

# RCP6S with Built-in Controller

Built-in controller for RCP6S

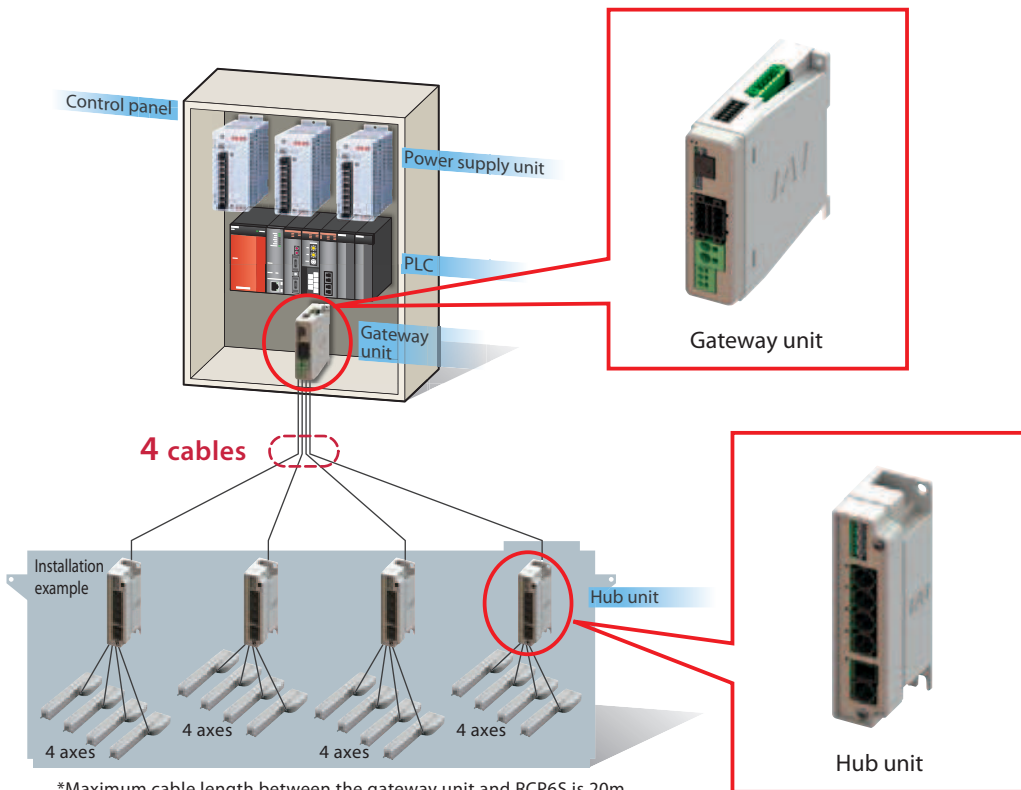
## Features

By using the gateway unit, a maximum of 16 axes\* of RCP6S (relayed through a hub unit) can be operated via a field network with less wiring.

Hub unit allows us to keep the cable connected to the actuator of each axis short, and motor power supply and control signal lines can be connected as one cable between the hub unit and the RCP6S.

\*The number of connectable axes will vary depending on the type of field network and its mode. Please refer to P. 149 for more information.

### Control Panel for the RCP6S Built-in Controller Actuator



\*Maximum cable length between the gateway unit and RCP6S is 20m.  
If there is a hub unit in between, the maximum length is still 20m.  
The cable length from the gateway unit to the hub unit needs to be 10m or less.

### RCP6S Peripheral Equipment

Gateway unit is required in order to operate RCP6S.

- Gateway unit: This unit is used in order to connect RCP6S to the field network. See P. 149
- Hub unit: This unit can expand the number of axes connected to the gateway unit. See P. 152
- PLC connection unit: This unit is used to connect RCP6S directly to the PLC using Modbus serial communication. See P. 153

## Basic Controller Specification List

Specification		Specification Description	
Number of controlled axes		1 axis	
Power supply voltage		24VDC±10%	
Control power capacity		0.3A (Built-in controller only)	
Load current (including control-side current consumption)	Motor type	28P, 35P, 42P, 56P	3.2A max.
		56SP, 60P	5.7A max.
Electromagnetic brake power (for actuator with brake)		24VDC±10% 0.15A (Note) For releasing brake, 0.7A for 0.2 sec is required.	
Heat output		5W (Motor type 28P, 35P, 42P, 56P) 19.2W (Motor type 56SP, 60P)	
Inrush current (Note 1)	Motor type	28P, 35P, 42P, 56P	8.3A (With inrush current protection circuitry)
		56SP, 60P	10A (With inrush current protection circuitry)
Motor control method		Weak field vector control	
Compatible encoder		Resolution of battery-less absolute encoder: 8192 pulses/rev	
Actuator cable length		20m max.	
Serial communication interface (SIO port)		RS485: 1CH (Modbus protocol RTU/ASCII compliant) Speed: 9.6~230.4Kbps 1CH (Modbus protocol RTU)	
External interface		Field bus connection: DeviceNet, CC-Link, PROFIBUS-DP, EtherCAT, EtherNet/IP, PROFINET-IO. (Note) Additional gateway unit connection is required.	
Data setting, input method		PC compatible software, touch panel teaching pendant	
Data retention memory		Position data and parameters are saved in non-volatile memory. (No limit to rewrite)	
LED display		SV (green) / ALM (red): Servo ON / Alarm triggered and emergency stop	
Insulation resistance		Not less than 10MΩ at 500VDC	
Electric shock protection mechanism		Class I basic insulation	
Cooling method		Natural air cooling	

Note1: Inrush current will flow for approximately 5msec after the power is turned on (at 40°C).

Inrush current value differs depending on the impedance on the power supply line.

### <The Calculation of Number of Connectable Axes and Power Capacity>

To calculate the number of axes connectable to one gateway unit and the current amperage of 24VDC, figure out (1) to (5) below and follow (6).

(1) The Calculation of Number of Connectable Axes, and Motor Current Consumption

Condition 1: Sum of motor current consumption connectable to one hub unit: 12.8A or less

Condition 2: Number of controlled axes connectable to corresponding 1 unit: 4 axes or less

\* By adjusting the number of connected axes or motor type, select the connected axes so each hub unit satisfies the formulas below.

● Sum of motor current consumption for hub unit = Motor current consumption of 1st axis + Motor current consumption of 2nd axis (if connected)  
+ Motor current consumption of 3rd axis (if connected)  
+ Motor current consumption of 4th axis (if connected) ≤ 12.8A.....①

● Sum of motor current consumption = Motor current consumption of hub unit 1st unit  
+ Motor current consumption of 2nd hub unit (if connected)  
+ Motor current consumption of 3rd hub unit (if connected)  
+ Motor current consumption of 4th hub unit (if connected) .....②

(2) Control Power Current Consumption: 0.3A × Number of actuator + 0.6A (gateway unit) + 0.3A × Number of hub unit .....③

(3) Consumption current when excited phase detected: The maximum current value of the total motor consumption current when servos are turned on at the same time ..... ④

(4) Inrush Current: 8.3A (Motor type 28P, 35P, 42P, 56P) 10A (Motor type 56SP, 60P) .....⑤

(5) Current Consumption of Brake Release: Number of actuators with brake × 0.7A .....⑥

\* When servo is on, it should be 0.5sec or less, after that retaining of released status should be 0.1A / axis.

(6) Selection of Power Supply:

Usually, the rated current is to be approximately 1.2 times higher than the total of Control Power ② + ③ + ⑥ above considering approximately 20% of margin to the load current.

However, although it is for a short time, current of ④ and ⑤ will flow, so please take this into account and select a "peak load support" specification or select a power supply that has sufficient headroom. Avoid having all of the current from ④ and ⑤ from flowing at the same time by turning the servos on at different times from each other (Note 1).

If a power supply with insufficient headroom is selected, voltage may drop instantaneously. Be careful especially when selecting a power source equipped with remote sensing.

Note 1: The timing to turn the servo on can be tuned in Parameter No. 165 [Latency after Shutdown Release].

(Note) Ensure motor and control power supplies reference the same potential when using multiple power supplies.

# Gateway Unit (RCM-P6GW)

## Features:

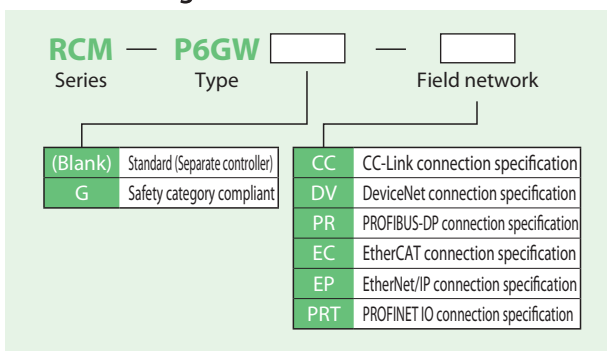
This unit is used in order to connect RCP6S to the field network.

Details:

- Compatible with many field networks.  
(Applicable networks: CC-Link, DeviceNet, PROFIBUS-DP, EtherCAT, EtherNet/IP, PROFINET-IO)
- Motor power and control power for all of the connected axes can be supplied through the gateway unit.
- Monitoring during AUTO is possible.
- A mini-USB connection comes standard.
- Each channel has MPO/MPI for drive source cutoff.
- Brake can be forcibly released by supplying power to the brake release input terminal for each channel. (In the case that the actuator is directly connected)
- When RCP6S is directly connected to the gateway unit, the communication time is 10msec. When RCP6S is connected to the gateway unit through the hub unit, the communication time is 40msec. The communication time does not become longer even if the connected axes increase.



## Model Configuration

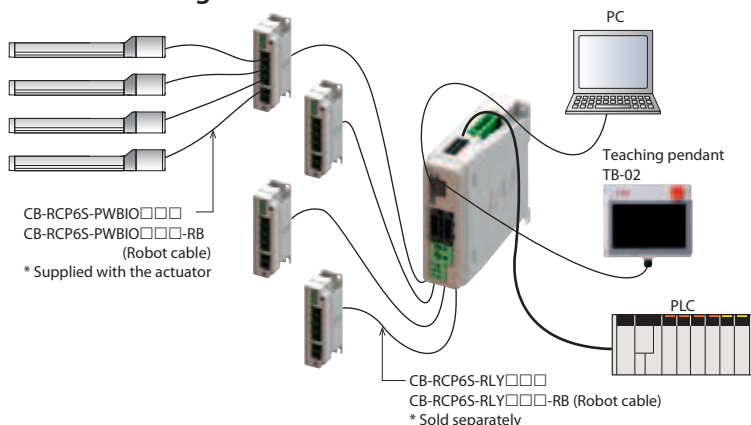


## Available Models

Models
CC-Link specification
DeviceNet specification
PROFIBUS specification
EtherCAT specification
EtherNet/IP specification
PROFINET IO specification
Safety category CC-Link specification
Safety category DeviceNet specification
Safety category PROFIBUS-DP specification
Safety category EtherCAT specification
Safety category EtherNet/IP specification
Safety category PROFINET IO specification

\*For safety category compliant specification, DP-5 will be included.

## Connection Image



Up to 16 axes<sup>(\*)</sup> of RCP6S can be connected per gateway unit with hub units.<sup>(\*\*)</sup>  
 Because both the motor power and control power for all the axes connected to the gateway unit can be supplied together, the required wiring for RCP6S can be connected as one cable between the hub and RCP6S.

Also RCP6S can be directly connected to the gateway unit.  
 (\*1) Number of connectable axes varies depending on the type of the field network. Please see "Number of connectable axes" table for details.  
 (\*2) Hub unit: Refer to P. 152 for the details.

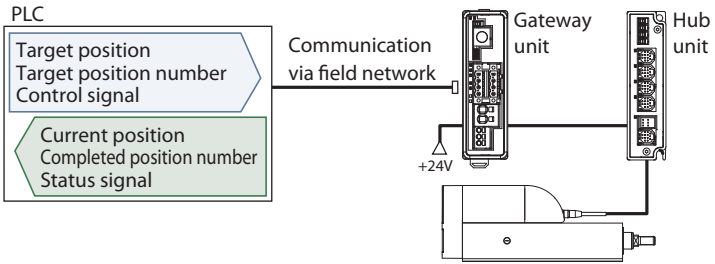
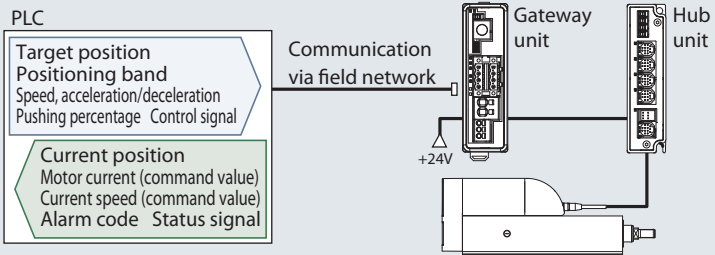
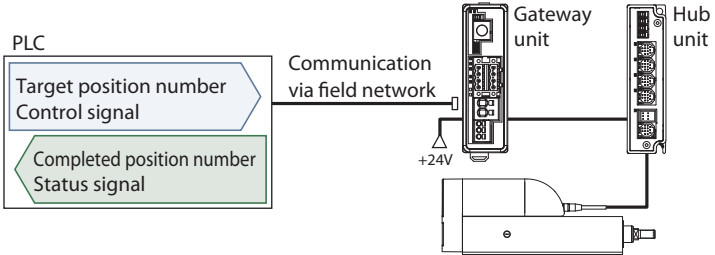
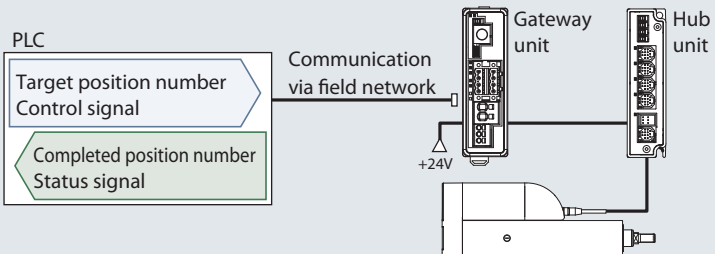
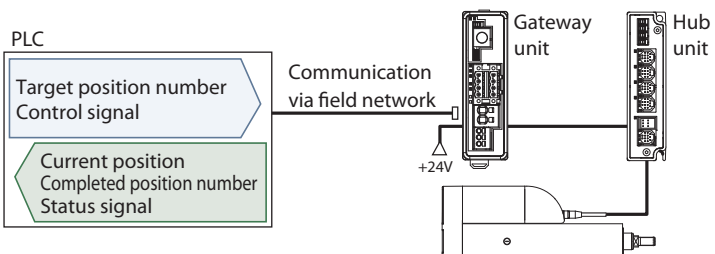
## The Number of Connectable Axes:

Maximum connectable axes for RCP6GW are as shown below.

	Direct value mode	Simple direct value mode	Positioner 1	Positioner 2	Positioner 3	Positioner 5
CC-Link	16	16	16	16	16	16
DeviceNet	8	16	16	16	16	16
PROFIBUS	8	16	16	16	16	16
EtherCAT	8	16	16	16	16	16
EtherNet/IP	8	16	16	16	16	16
PROFINET IO	8	16	16	16	16	16

Field Network Control Operation Mode

These control modes are available to choose from when using the RCP6S via field network. Data required for operation (target position, speed, acceleration, push current value, etc.) are written by a PLC or other host controller into the specified addresses.

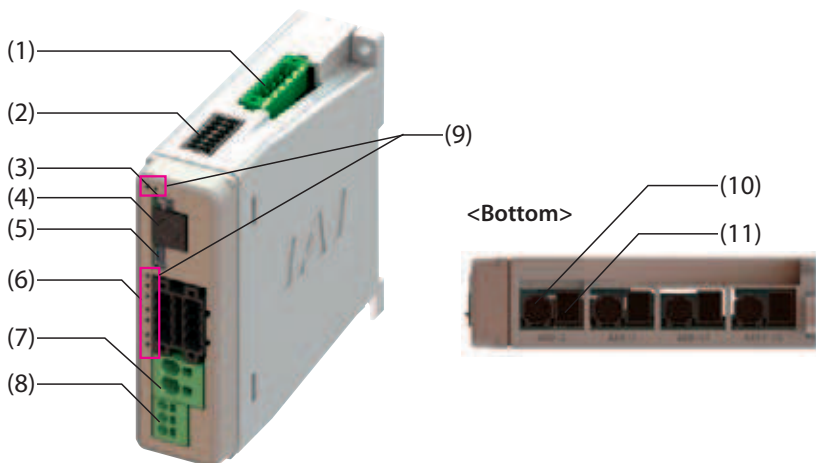
Operation mode	Description	Overview
<p><b>Positioner 1/ Simple direct numerical value mode (Simple direct mode)</b></p>	<p>Positioner 1 mode can store up to 256 points of position data, and can move to the stored position. Both modes allow monitoring the current position numerically with 0.01mm increments. The simple direct numerical value mode can modify any of the stored target positions by numerical value. Both modes allow monitoring the current position numerically with 0.01mm increments.</p>	
<p><b>Direct numerical control mode (Direct indication/ Full mode)</b></p>	<p>This mode allows designating the target position, speed, acceleration/deceleration, and motor current percentage for pushing numerically. Also, it is capable of monitoring the current position, current speed, and the motor current command value with 0.01mm increments.</p>	
<p><b>Positioner 2 mode</b></p>	<p>Positioner 2 mode can store up to 256 points of position data, and can move to the stored position. This mode does not allow monitoring of the current position. This is a mode that has less in/out data transfer volume than the Positioner 1 mode.</p>	
<p><b>Positioner 3 mode</b></p>	<p>Positioner 3 mode can store up to 256 points of position data, and can move to the stored position. This mode does not allow monitoring of the current position. This is a mode that has less in/out data transfer volume than the Positioner 2 mode, and operates with a minimum number of signals.</p>	
<p><b>Positioner 5 mode</b></p>	<p>Positioner 5 mode can store up to 16 points of position data, and can move to the stored position. This is a mode that has less in/out data transfer volume than the Positioner 2 mode, and allows monitoring the current position numerically with 0.01mm increments.</p>	

List of Functions by Operation Mode

	Simple direct value mode	Positioner 1 mode	Direct numerical control mode (Direct indication/Full mode)	Positioner 2 mode	Positioner 3 mode	Positioner 5 mode
Number of positioning points	256 points	256 points	Unlimited	256 points	256 points	16 points
Home return operation	○	○	○	○	○	○
Positioning operation	○	△	○	△	△	△
Speed, acceleration/deceleration settings	△	△	○	△	△	△
Different acceleration and deceleration settings	△	△	—	△	△	△
Pitch Feed (Incremental)	△	△	○	△	—	△
Push-motion operation	△	△	○	△	△	△
Speed changes while moving	△	△	○	△	△	△
Pausing	○	○	○	○	○	○
Zone signal output	△	△	△	△	△	△
Position zone signal output	△	△	—	△	—	—
Current position reading (Resolution)	○ (0.01mm)	○ (0.01mm)	○ (0.01mm)	—	—	○ (0.1mm)

\* ○ indicates that direct setting is possible, △ indicates position data or parameter input is required, — indicates the operation is not supported.

Names and Functions of Each Part

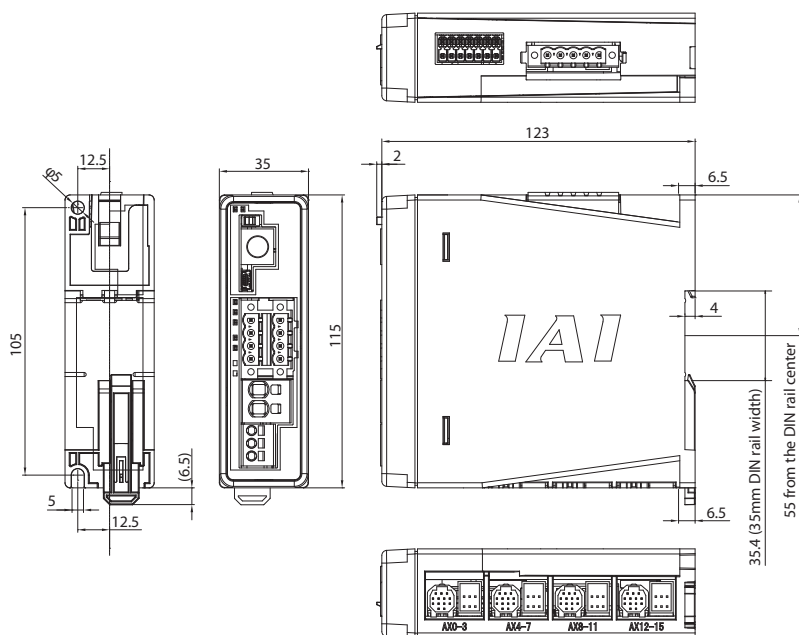


- (1) Field network connector  
The connector used to connect to the field network.
- (2) System I/O connector  
The connector for emergency stop input, external AUTO/MANU switchover input, and brake release input in case of directly connecting RCP6S to a gateway unit.
- (3) Operation mode setting switch  
For switching the operation mode between automatic (AUTO) and manual (MANU).
- (4) SIO connector  
The connector used to connect a teaching pendant or PC software.
- (5) USB connector  
The connector used to connect the PC software.
- (6) Drive power cut-off connector  
The connector used to connect an external drive power cut-off relay to the 24VDC power supply from the motor power connector.
- (7) Motor power supply connector  
For 24VDC motor power supply for a gateway unit.
- (8) Control power supply connector  
The connector for the gateway unit 24VDC control power supply and the frame ground (FG).
- (9) Status display LED  
Displays the status of the gateway unit.

Code	LED	Display color and operating status.
LED1	SYS	System status Ready (Green) Alarm (Red)
LED2	AUTO	Operation mode (AUTO/MANU) status Automatic operation mode (Green)
LED3	EMG	Emergency stop (EMG) status Emergency stop (EMG)(Red)
LED4	T. ERR	Bus communication error in the controller T.ERR (Orange)
LED5	C. ERR	Field bus network communication error C.ERR (Orange)

- (10) Axis control connector  
The connector used to supply power and control signals (24VDC control power, 24VDC motor power, communication line, brake release signal, emergency stop status, etc.) from the gateway unit to the hub unit or RCP6S.
- (11) Axis power supply connector  
The connector used to supply 24VDC motor power via gateway unit to either a RCP6S or a hub unit.

External Dimensions



## Gateway Unit Basic Specifications

Specification	Description
Number of controlled axes	16 axes max. (4 axes with a single gateway unit)
Power supply voltage	24VDC±10%
Control power capacity	0.6A (0.3A with a single gateway unit + field bus module 0.3A)
Motor power capacity	External 24V power supply Consumption current 56.6A (40A effective)*
Cooling method	Natural air cooling
Emergency stop input	B contact input
Enable input	None
T.P. enable input	Yes
Enable operation	Servo OFF
Backup memory	FRAM (256kbit), No. of overwrites: Unlimited
Calendar function	Yes (retains data for 10 days after power off)
Gateway board LED display	SYS LED × 1 (RUN/ALM), EMG LED × 1, MODE LED × 1 (AUTO/MANU), T.ERR LED × 1, C.ERR LED × 1 Field bus module status LED × 2
Tool connection	T/P connector: RS485 1ch (Modbus protocol compliant) USB connector: USB 1ch
Electromagnetic braking forced release mechanism	System I/O connector: External brake release signal input (24VDC) *Only used when an RCP6S unit is directly connected to the gateway unit. Disabled when a hub is connected.
Electric shock protection mechanism	Class 1, basic insulation
Insulation withstanding voltage	500VDC 10MΩ
Weight	250g
External dimensions	35W × 115H × 123D

\*The amount limited by the connectors rated current and PCB trace widths through to the actual 40A value.  $40 \times \sqrt{2} = 56.6A$

## Options

### Hub Unit (RCM-P6HUB)

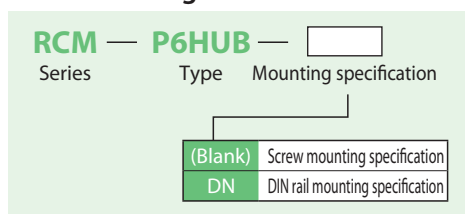
The hub unit cannot be used alone.  
It must be used with a gateway unit.

#### Features:

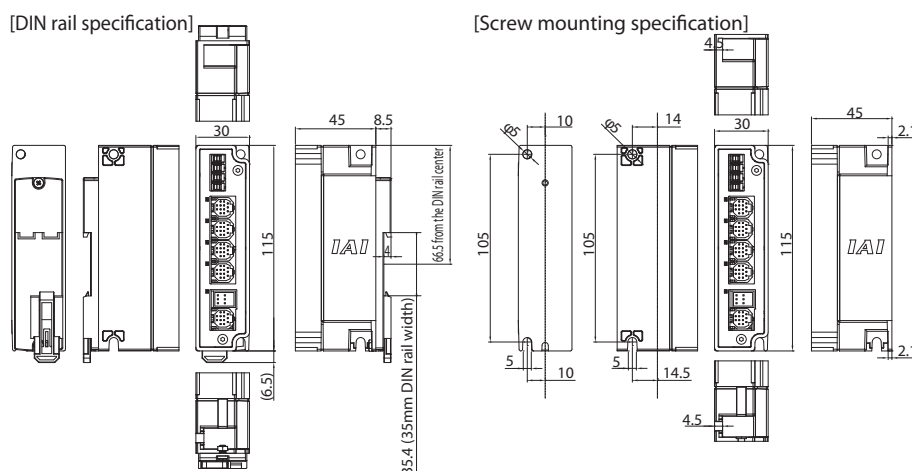
The connection between gateway unit - hub unit and hub unit - RCP6S can be established using serial communication. By using a gateway unit with hub units, up to 16 axes can be controlled.

\* The number of connectable axes will vary depending on the type of field networks and its mode. Please see P. 149 for the details.

#### Model Configuration



#### External Dimensions



#### Specification

Specification	Description
Number of controlled axes	4 axes max.
Power supply voltage	24VDC±10%
Control power capacity	0.3A (single hub unit)
Motor power capacity	12.8A max. from connected axes
Emergency stop input	None
Enable input	None
LED display	SYS LED × 1 (RUN/ALM) AXIS LED × 4 (RUN/ALM)
Electromagnetic braking forced release mechanism	External brake release switch × 4
Electric shock protection mechanism	Class 1, basic insulation
Insulation withstanding voltage	500VDC 10MΩ
Contamination	Contamination 2
Weight	80g
External dimensions	35W × 115H × 45D

## PLC Connection Unit (RCB-P6PLC)

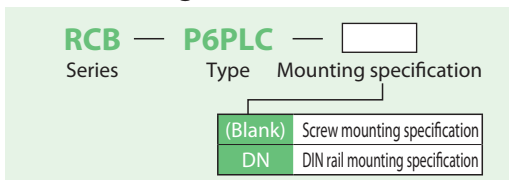
### Features:

This is a terminal block used to connect the RCP6S and the PLC using serial communication.

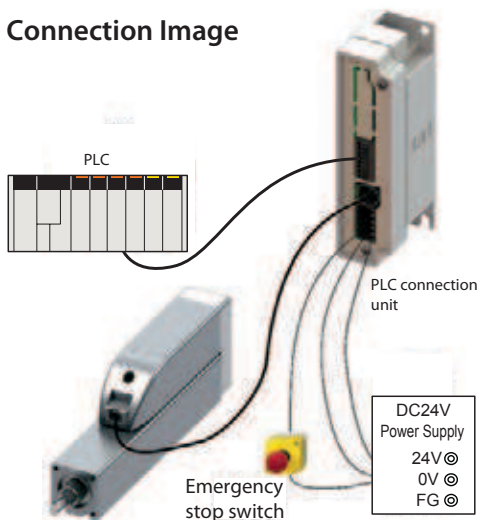
The RCP6S and the PLC connection unit can be easily connected with a cable.

\* The gateway unit and the hub unit cannot be connected to this PLC connection unit.

### Model Configuration



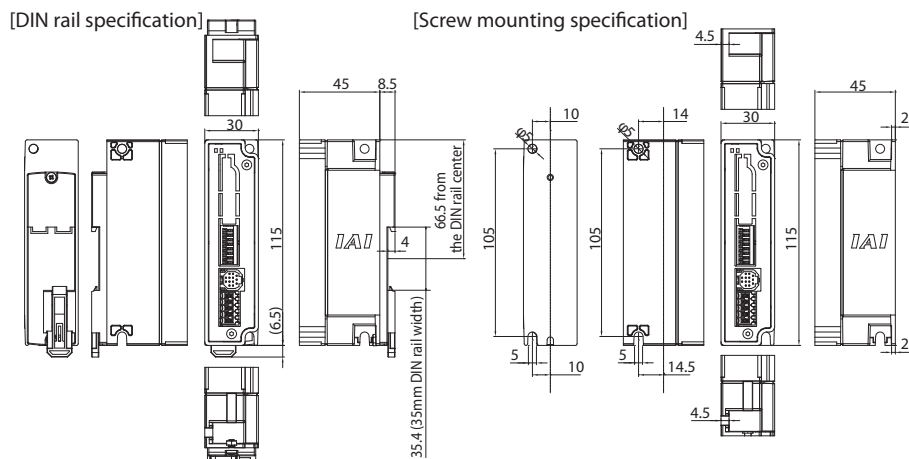
### Connection Image



### Specification

Specification	Description
Number of controlled axes	1 axis
Power supply voltage	24VDC±10%
Control power capacity	0A for single PLC connection unit 0.3A for connected PLC units + RCP6S built-in driver • For brake type, 0.7A for 0.2 sec is required for releasing brake
Motor power capacity	Depending on RCP6S built-in driver
Emergency stop input	B contact input
Enable input	None
LED display	None
Electromagnetic braking forced release mechanism	External brake release signal input (24VDC)
Electric shock protection mechanism	Class 1, basic insulation
Insulation withstanding voltage	500VDC 10MΩ
Contamination	Contamination 2
Weight	65g
External Dimensions	35W × 115H × 45D

### External Dimensions



### Touch Panel Teaching Pendant

#### Features

A teaching device equipped with functions such as position teaching, trial operation, and monitoring.

Model **TB-02-C** (See P.143)

### PC Compatible Software (for Windows)

#### Features

This is start-up support software which comes equipped with functions such as position input, trial operation, monitoring, etc. A complete range of functions needed for making adjustments contributes to a reduced start-up time.

Model **RCM-101-MW** (See P.143)  
(with an external device communication cable + RS232 conversion unit)

Model **RCM-101-USB** (See P.143)  
(with an external device communication cable + USB conversion adapter + USB cable)

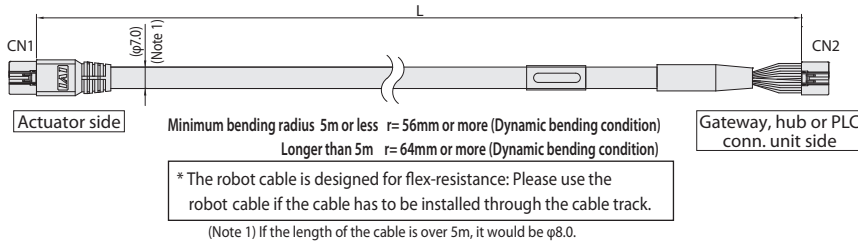
Maintenance Parts

When placing an order for the replacement cable, please use the model number shown below. \*There are restrictions on the total cable length. Please check with the [Notes] on P. 2.

For connecting RCP6S to gateway unit, hub unit, or PLC connection unit.

Model number **CB-RCP6S-PWBIO**    / **CB-RCP6S-PWBIO**    -**RB**  
 Standard cable Robot cable

\* Please indicate the cable length (L) in , maximum 20m, e.g.) 080 = 8m

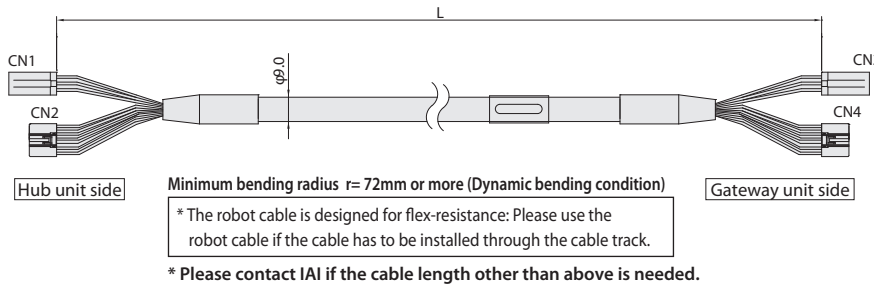


CN1			CN2		
Color	Signal name	Pin No.	Pin No.	Signal name	Color
Gray (AWG22/19)	CP	1	1	CP	Gray (AWG22/19)
Blue (AWG22/19)	MP	8	8	MP	Blue (AWG22/19)
Orange (AWG22/19)	MP	9	9	MP	Orange (AWG22/19)
Green (AWG22/19)	GND	10	10	GND	Green (AWG22/19)
Brown (AWG22/19)	GND	11	11	GND	Brown (AWG22/19)
Orange (AWG26)	AM_SD+	6	6	AM_SD+	Orange (AWG26)
Light blue (AWG26)	AM_SD-	2	2	AM_SD-	Light blue (AWG26)
Red (AWG26)	CT_SD+	7	7	CT_SD+	Red (AWG26)
Gray (AWG26)	CT_SD-	3	3	CT_SD-	Gray (AWG26)
Green (AWG26)	BK	4	4	BK	Green (AWG26)
Brown (AWG26)	EMGS	5	5	EMGS	Brown (AWG26)
Brown (AWG26)	NC	13	13	NC	Brown (AWG26)
Black (AWG26)	FG	12	12	FG	Black (AWG26)

For connecting a gateway unit and a hub unit

Model number **CB-RCP6S-RLY**    / **CB-RCP6S-RLY**    -**RB**  
 Standard cable Robot cable

\* Please indicate the cable length (L) in , maximum 10m, e.g.) 030 = 3m  
 Available standard lengths: 1m/3m/5m/10m



CN1			CN3		
Color	Signal name	Pin No.	Pin No.	Signal name	Color
Brown (AWG18)	MP	B1	B1	MP	Brown (AWG18)
Gray (AWG18)	MP	B2	B2	MP	Gray (AWG18)
Red (AWG18)	MP	B3	B3	MP	Red (AWG18)
Blue (AWG18)	GND	A1	A1	GND	Blue (AWG18)
Orange (AWG18)	GND	A2	A2	GND	Orange (AWG18)
Green (AWG18)	GND	A3	A3	GND	Green (AWG18)

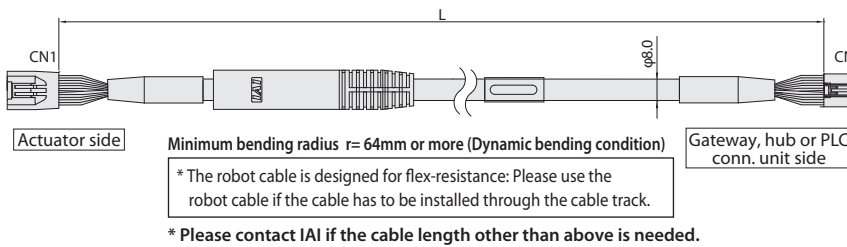
  

CN2			CN4		
Color	Signal name	Pin No.	Pin No.	Signal name	Color
Blue (AWG22)	CP	1	1	CP	Blue (AWG22)
-	NC	8	8	NC	-
-	NC	9	9	NC	-
Orange (AWG22)	GND	10	10	GND	Orange (AWG22)
Green (AWG22)	GND	11	11	GND	Green (AWG22)
Brown (AWG26)	AM_SD+	6	6	AM_SD+	Brown (AWG26)
Green (AWG26)	AM_SD-	2	2	AM_SD-	Green (AWG26)
Red (AWG26)	CT_SD+	7	7	CT_SD+	Red (AWG26)
Gray (AWG26)	CT_SD-	3	3	CT_SD-	Gray (AWG26)
Light blue (AWG26)	NC	4	4	NC	Light blue (AWG26)
Orange (AWG26)	EMGS	5	5	EMGS	Orange (AWG26)
-	NC	13	13	NC	-
Black (AWG26)	FG	12	12	FG	Black (AWG26)

Extension cable for connecting RCP6S to gateway unit, hub unit, or PLC connection unit.

Model number **CB-RCP6S-PWBIO**    -**JY1** / **CB-RCP6S-PWBIO**    -**JY1-RB**  
 Standard cable Robot cable

\* Please indicate the cable length (L) in , maximum 20m minus basic cable length, e.g.) 030 = 3m  
 Available standard lengths: 1m/3m/5m

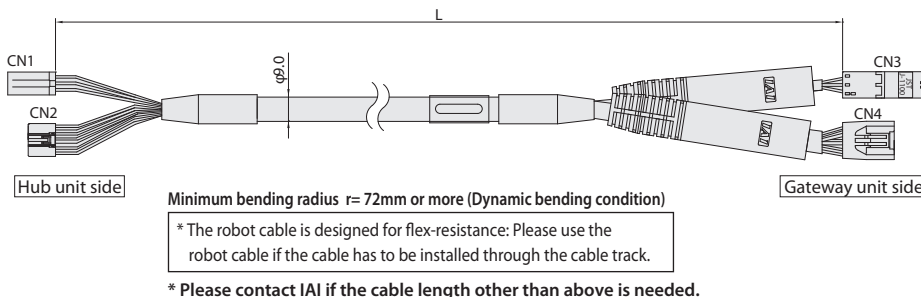


CN1			CN2		
Color	Signal name	Pin No.	Pin No.	Signal name	Color
Gray (AWG18)	CP	1	1	CP	Gray (AWG18)
Blue (AWG18)	MP	8	8	MP	Blue (AWG18)
Orange (AWG18)	MP	9	9	MP	Orange (AWG18)
Green (AWG18)	GND	10	10	GND	Green (AWG18)
Brown (AWG18)	GND	11	11	GND	Brown (AWG18)
Orange (AWG26)	AM_SD+	6	6	AM_SD+	Orange (AWG26)
Light blue (AWG26)	AM_SD-	2	2	AM_SD-	Light blue (AWG26)
Red (AWG26)	CT_SD+	7	7	CT_SD+	Red (AWG26)
Gray (AWG26)	CT_SD-	3	3	CT_SD-	Gray (AWG26)
Green (AWG26)	BK	4	4	BK	Green (AWG26)
Brown (AWG26)	EMGS	5	5	EMGS	Brown (AWG26)
Brown (AWG26)	NC	13	13	NC	Brown (AWG26)
Black (AWG26)	FG	12	12	FG	Black (AWG26)

Extension cable for connecting a gateway unit and a hub unit.

Model number **CB-RCP6S-RLY**    -**JY1** / **CB-RCP6S-RLY**    -**JY1-RB**  
 Standard cable Robot cable

\* Please indicate the cable length (L) in , maximum 10m minus basic cable length, e.g.) 030 = 3m  
 Available standard lengths: 1m/3m/5m



CN1			CN3		
Color	Signal name	Pin No.	Pin No.	Signal name	Color
Brown (AWG18)	MP	B1	B1	MP	Brown (AWG18)
Gray (AWG18)	MP	B2	B2	MP	Gray (AWG18)
Red (AWG18)	MP	B3	B3	MP	Red (AWG18)
Blue (AWG18)	GND	A1	A1	GND	Blue (AWG18)
Orange (AWG18)	GND	A2	A2	GND	Orange (AWG18)
Green (AWG18)	GND	A3	A3	GND	Green (AWG18)

CN2			CN4		
Color	Signal name	Pin No.	Pin No.	Signal name	Color
Blue (AWG22)	CP	1	1	CP	Blue (AWG22)
-	NC	8	8	NC	-
-	NC	9	9	NC	-
Orange (AWG22)	GND	10	10	GND	Orange (AWG22)
Green (AWG22)	GND	11	11	GND	Green (AWG22)
Brown (AWG26)	AM_SD+	6	6	AM_SD+	Brown (AWG26)
Green (AWG26)	AM_SD-	2	2	AM_SD-	Green (AWG26)
Red (AWG26)	CT_SD+	7	7	CT_SD+	Red (AWG26)
Gray (AWG26)	CT_SD-	3	3	CT_SD-	Gray (AWG26)
Light blue (AWG26)	NC	4	4	NC	Light blue (AWG26)
Orange (AWG26)	EMGS	5	5	EMGS	Orange (AWG26)
-	NC	13	13	NC	-
Black (AWG26)	FG	12	12	FG	Black (AWG26)