IAI
Quality and Innovation

RCP2-C/CG/CF

First Step Guide Fifth Edition

Thank you for purchasing our product.
Make sure to read the Safety Guide and detailed Instruction Manual as well as this First Step Guide to ensure correct use.
This Instruction Manual is original.

Warning : Read the instruction manual carefully and follow the instruction manual when handling this equipment.
Please downloaded the user's manual from our website.
You can download it free of change. User registration is required for first time users.
URL:www.iai-robot.co.jp/data_dl/CAD_MANUAL/
Keep a printout of the introduction manual near the equipment in which this product is installed so that it can be checked at all times, or display it on your computer, tablet terminal, etc. so that you can check it immediately.
If you need a bound copy of the instruction manual, order it from the nearest sales office listed in the First Step Guide or at the end of the instruction manual. It will be provided for a fee.

Product Check

This product is comprised of the following parts if it is of standard configuration.
If you find any fault in the contained model or any missing parts, contact us or our distributor.

1. Parts (The option is excluded.)

No.	Part Name	Model
1	Controller Main Body	[Refer to "How to read the model plate", "How to read controller model code"]
Accessories		
2	I/O Flat Cable	CB-RAC-PIO*** (*** indicates the cable length.)
3	First Step Guide	ME0252
4	Safety Guide	M0194

2. Teaching Tool

The PC software or teaching pendant is necessary to perform setup operations such as position and parameter settings through teaching or other means.
Prepare either PC software or teaching pendant.

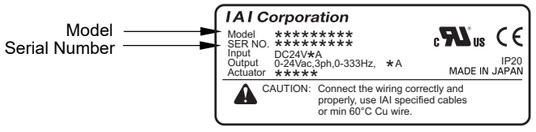
No.	Part Name	Model
1	PC Software	RCM-101-MW
2	PC Software	RCM-101-USB
3	Teaching pendant	CON-T
4	Teaching pendant	CON-T/TG
5	Teaching pendant	RCM-T
6	Teaching pendant (with deadman switch)	RCM-TD
7	Simplified Teaching Pendant	RCM-E
8	Data Setter	RCM-P

* Fixed type touch panel display (RCM-PM-01) which enables data input, change and monitoring is also prepared. Please note only a few parameters can be set on the display.

* Instruction manuals related to this product

No.	Name	Manual No.
1	RCP2-C/CG/CF Controller Instruction Manual	ME0170
2	PC Software RCM-101-MW/RCM-101-USB	ME0155
3	Teaching pendant CON-T/TG	ME0178
4	Teaching pendant RCM-T/TD	ME0173
5	Simplified Teaching Pendant RCM-E	ME0174
6	Data Setter RCM-P	ME0175
7	Touch Panel Indicator RCM-PM-01	ME0182

* How to read the model plate



* How to read controller model code

[RCP2-C/CG]

RCP2-C-SA5-I-PM-0-P-K

<Series>
<Type of Safety Circuit>
C : Built-in Cutoff Relay
CG : External Cutoff Relay
<Actuator Type>
Ball Screw Slider Type: ·SA5 ·SA5R ·SA6 ·SA6R ·SA7 ·SA7R ·SS ·SSR ·SM ·SMR
Rod Type: ·RPA ·RXGD ·RXA ·RMA ·RSA ·RMGS ·RSGS ·RMGD ·RSGD
Gripper Type: ·GRS ·GRM ·GR3SS ·GR3SM ·GR3LS ·GR3LM
Belt Slider Type: ·BA6 ·BA6U ·BA7 ·BA7U
Splash-Proof Rod Type: ·RSW ·RSW
Rotary Type: ·RTB ·RTC
<Encoder Type>
I : Incremental
A : Absolute
<Motor Type>
PM : Pulse Motor
<Power-supply Voltage>
0 : 24VDC
<Input and Output Signal Format>
Blank : NPN (Sink Type)
P : PNP (Source Type)
<Absolute Battery Mounting Bracket>
Blank : No bracket
K : With bracket

[RCP2-CF]

RCP2-CF-RFA-I-PM-0-P

<Series>
<Type of Safety Circuit>
CF : Built-in Cutoff Relay High Output Type
<Actuator Type>
High Speed Ball Screw Type
·HSM
·HSMR
High Thrust Rod Type
·RFA
·RFW
Water-Proof Type
·RCP2W-SA16
<Encoder Type>
I : Incremental
<Motor Type>
PM : Pulse Motor
<Power-supply Voltage>
0 : 24VDC
<Input and Output Signal Format>
Blank : NPN (Sink Type)
P : PNP (Source Type)

Basic Specifications

Characteristics

1) This product is a position controller that enables to position at 16 points for the standard type and 64 points for the maximum. Number of the positioning points depends on the PIO patterns (can be selected from 6 kinds of control method) that is selectable with the parameters.
2) The zone output boarder value can be set for each positioning point.
3) The acceleration and deceleration values can be set separately for each positioning point.
4) The transfer speed in test run adjustment can be controlled to ensure safety.
5) Power saving mode can be selected with a parameter for a use that contains a long time standby.

RCP2-C/CG Specifications

Specification Item		Built-in Cutoff Relay Type	External Cutoff Relay Type
Model		RCP2-C-***(Note 1)	RCP2-CG-***(Note 1)
Number of Controlled Axes		1-axis / Unit	
Power-supply Voltage		24VDC±10%	
Power Current		Max. 2A	
Rush Current		8A	
Control Method		Weak field-magnet vector control	
Encoder Resolution		800Pulse / rev (quad edge evaluation)	
Positioning Command		Position number indication	
Number of Positions		Standard 16 points, Max. 64 points	
Backup Memory		Save position number data and parameters to non-volatile memory Serial EEPROM 100,000 times rewritable	
PIO		Dedicated 10-point input / 10-point output selectable from 6 patterns	
LED Indication		RDY (GN) · RUN (GN) · ALM (RD)	
Communication		RS485 1ch (terminated externally)	
Electromagnetic Brake Compulsory Release		Toggle switch on front side of housing	
Cable Length		Actuator Cable : 20m or less	
		PIO Cable : 5m or less	
Insulation Strength		500VDC 10MΩ	
Environment	Surrounding air temperature	0 to 40°C	
	Surrounding humidity	85%RH or less (non-condensing)	
	Surrounding environment	[Refer to Installation Environment section]	
	Surrounding storage temperature	-10 to 65°C	
	Surrounding storage humidity	90%RH or less (non-condensing)	
	Vibration resistance	XYZ Each direction 10 to 57Hz Pulsating amplitude 0.035mm (continuous) 0.075mm (intermittent)	
Cooling Method		Natural air-cooling	
Protection Class		IP20	
Weight		300g or less	
External Dimensions		35 W × 178.5H × 68.1Dmm	

Note 1 *** indicates the actuator type.

Note : Position data and parameters are written to EEPROM.
The limitation for the reload is about 100,000 times. Take the greatest care.

RCP2-CF Specifications

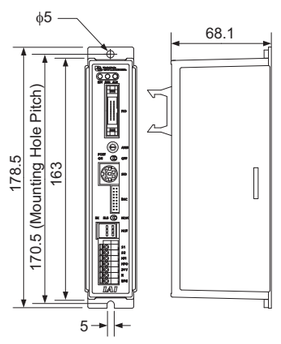
Specification Item		Built-in Cutoff Relay Type
Model		RCP2-CF-***(Note 2)
Number of Controlled Axes		1-axis / Unit
Power-supply Voltage		24VDC±10%
Power Current		Max. 6A
Rush Current		8A
Control Method		Weak field-magnet vector control
Encoder Resolution		800Pulse / rev (quad edge evaluation)
Positioning Command		Position number indication
Number of Positions		Standard 16 points, Max. 64 points
Backup Memory		Save position number data and parameters to non-volatile memory Serial EEPROM 100,000 times rewritable
PIO		Dedicated 10-point input / 10-point output selectable from 6 patterns
LED Indication		RDY (GN) · RUN (GN) · ALM (RD)
Communication		RS485 1ch (terminated externally)
Electromagnetic Brake Compulsory Release		Toggle switch on front side of housing
Cable Length		Actuator Cable : 20m or less
		PIO Cable : 5m or less
Insulation Strength		500VDC 10MΩ
Environment	Surrounding air temperature	0 to 40°C
	Surrounding humidity	85%RH or less (non-condensing)
	Surrounding environment	[Refer to Installation Environment section]
	Surrounding storage temperature	-10 to 65°C
	Surrounding storage humidity	90%RH or less (non-condensing)
	Vibration resistance	XYZ Each direction 10 to 57Hz Pulsating amplitude 0.035mm (continuous) 0.075mm (intermittent)
Cooling Method		Forced air-cooling
Protection Class		IP20
Weight		300g or less
External Dimensions		35 W × 180H × 71.6Dmm

Note 2 *** indicates the actuator type.

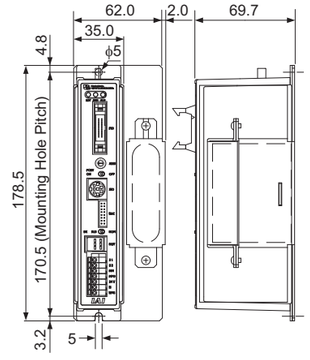
Note : Position data and parameters are written to EEPROM.
The limitation for the reload is about 100,000 times. Take the greatest care.

External Dimensions

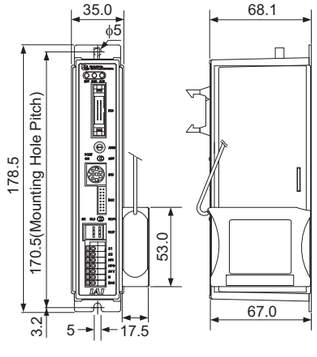
[RCP2-C/CG Standard Type]



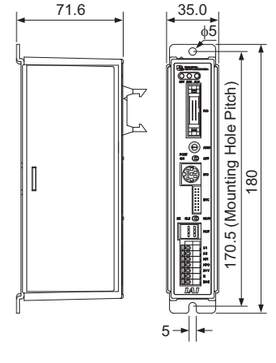
[RCP2-C/CG Absolute Specifications (with Battery Mounting Bracket)]



[RCP2-C/CG Absolute Specifications (with No Battery Mounting Bracket)]



[RCP2-CF]



Installation Environment

This product is capable for use in the environment of pollution degree 2 *1 or equivalent.

*1 Pollution Degree 2: Environment that may cause non-conductive pollution or transient conductive pollution by frost (IEC60664-1)

Do not use this product in the following environment

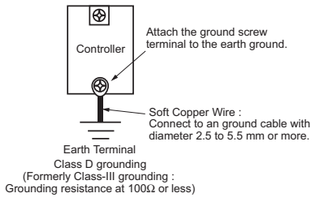
- Location where the surrounding air temperature exceeds the range of 0 to 40℃
- Location where condensation occurs due to abrupt temperature changes
- Location where relative humidity exceeds 85%RH
- Location exposed to corrosive gases or combustible gases
- Location exposed to significant amount of dust, salt or iron powder
- Location subject to direct vibration or impact
- Location exposed to direct sunlight
- Location where the product may come in contact with water, oil or chemical droplets

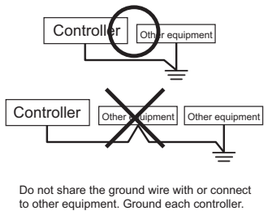
When using the product in any of the locations specified below, provide a sufficient shield.

- Location subject to electrostatic noise
- Location where high electrical or magnetic field is present
- Location with the mains or power lines passing nearby

Installation and Noise Elimination

1. Noise Elimination Grounding

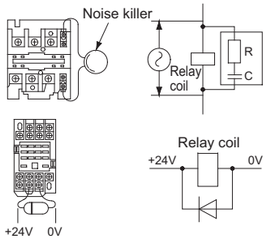




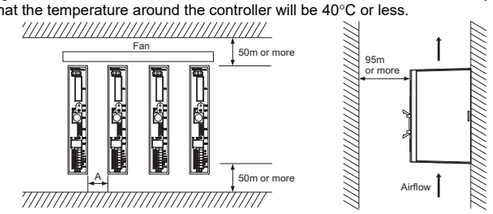
Do not share the ground wire with or connect to other equipment. Ground each controller.

2. Precautions regarding wiring method
   (1) Twist the wires for the 24VDC power unit.
   (2) Separate signal lines and encoder cables from high-power lines such as the power wire.

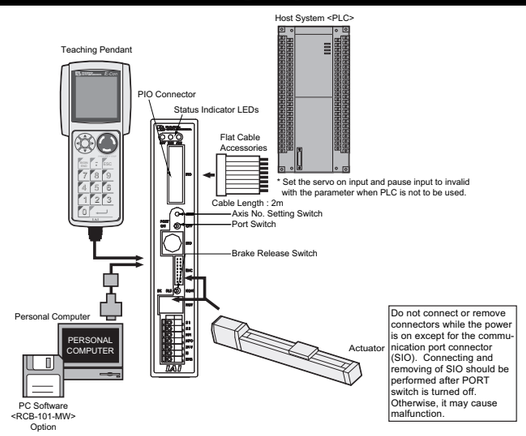
3. Noise Sources and Elimination
   Carry out noise elimination measures for power devices on the same power path and in the same equipment.
   The following are examples of measures to eliminate noise sources.
   (1) AC solenoid valves, magnet switches and relays
   [Measure] Install a surge absorber parallel with the coil.
   (2) DC solenoid valves, magnet switches and relays
   [Measure] Install a diode parallel with the coil. Use a DC relay with a built-in diode.



4. Heat Radiation and Installation
   Conduct design and manufacture in consideration of the control box size, controller layout and cooling in such a way that the temperature around the controller will be 40°C or less.



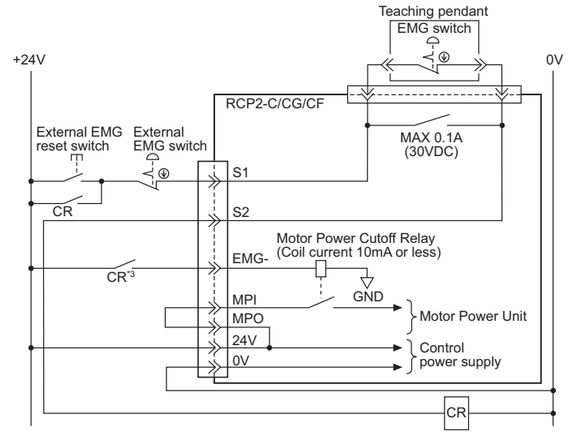
Wiring Layout



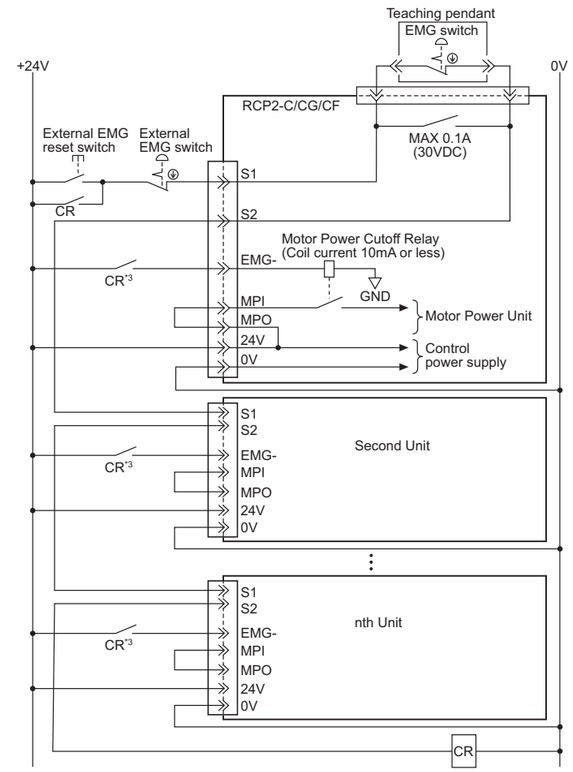
Power Supply and Emergency Stop Circuit (Example)

Following diagrams are an example of the circuits when the emergency stop switch on the teaching pendant is utilized in the emergency stop circuit that you may construct.

- Drive Cutoff Relay Built-in Type : RCP2-C/CG/CF
  - For the case one controller is used



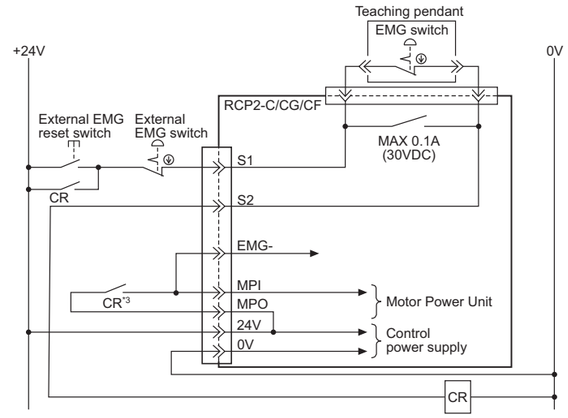
  - For the case multiple controllers are used



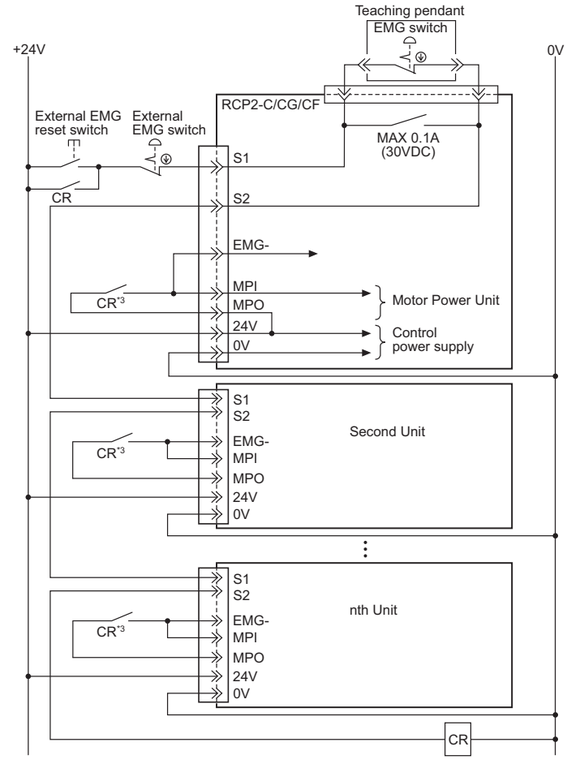
*1 When cutting off the motor driving power supply which is equivalent to the Safety Category 2, connect 24V to EMG terminal, and connect a contactor contact point to MPI/MPO terminal like the external-equipped type driving system cutoff relay.
*2 Connect the teaching pendant to the controller, and the controller automatically confirms the connection.
*3 Apply 24V DC, 0.1A or more for the CR contact ratings.

⚠ Note : The circuit diagrams above are an example of an emergency stop method that utilizes the emergency stop switch.
Make sure to construct the optimized circuit that follows the specification of the emergency stop of the whole system.

- Drive Cutoff Relay Externally Mounted Type : PCP2-C/CG/CF
  - For the case one controller is used



  - For the case multiple controllers are used



*1 When cutting off the motor driving power supply which is equivalent to the Safety Category 2, connect 24V to EMG terminal, and connect a contactor contact point to MPI/MPO terminal.
*2 Connect the teaching pendant to the controller, and the controller automatically confirms the connection.
*3 Select the CR contact ratings from the motor power capacity.

⚠ Note : The circuit diagrams above are an example of an emergency stop method that utilizes the emergency stop switch.
Make sure to construct the optimized circuit that follows the specification of the emergency stop of the whole system.

I/O signals (PIO Type)

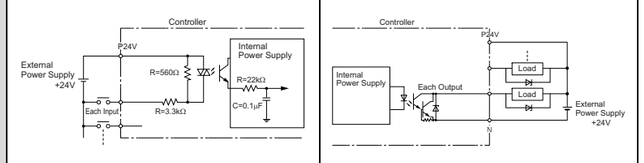
Function description for I/O Signals

Category	Signal Abbreviation	Signal Name	Summery of Functions
Input	CSTR	Start	Start moving with rising edge
	PC1 to PC32	Command Position Number	Input of the position number to move
	∗STP	∗Pause	OFF to pause (decelerate and stop), ON to reboot
	ST0	Move to Backward Position	Start moving to the backward position with this signal ON for 4-point type Signal input can be selected from edge and level (initial setting) with the parameter
	ST1	Move to Forward Position	Start moving to the forward position with this signal ON for 4-point type Signal input can be selected from edge and level (initial setting) with the parameter
	ST2	Move to Intermediate Position 1	Start moving to the intermediate position 1 with this signal ON for 4-point type Signal input can be selected from edge and level (initial setting) with the parameter
	ST3	Move to Intermediate Position 2	Start moving to the intermediate position 2 with this signal ON for 4-point type Signal input can be selected from edge and level (initial setting) with the parameter
	HOME	Home return	Start home-return operation with rising edge
	MODE	Operation Mode	Mode select (ON : Teaching Mode, OFF : Normal Mode)
	PWRT	Current Position Write	Current position is written to the position number selected from PC1 to PC8 after ON status being continued for more than 20msec
	JOG+	+ Jog Move to Positive Direction	Move in positive direction while it is on.
	JOG-	- Jog Move to Positive Direction	Move in negative direction while it is on.
	SON	Servo On	The servo remains ON while this signal is ON OFF while this signal is OFF
	RES	Alarm Reset	Alarm reset with rising edge
Output	PM1 to PM32	Completion Position No.	Output position number when positioning complete Turns off when next movement started Used to check completion of positioning on PLC side
	MOVE	While in Operation	Turns on while in move, turns off in stop condition Turns off also when stopped by mis-pressing in pressing operation and a pause
	PEND	Position Completion	Turns on within positioning band in the movement to target position Turns on when pressing operation complete
	HEND	Home Return Completion	OFF when turning the power on, ON after home-return operation complete For absolute type, it is ON until the home position is erased by an alarm, etc. once the home return is complete.
	MODES	Current Operation Mode	ON while in teaching selection with MODE signal, OFF in normal condition
	WEND	Writing Complete	Turns on when complete writing position data with the current position writing command (PWRT)
	ZONE1 ZONE2	Zone	Output when the current position of the actuator is in the range set with the parameter after home-return operation complete Used as a replacement for LS at intermediate point and a rough measurement for pressing operation
	PE0	Backward Position Complete	Turns on when complete moving to backward position for 4-point type
	PE1	Forward Position Complete	Turns on when complete moving to forward position for 4-point type
	PE2	Intermediate Position 1 Complete	Turns on when complete moving to intermediate position 1 for 4-point type
	PE2	Intermediate Position 2 Complete	Turns on when complete moving to intermediate position 2 for 4-point type
	SRDY	Operation Ready	Output when servo is on and ready for operation Synchronized to LED “RUN” on the front of the external housing
	∗ALM	∗Alarm	ON in normal condition, OFF when alarm is generated
	∗EMGS	∗Emergency Stop	Valid for RCP2-C/CF ON: in normal condition, OFF: in emergency stop

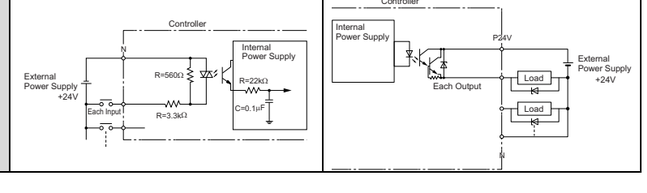
I/O signals

	Input section		Output section	
Specification	Input voltage	24VDC±10%	Load voltage	24VDC
	Input current	7mA / 1 circuit	Peak load electric current	20mA / 1 point
	ON/OFF voltage	ON voltage : MIN. 18VDC OFF : MAX. 6VDC	Residual Voltage	2V or less
	Leakage Current	MAX. 1mA / 1 point		

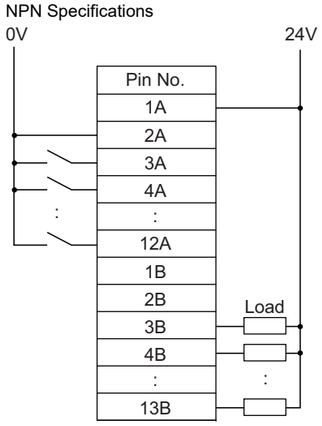
NPN



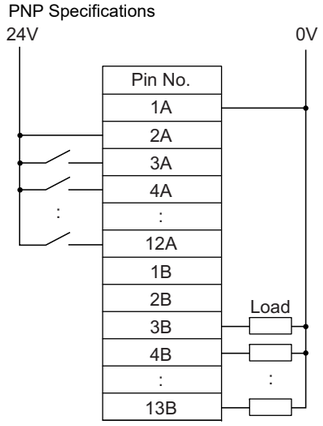
PNP



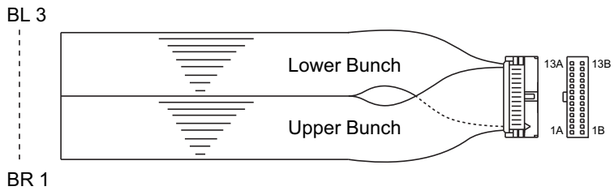
NPN Specifications



PNP Specifications



I/O Flat cable



I/O signals

Pin No.	Category	Cable Color	Setting of Parameter No. 25 (PIO Pattern selection) 0 Normal Type	1 Standard Type	2 Number of Positioning Points	3 Zone Output	4 Teaching Type	5 4-Point Type
1A	+24V	Upper Bunch BR-1	P24					
2A	0V	RD-1	N					
3A	Input	OR-1	CSTR	PC1	PC1	PC1	PC1	ST0
4A		YW-1	PC1	PC2	PC2	PC2	PC2	ST1
5A		GN-1	PC2	PC4	PC4	PC4	PC4	ST2
6A		BL-1	PC4	PC8	PC8	PC8	PC8	ST3
7A		PL-1	PC8	–	PC16	–	MODE	–
8A		GY-1	–	∗STP	PC32	∗STP	∗STP/JOG+	∗STP
9A		WT-1	–	CSTR	CSTR	CSTR	CSTR/PWRT	–
10A		BK-1	∗STP	HOME	HOME	HOME	HOME	–
11A		BR-2	–	SON	∗STP	SON	SON	–
12A		RD-2	–	RES	RES	RES	RES/JOG–	RES
13A		OR-2	(Not used)					
1B		Lower Bunch YW-2	(Not used)					
2B		GN-2	(Not used)					
3B	Output	BL-2	PM1	PM1	PM1	PM1	PM1	PE0
4B		PL-2	PM2	PM2	PM2	PM2	PM2	PE1
5B		GY-2	PM4	PM4	PM4	PM4	PM4	PE2
6B		WT-2	PM8	PM8	PM8	PM8	PM8	PE3
7B		BK-2	PEND	ZONE1	PM16	ZONE1	MODES	ZONE1
8B		BR-3	HEND	MOVE	PM32	ZONE2	MOVE	–
9B		RD-3	ZONE1	PEND	PEND	PEND	PEND/WEND	PEND
10B		OR-3	∗ALM	HEND	HEND	HEND	HEND	HEND
11B		YW-3	∗EMGS					
12B		GN-3	–	SRDY	MOVE	SRDY	SRDY	–
13B		BL-3	–	∗ALM	∗ALM	∗ALM	∗ALM	∗ALM

⚠Note : (1) “∗” in codes above shows the signal of the active low.
(2) Do not connect the pins that are not in use (13A, 1B and 2B).
(3) The power supply lines for NPN type and PNP type are in common. It is not necessary to turn around the power supply line even for PNP.
(4) *EMGS (emergency stop) that is allocated to the pin number 11B is valid for RCP2-C/CF.

Starting Procedures

When using this product for the first time, make sure to avoid mistakes and incorrect wiring by referring to the procedure below.
* Please refer to “RCP2 Series ROBO Cylinder Instruction Manual” for details of each section.

Check of Packed Items
Are there all the delivered items?
No→ Contact the sales shop.

↓ Yes

Installation and Wiring
Install and wire the actuator and the controller following the instructions described in the Instruction Manual and this guide.
→ Point Check Item
• Is frame ground (FG) connected?
• Has the noise countermeasure been taken?

↓ Yes

For Absolute Type
Connect the battery to the battery connector on the top side of the controller.

↓

Power Supply and Alarm Check
Connect a teaching tool such as PC and turn on the port switch to supply power to the controller.
→ Check Item
Is “ALM” in LED display on the front side of the panel off?
No→ Connect the PC or teaching pendant and check the content of the alarm to have the right treatment.
For absolute type, an error code “EE” Absolute Encoder Error (2) occurs in the first power-on after wiring. Conduct the alarm reset.

↓ Yes

Servo ON
Turn ON the servo motor with the personal computer or teaching pendant operation.
→ Check Item
Is the status display LED “RUN” turned on in green?
No→ If an alarm is generated, connect the PC or teaching pendant and check the content of the alarm to have the right treatment.

⚠Note
The actuator may get slightly dropped by self-weight if servo on and off is repeatedly performed at the same position. Be careful not to pinch the hand or damage the work.

↓ Yes

Check of Safety Circuit
Check that the emergency stop circuit (or motor drive-power cutoff circuit) operates normally to turn off the servo.
No→ Check the emergency stop circuit.

↓ Yes

Absolute Reset (for absolute type)
Turn the servo on again and perform the home-return operation.
Absolute reset can be done by performing the home-return operation.
Once the home return is completed, home position gets established and memorized in the position data.

↓

Establishing the Target Position
Set the target position to the “Position” box on each position table.
Have a home-return operation first when the Direct Teach is performed.
When moving the actuator manually, set the Brake Release Switch to BK RLS side for the brake equipped type before the Direct Teach is performed.

⚠Note
To ensure safety, it is recommended that safety speed be enabled during initial movements.

↓

Test Run Adjustment
(1) Make the safety speed invalid with using the PC software or the teaching pendant and conduct an operation check.
(2) Select “Monitor Mode 2 Safety Speed Invalid / Permit PIO Start” in MANU Operation Mode, then detach the PC or teaching pendant from the controller.
(3) Set Mode Switch to AUTO side.
No→ If a vibration or an abnormal noise is occurred, check if there is a problem in the way to mount the actuator, or the condition of the actuator use is below the rated values.

↓ Yes

Set-up for operation is completed. Perform the system operation adjustment.

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Manual No.: ME0252-5A