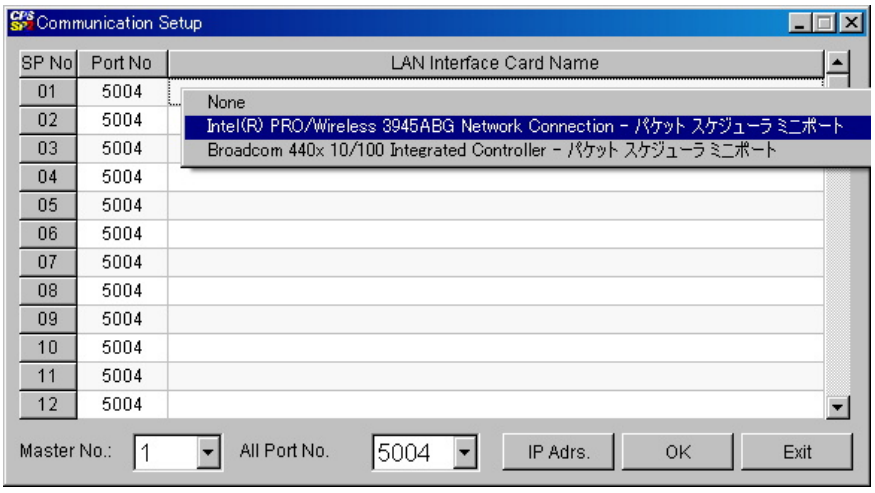


Fig. 9-5 Communication Setup screen

9 - 7 Use of two or more network interface cards

If LAN Interface Card Name in the Communication Setup screen of Fig. 9-5 is used, the communication route between a PC and controllers can be specified. Mixture of a network is avoidable if this function is used when using two or more network interface cards. Moreover, if two Configurators are started and data collection is performed by the separated network interface card, the time of data collection can be shortened.

As shown in Fig. 9-5, the network interface card names are displayed in a floating window by right click of the lower part of LAN Interface Card Name.

A setup will become effective, if LAN Interface Card Name of you wish is chosen and O.K. button is clicked.

9 - 8 Arbitrary IP address setup

Arbitrary IP addresses can be set up now to the controller of a version 1.02.31 or later. On Fig. 9-5 Communication Setup screen if IP Address button is clicked, Fig.9-6 IP Address Setup screen will open. The IP address of Configurator and the IP address of a controller can be arbitrarily set up on this screen. Address 4 is decided by the spindle number. A spindle number is set up with the rotary SWs of the front upper part of a controller. The setting range of a spindle number is from 1 to 31.

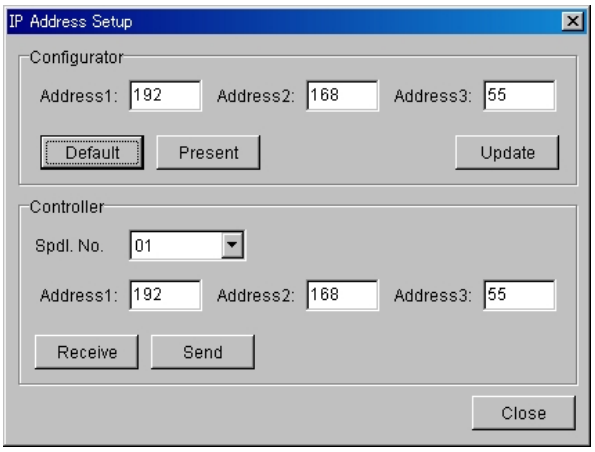


Fig.9-6 IP Address Setup screen

9 - 8 - 1 Notes

Communication is impossible unless Configurator and a controller are the same IP addresses. Moreover, it is necessary to also change the IP address of the network interface card used with a personal computer. Please setup addresses 1 and 2 with the same addresses of a controller.

A setup of a controller becomes effective after a re-injection of a power supply.

9-8-2 The communication method with an IP address unknown controller

Please use a default fixed IP address to the controller with an unknown setup of an IP address. When a spindle number is set as 71 to 99 with the rotary SW of the upper part in front of a controller, the IP address of the controller is as follows.

192.168.55.(spindle number - 70)

A new IP address becomes effective by re-injection of a power supply.

10 Starting

10–1 Starting procedure of CPS controller

The outline procedure in the case of actually using CPS controller is shown below. The item which needs details is indicated after [2].

10-1-1 Attachment to equipment

CPS controller and a tool are fixed to equipment.

10-1-2 Wiring

Please wire with reference to a wiring diagram.

10-1-3 Control power supply injection

Only a control power supply is switched on.

10-1-4 Attachment of a backup battery

The backup battery for holding the contents of a setting is attached.

10-1-5 Parameter setup

Tool type selection, a stroke limit, etc. are set up from exclusive PC application CPS SP Configurator.

10-1-6 Re-starting of a power supply

After a setup of a parameter, a power supply is turned off at once and only a control power supply is switched on again. If alarm has not occurred, AC power supply is also switched on. When alarm has occurred, please remove a cause with reference to troubleshooting.

10-1-7 Check of a brake

When a mechanical brake is chosen as an option, it checks that a brake is taken off in the state of operation.

10-1-8 Origin

Large restriction is applied to speed and output load when origin has not been completed.

10-1-9 Build a program.

Build the program which suited the purpose using CPS SP Configurator, and transmit to CPS controller.

10-1-10 Execution of a program

If you run a program and there is an inconvenient portion, please add correction and raise the completeness of a program.

10-2 Parameter setup

A parameter required in order to start a program is only tool type selection. Please setup a stroke limit, acceleration time, and deceleration time if needed.

These can be set up from the tool selection screen of exclusive PC application CPS SP Configurator. The tool selection screen is shown in Fig. 10-3-1.

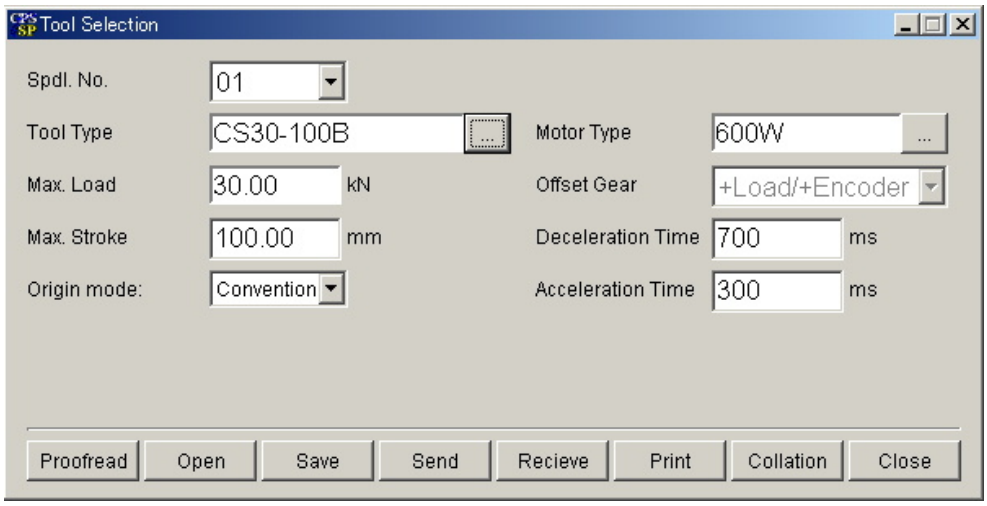


Fig. 10-3-1 The tool selection screen

Tool type setting procedure is explained.

① Choose a spindle number.

② Choose a suitable tool name from the pull down list of tool types.

③ A click of the display area of the maximum stroke displays a numerical input screen. The maximum stroke of a system is inputted. A positive numerical value smaller than a default numerical value can be set up. If the Max. stroke is set as longer 5-10mm than the actually used maximum stroke value, the crash by incorrect operation etc. may be able to be prevented.

④ Set up deceleration time by the same method. Deceleration time is time required for a tool to stop from top speed. Although a cycle time will be shortened if deceleration time is shortened, the rate of regeneration load rises.

⑤ Set up acceleration time by the same method. Acceleration time is time until a tool reaches to top speed from a stop state. Although a cycle time will be shortened if acceleration time is shortened, large current flows at the time of acceleration. Since it leads to a rise of the rate of execution load, please be careful.

⑥ A click of a send button displays a check screen. A click of O.K. sends the contents of a display to CPS controller.

⑦ After changing a tool type, a power supply needs to be re-supplied. Please

re-switch on a control power supply after equipping with a backup battery.

10-3 Check of the brake

When a mechanical brake is chosen as an option, please check that a brake is taken off at the time of operation. Although the brake control command is prepared for program language, if a program is performed, brake release will be performed by the controller side.

Cautions 1 A serge noise generates a mechanical brake at the time of opening and closing. Since the noise control circuit is added to the brake control circuit of CPS controller, it is not necessary to prepare a serge killer etc. by the user side.

Cautions 2 The mechanical brake which is an option article is an object for position maintenance. Please do not use it for braking.

10-4 Origin

Since CPS controller is an incremental encoder system, whenever it switches on a control power supply, origin is needed. Execution of a program cannot be performed in the state of un-completing an origin. Moreover, in the state of un-completing an origin , even in manual operation, the speed of a tool and an output are restricted sharply. Speed is restricted to origin speed. An output is restricted to about 10% of the maximum output. Where the load exceeding it is applied, origin cannot be performed.

If origin is again started from the completion position of origin, ram will once move in the minus direction. Please design a mechanism so that rum can operate in the 10mm or more minus direction from the origin point.

10-5 Program creation

There are the following as indispensable data at the time of creating a program.

1. Contact position with a work
2. Permission Maximum Stroke
3. Permission Maximum Load

These parameters are greatly concerned with the safety of a system. Please pay careful attention and define a numerical value.

Refer to the applicable item of the operation description of CPS SP Configurator for program language specification. We recommend you for the more unfamiliar one to use the program automatic generation function of CPS SP Configurator. If the numerical value is set up according to the guide screen,

a program will be generated automatically.

Please send the created program to a CPS controller.

10-6 Execution of a program

Although execution of a program is usually performed by PI / O operation, it is possible even if it uses the program execution function of CPS SP Configurator. When wiring of PI/O and a control system are incomplete, it is effective as a check means of operation.

We recommend use of the numerical monitor of CPS SP Configurator, or a waveform monitor function to debugging of a program. Please refer to the applicable item of a CPS SP Configurator operation description about those details.

11 Troubleshooting

Alarm is generated in many cases in multiplex, and the contents of a display machine etc. are overwritten by the newest alarm. In order to know the details of alarm, we recommend you to use the alarm history function of CPS SP Configurator.

11-1 The state display by LED

There are four LEDs in the front panel upper part of CPS controller. Among those, two pieces are assigned to STATUS and CODE and display the internal state of CPS controller in the state of these lightings.

LED3		LED4		The state of a controller	Note
STATUS		CODE			
Color	State	Color	State		
	off		off	Power supply off	It may be, when CPU is not operating normally.
	off	Green	Blink	AC off	It is in the state where only the control power supply was switched on.
Green	on		off	READY	It is in the state in which program execution is possible.
Orange	on		off	Under program execution	
—	Blink	—	-	Battery alarm	Blink of STATUS is not based on a color but means battery alarm. Even when LED3 is off, it is compulsorily green and blinks.
Red	on	Green	on	Slight alarm	It is the alarm resulting from I/O operation and timing.
Red	on	Orange	on	Middle alarm	It is alarm to be set up according to CPS SP Configurator.
Red	on	Red	on	Serious alarm	It is the alarm resulting from the environment of a controller, and hardware.

11-2 Alarm code table

An alarm code cannot be known only with a controller. Please use CPS SP Configurator or the below-mentioned option article.

Basic alarm code

Alarm code	Name	Meaning/correspondence
001	The abnormalities in RAM backup	Abnormalities were discovered by the data of the backup domain of SRAM. The domain containing abnormalities is shown by the detailed alarm code. Consumption of a backup battery or the omission of the connector of a backup battery is suspected(CN11). When a backup file exists, restoration can restore easily. (Refer CPS SP_Configurator handling description 7-6-2 backup)
002	The abnormalities in CAL	The output is over tolerance level at the time of the calibration of a load cell. Please check calibration value by manual operation. (Refer CPS SP Configurator handling description 4-3 proofreading) When a tool has been crashed, calibration value may be out of order. In this case, repair is required.
003	The abnormalities in ZERO	The no-load output value of a load cell is over tolerance level. Please check a load cell output by the monitor function. (Refer CPS SP Configurator handling description 4-3 proofreading) When a tool has been crashed, no-load output value may be out of order. In this case, repair is required. Moreover, it may become abnormalities in ZERO if a program is started when load is applied to a tool. In this case, please start a program after removing the cause of load.
006	Program un-registering.	The specified user program does not exist in a controller. Please check that an appointed program number is in a controller.
007	Tool un-registering.	A tool type has not been registered. Please set a suitable tool type as a controller. Consumption of a backup battery or the omission of the connector of a backup battery is suspected(CN11). All itmes of thr setup menu in CPS SP Configurator need to be set up. When a backup file exists, restoration can restore easily. (Refer CPS SP_Configurator handling description 7-6-2 backup)
008	Origin error	Abnormalities occurred during origin and origin was not completed. The following things can be considered as a factor which bars origin, STOP signal is inputted, Excessive load exists. Please remove these causes and perform origin operation again.
009	The abnormalities in SG amplifier	The communication with a tool is unusual. Please check the omission of an encoder cable(CN2), and disconnection.
010	The abnormalities	The types of the tool connected with the tool type set as

	in a tool type	the controller differ. Please set the right tool type as a controller.
011	The abnormalities in EEPROM	Abnormalities were discovered by the contents of EEPROM. Please check the numerical value of each item on the maintenance information screen of CPS SP Configurator. Please consult with a operating window, when there is an unusual numerical value.
013	Basic parameter or gain parameter un-registering.	The parameter which accompanies a tool has not been registered. All itmes of thr setup menu in CPS SP Configurator need to be set up. When a backup file exists, restoration can restore easily. (Refer CPS SP_Configurator handling description 7-6-2 backup)
014	The abnormalities in the contents of Program	The parameter exceeding rating is contained in the program under execution. Please check the contents of a user program. When each table is being referred to with speed, the position, and the load parameter, please check the contents of each table.
016	The abnormalities in a driver	It is the alarm about a motor driver. Please refer to a detailed alarm code.
017	AC power supply is OFF state.	AC power supply is in off state. Please check the state of power supply.
018	The abnormalities in origin	A program was started in the state of un-completing the origin.
019	The abnormalities in a data collection failure	Access for data collection was not made from PC during user program execution. The abnormalities of data collection PC and Ethernet cable are suspected. When you do not perform data collection, please cancel an output setup of this alarm. (Refer CPS SP_Configurator handling description of 7-7-1 PC surveillance)
021	Tool type mismatching error	The tool type of the performed program differs from the tool type set as the controller.
022	Power supply re-injection demand	Since the backup file was restored, a power supply needs to be re-supplied.
023	Backup area partial error	The checksum error occurred in a part of backup domain. It generates rarely by power supply interception under program execution. It does not have influence on operation of a system.
024	The abnormalities in JOG operation signal	When JOG_ENA is turned on, JOG+ or JOG- has already turned on.
025	It was started in AC power supply OFF.	It was going to work the controller in spite of OFF state of AC power supply.
026	Since it is JOG_ENA ON, it cannot start.	It was going to start the program in spite of the state of ON of JOG_ENA.
027	Under operation of JOG or origin	It was going to start the program during JOG operation or origin.

029	Anybus initialization error	It failed in initialization of the card which was equipped to Anybus. Please check the Anybus card.
030	Tool change error	The power supply is not re-switched on after change of a tool type. A power supply is re-switched on.
031	Anybus board internal error	The Anybus board does not return a response to CPU. The abnormalities of the Anybus board are suspected.
032	A collision of PC and PLC	While opening the tool proofreading screen or the tool operation screen of CPS SP Configurator, program start operation was made via I/O. Please close the tool proofreading screen or a tool operation screen of CPS SP Configurator at the time of program execution.
033	The error of Anybus board kind	The kind of board equipped to Anybus is wrong. Please check the kind of Anybus set to the controller, and the kind of actual board.
050	Post Judge file error	There is no file assigned with Post Judge.
051	Post judgment response error	Although the post judgment was used, PC did not answer within regulation time. Please check that PC is in a data collection state. Moreover, about a setup of the response time from PC, please refer CPS SP Configurator handling description 7-7-7 others.
052	SG Amp. data error	Data in load cell amplifire is wrong.
053	Anybus communication error	The communication with the master of a network stopped. The omission of the communication cable or the abnormalities of the master are suspected.
054	Basic/Gain parameter time out error	Time out error occured when updating tool parameters.
097	CAL error 2	Time out error occured when calibrating load cell amplifire.
098	The abnormalities in a battery	Backup battery voltage fell. A battery needs to be exchanged.(CN11)

Detailed alarm code

It is a detailed alarm code in the case of the abnormalities in a driver.

Alarm code	Name	Meaning/correspondence
100	IGBT error.	The abnormalities of a power IC module orexcessive current was detected in the power supply system after rectification. Please leave it during several minutes until a charge lamp puts out the light, after turning off a power supply, and re-switch on only a control power supply after that. When the same error comes out, breakage of a power IC module is suspected. Repair is required. Excessive current is the cause when that

		is not right. The excessive load at the time of high-speed operation is considered as a factor.
102	FPGA error.	They are the abnormalities of a logic IC. Repair is required.
103	Updating timing violation of a basic parameter.	A tool type setup was performed during servo-on. Please do not perform a tool type setup during program execution.
104	Origin isn't finished.	Positioning operation was performed for orogin not to be performed. Please perform origin.
200	The abnormalities in a motor type	Abnormalities were discovered by the contents of a motor table. Please refer to the details of a motor table.
202	Outside of the range-rated current.	Abnormalities were discovered by the contents of a motor table. Please refer to the details of a motor table.
203	Rated current is outside of the range.	Abnormalities were discovered by the contents of a motor table. Please refer to the details of a motor table.
204	Outside of the range-max speed.	Abnormalities were discovered by the contents of a motor table. Please refer to the details of a motor table.
205	Outside of the range-self inductance.	Abnormalities were discovered by the contents of a motor table. Please refer to the details of a motor table.
206	Outside of the range-electro-magnetic coefficient.	Abnormalities were discovered by the contents of a motor table. Please refer to the details of a motor table.
207	Outside of the range-max rated current.	Abnormalities were discovered by the contents of a motor table. Please refer to the details of a motor table.
211	Outside of the range-encorder direction.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
212	Outside of the range-origin direction.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
213	Outside of the range-encorder resolution.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
214	Outside of the range-origin speed.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
215	Outside of the range-creep speed.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
216	Outside of the range-origin sensor logic.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
217	Outside of the range-load cell type.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.

218	Outside of the range-current limit.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
300	Outside of the range-d-Cur P-Gain.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
301	Outside of the range-d-Cur I-Gain.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
302	Outside of the range-q-Cur P-Gain.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
303	Outside of the range-q-Cur I-Gain.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
304	Outside of the range-speed P-Gain.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
305	Outside of the range-speed I-Gain.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
306	Outside of the range-position P-Gain.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
307	Outside of the range-stop speed.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
308	Outside of the range-stop speed ratio.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
309	Outside of the range-deceleration.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
310	Outside of the range-deceleration ratio.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
311	Outside of the range-E-thermal sensitivity.	Abnormalities were discovered by the contents of a tool table. Please refer to the details of a tool table.
400	Outside of the range-control mode.	They are the abnormalities of a control mode parameter. Incorrect operation of a microcomputer is suspected. Repair is required, if, so that it may occur frequently.
401	Over limit-target stroke.	Since there was a possibility of the stroke limit having been exceeded or exceeding, it went into the stop mode.
402	Over limit-target speed.	The speed target value exceeding the limit was set up.
404	Inconsistency of pulus limits.	- side of stroke restriction value was set up more greatly than + side.
408	Outside of the	They are the abnormalities of an acceleration

	range-acceleration mode.	parameter. Incorrect operation of a microcomputer is suspected. Repair is required, if, so that it may occur frequently.
410	Outside of the range-stroke mode.	The parameter in the positioning mode is unusual. Incorrect operation of a microcomputer is suspected. Repair is required, if, so that it may occur frequently.
411	Outside of the range-acceleration time.	The setting value of acceleration time is over the range. Please improve a setup of a tool table or check a tool setup.
501	Over current.	Motor current exceeded restriction value. This will be generated if a big load change happens during high-speed operation. Please change a user program, if, so that this may occur frequently.
505	FAN locked.	The rotation pulse from a cooling fan was disrupted. Please remove the cause, when the fan is locked. A fan's failure is suspected when the fan is not locked.
506	PWM turned on simultaneously.	The upper side and lower side of a power IC control signal of a motor drive turned on simultaneously. Incorrect operation by the strong noise is suspected.
510	Over voltage.	AC power supply voltage is over tolerance level. AC100-230V±10% is a conformity range. Please do not switch on a AC power supply until it checks that AC voltage is a conformity range. When a maximum is exceeded greatly, there is possibility of breakage.
511	Low voltage.	AC power supply voltage is over tolerance level. AC100-230V±10% is a conformity range. Please do not switch on a AC power supply until it checks that AC voltage is a conformity range. If it continues switching on a AC power supply in the state of low voltage, there is a possibility of damaging regeneration resistance by fire.
512	AC power is off.	The drive command was emitted in the state of off of a AC power supply. Please check the supply state of a AC power supply.
513	Charge relay is off.	The charge relay turned off during servo-on. Incorrect operation of a microcomputer is suspected. Repair is required, if, so that this may occur frequently.
514	Charge alarm	An electric charge was not normally charged by the large-sized electrolysis capacitor. Failure of an inrush current deterrence circuit is suspected. Repair is required.
520	Regeneration register over heat.	The cooling fin temperature near regeneration resistance exceeded 70 degrees C. Cooling of a control board or Change of an operation pattern are needed.
521	Over voltage in	DC voltage exceeded marginal value at the time of

	regeneration.	regeneration electric discharge. The regeneration electric power exceeding electric discharge capability occurred or abnormalities of an electric discharge function. When exceeding electric discharge capability, a slowdown ratio is made loose or the resistance of regeneration resistance and capacity need to be looked again. The connector omission of regeneration resistance and disconnection can be considered as an electric discharge function being unusual.
522	Over time of regeneration.	Regeneration electric discharge exceeds fixed time and was performed continuously. Disconnection of regeneration resistance is suspected.
523	No regeneration register.	The thermistor which carries out the temperature surveillance of regeneration resistance is outputting unusual value. Please check attachment of a thermistor.
530	Z phase ditected wrong timing.	The encoder incorrect-counted. Incorrect operation by the abnormalities in an encoder cable and the noise can be considered. Please add filters, such as a ferrite core, to a noise generation source.
531	UVW of encoder alarm.	Disconnection detection of an encoder cable operated. Please check the plug of a connector.
532	ABZ of encoder alarm.	Disconnection detection of an encoder cable operated. Please check the plug of a connector.
533	Resolver alarm.	The signal level of the resolver is falling. A visitor noise is considered to be the cause. Please add filters, such as a ferrite core, to a noise generation source.
536	Z-phase lost	Z phase of the encoder was not detected more than a fixed term. The failure relevant to an encoder cable or an encoder is suspected.
540	Limit over-stroke.	The stroke limit was exceeded. Please move by manual operation after reset at within the limits.
550	Limit over-current in origin mode.	Current restriction value was exceeded at the time of origin. In such a case, the big load at the time of origin should set the concerned part of a tool table as proper value.
551	Limit over-stroke in origin mode.	The stroke range currently assumed by origin sequence was exceeded. The abnormalities of an originsensor is suspected.
553	Communication error-load cell amplifier.	The communication with a tool was disrupted.
600	Electric thermal alarm.	Electronic thermal operated. Please put in the suitable interval for an operation pattern.
601	Electric thermal alarm.(Stall)	Electronic thermal operated. Stall time exceeded the limit.
1001-1031	The abnormalities in a program	Abnormalities were detected in the program number (detailed alarm code -1000).
1101-1131	The abnormalities in	Abnormalities were detected in Judge Table

	Judge Table	number (detailed alarm code -1100).
1201-1231	The abnormalities in Zone Table	Abnormalities were detected in Zone Table number (detailed alarm code -1200).
1301	The abnormalities in Position Table	Abnormalities were detected in Position Table.
1302	The abnormalities in Load Table	Abnormalities were detected in Load Table.
1303	The abnormalities in Speed Table	Abnormalities were detected in Speed Table.
1304	The abnormalities in Home Position Table	Abnormalities were detected in Home Position Table.
1400	The abnormalities in Tool Table	Abnormalities were detected in Home Tool Table.
1601	The abnormalities in Numerical data	Abnormalities were detected in the pointer of Numerical data.
1602	The abnormalities in Numerical data	Abnormalities were detected in Numerical data.
1603	The abnormalities in Waveform data	Abnormalities were detected in the pointer of Normal Waveform data.
1604	The abnormalities in Waveform data	Abnormalities were detected in Normal Waveform data.
1605	The abnormalities in Waveform data	Abnormalities were detected in the pointer of NG Waveform data.
1606	The abnormalities in Waveform data	Abnormalities were detected in NG Waveform data.
1608	The abnormalities in Electric discharge	Abnormalities were detected in Electric discharge data.
1701	The abnormalities in Alarm history	Abnormalities were detected in the pointer of Alarm history.
1702	The abnormalities in Alarm history	Abnormalities were detected in Alarm history.
1801	The abnormalities in Backup time	Abnormalities were detected in Backup time.
1802	The abnormalities in Total running times	Abnormalities were detected in Total running times.
1803	The abnormalities in Total running distance	Abnormalities were detected in Total running distance.
1901-1904	The abnormalities in Others	Abnormalities were detected in Others.
1905	The abnormalities in JOG speed	Abnormalities were detected in JOG speed
1906	The abnormalities in Load/Stroke output interval	Abnormalities were detected in Load/Stroke output interval.
1907	The abnormalities in Others	Abnormalities were detected in Others.
1908	The abnormalities in Load Rate Parameters	Abnormalities were detected in Load Rate Parameters.
2001-2010	The abnormalities in Unused area	Abnormalities were detected in Unused area.

12 Regeneration

The regeneration electric power which occurs by rapid slowdown is changed into heat by regeneration resistance. In CPS SP Configurator, a monitor is possible in the cooling fin temperature of the regeneration resistance attachment position neighborhood. The maximum is 70 degrees C. There are two methods in avoiding the abnormalities in regeneration. The first is the method of lowering regeneration frequency.、The second is the method of using more nearly mass regeneration resistance.

12-1 Lowering regeneration frequency

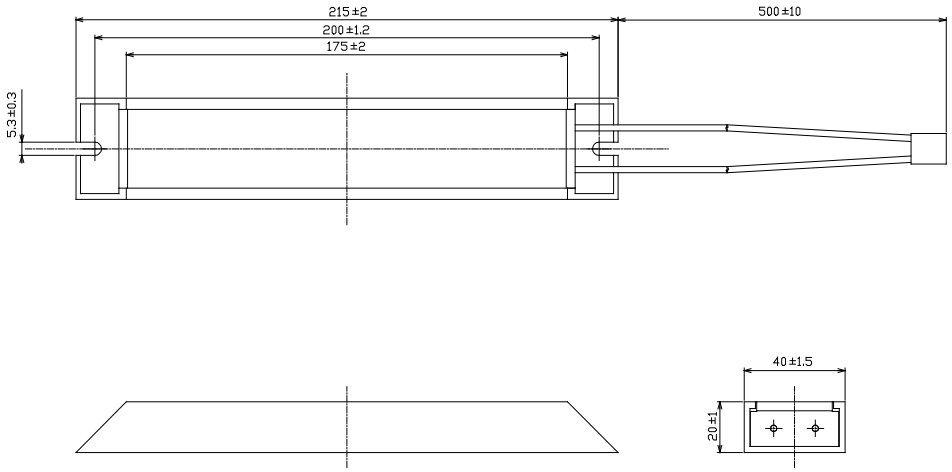
Although there are a method of lengthening slowdown time, and a method of taking long operation pause time in order to lower regeneration frequency ,in all a cycle time becomes long.

12-2 Regeneration option

If more nearly mass regeneration resistance is attached instead of a standard article, the abnormalities in regeneration are avoidable.

When it corresponds to the regeneration of high frequency by the regeneration option, it is necessary to consider the temperature rise in a control board. I ask measure, such as attaching a cooling device so that the temperature in a control board may not exceed 50 degrees C, of you.

Model-name: CWS15C50



12-3 How to attach

DANGER

There is a case where it is charged in several 100v in the connector of

regeneration resistance. Please perform attachment work after checking that CHARGE LED of the front panel upper part has gone out.

How to attach option regeneration resistance in a controller is explained. CN14 at the bottom of a controller is a connector for regeneration resistance. The white harness of standard regeneration resistance is connected in the state of shipment. Please remove it and substitute for the connector of option regeneration resistance. Please keep standard regeneration resistance attached for a controller as it is. Please leave as it is also about the temperature sensor in the standard regeneration resistance upper part.

1 3 Load-Sensor-less System

The load-sensor-less tool is also prepared in this system. The special feature is shown in a comparison table.

Item	load-sensor-less	with load sensor
Load value	It computes from motor current.	Load cell value
Accuracy	±15%@Tool rating	±2%@Tool rating
Renewal cycle of load value	1ms	1ms
At the time of crash	It has no problem to the amount of -proof of a tool and a system.	A load cell carries out plastic modification in about 150% of its rating.
Disconnection	No	It is detected by ZERO and CAL alarm.
Price	Only the part without a load cell is cheap.	Only the part of a load cell is expensive.

Since there are the above special features, please choose the system according to the use.

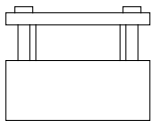
14 Tool Type Discernment

Information, such as a tool type name and load cell proofreading value, is written in CPS type tool. The consideration about the combination of CPS controller and a tool does not have necessity at the time of installation with multi-axis composition. However, it is necessary to set the tool name connected to CPS controller correctly.

１５ Others

15-1 The options of the servo press

The options of the servo press are shown below.

 CPS SP Configurator	**CPS SP Configurator** It is exclusive application software which operates on Windows of IBM compatible machine. Setup of a controller, a maintenance, and editing a user program, data collection, etc. can be performed.
	LED DISPLAY This is two steps of 6 figure display machines by 7 segment LED. It connects with RS-232C port of a controller. Monitors, such as a numerical result, can be done.
	**Electromagnetic brake** It is effective when preventing the slide of the ram at the time of servo off.

１６ Article of Consumption

16-1 Battery

16-1-1 The detection method

The visual check of the abnormalities in a battery can be carried out by blink of LED3 STATUS in the front panel upper part of a controller.

Moreover, since a battery unusual signal is outputted also from a general-purpose output, it is detectable also by PLC.

16-1-2 The exchange method

Although the life of a backup battery is about five years, it varies greatly according to a state of operation and environment of operation. If the abnormalities in a battery occur, please exchange a backup battery quickly. Battery exchange is carried out in the state of power supply ON. If batteries are exchanged in the state of power supply off, a backup circuit will not operate normally but consumption of a battery will progress remarkably.

16-1-3 Management

The exchange date of a backup battery is memorized in a controller by CPS SP Configurator, and a monitor of it is possible. Moreover, calculation of the net backup time is count. Please use it for management of a backup battery.

16-1-4 Clock setup

This controller is equipped with the clock function. In the case of battery exchange, we recommend you to setup of a date and time.

１６-１-５ Model name

CR2023WK13

１６-２ Cooling fan

Although fan maker guarantee value is 50,000 hours, this is a numerical value under clean environment. It is expected under the environment with many coarse particulates that a fan life becomes short sharply. Calculation of a fan's total hours worked is count within a controller. The monitor of that is possible by the maintenance information function of CPS SP Configurator.

17 Maintenance of Tool

About a tool, we recommend you implementation of a periodical maintenance. By CPS controller, the number of times of operation and the total information on the mileage of a ball screw are managed. A monitor is possible for these information by the maintenance information function of CPS SP Configurator. A near maintenance cycle can be obtained from these information and the load situation of a program. Please ask for details the window in your duty.

An overhaul must be carried out at our company and any overhaul carried out by another company falls outside our guaranteed coverage.

If you have any questions on the Servo press, please contact us.

18 Cautions on abandonment

Devices into which electronic equipment is mounted must not be discarded as domestic waste. Please obey the local laws or regulations effective at present for electrical and electronic equipment waste.

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Revision history	