CONTROLLERS

An optimal controller can be selected from various command input formats.
As servo parameters and deceleration patterns suitable for robots are pre-registered, robots can be operated quickly without complex settings.

High performance controllers supporting YAMAHA robots

		TRANSERVO	FLIP-X		PHASER	
		Stepping motor	[T4L/T5L] Small type servomotor (24 V • 30 W)	General-purpose servomotor (30 to 600 W)	Linear motor	
1 axis	• I/O point trace • Remote command • Online command	P TS-S2, P TS-SH		P TS-X	P TS-P	TS-S2/ TS-SH/ TS-X/TS-P P.514
	• Pulse train	D TS-SD	C ERCD	D RDV-X	D RDV-P	TS-SD P.524 RDV-X/ RDV-P P.528 ERCD P.534
	• Program (YAMAHA SRC language) • I/O point trace • Remote command • Online command			C SR1-X	C SR1-P	SR1-X/ SR1-P P.540
2 axis	• Program (YAMAHA BASIC language) Note 1 • I/O command • Remote command • Online command			C RCX320 C RCX222	C RCX221	RCX320 P.548 RCX221/ RCX222 P.558
3, 4 axes	• Program (YAMAHA BASIC language) Note 1 • Remote command • Online command			C RCX340		RCX340 P.566

Five or more axes can also be supported

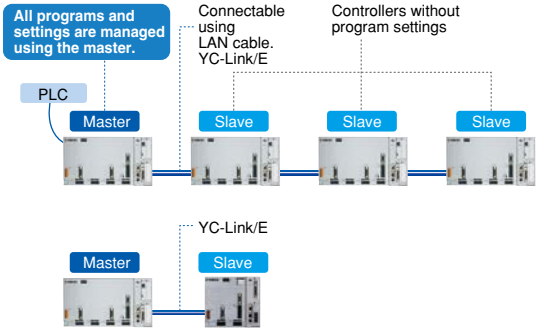
up to 16 axes

RCX320 RCX340

YC-Link/E

Up to four RCX320, RCX340 controllers (up to 16 controllable axes) can be connected.

The RCX340 controller and RCX320 controller can be connected.



Note 1. The RCX320, RCX340 uses YAMAHA BASIC2 language.

P : Robot positioner D : Robot driver C : Robot controller

POINT 1

Selectable from various control methods

Program input

A variety of operation settings, calculations, and conditional branching is possible

The single-axis robot controllers use the YAMAHA SRC language [Note] which is simple yet contains all required functions, such as I/O outputs and conditional branching, etc. The multi-axis controller RCX series uses the YAMAHA BASIC language capable of more sophisticated programming and includes all types of arithmetic operations, flexible variable settings, and various conditional branching, etc. Both are easy to use robot language conforming to the BASIC. These languages support various needs from simple operations to expert user's sophisticated work.

Note. The 2-axis controller DRCX also uses YAMAHA SRC language.

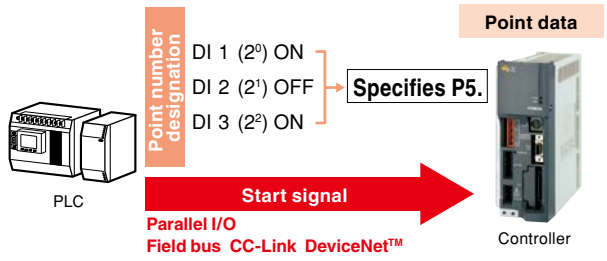
Single-axis robot controller	**YAMAHA SRC language <Example>**	**MOVA 1 , 100**	Moves to point number 1 at 100 %-speed.
		DO 1 , 1	Turns on general-purpose output number 1.
		WAIT 2 , 1	Waits until general-purpose input number 2 turns on.

Multi-axis robot controller	**YAMAHA BASIC language <Example>**	**IF DO(10)=1 THEN *END**	Jumps to *END if general-purpose input number 10 turns on. Otherwise, moves to the next line.
		MOVE P, P2, STOPON DI(1) =1	Moves to point number 2. Stops when general-purpose input number 1 turns on during movement.
		WAIT ARM	Waits until the robot arm operation ends.
		P3=WHERE	Writes the current position into point number 3.
		***END:**	Defines the label named "END".
		HOLD	Pauses the program.

I/O point trace

Program-less means easy

The host unit specifies a point number in binary format and the robot moves to the specified point when the start signal is input. The controller can operate only by teaching the point data without programs.

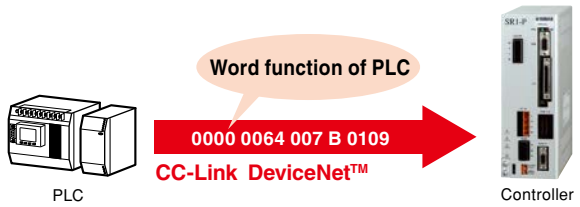


Remote command

Ideal for unified data management

The word function of the CC-Link or DeviceNet™ is used to issue various commands or data to the robot. The expandability of the word function from simple operation instructions to point data writing is fully utilized to freely use the robot controller functions from the host unit.

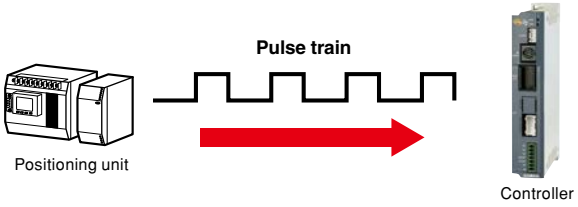
Note. This function is enabled when selecting an option network board.



Pulse train

Acceleration/deceleration curves can be created freely

The robot is controlled using pulse trains sent from the positioning unit. The controller does not need to have programs or point data. This pulse train is convenient when the control is centralized to the host unit.



Online command

Execute everything from a PC

The PC can issue various commands or data to the controller or receive the data or status through the RS-232C or Ethernet [Note]. All executable operations from the teaching pendant can be executed from the PC.

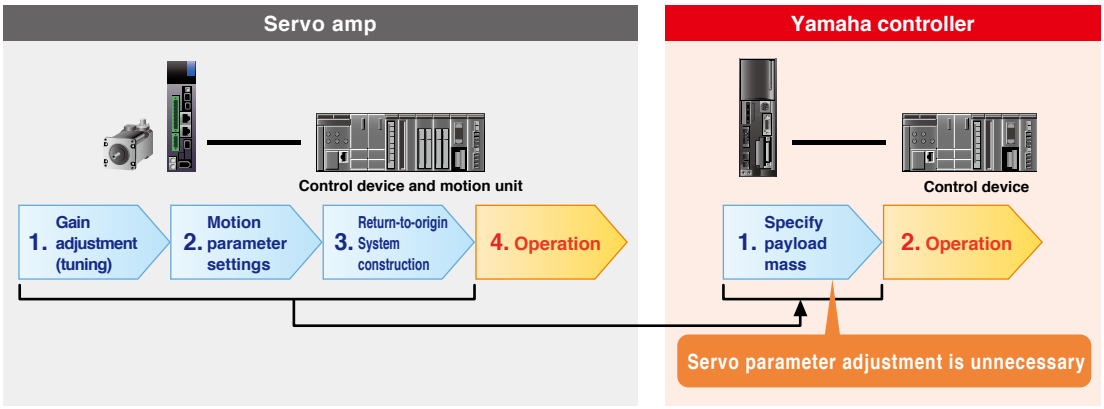
Note. Ethernet is enabled when selecting an option network board.
(For the RCX340, Ethernet is provided as standard function.)

POINT 2

Easy optimal setup

Complicated parameter settings are unnecessary

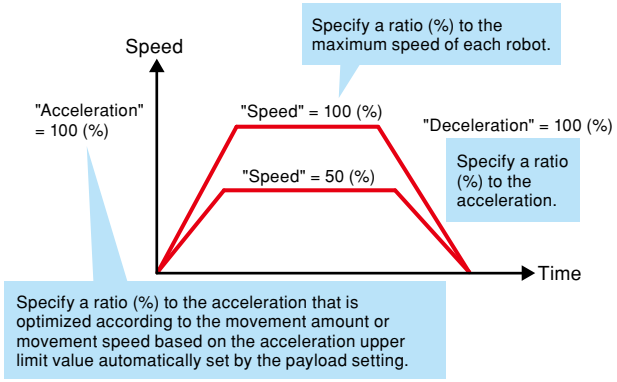
Robot controllers are specially designed for YAMAHA robots. Optimal values for servo parameters required for robot operation, such as gain are already registered beforehand. Start operating immediately without any need for complicated settings or tuning, even if you don't have knowledge or experience about control.



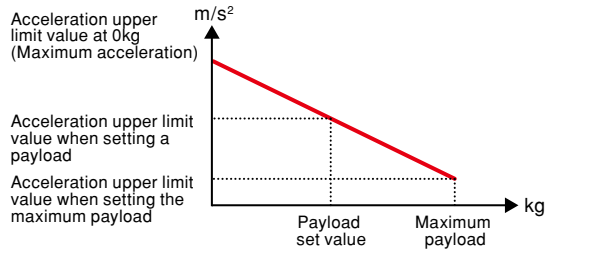
Easy acceleration/deceleration settings

The acceleration/deceleration is an important factor that affects the service life of the machine. If too high acceleration is set, this may cause the service life of the machine to shorten. If the acceleration is too low, the motor power cannot be used effectively, causing the tact time to lower. The acceleration/deceleration setting of YAMAHA robot controller is determined finely by load weight. Setting only payload parameters will automatically set optimal acceleration/deceleration by taking the service life of the machine and motor capability into consideration. Detailed robot knowledge from YAMAHA is what makes this possible. (Note: For the pulse train input, the customer may need to set the acceleration/deceleration.)

Concept of speed and acceleration



Acceleration calculation algorithm



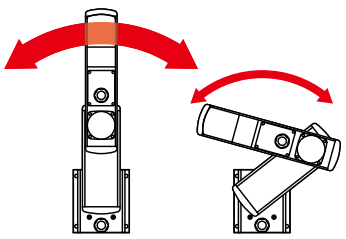
Payload setting	Automatic setting of acceleration upper limit value according to payload. (See the figure shown above.)	Optimal acceleration is calculated from the movement amount and movement speed at startup based on acceleration upper limit.	Acceleration determination and operation start

Zone control (= Optimal acceleration/deceleration automatic setting) function

The SCARA robot also incorporates a zone control function that always operates the robot at its maximum performance level by considering changes in inertia due to the arm posture. Therefore, the robot does not exceed the tolerance value of the motor peak torque or speed reducer allowable peak torque only by entering the initial payload to bring out the full power of the motor and keep the high acceleration/deceleration.

For X-axis of YK500XG

The torque in the arm folded state is 5 or more times different from that in the arm extended state.



This may greatly affect the service life, vibration during operation, and controllability.

If the motor torque exceeds the peak value

→ **This may adversely affect the controllability and mechanical vibration, etc.**

If the torque exceeds the tolerable peak torque value of the speed reducer

→ **This may cause early breakage or shorten the service life extremely.**

POINT 3

Multi-function and expandability

■ Multi-axis controllers support up to 30,000 points (10,000 points for the RCX2 series, 1,000 points for the single-axis controller (255 points for the TS series)). Up to 100 programs can be created on each controller.

■ Various field networks, CC-Link, DeviceNet™, PROFIBUS, and EtherNet/IP™ are supported.

Note. Some models do not support all networks.

■ The TS series, RD series, SR1 series, and RCX series use a dual-power supply system with separate control power supply and power supply.

■ As the controllers conform to the CE marking that is safety standards in EU (Europe), they can be used safely even overseas.
The TS series (except for TS-S), SR1 series, and RCX series conform to up to safety category 4.

For details about functions of each controller, refer to controller details pages from P.503.

Name	Type	Number of points	Number of programs	Applicable network							Compliance with CE
				CC-Link	DeviceNet™	Ethernet	EtherNet/IP™	PROFIBUS	PROFINET	EtherCAT	
TS-S2/TS-SH	1 axis robot positioner	255	-	○	○	-	○	-	○	-	○
TS-X/TS-P		255	-	○	○	-	○	-	○	-	○
TS-SD	1 axis robot driver	-	-	-	-	-	-	-	-	-	○
RDV-X/RDV-P		-	-	-	-	-	-	-	-	-	○
ERCD	1 axis robot controller	1,000	100	-	-	-	-	-	-	-	-
SR1-X/SR1-P		1,000	100	○	○	○	-	○	-	-	○
RCX320	1 to 2 axes controller	30,000	100	○	○	○	○	○	○	○	○
RCX221/RCX222	1 to 2 axes controller	10,000	100	○	○	-	-	○	-	-	○
RCX340	1 to 4 axes controller	30,000	100	○	○	○	○	○	○	○	○

RDV-X/RDV-P

P.528 FLIP-X PHASER

[Robot driver]


RDV-X


RDV-P

Operation method	Pulse train
Input power	Main power Single-phase/3-phase AC 200 V to 230 V Control power Single-phase AC 200 V to 230 V
Origin search method	Incremental

Dedicated pulse train control

The dedicated pulse train control has achieved a compact body and a low price.

Position setting time reduced by 40%

The response frequency is enhanced about two times in comparison with former models. The position setting time of uniaxial robots is reduced by about 40%.[Note 1]

Large cost reduction possible

It is easy to assemble them in automated machinery. You can save much labor in designing, parts selection, setting and more. A large cost reduction is possible.

Contributing to saving space for the whole control board

The compact design has reduced the width up to a maximum of 38% in comparison with former models. In addition, the improvement of radiation efficiency makes it possible to arrange the devices with less space in between. Multiple units can be installed side by side in a neat arrangement.

Easy replacement

The parameter settings and fastening-hole pitches are the same as those of former models. It is easy to replace the software and the hardware as well.

Command input: Line driver (2 Mpps)

Command output: ABZ-phase output (with a divider function)

Real-time operation status monitoring

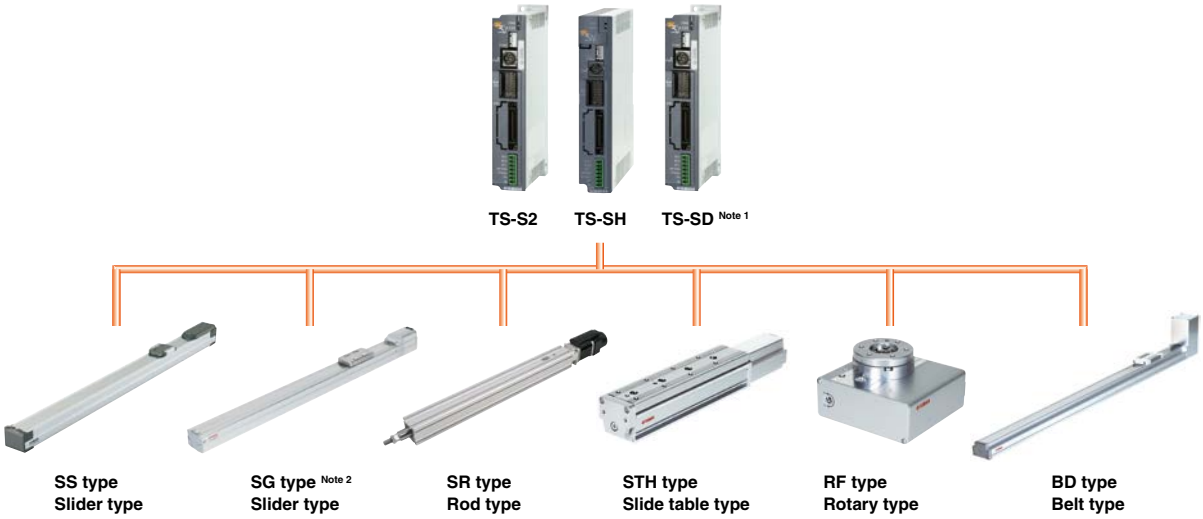
You can have analog outputs for speed, amperage, and more information to know the operation status in real time. RDV-Manager, the dedicated support software, is also available for a graphical view of the status.

Main power: Single and three phases supported (200V)

The full-specification operation is available with a single-phase power supply.

Note 1. With a 400W servomotor, 20mm ball screw lead, and portability of 40kg.

Usable for all TRANSERVO series models



Note 1. The STH type vertical specifications and RF type sensor specifications do not support the TS-SD.
Note 2. SG07 is only applicable to TS-SH.

TS-SD P.524 TRANSERVO

[Robot driver]


TS-SD

Operation method	Pulse train	
Input power	Main power Control power	DC 24 V +/- 10 % DC 24 V +/- 10 %
Origin search method	Incremental	

Pulse train input driver dedicated to "TRANSERVO"

A robot driver dedicated to the pulse train input for "TRANSERVO".

Torque decrease in high-speed area is suppressed

As a vector control method is used, the torque decrease in high-speed area is small and high-speed operation even with high payload can be performed. This greatly contributes to shortening of the tact time.

Excellent silence

High-pitched operation sounds unique to the stepping motor are suppressed to achieve silent operation sounds similar to the AC servo.

Easy operation with support software TS-Manager

In the same manner as the robot positioner TS series, the operation can be performed with the TS-Manager (Ver.1.3.0 or later) having various convenient functions, such as robot parameter setting, backup, and real-time trace (The handy terminal "HT1" cannot use this TS Manager).

Applicable to a wide variety of pulse train command inputs

This robot driver can be made applicable to the open collector method or line driver method using the parameter setting and signal wiring. In the open collector method, a wide voltage range from 5 V to 24 V is supported. So, the robot driver can be matched to the specifications of the host unit to be used.

TS-Manager: Real-time trace function

The current position, speed, load factor, current value, and voltage value, etc. can be traced at real-time. Additionally, as trigger conditions are set, the data when the conditions are satisfied can be automatically acquired. Furthermore, as a range is specified from the monitor results, the maximum value, minimum value, and average value can be calculated. So, this is useful for the analysis if a trouble occurs.

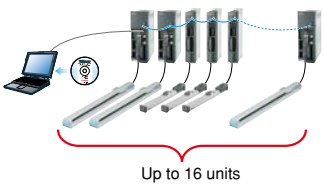
Real-time traceable items (up to four items)

- Voltage type
- Command speed
- Command current value
- Input/output I/O state
- Word input/output state Note 2
- Command position
- Current speed
- Current current value
- Input pulse count Note 1
- Current position
- Internal temperature
- Motor load factor
- Movement pulse count Note 1

Note. 1: TS-SD only Note. 2: TS controller only

Daisy chain function

As multiple TS series controllers and drivers are connected in a daisy chain, the data of a desired unit can be edited from the personal computer (up to 16 units).



TS-S2/TS-SH P.514 TRANSERVO

[Robot positioner]

TS-S2 TS-SH

Operation method	Point trace Remote command Online command
Number of points	255 points
Input power	Main power DC 24 V +/- 10 % Control power DC 24 V +/- 10 %
Origin search method	TS-S2 Incremental TS-SH Absolute Incremental

TS-X/TS-P P.514 FLIP-X PHASER

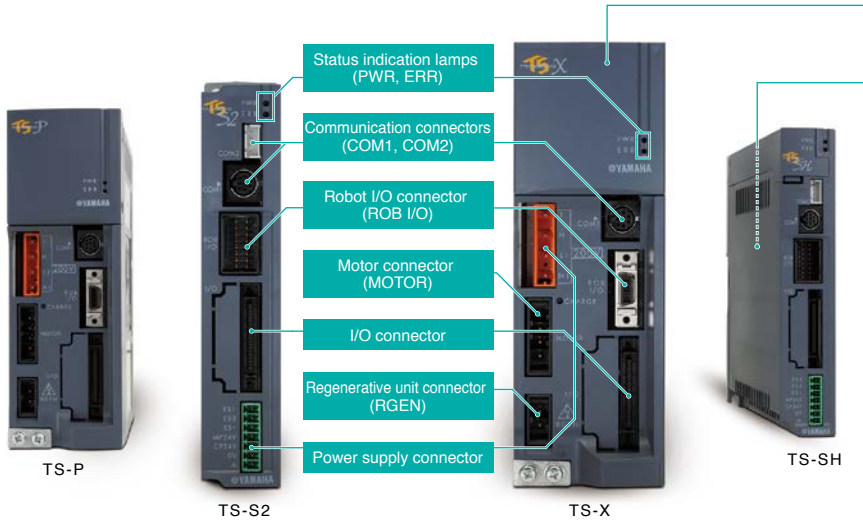
TS-X TS-P

Operation method	Point trace Remote command Online command
Number of points	255 points
Input power	AC 100 V / AC 200 V
Origin search method	TS-X Absolute Incremental TS-P Incremental Semi-absolute

Design that allows a clean installation

Unified installation sizes

Height and installation pitch are unified throughout the series. Units can be installed neatly within the control board.



Absolute battery is neatly accommodated

The absolute battery is stored inside the unit. Replacement can be performed easily from the front side. (TS-X and TS-SH supported)

TS-X

DIN rail installation

On-board installation is made easy by the DIN rail installation mechanism that is standard on the TS-SH. (Optionally installable on other models)

Selectable I/O interfaces

Two RS-232C ports provided

- **Connect support tools**

  Intuitive operation supports controller design and maintenance.

- **Daisy-chaining**

  Two ports can be used to daisy-chain up to 16 units.

- **Communication commands**

  Easily understood ASCII text strings can be used to perform robot operations.

Selectable 100V/200V

- The TS-X/P let you select AC100/200V as the power input. (The 20A model is 200V only.)
- The TS-S2/SH is DC24V input.

A variety of I/O interfaces

In addition to NPN and PNP, you can choose CC-Link, DeviceNet™, EtherNet/IP™, and PROFINET field networks.

CC-Link DeviceNet EtherNet/IP PROFINET

- **Positioner interface**

  Functionality has been condensed into an I/O interface with 16 inputs and 16 outputs. In addition to easy positioning, this also includes functionality that enhances interoperability with the control device.

- **Remote commands**

  Numerical data can be directly manipulated by using the four-word input and four-word output areas. You can add new direct positioning commands to further unify the data at the control device.

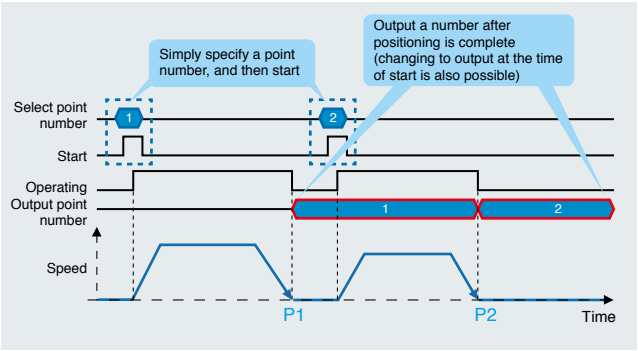
- **Gateway function**

  New types of connection are provided to reduce network costs. (CC-Link, EtherNet/IP™, and PROFINET are supported.)

Positional interface

"Positioner function" for easy positioning

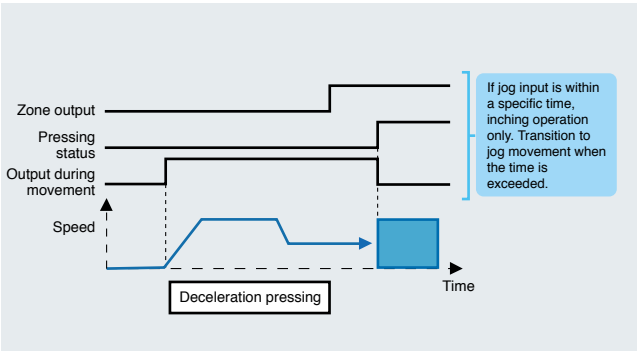
You can easily perform positioning operations by specifying the number of a point that is registered in the data, and entering a start command.



Number	Operation type	Position (mm)	Speed (%)	Acceleration (%)	Deceleration (%)	Branch	Timer (ms)
P1	ABS	100.00	100	100	100	0	0
P2	ABS	200.00	80	100	100	0	0

A variety of output functions

The TS controller provides a variety of status outputs that are linked with positioning operations. By selecting and using an output appropriate for the scene, this can contribute to cost-saving measures such as making the steps of the control device's program more efficient or by reducing the peripheral equipment.



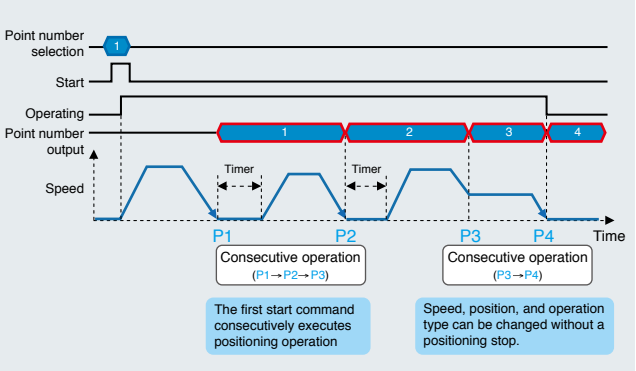
List of outputs

- Zone output.....Output ON when between the two specified points
- Near position output.....Output ON when entering the specified region from the goal position
- In movement output .....Output ON when above the specified speed
- Pressing status.....Output ON when specified pressing strength is reached

Also provided are return-to-origin completed status, manual mode status, warning output, and alarm number output, etc.

Consecutive operation, linked operation

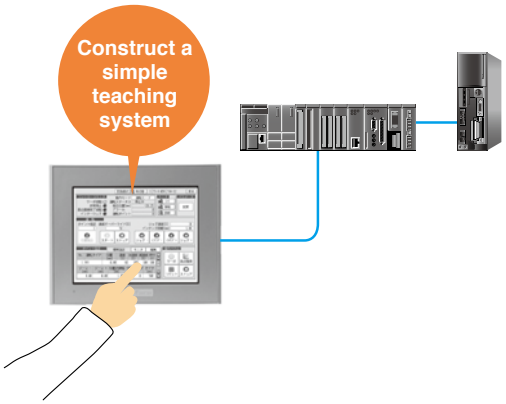
By specifying a branch destination, it is possible to execute positioning operations consecutively. Additionally, by specifying linked operation, operation with the branch destination can be executed while changing the speed without positioning stops; this allows control programming to be simplified and takt to be shortened.



Number	Operation type	Position (mm)	Speed (%)	Acceleration (%)	Deceleration (%)	Branch	Timer (ms)
P1	ABS	100.00	100	100	100	2	500
P2	ABS	200.00	80	100	100	3	800
P3	ABS linked	300.00	100	100	100	4	0
P4	ABS	350.00	30	100	100	0	0

Jog and point teaching functions are provided as standard

Jog movement and point teaching functions are provided as standard for input signals. By linking these with buttons of a touch panel etc., a simple teaching system can be constructed.



TS-S2/TS-SH/TS-X/TS-P

Remote commands

Ideal for unifying data management

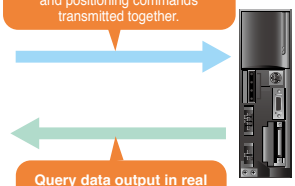
Remote commands are functions by which the control device can directly handle data such as points and parameters using the word area of the field network.
Numerical data can be operated directly by using the word area. This promotes unification of data management.

WIN0	WIN1	WIN2	WIN3
Command	Speed data	Position data	

WOUT0	WOUT1	WOUT2	WOUT3
Status	–	Query data	

Data can be managed on the control device

Position and speed data settings and positioning commands transmitted together.



Query data output in real time every 5 ms.

Query data list

- Current position
- Current
- Internal temperature
- Point number being executed
- Current speed
- Voltage
- Load ratio

New function Direct positioning commands that directly specify position and speed data

As remote commands, "direct positioning commands" are provided, allowing the position and speed data to be specified directly and then positioning operations to be performed. In addition to unifying the positioning data on the control device, this allows it to be done with a single command, simplifying programming of the control device.

Consecutive queries for realtime update of various status information

Normally, remote commands only update data when responding, but if a consecutive query is issued, the data continues to be updated at a fixed interval until permission is given to stop. This is useful in various cases such as when it is desirable to obtain positioning data during operation for interoperation with peripheral devices, or to obtain current values in order to monitor the status of a robot.

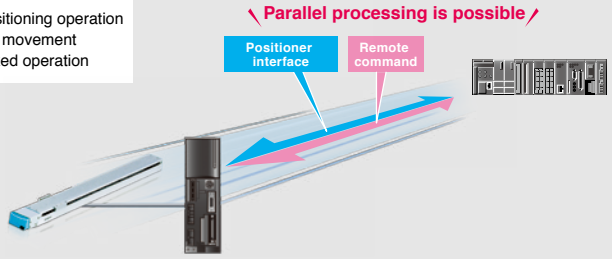
Parallel processing of "positioner interface" and "remote commands"

Since positioner interface and remote commands operate independently of each other, parallel processing is possible.

< Usage examples >
- Obtain the current position during positioning operation
- Obtain the current position during jog movement
- Change the target position during linked operation

		Positioner interface		Remote command
		Positioning operation	Jog movement	Positioning operation
Remote commands	Data write	○	○	—
	Data read	○	○	—
	Consecutive query	○	○	○

○: Parallel processing possible

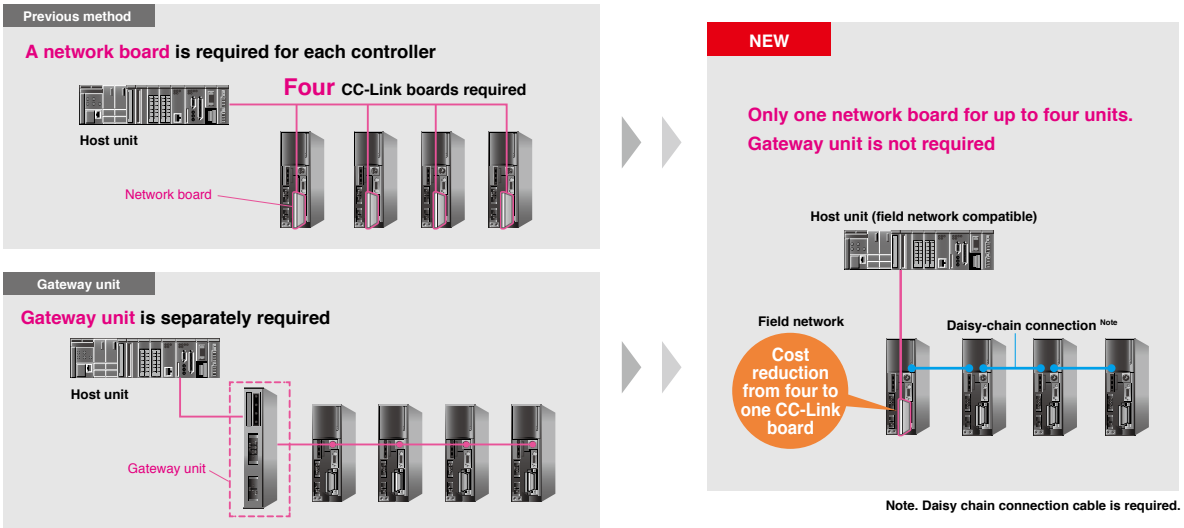


"Gateway function" — a new way to connect

New function

Decrease network cost

One controller equipped with a field network board can provide unified management of up to four I/O interfaces via a daisy-chain connection. This allows network cost to be decreased while enabling the same type of I/O control as when one board is installed for each unit. (CC-Link and EtherNet/IP™ are supported)

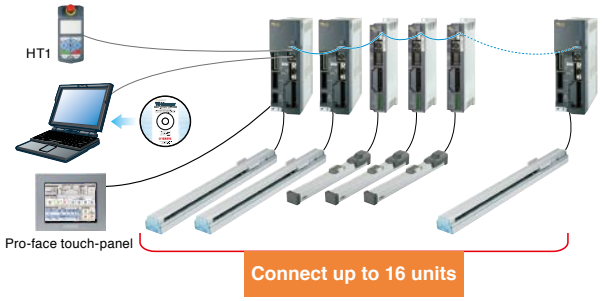


Note. Daisy chain connection cable is required.

Daisy chain connection

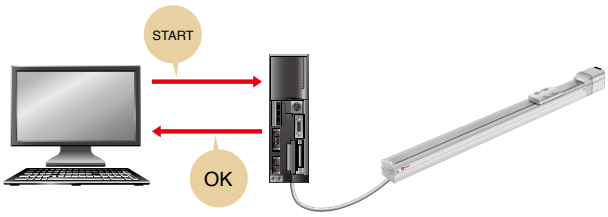
No need to connect or disconnect cables during operation (up to 16 units)

From a single PC, handy terminal, or touch-panel display, it is possible to specify point data and parameters, perform operations, and monitor the status for up to 16 axes on daisy-chained controllers. For everything from design to maintenance, a connection to only the first controller is sufficient; any desired controller can be accessed simply by switching the station number, without having to connect or disconnect cables.



Communication commands

An easily handled command protocol using ASCII text strings supports a wide range of needs from data editing to operation and status monitoring. By daisy-chaining multiple devices, simple multi-axis control can be performed.



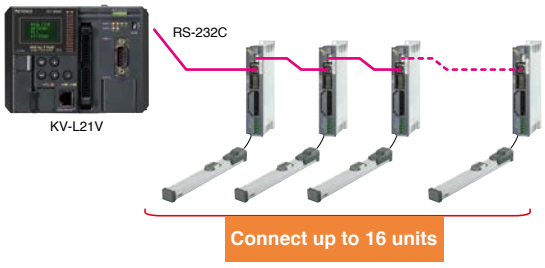
"KEYENCE PROTOCOL STUDIO Lite" serial communication settings software

By loading a TS settings file into PROTOCOL STUDIO Lite, communication settings and main communication commands can be registered automatically. Ladder-less data editing and daisy-chaining can be easily accomplished.

Contact for questions regarding PROTOCOL STUDIO Lite
Keyence Corporation, www.keyence.co.jp/red/kv01/

Daisy-chain connections (up to 16 axes)

Communication with the KV-L21V uses a Yamaha-made communication cable (D-sub type). By using daisy-chain connections, up to 16 axes can be managed together.



Automatic device assignment for each communication command

If the communication type is specified as cyclic, the desired information to be obtained is automatically stored in data memory.

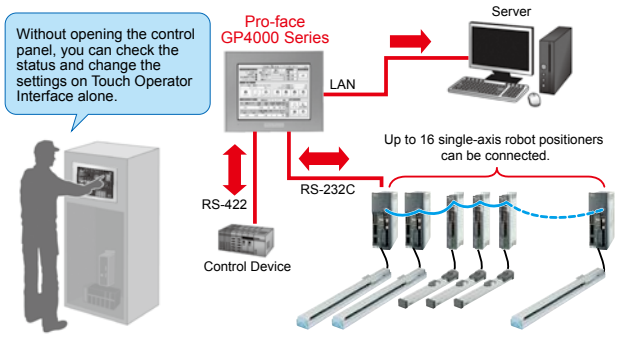
Touch operator interface "Pro-Face" GP4000 Series

Connecting GP4000 Series made by Pro-face to Robot Positioner, TS-S2, TS-SH, TS-X, TS-P enables you to use a lot of functions as well as basic operations on Touch Operator Interface.

Free download of the program file from the Pro-face home page
http://www.proface.com

Can easily check a state and change settings.

- Check the status (the current position, speed etc)
- Basic operations such as Jog operation, inching operation, return to origin, error reset etc.
- Set, edit, or back up point data and parameters
- Check triggered alarms and detailed descriptions of alarm history



Supports 3 languages

- Supports Japanese, English, and Chinese (simplified, traditional)

SR1-X/SR1-P P.540 FLIP-X PHASER

[Single-axis robot controller]


SR1-X


SR1-P

Operation method	Program Point trace Remote command Online command
Number of points	1000 points
Input power	AC 100 V AC 200 V
Origin search method	SR1-X Absolute Incremental SR1-P Incremental Semi-absolute

Various command methods

An optimal method can be selected from various command methods, such as program, point trace, remote command, and online command. The program uses the YAMAHA SRC language that is similar to the BASIC. Various operations, such as I/O output and conditional branching, etc. can be executed using simple operations.

Applicable to complete absolute position system

The SR1-X is applicable to complete absolute position system. No return-to-origin is needed. (The backup period is one year in the non-energizing state.)

I/O assignment function

As the I/O assignment is changed, the point trace operation, point teaching, and trace operation by specifying coordinate values can be selected in addition to the normal program operation. Since the JOG movement through the I/O is possible in the point teaching mode, the point teaching can be performed from the host unit without the HPB.

Current position output function

The position data is output as feedback pulse or binary data. This allows the host unit to understand the current robot position at real-time. Furthermore, functions, zone output or point zone output to output near point number are incorporated.

Torque limiting

As this function limits the maximum torque command value at desired timing, it is effective in operations such as pushing and workpiece gripping operations. Furthermore, in addition to the torque limiting by the parameter data value, the torque limiting by the analog input voltage can be performed.

ERCD P.534 T4L/T5L

[Single-axis robot controller]


ERCD

Operation method	Program Point trace Online command Pulse train
Number of points	1000 points
Input power	DC 24 V
Origin search method	Incremental

Four command formats

A desired command format can be selected from four command formats, program operation using various commands, point trace operation only by instructing a point number, online command, and pulse train input.

Compact design

Compact box size of W 44 × H 142 × D 117mm is achieved with the functions improved.
The installation space can be reduced greatly.

Various input/output functions

As a feedback pulse output function is provided, the host control unit can easily manage the current position. Additionally, as the movement point number can be output in binary format during point trace, the operation can be checked easily. As a teaching function using the I/O is added, the flexibility and usability of the system configuration are further improved.
This output is enabled in the program or point trace operation and the number of outputs can be changed to a desired level using the division setting.

Various monitor functions

The controller status can be checked using the input/output status monitor, duty monitor, and LED status display.

Error history and alarm history

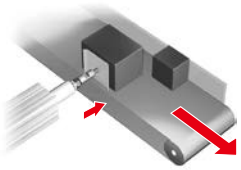
The error or alarm history that occurred in the past can be displayed and checked on the HPB or personal computer screen.

Robot number management

As the controller is initialized by the robot number of the robot to be controlled, parameters suitable for each robot model are automatically registered and no complicated servo adjustment is needed.

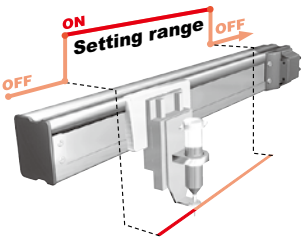
Torque limiting control

The torque limiting control can be performed using the program command. The axis can be stopped with the torque applied. This torque limiting control can be used for continuous positioning of workpieces with different sizes, press-fitting work, and workpiece holding operation.



Zone output function

The general-purpose output on/off setting between desired points can be performed using the parameter setting. The positive logic/negative logic setting can be made and the axis position can be easily judged by an external unit. Up to four patterns can be set.

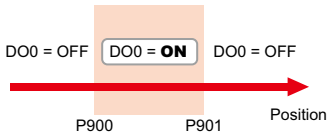


SR1-X/SR1-P/ERCD Various functions

Position data output function

Zone output

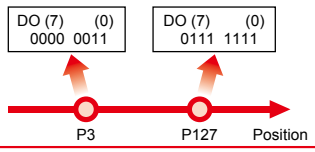
Outputs whether or not the robot position is within the specified range.



It is possible to reverse the output logic.

Point zone output

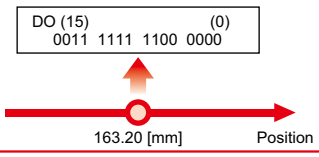
Outputs the point number near the robot position in binary format.



It is also possible to limit to only the moving point.

Binary output

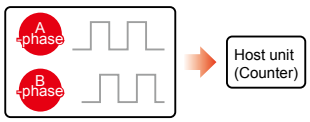
Outputs the current robot position in 16-bit binary format. (This function is available only in the SR1.)



It is possible to adjust the unit of the output position data to be output using parameters.

Feedback pulse output

Outputs the current position counter value of the robot through the A/B-phase line driver.



It is possible to perform the monitoring by host unit at real-time.
A frequency division function is built-in.

Point teaching

The JOG movement of the robot and the point reaching can be performed from the host unit.

■ Concept

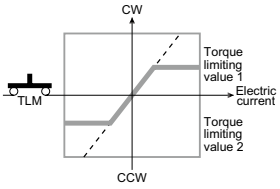
- The robot is moved to the teaching position using the JOG+/JOG- command.

- The current position is registered into the point number specified by the PSET input.

Torque limiting function

As the torque limiting is performed during operation, the operation, such as pushing and workpiece gripping can be performed.

■ Concept



■ Features

SR1

- Host unit manages the limiting time using the TLM input.
- Limiting status is understood using the torque limiting status output (TLON).
- Torque limit value is changed (up to 4 patterns) using the input.
- Torque can be limited using the program command.
- Torque can be limited using the analog input (0 to +10 V / 12 bit).

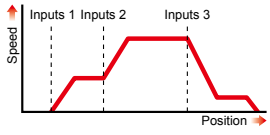
ERCD

- Torque can be limited using the T program command.

Movement data change function

The movement speed or target position can be changed during movement. (This function is available only in the SR1.)

■ Concept



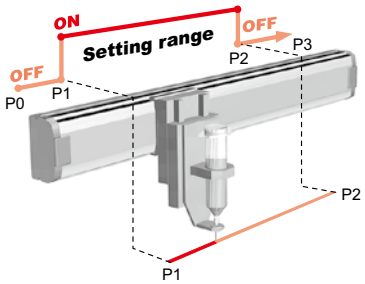
■ Features

- Host unit manages the limiting time using the movement command input.
- Movement command is ABS-PT (absolute movement command) or ABS-BN (binary specified movement command).
- Change speed can be specified in a range of 1 to 100 % (up to 4 patterns).
- Changing is disabled in the deceleration zone.

YAMAHA SRC language convenient functions

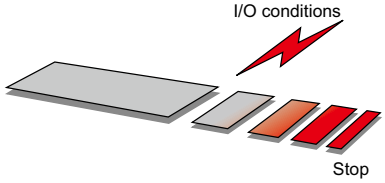
Multi-task function

This function can execute multi tasks, such as robot peripheral units in parallel at the same time. Up to four tasks can be executed. With the multi-task function combined with JMPP command, the I/O signals can be output when the robot passes through the specified point during movement.



Conditional stop function during movement

The arm can be decelerated and stopped using I/O conditions of the MOVF command while it is moving. This function is useful when searching for the target position with the sensor.



RCX2 series

RCX221/222 P.558

[Multi-axis robot controller]

Operation method	Program Remote command Online command
Number of points	10000 points
Input power	AC 200 V
Origin search method	Incremental Semi-absolute

Operation method	Program Remote command Online command
Number of points	10000 points
Input power	AC 200 V
Origin search method	Absolute Incremental

Applicable to all YAMAHA robot models

The RCX series is applicable to all YAMAHA robot models, such as PHASER, FLIP-X, and XY-X, etc. As the single-axis robot (FLIP-X/PHASER) can be combined with the Cartesian robot freely, various applications can be supported (except for some compact single-axis robots).

Complete absolute position system

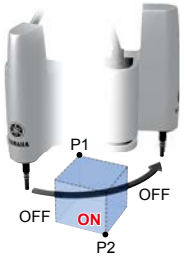
The RCX uses complete absolute specifications that need no return-to-origin when the power turns on. The completely same system can be applicable to the incremental specifications. (When the PHASER series uses the magnetic scale, it is applicable to the semi-absolute or incremental specifications.)

Extension of absolute data backup time

As the backup circuit is improved to the energy saving, the absolute position data retention period in the non-energizing state is greatly extended. The maximum one month of the conventional model is extended to approximately one year. The current position information is monitored during long vacations, equipment storage, or even during transportation, and no return-to-origin is needed when energized again. This allows quick production start.

Area check output function

This function can output the I/O signals when the robot enters a set area during operation. Up to eight check areas can be set.



Applicable to dual-drive

A dual-drive function is incorporated that controls two axes synchronously. This function is effective for heavy workpiece transfer or Y-axis long stroke of the Cartesian robot. The function can perform the operation using the high-speed and high acceleration/deceleration of YAMAHA robots.

Note. The dual-drive is supported as a custom order. For detail, please consult YAMAHA.

■ Example of dual-drive

Double-carrier anti-collision function

When using the double-carrier, collisions between both carriers can be prevented by the control in the controller. Collision preventions by the zone judgments or external sensors are no longer needed to make the double-carrier easier to use.

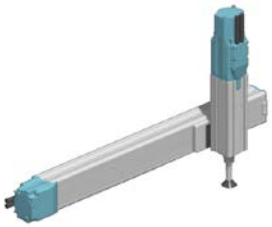
3D linear/circular interpolation control

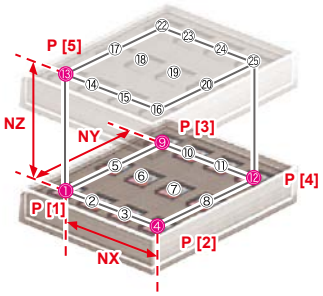
2D and 3D linear and circular interpolation controls are possible. This ensures the smooth and highly accurate operations suitable for the sealing work. (The 3D interpolation is not available in the RCX221/222.)

Palletizing function

This function can easily define up to 20 kinds of pallets only by entering four corner positions on the pallet as the teaching points. When entering the teaching point in the height direction, even three-dimensional pallets are supported.

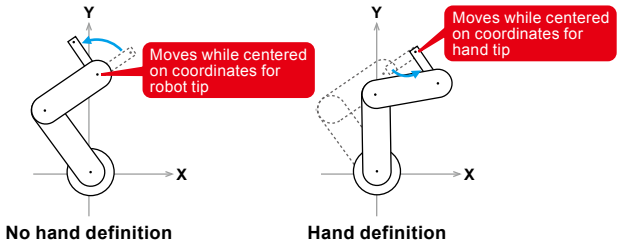
When specifying the defined pallet number and executing the movement command, the palletizing work is then performed. Various operations, one point → pellet, pallet → one point, and pallet → pallet, can be performed using the programs.





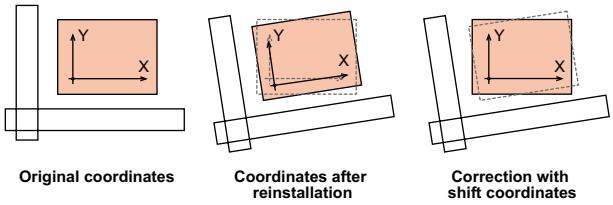
Hand definition

This function operates the robot based on coordinates of the offset tool tip when the tool is attached to the tip of the robot axis in the offset state. Particularly, this function is effective during tool rotation of SCARA robots or robots including the rotation axis.



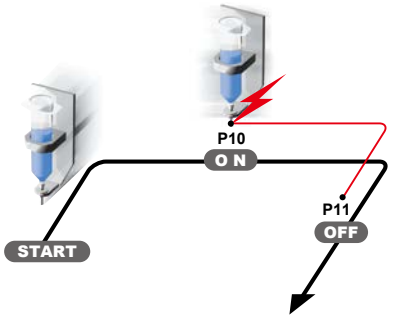
Shift coordinates

A deviation may occur in the coordinate system when re-installing or replacing the robot during maintenance work. In this case, the coordinate system can be corrected using the shift coordinate function. So, the point data can be used as it is. No re-teaching is needed.



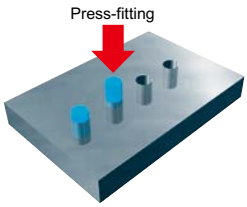
Passing point output control

The general-purpose output on/off can be controlled by specified points without stopping the axis operation during interpolation operation. The dispense can be turned on or off with the axis operated during sealing to allow smooth and stable dispensing.



Torque limiting function

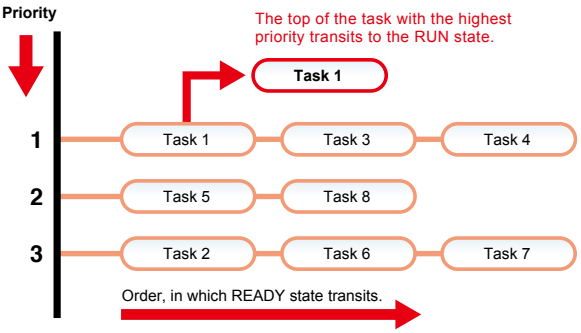
The motor torque can be limited during gripping or press-fitting.



Multi-task function

This function can execute multi tasks (up to eight tasks), such as robot peripheral units in parallel at the same time. When there are multiple tasks, the task can be changed by means of the time sharing method and a priority can be put on the task. Additionally, the priority can also be changed while the task is running. The multi-task function simplifies the control configuration of the entire system to improve the operation efficiency.

■ Task scheduling

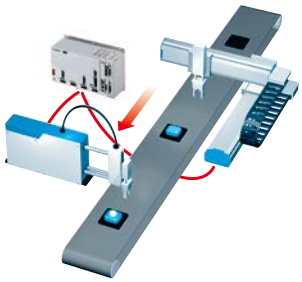


Sequence program

In addition to the normal task, a task to individually control the input/output (parallel, serial, memory, timer) can be executed.
As the sequence program can be enabled even in the manual mode, this is effective to construct a safety system linked with peripheral units.

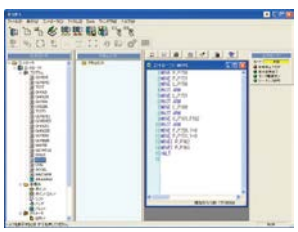
2-robot control

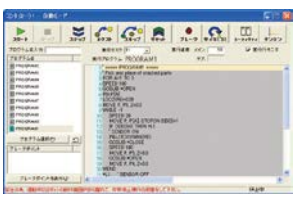
Two robots that are assigned to the main and sub robots can be simultaneously controlled using one controller. As this function is used together with the multi-task, advanced and smooth linking of two robots can be performed using one controller.



Powerful support software: VIP+ (plus)

This application software allows you to easily and visually operate the robot, create and edit programs, and teach points.
The user interface is greatly improved and made easier to use when compared to the conventional support software VIP.





RCX3 series

RCX320 P.548

RCX340 P.566

[Multi-axis robot controller]

RCX320

2 axes	
Operation method	Program Remote command Online command
Number of points	30000 points
Input power	Single phase : AC200V to 230V +/-10% maximum
Origin search method	Absolute Incremental Semi-absolute

RCX340

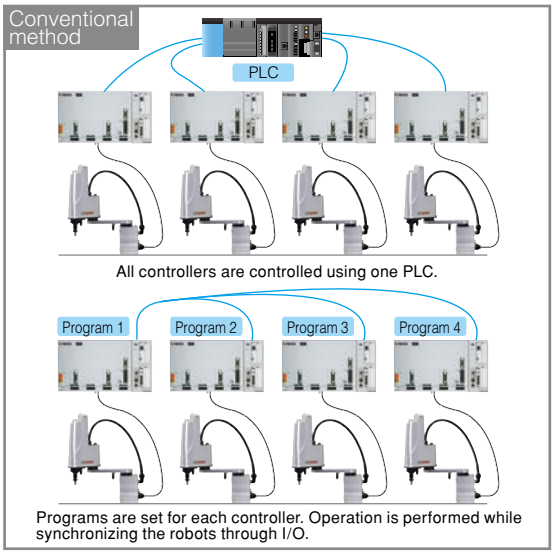
3 to 4 axes	
Operation method	Program Remote command Online command
Number of points	30000 points
Input power	Single phase : AC200V to 230V +/-10% maximum
Origin search method	Absolute Incremental Semi-absolute

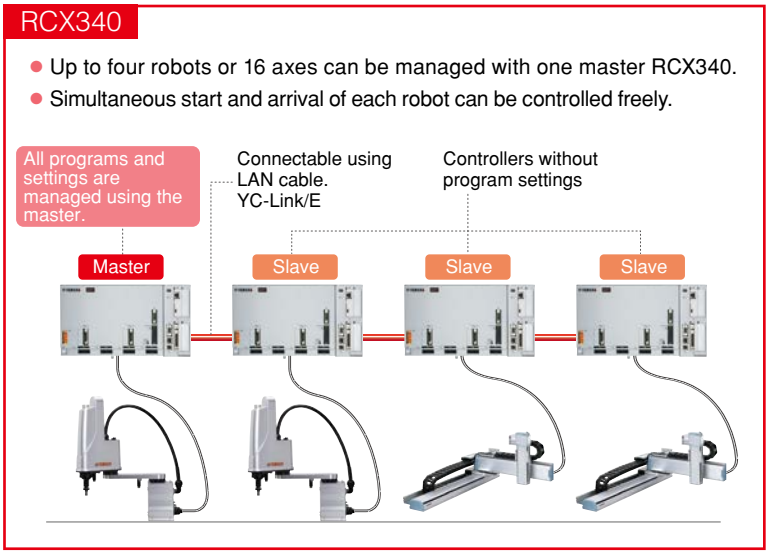
Advanced functionality allowing construction of high-level equipment

Multiple robots can be operated synchronously through the high-speed communication. Use of linking among controllers makes it possible to store programs into only one controller. Use of a newly developed algorithm achieves shortening of the positioning time and improvement of the tracking accuracy.

The control of multiple robots can be managed using one master controller

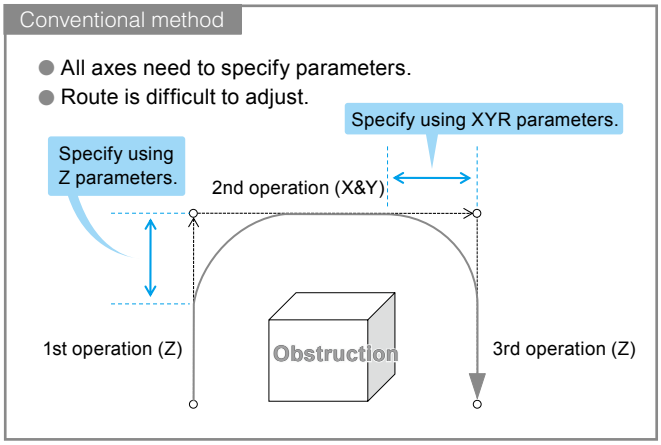
The RCX340 controller allows high-speed communication among the controllers. As the operation command can be sent to the controller of each slave from the master controller, the programs or points can be managed only using the host master controller. Additionally, as this controller supports multi tasks flexibly, data exchanging with the PLC can be simplified. Simultaneous start and simultaneous arrival of each robot can be controlled freely. Complicated and precision robot system using many axes can be constructed at a low cost.

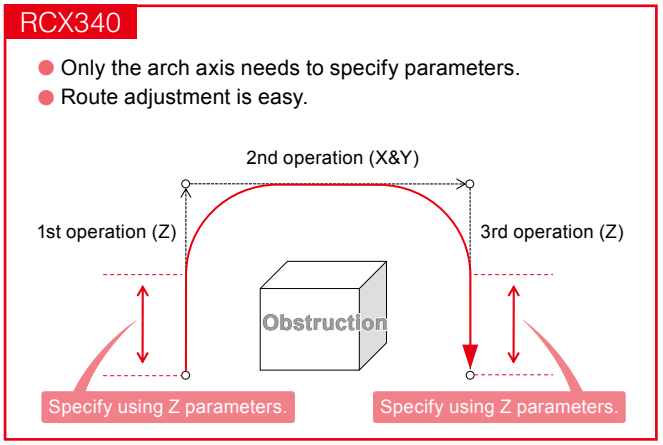




Arch motion can be specified more intuitively

As the arch motion route designation method is changed and the designation method is simplified, the arch motion can be specified more intuitively.





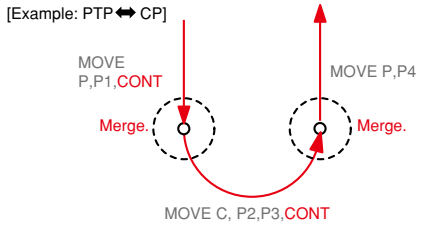
Smooth movement is achieved by greatly improving motion functions

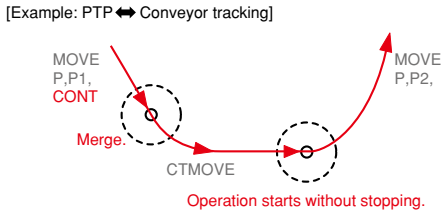
As a new servo motion engine is incorporated, various operations can be merged. Use of a newly developed algorithm achieves shortening of the positioning time and improvement of the tracking accuracy.

Expansion of CONT option function

Different type operations, such as PTP, interpolation operation, and conveyor tracking, etc. are merged to improve the speed.

RCX320 RCX340



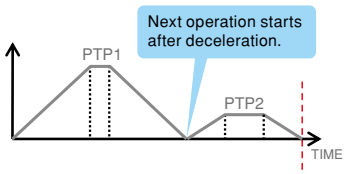


Operation starts without stopping.

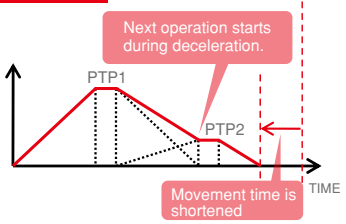
Improvement of operation speed Note

All operations can be merged as much as possible using the merge PTP.
As even operations with different acceleration or deceleration time are merged at maximum level with priority put on the operation time, the movement time is shortened greatly.

Conventional method



Merge PTP operation

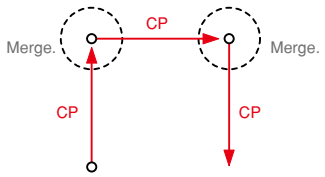


- The PTP1/PTP2 operation pattern is calculated as the merge is preconditioned.
- Maximum merge can be made regardless of operation types to be merged. So, the merge effect is large.

Proper use according to application Note

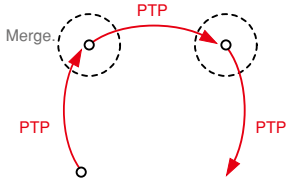
When performing the continuous operation, an optimal operation can be selected according the application, like traditional PATH is used for constant-speed operation, such as sealing and merge PTP is used for operation with priority put on the movement time.

PATH



- Interpolation operation to the final target position is performed at a specified speed.

Merge PTP operation

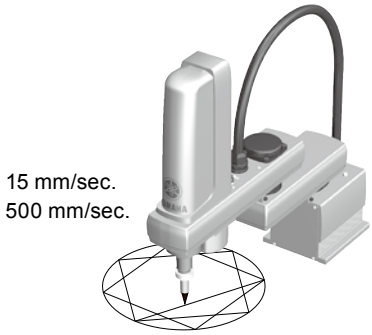


- PTP operation is performed so that the movement time until the final target position becomes the shortest.

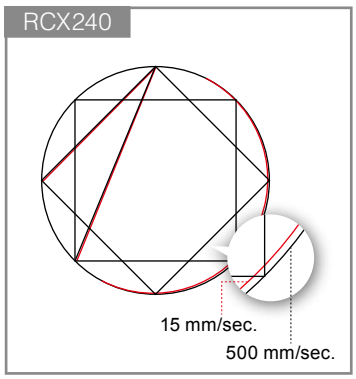
Note. It is necessary to upgrade the firmware to its latest version.

Improvement of tracking accuracy

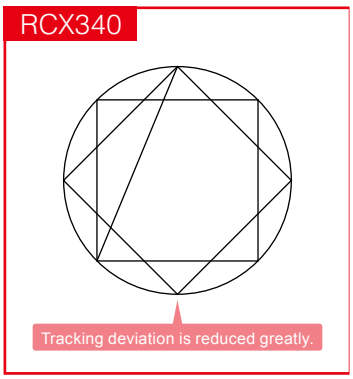
Use of visualization with servo analyze function and high responsiveness with new servo function makes it possible to increase the follow-up ability and improve the tracking accuracy when compared to the conventional models.



RCX240



RCX340



Improved basic performance

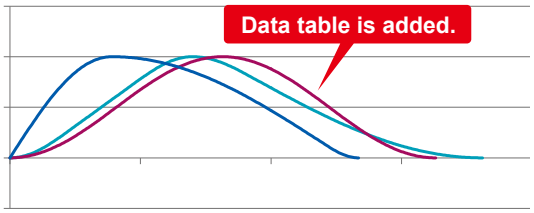
Functions, such as robot language, multi-task, sequence function, communication, and field bus are improved and made easier to use.

Motion optimization

The optimization of the motion to meet the operation pattern is further strengthened to bring out the robot performance at its maximum level. Higher quality robot operations, such as shortening of the operation time and suppression of vibrations during stopping are achieved.

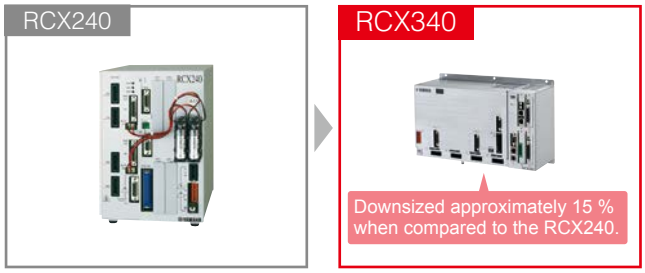
Optimal acceleration/deceleration motion

Acceleration/deceleration motion is generated that can perform the high-speed operation while suppressing vibrations.



Compact design

The outside dimensions are approximately 355 mm (W) × 195 mm (H) × 130 mm (D). The volume ratio is reduced to approximately 85 % and the body size is made compact when compared to the conventional 4-axis controllers so as to make the installation inside the control panel easy.

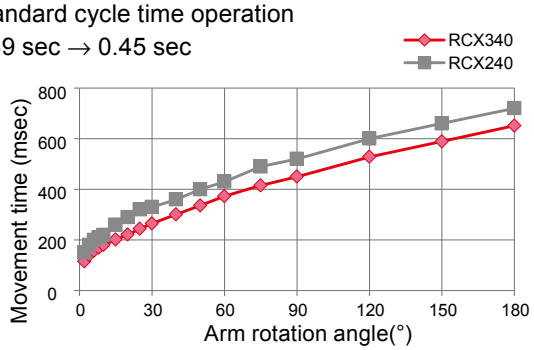


Improvement of cycle time

The speed-up of the YK-XG series is achieved.

Example: YK400XG

- Standard cycle time operation
  0.49 sec → 0.45 sec

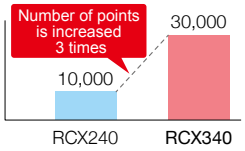


Built-in regenerative unit RCX340

As the regenerative unit (equivalent to RGU3) is built-in, no additional regenerative unit is needed when connecting to the existing robot.

User memory capacity increase

- Number of points is greatly increased.



- Total capacity of program and point

Economical solution for 6 axes robot setup.

Use of the inter-controller “YC-Link/E” system makes it possible to easily link the RCX340 controller with the RCX320 controller. The control of the 6-axis [Note] can be achieved at low cost.

Note. The vertical articulated robot YA series are outside the target.

PBX with USB port for backup

Simple and easy operation for adding function or editing work.

Storing backup data is a simple task.

Convenient LED Display for Error Status.

The operation status is displayed on the “7-segment LED display” located on the front panel of the controller.

If an error occurs, the relevant error message is displayed. The error status can visibly recognized without connecting the programming box.

▲ 7-segment LED display

PC Programming Software “RCX-Studio Pro”

Both RCX340 and RCX320 run with RCX-Studio Pro. With an emulator function, writing programs or debugging can be done without connecting a controller.

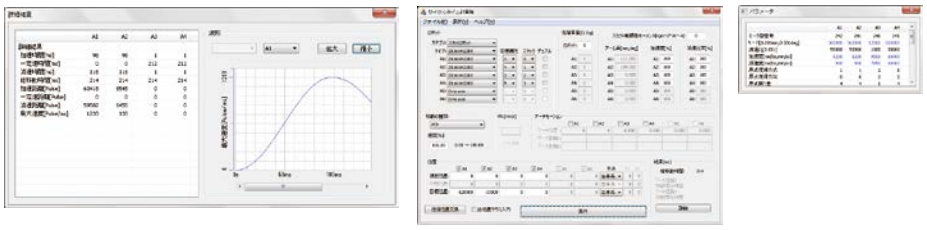
Cycle time calculator between two points simplified a selection of the most suitable robot system. After startup, real-time trace and multi-tasking debug information is displayed simultaneously for monitoring status.

■ **Robot operations like initial setup and maintenance tasks are easier than ever.**

Model Selection Stage

Reduces evaluation time before design stage.

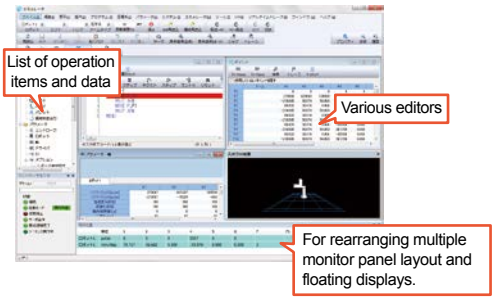
- **Emulator function** ➤ The software can be debugged in the offline mode.
- **Cycle time calculator** ➤ Easy selection of the most suitable robot system.



Design Stage

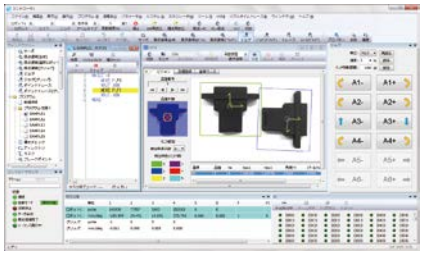
Reduced design workload

- **Easy-to-use operating controls**



- **iVY2 editor provide**

The component type can be registered without changing the software when the robot vision is used.

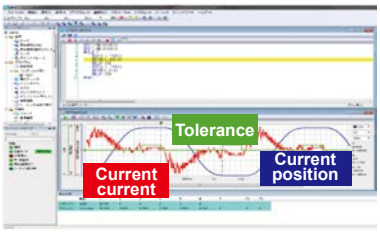


Startup and Operation Stage

Visualized information for easy monitoring.

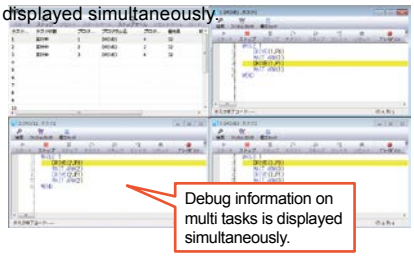
- **Realtime trace**

The internal information of the controller is output continuously.



- **Application debugging function**

The debugging statuses of multiple tasks can be displayed simultaneously.

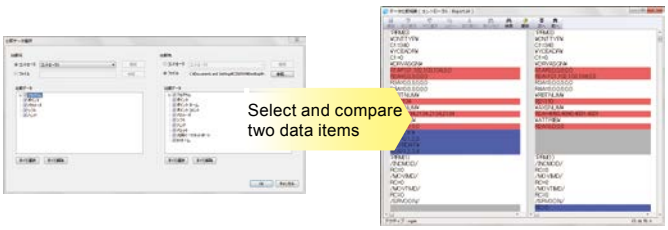


Maintenance

The maintenance and service time is reduced greatly.

- **Data comparison tool**

The specified two data is compared to visually display the difference.
Comparison of all or by program “.all” files or comparison with online data can be selected.



Enhanced expandability

RS-232C and Ethernet ports are provided as standard equipment. A wide variety of high-speed and large capacity field networks, such as CC-Link, DeviceNet™, EtherNet/IP™, and EtherCAT are supported as options. Connections with general-purpose servo amplifier or other company's VISION are easy. So, the RCX320 and RCX340 is called "connectable controller".

Communication between controllers

YC-Link/E

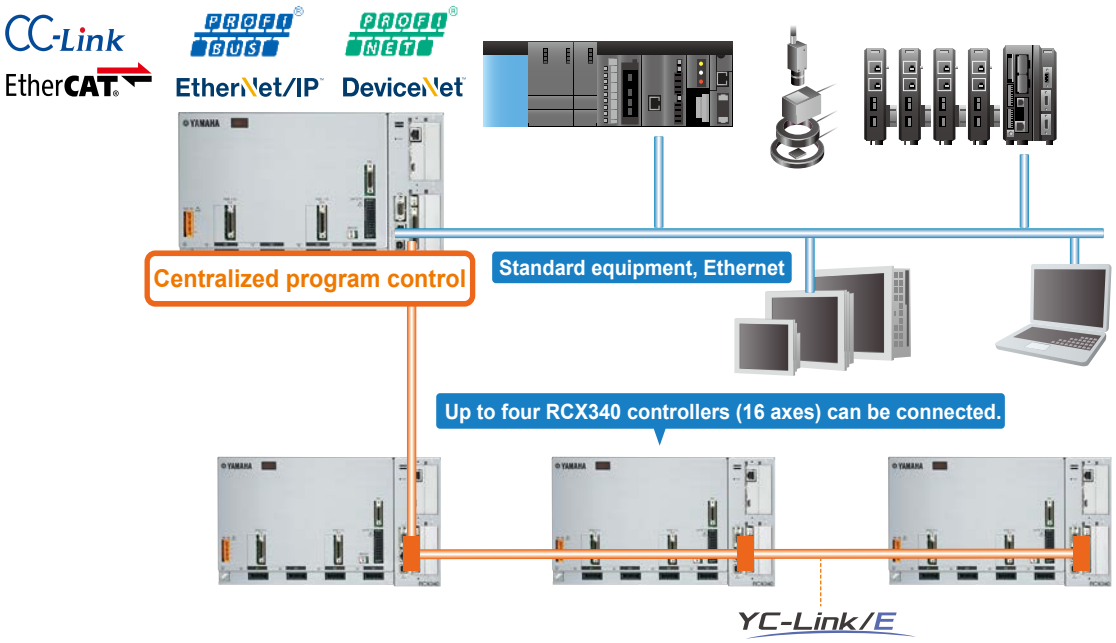
Up to four RCX320 and RCX340 controllers (up to 16 controllable axes) can be connected.

- More flexible robot configuration
- Easy programming
- Centralized control of multiple robots
- Cost reduction

Applicable to various field buses/centralized control of robots through connections of up to four controllers

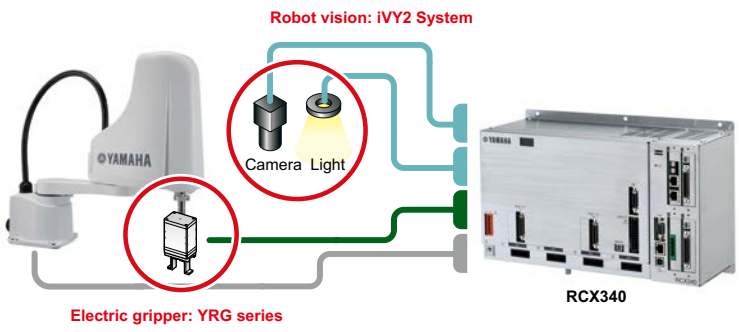
RS-232C and Ethernet ports are provided as standard equipment. Additionally, fulfilling field buses, such as CC-Link, EtherNet/IP™, DeviceNet™, PROFIBUS, PROFINET Note 1, and EtherCAT can be supported to connect and control a wide variety of devices. For 5 or more axes, use of YC-Link/E makes it possible to connect up to four RCX340 controllers so as to perform the centralized control of multiple robots.
Additionally, when using YC-Link/E Note 2, multiple robots can be handled as if they are operated using one controller. This ensures very easy robot programming and management.
Therefore, this robot controller contributes to reduction of unseen costs, such as labor cost necessary for the setup work.

Note 1. Supports PROFINET Ver. 2.2
Note 2. When ordering YC-Link/E, please specify what robot is connected to what number controller.



Applicable to electric gripper "YRG series"

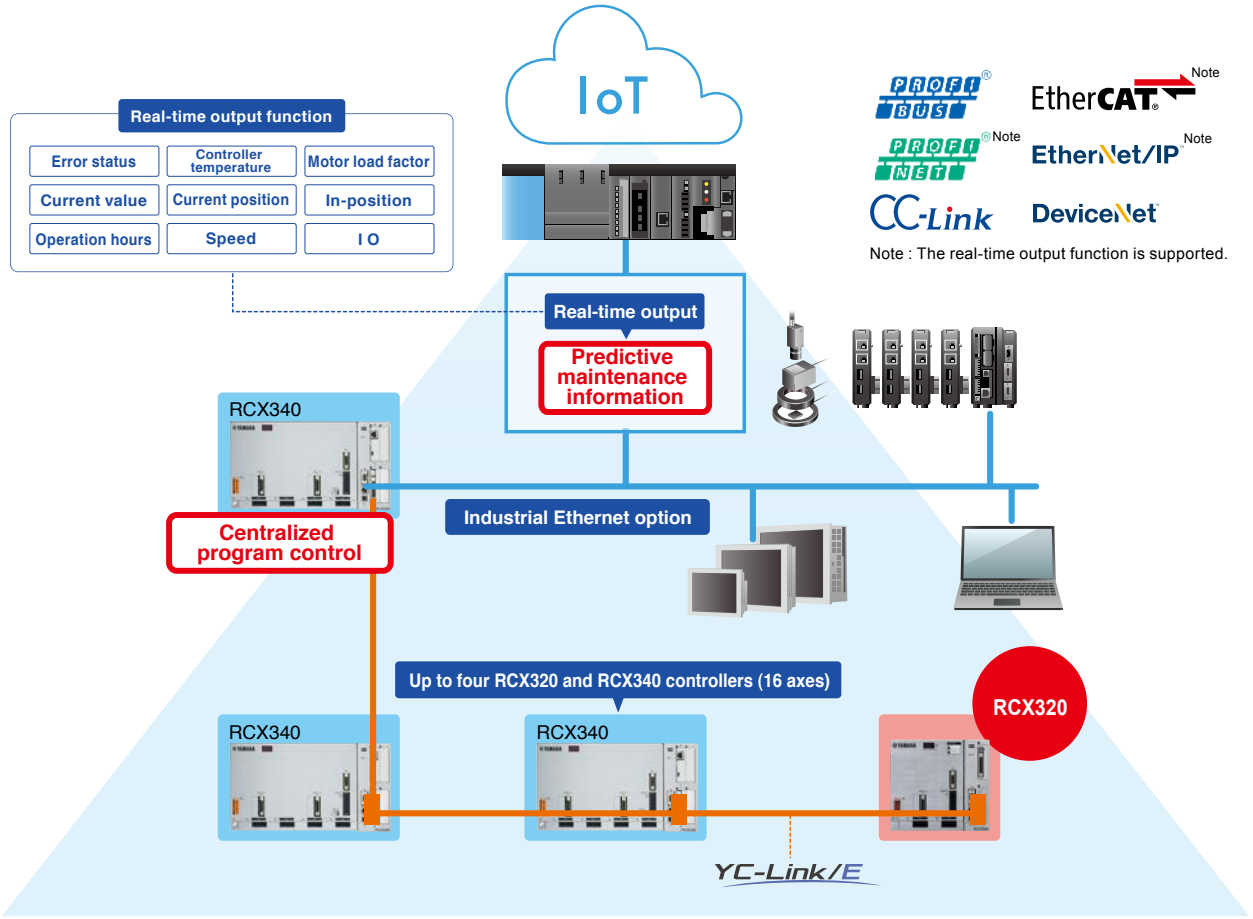
The gripper can be controlled entirely by one RCX320 or RCX340 controller. Data exchanging with the host unit, such as PLC is not needed. The setup or startup is very easy.



Real-Time output function for Preventive Maintenance.

Industrial Ethernet option Real-Time output function

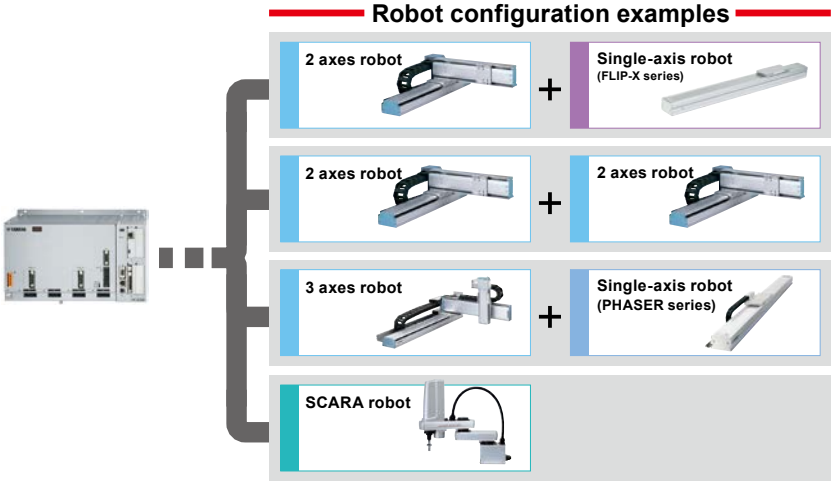
When the industrial Ethernet option (Ethernet/IP, EtherCAT, or Profinet) is selected, the information necessary for the predictive maintenance such as error status, current position, current value, motor load factor, operation hours, and others can be output in real-time to contribute to achievement of the “non-stop production line”.

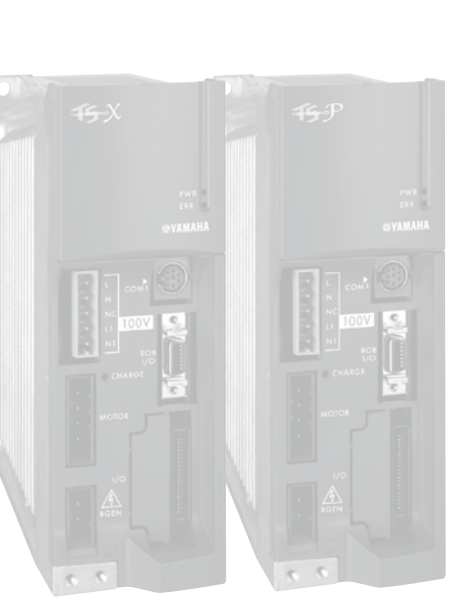
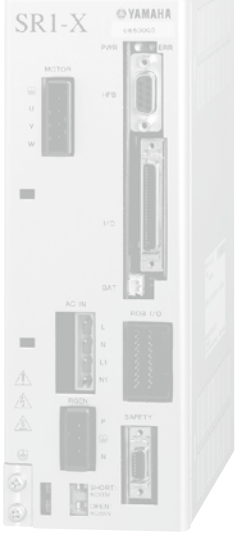
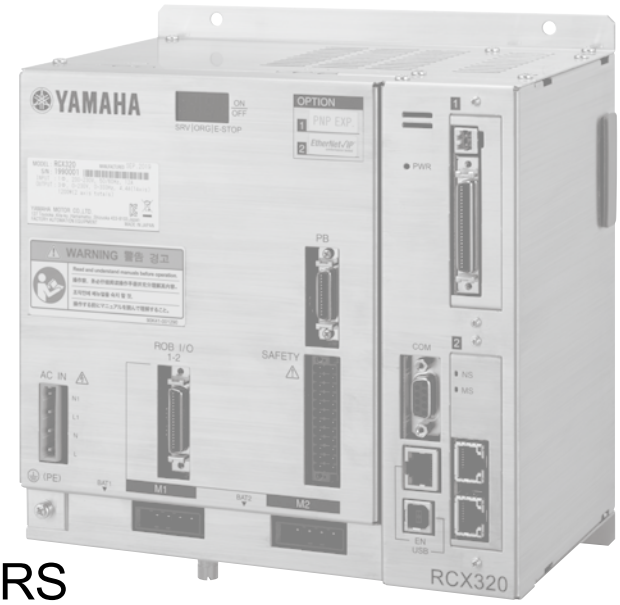


RCX340 are applicable to all single-axis, Cartesian, SCARA, and P&P robots Note

The 4-axis robot controller RCX340 are applicable to all robot models including single-axis, Cartesian, SCARA, and Pick & Place robots.
As the mixed control of the ball screw type FLIP-X series and linear motor type PHASER series can be performed, the robots can be combined freely according to the applications. Additionally, when preparing the robot controllers for the maintenance work of multiple robots, it is enough to prepare only one robot controller. This robot controller can be used for any model only by changing the setting.

Note. Except for 24 V specification models.



YAMAHA ROBOT CONTROLLERS

CONTROLLER

CONTENTS

Main functions ▶ P.58

CONTROLLER FEATURE DESCRIPTION

Single-axis

Dedicated robot controller for the LCM100

Linear conveyor module

LCC140

Linear conveyor module LCM100

P.508

Operating method	Programming/I/O point tracing/ Remote command/Operation using RS-232C communication
Points	10,000 points
Input power	Single phase 200 to 230V AC +/-10% maximum (50/60Hz)
Origin search method	Incremental
Field networks	CC-Link, DeviceNet™, EtherNet/IP™

Single-axis robot positioner

TS-S2/TS-SH

Dedicated compact single-axis... TRANSERVO Note 1

P.514

Note 1. SG07 is only applicable to TS-SH.

Operating method	I/O point tracing/Remote command/ Operation using RS-232C communication
Points	255 points
Input power	Main power supply DC24V +/-10% Control power supply DC24V +/-10%
Origin search method	TS-S2 : Incremental TS-SH : Absolute Incremental
Field networks	CC-Link, DeviceNet™, EtherNet/IP™, PROFINET

Single-axis robot positioner

TS-X/TS-P

Single-axis robot ..... FLIP-X
Linear motor single-axis ..... PHASER

P.514

Operating method	I/O point tracing/Remote command/ Operation using RS-232C communication
Points	255 points
Input power	AC100V/AC200V
Origin search method	TS-X : Absolute Incremental TS-P : Incremental Semi-absolute
Field networks	CC-Link, DeviceNet™, EtherNet/IP™, PROFINET

Single-axis robot driver

TS-SD

Dedicated compact single-axis... TRANSERVO

P.524

Operating method	Pulse train control
Input power	Main power supply DC24V +/-10% Control power supply DC24V +/-10%
Origin search method	Incremental
Field networks	Not supported

Single-axis robot driver

RDV-X/RDV-P

[RDV-X] Single-axis robot ..... FLIP-X
[RDV-P] Linear motor single-axis..... PHASER

P.528

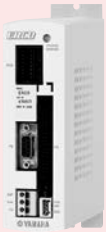
Operating method	Pulse train control
Input power	Main power supply Single phase/3-phase 200V to 230V Control power supply Single phase 200V to 230V
Origin search method	Incremental
Field networks	Not supported

Single-axis robot controller

ERCD

Single-axis robot..... T4L/T5L
Clean single-axis C4L/C5L

P.534



Operating method	Pulse train control/Programming/ I/O point tracing/Operation using RS-232C communication
Points	1000 points
Input power	DC24V +/-10% maximum
Origin search method	Incremental
Field networks	Not supported

Single-axis robot controller

SR1-X/SR1-P

Single-axis robot..... FLIP-X
Linear motor single-axis ..... PHASER

P.540

Operating method	Programming/I/O point tracing/ Remote command/Operation using RS-232C communication
Points	1000 points
Input power	AC100V/AC200V
Origin search method	SR1-X Absolute Incremental SR1-P Incremental Semi-absolute
Field networks	CC-Link, DeviceNet™, PROFIBUS

1 to 2 axis

Multi-axis robot controller
RCX320

Single-axis robot.....FLIP-X
Linear motor single-axis .....PHASER
Cartesian robot .....XY-X
Pick & place.....YP-X

P.548

Operating method	Programming/Remote command/ Operation using RS-232C communication
Points	30000 points
Input power	Single phase 200 to 230V AC +/-10% maximum (50/60Hz)
Origin search method	Absolute Incremental
Field networks	CC-Link, DeviceNet™, EtherNet/IP™, Ethernet, PROFIBUS, PROFINET, EtherCAT

Multi-axis robot controller
RCX221/ RCX221HP

Single-axis robot.....FLIP-X
Linear motor single-axis .....PHASER
Cartesian robot .....XY-X
Pick & place.....YP-X

P.558

Operating method	Programming/Remote command/ Operation using RS-232C communication
Points	10000 points
Input power	AC200V
Origin search method	Incremental Semi-absolute
Field networks	CC-Link, DeviceNet™, Ethernet, PROFIBUS

Multi-axis robot controller
RCX222/ RCX222HP

Single-axis robot.....FLIP-X
Cartesian robot .....XY-X
Pick & place.....YP-X

P.558

Operating method	Programming/Remote command/ Operation using RS-232C communication
Points	10000 points
Input power	AC200V
Origin search method	Absolute Incremental
Field networks	CC-Link, DeviceNet™, Ethernet, PROFIBUS

1 to 4 axis

Multi-axis robot controller
RCX340

Single-axis robot.....FLIP-X
Linear motor single-axis .....PHASER
Cartesian robot .....XY-X
SCARA robot.....YK-TW, YK-XG, YK-XR, YK-XGS, YK-XGP
Pick & place.....YP-X

P.566

Operating method	Programming/Remote command/ Operation using RS-232C communication
Points	30000 points
Input power	Single phase 200 to 230V AC +/-10% maximum (50/60Hz)
Origin search method	Absolute Incremental
Field networks	CC-Link, DeviceNet™, EtherNet/IP™, Ethernet, PROFIBUS, PROFINET, EtherCAT

CONTROLLER SPECIFICATION SHEET

Category			Robot controller	Robot positioner				Robot driver			
Name			LCC140	TS-S2	TS-SH	TS-X	TS-P	TS-SD	RDV-X	RDV-P	
External view											
Operating method			Programming/ I/O point tracing/ Remote command/ Operation using RS-232C communication	I/O point tracing/Remote command/ Operation using RS-232C communication				Pulse train control			
Applicable robot	LCM100		●	—	—	—	—	—	—	—	
	TRANSERVO		—	● Note 2	●	—	—	●	—	—	
	FLIP-X	T4L/T5L/C4L/C5L	—	—	—	—	—	—	—	—	
		FLIP-X other than above	—	—	—	●	—	—	●	—	
	PHASER		—	—	—	—	●	—	—	●	
	XY-X		—	—	—	—	—	—	—	—	
	YK-X		—	—	—	—	—	—	—	—	
	YP-X		—	—	—	—	—	—	—	—	
Input power	Main power supply		Single phase 200 to 230V AC +/-10% maximum (50/60Hz)	DC24V +/-10% maximum		● **AC100V specifications** Note 1 (105 / 110 driver) Single phase 100 to 115V AC +/-10% maximum (50/60Hz) ● **AC200V specifications** (205 / 210 / 220 driver) Single phase 200 to 230V AC +/-10% maximum (50/60Hz)		DC24V +/-10% maximum	Single phase / 3-phase 200 to 230V +10% to -15% (50/60Hz +/-5%)		
	Control power supply			DC24V +/-10% maximum				DC24V +/-10% maximum	Single phase 200 to 230V AC +10% to -15% (50/60Hz +/-5%)		
Number of controllable axes			Single-axis	Single-axis				Single-axis			
Origin search method			Incremental	Incremental	Absolute/ Incremental	Absolute/ Incremental	Incremental/ Semi-absolute	Incremental			
Maximum number of programs			100	(program not required)				—	—		
Maximum number of steps per program			999 steps	(program not required)				—	—		
Points			10,000 points	255 points				—	—		
Multitasks			4	—	—	—	—	—	—		
I/O points	Dedicated I/O		8 points/4 points	16 points/16 points	16 points/16 points	16 points/16 points	16 points/16 points	—	—		
	General I/O		16 points/16 points	—	—	—	—	—	—		
Field network support	CC-Link		●	●	●	●	●	—	—	—	
	DeviceNet		●	●	●	●	●	—	—	—	
	EtherNet/IP		●	●	●	●	●	—	—	—	
	Ethernet		—	—	—	—	—	—	—	—	
	PROFIBUS		—	—	—	—	—	—	—	—	
	PROFINET		—	●	●	●	●	—	—	—	
	EtherCAT		—	—	—	—	—	—	—	—	
CE marking			—	●	●	●	●	●	●	●	
Programming box			HPB / HPB-D (with enable switch)	HT1 / HT1-D (with enable switch)				—	—		
Support software for PC			POPCOM+	TS-Manager				TS-Manager	RDV-Manager		
Detailed info page			P.508	P.514				P.524	P.528		

Note 1. 20A specifications provide only 200V.
Note 2. Exclude SG07
Note 3. Exclude YK400XR
Note 4. Maximum number of general-purpose I/O points when a total of two option boards OP.1 and OP.2 (one each) are installed.
Note 5. Maximum number of general-purpose I/O points when option OP.DIO boards (4 boards) are installed.

	Robot controller						
	ERCD	SR1-X	SR1-P	RCX320	RCX221 RCX221HP	RCX222 RCX222HP	RCX340
							
	Pulse train control/ Programming/ I/O point tracing/ Operation using RS-232C communication	Programming/I/O point tracing/ Remote command/ Operation using RS-232C communication		Programming/Remote command/ Operation using RS-232C communication			
	—	—	—	—	—	—	—
	—	—	—	—	—	—	—
	●	—	—	—	—	—	—
	—	●	—	●	●	●	●
	—	—	●	●	●	—	●
	—	—	—	●	●	●	●
	—	—	—	—	—	—	●
	—	—	—	●	—	●	●
	DC24V +/-10% maximum	● **05 / 10 driver** Single phase 100 to 115V/200 to 230V AC +/-10% maximum (50/60Hz) ● **20 driver** Single phase 200 to 230V AC +/-10% maximum (50/60Hz)		Single phase 200 to 230V AC +/-10% maximum (50/60Hz)			
	Single-axis	Single-axis		2 axes maximum Max. number of robots 4	2 axes maximum	2 axes maximum	Max. number of robots 4 Max. number of controllable axes 16
	Incremental	Absolute/ Incremental	Incremental/ Semi-absolute	Absolute/ Incremental/ Semi-absolute	Incremental/ Semi-absolute	Absolute/ Incremental	Absolute/ Incremental/ Semi-absolute
	100	100		100	100	100	100
	1024 steps	3000 steps		9999 steps	9999 steps	9999 steps	9999 steps
	1000 points	1000 points		30000 points	10000 points	10000 points	30000 points
	4	4		16	8	8	16
	8 points/3 points	8 points/4 points		8 points/9 points	10 points/12 points	10 points/12 points	8 points/9 points
	6 points/6 points	16 points/16 points		96 points/64 points (Max.) Note 5	40 points/24 points(Max.) Note 4	40 points/24 points(Max.) Note 4	96 points/64 points (Max.) Note 5
	—	●	●	●	●	●	●
	—	●	●	●	●	●	●
	—	—	—	●	—	—	●
	—	—	—	●	●	●	●
	—	●	●	●	●	●	●
	—	—	—	●	—	—	●
	—	—	—	●	—	—	●
	—	●	●	●	●	●	●
	HPB / HPB-D (with enable switch)			PBX / PBX-E (with enable switch)	RPB / RPB-E (with enable switch)		PBX / PBX-E (with enable switch)
	POPCOM+			RCX-Studio Pro	VIP+		RCX-Studio Pro
	P.534	P.540		P.548	P.558		P.566

Controller operating methods

- Point trace : Host device specifies a binary point number and robot moves to the specified point when a start signal is input. Controller does not need a program and operates just by teaching point data.
- Remote command : Controller issues a wide range of commands and data to the robot via CC-Link or DeviceNet™ word functions. Host device can freely use robot controller functions as needed.
- Pulse train : Controller operates robot by pulse train from positioner unit. Controller needs no programs or point data. Pulse train operation is convenient to allow the host device to concentrate on robot control.
- Online instructions : PC can send various commands and data directly to the robot controller via RS232C or Ethernet and receive status information and data.

LCC140

Dedicated controller for LCM100

This is a dedicated controller for the LCM100 linear conveyor module. In addition to controlling movement, positioning, and input/output signals, it can also perform operations related to slider insertion and ejection.

LCC140

Main functions ▶ P.15

Programming box
▶ HPB/HPB-D
P.585

Support software for PC
▶ POPCOM+
P.578

Basic specifications

Item		LCC140
Controllable robot		Linear conveyor module LCM series
Power supply capacity		350 VA
External dimensions		W:402.5 × H:229 × D:106.5 mm
Weight		4.8 kg
Control power supply input		Single-phase 200 to 230 V AC +/-10% (50/60 Hz)
Main power supply input		Single-phase 200 to 230 V AC +/-10% (50/60 Hz)
Control method		AC fully digital software servo
Position detection method		Magnetic linear scale
Emergency stop input		Normal close contact input
Output signal		Contact output: MPRDY
Communication		RS-232C 2ch (HPB/COM, RFID)
Program		Max. 999 steps/single program, Max. 10000 steps/all programs, Max. 100 programs
Points		10000 points
System backup		Lithium battery
Multitasking		Max. 4 tasks
Usage temperature		0 to 40 °C
Storage temperature		-10 to 65 °C
Usage humidity		35 to 85%RH (no dewing)
Noise resistance		IEC61000-4-4 level 3
CC-Link unit	CC-Link compatible version	Ver. 1.10
	Remote station type	Remove device station
	Number of occupied stations	Fixed to 2 stations
	Station number	1 to 63 (Set from HPB)
	Communication speed	10M/5M/2.5M/625K/156Kbps (Set using HPB or POPCOM+.)
	Shortest length between stations	0.2 m or more
	Total length	100m/10Mbps, 160m/5Mbps, 4000m/2.5Mbps, 900m/625Kbps, 1200m/156Kbps
	Monitor LED	None
	CC-Link I/O points	General-purpose input 32 points General-purpose output 32 points Dedicated input 16 points Dedicated output 16 points Input register 8 words Output register 8 words

Controllable robot	LCM100 P.126
CE marking	—
Field networks	CC-Link DeviceNet EtherNet/IP

Model Overview

Name	LCC140
Controllable robot	Linear conveyor module LCM100
Power	Single-phase AC200 to 230V +/-10% or less (50/60Hz)
Operating method	Programming/I/O point tracing/Remote command/ Operation using RS-232C communication

Ordering method

LCC140 - 10 -

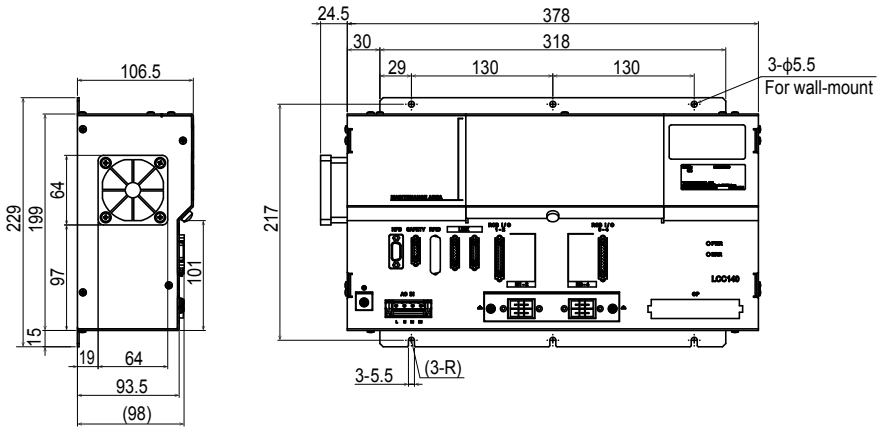
Controller	Current sensor	Network option Note
	10:10A	No entry: None
		CC: CC-Link
		DN: DeviceNet™
		EP: EtherNet/IP™

Note. For 2MT, be sure to select an appropriate network option.

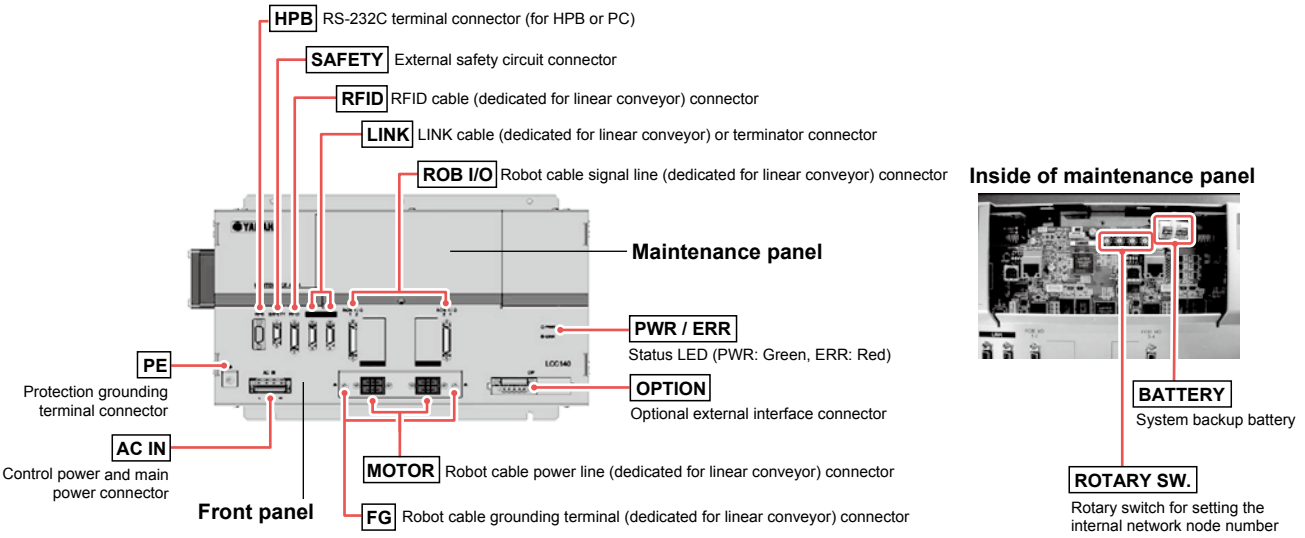
Item			LCC140	
DeviceNet™ unit	Applicable DeviceNet™ specifications		Volume 1 Release2.0, Volume 2 Release2.0	
	DeviceNet™ Conformance test		Compliant with CT24	
	Device profile/Device type number		Generic Device (keyable) / 2B Hex	
	Vendor name/Vendor ID		YAMAHA MOTOR CO.,LTD. / 636	
	Product code		21	
	Product revision		1.0	
	EDS file name		Yamaha_LCC1(DEV).eds	
	MAC ID setting		0 to 63 (Set using HPB or POPCOM+.)	
	Communication speed setting		500K/250K/125Kbps (Set using HPB or POPCOM+.)	
	Communication data		Predefined Master/Slave Connection Set: Group 2 only server Dynamic connection support (UCMM): None Support for divided transmission of explicit message: Yes	
	Network length	Total length	100m/500Kbps, 250m/250Kbps, 500m/125Kbps	
		Branch length	6m or less	
		Total branch length	39m or less/500Kbps, 78m or less/250Kbps, 156m or less/125Kbps	
	Monitor LED		None	
	Number of DeviceNet™ I/O points/number of occupied channels		General-purpose input 32 points General-purpose output 32 points Dedicated input 16 points Dedicated output 16 points Input register 8 words Output register 8 words	Input: 24byte Output: 24byte
EtherNet/IP™ unit	Applicable software version		LCC140: Ver. 64.07 or higher HPB/HPB-D: Ver. 24.06 or higher POPCOM+: Ver. 2.1.0 or higher	
	Applicable EtherNet/IP™ specifications		Volume 1: Common Industrial protocol(CIP™) Edition 3.14 Volume 2: EtherNet/IP™ Adaptation of CIP™ Edition 1.15	
	EtherNet/IP™ Conformance test		Compliant with CT11	
	Device profile/Device type number		Generic Device (keyable) / 2B Hex	
	Vendor name/Vendor ID		YAMAHA MOTOR CO.,LTD. / 636	
	Product code		23	
	Product revision		1.1	
	EDS file name		Yamaha_LCC1(EIP2).eds	
	Communication speed		10Mbps / 100Mbps	
	Connector specifications		RJ-45 connector (8-pole modular connector), 2 ports	
	Applicable cable specifications		STP cable (double shield) with CAT 5e or higher	
	Maximum cable length		100m	
	Monitor LED		Module Status(MS), Network Status(NS), Link/Activity:Port1-2	
	Number of EtherNet/IP™ I/O points/number of occupied channels		General-purpose input 32 points General-purpose output 32 points Dedicated input 16 points Dedicated output 16 points Input register 8 words Output register 8 words	Input: 24byte Output: 24byte

LCC140

Dimensions

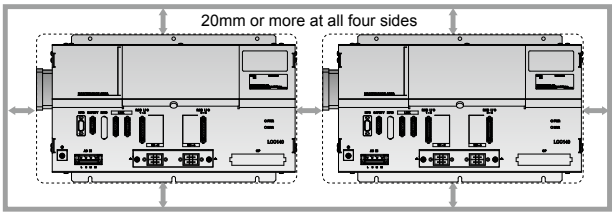


Part names



Installation conditions

- Reserve a space for the controller in the vicinity of the module.
- Install the controller perpendicularly to the wall.
- Reserve enough margins around the controller (20 mm or more on each side) and ensure sufficient ventilation.
  (See fig. at right.)
- Environmental temperature: 0 to 40°C
- Environmental humidity: 35 to 85%RH (no condensation)



Reference for power supply capacity and heat generation quantity

The power capacity and heat generation quantity required for the linear conveyor may vary depending on the module type or operation duty. Prepare the power supply and investigate the control panel size, controller layout, and cooling method while referring to the table below.

Reference values for actual operation (per LCC140 controller)

Module type	Number of motors	Power supply capacity			Heat generation quantity (during operation)
		Control power supply	During waiting	During slider operation	During slider operation
LCM100-4M	4	35VA	60VA	350VA	20W
LCM100-3M	3	35VA	54VA	271VA	16W
LCM100-2MT	2	35VA	48VA	193VA	11W

The power capacity and heat generation quantity values stated in the table show the maximum values of LCC140 and they do not exceed these values. Since the operation duty of each motor of the linear conveyor is low due to operating characteristics, the power capacity required for actual operation becomes about 1/4 to 1/3 of the maximum capacity value.

Maximum capacity values (per LCC140 controller)

Model	Power supply capacity	Heat generated
LCM100	1200VA	70W

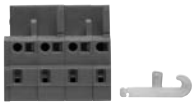
Option parts

LCC140

Options

Power connector + wiring connection lever

One set of parts per LCC140 is required.



Model	KAS-M5382-00

LCC140 / TS-X / TS-P / SR1-X / SR1-P / RCX320 / RCX221 / RCX222 / RCX340

HPB dummy connector

When performing the operation with the programming box HPB removed, connect this dummy connector to the HPB connector.
One connector per LCC140 is required.

Model	KDK-M5163-00

LCC140 / SR1-X / SR1-P

SAFETY connector

One connector per LCC140 is required.

Not wired (plug + shell kit)

Wired Note

Model	Not wired	KDK-M5370-10
	Wired Note	KDK-M5370-00

Note. The wired connector is that the wiring for the emergency stop cancel was performed inside the connector. Select this model when performing the operation check or debugging with single linear conveyor.

LCC140

LINK cable

([Number of modules] - 1) cables per line are required.

Model	1m	KDK-M5361-10
	3m	KDK-M5361-30
	5m	KDK-M5361-50

LCC140

Terminator connector

When connecting modules, two connectors per line are required.

Model	KDK-M5361-00

LCC140

Dust cover (for LINK connector)

This dust cover is attached to the insertion port, into which the the LINK cable terminator connector is not inserted.
When using only one module without connections, two dust covers are required.

Model	KDK-M658K-00 (for MDR20 pin)

Note. The dust cover is essential for the 2MT.

LCC140

Programming box HPB/HPB-D P.585

All operations, such as robot manual operation, program input or edit, teaching, and parameter setting can be performed with this programming box.

HPB HPB-D

	HPB	HPB-D
Model	KBB-M5110-01	KBB-M5110-21
Enable switch	–	3-position
CE marking	Not supported	Applicable

LCC140 / ERCD / SR1-X / SR1-P

Support software for PC POPCOM+ P.578

POPCOM is a simple to use application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

Model	KBG-M4966-00

LCC140 / ERCD / SR1-X / SR1-P

POPCOM+ environment

OS	Windows XP (32bit), Vista, 7, 8 / 8.1, 10 (Supported version: V.2.1.1 or later)
CPU	Processor that meets or exceeds the suggested requirements for the OS being used.
Memory	Suggested amount of memory or more for the OS being used.
Hard disk	50MB of available space required on installation drive.
Disk operation	RS-232C
Applicable controllers	SRCX to SR1, DRCX, TRCX, ERCX, ERCD, LCC140 Note 1

Note 1. LCC140 is applicable to Ver. 2.1.1 or later.
Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

Continues on next page

Options

Data cables
Communication cable for POPCOM+.
Select from USB cable or D-sub cable.

Model		
	USB type (5m)	KBG-M538F-00
	D-Sub type 9pin-9pin (5m)	KAS-M538F-10

Note. This USB cable supports Windows 2000/XP or later.
Note. Data cable jointly used for POPCOM+, VIP+, RCX-Studio Pro.
Note. USB driver for communication cable can also be downloaded from our website.

LCC140 ERCD SR1-X SR1-P RCX320 RCX221 RCX222 RCX340

RFID

RFID (manufactured by BALLUFF GmbH)
Reader/writer cable

Model	KDK-M6300-00

Note. Whether or not the RFID system can be used may vary depending on the destination place (country).
Before selecting a RFID system, please contact YAMAHA.

RFID (manufactured by OMRON)
Antenna amplifier controller cable

Model	KDK-M6300-A0

Note. Whether or not the RFID system can be used may vary depending on the destination place (country).
Before selecting a RFID system, please contact YAMAHA.

Dust cover (for RFID)
This cover is attached to the insertion port if RFID is not used. (Included as standard)

Model	KDK-M658K-10 (for MDR26 pin)

Note. Whether or not the RFID system can be used may vary depending on the destination place (country).
Before selecting a RFID system, please contact YAMAHA.

Maintenance parts

Robot cable for LCM100

Model	
	KDJ-M4751-30 (3m×1 pc.)
	KDJ-M4751-50 (5m×1 pc.)
	KDJ-M4755-30 (Flexible cable 3m×1 pc.)
	KDJ-M4755-50 (Flexible cable 5m×1 pc.)

LCC140

Lithium battery for system backup

Model	KDK-M4252-00

LCC140

Replacement filter for LCC140 (5 pcs. in package)

Model	KDK-M427G-00

LCC140

MEMO

TS-S2/TS-SH/TS-X/TS-P

● CE compliance

TS series are positioner type controllers that only performs point trace. No program is needed. Operation is simple. After setting point data, specify the point number and enter a START signal from host controller such as a PLC. Positioning or pushing operation then begins.

Main functions ▶ P.64

Handy terminal
▶ HT1/HT1-D
P.584

Support software for PC
▶ TS-Manager
P.576

Basic specifications

TS-S2/TS-SH

	Item		Model	TS-S2	TS-SH
Basic specifications	Number of controllable axes			Single-axis	
	Controllable robots			TRANSERVO series	
	Current consumption			2.5A (Rating) 4.5A (Max.)	3.5A (Rating) 6.5A (Max.)
	Dimensions			W30 × H162 × D82mm	W30 × H162 × D123mm
	Weight			Approx. 0.2kg	Approx. 0.3kg
	Input power supply	Control power supply		DC24V +/-10%	
		Motor power supply		DC24V +/-10%	
Axis control	Control method			Closed loop vector control method	
	Operating method			I/O point tracing (Positioning operation by specifying point number) / Remote command	
	Operation types			Positioning, merge-positioning, push, and jog operations	
	Position detection method			Resolver	Resolver with multi-turn absolute function
	Resolution			20480 pulses/rev. or 4096 pulses/rev. depending on the robot	
	Origin search method			Incremental	Absolute / Incremental
Points	Points			255 points	
	Point type setting			(1) Standard setting: Set speed and acceleration in percent of the respective maximum settings. (2) Custom setting: Set speed and acceleration in SI units.	
	Point teaching method			Manual data input (coordinates input), Teaching, Direct teaching	
External input/output	I/O interface			Selectable from the following: NPN, PNP, CC-Link, DeviceNet™, EtherNet/IP™, PROFINET	
	Input			Servo ON (SERVO), reset (RESET), start (START), interlock (/LOCK) origin search (ORG), manual mode (MANUAL), jog motion - (JOG-), jog motion + (JOG+), Point number selection (PIN0 to PIN7)	
	Output			Servo status (SRV-S), alarm (/ALM), operation end (END), operation in-progress (BUSY), control outputs (OUT0 to 3), Point number output 0 to 7 (POUT0 to POUT7)	
	External communications			RS-232C 1CH	
	Safety circuit			Emergency stop input, emergency stop contact output (1 system: When the HT1 is used.)	
Options	Handy terminal			HT1, HT1-D (with enable switch)	
	Support software for PC			TS-Manager	
General specifications	Operating temperature / Operating humidity			0°C to 40°C, 35% to 85%RH (non-condensing)	
	Storage temperature/ Storage humidity			-10°C to 65°C, 10% to 85%RH (non-condensing)	
	Atmosphere			Indoor location not exposed to direct sunlight. No corrosive , flammable gases, oil mist, or dust particles	
	Anti-vibration			All XYZ directions 10 to 57Hz unidirectional amplitude 0.075mm 57 to 150Hz 9.8m/s^2	
	Protective functions			Position detection error, temperature error, overload, overvoltage, low voltage, excessive position deviation, overcurrent, motor current error, motor cable faulty wiring, Excitation power failure error Note 1	

Note 1. The excitation power failure error is a protection function that is available only in TS-SH.

Controllable robot	TS-S2/TS-SH ▶ TRANSERVO P.151	TS-X ▶ FLIP-X P.193	TS-P ▶ PHASER P.239
CE marking	◯	Field networks	CC-Link DeviceNet EtherNet/IP PROFINET

Model Overview

Name		TS-S2	TS-SH	TS-X/TS-P	
Controllable robot		Dedicated compact single-axis TRANSERVO		TS-X: Single-axis robot FLIP-X TS-P: Linear motor single-axis PHASER	
Input power	Main power supply	DC24V +/-10%		● AC100V specifications Main power supply AC100 to 115V+/-10%	● AC200V specifications Main power supply AC200 to 230V+/-10%
	Control power supply	DC24V +/-10%		Control power supply AC100 to 115V+/-10%	Control power supply AC200 to 230V+/-10%
Operating method		I/O point tracing / Remote command /Operation using RS-232C communication			
Maximum number of controllable axes		Single-axis			
Origin search method		Incremental	Absolute / Incremental	TS-X: Absolute / Incremental TS-P: Absolute / Semi-absolute	

Ordering method

TS-S2/TS-SH (TRANSERVO)

Robot positioner	Type	I/O	Battery Note 1
S2: TS-S2	No entry: Standard	NP: NPN	B: With battery (Absolute model)
SH: TS-SH	S: Sensor	PN: PNP	N: None (Incremental model)
		CC: CC-Link	
		DN: DeviceNet™	
		EP: EtherNet/IP™	
		PT: PROFINET	
		GW: With no I/O board	

Note 1. Battery can only be selected for TS-SH. (Not provided for TS-S2).

TS-X/TS-P (FLIP-X/PHASER)

Controller	Driver: Power-supply voltage/ Power capacity	Regenerative unit	LCD monitor	Input/Output Selection	Battery Note 2
TSX: TS-X	105: 100V / 100W more less	No entry: None	No entry: None	NP: NPN	B: With battery (Absolute model)
TSP: TS-P	110: 100V / 200W	R: With RGT	L: With LCD	PN: PNP	N: None (Incremental model)
	205: 200V / 100W more less	R: With RGU-2		CC: CC-Link	
	210: 200V / 200W			DN: DeviceNet™	
	220: 200V / 400 to 600W			EP: EtherNet/IP™	
				PT: PROFINET	
				GW: With no I/O board	

Note 2. Battery can only be selected for TS-X. (Not provided for TS-P).

TS-X/TS-P

	Item		Model	TS-X / TS-P				
				100V AC input		200V AC input		
Basic specifications	Driver model			TS-X105 / TS-P105	TS-X110 / TS-P110	TS-X205 / TS-P205	TS-X210 / TS-P210	TS-X220 / TS-P220
	Number of controllable axes			Single-axis				
	Controllable robots			TS-X: Single-axis robot FLIP-X series TS-P: Linear motor single-axis robot PHASER series				
	Power capacity			400VA	600VA	400VA	600VA	1400VA
	Dimensions			W58 × H162 × D131mm				W70 × H162 × D131mm
	Weight			Approx. 0.9kg				Approx. 1.1kg
	Input power supply	Control power supply		Single phase AC100 to 115V +/-10% 50/60Hz		Single phase AC200 to 230V +/-10% 50/60Hz		
		Motor power supply		Single phase AC100 to 115V +/-10% 50/60Hz		Single phase AC200 to 230V +/-10% 50/60Hz		
Axis control	Control method			Closed loop vector control method				
	Operating method			I/O point tracing (Positioning operation by specifying point number) / Remote command				
	Operation types			Positioning, merge-positioning, push, and jog operations				
	Position detection method			TS-X: Resolver with multi-rotation absolute function TS-P: Magnetic type linear scale				
	Resolution			TS-X: 16384 pulses/rev. TS-P: 1µm				
	Origin search method			TS-X: Absolute / Incremental TS-P: Incremental / Semi-absolute				
Points	Number of points			255 points				
	Point type setting			(1) Standard setting: Set speed and acceleration in percent of the respective maximum settings. (2) Custom setting: Set speed and acceleration in SI units.				
	Point teaching method			Manual data input (coordinates input) , Teaching, Direct teaching				
External input/output	I/O interface			Selectable from the following: NPN, PNP, CC-Link, DeviceNet™, EtherNet/IP™, PROFINET				
	Input			Servo ON (SERVO), reset (RESET), start (START), interlock (/LOCK) origin search (ORG), manual mode (MANUAL), jog motion - (JOG-), jog motion + (JOG+), Point number selection (PIN0 to PIN7)				
	Output			Servo status (SRV-S), alarm (/ALM), operation end (END), operation in-progress (BUSY), control outputs (OUT0 to 3), Point number output 0 to 7 (POUT0 to POUT7)				
	External communications			RS-232C 1CH				
	Power supply for brake			DC24V +/-10% 300mA (prepared by the customer)				
	Safety circuit			Emergency stop input, main power input ready output, emergency stop contact output (1 system: When the HT1 is used.)				
Options	Handy terminal			HT1, HT1-D (with enable switch)				
	Support software for PC			TS-Manager				
General specifications	Operating temperature / Operating humidity			0°C to 40°C, 35% to 85%RH (non-condensing)				
	Storage temperature / Storage humidity			-10°C to 65°C, 10% to 85%RH (non-condensing)				
	Atmosphere			Indoor location not exposed to direct sunlight. No corrosive , flammable gases, oil mist, or dust particles				
	Anti-vibration			All XYZ directions 10 to 57Hz unidirectional amplitude 0.075mm 57 to 150Hz 9.8m/s^2				
	Protective functions			Position detection error, power module error, temperature error, overload, overvoltage, low voltage, excessive position deviation, overcurrent, motor current error				
	Protective structure			IP20				

TS-S2/TS-SH/TS-X/TS-P

TS-X / TS-P specification selection table

Some specifications are automatically determined by the robot model.

TS-X

			T4LH/ C4LH	T5LH/ C5LH	T6L/ C6L	T9	T9H	F8/ C8	F8L/ C8L	F8LH/ C8LH	F10/ C10	F10H	F14/ C14	F14H/ C14H	GF14XL	F17/ C17	F17L/ C17L	GF17XL	F20/ C20	F20N	N15/ N15D	N18/ N18D	B10	B14	B14H	R5	R10	R20
Power supply voltage / Current sensor	TS-X	105	●	●	●	●		●	●	●	●		●										●	●	●	●	●	
		110					●					●		●	●														●
		205	●	●	●	●		●	●	●	●		●										●	●	●	●	●	
		210					●					●		●	●														●
		220														●	●	●	●	●	●	●							
Regenera-tive unit	No entry (None)					(1)	(2)				(1)	(2)	(1)	(2)	●	(3)		(6)	(3)	(4)					(5)			
	R (RGT)					(1)	(2)				(1)	(2)	(1)	(2)		(3)	●	(6)	(3)	(4)	●	●			(5)			

(1) Regenerative unit is needed if using in a perpendicular position and movement stroke is 700mm or more.
(2) Regenerative unit is needed if using in a perpendicular position.
(3) [The following arrangements require a regeneration unit.]
- Using in the upright position.
- To move at a speed exceeding 1,000 mm/sec horizontally.
- High lead (40) used horizontally.

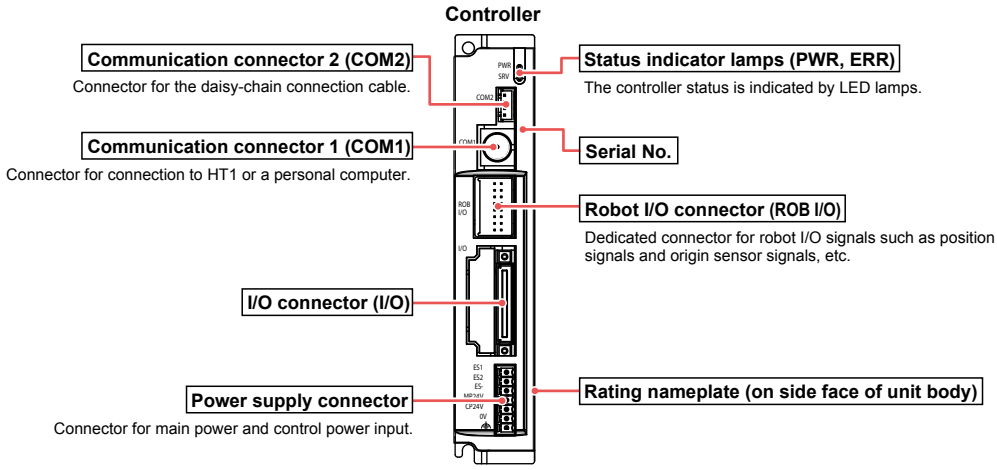
(4) Regenerative unit is needed if using at maximum speeds exceeding 1000mm per second.
(5) Regenerative unit is needed if using at maximum speeds exceeding 1250mm per second.
(6) Regenerative unit is needed if using at maximum speeds exceeding 750mm per second.

TS-P

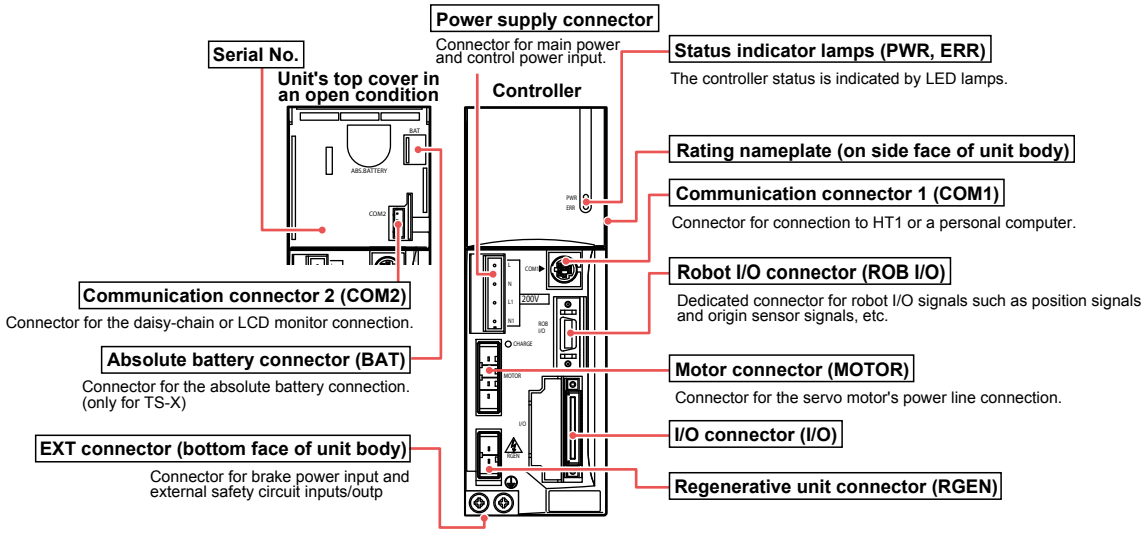
			MF7/7D	MF15/15D	MF20/20D	MF30/30D	MF75/75D
Power supply voltage / Current sensor	TS-P	105					
		110	●	●	●		
		205					
		210	●	●	●		
		220				●	●
Regenera-tive unit	No entry (None)		●	●			
	R (RGT)				●	●	
	R (RGU-2)						●

Part names

TS-S2/TS-SH

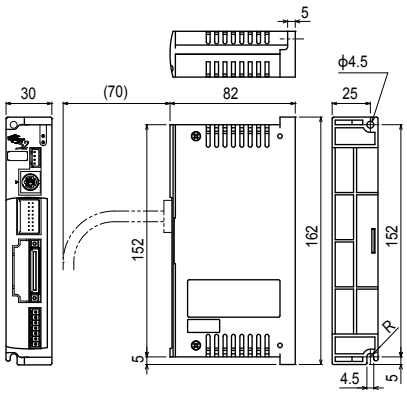


TS-X/TS-P

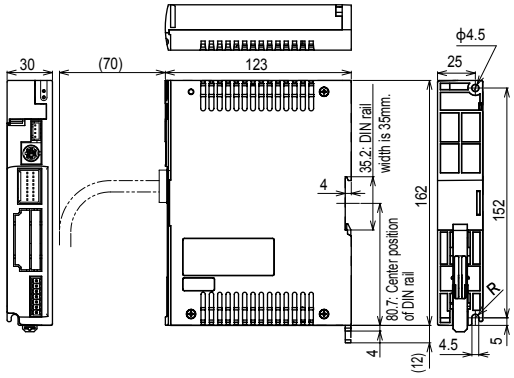


Dimensions

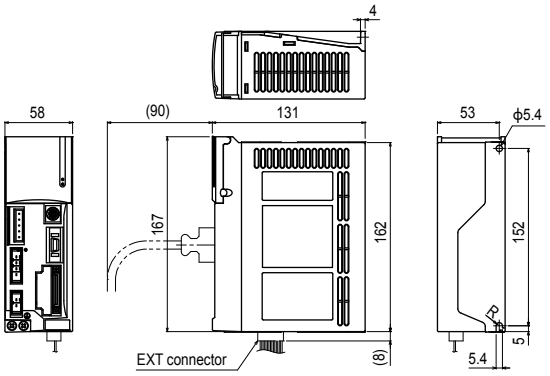
TS-S2



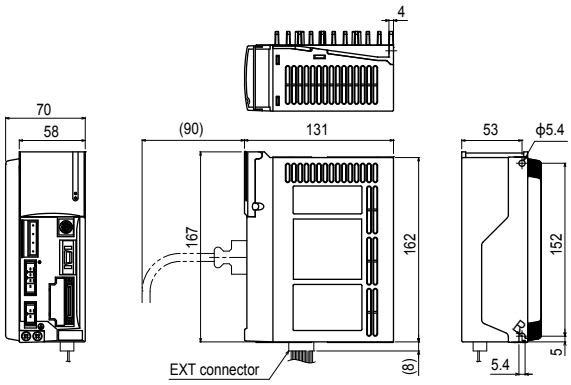
TS-SH



TS-X/TS-P (105/110/205/210)



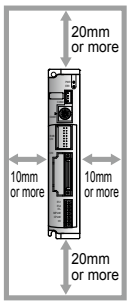
TS-X/TS-P (220)



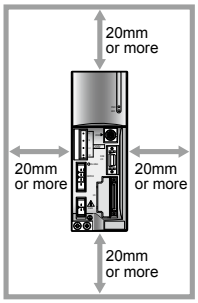
Installation conditions

- Install the TS-S2/TS-SH/TS-X/TS-P inside the control panel.
- Install the TS-S2/TS-SH/TS-X/TS-P on a vertical wall.
- Install the TS-S2/TS-SH/TS-X/TS-P in a well ventilated location, with space on all sides of the TS-S2/TS-SH/TS-X/TS-P (See fig. at right.).
- Ambient temperature : 0 to 40˚C
- Ambient humidity : 35 to 85% RH (no condensation)

TS-S2/TS-SH



TS-X/TS-P



Cautions on TS-S2 / TS-SH

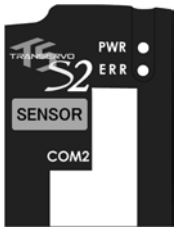
For the RF type sensor specifications, the controllers “TS-S2” and “TS-SH” become “TS-S2S” and “TS-SHS”, respectively.

TS-S2 / TS-SH (Standard specifications)

“BK” label is affixed to the front of the controller.

TS-S2S / TS-SHS (Sensor specifications)

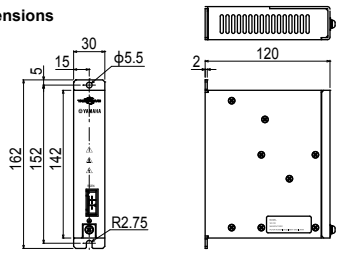
“SENSOR” label is affixed to the front of the controller.
(Be aware that “TS-S2S” is affixed to the front of the controller.)



Regenerative unit RGT/RGU-2

Regenerative unit RGT

Dimensions



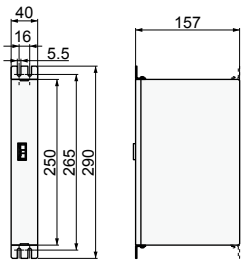
Basic specifications

Item	RGT
Model	KCA-M4107-0A (including cable supplied with unit)
Dimensions	W30 × H142 × D118mm (Not including installation stay)
Weight	470g
Regenerative voltage	Approx. 380V or more
Regenerative stop voltage	Approx. 360V or less
Accessory	Cable for connection with controller (300mm)

Note. Always leave an empty space (gap of about 20mm) between this unit and the adjacent controller.
Also, always use the dedicated cable when connecting the controller.

Regenerative unit RGU-2

Dimensions



Basic specifications

Item	RGU-2 TS-P
Model	KCA-M4107-2A (including cable supplied with unit)
Dimensions	W40 × H250 × D157mm
Weight	0.9kg
Regenerative voltage	Approx. 380V or more
Regenerative stop voltage	Approx. 360V or less
Accessory	Cable for connection with controller (300mm)

Note. Always leave an empty space (gap of about 20mm) between this unit and the adjacent controller. Also, always use the dedicated cable when connecting the controller.

Data overview

Point data and parameter data settings must be specified in order to operate a robot from a TS series controller.

Point data

The point data used in positioning operations includes items such as the “RUN type”, “Position”, and “Speed”, etc. Up to 255 points (P1 to P255) can be registered. There are two point data setting types: “Standard setting” type that automatically defines optimal positioning simply by specifying the payload and “Custom setting” type that allows setting the speed (mm/s) and acceleration (m/s^2) in SI units. Select the desired setting type according to the application.

Parameter data

Parameter data is divided into the following categories: “RUN parameters”, “I/O parameters”, “option parameters”, and “servo parameters”.

Data structure

Data

Point data — **P1 to P255**

1	RUN type	7	Zone (-)
2	Position	8	Zone (+)
3	Speed	9	Near width
4	Accel.	10	Jump
5	Decel.	11	Flag
6	Push	12	Timer

Sets the point data to be used in positioning.
Select the desiredsetting type (“standard setting” or “custom setting”) according to the application.

(1) Standard setting
Optimum positioning is provided simply by specifying the payload.

(2) Custom setting
Speed and acceleration can be set in SI units.

Parameter data

- **K1 to K20** — RUN parameter: Specifies parameter settings related to positioning and return to-origin operations.
- **K21 to K39** — I/O parameter: Specifies parameter settings related to terminal assignments and I/O function selection.
- **K80 to K99** — Option parameter: Specifies parameter settings related to options such as CC-Link, etc.
- **K40 to K79, K100 to ...** — Servo parameter: Specifies parameter settings specified to the connected robot. These parameters are specified during initial processing.

Point data

Point data item list

P1 to P255		
Item		Description
1	RUN type	Specifies the positioning operation pattern.
2	Position	Specifies the positioning target position or movement amount.
3	Speed	Specifies the positioning speed.
4	Accel.	Specifies the positioning acceleration.
5	Decel.	Specifies the positioning deceleration (as a percentage of the acceleration).
6	Push	Specifies the electrical current limit value for “Push” operations.
7	Zone (-)	Specifies the “personal zone” output range.
8	Zone (+)	
9	Near width	Specifies the “near width” zone (distance tolerance relative to target position).
10	Jump	Specifies the next movement destination, or the next merge operation merge destination point No. following positioning completion.
11	Flag	Specifies other information related to the positioning operation.
12	Timer	Specifies the waiting time (delay) after positioning completion.

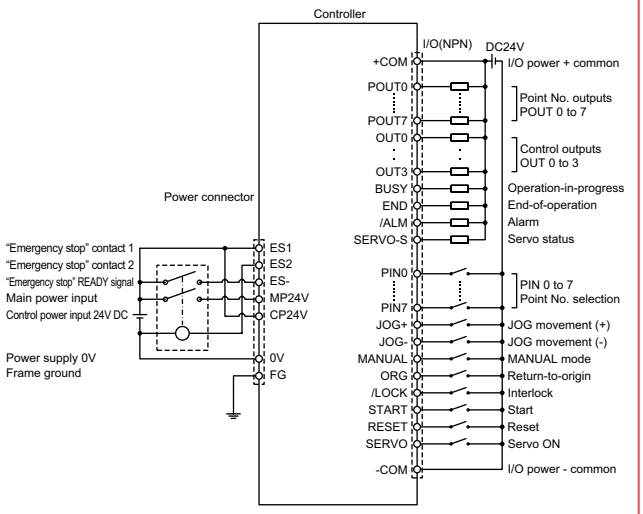
“Standard setting” and “custom setting”

There are 2 setting types for point data (“standard setting” or “custom setting”). Select the desired setting type according to the application.
The maximum number of setting points for both setting types is 255 points (P1 to P255).

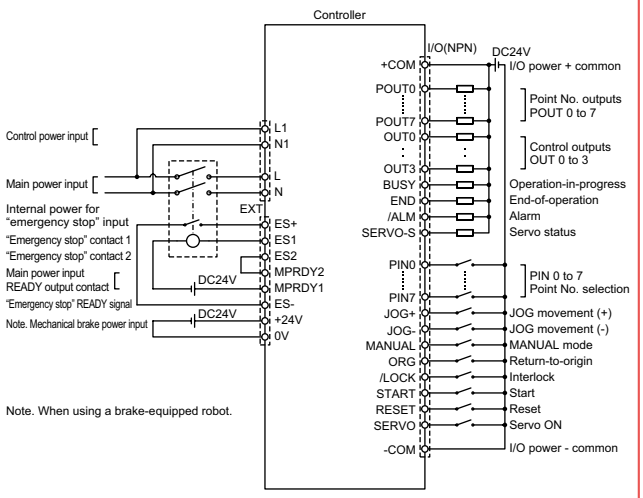
Setting Type	Description
Standard setting	Optimum positioning is provided simply by specifying the payload. This setting type is well-suited to assembly and transport applications.
Custom setting	Allows changing the speed and acceleration in SI units so the desired positioning operation can be set. This setting type is suited for machining and inspection systems.

NPN type input / output wiring diagram

TS-S2/TS-SH

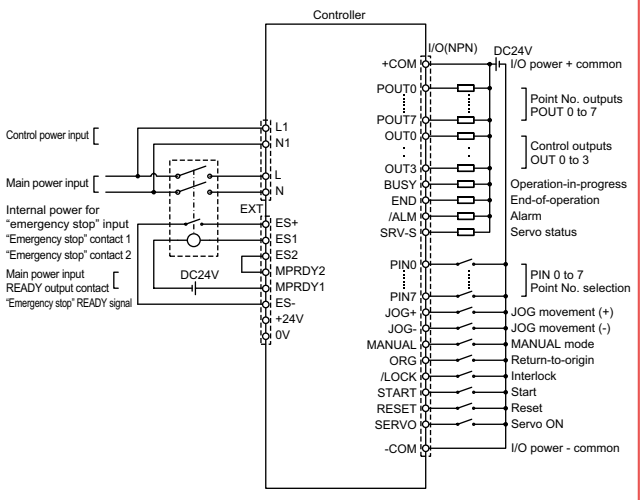


TS-X



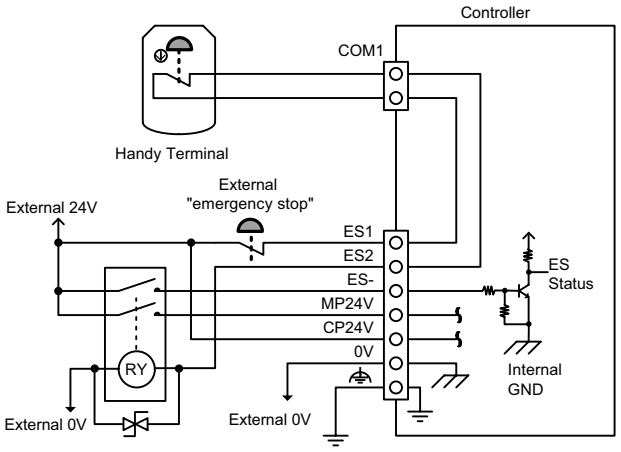
Note. When using a brake-equipped robot.

TS-P



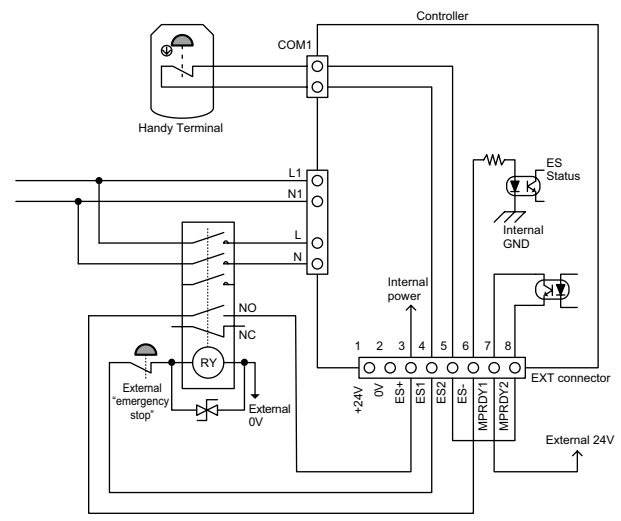
Emergency stop circuit example

TS-S2/TS-SH (power connector and host unit connection example)



Note. Always connect a surge absorber unit to the coil on the electromagnetic contactor.

TS-X/TS-P (EXT connector and host unit connection example)



Note. Always connect a surge absorber unit to the coil on the electromagnetic contactor.

Installing an external safety circuit will satisfy safety category class 4 standards. See P.645 for more information.

I/O Specifications

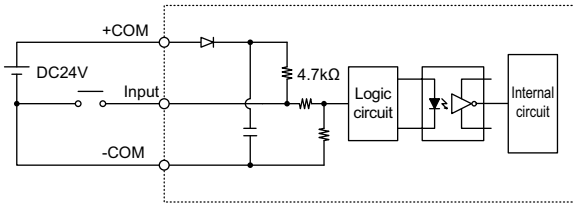
Item	Description
NPN	Input 16 points, 24VDC +/-10%, 5.1mA/point, positive common Output 16 points, 24VDC +/-10%, 50mA/point, sink type
PNP	Input 16 points, 24VDC +/-10%, 5.5mA/point, minus common Output 16 points, 24VDC +/-10%, 50mA/point, source type
CC-Link	CC-Link Ver.1.10 compatible, Remote station device (1 node)
DeviceNet™	DeviceNet™ Slave 1 node
EtherNet/IP™	EtherNet/IP™ adapter (2 ports)
PROFINET	PROFINET Slave 1 node

I/O signals (NPN / PNP)

No.	Signal Name	Description		No.	Signal Name	Description	
A1	+COM	I/O power input, positive common (24VDC +/-10%)		B1	POUT0	Outputs	Point No. outputs
A2				B2	POUT1		
A3	NC	No connection		B3	POUT2		
A4	NC			B4	POUT3		
A5	PIN0	Inputs	Point No. select	B5	POUT4		
A6	PIN1			B6	POUT5		
A7	PIN2			B7	POUT6		
A8	PIN3			B8	POUT7		
A9	PIN4			B9	OUT0		OUT0 to OUT3 assignments include: • Zone output • Personal zone output • MANUAL mode status • Return-to-origin end status • NEAR output • Movement-in-progress • Push status • Warning output
A10	PIN5			B10	OUT1		
A11	PIN6			B11	OUT2		
A12	PIN7			B12	OUT3		
A13	JOG+		JOG movement (+ direction)	B13	BUSY		Operation-in-progress
A14	JOG-		JOG movement (- direction)	B14	END		Operation-end
A15	MANUAL		MANUAL mode	B15	/ALM		Alarm
A16	ORG		Return-to-origin	B16	SRV-S		Servo status
A17	/LOCK		Interlock	B17	NC	No connection	
A18	START		Start	B18	NC		
A19	RESET		Reset	B19	-COM	I/O power input, negative common (0V)	
A20	SERVO		Servo ON	B20			

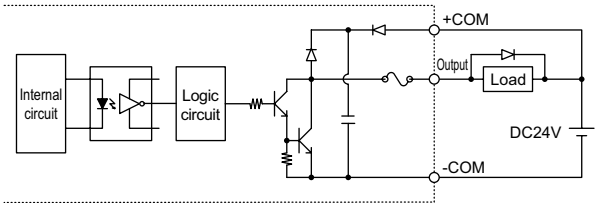
NPN type I/O circuit details

Input circuit



Type : DC input (plus common type)
Photo-coupler isolation format
Load : 24VDC +/- 10%, 5.1mA
OFF voltage : 19.6Vmin (1.0mA)
ON voltage : 4.9Vmax (4.0mA)

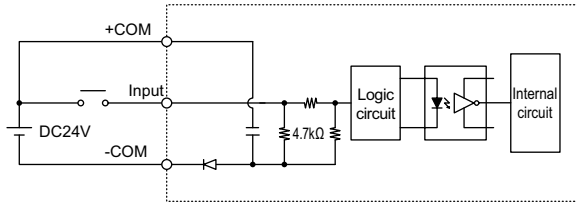
Output circuit



Type : NPN open collector output
(Minus common type)
Photo-coupler isolation format
Load : 24VDC, 50mA/point

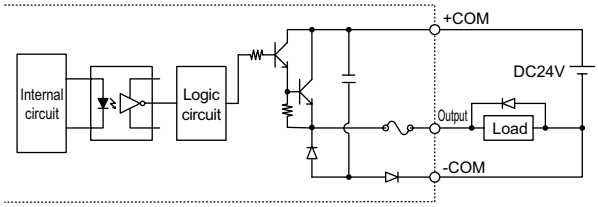
PNP type I/O circuit details

Input circuit



Type : DC input (minus common type)
Photo-coupler isolation format
Load : 24VDC +/- 10%, 5.5mA
ON voltage : 19.6Vmin (4.5mA)
OFF voltage : 4.9Vmax (1.1mA)

Output circuit



Type : PNP open collector output
(Plus common type)
Photo-coupler isolation format
Load : 24VDC, 50mA/point

Accessories and part options

TS-S2/TS-SH/TS-X/TS-P

Standard accessories

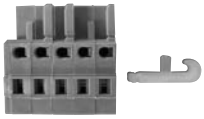
Power connector

Model	KCC-M4421-00

TS-S2 TS-SH TS-SD

Power connector (AC100V specifications)

Included when 100V model is purchased

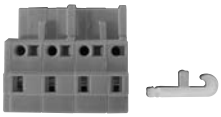


Model	KCA-M5382-00

TS-X TS-P

Power connector (AC200V specifications)

Included when 200V model is purchased



Model	KAS-M5382-00

LCC140 TS-X TS-P SR1-X SR1-P RCX320 RCX221 RCX222 RCX340

EXT connector

For braking power and safety circuit connections.

Model	KCA-M5370-00

TS-X TS-P

Dummy connector

Model	KCA-M5163-00

TS-S2 TS-SH TS-X TS-P

I/O cables (2m/20-core×2)

Model	KCA-M4421-20

TS-S2 TS-SH TS-X TS-P

Absolute battery

Absolute battery basic specifications

Item	For TS-X	For TS-SH
Battery type	Lithium metallic battery	
Battery capacity	3.6V / 1,650mAh	3.6V / 2,750mAh
Data holding time	About 1 year (in state with no power applied)	
Dimensions	ϕ18 × L60mm	ϕ17 × L53mm
Weight	24g	22g

For TS-X

For TS-SH

Model	KCA-M53G0-10 (For TS-X)
	KCA-M53G0-01 (For TS-SH)

Note. The absolute battery is subject to wear and requires replacement.
If trouble occurs with the memory then remaining battery life is low so replace the absolute battery. The battery replacement period depends on usage conditions. But generally you should replace the battery after about 1 year counting the total time after connecting to the controller and left without turning on the power.

TS-X TS-SH RCX320 RCX340

CC-Link connector (CC-Link specifications)

Included when CC-Link model is purchased

Connector

Jump socket

Model	Connector Note.	KCA-M4872-00
	Jump socket	KCA-M4873-00

Note. This is a single connector type. (Insert two connectors into a branching socket.)

TS-S2 TS-SH TS-X TS-P

See next page for optional parts

Options

Handy terminal HT1/HT1-D P.584

		HT1	HT1-D
Model	3.5m	KCA-M5110-0J	KCA-M5110-1J
	10m	KCA-M5110-6J	KCA-M5110-7J
Enable switch		–	3-position
CE marking		Not supported	Applicable

TS-S2 TS-SH TS-X TS-P

Support software TS-Manager P.576

Model	KCA-M4966-0J (Japanese)
	KCA-M4966-0E (English)

TS-S2 TS-SH TS-X TS-P TS-SD

TS-Manager environment

OS	Windows 2000, XP (32bit), Vista, 7, 8 / 8.1, 10 (Supported version: V.1.4.5 or later)
CPU	Exceeding the environment recommended by the OS being used
Memory	Exceeding the environment recommended by the OS being used
Hard disk	Vacant capacity of more than 20MB in the installation destination drive
Communication port	Serial (RS-232C), USB
Applicable controllers	TS series

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

Data cables

Communication cable for TS-Manager.
Select from USB cable or D-sub cable.

Model	USB type (5m)	KCA-M538F-A0
	D-Sub type (5m)	KCA-M538F-01

Note. USB driver for communication cable can also be downloaded from our website.

TS-S2 TS-SH TS-X TS-P TS-SD

Daisy chain and gateway connection cable

Model	KCA-M532L-00 (300mm)

TS-S2 TS-SH TS-X TS-P TS-SD

CC-Link termination connector (CC-Link specifications)

Model	KCA-M4874-00

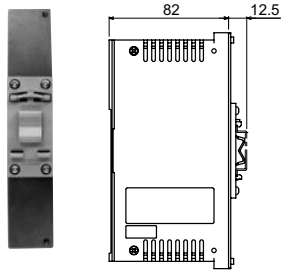
TS-S2 TS-SH TS-X TS-P

TS-Monitor (LCD monitor) P.588

Model	For TS-X	KCA-M5119-00
	For TS-P	KCA-M5119-10

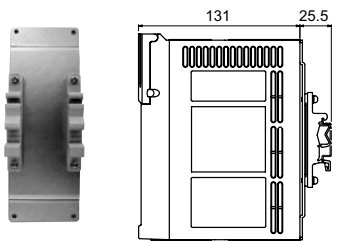
TS-X TS-P

DIN rail mounting bracket (This bracket is provided in TS-SH as standard equipment.)



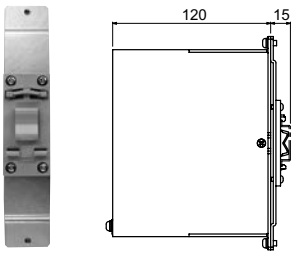
Model	For TS-S2
	KCC-M499A-00

TS-S2



Model	For TS-X / TS-P
	KCA-M499A-00

TS-X TS-P



Model	For TS-X / TS-P with RGT
	KCA-M499A-10

TS-X TS-P

MEMO

TS-SD

● CE compliance ● Only for pulse train control ● Dedicated for TRANSERVO

The TS-SD is a high-performance robot driver specifically designed for the TRANSERVO series that supports pulse train command input.

TS-SD

Main functions ▶ P.63

Support software for PC
▶ TS-Manager
P.576

Basic specifications

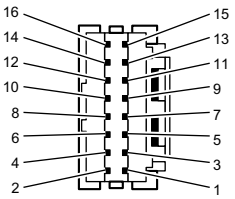
	Item	Model	TS-SD
Basic specifications	Number of controllable axes		Single-axis
	Controllable robots		TRANSERVO series Note
	Current consumption		3A (Rating) 4.5A (Max.)
	Dimensions		W30 × H162 × D82mm
	Weight		Approx. 0.2kg
	Input power supply	Control power supply	DC24V +/-10%
		Main power supply	DC24V +/-10%
Axis control	Operating method		Pulse train control
	Control method		Closed loop vector control method
	Position detection method		Resolver
	Resolution		20480 P/rev, 4096 P/rev
	Origin search method		Incremental
External input/output	Pulse train command input		Line driver method : 500 kpps or less
			Open collector method : 100 kpps or less (DC5 to 24V +/-10%)
	Input		Servo ON (SERVO), reset (RESET) origin search (ORG)
	Output		Servo status (SRV-S), alarm (/ALM), positioning completion (IN-POS), return-to-origin end status (ORG-S)
	External communications		RS-232C 1CH
Options	Support software for PC		TS-Manager
General specifications	Operating temperature		0°C to 40°C
	Storage temperature		-10°C to 65°C
	Operating humidity		35% to 85%RH (non-condensing)
	Storage humidity		10% to 85%RH (non-condensing)
	Atmosphere		Indoor location not exposed to direct sunlight. No corrosive , flammable gases, oil mist, or dust particles
	Anti-vibration		All XYZ directions 10 to 57Hz unidirectional amplitude 0.075mm 57 to 150Hz 9.8m/s^2
	Protective functions		Position detection error, overheat, overload, overvoltage, low voltage, position deviation, control power voltage drop, overcurrent, motor current error, CPU error, motor line disconnection, command speed over, pulse frequency over

Note. Except for RF type sensor specifications and STH type vertical specifications.

I/O signal table

No.	Signal Name	Description
1	+COM	I/O power supply input (DC 24V +/- 10%)
2	OPC	Open collector power supply input
3	PULS1	Command pulse input 1
4	PULS2	Command pulse input 2
5	DIR1	Command direction input 1
6	DIR2	Command direction input 2
7	ORG	Return-to-origin
8	NC	Prohibited to use this signal.
9	RESET	Reset
10	SERVO	Servo ON
11	ORG-S	Return-to-origin end status
12	IN-POS	Positioning completion
13	/ALM	Alarm
14	SRV-S	Servo status
15	-COM	I/O power supply input (0V)
16	FG	Ground

I/O connector



Controllable robot	TRANSERVO P.151
CE marking	◯
Field networks	—

Model Overview

Name		TS-SD
Controllable robot		Dedicated compact single-axis TRANSERVO
Input power	Main power supply	DC24V +/-10% maximum
	Control power supply	DC24V +/-10% maximum
Operating method		Pulse train control
Maximum number of controllable axes		Single-axis
Origin search method		Incremental

Ordering method

Controller only

TS-SD Note

Controller

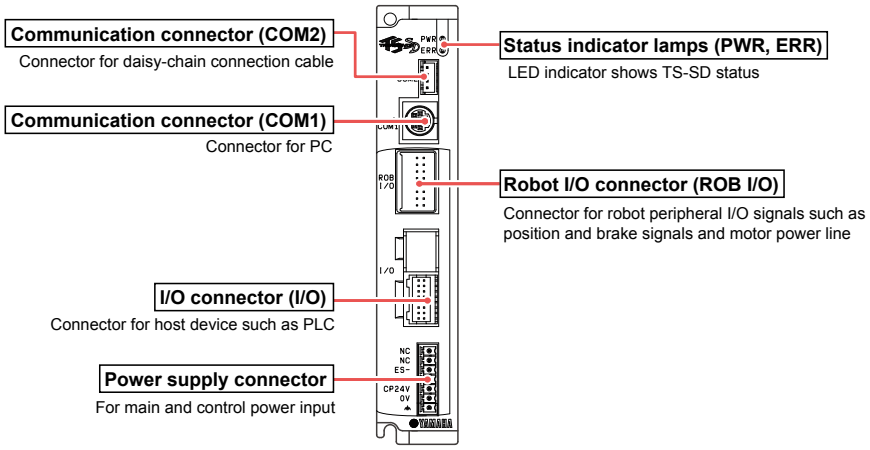
Robot + Controller

[ ] – [ ] – **SD** **1**

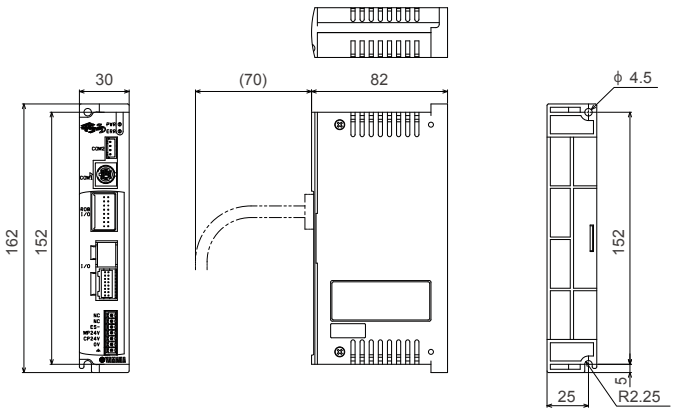
Robot model	Cable length	Controller	I/O cable
TRANSERVO Series	1L: 1 meter 3L: 3 meters 5L: 5 meters 10L: 10 meters (flexible cables)		1L: 1 meter

Note. I/O cable (1 meter) comes supplied with unit.

Part names



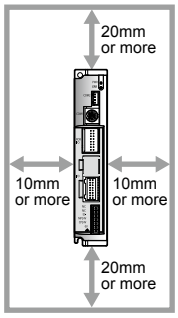
Dimensions



TS-SD

Installation conditions

- Install the TS-SD inside the control panel.
- Install the TS-SD on a vertical wall.
- Install the TS-SD in a well ventilated location, with space on all sides of the TS-SD (See fig. at right.).
- Ambient temperature : 0 to 40˚C
- Ambient humidity : 35 to 85% RH (no condensation)

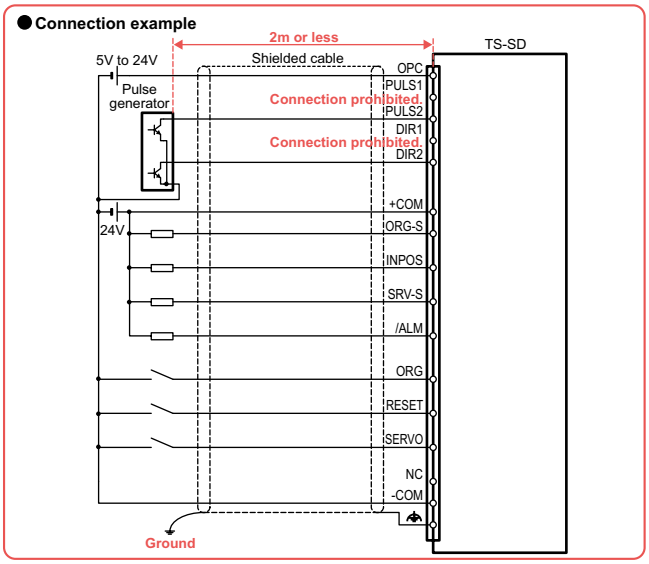


I/O signal list

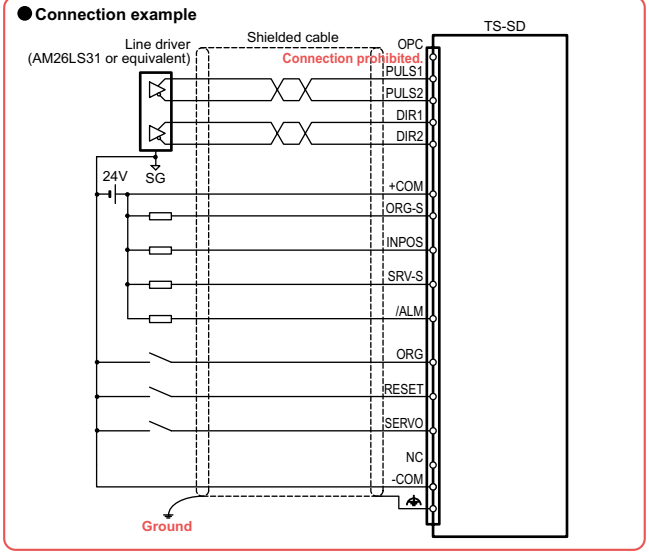
Type	Signal Name	Open collector	Line driver	Description
Inputs	OPC	Open collector power supply input	(Connection prohibited. Note 2)	Input the power supply for the open collector. (DC5 to 24V +/- 10%)
	PULS1	(Connection prohibited. Note 1)	Command pulse input (+)	Input terminal for pulse train input commands. Select from 3 command forms by changing parameters. • Phase A/Phase B input • Pulse/Sign input • CW/CCW input
	DIR1	(Connection prohibited. Note 1)	Command direction input (+)	
	PULS2	Command pulse input	Command pulse input (-)	
	DIR2	Command direction input	Command direction input (-)	
	ORG	Return-to-origin	←	Starts return-to-origin when ON and stops it when OFF.
	RESET	Reset	←	Alarm reset
	SREVO	Servo ON	←	ON: servo on; OFF: servo off.
Outputs	ORG-S	Return-to-origin end status	←	ON at return-to-origin end.
	IN-POS	Positioning completion	←	ON when accumulated pulse in deviation counter are within specified value range.
	/ALM	Alarm	←	ON when normal. OFF when alarm occurs.
	SRV-S	Servo status	←	ON when servo is on.

Note 1. When using the open collector specifications, do not connect any signal to the PULS1 and DIR1 terminals. Doing so may cause the driver to malfunction or breakdown.
Note 2. When using the line driver specifications, do not connect any signal to the OPC terminal. Doing so may cause the driver to malfunction or breakdown.

Input / output signal connection diagram [open collector]



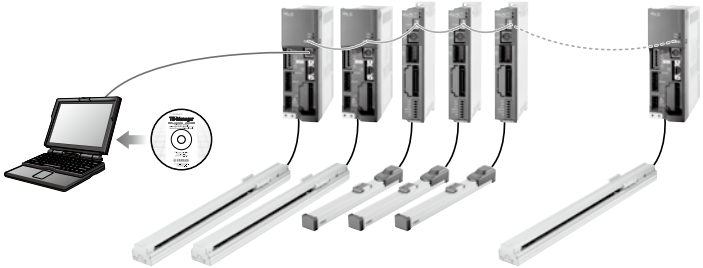
Input / output signal connection diagram [line driver]



Daisy chain function

Connecting two or more TS series controllers and drivers in a daisy chain allows editing data on any one unit from a PC.

- Up to 16 units connectable
- Requires daisy chain coupler cables.



Accessories and part options

TS-SD

Standard accessories

Power connector

Model	KCC-M4421-00

TS-S2 TS-SH TS-SD

I/O cables (1m)

Model	KCC-M5362-00

TS-SD

Options

Support software TS-Manager

P576

Model	KCA-M4966-0J (Japanese)
	KCA-M4966-0E (English)

TS-S2 TS-SH TS-X TS-P TS-SD

TS-Manager environment

OS	Windows 2000, XP (32bit), Vista, 7, 8 / 8.1, 10 (Supported version: V.1.4.5 or later)
CPU	Exceeding the environment recommended by the OS being used
Memory	Exceeding the environment recommended by the OS being used
Hard disk	Vacant capacity of more than 20MB in the installation destination drive
Communication port	Serial (RS-232C), USB
Applicable controllers	TS series

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

Data cables

Communication cable for TS-Manager.
Select from USB cable or D-sub cable.

USB D-Sub

Model	USB type (5m)	KCA-M538F-A0
	D-Sub type (5m)	KCA-M538F-01

Note. USB driver for communication cable can also be downloaded from our website.

TS-S2 TS-SH TS-X TS-P TS-SD

Daisy chain and gateway connection cable

Model	KCA-M532L-00 (300mm)

TS-S2 TS-SH TS-X TS-P TS-SD

RDV-X/RDV-P

● Only for pulse train control

These are high-performance robot drivers for the FLIP-X series and PHASER series which support pulse train command input.

RDV-X RDV-P

Main functions ▶ P.62

Support software for PC
▶ RDV-Manager
P.582

Basic specifications

Item		Model	RDV-X			RDV-P			
Driver model			RDV-X205	RDV-X210	RDV-X220	RDV-P205	RDV-P210	RDV-P220	RDV-P225
Number of controllable axes			Single-axis						
Controllable robots			Single-axis robot FLIP-X			Linear motor single-axis robot PHASER			
Basic specifications	Capacity of the connected motor		200V 100W or less	200V 200W or less	200V 600W or less	200V 100W or less	200V 200W or less	200V 400W or less	200V 750W or less
	Maximum power consumption		0.3kVA	0.5kVA	0.9kVA	0.3kVA	0.5kVA	0.9kVA	1.3kVA
	Dimensions		W40×H160×D140mm		W40×H160×D170mm	W40×H160×D140mm		W40×H160×D170mm	W55×H160×D170mm
	Weight		0.7kg		1.1kg	0.7kg		1.1kg	1.2kg
	Input power supply	Control power supply	Single phase 200 to 230V +10%, -15%, 50/60Hz +/-5%						
		Motor power supply	Single phase / 3-phase 200 to 230V +10%, -15%, 50/60Hz +/-5%						
Axis control	Position detection method		Resolver			Magnetic linear scale			
	Control system		Sine-wave PWM (pulse width modulation)						
	Control mode		Position control						
	Maximum speed Note 1		5000rpm			3.0m/s			
Input/output related function	Position command input		Line driver signal (2M pps or less) (1) Forward pulse + reverse pulse (2) Sign pulse + Command pulse (3) 90-degree phase difference 2-phase pulse command One of (1) to (3) is selectable.						
	Input signal		24V DC contact point signal input (usable for sink/source) (24V DC power supply incorporated) (1) Servo ON (2) Alarm reset (3) Torque limit (4) Forward overtravel (5) Reverse overtravel (6) Origin sensor Note 3 (7) Return-to-origin (8) Pulse train input enable (9) Deviation counter clear						
	Output signal		Open collector signal output (usable for sink/source) (1) Servo ready (2) Alarm (3) Positioning completed (4) Return-to-origin complete						
	Relay output signal		Braking cancel signal (24V 375mA)			-			
	Position output		Phase A, B signal output: Line driver signal output Phase Z signal output: Line driver signal output / open collector signal output N/8192 (N=1 to 8191), 1/N (N=1 to 64) or 2/N (N=3 to 64)						
	Monitor output		Selectable items: 2ch, 0 to +/-5V voltage output, speed detection value, torque command, etc.						
Internal function	Display		5-digit number indicator, Control power LED						
	External operator		PC software “RDV-Manager” monitoring function, parameter setting function, operation tracing function, trial operation function, etc. USB2.0 is used. Windows Vista / 7 / 8 / 8.1 personal computer can be connected.						
	Regenerative braking circuit		Included (but without braking resistor)						
	Dynamic brake Note 4		Included (Operation conditions can be set.) (No DB resistor, connection: 2-phase short circuit)						Included (Operation conditions can be set.) (with DB resistor, connection: 2-phase short circuit)
	Protective function Note 2		Semi-enclosure type (IP20)						
	Protective functions		Over-current, overload, braking resistor overload, main circuit overvoltage, memory error, etc.						

Controllable robot	RDV-X ▶ FLIP-X Note 1 P.193	RDV-P ▶ PHASER P.239
CE marking	◯	Field networks —

Note 1. Exclude T4 / T5 / C4 / C5 / YMS

Model Overview

Name		RDV-X	RDV-P
Controllable robot		Single-axis robot FLIP-X Note 1	Linear motor single-axis robot PHASER
Input power	Main power supply	Single phase / 3-phase 200 to 230V +10% to -15% (50/60Hz +/-5%)	
	Control power supply	Single phase 200 to 230V +10% to -15% (50/60Hz +/-5%)	
Operating method		Pulse train control	
Maximum number of controllable axes		Single-axis	
Origin search method		Incremental	

Ordering method

RDV-X

RDV-X □ □ – □ – □

Controller	Power-supply voltage	Driver Note	Regenerative unit Note
	2: AC200V	05: 100W or less	RBR1
		10: 200W or less	RBR2
		20: 600W or less	

Note. Driver selection and regenerative unit selection depend on the robot type. See the selection table on the next page for selecting the driver/regenerative circuit.

RDV-P

RDV-P □ □ – □ – □

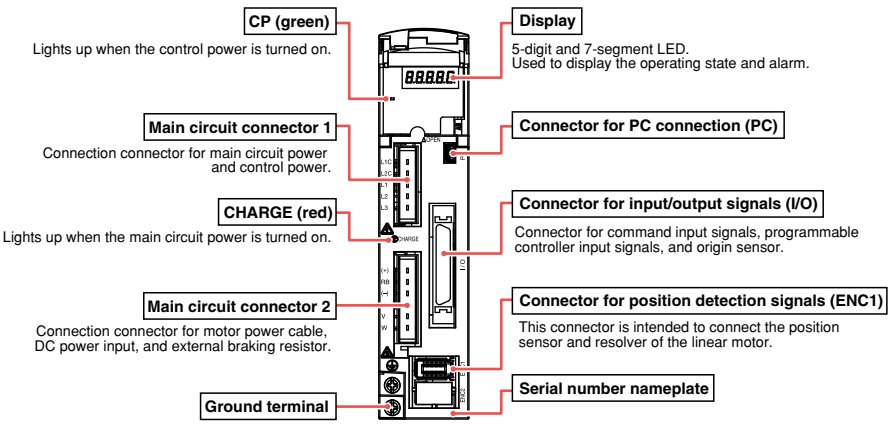
Controller	Power-supply voltage	Driver Note	Regenerative unit Note
	2: AC200V	05: 100W or less	No entry: None
		10: 200W or less	RBR1
		20: 400W or less	RBR2
		25: 750W or less	

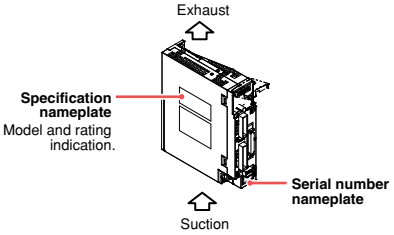
Note. Driver selection and regenerative unit selection depend on the robot type. See the selection table on the next page for selecting the driver/regenerative circuit.

Item		RDV-X			RDV-P			
Driver model		RDV-X205	RDV-X210	RDV-X220	RDV-P205	RDV-P210	RDV-P220	RDV-P225
Options	Support software for PC	RDV-Manager						
General specifications	Operating temperature	0°C to +55°C						
	Storage temperature Note 5	-10°C to +70°C						
	Operating humidity	20% to 90%RH (non-condensing)						
	Vibration Note 6	5.9m/s^2 (0.6G) 10 to 55Hz						

Note 1. These data are parameters and calculation range in controlling the robot driver and do not indicate the capacity of the robot at the maximum speed.
Note 2. JIS C 0920 (IEC60529) is used as the base for the protection method.
Note 3. GXL-8FB (made by SUNX) or FL7M-1P5B6-Z (made by YAMATAKE) is used for the origin sensor. The power consumption of the origin sensor is 15mA or less (at open output) and only 1 unit of the origin sensor is connected to each robot driver. (future specification)
Note 4. Use the dynamic brake for emergency stop. Note that the braking may be less effective depending on the robot model.
Note 5. The storage temperature is the temperature in the non-energized state including transportation.
Note 6. The JIS C 60068-2-6:2010 (IEC 60068-2-6:2007) test method is uses as the base.

Part names

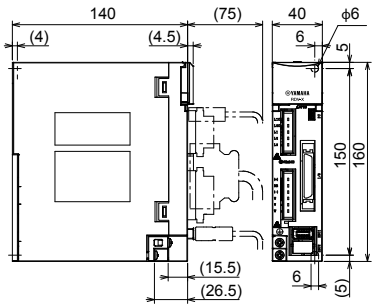




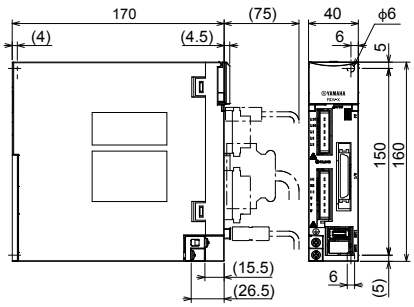
RDV-X/RDV-P

Dimensions

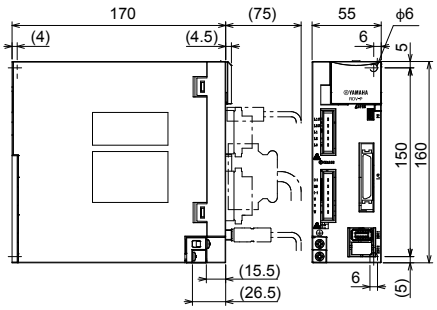
RDV-X205/210
RDV-P205/210



RDV-X220
RDV-P220



RDV-P225



Driver / regenerative unit selection table

RDV-X

			FLIP-X																										
			T4LH/ C4LH	T5LH/ C5LH	T6L/ C6L	T9	T9H	F8/ C8	F8L/ C8L	F8LH/ C8LH	F10/ C10	F10H	F14/ C14	F14H/ C14H	GF14XL	F17/ C17	F17L/ C17L	GF17XL	F20/ C20	F20N	N15	N18	N15D	N18D	B10	B14	B14H	R5	R10	R20
Driver selection	RDV-X	05	●	●	●	●		●	●	●	●		●												●	●		●	●	
		10					●					●		●														●			●
		20													●	●	●	●	●	●	●	●	●	●						
Regenerative unit	No entry (None)		●	●																										
	RBR1				●	●	●	●	●	●	●	●	●	●	●	❶	❶	●	❶	●	●	●	●	●	●	●	●	●	●	●
	RBR2															❶	❶		❶												

❶ If placed horizontally the RBR1 is required, if placed vertically then RBR2 is required.

RDV-P

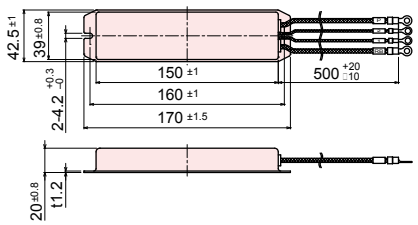
			PHASER				
			MF7/ MF7D	MF15/ MF15D	MF20/ MF20D	MF30/ MF30D	MF75/ MF75D
Driver selection	RDV-P	05					
		10	●	●	●		
		20				●	
		25					●
Regenerative unit	No entry (None)						
	RBR1		●	●	●	●	
	RBR2						●

Regenerative unit RBR1 / RBR2 dimensions

The regenerative unit is a device that converts the braking current generated when the motor decelerates into heat.
Regenerative unit is required for specified Yamaha models and for operation with loads having large inertia.

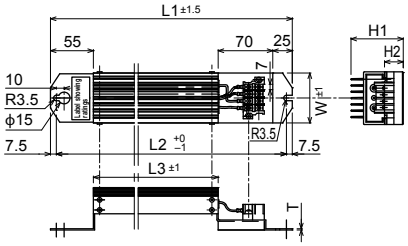
Regenerative unit RBR1

Dimensions



Regenerative unit RBR2

Dimensions



Regenerative unit RBR1 / RBR2 basic specifications

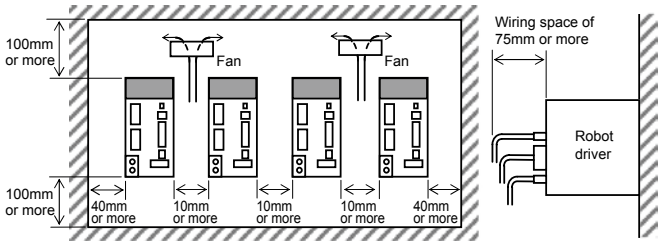
Item	RBR1	RBR2
Model	KBH-M5850-00	KBH-M5850-10
Capacity type	120W	200W
Resistance value	100Ω	100Ω
Permissible braking frequency	2.5%	7.5%
Permissible continuous braking time	12 sec.	30 sec.
Weight	0.27kg	0.97kg

Note. The internal thermal contact point capacity is AC250V, 2A max. ON (b contact point) in the normal state.
Note. The built-in thermal fuse prevents abnormal heat generation which occurs by an erroneous use. (not resettable)
Note. When the thermal relay has worked, reduce the regeneration energy by either stopping the servo amplifier or making the deceleration time longer.
Note. With the regenerative unit, specifications and whether or not required may vary depending on each robot and its operation conditions.

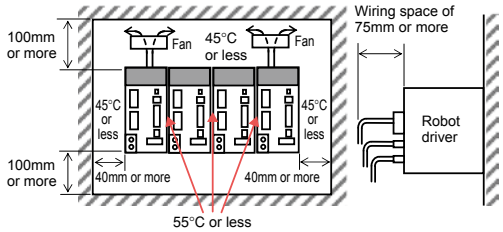
Installation conditions

- Install the RDV-X/RDV-P on a vertical metal wall.
- Install the RDV-X/RDV-P in a well ventilated location, with space on all sides of the RDV-X/RDV-P.
- Ambient temperature: 0 to 55˚C
- Ambient humidity: 20 to 90% RH (no condensation)
- When placing two or more robot drivers in one operating panel, install them as shown in the figure below.

Stored inside RDV-X/RDV-P panel

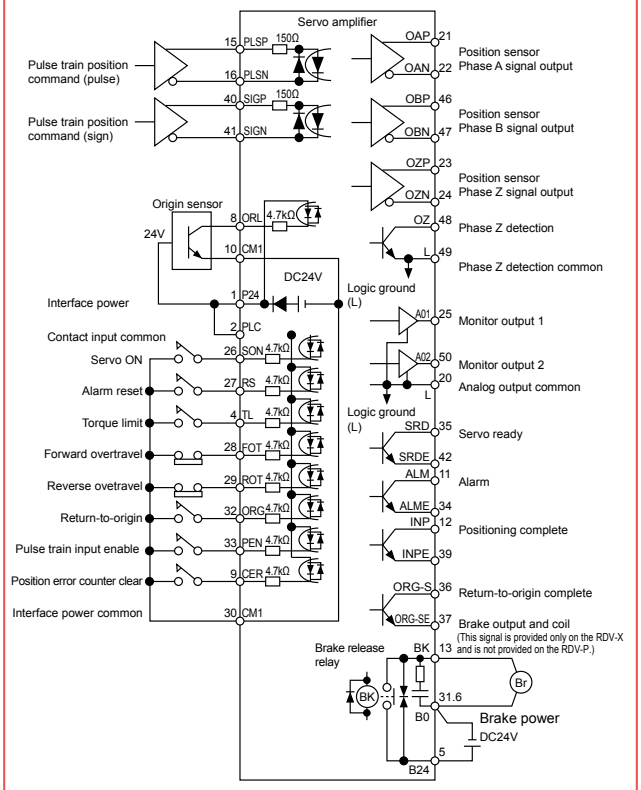


Side-by-side installation



* Note that the ambient temperature is 45°C or less or the effective load factor is 75% or less.

Input / output signal connection diagram



* The above diagram shows a sink type output module using a power supply for internal input.

List of RDV-P / RDV-X terminal functions

Type	Terminal symbol	Terminal name	Description
Input signal	P24	Interface power	Supplies 24V DC for contact inputs. Connecting this signal to the PLC terminal allows using the internal power supply. Use this terminal only for contact input. Do not use for controlling external equipment connected to the driver, such as brakes.
	CM1	Interface power common	This is a ground signal for the power supply connected to P24. If using the internal power supply then input a contact signal between this signal and the contact-point signal.
	PLC	Intelligent input common	Connect this signal to the power supply common contact input. Connect an external supply or internal power supply (P24).
	SON	Servo ON	Setting this signal to ON turns the servo on (supplies power to motor to control it). Additionally, this signal is also used for estimating magnetic pole position when FA-90 is set to oFF4, oFF5.
	RS	Alarm reset	After an alarm has tripped, inputting this signal cancels the alarm. But before inputting this reset signal, first set the SON terminal to OFF and eliminate the cause of the trouble.
	TL	Torque limit	When this signal is ON, the torque limit is enabled.
	FOT	Forward overtravel	When this signal is OFF, the robot will not run in forward direction. (Forward direction limit signal)
	ROT	Reverse overtravel	When this signal is OFF, the robot will not run in reverse direction. (Reverse direction limit signal)
	ORL	Origin sensor	Input an origin limit switch signal showing the origin area.
	ORG	Return-to-origin	Inputting this signal starts return-to-origin operation.
	PEN	Pulse train input enable	When this signal is turned on, the pulse train position command input is enabled.
	CER	Position error counter clear	Inputting this signal clears the position deviation (position error) counter. (Position command value is viewed as current position.)
Output signal	SRD SRDE	Servo ready	This signal is output when the servo is ready to turn on (with main power supply turned on and no alarms tripped)
	ALM ALME	Alarm	This signal is output when an alarm has tripped. (This signal is ON in normal state and OFF when an alarm has tripped.)
	INP INPE	Positioning complete	This signal is output when the deviation between the command position and current position is within the preset positioning range.
	ORG-S ORG-SE	Return-to-origin complete	This signal is output when the return-to-origin is completed successfully.
Relay output	BK (B24)[Note 1]	Brake release relay output	When the servo is ON, this terminal outputs a signal to allow releasing the brake. (FLIP-X series only)
Monitor output	AO1	Monitor output 1	Outputs speed detection values, torque commands, etc. as analog signal voltages for monitoring. Signals to output are selected by setting parameters. These signals are only for monitoring. Do not use for control.
	AO2	Monitor output 2	
	L	Monitor output common	This is the ground for the monitor signal.
Position command	PLSP	Position command pulse (pulse signal)	Select one of the following signal forms as the pulse-train position command input. 1. Command pulse + direction signal 2. Forward direction pulse train + reverse direction pulse train 3. Phase difference 2-phase pulse
	PLSN		
	SIGP	Position command pulse (sign signal)	
	SIGN		
Position sensor monitor	OAP	Position sensor Phase A signal	Outputs monitor signal obtained by dividing "phase A" signal of position sensor.
	OAN		
	OBP	Position sensor Phase B signal	Outputs monitor signal obtained by dividing "phase B" signal of position sensor.
	OBN		
	OZP	Position sensor Phase Z signal	Outputs monitor signal for position sensor "phase Z" signal.
	OZN		
	OZ	Phase Z detection	Outputs monitor signal for position sensor "phase Z" signal.
	L	Phase Z detection common	
Braking power input	B24 [Note 1]	Brake power input	Input 24V DC brake power to this terminal.
	B0 [Note 1]	Brake power common	Common terminal input for brake power.

Note 1. B24, BO and BK are available only with RDV-X, and not with RDV-P.

Accessories and part options

RDV-X/RDV-P

Standard accessories

I/O connector (no brake wiring)

Model	KBH-M4420-00

RDV-X RDV-P

I/O connector (with brake wiring)

Model	KBH-M4421-00

RDV-X RDV-P

Power supply connector

Model	KEF-M4422-00

RDV-X RDV-P

Options

Support software RDV-Manager

P.582

Model	KEF-M4966-00

RDV-X RDV-P

Environment

OS	Windows Vista SP1 (32bit) Note 1, 7, 8 / 8.1
CPU	Pentium4 1.8GHz or more (Recommend)
Memory	1GB or more
Hard disk	1GB of available space required on installation drive.
Disk operation	USB
Applicable controllers	RDV series

Note 1. SP1 (service pack 1) or higher.
Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

Communication cable

Communication cable to connect PC and a controller.

Model	KEF-M538F-00

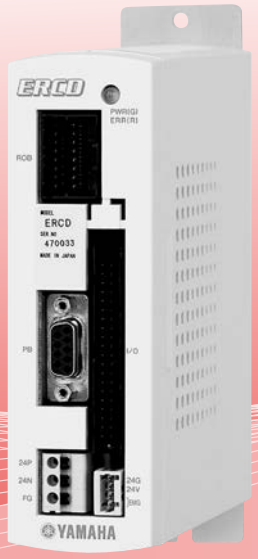
RDV-X RDV-P

MEMO

ERCD

● Dedicated for T4L / T5L / C4L / C5L

Low price and compact in size.
In addition to the conventional functions, a pulse train function is added for a wider application range.
This is a dedicated controller for the FLIP-X series models T4L, T5L, C4L, and C5L.



ERCD

Main functions ▶ P.68

Programming box
▶ HPB/HPB-D
P.585

Support software for PC
▶ POPCOM+
P.578

Basic specifications

Item				Model	ERCD
Number of controllable axes					Single-axis
Controllable robots					Single-axis robot FLIP-X series T4L / T5L / C4L / C5L
Basic specifications	Capacity of the connected motor				DC24V 30W or less
	Dimensions				W44 × H166 × D117mm
	Weight				0.45kg
	Input power supply				DC24V +/-10% maximum 3A to 4.5A (Variable depending on robots in use.)
Axis control	Drive method				AC full-digital software servo
	Position detection method				Resolver
	Operating method				Normal mode: point trace movement, program operation, operation using RS-232C communication Pulse Train mode: operation by pulse train input
	Position indication units				mm (millimeters)
	Speed setting				1% to 100% (Setting by 1% unit)
	Acceleration setting				1. Automatic speed setting per robot No. and payload 2. Setting based on acceleration and deceleration parameter 1% to 100% (Setting by 1% unit)
	Resolution				16384 P/rev
	Origin search method				Incremental
Program	Program language				YAMAHA SRC
	Multitasks				4 tasks
	Point-data input method				Manual data input (coordinates input), Direct teaching, Remote teaching
Memory	RAM				32 Kbytes with lithium battery backup (5-year life) Retains programs, point data, parameters and alarm history
	Programs				100 programs (Maximum program number) 255 steps per program 1024 steps / total or less
	Points				1000 points (256 when point tracing)
External input/output	I/O interface	Normal mode Note 1	Sequence input		Dedicated input 8 points, General input 6 points
			Sequence output		Dedicated input 3 points, General input 6 points, Open collector output
		Pulse train mode Note 1	Sequence input		Dedicated input 5 points, General input 6 points
			Sequence output		Dedicated input 3 points, General input 6 points, Open collector output
			Command pulse input	Type	1.Phase A / phase B, 2.Pulse / code, 3.CW / CCW
				Mode	Line driver (+5V)
				Frequency	Maximum 2 Mpps
		Feedback pulse output		Terminal name	PA+, PA-, PB+, PB-, PZ+, PZ-
				Type	Phase A / phase B / phase Z
				Mode	Line driver (+5V)
				Number of pulse	16 to 4096 P/rev
		Power supply for sequence I/O			External DC +24V input
	Emergency stop input				Normal close contact point input
	Brake output				Relay output (for 24V/300mA brake) 1CH
	External communications				RS-232C 1CH (For communication with HPB or PC)

Controllable robot	FLIP-X Dedicated for T4L/T5L P.198 Dedicated for C4L/C5L P.466		
CE marking	—	Field networks	—

Model Overview

Name	ERCD
Controllable robot	Deicated for T4L / T5L / C4L / C5L
Input power	DC24V +/-10% maximum 3A to 4.5A (Variable depending on robots in use.)
Operating method	Pulse train control / Programming / I/O point tracing / Operation using RS-232C communication
Maximum number of controllable axes	Single-axis
Origin search method	Incremental

Ordering method

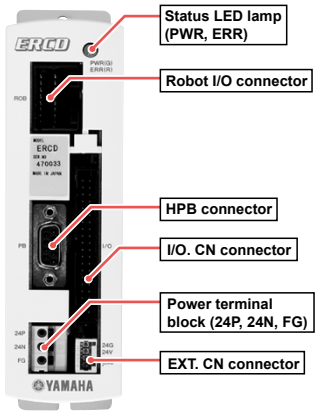
ERCD – [ ]

Controller	–	I/O connector specification
		CN1: I/O flat cable 1m (Standard)
		CN2: Twisted-pair cable 2m (pilse train function)

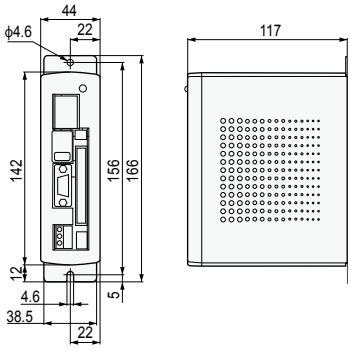
	Item / Model	ERCD
Options	Programming box	HPB, HPB-D (with enable switch)
	Support software for PC	POPCOM+
General specifications	Operating temperature	0°C to 40°C
	Storage temperature	-10°C to 65°C
	Operating humidity	35% to 85%RH (non-condensing)
	Noise resistance capacity	IEC61000-4-4 Level 2
	Protective functions	Overload, overvoltage, voltage drop, resolver wire breakage, runaway detection, etc.

Note 1. Switching between the normal mode and pulse train mode is done by use of the parameter.

Part names

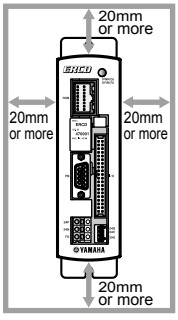


Dimensions



Installation conditions

- Install the ERCD inside the control panel.
- Install the ERCD on a vertical wall.
- Install the ERCD in a well ventilated location, with space on all sides of the ERCD (See fig. below).
- Ambient temperature : 0 to 40˚C
- Ambient humidity : 35 to 85% RH (no condensation)



Connector I/O signals

Terminal number	Signal name	Function
A-1	ABS-PT	Move the point from the origin position
B-1	INC-PT	Move the point from the current position
A-2	AUTO-R	Start automatic operation
B-2	STEP-R	Start step operation
A-3	ORG-S	Return to the origin
B-3	RESET	Reset
A-4	SERVO	Return to servo on
B-4	LOCK	Interlock
A-5	DI 0	General input 0
B-5	DI 1	General input 1
A-6	DI 2	General input 2
B-6	DI 3	General input 3
A-7	DI 4	General input 4
B-7	DI 5	General input 5
A-8	(SVCE)	Service mode input
B-8	DO 5	General output 5
A-9	DO 0	General output 0
B-9	DO 1	General output 1
A-10	DO 2	General output 2
B-10	DO 3	General output 3
A-11	DO 4	General output 4
B-11	END	End normal execution
A-12	BUSY	Executing the command
B-12	READY	Ready for operation
A-13	FG	Frame ground
B-13	FG	Frame ground
A-14	GND	Signal ground
B-14	GND	Signal ground
A-15	NC	Reserved (use inhibited)
B-15	NC	Reserved (use inhibited)
A-16	NC	Reserved (use inhibited)
B-16	NC	Reserved (use inhibited)
A-17	PA+	Feedback pulse output
B-17	PA-	Feedback pulse output
A-18	PB+	Feedback pulse output
B-18	PB-	Feedback pulse output
A-19	PZ+	Feedback pulse output
B-19	PZ-	Feedback pulse output
A-20	NC	Reserved (use inhibited)
B-20	NC	Reserved (use inhibited)

Pulse train I/O connector signals

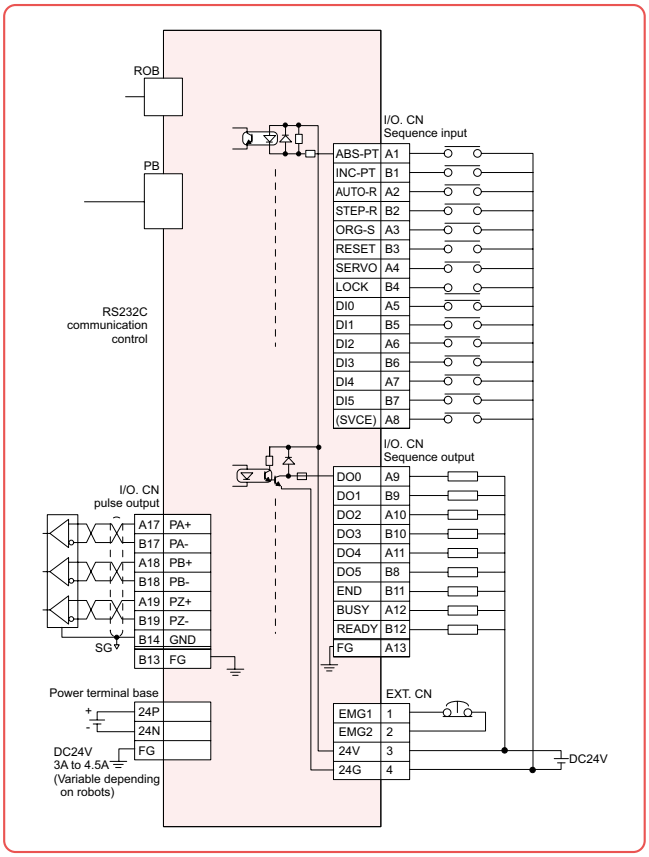
Terminal number	Signal name	Function
A-1	NC	Reserved (use inhibited)
B-1	NC	Reserved (use inhibited)
A-2	NC	Reserved (use inhibited)
B-2	PCLR	Differential clear input
A-3	ORG-S	Return to the origin input
B-3	RESET	Alarm reset input
A-4	SERVO	Servo-ON input
B-4	INH	Command pulse inhibition input
A-5	DI 0	General input 0
B-5	DI 1	General input 1
A-6	DI 2	General input 2
B-6	DI 3	General input 3
A-7	DI 4	General input 4
B-7	DI 5	General input 5
A-8	NC	Reserved (use inhibited)
B-8	DO 5	General output 5
A-9	DO 0	General output 0
B-9	DO 1	General output 1
A-10	DO 2	General output 2
B-10	DO 3	General output 3
A-11	DO 4	General output 4
B-11	IN-POS	In-position output
A-12	SRDY	Servo ready output
B-12	ALM	Alarm output
A-13	FG	Frame ground
B-13	FG	Frame ground
A-14	GND	Signal ground
B-14	GND	Signal ground
A-15	PULS+	Command pulse input
B-15	PULS-	Command pulse input
A-16	DIR+	Command direction input
B-16	DIR-	Command direction input
A-17	PA+	Feedback pulse output
B-17	PA-	Feedback pulse output
A-18	PB+	Feedback pulse output
B-18	PB-	Feedback pulse output
A-19	PZ+	Feedback pulse output
B-19	PZ-	Feedback pulse output
A-20	NC	Reserved (use inhibited)
B-20	NC	Reserved (use inhibited)

Robot Language Table

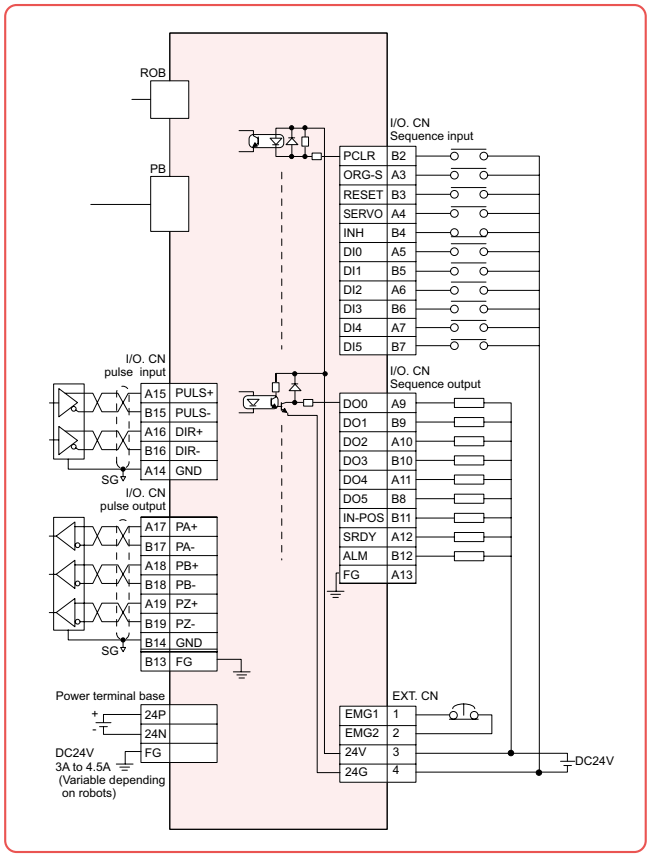
Command	Description
MOVA	Moves to a point data position.
MOVI	Moves from current position by amount of point data.
MOVF	Moves until a specified DI input is received.
JMP	Jumps to a specified label in the specified program.
JMPF	Jumps to a specified label in a specified program according to the input condition.
JMPB	Jumps to a specified label when general-purpose input or memory input is in the specified state.
L	Defines the jump destination for a JMP or JMPF statement, etc.
CALL	Runs another program.
DO	Turns general-purpose output or memory output on or off.
WAIT	Waits until general-purpose input or memory input is in the specified state.
TIMR	Waits the specified amount of time before advancing to the next step.
P	Defines point variable.
P+	Adds 1 to point variable.
P-	Subtracts 1 from point variable.
SRVO	Turns servo on or off.
STOP	Temporarily stops program execution.
ORGN	Performs return-to-origin.
TON	Runs a specified task.
TOFF	Stops a specified task.

Command	Description
JMPP	Jumps to a specified label when the axis position condition meets the specified conditions.
MAT	Defines a matrix.
MSEL	Specifies a matrix to move.
MOVM	Moves to a specified pallet work position on matrix.
JMPC	Jumps to a specified label when the counter array variable C equals the specified value.
JMPD	Jumps to a specified label when the counter variable D equals the specified value.
CSEL	Specifies an array element for counter array variable C.
C	Defines counter array variable C.
C+	Adds a specified value to counter array variable C.
C-	Subtracts a specified value from counter array variable C.
D	Defines counter variable D.
D+	Adds a specified value to counter variable D.
D-	Subtracts a specified value from counter variable D.
SHFT	Shifts the coordinate position by amount of specified point data.
IN	Stores bit information on specified general-purpose input or memory input into counter variable D.
OUT	Outputs the value of counter variable D to specified generalpurpose output or memory output.
LET	Assigns the value of a specified variable to another variable.
TORQ	Defines the maximum torque command value.

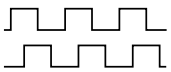
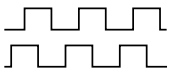
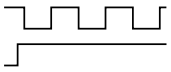
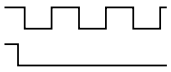
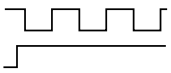
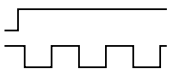
Input / output wiring diagram

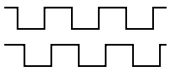
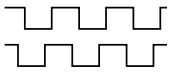
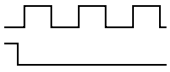
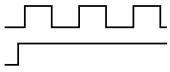
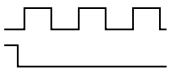
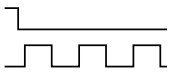


Pulse train input / output wiring diagram



Pulse train input form

Logic	Command pulse form	CW direction	CCW direction
Positive logic	Phase A / phase B		
	Pulse / code		
	CW / CCW		

Logic	Command pulse form	CW direction	CCW direction
Positive logic	Phase A / phase B		
Negative logic	Pulse / code		
	CW / CCW		

Accessories and part options

ERCD

Standard accessories

24V power connector (for EXT. CN)

Model	KAU-M4422-00	ERCD

I/O flat cable (CN1): 1m

Connects the standard parallel I/O to an external device. The end of the cable is cut and left as it is.

Model	KAU-M4421-00	ERCD

I/O twisted-pair cable (CN2): 2m

Connects the parallel I/O to an external device. The end of the cable is cut and left as it is.

Note. Select CN2 when using the pulse train input equipment.

Model	KAU-M4421-10	ERCD

Options

Support software for PC POPCOM+ P.578

POPCOM+ is a simple to use application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

Model	KBG-M4966-00	LCC140 ERCD SR1-X SR1-P

Environment

OS	Windows XP (32bit), Vista, 7, 8 / 8.1, 10 (Supported version: V.2.1.1 or later)
CPU	Processor that meets or exceeds the suggested requirements for the OS being used.
Memory	Suggested amount of memory or more for the OS being used.
Hard disk	50MB of available space required on installation drive.
Disk operation	RS-232C
Applicable controllers	SRCX to SR1, DRCX, TRCX, ERCX, ERCD, LCC140 Note 1

Note 1. LCC140 is applicable to Ver. 2.1.1 or later.
Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

Data cables

Communication cable for POPCOM+.
Select from USB cable or D-sub cable.


USB


D-Sub

Model			LCC140 ERCD SR1-X SR1-P RCX320 RCX221 RCX222 RCX340
	USB type (5m)	KBG-M538F-00	
	D-Sub type 9pin-9pin (5m)	KAS-M538F-10	

Note. This USB cable supports Windows 2000/XP or later.
Note. Data cable jointly used for POPCOM+, VIP+, RCX-Studio Pro.
Note. USB driver for communication cable can also be downloaded from our website.

Programming box HPB/HPB-D P.585

This device can perform all operations such as manual robot operation, program entry and edit, teaching and parameter settings.


HPB


HPB-D

	HPB	HPB-D	LCC140 ERCD SR1-X SR1-P
Model	KBB-M5110-01	KBB-M5110-21	
Enable switch	–	3-position	
CE marking	Not supported	Applicable	

MEMO

SR1-X/SR1-P

Robot controller with advanced functions

Compact design with high performance.
Although with one axis, functions of upper class controllers.

SR1-X

SR1-P

Main functions ▶ P.68

Programming box
▶ HPB/HPB-D
P.585

Support software for PC
▶ POPCOM+
P.578

Basic specifications

	Item		Model	SR1-X			SR1-P		
Basic specifications	Driver model			SR1-X05	SR1-X10	SR1-X20	SR1-P05	SR1-P10	SR1-P20
	Applicable motor output			200V 100W or less	200V 200W or less	200V 600W or less	200V 100W or less	200V 200W or less	200V 600W or less
	Number of controllable axes			Single-axis					
	Controllable robots			Single-axis robot FLIP-X (exclude T4L, T5L)			Linear motor single-axis robot PHASER		
	Maximum power consumption			400VA	600VA	1400VA	400VA	600VA	1400VA
	Capacity of the connected motor			100W	200W	600W	100W	200W	600W
	Dimensions			W74 × H210 × D146mm		W99 × H210 × D146mm	W74 × H210 × D146mm		W99 × H210 × D146mm
	Weight			1.54kg		1.92kg	1.54kg		1.92kg
	Input power supply	Control power supply		Single phase AC100 to 115/200 to 230V +/-10% maximum 50/60Hz					
		Motor power supply		Single phase AC100 to 115/200 to 230V +/-10% maximum 50/60Hz		Single phase AC200 to 230V +/-10% maximum 50/60Hz	Single phase AC100 to 115/200 to 230V +/-10% maximum 50/60Hz		Single phase AC200 to 230V +/-10% maximum 50/60Hz
Axis control	Drive method			AC full-digital software servo					
	Position detection method			Multi-turn resolver with data backup function			Magnetic linear scale		
	Operating method			Programming, I/O point tracing, Remote command, Operation using RS-232C communication					
	Position indication units			mm (millimeters), deg (degrees)					
	Speed setting			1% to 100% (Setting by 1% unit)					
	Acceleration setting			1. Automatic speed setting per robot No. and payload 2. Setting based on acceleration and deceleration parameter (Setting by 1% unit)					
	Resolution			16384 P/rev			1µm		
	Origin search method			Absolute, Incremental			Incremental, Semi-absolute		
Program	Program language			YAMAHA SRC					
	Multitasks			4 tasks maximum					
	Point-data input method			Manual data input (coordinate value input), Direct teaching, Teaching playback					
Memory	Programs			100 programs 255 steps / 1 programs 3000 steps / total					
	Points			1000 points					
External input/output	STD.DIO	I/O input		Dedicated input 8 points, General input16 points					
		I/O output		Dedicated Output4 points, General output16 points					
	SAFETY			Emergency stop input (Normal close contact point input), service mode input					
	Brake output			Relay contact			–		
	Origin sensor input			Connectable to DC 24V normally-closed contact sensor					
	External communications			RS-232C: 1CH (For communication with HPB / HPB-D or PC)					
	Analog input/output			Input 1ch (0 to +10V) Output 2ch (0 to +10V)					
	Options	Slots		1					
		Type		NPN/PNP: Dedicated input 8 points, Dedicated Output 4 points, General input 16 points, General output 16 points					
				CC-Link: Dedicated input 16 points, Dedicated Output 16 points, General input 32 points, General output 32 points					
				DeviceNet™: Dedicated input 16 points, Dedicated Output 16 points, General input 32 points, General output 32 points					
				PROFIBUS: Dedicated input 16 points, Dedicated Output 16 points, General input 32 points, General output 32 points					

Controllable robot	SR1-X ▶ FLIP-X P.193	SR1-P ▶ PHASER P.239
CE marking	◯	
Field networks	CC-Link DeviceNet PROFIBUS	

Model Overview

Name	SR1-X	SR1-P
Controllable robot	Single-axis robot FLIP-X	Linear motor single-axis robot PHASER
Input power	05 / 10 driver Single phase 100 to 115V/200 to 230V +/-10% maximum (50/60Hz)	20 driver Single phase 200 to 230V +/-10% maximum (50/60Hz)
Operating method	Programming / I/O point tracing / Remote command / Operation using RS-232C communication	
Maximum number of controllable axes	Single-axis	
Origin search method	Absolute/Incremental	Incremental/Semi-absolute

Ordering method

SR1-X

SR1-X - [ ] - [ ] - [ ] - [ ] - [ ]

Controller	Driver	Usable for CE	Regenerative unit Note1	Input/Output Selection	Battery
	05: 100W or less 10: 200W 20: 400 to 600W	No entry: Standard E: CE marking	No entry: None R: RG1	N: NPN P: PNP CC: CC-Link DN: DeviceNet™ PB: PROFIBUS YC: YC-Link Note2	No entry: None (Incremental specification) B: Battery (Absolute specification)

Note 1. Driver selection and regenerative unit selection depends on the robot type. See the selection table on the next page for selecting the driver/regenerative circuit.
Note 2. Available only for the slave.

SR1-P

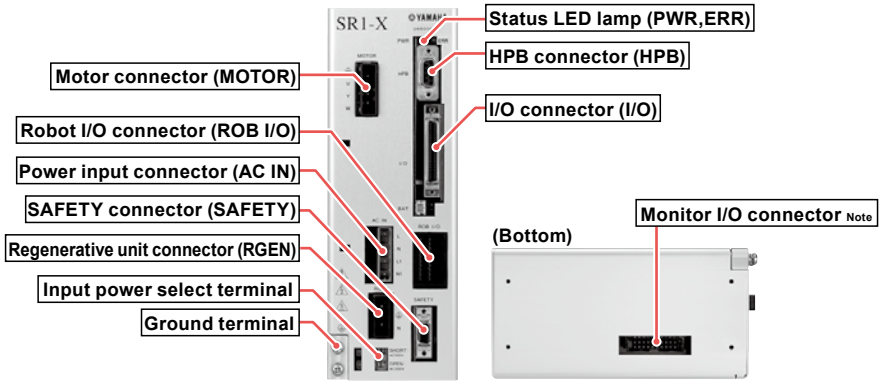
SR1-P - [ ] - [ ] - [ ] - [ ] - [ ]

Controller	Driver	Usable for CE	Regenerative unit Note1	Input/Output Selection
	05: 100W or less 10: 200W 20: 400 to 600W	No entry: Standard E: CE marking	No entry: None R: RG1	N: NPN P: PNP CC: CC-Link DN: DeviceNet™ PB: PROFIBUS YC: YC-Link Note2

Note 1. Driver selection and regenerative unit selection depends on the robot type. See the selection table on the next page for selecting the driver/regenerative circuit.
Note 2. Available only for the slave.

	Item / Model	SR1-X	SR1-P
Options	Programming box	HPB, HPB-D (with enable switch)	
	Support software for PC	POPCOM+	
General specifications	Operating temperature	0°C to 40°C	
	Storage temperature	-10°C to 65°C	
	Operating humidity	35% to 85%RH (non-condensing)	
	Absolute backup battery	Lithium metallic battery	–
	Absolute data backup period	1 year (in state with no power applied)	–
	Noise immunity	IEC61000-4-4 Level 3	

Part names



Note. Cable for monitor I/O (option) is required when using this connector.

SR1-X/SR1-P

Driver / regenerative unit selection table

SR1-X

			FLIP-X																									
			T4LH/ C4LH	T5LH/ C5LH	T6L/ C6L	T9	T9H	F8/ C8	F8L/ C8L	F8LH/ C8LH	F10 C10	F10H	F14/ C14	F14H/ C14H	GF14XL	F17/ C17	F17L/ C17L	GF17XL	F20/ C20	F20N	N15/ N15D	N18/ N18D	B10	B14	B14H	R5	R10	R20
Driver selection	SR1-X	05	●	●	●	●		●	●	●	●		●										●	●	●	●	●	
		10					●					●		●	●													●
		20														●	●	●	●	●	●	●						
Regenerative unit	No entry (None)		●	●	●	①	②	●	●	●	①	②	①	②	●	③		⑥	③	④			●	●	⑤	●	●	●
	R (RG1)					①	②				①	②	①	②		③	●	⑥	③	④	●	●			⑤			

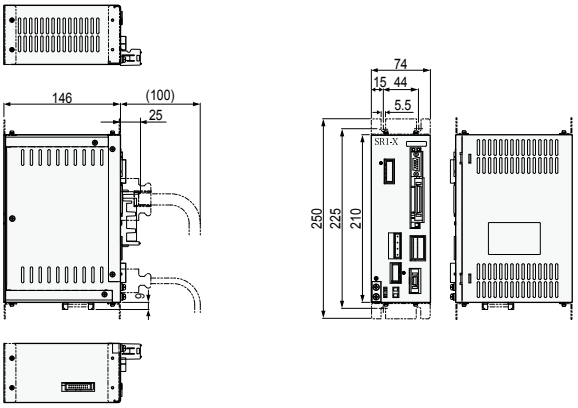
① Regenerative unit is needed if using in a perpendicular position and movement stroke is 700mm or more.
② Regenerative unit is needed if using in a perpendicular position.
③ Regenerative unit is needed if using in a perpendicular position, using at maximum speeds exceeding 1000mm per second, or if using high leads (40).
④ Regenerative unit is needed if using at maximum speeds exceeding 1000mm per second.
⑤ Regenerative unit is needed if using at maximum speeds exceeding 1250mm per second.
⑥ Regenerative unit is needed if using at maximum speeds exceeding 750mm per second.

SR1-P

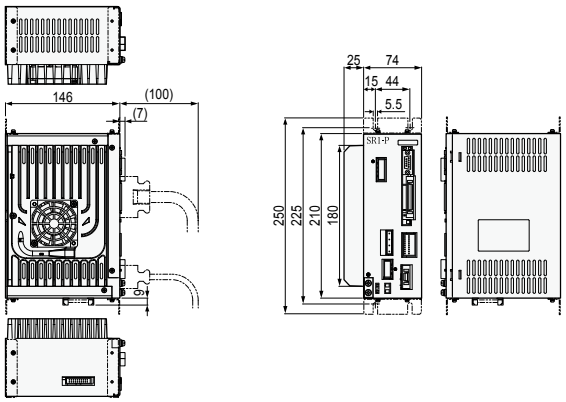
			PHASER								
			MR16/ MR16D	MR16H/ MR16HD	MR20/ MR20D	MR25/ MR25D	MF7/ MF7D	MF15/ MF15D	MF20/ MF20D	MF30/ MF30D	MF75/ MF75D
Driver selection	SR1-P	05	●								
		10		●		●	●	●	●		
		20			●					●	●
Regenerative unit	No entry (None)		●	●	●	●	●	●			
	R (RG1)								●	●	
	R (RGU-2)										●

Dimensions

SR1-X/SR1-P 05 - 10

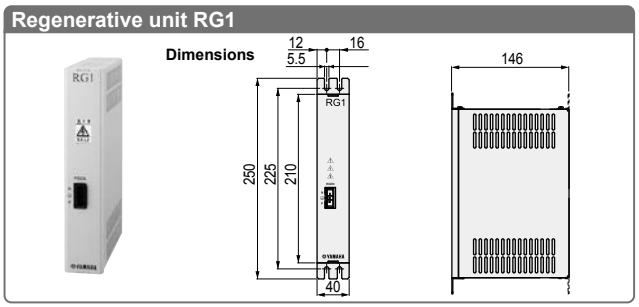


SR1-X/SR1-P 20

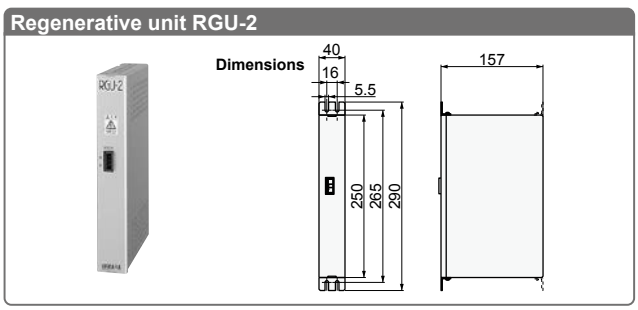


Regenerative unit RG1 / RGU-2

Regenerative unit RG1



Regenerative unit RGU-2



Basic specifications

Item	RG1
Model	KBG-M4107-0A (Including accessory)
Dimensions	W40 × H210 × D146mm
Weight	0.8kg
Regenerative voltage	Approx. 380V or more
Regenerative stop voltage	Approx. 360V or less
Accessory	Cable for connection with controller (300mm)

Note. Always leave an empty space (gap of about 20mm) between this unit and the adjacent controller. Also, always use the dedicated cable when connecting the controller.

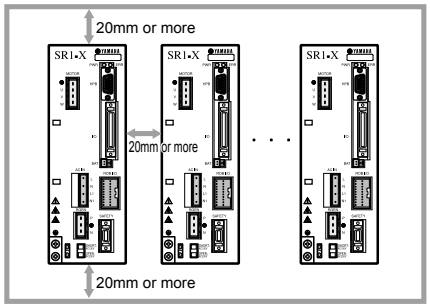
Basic specifications

Item	RGU-2
Model	KS5-M4107-0A (Including accessory)
Dimensions	W40 × H250 × D157mm
Weight	0.9kg
Regenerative voltage	Approx. 380V or more
Regenerative stop voltage	Approx. 360V or less
Accessory	Cable for connection with controller (300mm)

Note. Always leave an empty space (gap of about 20mm) between this unit and the adjacent controller. Also, always use the dedicated cable when connecting the controller.

Installation conditions

- Install the SR1-X/SR1-P inside the control panel.
- Install the SR1-X/SR1-P on a vertical wall.
- Install the SR1-X/SR1-P in a well ventilated location, with space on all sides of the SR1-X/SR1-P (See fig. at right.).
- Ambient temperature : 0 to 40˚C
- Ambient humidity : 35 to 85% RH (no condensation)



[NPN, PNP type] Input/Output list

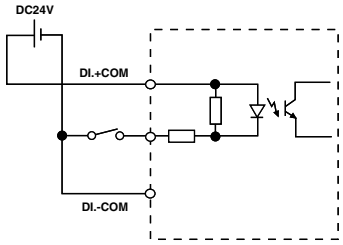
Terminal number	Signal name	Function
1	DI.+COM	Input supply+common
2	SERVO	Return to servo on
3	INC-PT	Relative point transfer
4	ABS-PT	Absolute point transfer
5	STEP-R	Step run
6	DI 0	General input 0
7	DI 1	General input 1
8	DI 2	General input 2
9	DI 3	General input 3
10	DI 4	General input 4
11	DI 5	General input 5
12	DI 6	General input 6
13	DI 7	General input 7
14	DO.+COM	Output supply+common
15	DO.+COM	Output supply+common
16	END	Execution result (Execution complete)
17	BUSY	Executing the command
18	DO 0	General output 0
19	DO 1	General output 1
20	DO 2	General output 2
21	DO 3	General output 3
22	DO 4	General output 4
23	DO 5	General output 5
24	DO 6	General output 6
25	DO 7	General output 7

Terminal number	Signal name	Function
26	DI.-COM	Input supply-common
27	AUTO-R	Auto run
28	RESET	Reset
29	ORG-S	Return to the origin
30	ALMRST	Alarm reset
31	DI 8	General input 8
32	DI 9	General input 9
33	DI 10	General input 10
34	DI 11	General input 11
35	DI 12	General input 12
36	DI 13	General input 13
37	DI 14	General input 14
38	DI 15	General input 15
39	DO.-COM	Output supply-common
40	DO.-COM	Output supply-common
41	READY	Available to operate (Ready for operation)
42	UTL	Utility output
43	DO 8	General output 8
44	DO 9	General output 9
45	DO 10	General output 10
46	DO 11	General output 11
47	DO 12	General output 12
48	DO 13	General output 13
49	DO 14	General output 14
50	DO 15	General output 15

NPN type input/output circuit

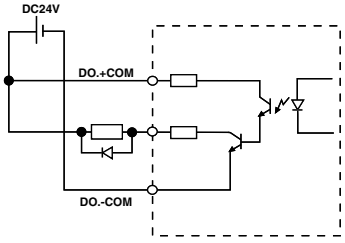
Input circuit

- Form : DC input (positive common type)
  Photo coupler insulation type
- Input power supply : 5mA/point
- Answering time : 30ms or less



Output circuit

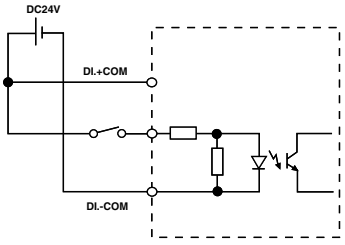
- Form : NPN open collector output (negative common type)
  Photo coupler insulation type
- Load : 50mA/point
- Answering time : 1ms or less



PNP type input/output circuit

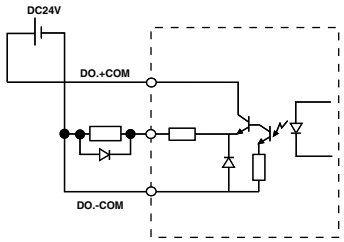
Input circuit

- Form : DC input (negative common type)
  Photo coupler insulation type
- Input power supply : 5mA/point
- Answering time : 30ms or less



Output circuit

- Form : PNP open collector output (positive common type)
  Photo coupler insulation type
- Load : 50mA/point
- Answering time : 1ms or less



SAFETY connector signals

Terminal number	Signal name	Meaning
1	DI.COM	Input supply common
2	LOCK	Interlock
3	SVCE	SERVICE mode
4	DO.COM	Output supply common
5	MPRDY	Main power ready
6	NC	NC
7	NC	NC
8	NC	NC
9	NC	NC
10	NC	NC
11	EMG1	Emergency stop 1
12	EMG2	Emergency stop 2
13	NC	NC
14	NC	NC

Robot Language Table

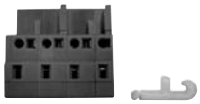
Command	Description
MOVA	Moves to a point data position.
MOVI	Moves from current position by amount of point data.
MOVF	Moves until a specified DI input is received.
JMP	Jumps to a specified label in the specified program.
JMPF	Jumps to a specified label in a specified program according to the input condition.
JMPB	Jumps to a specified label in a specified program when general-purpose input or memory input is in the specified state.
L	Defines the jump destination for a JMP or JMPF statement.
CALL	Runs another program.
DO	Turns general-purpose output or memory output on or off.
WAIT	Waits until general-purpose input or memory input is in the specified state.
TIMR	Waits the specified amount of time before advancing to the next step.
P	Defines point variable.
P+	Adds 1 to point variable.
P-	Subtracts 1 from point variable.
SRVO	Turns servo on or off.
STOP	Temporarily stops program execution.
ORGN	Performs return-to-origin.
TON	Runs a specified task.
TOFF	Stops a specified task.
JMPP	Jumps to a specified label when the axis position condition meets the specified conditions.
MAT	Defines a matrix.
MSEL	Specifies a matrix to move.
MOVM	Moves to a specified pallet work position on matrix.
JMPC	Jumps to a specified label when the counter array variable C equals the specified value.
JMPD	Jumps to a specified label when the counter variable D equals the specified value.
CSEL	Specifies an array element for counter array variable C.
C	Defines counter array variable C.
C+	Adds a specified value to counter array variable C.
C-	Subtracts a specified value from counter array variable C.
D	Defines counter variable D.
D+	Adds a specified value to counter variable D.
D-	Subtracts a specified value from counter variable D.
SHFT	Shifts the coordinate position by amount of specified point data.
IN	Stores bit information on specified general-purpose input or memory input into counter variable D.
OUT	Outputs the value of counter variable D to specified general-purpose output or memory output.
LET	Shifts the coordinate position by amount of specified point data.

Accessories and part options

SR1-X/SR1-P

Standard accessories

Power connector + wiring connection lever



Model	KAS-M5382-00

LCC140 TS-X TS-P SR1-X SR1-P RCX320 RCX221 RCX222 RCX340

Safety connector

Connector plug model	KBG-M4424-00
Connector cover model	KBG-M4425-00

SR1-X SR1-P

HPB dummy connector

Attach this to the HPB connector during operation with the programming box HPB removed.

Model	KDK-M5163-00

LCC140 SR1-X SR1-P

NPN / PNP connector

Connector plug model	KBH-M4424-00
Connector cover model	KBH-M4425-00

SR1-X SR1-P RCX320 RCX340

L type stay

Use to install the controller.

Model	KBG-M410H-00

Note. Model No. is for a single bracket (L type stay).

SR1-X SR1-P

Absolute battery

Battery for absolute data back-up.
(Not included with the SR1-P)

Basic specifications

Item	Absolute battery
Battery type	Lithium metallic battery
Battery capacity	3.6V/2,750mAh
Data holding time	About 1 year (in state with no power applied)
Dimensions	ϕ17 × L53mm
Weight Note1	22g

Model	KAS-M53G0-11

Note 1. Weight of battery itself.
Note. The absolute battery is subject to wear and requires replacement.
If trouble occurs with the memory then remaining battery life is low so replace the absolute battery. The battery replacement period depends on usage conditions. But generally you should replace the battery after about 1 year counting the total time after connecting to the controller and left without turning on the power.

SR1-X RCX222

Battery case

This is the absolute battery holder.

Model	KBG-M5395-00

SR1-X RCX222

See next page for optional parts

Options

Cable for monitor I/O

Cable to connect I/O connector of SR1 monitor.
The cable is 1.5m long with its end cut and left as it is.
Required when using analog input / output and feedback pulse output.

Model	KBG-M4421-00

SR1-X
SR1-P

Support software for PC POPCOM+ P.578

POPCOM+ is a simple to use application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

Model	KBG-M4966-00

LCC140
ERCD
SR1-X
SR1-P

Environment

OS	Windows XP (32bit), Vista, 7, 8 / 8.1, 10 (Supported version: V.2.1.1 or later)
CPU	Processor that meets or exceeds the suggested requirements for the OS being used.
Memory	Suggested amount of memory or more for the OS being used.
Hard disk	50MB of available space required on installation drive.
Disk operation	RS-232C
Applicable controllers	SRCX to SR1, DRCX, TRCX, ERCX, ERCD, LCC140 Note 1

Note 1. LCC140 is applicable to Ver. 2.1.1 or later.
Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

Data cables

Communication cable for POPCOM+.
Select from USB cable or D-sub cable.


USB


D-Sub

Model	USB type (5m)	KBG-M538F-00
	D-Sub type 9pin-9pin (5m)	KAS-M538F-10

Note. This USB cable supports Windows 2000/XP or later.
Note. Data cable jointly used for POPCOM+, VIP+, RCX-Studio Pro.
Note. USB driver for communication cable can also be downloaded from our website.

LCC140
ERCD
SR1-X
SR1-P
RCX320
RCX221
RCX222
RCX340

Programming box HPB/HPB-D P.585

This device can perform all operations such as manual robot operation, program entry and edit, teaching and parameter settings.


HPB


HPB-D

	HPB	HPB-D
Model	KBB-M5110-01	KBB-M5110-21
Enable switch	–	3-position
CE marking	Not supported	Applicable

LCC140
ERCD
SR1-X
SR1-P

YC-Link board (with connection cable)

Model	KBG-M4400-60

SR1-X
SR1-P

Note. Use the converter cable if changing to the SR1-X, SR1-P from a system using SRCX, SRCP. (See P.623).

MEMO

RCX320

Robot controller with advanced functions

A 2-axis model of the RCX340 controller has been launched finally.
The high-level equipment construction such as simultaneous control of multiple robots is achieved by the advanced functionality and flexible expandability.

RCX320

Main functions ▶ P.72

Programming box
▶ PBX/PBX-E
P.587

Support software for PC
▶ RCX-Studio Pro
P.583

Ordering method

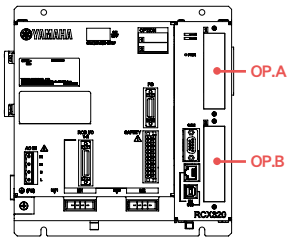
RCX320 – [ ] – [ ] – [ ] – [ ] – [ ] – [ ] – [ ] – [ ]

Controller	No. of controllable axes	Safety standards	Regenerative unit Note 8	Controller option A (OP.A)	Controller option B (OP.B)	Vision System	Absolute battery
	2: 2 axes 1: 1 axes	N: Normal E: CE	No entry: None R: YHX-RU1	No entry: Non-selection NS : STD.DIO(NPN) Note 1 Note 4 NE : EXP.DIO(NPN) Note 2 Note 4 PS : STD.DIO(PNP) Note 1 Note 4 PE : EXP.DIO(PNP) Note 2 Note 4 GR: Gripper TR : Tracking Note 5 YM1 : YC-Link/E master Note 6 YS2 to 4: YC-Link/E slave Note 6 EP : EtherNet/IP™ Note 7 PB : PROFIBUS Note 7 CC : CC-Link Note 7 DN : DeviceNet™ Note 7 PT : PROFINET Note 7 ES : EtherCAT Note 7	No entry: Non-selection --- Note 3 NE : EXP.DIO(NPN) Note 2 Note 4 --- Note 3 PE : EXP.DIO(PNP) Note 2 Note 4 GR: Gripper TR : Tracking Note 5 YM1 : YC-Link/E master Note 6 YS2 to 4: YC-Link/E slave Note 6 EP : EtherNet/IP™ Note 7 PB : PROFIBUS Note 7 CC : CC-Link Note 7 DN : DeviceNet™ Note 7 PT : PROFINET Note 7 ES : EtherCAT Note 7	No entry: Non-selection VY: iVY2 without light VL: iVY2 with light	2: 2 pcs. 1: 1 pc. 0: 0 pc.

Please select desired selection items from the upper portion of the controller option A in order.

Note 1. [STD.DIO] Parallel I/O board standard specifications
Dedicated input 8 points, dedicated output 9 points, general-purpose input 16 points, general-purpose output 8 points
Do not mix with field bus (CC/DN/PB/EP/PT/ES).
Note 2. [EXP.DIO] Parallel I/O board expansion specifications
General-purpose input 24 points, general-purpose output 16 points
Note 3. Only one DIO STD specification board can be selected. Therefore, this board cannot be selected in OP.B to OP.D.
Note 4. Select either NPN or PNP in DIO.
Note 5. Only one tracking board can be selected.
Note 6. Select only one master or slave board for YC-Link/E. For details, refer to "YC-Link/E ordering explanation" below.
Additionally, when ordering YC-Link/E, please specify what robot is connected to what number controller.
Note 7. Select only one fieldbus in a controller (CC/DN/PB/EP/PT/ES).
Note 8. The regenerative unit (option) is required when operating a model designated by YAMAHA or a load with a large inertia.

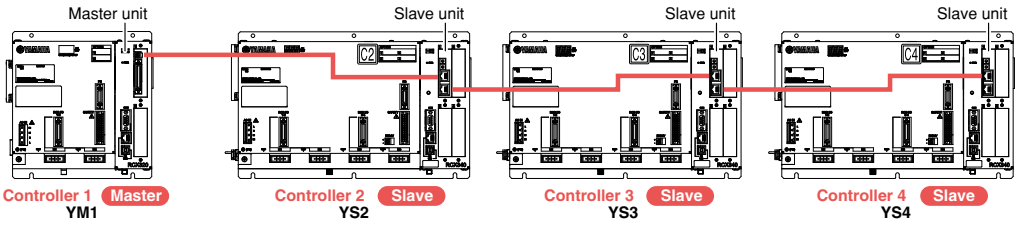
Controller option board position



YC-Link/E explanation

Using the inter-controller communication "YC-Link/E", the RCX320 and RCX340 are connected and up to 14 axes (4 robots) can be expanded.
The YC-Link/E can be executed by the program of only the master controller. This contributes to great reduction of the system startup time.

Example of YC-Link/E connections



- The "RCX320" and "RCX340" controllers support both the master and slave specifications.
- Up to four "RCX320" and "RCX340" controllers can be connected.
- The network board is inserted into only the master controller (YM1).

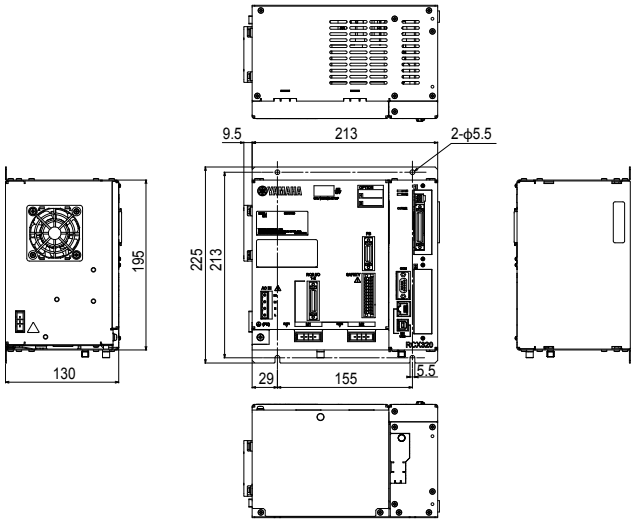
Controllable robot	XY-X P.261	FLIP-X P.193	PHASER P.239	YP-X P.451
CE marking	◯	Field networks	CC-Link DeviceNet EtherNet/IP Ethernet PROFIBUS PROFINET EtherCAT	

Basic specifications

Item			RCX320
Basic specifications	Applicable robots		YAMAHA single-axis robots, linear single-axis robots, P&P robots
	Connected motor capacity		1200W or less (in total for 2 axes)
	Power capacity		2400VA
	Dimensions		W213 × H195 × D130mm (main unit only)
	Weight		3.6kg (main unit only)
	Input power supply	Control power supply	Single-phase 200 to 230V AC +/-10% 50/60Hz
		Main power supply	Single-phase 200 to 230V AC +/-10% 50/60Hz
Axis control	No. of controllable axes		Max. 2 axes Up to four units of the RCX320 and RCX340 can be connected using the inter-controller communication “YC-Link/E”.
	Drive method		AC full digital servo
	Position detection method		Resolver or magnetic linear scale
	Control method		PTP motion (point to point), ARCH motion, linear interpolation, circular interpolation
	Coordinate systems		Joint coordinates, Cartesian coordinates
	Position display units		Pulses, mm (1/1000 steps), degree (1/1000 steps)
	Speed setting		0.01 to 100% (below 1% can be changed by programming)
	Acceleration/deceleration setting		Optimized by robot model and tip weight parameter Setting by acceleration coefficient and deceleration rate parameters (1% steps) * Can be changed by programming. Zone control (For SCARA robots only, optimized according to arm posture)
Programming	Program language		YAMAHA BASIC II conforming to JIS B8439 (SLIM language)
	Multi-task		Max. 16 tasks
	Sequence program		1 program
	Memory capacity		2.1MB (Total of program and point data) (Available capacity for program when the maximum number of points is used: 300KB)
	Program		100 programs (maximum number of programs) 9999 lines (maximum number of lines per program)
	Point		30000 points (maximum number of points)
	Point teaching method		MDI (coordinate data input), direct teaching, teaching playback, offline teaching (data input from external unit)
	System backup (Internal memory backup)		Lithium battery (service life about 4 years at 0 to 40°C)
	Internal flash memory		512 KB
External I/O	SAFETY	Input	Emergency stop ready input, 2 systems Auto mode input, 2 systems (Enabled only when the global specifications are used.)
		Output	Emergency stop contact output, 2 systems Enable contact output, 2 systems (Enabled only when the PBX-E is used.) Motor power ready output, 2 systems
	Brake output		Transistor output (PNP open collector)
	Origin sensor input		Connectable to 24V DC B-contact (normally closed) sensor
	External communications		RS-232C: 1CH (D-SUB 9-pin (female)) Ethernet: 1CH (In conformity with IEEE802.3u/IEEE802.3) 100Mbps/10Mbps (100BASE-TX/10BASE-T) Applicable to Auto Negotiation RS-422: 1CH (Dedicated to PBX)
General specifications	Operating temperature		0 to 40°C
	Storage temperature		-10 to 65°C
	Operating humidity		35 to 85% RH (no condensation)
	Atmosphere		Indoor location not exposed to direct sunlight. *No corrosive , flammable gases, oil mist, or dust particles
	Anti-vibration		All XYZ directions 10 to 57Hz unidirectional amplitude 0.075mm 57 to 150Hz 9.8m/s^2
	Protective functions		Position detection error, power module error, temperature error, overload, overvoltage, low voltage, excessive position deviation, overcurrent, motor current error
	Noise immunity		Conforms to IEC61000-4-4 Level 3
	Protective structure		IP20
	Appliance classes		Class I
Options	Option board	Parallel I/O board	Standard specifications	Dedicated input 8 points, dedicated output 9 points General-purpose input 16 points, general-purpose output 8 points NPN/PNP specifications are selected. (maximum 1 board)
			Expansion specifications	General-purpose input 24 points, general-purpose output 16 points NPN/PNP specifications are selected. (maximum 4 boards)
		CC-Link board Ver1.1/2.0		Remote I/O Dedicated input/output: 16 points each General-purpose input/output: 96 points each Remote register Input/output: 16 words each
		DeviceNet™ board		
		EtherNet/IP™ board		
		PROFIBUS board		
		PROFINET board		
		EtherCAT board		
		YC-Link/E board (master/slave)		Communication cycle: 1 ms, control cycle: minimum 1 ms / maximum 8 ms, maximum number of robot units: four units Maximum number of control axes: total 14 axes (including two master controller axes), maximum 12 axes for slaves only
		YRG (gripper) board		Position detection method: optical rotary encoder, minimum setting distance: 0.01 mm Speed setting: 20 to 100% relative to the maximum parameter speed, number of connected gripper units: maximum two units Drive power: DC 24V +/-10%, 1.0A Max
		Tracking board		Number of connected encoders: maximum two units, supported encoders: 26LS31/26C31 equivalent line driver (RS422 compliant) Encoder power supply: DC5V (2 counter (ch) total 500 mA or less) (supplied from controller)
	iVY2 unit			Camera pixels: maximum 5 million pixels, number of registered models: 254 models, number of connected cameras: maximum two units Power supply: DC24V +/-10% 1.5A Max
	Programming box			PBX, PBX-E
	Absolute battery			3.6V 2750mAH / axis Backup retention time: About 1 year
	Support software for personal computer			RCX-Studio Pro

RCX320

Dimensions



Power supply capacity and heat emission

The required power supply capacity and heat emission will vary depending on the robot type and number of axes.
Using the following table as a general guide consider the required power supply preparation and control panel size, controller installation, and cooling method.

When connected to 2 axis (Cartesian robot and/or multi-axis robot)

Axial current sensor value		Power capacity (VA)	Generated heat amount (W)
X axis	Y axis		
05	05	500	53
10	05	700	58
20	05	1500	78
10	10	900	63
20	10	1700	83
20	20	2400	100

Note. Even if axial current sensor values for each axis are interchanged no problem will occur.

Motor capacity vs. current sensor table

Connected motor capacity	Current sensor
100W or less	05
200W	10
400W or more	20

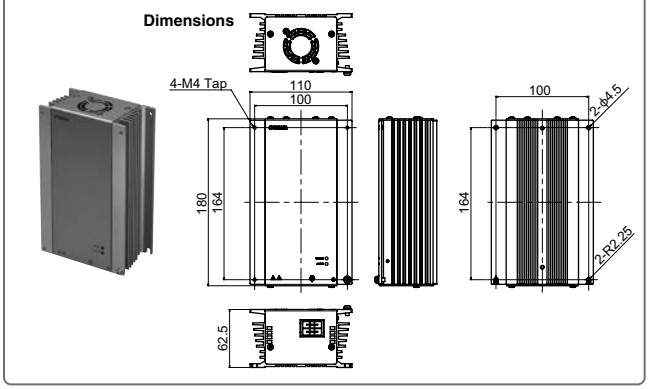
Note. Motor output of the B14H is 200W but the current sensor is 05.

Conditions where regenerative unit is needed on multi robots

- Motor capacity exceeds a total of 450W.
- Motor capacity for perpendicular axis exceeds a total of 240W.
- The following conditions apply when perpendicular axis capacity is 240W or less.
  - perpendicular axis is 200W.
  - perpendicular axis is 100W and stroke is 700mm or more.
  - there are 2 perpendicular axes at 100W, and includes leads of 5mm.
- B14H which maximum speed exceeds 1250mm per second.

Regenerative unit YHX-RU1

Regenerative unit YHX-RU1



Basic specifications

Item		YHX-RU1
Model		KEK-M4107-0A (including cable supplied with unit)
Dimensions		W62.5×H180×D110mm
Weight		1.45kg
Absorbable electric power		100 W (Equivalent to RGU 3) * 200 W when 2 are connected
Power Supply	Input	254 to 357 V DC (Controller DCBUS Connecting)
Connector		Regenerative unit connector (for unit connection and extension)
Installation Environment	Working Temperature	0 to 40 °C
	Working Humidity	35 to 85% RH (No Condensation)
	Location of Use	Altitude 2,000 m or lower and indoor (free from corrosive gases and dust)
	Storage Temperature	-10 to 65 °C
	Vibration Withstanding	1G
Protective Construction / Rating		IP20 / Class 1
Accessory		Cable for connection with controller (500mm)

Regenerative unit selection table

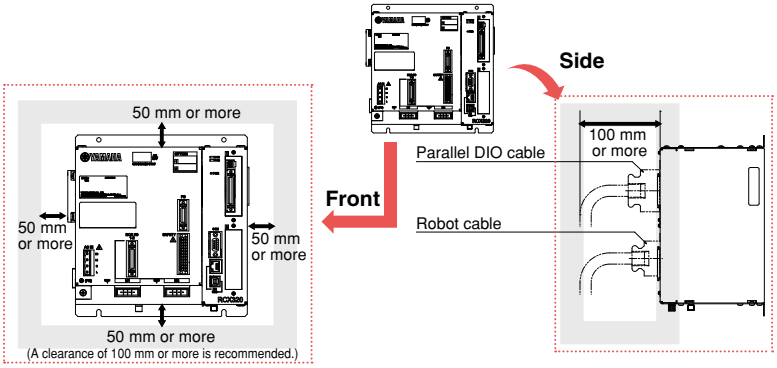
Whether the regenerative unit is needed is automatically determined by the robot model.

		PHASER						FLIP-X		XY-X: Arm type, Gantry type, Moving arm type, Pole type (2 axes)								XY-X: XZ type (2 axes)						YP-X		Clean
		MF7D	MF15D	MF20D	MF30D	MF50D	MF75D	N15D	N18D	PXYx	FXYx	FXYBx	SXYx	SXYBx	NXY	MXYx	HXYx	HXYLx	SXYx (ZF)	SXYx (ZFL20)	SXYBx (ZF)	SXYBx (ZFL20)	MXYx	HXYx	YP220BX	YP320X	SXYxC (2 axes)
Regenerative unit	No entry (None)	●	●							●	●	●	●	○					●		●				●	●	●
	R (YHX-RU1)			●	●	●	●	●	●					○	●	●	●	●		●		●	●	●			

● : Applicable ○ : Select per conditions

Installation conditions

- Use the screws to secure the controller to the installation plate inside the control panel so that it is in a horizontal position. Be sure to use the metallic installation plate.
- Install the RCX320 in a well ventilated location, with space on all sides of the RCX320 (See fig. at right.).
- Ambient temperature : 0 to 40˚C
- Ambient humidity : 35 to 85% RH (no condensation)



Standard specification I/O connector signal list

Pin	I/O No.	Signal name	Remarks
1	DI 01	Dedicated input: Servo ON input	
2	DI 10	Dedicated input: Sequence control	
3	DI 03	Spare	Do not use.
4	CHK 1	Check signal 1	Short-circuit with CHK2.
5	DI 05	Spare	Do not use.
6	DI 06	Dedicated input: Stop	
7	DI 07	Spare	Do not use.
8	DI 20	General-purpose input 20	
9	DI 21	General-purpose input 21	
10	DI 22	General-purpose input 22	
11	DI 23	General-purpose input 23	
12	DI 24	General-purpose input 24	
13	DI 25	General-purpose input 25	
14	DI 26	General-purpose input 26	
15	DI 27	General-purpose input 27	
16	DO 00	Spare	Do not use.
17	DO 01	Dedicated output CPU OK	
18	DO 10	Dedicated output AUTO mode output	
19	DO 11	Dedicated output Return-to-origin complete	
20	DO 12	Dedicated output Sequence program-in-progress	
21	DO 13	Dedicated output Robot program-in-progress	
22	DO 14	Dedicated output Program reset status output	
23	DO 15	Dedicated output Warning output	
24	DO 16	Spare	Do not use.
25	DO 17	Spare	Do not use.
26	DI 12	Dedicated input: Automatic operation start	
27	DI 13	Spare	Do not use.
28	DI 14	Dedicated input: Return-to-origin (for INC axis)	
29	DI 15	Dedicated input: Program reset input	
30	DI 16	Dedicated input: Alarm reset input	
31	DI 17	Dedicated input: Return-to-origin (for ABS axis)	
32	DI 30	General-purpose input 30	
33	DI 31	General-purpose input 31	
34	DI 32	General-purpose input 32	
35	DI 33	General-purpose input 33	
36	DI 34	General-purpose input 34	
37	DI 35	General-purpose input 35	
38	DI 36	General-purpose input 36	
39	DI 37	General-purpose input 37	
40	CHK 2	Check signal 2	Short-circuit with CHK1.
41	DO 02	Dedicated output: Servo ON output	
42	DO 03	Dedicated output: Alarm output	
43	DO 20	General-purpose output 20	
44	DO 21	General-purpose output 21	
45	DO 22	General-purpose output 22	
46	DO 23	General-purpose output 23	
47	DO 24	General-purpose output 24	
48	DO 25	General-purpose output 25	
49	DO 26	General-purpose output 26	
50	DO 27	General-purpose output 27	

Expanded specification I/O connector signal list

Pin	I/O No. (ID=1)	I/O No. (ID=2)	I/O No. (ID=3)	I/O No. (ID=4)	Signal name
1	---	---	---	---	Reserved
2	DI 10	DI 40	DI 70	DI 120	General-purpose input 10,40,70,120
3	---	---	---	---	Reserved
4	DI 11	DI 41	DI 71	DI 121	General-purpose input 11,41,71,121
5	---	---	---	---	Reserved
6	---	---	---	---	Reserved
7	---	---	---	---	Reserved
8	DI 20	DI 50	DI 100	DI 130	General-purpose input 20,50,100,130
9	DI 21	DI 51	DI 101	DI 131	General-purpose input 21,51,101,131
10	DI 22	DI 52	DI 102	DI 132	General-purpose input 22,52,102,132
11	DI 23	DI 53	DI 103	DI 133	General-purpose input 23,53,103,133
12	DI 24	DI 54	DI 104	DI 134	General-purpose input 24,54,104,134
13	DI 25	DI 55	DI 105	DI 135	General-purpose input 25,55,105,135
14	DI 26	DI 56	DI 106	DI 136	General-purpose input 26,56,106,136
15	DI 27	DI 57	DI 107	DI 137	General-purpose input 27,57,107,137
16	---	---	---	---	Reserved
17	---	---	---	---	Reserved
18	DO 10	DO 30	DO 50	DO 70	General-purpose output 10,30,50,70
19	DO 11	DO 31	DO 51	DO 71	General-purpose output 11,31,51,71
20	DO 12	DO 32	DO 52	DO 72	General-purpose output 12,32,52,72
21	DO 13	DO 33	DO 53	DO 73	General-purpose output 13,33,53,73
22	DO 14	DO 34	DO 54	DO 74	General-purpose output 14,34,54,74
23	DO 15	DO 35	DO 55	DO 75	General-purpose output 15,35,55,75
24	DO 16	DO 36	DO 56	DO 76	General-purpose output 16,36,56,76
25	DO 17	DO 37	DO 57	DO 77	General-purpose output 17,37,57,77
26	DI 12	DI 42	DI 72	DI 122	General-purpose input 12,42,72,122
27	DI 13	DI 43	DI 73	DI 123	General-purpose input 13,43,73,123
28	DI 14	DI 44	DI 74	DI 124	General-purpose input 14,44,74,124
29	DI 15	DI 45	DI 75	DI 125	General-purpose input 15,45,75,125
30	DI 16	DI 46	DI 76	DI 126	General-purpose input 16,46,76,126
31	DI 17	DI 47	DI 77	DI 127	General-purpose input 17,47,77,127
32	DI 30	DI 60	DI 110	DI 140	General-purpose input 30,60,110,140
33	DI 31	DI 61	DI 111	DI 141	General-purpose input 31,61,111,141
34	DI 32	DI 62	DI 112	DI 142	General-purpose input 32,62,112,142
35	DI 33	DI 63	DI 113	DI 143	General-purpose input 33,63,113,143
36	DI 34	DI 64	DI 114	DI 144	General-purpose input 34,64,114,144
37	DI 35	DI 65	DI 115	DI 145	General-purpose input 35,65,115,145
38	DI 36	DI 66	DI 116	DI 146	General-purpose input 36,66,116,146
39	DI 37	DI 67	DI 117	DI 147	General-purpose input 37,67,117,147
40	---	---	---	---	Reserved
41	---	---	---	---	Reserved
42	---	---	---	---	Reserved
43	DO 20	DO 40	DO 60	DO 100	General-purpose output 20,40,60,100
44	DO 21	DO 41	DO 61	DO 101	General-purpose output 21,41,61,101
45	DO 22	DO 42	DO 62	DO 102	General-purpose output 22,42,62,102
46	DO 23	DO 43	DO 63	DO 103	General-purpose output 23,43,63,103
47	DO 24	DO 44	DO 64	DO 104	General-purpose output 24,44,64,104
48	DO 25	DO 45	DO 65	DO 105	General-purpose output 25,45,65,105
49	DO 26	DO 46	DO 66	DO 106	General-purpose output 26,46,66,106
50	DO 27	DO 47	DO 67	DO 107	General-purpose output 27,47,67,107

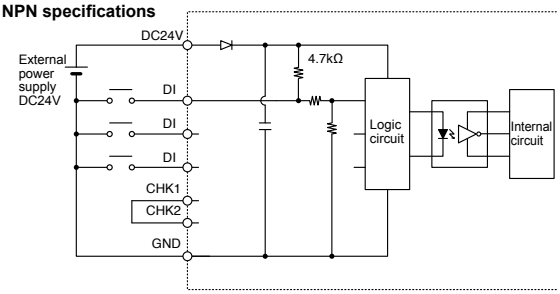
Note. The IDs are set using the parameter.

Standard specification I/O connector pin assignment lists

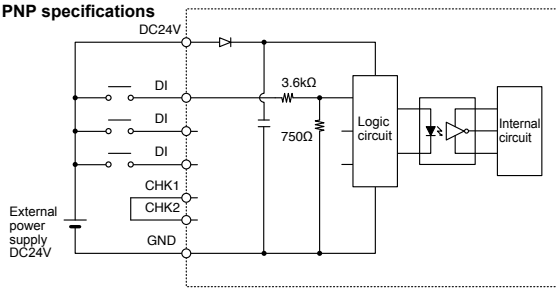
Pin	I/O No.	Name
1	DI01	Servo ON
2	DI10	SEQ enable
3	DI03	(Spare)
4	CHK1	Check input 1
5	DI05	(Spare)
6	DI06	STOP
7	DI07	(Spare)
8	DI20	General-purpose input
9	DI21	General-purpose input
10	DI22	General-purpose input
11	DI23	General-purpose input
12	DI24	General-purpose input
13	DI25	General-purpose input
14	DI26	General-purpose input
15	DI27	General-purpose input
16	DO00	(Spare)
17	DO01	CPUOK
18	DO10	AUTO
19	DO11	ORGOK
20	DO12	SEQRUN
21	DO13	RUN
22	DO14	RESET
23	DO15	WARNING
24	DO16	(Spare)
25	DO17	(Spare)
26	DI12	RUN
27	DI13	(Spare)
28	DI14	ORIGIN (for INC axis)
29	DI15	RESET
30	DI16	ALMRST
31	DI17	ORIGIN(for ABS axis)
32	DI30	General-purpose input
33	DI31	General-purpose input
34	DI32	General-purpose input
35	DI33	General-purpose input
36	DI34	General-purpose input
37	DI35	General-purpose input
38	DI36	General-purpose input
39	DI37	General-purpose input
40	CHK2	Check input 2
41	DO02	SERVO
42	DO03	ALARM
43	DO20	General-purpose output
44	DO21	General-purpose output
45	DO22	General-purpose output
46	DO23	General-purpose output
47	DO24	General-purpose output
48	DO25	General-purpose output
49	DO26	General-purpose output
50	DO27	General-purpose output

Typical input signal connection

NPN specifications

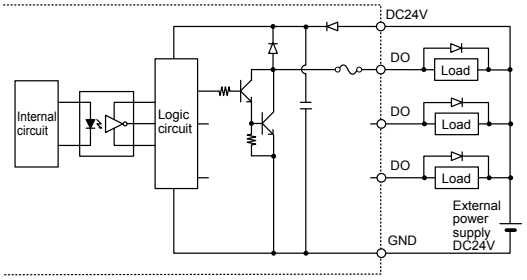


PNP specifications

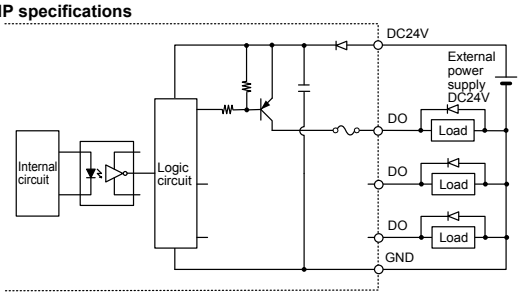


Typical output signal connection

NPN specifications



PNP specifications

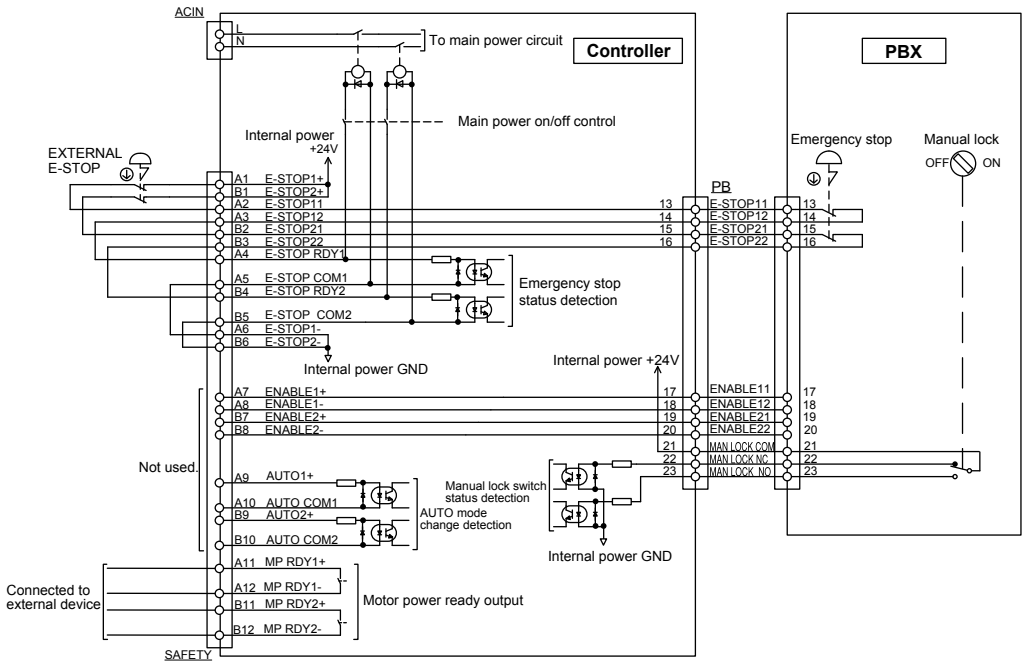


Basic functions

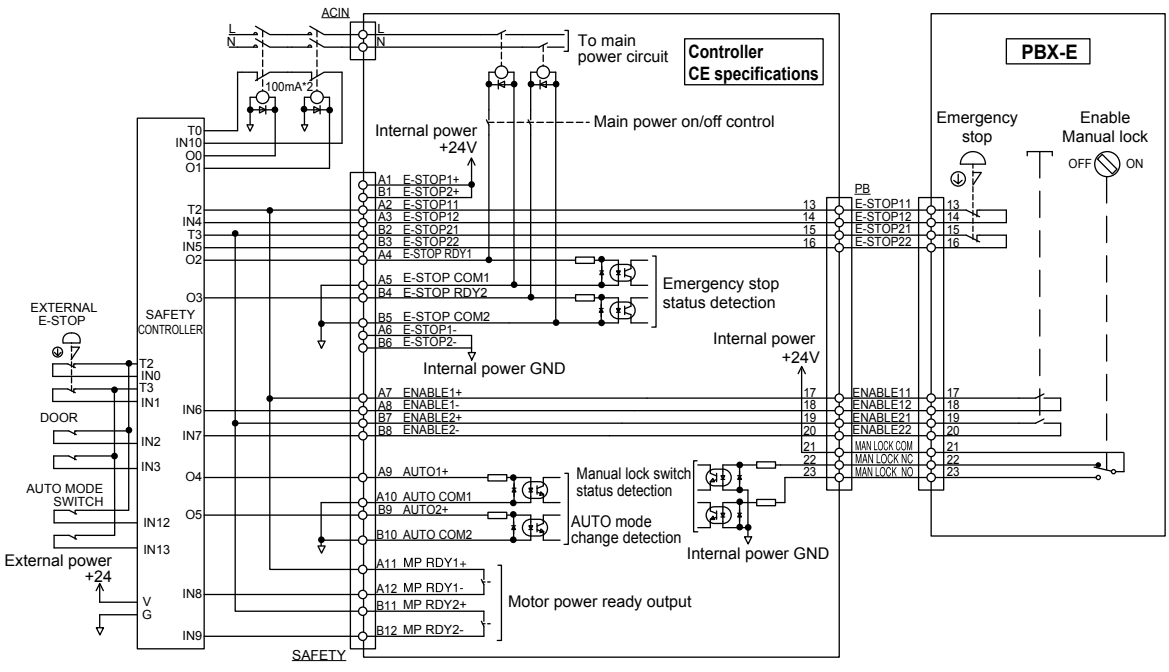
Function	Description
Operation modes	AUTO mode (Major functions: program creation, program execution, step execution, etc.) MANUAL mode (Major functions: jog movement, point data teaching, parameter editing, etc.)
Commands	Array declaration commands (DIM statement) Assignment commands (Numeric assignment, character string assignment, point definition statements, etc.) Movement commands (MOVE, DRIVE, PMOVE statements, etc.) Conditional branching commands (IF, FOR, WHILE statements, etc.) External output commands (DO, MO, LO, TO, SO statements) Parameter commands (ACCEL, OUTPOS, TOLE statements, etc.) Condition wait command (WAIT statement) Task related commands (START, SUSPEND, CUT statements, etc.) etc.
Functions	Arithmetic functions (SIN, COS, TAN functions, etc.) Character string functions (STR$, LEFT$, MID$, RIGHT$ functions, etc.) Point functions (WHERE, JTOXY, XYTOJ functions, etc.) Parameter functions (ACCEL, OUTPOS, TOLE statements, etc.) etc.
Variables	Simple variables (integer variables, real variables, character variables) Array variables (integer variables, real variables, character variables) Point variables Shift variables I/O variables etc.
Arithmetic operation	Arithmetic operators (+, -, *, /, MOD) Logic operators (AND, OR, XOR) Relational operators (=, <, >, <>, <=, >=)
Monitor	I/O status monitor (200 ms intervals)
Online commands	Program operation commands (RUN, STOP, RESET, STEP, etc.) Utility commands (COPY, ERA, INIT, etc.) Data handling commands (READ, WRITE, etc.) Robot language commands (independent-executable commands)
Data files	Program, point, parameter, shift, hand, all, error history etc.
Internal timer	Timer count variable (TCOUNTER), 1 ms interval
Program break points	Max. 32 points

Emergency input signal connections

Connection example of controller with normal specifications and PBX



Connection example of controller with CE specifications and PBX-E



Robot Language Table

General commands

Command	Description
DIM	Declares the array variable name and the number of elements.
LET	Executes a specified assignment statement.
REM	Expresses a comment statement.

Arithmetic commands

Command	Description
ABS	Acquires the absolute value of a specified value.
ATN	Acquires the arctangent of the specified value.
ATN2	Acquires the arctangent of the specified X-Y coordinates.
COS	Acquires the cosine value of a specified value.
DEGRAD	Converts a specified value to radians (↔RADDEG).
DIST	Acquires the distance between 2 specified points.
INT	Acquires an integer for a specified value by truncating all decimal fractions.
LSHIFT	Shifts a value to the left by the specified bit count. (↔RSHIFT)
RADDEG	Converts a specified value to degrees. (↔DEGRAD)
RSHIFT	Shifts a value to the right by the specified bit count. (↔LSHIFT)
SIN	Acquires the sine value for a specified value.
SQR	Acquires the square root of a specified value.
TAN	Acquires the tangent value for a specified value.

Date / time

Command	Description
DATE $	Acquires the date as a "yy/mm/dd" format character string.
TCOUNTER	Outputs count-up values at 1ms intervals starting from the point when the TCOUNTER variable is reset.
TIME $	Acquires the current time as an "hh:mm:ss" format character string.
TIMER	Acquires the current time in seconds, counting from midnight.

Character string operation

Command	Description
CHR $	Acquires a character with the specified character code.
LEFT $	Extracts a character string comprising a specified number of digits from the left end of a specified character string.
LEN	Acquires the length (byte count) of a specified character string.
MID $	Extracts a character string of a desired length from a specified character string.
ORD	Acquires the character code of the first character in a specified character string.
RIGHT $	Extracts a character string comprising a specified number of digits from the right end of a specified character string.
STR $	Converts a specified value to a character string (↔VAL).
VAL	Converts the numeric value of a specified character string to an actual numeric value. (↔STR$)

Point, coordinates, shift coordinates

Command	Description
CHANGE	Switches the hand of a specified robot.
HAND	Defines the hand of a specified robot.
JTOXY	Converts joint coordinate data to Cartesian coordinate data of a specified robot. (↔XYTOJ)
LEFTY	Sets the hand system of a specified robot to the left-handed system.
LOCx	Specifies/acquires point data for a specified axis or shift data for a specified element.
PATH	Sets the movement path.
Pn	Defines points within a program.
PPNT	Creates point data specified by a pallet definition number and pallet position number.
RIGHTY	Sets the hand system of a specified robot to the right- handed system.
Sn	Defines the shift coordinates within the program.
SHIFT	Sets the shift coordinate for a specified robot by using the shift data specified by a shift variable.
XYTOJ	Converts the point variable Cartesian coordinate data to the joint coordinate data of a specified robot. (↔JTOXY).

Branching commands

Command	Description
EXIT FOR	Terminates the FOR to NEXT statement loop.
FOR to NEXT	Executes the FOR to NEXT statement repeatedly until a specified value is exceeded.
GOSUB to RETURN	Jumps to a subroutine with the label specified by GOSUB statement, and executes that subroutine.
GOTO	Unconditionally jumps to the line specified by a label.
IF	Allows control flow to branch according to conditions.
ON to GOSUB	Jumps to a subroutine with labels specified by a GOSUB statement in accordance with the conditions, and executes that subroutine.
ON to GOTO	Jumps to label-specified lines in accordance with the conditions.
SELECT CASE to END SELECT	Allows control flow to branch according to conditions.
WHILE to WEND	Controls repeated operations.

Error control

Command	Description
ERR / ERL	Acquires the error code number of an error which has occurred / the line number where an error occurred.
ON ERROR GOTO	This command allows the program to jump to the error processing routine specified by the label without stopping the program, or it stops the program and displays the error message.
RESUME	Resumes program execution after error recovery processing.

Program control

Command	Description
CALL	Calls a sub-procedure.
HALT	Stops the program and performs a reset.
HALTALL	Stops and resets all programs.
HOLD	Temporarily stops the program.
HOLDALL	Temporarily stops all programs.
PGMTSK	Acquires the task number in which a specified program is registered.
PGN	Acquires the program number from a specified program name.
SGI	Assigns/acquires the value to a specified integer type static variable.
SGR	Assigns/acquires the value to a specified real type static variable.
SWI	Switches the program being executed, then begins execution from the first line.
TSKPGM	Acquires the program number which is registered in a specified task.

Task control

Command	Description
CHGPRI	Changes the priority ranking of a specified task.
CUT	Terminates another task currently being executed or temporarily stopped.
EXIT TASK	Terminates its own task which is in progress.
RESTART	Restarts another task during a temporary stop.
START	Specifies the task number and priority ranking of a specified program, and starts that program.
SUSPEND	Temporarily stops another task which is being executed.

Robot operations

Command	Description
DRIVE	Moves a specified axis of a specified robot to an absolute position.
DRIVEI	Moves a specified axis of a specified robot to a relative position.
MOTOR	Controls the motor power status.
MOVE	Performs absolute movement of all axes of a specified robot.
MOVEI	Performs relative movement of all axes of a specified robot.
MOVET	Performs relative movement of all axes of a specified robot when the tool coordinate is selected.
ORIGIN	Performs return-to-origin.
PMOVE	Executes the pallet movement command of a specified robot.
PUSH	Executes a pushing operation in the axis unit.
SERVO	Controls the servo ON/OFF of a specified axis or all axes of a specified robot.

Status acquisition

Command	Description
ABSRPOS	Acquires the machine reference value for specified robot axes. (Valid only for axes whose return-to-origin method is set as "mark".)
ARMCND	Acquires the current arm status of a specified robot.
ARMSEL	Specifies/acquires the current "hand system" setting of a specified robot.
ARMTYP	Specifies/acquires the "hand system" setting of a specified robot.
CURTQST	Acquires the current torque value ratio of a specified axis to the rated torque.
MCHREF	Acquires the return-to-origin or absolute-search machine reference value for specified robot axes. (Valid only for axes whose return-to-origin method is set as "sensor" or "stroke-end".)
MTRDUTY	Acquires the motor load factor of the specified axis.
PSHRSLT	Acquires the status at the end of the PUSH statement.
PSHSPD	Specifies/acquires the push speed parameter.
PSHTIME	Specifies/acquires the push time parameter.
WAIT ARM	Waits until the axis operation of a specified robot is completed.
WHERE	Reads out the current position of the arm of a specified robot in joint coordinates (pulse).
WHRXY	Reads out the current position of the arm of a specified robot as Cartesian coordinates (mm, degrees).

Status change

Command	Description
ACCEL	Specifies/acquires the acceleration coefficient parameter of a specified robot.
ARCHP1	Specifies/acquires the arch position 1 parameter of a specified robot.
ARCHP2	Specifies/acquires the arch position 2 parameter of a specified robot.
ASPEED	Specifies/acquires the AUTO movement speed of a specified robot.
AXWGHT	Specifies/acquires the axis tip weight parameter of a specified robot.
CHANGE	Switches the hand of a specified robot.
DECEL	Specifies/acquires the deceleration rate parameter of a specified robot.
HAND	Defines the hand of a specified robot.
LEFTY	Sets the hand system of a specified robot to the left-handed system.
ORGORD	Specifies/acquires the axis sequence parameter for performing return-to-origin and an absolute search operation in a specified robot.
OUTPOS	Specifies/acquires the "OUT position" parameter of a specified robot.
PDEF	Defines the pallet used to execute pallet movement commands.
PSHFRC	Specifies/acquires the "Push force" parameter.
PSHJGSP	Specifies/acquires the push judge speed threshold parameter.
PSHMTD	Specifies/acquires the push method parameter.
RIGHTY	Sets the hand system of a specified robot to the right- handed system.
SETGEP	Sets the General Ethernet Port.
SPEED	Changes the program movement speed of a specified robot.
TOLE	Specifies/acquires the tolerance parameter of a specified robot.
WEIGHT	Specifies/acquires the tip weight parameter of a specified robot.

PATH control

Command	Description
PATH	Specifies the PATH motion path.
PATH END	Ends the path setting for PATH motion.
PATH SET	Starts the path setting for PATH motion.
PATH START	Starts the PATH motion.

Torque control

Command	Description
CURTQST	Acquires the current torque value ratio of a specified axis to the rated torque.
CURTRQ	Acquires the current torque value of the specified axis of a specified robot.
PUSH	Executes a pushing operation in the axis unit.
TORQUE	Specifies/acquires the maximum torque command value which can be set for a specified axis of a specified robot.

Input/output control

Command	Description
DELAY	Waits for the specified period (units: ms).
DO	Outputs a specified value to the DO port or acquires the DO status.
LO	Outputs a specified value to the LO port to enable/disable axis movement or acquires the LO status.
MO	Outputs a specified value to the MO port or acquires the MO status.
OUT	Turns ON the bits of the specified output ports and terminates the command statement.
RESET	Turns the bit of a specified output port OFF.
SET	Turns the bit at the specified output port ON.
SI	Acquires a specified SI status.
SID	Acquires a specified serial input's double-word information status.
SIW	Acquires a specified serial input's word information status.
SO	Outputs a specified value to the SO port or acquires the SO status.
SOD	Outputs a specified serial output's double-word information or acquires the output status.
SOW	Outputs a specified serial output's word information or acquires the output status.
TO	Outputs a specified value to the TO port or acquires the TO status.
WAIT	Waits until the conditions of the DI/DO conditional expression are met (with time-out).

Communication control

Command	Description
CLOSE	Close the specified General Ethernet Port.
ETHSTS	Acquires the Ethernet port status.
GEPSTS	Acquires the General Ethernet Port status.
OFFLINE	Sets a specified communication port to the "offline" mode.
ONLINE	Sets the specified communication port to the "online" mode.
OPEN	Opens the specified General Ethernet Port.
SEND	Sends a file.

Accessories and part options

RCX320

Standard accessories

Power connector + wiring connection lever

Model	KAS-M5382-00

LCC140 TS-X TS-P SR1-X SR1-P RCX320 RCX221 RCX222 RCX340

Safety connector

Model	KCX-M5370-00

RCX320 RCX340

PBX terminator (dummy connector)

Attach this to the PBX connector during operation with the programming box PBX removed.

Model	KFR-M5163-00

RCX320 RCX221 RCX222 RCX340

NPN / PNP connector

Connector plug model	KBH-M4424-00
Connector cover model	KBH-M4425-00

SR1-X SR1-P RCX320 RCX340

Absolute battery

Battery for absolute data back-up.

Basic specifications

Item	Absolute battery
Battery type	Lithium metallic battery
Battery capacity	3.6V/2,750mAh
Data holding time	About 1 year (in state with no power applied)
Dimensions	ϕ17 × L53mm
Weight Note1	22g

Model	KCA-M53G0-01

Note 1. Weight of battery itself.
Note. The absolute battery is subject to wear and requires replacement.
If trouble occurs with the memory then remaining battery life is low so replace the absolute battery.
The battery replacement period depends on usage conditions. But generally you should replace the battery after about 1 year counting the total time after connecting to the controller and left without turning on the power.

RCX320 RCX340 TS-SH

Important **Absolute battery installation conditions**

1 batteries are required for each 1 axes.
● 1 battery……Data storage time of approximately 6 months (with no power applied)
Note. No absolute battery is required for the incremental or semi-absolute axis.

Dust cover for COM connector

Model	KR7-M5395-10

RCX320 RCX340

Dust cover for LAN connector

Model	KCX-M658K-10

RCX320 RCX340

Dust cover for USB connector

Model	KCX-M658K-00

RCX320 RCX340

Options

Programming box PBX/PBX-E

P.587

This device can perform all operations such as manual robot operation, program entry and edit, teaching and parameter settings.

PBX

Type	Language	Cable length	Model
PBX	Japanese	5m	KCX-M5110-1J
		12m	KCX-M5110-3J
	English	5m	KCX-M5110-1E
		12m	KCX-M5110-3E
	Chinese	5m	KCX-M5110-1C
		12m	KCX-M5110-3C
PBX-E (with enable switch)	Japanese	5m	KCX-M5110-0J
		12m	KCX-M5110-2J
	English	5m	KCX-M5110-0E
		12m	KCX-M5110-2E
	Chinese	5m	KCX-M5110-0C
		12m	KCX-M5110-2C

RCX320 RCX340

	Model
Display language switching USB for PBX	KCX-M6498-00
USB cable	KCX-M657E-00

Support software for PC RCX-Studio Pro

P.583

This is support software for operating the RCX320 / RCX340 controller.
A USB key is supplied to the RCX-Studio Pro to prevent robot operation mistakes.

RCX-Studio Pro Note.
Note. This software is only downloaded from the website.

USB key (Dongle)

Model	RCX-Studio Pro (USB key)	KCX-M4990-20

RCX320 RCX340

Note. Although it is possible to install this software on multiple PCs, the functionality is limited if there is no USB key (see table below).
Additional USB keys (additional licenses) are available at a special price. Please contact Yamaha for details.

Environment

OS	Windows XP (32bit), Vista, 7, 8 / 8.1, 10 (Supported version: V.2.1.3 or later)
CPU	Intel® Core™ 2 Duo 2 GHz or higher is recommended
Memory	1 GB or more is recommended
Hard disk	80MB or more free space in the RCX-Studio Pro installation destination
Communication port	Communication cable: serial communication port, Ethernet, or USB port USB key: USB port (one port)
Display	1024×768 or higher resolution, 256 colors or higher
Other	CD-ROM drive Dedicated communication cable (for D-Sub or for USB) Ethernet cable (category 5 or higher)
Applicable robot controllers	RCX320 / RCX340

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries. Other company names and product names listed in this manual may be the trademarks or registered trademarks of their respective companies.

Functional limitations depending on USB key presence

Function	USB key present	USB key absent
Connecting to the controller	○	×
Saving the file data	○	×
Emulator function	○	○
Real Time Trace	○	△ Emulator only
Cycletime Calculator	○	×
iVY2 editor	○	×
Data Difference	○	△ Except data saving

Data cables

Communication cable for RCX-Studio Pro.
Select from USB cable or D-sub cable.

USB

D-Sub

Model	USB type (5m)	KBG-M538F-00
	D-Sub type 9pin-9pin (5m)	KAS-M538F-10

Note. This USB cable supports Windows 2000/XP or later.
Note. Data cable jointly used for POPCOM+, VIP+, RCX-Studio Pro.
Note. USB driver for communication cable can also be downloaded from our website.

LCC140 ERCD SR1-X SR1-P RCX320 RCX221 RCX222 RCX340

YC-Link/E master board

Model	KCX-M4400-M0

RCX320 RCX340

YC-Link/E slave board

Model	KCX-M4400-S0

RCX320 RCX340

YC-Link/E cable (1m)

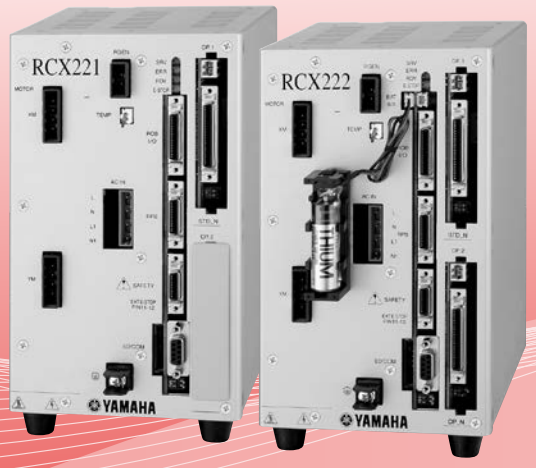
Model	KCX-M6479-10

RCX320 RCX340

RCX221/RCX222

Robot controller with advanced functions

A 2-axis robot controller with a full range of advanced functions in a compact, space-saving size.
Very easy to use.



RCX221 RCX222

Main functions ▶ P.70

Programming box
▶ RPB/RPB-E
P.586

Support software for PC
▶ VIP+
P.580

Basic specifications

	Item		Model	RCX221	RCX221HP	RCX222	RCX222HP
Basic specifications	Number of controllable axes			2 axes maximum			
	Controllable robots			Single-axis robot FLIP-X, Linear motor single-axis robot PHASER, Cartesian robot XY-X, Pick & place robot YP-X		Single-axis robot FLIP-X, Cartesian robot XY-X, Pick & place robot YP-X	
	Connected motor capacity			2 axes total: 800W or less	2 axes total: 900W to 1200W	2 axes total: 800W or less	2 axes total: 900W to 1200W
	Maximum power consumption			1700VA	2400VA	1700VA	2400VA
	Dimensions			W130 × H210 × D158mm			
	Weight			Approx. 2.9kg	Approx. 3.1kg	Approx. 2.9kg	Approx. 3.1kg
	Input power supply	Control power supply		Single phase AC200 to 230V +/-10% maximum (50/60Hz)			
		Motor power		Single phase AC200 to 230V +/-10% maximum (50/60Hz)			
Axis control	Drive method			AC full-digital software servo			
	Position detection method			Resolver, Magnetic linear scale		Multi-turn resolver with data backup function	
	Operating method			PTP (Point to Point), Linear interpolation, Circular interpolation, Arch motion			
	Coordinate system			Joint coordinates, Cartesian coordinates			
	Position indication units			Pulses, mm (millimeters), deg (degrees)			
	Speed setting			1% to 100% (In units of 1%. However speed is in units of 0.01% during single-axis operation by DRIVE statement.)			
	Acceleration setting			1.Automatic acceleration setting based on robot model type and end mass parameter 2.Setting based on acceleration and deceleration parameter (Setting by 1% unit)			
	Resolution			1μm		16384 P/rev	
	Origin search method			Incremental / Semi-absolute		Absolute / Incremental	
Program	Program language			YAMAHA BASIC (Conforming to JIS B8439 SLIM Language)			
	Multitasks			8 tasks maximum			
	Sequence program			1 program			
	Point-data input method			Manual data input (coordinate value input), Direct teaching, Teaching playback			
Memory	Memory capacity			364KB (total capacity of program and points) (available program capacity during use of maximum number of points is 84KB)			
	Programs			100 program 9,999: maximum lines per program 98KB: maximum capacity per program			
	Points			10,000 points : maximum numbers of points			
	Memory Backup battery			Lithium metallic battery (service life 4 years at 0℃ to 40℃)			
	Internal flash memory			512KB (ALL data only)			
	External memory backup			SD memory card			

Controllable robot	RCX221 ▶ XY-X P.261, FLIP-X P.193, PHASER P.239, YP-X P.451 RCX222 ▶ XY-X P.261, FLIP-X P.193, YP-X P.451
CE marking	◯
Field networks	CC-Link DeviceNet PROFIBUS

Model Overview

Name	RCX221/RCX221HP	RCX222/RCX222HP
Controllable robot	Cartesian robot XY-X / Single-axis robot FLIP-X / Linear motor single-axis robot PHASER/ Pick & place robot YP-X	Cartesian robot XY-X / Single-axis robot FLIP-X / Pick & place robot YP-X
Power	Single phase: AC200V to 230V +/-10% maximum (50/60Hz)	
Operating method	Programming / Remote command / Operation using RS-232C communication	
Maximum number of controllable axes	2 axes maximum	
Origin search method	Incremental/Semi-absolute	Absolute/Incremental

Ordering method

RCX221/RCX221HP

RCX221 – [Controller Note1] – [Usable for CE] – [Regenerative unit Note2] – [Input/Output Selection 1] – [Input/Output Selection 2]

Controller Note1	Usable for CE	Regenerative unit Note2	Input/Output Selection 1	Input/Output Selection 2
RCX221 RCX221HP	No entry: Standard E: CE marking	No entry: None R: RG2	N: NPN P: PNP CC: CC-Link DN: DeviceNet™ PB: PROFIBUS YC: YC-Link Note3	No entry: None N1: OP.DIO24/16 (NPN) P1: OP.DIO24/16 (PNP)

Note 1. Driver selection and regenerative unit selection depends on the robot type. See Specification selection table on following page.
Note 2. The regenerative unit (option) is required when operating a model designated by YAMAHA or a load with a large inertia.
Note 3. Available only for the master.

RCX222/RCX222HP

RCX222 – [Controller Note1] – [Usable for CE] – [Regenerative unit Note2] – [Input/Output Selection 1] – [Input/Output Selection 2]

Controller Note1	Usable for CE	Regenerative unit Note2	Input/Output Selection 1	Input/Output Selection 2
RCX222 RCX222HP	No entry: Standard E: CE marking	No entry: None R: RG2	N: NPN P: PNP CC: CC-Link DN: DeviceNet™ PB: PROFIBUS YC: YC-Link Note3	No entry: None N1: OP.DIO24/16 (NPN) P1: OP.DIO24/17 (PNP)

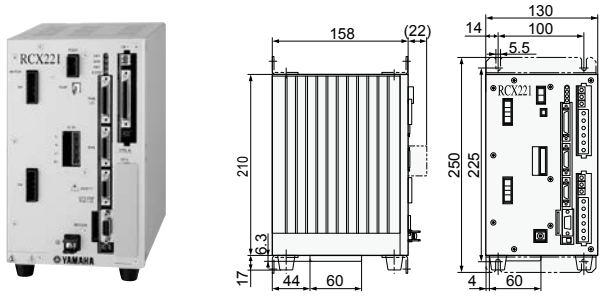
Note 1. Driver selection and regenerative unit selection depends on the robot type. See Specification selection table on following page.
Note 2. The regenerative unit (option) is required when operating a model designated by YAMAHA or a load with a large inertia.
Note 3. Available only for the master.

	Item		Model	RCX221	RCX221HP	RCX222	RCX222HP
External input/output	STD.DIO	I/O input		Dedicated input 10 points, General input 16 points			
		I/O output		Dedicated Output12 points, General output 8 points			
	SAFETY			Emergency stop input (Relay contact), Service mode input (NPN/PNP specification is set according to STD. DIO setting)			
	Brake output			Relay contact			
	Origin sensor input			Connectable to DC 24V normally-closed contact sensor			
	External communications			RS232C: 1CH D-SUB9 (female) RS422 : 1CH (RPB)			
	Options	Slots		2 (inc.STD.DIO)			
		Type		STD.DIO (NPN/PNP): Dedicated input 10 points, Dedicated output 12 points, General input 16 points, General output 8 points			
				Optional input/output (NPN/PNP): General input 24 points / General output 16 points			
				CC-Link: Dedicated input 16 points, Dedicated output 16 points, General input 96 points, General output 96 points (4 nodes occupied)			
				DeviceNet™: Dedicated input 16 points, Dedicated output 16 points, General input 96 points, General output 96 points			
				PROFIBUS: Dedicated input 16 points, Dedicated output16 points, General input 96 points, General output 96 points			
				Ethernet: IEEE802.3 10Mbps (10BASE-T)			
Options	Programming box			RPB, RPB-E (with enable switch)			
	Support software for PC			VIP+ / VIP			
General specifications	Operating temperature			0°C to 40°C			
	Storage temperature			-10°C to 65°C			
	Operating humidity			35% to 85%RH (non-condensing)			
	Absolute backup battery			–		Lithium metallic battery 3.6V 5400mAH (2700nAH × 2)	
	Absolute data backup period			–		1 year (in state with no power applied)	
	Noise immunity			IEC61000-4-4 Level3			
	Protecting structure			IP10			

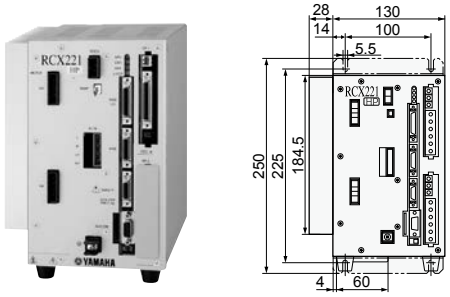
RCX221/RCX222

Dimensions

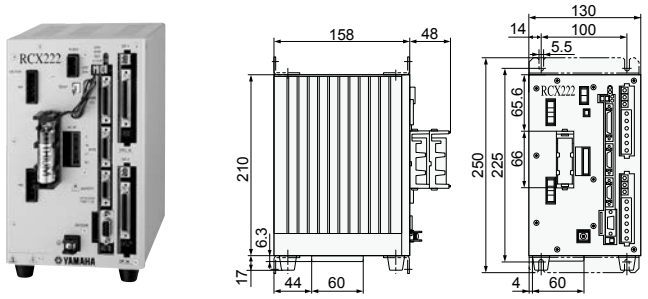
RCX221



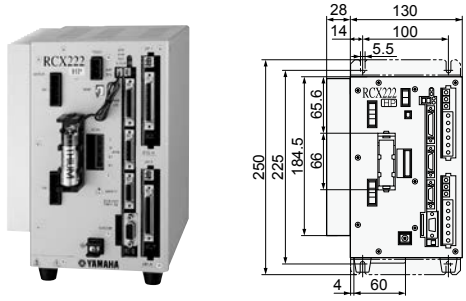
RCX221HP



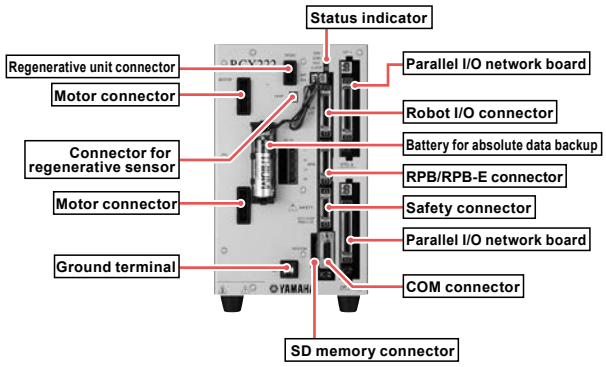
RCX222



RCX222HP

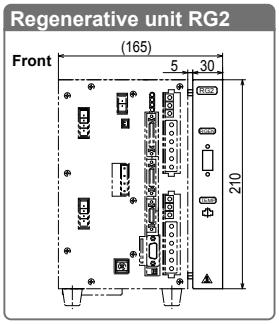


Part names



Note. Photograph shows RCX222. The component names on the RCX221 are the same but it does not come with an absolute backup battery.

Regenerative unit RG2



Note. Depth (D) is 158mm. Installs on the right side of the RCX221 (HP), RCX222 (HP). Cannot be installed as a separate unit.

Basic specifications

Item	RG2
Model	KAS-M4130-00 (including cable supplied with unit)
Dimensions	W35 × H210 × D158mm
Weight	0.8kg
Regenerative voltage	Approx. 380V or more
Regenerative stop voltage	Approx. 360V or less
Accessory	Cable for connection with controller (300mm)

Note. Installs on the right side of the RCX221 (HP), RCX222 (HP).Cannot be installed as a separate unit.

Specification selection table

The robot type automatically determines the normal specifications or HP specifications.

RCX221/RCX221HP

		PHASER					
		MF7D	MF15D	MF20D	MF30D	MF50D	MF75D
RCX221		●	●	●			
RCX221HP					●	●	●
Regenerative unit	No entry (None)	●	●				
	R (RG2)			●	●	●	●

● : Applicable

RCX222/RCX222HP

		FLIP-X		XY-X														YP-X		Clean
				Arm type, Gantry type, Moving arm type, Pole type								XZ type								
		N15D	N18D	PXYx	FXYx	FXYBx	SXYx	SXYBx	NXY	MXYx	HXYx	HXYLx	SXYx (ZF)	SXYx (ZFL20)	SXYBx (ZF)	SXYBx (ZFL20)	MXYx	HXYx	YP220BX	YP320X	SXYxC
		2 axes																		2 axes
RCX222				●	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●
RCX222HP		●	●								●	●									
Regenerative unit	No entry (None)			●	●	●	●	○					●		●				●	●	●
	R (RG2)	●	●					○	●	●	●	●		●		●	●	●			

● : Applicable ○ : Select per conditions

Power capacity

Required power supply capacity varies according to the robot type and number of axes. Prepare a power supply using the following table as a general guide.

When connected to 2 axes (Cartesian robot or multi-axis robot)

Axial current sensor value		Power capacity (VA)
X axis	Y axis	
05	05	500
10	05	700
10	10	900
20	05	1500
20	10	1700
20	20	2000
		2400 (HP)

Note. Even if axial current sensor values for each axis are interchanged no problem will occur.

Motor capacity vs. current sensor table

Connected motor capacity	Current sensor
100W or less	05
200W	10
400W or more	20

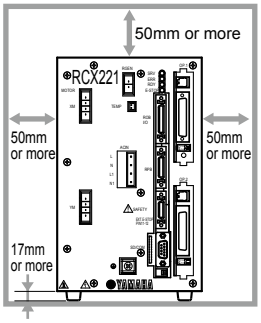
Note. Motor output of the B14H is 200W but the current sensor is 05.

Conditions where regenerative unit is needed on multi robots

- Motor capacity exceeds a total of 450W.
- Motor capacity for perpendicular axis exceeds a total of 240W.
- The following conditions apply when perpendicular axis capacity is 240W or less.
  - perpendicular axis is 200W.
  - perpendicular axis is 100W and stroke is 700mm or more.
  - there are 2 perpendicular axes at 100W, and includes leads of 5mm.
- B14H which maximum speed exceeds 1250mm per second.

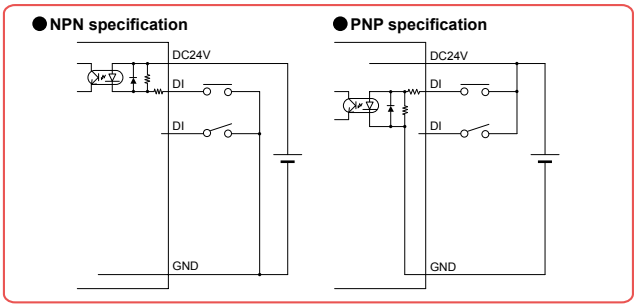
Installation conditions

- Install the RCX221/RCX222 inside the control panel.
- Install the RCX221/RCX222 on a flat, level surface.
- Install the RCX221/RCX222 in a well ventilated location, with space on all sides of the RCX221/RCX222 (See fig. at right.).
- Do not block the heat-sink on the side panel.
- Do not block the fan on the bottom of the controller.
- Ambient temperature : 0 to 40˚C
- Ambient humidity : 35 to 85% RH (no condensation)

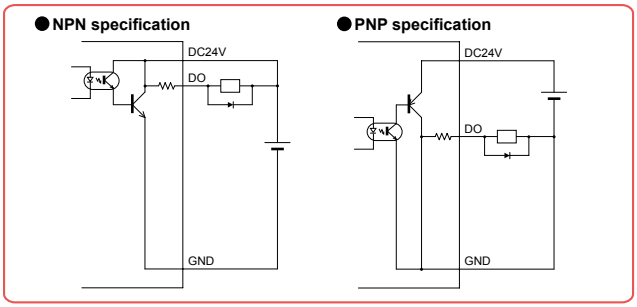


*Provide the same space dimensions for RCX222.

Example of input signal connection

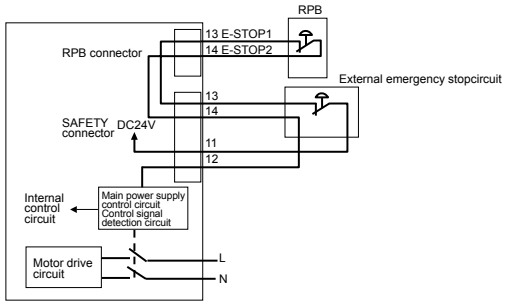


Example of output signal connection

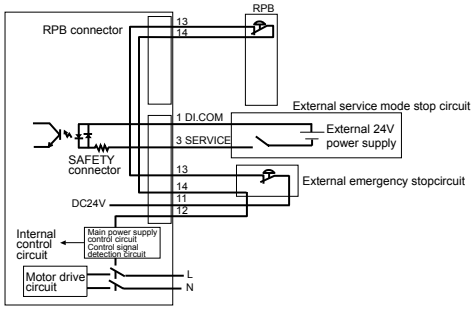


Emergency input signal connections

Connection when using the standard RPB with an external emergency stop circuit (1)



Connection when using the standard RPB with an external emergency stop circuit (2)



SAFETY connector signals

Terminal number	I/O No.	Name
1	DI.COM	Dedicated input common
2	INTERLOCK	Interlock signal
3	SERVICE	SERVICE mode input
4	DO.COM	Dedicated output common
5	MPRDY	Main power supply ready
6	SERVO OUT	Servo-on state output
7	NC	No connection
8	KEY1	RPB key switch contact
9	KEY2	RPB key switch contact
10	24VGND	EMG 24V, GND

Terminal number	I/O No.	Name
11	EMG24V	Power supply for emergency stop input
12	EMGRDY	Emergency stop ready signal
13	EMGIN1	Emergency stop input 1
14	EMGIN2	Emergency stop input 2
15	EMGIN3	Emergency stop input 3
16	EMGIN4	Emergency stop input 4
17	LCKIN1	Enable switch input 1
18	LCKIN2	Enable switch input 2
19	LCKIN3	Enable switch input 3
20	LCKIN4	Enable switch input 4

RCX221/RCX222

Standard I/O [connector name: STD. DIO] signal table

Terminal number	Signal name	Name	
		RCX221	RCX222
1	DI01	Servo ON	
2	DI10	Sequence program control	
3	DI03	Step run	
4	CHK1	Check input 1	
5	DI05	I/O command run	
6	DI06	Spare Note 1	
7	DI07	Spare Note 1	
8	DI20	General input 20	
9	DI21	General input 21	
10	DI22	General input 22	
11	DI23	General input 23	
12	DI24	General input 24	
13	DI25	General input 25	
14	DI26	General input 26	
15	DI27	General input 27	
16	DO00	EMG monitor (emergency stop monitor)	
17	DO01	CPU OK	
18	DO10	AUTO mode	
19	DO11	Return-to-origin complete	
20	DO12	Sequence program in progress	
21	DO13	Auto operation in progress	
22	DO14	Program reset output	
23	DO15	Battery alarm output Note 2	
24	DO16	END	
25	DO17	BUSY	
26	DI12	Auto operation start	
27	DI13	AUTO mode switching	
28	DI14	ABS reset (Not in use normally)	Return-to-origin Note 3
29	DI15	Program reset	
30	DI16	MANUAL mode	
31	DI17	Return-to-origin (In use normally)	ABS reset Note 4
32	DI30	General input 30	
33	DI31	General input 31	
34	DI32	General input 32	
35	DI33	General input 33	
36	DI34	General input 34	
37	DI35	General input 35	
38	DI36	General input 36	
39	DI37	General input 37	
40	CHK2	Check input 2	
41	DO02	Servo-on state	
42	DO03	Alarm	
43	DO20	General output 20	
44	DO21	General output 21	
45	DO22	General output 22	
46	DO23	General output 23	
47	DO24	General output 24	
48	DO25	General output 25	
49	DO26	General output 26	
50	DO27	General output 27	

Note 1. Use of DI06, DI07 is prohibited.
Note 2. DO15 is a memory backup battery voltage drop alarm output.
Note 3. Set origin return for axes using incremental specifications and axes using semi-absolute specifications.
Note 4. Set origin return on axes using absolute specifications.

Area check output can be assigned to DO20 to DO157.
(Area check output assignment differs depending on the controller software version. See the user's manual for details.)

Option I/O [connector name: OP. DIO] signal table

Terminal number	Signal name	Name
1	–	Spare
2	DI40	General input
3	–	Spare
4	DI41	General input
5	–	Spare
6	–	Spare
7	–	Spare
8	DI50	General input
9	DI51	General input
10	DI52	General input
11	DI53	General input
12	DI54	General input
13	DI55	General input
14	DI56	General input
15	DI57	General input
16	–	Spare
17	–	Spare
18	DO30	General output
19	DO31	General output
20	DO32	General output
21	DO33	General output
22	DO34	General output
23	DO35	General output
24	DO36	General output
25	DO37	General output
26	DI42	General input
27	DI43	General input
28	DI44	General input
29	DI45	General input
30	DI46	General input
31	DI47	General input
32	DI60	General input
33	DI61	General input
34	DI62	General input
35	DI63	General input
36	DI64	General input
37	DI65	General input
38	DI66	General input
39	DI67	General input
40	–	Spare
41	–	Spare
42	–	Spare
43	DO40	General output
44	DO41	General output
45	DO42	General output
46	DO43	General output
47	DO44	General output
48	DO45	General output
49	DO46	General output
50	DO47	General output

Robot Language Table

General commands

Language	Function
DECLARE	Declares that a label or sub-procedure is in an external program.
DEF FN	Defines a function that is available to the user.
DIM	Declares the name of an array variable and the number of elements.
EXIT FOR	Terminates a FOR statement to NEXT statement loop.
FOR to NEXT	Controls repetitive operations
GOSUB to RETURN	Jumps to a subroutine with the label specified by a GOSUB statement and executes the subroutine.
GOTO	Unconditionally jumps to the line specified by a label.
HALT	Stops a program and resets it.
HOLD	Pauses a program.
IF	Allows control flow to branch according to conditions.
LET	Executes a specified assignment statement.
ON to GOSU	Jumps to a subroutine with each label specified by a GOSUB statement according to conditions and executes the subroutine.
ON to GOTO	Jumps to each line specified by a label according to conditions.
REM	All characters that follow REM or an apostrophe (') are viewed as comments.
SELECT CASE to END SELECT	Allows control flow to branch according to conditions.
SWI	Switches the currently executed program to a specified program, and executes from the first line after compiling.
WHILE to WEND	Controls repetitive operations.
Label statement	Defines "labels" in program lines.

Robot operation

Language	Function
ABSRST	Performs return-to-origin along robot absolute motor axes.
DRIVE	Performs an absolute movement of each axis in the main group.
DRIVEI	Performs a relative movement of each axis in the main group.
MOVE	Performs an absolute movement of the main robot axes.
MOVEI	Performs a relative movement of the main robot axes.
ORIGIN	Performs return-to-origin on an incremental mode axis or absolute search on a semi-absolute mode axis.
PMOVE	Performs a pallet movement of the main robot axes.
SERVO	Controls the servo ON/OFF of the specified axes in the main group or all axes (in main group and sub group).

I/O control

Language	Function
DELAY	Waits for the specified length of time (ms).
DO	Outputs the specified value to the DO ports.
LO	Outputs the specified value to the LO port to prohibit axis movement or permit axis movement.
MO	Outputs the specified value to the MO ports.
OUT	Turns ON the bits of the specified output ports and the command statement ends.
RESET	Turns OFF the bits of the specified output ports.
SET	Turns ON the bits of the specified output ports
SO	Outputs the specified value to the SO port.
TO	Outputs the specified value to the TO port.
WAIT	1. Waits until the condition in DI/DO conditional expression are met. 2. Waits until positioning on the robot axes is complete (within the tolerance range).

Coordinate control

Language	Function
CHANGE	Switches the hand of the main robot.
HAND	Defines the hand of the main robot.
RIGHTY / LEFTY	Selects whether the main robot will be "right-handed" or "left-handed" when moving to a point specified on a Cartesian coordinate system.
SHIFT	Sets the shift coordinates for the main robot by using the shift data specified by a shift variable.

Condition change

Language	Function
ACCEL	Changes the acceleration coefficient parameter of the main group.
ARCH	Changes the arch position parameter of the main group.
ASPEED	Changes the automatic movement speed of the main group.
AXWGHT	Changes the axis tip weight parameter of the main group.
DECEL	Changes the deceleration rate parameter of the main group.
ORGORD	Sets the axis sequence parameter to perform return-to-origin and absolute search in the main group.
OUTPOS	Changes the OUT position parameter of the main group.
PDEF	Defines the pallet used to execute a pallet movement command.
SPEED	Changes the program speed for the main group.
TOLE	Changes the tolerance parameter of the main group.
WEIGHT	Changes the tip weight parameter of the main robot.

Communication control

Language	Function
ONLINE / OFFLINE	Changes communication mode and initialize the communication port.
SEND	Sends the read file data into a write file.

Screen control

Language	Function
PRINT	Displays the value of specified variable on the MPB/RPB screen.

Key control

Language	Function
INPUT	Assigns a value to the variable specified from the MPB/RPB.

Procedure

Language	Function
CALL	Calls up sub-procedures defined by the SUB and END SUB statements.
EXIT SUB	Terminates the sub-procedure defined by the SUB and END SUB statements.
SHARED	Does not permit variables declared with a program written outside a subprocedure (SUB to END SUB) to be passed on as dummy arguments, but allows them to be referred to with a sub-procedure.
SUB to END SUB	Defines a sub-procedure.

Task control

Language	Function
CHGPRI	Changes the priority of the specified task.
CUT	Terminates a task currently being executed or temporarily stopped.
EXIT TASK	Terminates its own task currently being executed.
RESTART	Restarts a task that is temporarily stopped.
START	Sets the task number and priority of the specified task and starts that task.
SUSPEND	Temporarily stops another task being executed.

Error control

Language	Function
ON ERROR GOTO	If an error occurs during program execution, this command allows the program to jump to the error processing routine specified by the label without stopping the program, or stops the program and displays the error message.
RESUME	Resumes the program execution after recovery from an error. This command is used in the error processing routine.
ERL	Gives the line number where an error occurred.
ERR	Gives the error code number when an error occurred.

PATH control

Language	Function
PATH	Sets the PATH motion on the main robot axis.
PATH END	Terminates the path setting for PATH motion.
PATH SET	Starts the path setting for PATH motion.
PATH START	Starts the PATH motion.

Torque control

Language	Function
DRIVE (with torque limit option)	Executes an absolute movement command on each axis in the main group.
TORQUE	Changes the maximum torque instruction for the specified main group axis.
TRQTIME	Sets the current limit time-out period on the specified main group axis when using a torque limit setting option in the DRIVE statement.
TRQTIME	Sets the current limit time-out period on the specified main group axis when using a torque limit setting option in the DRIVE statement.

Accessories and part options

RCX221/RCX222

Standard accessories

Power connector + wiring connection lever

Model	KAS-M5382-00

LCC140 TS-X TS-P SR1-X SR1-P RCX320 RCX221 RCX222 RCX340

Safety connector

Model	KAS-M5370-00

RCX221 RCX222

RPB terminator (dummy connector)

Attach this to the RPB connector during operation with the programming box RPB removed.

Model	KFR-M5163-00

RCX320 RCX221 RCX222 RCX340

Standard I/O (STD.DIO) connector

Model	KAS-M533G-00

RCX221 RCX222

Option I/O (OP.DIO) connector

Model	KAS-M533G-10

RCX221 RCX222

L type stay (for installing front side, rear side.)

Use to install the controller.

Model	KAS-M410H-00

Note. Model No. is for a single bracket (L type stay). (Two are required to install one controller.)

RCX221 RCX222

Absolute battery

Battery for absolute data back-up.
(Not included with the RCX221)

Basic specifications

Item	Absolute battery
Battery type	Lithium metallic battery
Battery capacity	3.6V/2,750mAh
Data holding time	About 1 year Note1 (in state with no power applied)
Dimensions	ϕ17 × L53mm
Weight Note2	22g

Model	KAS-M53G0-11

Note 1. When using 2 batteries.
Note 2. Weight of battery itself.
Note. The absolute battery is subject to wear and requires replacement.
If trouble occurs with the memory then remaining battery life is low so replace the absolute battery. The battery replacement period depends on usage conditions. But generally you should replace the battery after about 1 year counting the total time after connecting to the controller and left without turning on the power.

SR1-X RCX222

Important **Absolute battery installation conditions**

1 to 2 batteries are required for each 2 axes.
- 1 battery.....Data storage time of approximately 6 months (with no power applied)
- 2 batteries...Data storage time of approximately 1 year (with no power applied)

Note. Absolute battery is not required for either of the 2 axes if using incremental or semi-absolute specifications.

Battery case

This is the absolute battery holder.

Model	KBG-M5395-00

SR1-X RCX222

Options

Programming box RPB/RPB-E

P.586

This device can perform all operations such as manual robot operation, program entry and edit, teaching and parameter settings.

RPB RPB-E

	RPB	RPB-E
Model	KBK-M5110-10	KBK-M5110-00
Enable switch	–	3-position
CE marking	Not supported	Applicable

RCX221 RCX222

Support software for PC VIP+

P.580

VIP+ is a simple to use application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

VIP+ software model	KX0-M4966-00

RCX221 RCX222

Environment

OS	Windows 2000, XP (32bit), Vista, 7, 10 (Supported version: V.2.8.4 or later)
CPU	Processor that meets or exceeds the suggested requirements for the OS being used.
Memory	Suggested amount of memory or more for the OS being used.
Hard disk	40MB of available space required on installation drive.
Communication method	RS-232C, Ethernet Note. For Ethernet communication, Ethernet unit for RCX series controller is required.
Applicable robot controllers	RCX22x / 240

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.
Note. ADOBE and ADOBE READER are registered trademarks of Adobe Systems Incorporated.
Note. Ethernet is a registered trademark of Xerox Corporation.

Data cables

Communication cable for VIP+.
Select from USB cable or D-sub cable.

USB

D-Sub

Model	USB type (5m)	KBG-M538F-00
	D-Sub type 9pin-9pin (5m)	KAS-M538F-10

Note. This USB cable supports Windows 2000/XP or later.
Note. Data cable jointly used for POPCOM+, VIP+, RCX-Studio Pro.
Note. USB driver for communication cable can also be downloaded from our website.

LCC140 ERCD SR1-X SR1-P RCX320 RCX221 RCX222 RCX340

RCX340

Robot controller with advanced functions

Next generation controller, all functions of which were reviewed to further improve the functions of conventional controllers.
This controller provides the features to achieve the high functionalities that can construct the equipment at high level.

RCX340

Main functions ▶ P.72

Programming box
▶ PBX/PBX-E
P.587

Support software for PC
▶ RCX-Studio Pro
P.583

Basic specifications

Item			RCX340
Basic specifications	Applicable robots		YAMAHA single-axis robots, linear single-axis robots, Cartesian robots, SCARA robots (except for YK120X and YK150X), P&P robots
	Connected motor capacity		1600W or less (in total for 4 axes)
	Power capacity		2500VA
	Dimensions		W355 × H195 × D130mm (main unit only)
	Weight		6.2kg (main unit only)
	Input power supply		Single-phase 200 to 230V AC +/-10% maximum, 50/60Hz
Axis control	No. of controllable axes		Max. 4 axes (simultaneous control: 6 axes) Expandable to a maximum of 16 axes (four robots) via controller link
	Drive method		AC full digital servo
	Position detection method		Resolver or magnetic linear scale
	Control method		PTP motion (point to point), ARCH motion, linear interpolation, circular interpolation
	Coordinate systems		Joint coordinates, Cartesian coordinates
	Position display units		Pulses, mm (1/1000 steps), degree (1/1000 steps)
	Speed setting		0.01 to 100% (below 1% can be changed by programming)
	Acceleration/deceleration setting		Optimized by robot model and tip weight parameter Setting by acceleration coefficient and deceleration rate parameters (1% steps) * Can be changed by programming. Zone control (For SCARA robots only, optimized according to arm posture)
Programming	Program language		YAMAHA BASIC II conforming to JIS B8439 (SLIM language)
	Multi-task		Max. 16 tasks
	Sequence program		1 program
	Memory capacity		2.1MB (Total of program and point data) (Available capacity for program when the maximum number of points is used: 300KB)
	Program		100 programs (maximum number of programs) 9999 lines (maximum number of lines per program)
	Point		30000 points (maximum number of points)
	Point teaching method		MDI (coordinate data input), direct teaching, teaching playback, offline teaching (data input from external unit)
	System backup (Internal memory backup)		Lithium battery (service life about 4 years at 0 to 40°C)
	Internal flash memory		512 KB
External I/O	SAFETY	Input	Emergency stop ready input, 2 systems Auto mode input, 2 systems (Enabled only when the global specifications are used.)
		Output	Emergency stop contact output, 2 systems Enable contact output, 2 systems (Enabled only when the PBX-E is used.) Motor power ready output, 2 systems
	Brake output		Transistor output (PNP open collector)
	Origin sensor input		Connectable to 24V DC B-contact (normally closed) sensor
	External communications		RS-232C: 1CH (D-SUB 9-pin (female)) Ethernet: 1CH (In conformity with IEEE802.3u/IEEE802.3) 100Mbps/10Mbps (100BASE-TX/10BASE-T) Applicable to Auto Negotiation RS-422: 1CH (Dedicated to PBX)

Controllable robot	XY-X P.261	YK-X P.389	FLIP-X P.193	PHASER P.239	YP-X P.451

CE marking	○	Field networks	CC-Link, DeviceNet, EtherNet/IP, Ethernet, PROFIBUS, PROFINET, EtherCAT

Ordering method

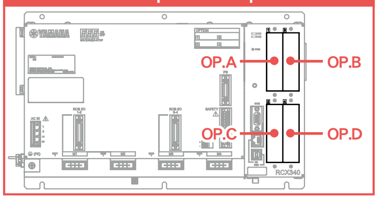
RCX340 – [ ] – [ ] – [ ] – [ ] – [ ] – [ ] – [ ] – [ ]

Controller	No. of controllable axes	Safety standards	Controller option A (OP.A)	Controller option B (OP.B)	Controller option C (OP.C)	Controller option D (OP.D)	Controller option E (OP.E)	Absolute battery
RCX340	4: 4 axes	N: Normal	No entry: Non-selection	No entry: Non-selection	No entry: Non-selection	No entry: Non-selection	No entry: Non-selection	4: 4 pcs.
	3: 3 axes	E: CE	NS : STD.DIO(NPN) Note 1 Note 4	--- Note 3	--- Note 3	--- Note 3	VY: iVY2 without light	3: 3 pcs.
	2: 2 axes	K: KCs	NE : EXP.DIO(NPN) Note 2 Note 4	NE : EXP.DIO(NPN) Note 2 Note 4	NE : EXP.DIO(NPN) Note 2 Note 4	NE : EXP.DIO(NPN) Note 2 Note 4	VL: iVY2 with light	2: 2 pcs.
			PS : STD.DIO(PNP) Note 1 Note 4	--- Note 3	--- Note 3	--- Note 3		1: 1 pc.
			PE : EXP.DIO(PNP) Note 2 Note 4	PE : EXP.DIO(PNP) Note 2 Note 4	PE : EXP.DIO(PNP) Note 2 Note 4	PE : EXP.DIO(PNP) Note 2 Note 4		0: 0 pc.
			GR: Gripper	GR: Gripper	GR: Gripper	GR: Gripper		
			TR : Tracking Note 5	TR : Tracking Note 5	TR : Tracking Note 5	TR : Tracking Note 5		
			YM1 : YC-Link/E master Note 6	YM1 : YC-Link/E master Note 6	YM1 : YC-Link/E master Note 6	YM1 : YC-Link/E master Note 6		
			YS2 to 4: YC-Link/E slave Note 6	YS2 to 4: YC-Link/E slave Note 6	YS2 to 4: YC-Link/E slave Note 6	YS2 to 4: YC-Link/E slave Note 6		
			EP : EtherNet/IP™ Note 7	EP : EtherNet/IP™ Note 7	EP : EtherNet/IP™ Note 7	EP : EtherNet/IP™ Note 7		
			PB : PROFIBUS Note 7	PB : PROFIBUS Note 7	PB : PROFIBUS Note 7	PB : PROFIBUS Note 7		
			CC : CC-Link Note 7	CC : CC-Link Note 7	CC : CC-Link Note 7	CC : CC-Link Note 7		
			DN : DeviceNet™ Note 7	DN : DeviceNet™ Note 7	DN : DeviceNet™ Note 7	DN : DeviceNet™ Note 7		
			PT : PROFINET Note 7	PT : PROFINET Note 7	PT : PROFINET Note 7	PT : PROFINET Note 7		
			ES : EtherCAT Note 7	ES : EtherCAT Note 7	ES : EtherCAT Note 7	ES : EtherCAT Note 7		

Please select desired selection items from the upper portion of the controller option A in order.

Note 1. [STD.DIO] Parallel I/O board standard specifications
Dedicated input 8 points, dedicated output 9 points, general-purpose input 16 points, general-purpose output 8 points
Do not mix with field bus (CC/DN/PB/EP/PT/ES).
Note 2. [EXP.DIO] Parallel I/O board expansion specifications
General-purpose input 24 points, general-purpose output 16 points
Note 3. Only one DIO STD specification board can be selected. Therefore, this board cannot be selected in OP.B to OP.D.
Note 4. Select either NPN or PNP in DIO.
Note 5. Only one tracking board can be selected.
Note 6. Select only one master or slave board for YC-Link/E.
For details, refer to “YC-Link/E ordering explanation” below.
Additionally, when ordering YC-Link/E, please specify what robot is connected to what number controller.
Note 7. Select only one fieldbus in a controller (CC/DN/PB/EP/PT/ES).

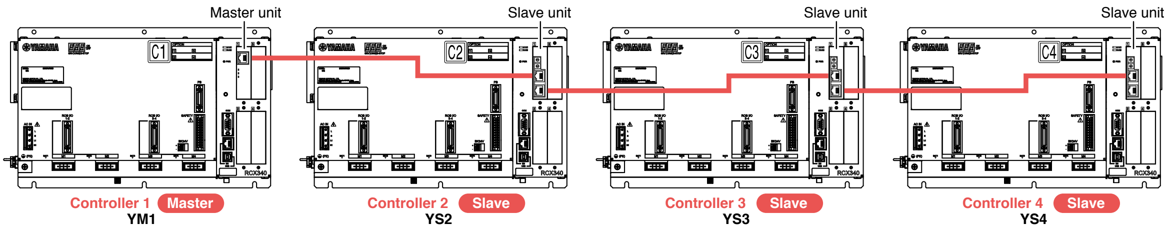
Controller option board position



	Item		RCX340
General specifications	Operating temperature		0 to 40°C
	Storage temperature		-10 to 65°C
	Operating humidity		35 to 85% RH (no condensation)
	Noise immunity		Conforms to IEC61000-4-4 Level 3
	Protective structure		IP20
	Appliance classes		Class I
Options	Option board Note	Parallel I/O board – Standard specifications	Dedicated input 8 points, dedicated output 9 points General-purpose input 16 points, general-purpose output 8 points NPN/PNP specifications are selected. (maximum 1 board)
		Parallel I/O board – Expansion specifications	General-purpose input 24 points, general-purpose output 16 points NPN/PNP specifications are selected. (maximum 4 boards)
		CC-Link board Ver1.1/2.0 DeviceNet™ board EtherNet/IP™ board PROFIBUS board PROFINET board EtherCAT board	Remote I/O Dedicated input/output: 16 points each General-purpose input/output: 96 points each Remote register Input/output: 16 words each
		YC-Link/E board (master/slave)	Communication cycle: 1 ms, control cycle: minimum 1 ms / maximum 8 ms, maximum number of robot units: four units Maximum number of control axes: total 16 axes (including four master controller axes), maximum 12 axes for slaves only
		YRG (gripper) board	Position detection method: optical rotary encoder, minimum setting distance: 0.01 mm Speed setting: 20 to 100% relative to the maximum parameter speed, number of connected gripper units: maximum four units Drive power: DC 24V +/-10%, 1.0A Max
		Tracking board	Number of connected encoders: maximum two units, supported encoders: 26LS31/26C31 equivalent line driver (RS422 compliant) Encoder power supply: DC5V (2 counter (ch) total 500 mA or less) (supplied from controller)
	iVY2 unit		Camera pixels: maximum 5 million pixels, number of registered models: 254 models, number of connected cameras: maximum two units Power supply: DC24V +/-10% 1.5A Max
	Programming box		PBX, PBX-E
	Absolute battery		3.6V 2750mAH / axis Backup retention time: About 1 year
	Support software for personal computer		RCX-Studio Pro

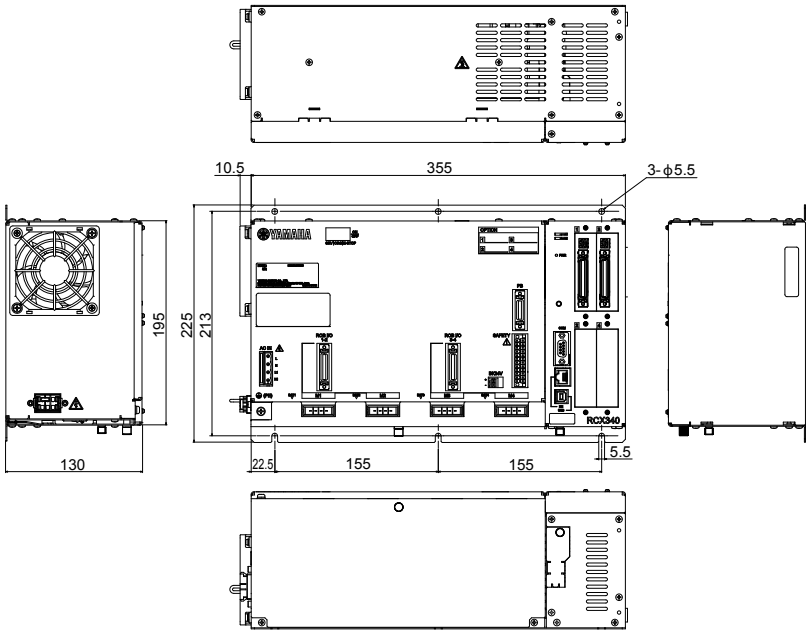
Note. There are four slots in which option boards can be installed.

YC-Link/E ordering explanation



RCX340

Dimensions



Power supply capacity and heat emission

The required power supply capacity and heat emission will vary depending on the robot type and number of axes.
Using the following table as a general guide consider the required power supply preparation and control panel size, controller installation, and cooling method.

(1) When connected to SCARA robot

Robot type					Power capacity (VA)	Generated heat amount (W)
Standard type	Clean type	Dust-proof & drip-proof type	Ceiling-mount	Wall-mount / Inverse type		
YK120XG, YK150XG	–	–	–	–	300	58
YK180XG, YK180X YK220X	YK180XC, YK220XC	–	–	–	500	63
YK250XG, YK350XG YK400XG, YK500XGL YK600XGL, YK400XE-4	YK250XCH, YK350XCH YK400XCH, YK250XGC YK350XGC, YK400XGC YK500XGLC, YK600XGLC	YK250XGP, YK350XGP YK400XGP, YK500XGLP YK600XGLP	–	YK300XGS, YK400XGS	1000	75
–	YK500XC, YK600XC	–	–	–	1500	88
YK500XG, YK610XE-10 YK600XG, YK710XE-10 YK700XGL	–	YK500XGP, YK600XGP		YK500XGS, YK600XGS	1700	93
–	YK700XC, YK800XC YK1000XC	–	–	–	2000	100
YK600XGH, YK700XG YK800XG, YK900XG YK1000XG, YK1200X	–	YK600XGHP, YK700XGP YK800XGP, YK900XGP YK1000XGP	YK350TW YK500TW	YK700XGS, YK800XGS YK900XGS, YK1000XGS	2500	113

(2) When connected to 2 axis (Cartesian robot and/or multi-axis robot)

Axial current sensor value Note		Power capacity (VA)	Generated heat amount (W)
X axis	Y axis		
05	05	600	65
10	05	800	70
20	05	1100	78
10	10	1000	75
20	10	1300	83
20	20	1700	93

(3) When connected to 3 axis (Cartesian robot and/or multi-axis robot)

Axial current sensor value Note			Power capacity (VA)	Generated heat amount (W)
X axis	Y axis	Z axis		
05	05	05	700	68
10	05	05	900	73
20	05	05	1200	80
10	10	05	1000	75
20	10	05	1300	83
20	20	05	1600	90
10	10	10	1200	80
20	10	10	1500	88
20	20	10	1800	95
20	20	20	2000	100

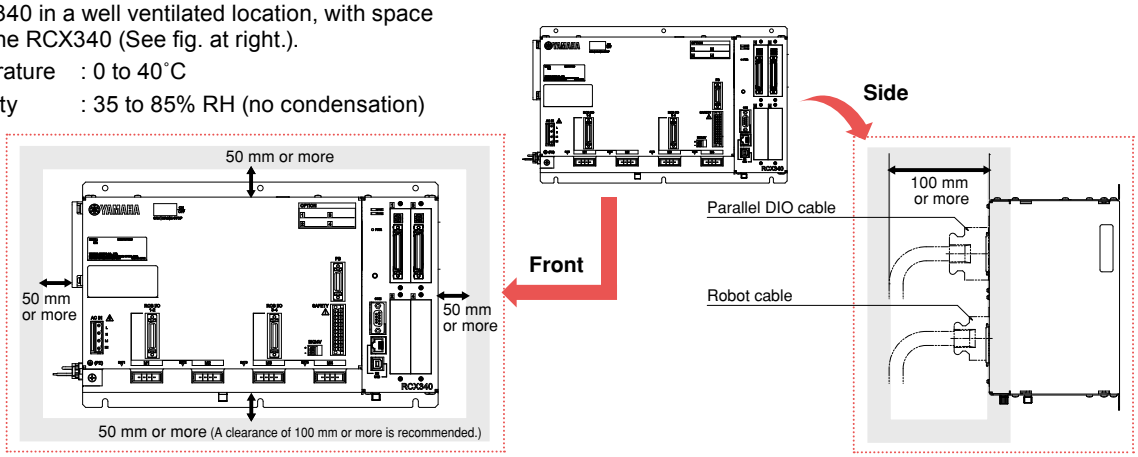
(4) When connected to 4 axis (Cartesian robot and/or multi-axis robot)

Axial current sensor value Note				Power capacity (VA)	Generated heat amount (W)
X axis	Y axis	Z axis	R axis		
05	05	05	05	800	70
10	05	05	05	1000	75
20	05	05	05	1200	80
10	10	05	05	1100	78
20	10	05	05	1400	85
20	20	05	05	1600	90
10	10	10	05	1300	83
20	10	10	05	1500	88
20	20	10	05	1800	95
20	20	20	05	2100	103
10	10	10	10	1400	85
20	10	10	10	1700	93
20	20	10	10	2000	100
20	20	20	10	2200	105
20	20	20	20	2500	113

Note. Even if axial current sensor values for each axis are interchanged no problem will occur.

Installation conditions

- Use the screws to secure the controller to the installation plate inside the control panel so that it is in a horizontal position. Be sure to use the metallic installation plate.
- Install the RCX340 in a well ventilated location, with space on all sides of the RCX340 (See fig. at right.).
- Ambient temperature : 0 to 40˚C
- Ambient humidity : 35 to 85% RH (no condensation)



Standard specification I/O connector signal list

Pin	I/O No.	Signal name	Remarks
1	DI 01	Dedicated input: Servo ON input	
2	DI 10	Dedicated input: Sequence control	
3	DI 03	Spare	Do not use.
4	CHK 1	Check signal 1	Short-circuit with CHK2.
5	DI 05	Spare	Do not use.
6	DI 06	Dedicated input: Stop	
7	DI 07	Spare	Do not use.
8	DI 20	General-purpose input 20	
9	DI 21	General-purpose input 21	
10	DI 22	General-purpose input 22	
11	DI 23	General-purpose input 23	
12	DI 24	General-purpose input 24	
13	DI 25	General-purpose input 25	
14	DI 26	General-purpose input 26	
15	DI 27	General-purpose input 27	
16	DO 00	Spare	Do not use.
17	DO 01	Dedicated output CPU OK	
18	DO 10	Dedicated output AUTO mode output	
19	DO 11	Dedicated output Return-to-origin complete	
20	DO 12	Dedicated output Sequence program-in-progress	
21	DO 13	Dedicated output Robot program-in-progress	
22	DO 14	Dedicated output Program reset status output	
23	DO 15	Dedicated output Warning output	
24	DO 16	Spare	Do not use.
25	DO 17	Spare	Do not use.
26	DI 12	Dedicated input: Automatic operation start	
27	DI 13	Spare	Do not use.
28	DI 14	Dedicated input: Return-to-origin (for INC axis)	
29	DI 15	Dedicated input: Program reset input	
30	DI 16	Dedicated input: Alarm reset input	
31	DI 17	Dedicated input: Return-to-origin (for ABS axis)	
32	DI 30	General-purpose input 30	
33	DI 31	General-purpose input 31	
34	DI 32	General-purpose input 32	
35	DI 33	General-purpose input 33	
36	DI 34	General-purpose input 34	
37	DI 35	General-purpose input 35	
38	DI 36	General-purpose input 36	
39	DI 37	General-purpose input 37	
40	CHK 2	Check signal 2	Short-circuit with CHK1.
41	DO 02	Dedicated output: Servo ON output	
42	DO 03	Dedicated output: Alarm output	
43	DO 20	General-purpose output 20	
44	DO 21	General-purpose output 21	
45	DO 22	General-purpose output 22	
46	DO 23	General-purpose output 23	
47	DO 24	General-purpose output 24	
48	DO 25	General-purpose output 25	
49	DO 26	General-purpose output 26	
50	DO 27	General-purpose output 27	

Expanded specification I/O connector signal list

Pin	I/O No. (ID=1)	I/O No. (ID=2)	I/O No. (ID=3)	I/O No. (ID=4)	Signal name
1	---	---	---	---	Reserved
2	DI 10	DI 40	DI 70	DI 120	General-purpose input 10,40,70,120
3	---	---	---	---	Reserved
4	DI 11	DI 41	DI 71	DI 121	General-purpose input 11,41,71,121
5	---	---	---	---	Reserved
6	---	---	---	---	Reserved
7	---	---	---	---	Reserved
8	DI 20	DI 50	DI 100	DI 130	General-purpose input 20,50,100,130
9	DI 21	DI 51	DI 101	DI 131	General-purpose input 21,51,101,131
10	DI 22	DI 52	DI 102	DI 132	General-purpose input 22,52,102,132
11	DI 23	DI 53	DI 103	DI 133	General-purpose input 23,53,103,133
12	DI 24	DI 54	DI 104	DI 134	General-purpose input 24,54,104,134
13	DI 25	DI 55	DI 105	DI 135	General-purpose input 25,55,105,135
14	DI 26	DI 56	DI 106	DI 136	General-purpose input 26,56,106,136
15	DI 27	DI 57	DI 107	DI 137	General-purpose input 27,57,107,137
16	---	---	---	---	Reserved
17	---	---	---	---	Reserved
18	DO 10	DO 30	DO 50	DO 70	General-purpose output 10,30,50,70
19	DO 11	DO 31	DO 51	DO 71	General-purpose output 11,31,51,71
20	DO 12	DO 32	DO 52	DO 72	General-purpose output 12,32,52,72
21	DO 13	DO 33	DO 53	DO 73	General-purpose output 13,33,53,73
22	DO 14	DO 34	DO 54	DO 74	General-purpose output 14,34,54,74
23	DO 15	DO 35	DO 55	DO 75	General-purpose output 15,35,55,75
24	DO 16	DO 36	DO 56	DO 76	General-purpose output 16,36,56,76
25	DO 17	DO 37	DO 57	DO 77	General-purpose output 17,37,57,77
26	DI 12	DI 42	DI 72	DI 122	General-purpose input 12,42,72,122
27	DI 13	DI 43	DI 73	DI 123	General-purpose input 13,43,73,123
28	DI 14	DI 44	DI 74	DI 124	General-purpose input 14,44,74,124
29	DI 15	DI 45	DI 75	DI 125	General-purpose input 15,45,75,125
30	DI 16	DI 46	DI 76	DI 126	General-purpose input 16,46,76,126
31	DI 17	DI 47	DI 77	DI 127	General-purpose input 17,47,77,127
32	DI 30	DI 60	DI 110	DI 140	General-purpose input 30,60,110,140
33	DI 31	DI 61	DI 111	DI 141	General-purpose input 31,61,111,141
34	DI 32	DI 62	DI 112	DI 142	General-purpose input 32,62,112,142
35	DI 33	DI 63	DI 113	DI 143	General-purpose input 33,63,113,143
36	DI 34	DI 64	DI 114	DI 144	General-purpose input 34,64,114,144
37	DI 35	DI 65	DI 115	DI 145	General-purpose input 35,65,115,145
38	DI 36	DI 66	DI 116	DI 146	General-purpose input 36,66,116,146
39	DI 37	DI 67	DI 117	DI 147	General-purpose input 37,67,117,147
40	---	---	---	---	Reserved
41	---	---	---	---	Reserved
42	---	---	---	---	Reserved
43	DO 20	DO 40	DO 60	DO 100	General-purpose output 20,40,60,100
44	DO 21	DO 41	DO 61	DO 101	General-purpose output 21,41,61,101
45	DO 22	DO 42	DO 62	DO 102	General-purpose output 22,42,62,102
46	DO 23	DO 43	DO 63	DO 103	General-purpose output 23,43,63,103
47	DO 24	DO 44	DO 64	DO 104	General-purpose output 24,44,64,104
48	DO 25	DO 45	DO 65	DO 105	General-purpose output 25,45,65,105
49	DO 26	DO 46	DO 66	DO 106	General-purpose output 26,46,66,106
50	DO 27	DO 47	DO 67	DO 107	General-purpose output 27,47,67,107

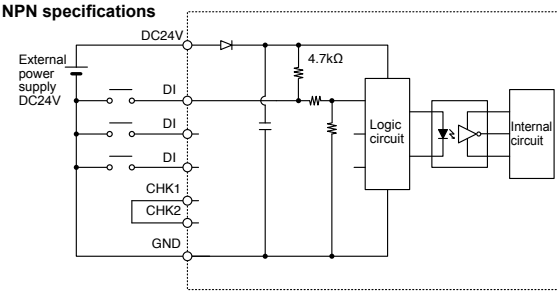
Note. The IDs are set using the parameter.

Standard specification I/O connector pin assignment lists

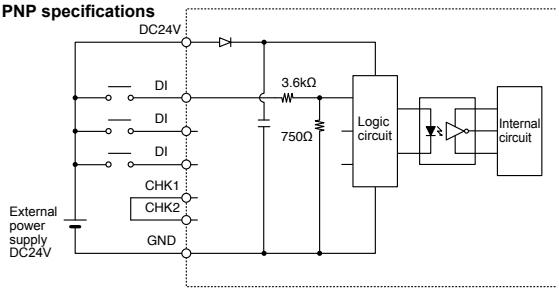
Pin	I/O No.	Name
1	DI01	Servo ON
2	DI10	SEQ enable
3	DI03	(Spare)
4	CHK1	Check input 1
5	DI05	(Spare)
6	DI06	STOP
7	DI07	(Spare)
8	DI20	General-purpose input
9	DI21	General-purpose input
10	DI22	General-purpose input
11	DI23	General-purpose input
12	DI24	General-purpose input
13	DI25	General-purpose input
14	DI26	General-purpose input
15	DI27	General-purpose input
16	DO00	(Spare)
17	DO01	CPUOK
18	DO10	AUTO
19	DO11	ORGOK
20	DO12	SEQRUN
21	DO13	RUN
22	DO14	RESET
23	DO15	WARNING
24	DO16	(Spare)
25	DO17	(Spare)
26	DI12	RUN
27	DI13	(Spare)
28	DI14	ORIGIN (for INC axis)
29	DI15	RESET
30	DI16	ALMRST
31	DI17	ORIGIN(for ABS axis)
32	DI30	General-purpose input
33	DI31	General-purpose input
34	DI32	General-purpose input
35	DI33	General-purpose input
36	DI34	General-purpose input
37	DI35	General-purpose input
38	DI36	General-purpose input
39	DI37	General-purpose input
40	CHK2	Check input 2
41	DO02	SERVO
42	DO03	ALARM
43	DO20	General-purpose output
44	DO21	General-purpose output
45	DO22	General-purpose output
46	DO23	General-purpose output
47	DO24	General-purpose output
48	DO25	General-purpose output
49	DO26	General-purpose output
50	DO27	General-purpose output

Typical input signal connection

NPN specifications

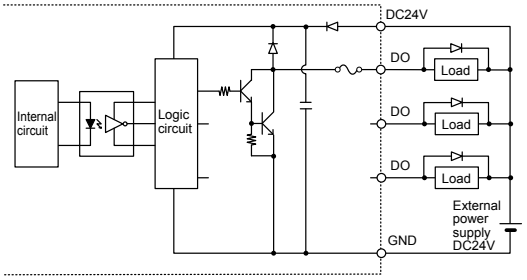


PNP specifications

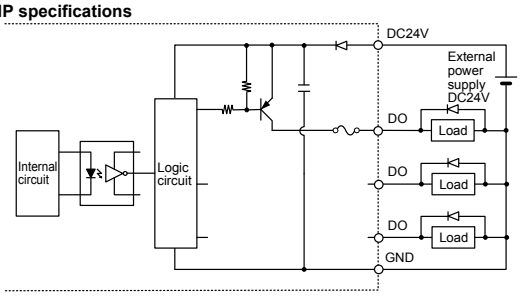


Typical output signal connection

NPN specifications



PNP specifications

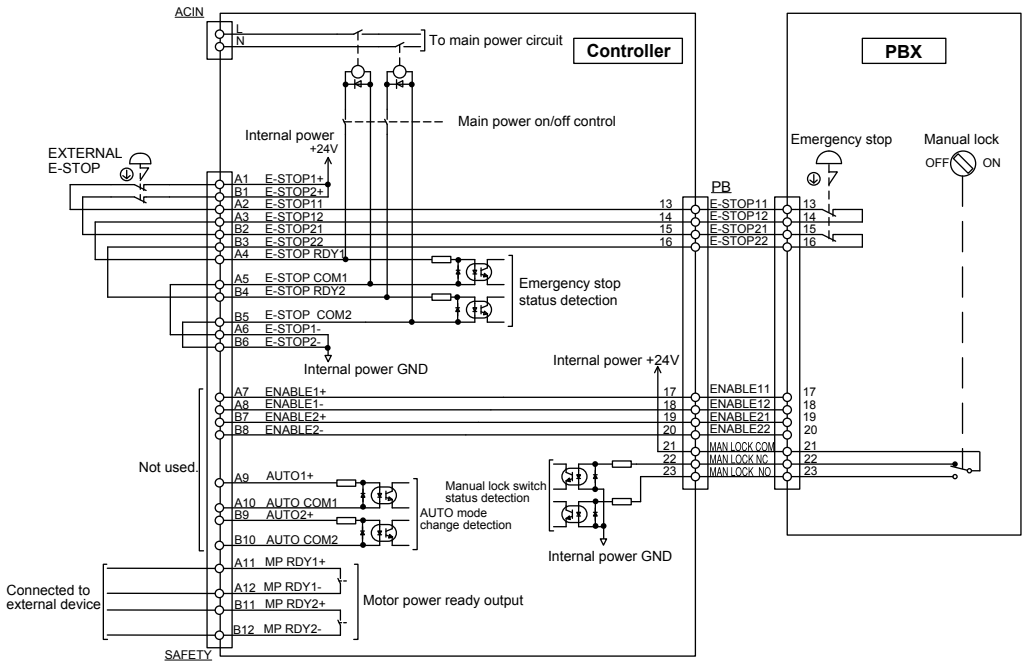


Basic functions

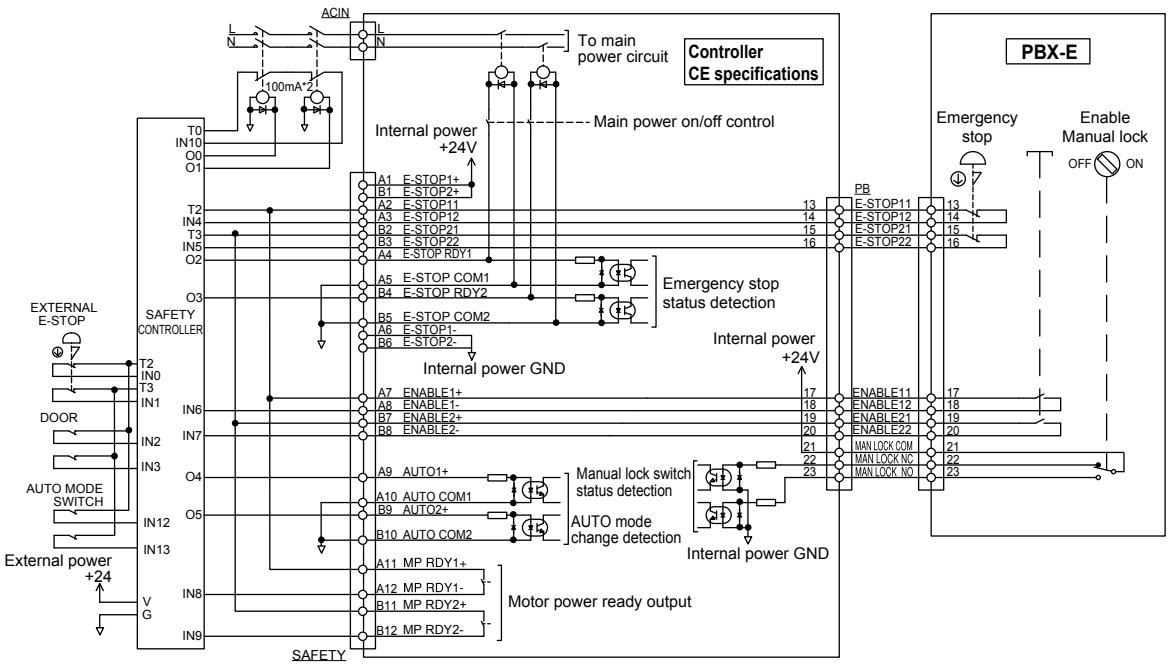
Function	Description
Operation modes	AUTO mode (Major functions: program creation, program execution, step execution, etc.) MANUAL mode (Major functions: jog movement, point data teaching, parameter editing, etc.)
Commands	Array declaration commands (DIM statement) Assignment commands (Numeric assignment, character string assignment, point definition statements, etc.) Movement commands (MOVE, DRIVE, PMOVE statements, etc.) Conditional branching commands (IF, FOR, WHILE statements, etc.) External output commands (DO, MO, LO, TO, SO statements) Parameter commands (ACCEL, OUTPOS, TOLE statements, etc.) Condition wait command (WAIT statement) Task related commands (START, SUSPEND, CUT statements, etc.) etc.
Functions	Arithmetic functions (SIN, COS, TAN functions, etc.) Character string functions (STR$, LEFT$, MID$, RIGHT$ functions, etc.) Point functions (WHERE, JTOXY, XYTOJ functions, etc.) Parameter functions (ACCEL, OUTPOS, TOLE statements, etc.) etc.
Variables	Simple variables (integer variables, real variables, character variables) Array variables (integer variables, real variables, character variables) Point variables Shift variables I/O variables etc.
Arithmetic operation	Arithmetic operators (+, -, *, /, MOD) Logic operators (AND, OR, XOR) Relational operators (=, <, >, <>, <=, >=)
Monitor	I/O status monitor (200 ms intervals)
Online commands	Program operation commands (RUN, STOP, RESET, STEP, etc.) Utility commands (COPY, ERA, INIT, etc.) Data handling commands (READ, WRITE, etc.) Robot language commands (independent-executable commands)
Data files	Program, point, parameter, shift, hand, all, error history etc.
Internal timer	Timer count variable (TCOUNTER), 1 ms interval
Program break points	Max. 32 points

Emergency input signal connections

Connection example of controller with normal specifications and PBX



Connection example of controller with CE specifications and PBX-E



Robot Language Table

General commands

Command	Description
DIM	Declares the array variable name and the number of elements.
LET	Executes a specified assignment statement.
REM	Expresses a comment statement.

Arithmetic commands

Command	Description
ABS	Acquires the absolute value of a specified value.
ATN	Acquires the arctangent of the specified value.
ATN2	Acquires the arctangent of the specified X-Y coordinates.
COS	Acquires the cosine value of a specified value.
DEGRAD	Converts a specified value to radians (↔RADDEG).
DIST	Acquires the distance between 2 specified points.
INT	Acquires an integer for a specified value by truncating all decimal fractions.
LSHIFT	Shifts a value to the left by the specified bit count. (↔RSHIFT)
RADDEG	Converts a specified value to degrees. (↔DEGRAD)
RSHIFT	Shifts a value to the right by the specified bit count. (↔LSHIFT)
SIN	Acquires the sine value for a specified value.
SQR	Acquires the square root of a specified value.
TAN	Acquires the tangent value for a specified value.

Date / time

Command	Description
DATE $	Acquires the date as a "yy/mm/dd" format character string.
TCOUNTER	Outputs count-up values at 1ms intervals starting from the point when the TCOUNTER variable is reset.
TIME $	Acquires the current time as an "hh:mm:ss" format character string.
TIMER	Acquires the current time in seconds, counting from midnight.

Character string operation

Command	Description
CHR $	Acquires a character with the specified character code.
LEFT $	Extracts a character string comprising a specified number of digits from the left end of a specified character string.
LEN	Acquires the length (byte count) of a specified character string.
MID $	Extracts a character string of a desired length from a specified character string.
ORD	Acquires the character code of the first character in a specified character string.
RIGHT $	Extracts a character string comprising a specified number of digits from the right end of a specified character string.
STR $	Converts a specified value to a character string (↔VAL).
VAL	Converts the numeric value of a specified character string to an actual numeric value. (↔STR$)

Point, coordinates, shift coordinates

Command	Description
CHANGE	Switches the hand of a specified robot.
HAND	Defines the hand of a specified robot.
JTOXY	Converts joint coordinate data to Cartesian coordinate data of a specified robot. (↔XYTOJ)
LEFTY	Sets the hand system of a specified robot to the left-handed system.
LOCx	Specifies/acquires point data for a specified axis or shift data for a specified element.
PATH	Sets the movement path.
Pn	Defines points within a program.
PPNT	Creates point data specified by a pallet definition number and pallet position number.
RIGHTY	Sets the hand system of a specified robot to the right- handed system.
Sn	Defines the shift coordinates within the program.
SHIFT	Sets the shift coordinate for a specified robot by using the shift data specified by a shift variable.
XYTOJ	Converts the point variable Cartesian coordinate data to the joint coordinate data of a specified robot. (↔JTOXY).

Branching commands

Command	Description
EXIT FOR	Terminates the FOR to NEXT statement loop.
FOR to NEXT	Executes the FOR to NEXT statement repeatedly until a specified value is exceeded.
GOSUB to RETURN	Jumps to a subroutine with the label specified by GOSUB statement, and executes that subroutine.
GOTO	Unconditionally jumps to the line specified by a label.
IF	Allows control flow to branch according to conditions.
ON to GOSUB	Jumps to a subroutine with labels specified by a GOSUB statement in accordance with the conditions, and executes that subroutine.
ON to GOTO	Jumps to label-specified lines in accordance with the conditions.
SELECT CASE to END SELECT	Allows control flow to branch according to conditions.
WHILE to WEND	Controls repeated operations.

Error control

Command	Description
ERR / ERL	Acquires the error code number of an error which has occurred / the line number where an error occurred.
ON ERROR GOTO	This command allows the program to jump to the error processing routine specified by the label without stopping the program, or it stops the program and displays the error message.
RESUME	Resumes program execution after error recovery processing.

Program control

Command	Description
CALL	Calls a sub-procedure.
HALT	Stops the program and performs a reset.
HALTALL	Stops and resets all programs.
HOLD	Temporarily stops the program.
HOLDALL	Temporarily stops all programs.
PGMTSK	Acquires the task number in which a specified program is registered.
PGN	Acquires the program number from a specified program name.
SGI	Assigns/acquires the value to a specified integer type static variable.
SGR	Assigns/acquires the value to a specified real type static variable.
SWI	Switches the program being executed, then begins execution from the first line.
TSKPGM	Acquires the program number which is registered in a specified task.

Task control

Command	Description
CHGPRI	Changes the priority ranking of a specified task.
CUT	Terminates another task currently being executed or temporarily stopped.
EXIT TASK	Terminates its own task which is in progress.
RESTART	Restarts another task during a temporary stop.
START	Specifies the task number and priority ranking of a specified program, and starts that program.
SUSPEND	Temporarily stops another task which is being executed.

Robot operations

Command	Description
DRIVE	Moves a specified axis of a specified robot to an absolute position.
DRIVEI	Moves a specified axis of a specified robot to a relative position.
MOTOR	Controls the motor power status.
MOVE	Performs absolute movement of all axes of a specified robot.
MOVEI	Performs relative movement of all axes of a specified robot.
MOVET	Performs relative movement of all axes of a specified robot when the tool coordinate is selected.
ORIGIN	Performs return-to-origin.
PMOVE	Executes the pallet movement command of a specified robot.
PUSH	Executes a pushing operation in the axis unit.
SERVO	Controls the servo ON/OFF of a specified axis or all axes of a specified robot.

Status acquisition

Command	Description
ABSRPOS	Acquires the machine reference value for specified robot axes. (Valid only for axes whose return-to-origin method is set as "mark".)
ARMCND	Acquires the current arm status of a specified robot.
ARMSEL	Specifies/acquires the current "hand system" setting of a specified robot.
ARMTYP	Specifies/acquires the "hand system" setting of a specified robot.
CURTQST	Acquires the current torque value ratio of a specified axis to the rated torque.
MCHREF	Acquires the return-to-origin or absolute-search machine reference value for specified robot axes. (Valid only for axes whose return-to-origin method is set as "sensor" or "stroke-end".)
MTRDUTY	Acquires the motor load factor of the specified axis.
PSHRSLT	Acquires the status at the end of the PUSH statement.
PSHSPD	Specifies/acquires the push speed parameter.
PSHTIME	Specifies/acquires the push time parameter.
WAIT ARM	Waits until the axis operation of a specified robot is completed.
WHERE	Reads out the current position of the arm of a specified robot in joint coordinates (pulse).
WHRXY	Reads out the current position of the arm of a specified robot as Cartesian coordinates (mm, degrees).

Status change

Command	Description
ACCEL	Specifies/acquires the acceleration coefficient parameter of a specified robot.
ARCHP1	Specifies/acquires the arch position 1 parameter of a specified robot.
ARCHP2	Specifies/acquires the arch position 2 parameter of a specified robot.
ASPEED	Specifies/acquires the AUTO movement speed of a specified robot.
AXWGHT	Specifies/acquires the axis tip weight parameter of a specified robot.
CHANGE	Switches the hand of a specified robot.
DECEL	Specifies/acquires the deceleration rate parameter of a specified robot.
HAND	Defines the hand of a specified robot.
LEFTY	Sets the hand system of a specified robot to the left-handed system.
ORGORD	Specifies/acquires the axis sequence parameter for performing return-to-origin and an absolute search operation in a specified robot.
OUTPOS	Specifies/acquires the "OUT position" parameter of a specified robot.
PDEF	Defines the pallet used to execute pallet movement commands.
PSHFRC	Specifies/acquires the "Push force" parameter.
PSHJGSP	Specifies/acquires the push judge speed threshold parameter.
PSHMTD	Specifies/acquires the push method parameter.
RIGHTY	Sets the hand system of a specified robot to the right- handed system.
SETGEP	Sets the General Ethernet Port.
SPEED	Changes the program movement speed of a specified robot.
TOLE	Specifies/acquires the tolerance parameter of a specified robot.
WEIGHT	Specifies/acquires the tip weight parameter of a specified robot.

PATH control

Command	Description
PATH	Specifies the PATH motion path.
PATH END	Ends the path setting for PATH motion.
PATH SET	Starts the path setting for PATH motion.
PATH START	Starts the PATH motion.

Torque control

Command	Description
CURTQST	Acquires the current torque value ratio of a specified axis to the rated torque.
CURTRQ	Acquires the current torque value of the specified axis of a specified robot.
PUSH	Executes a pushing operation in the axis unit.
TORQUE	Specifies/acquires the maximum torque command value which can be set for a specified axis of a specified robot.

Input/output control

Command	Description
DELAY	Waits for the specified period (units: ms).
DO	Outputs a specified value to the DO port or acquires the DO status.
LO	Outputs a specified value to the LO port to enable/disable axis movement or acquires the LO status.
MO	Outputs a specified value to the MO port or acquires the MO status.
OUT	Turns ON the bits of the specified output ports and terminates the command statement.
RESET	Turns the bit of a specified output port OFF.
SET	Turns the bit at the specified output port ON.
SI	Acquires a specified SI status.
SID	Acquires a specified serial input's double-word information status.
SIW	Acquires a specified serial input's word information status.
SO	Outputs a specified value to the SO port or acquires the SO status.
SOD	Outputs a specified serial output's double-word information or acquires the output status.
SOW	Outputs a specified serial output's word information or acquires the output status.
TO	Outputs a specified value to the TO port or acquires the TO status.
WAIT	Waits until the conditions of the DI/DO conditional expression are met (with time-out).

Communication control

Command	Description
CLOSE	Close the specified General Ethernet Port.
ETHSTS	Acquires the Ethernet port status.
GEPSTS	Acquires the General Ethernet Port status.
OFFLINE	Sets a specified communication port to the "offline" mode.
ONLINE	Sets the specified communication port to the "online" mode.
OPEN	Opens the specified General Ethernet Port.
SEND	Sends a file.

Accessories and part options

RCX340

Standard accessories

Power connector + wiring connection lever

Model	KAS-M5382-00

LCC140 TS-X TS-P SR1-X SR1-P RCX320 RCX221 RCX222 RCX340

Safety connector

Model	KCX-M5370-00

RCX320 RCX340

PBX terminator (dummy connector)

Attach this to the PBX connector during operation with the programming box PBX removed.

Model	KFR-M5163-00

RCX320 RCX221 RCX222 RCX340

NPN / PNP connector

Connector plug model	KBH-M4424-00
Connector shell model	KBH-M4425-00

SR1-X SR1-P RCX320 RCX340

Absolute battery

Battery for absolute data back-up.

Basic specifications

Item	Absolute battery
Battery type	Lithium metallic battery
Battery capacity	3.6V/2,750mAh
Data holding time	About 1 year (in state with no power applied)
Dimensions	ϕ17 × L53mm
Weight Note1	22g

Model	KCA-M53G0-01

Note 1. Weight of battery itself.
Note. The absolute battery is subject to wear and requires replacement.
If trouble occurs with the memory then remaining battery life is low so replace the absolute battery. The battery replacement period depends on usage conditions. But generally you should replace the battery after about 1 year counting the total time after connecting to the controller and left without turning on the power.

RCX320 RCX340 TS-SH

Important **Absolute battery installation conditions**

1 batteries are required for each 1 axes.
● 1 battery.....Data storage time of approximately 6 months (with no power applied)
Note. No absolute battery is required for the incremental or semi-absolute axis.

Dust cover for COM connector

Model	KR7-M5395-10

RCX320 RCX340

Dust cover for LAN connector

Model	KCX-M658K-10

RCX320 RCX340

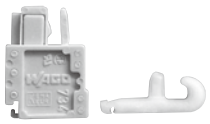
Dust cover for USB connector

Model	KCX-M658K-00

RCX320 RCX340

Options

External 24V power supply connector for brake + wiring lever



Model	KCX-M6500-10	RCX340

Programming box PBX/PBX-E P587

This device can perform all operations such as manual robot operation, program entry and edit, teaching and parameter settings.

PBX

Type	Language	Cable length	Model	
PBX	Japanese	5m	KCX-M5110-1J	RCX320 RCX340
		12m	KCX-M5110-3J	
	English	5m	KCX-M5110-1E	
		12m	KCX-M5110-3E	
	Chinese	5m	KCX-M5110-1C	
		12m	KCX-M5110-3C	
PBX-E (with enable switch)	Japanese	5m	KCX-M5110-0J	
		12m	KCX-M5110-2J	
	English	5m	KCX-M5110-0E	
		12m	KCX-M5110-2E	
	Chinese	5m	KCX-M5110-0C	
		12m	KCX-M5110-2C	

	Model
Display language switching USB for PBX	KCX-M6498-00
USB cable	KCX-M657E-00

Support software for PC RCX-Studio Pro P583

This is support software for operating the RCX340 controller.
A USB key is supplied to the RCX-Studio Pro to prevent robot operation mistakes.

RCX-Studio Pro Note.
Note. This software is only downloaded from the website.

USB key (Dongle)

Model	RCX-Studio Pro (USB key)	KCX-M4990-20	RCX320 RCX340

Note. Although it is possible to install this software on multiple PCs, the functionality is limited if there is no USB key (see table below).
Additional USB keys (additional licenses) are available at a special price. Please contact Yamaha for details.

Environment

OS	Windows XP (32bit), Vista, 7, 8 / 8.1, 10 (Supported version: V.2.1.3 or later)
CPU	Intel® Core™ 2 Duo 2 GHz or higher is recommended
Memory	1 GB or more is recommended
Hard disk	80MB or more free space in the RCX-Studio Pro installation destination
Communication port	Communication cable: serial communication port, Ethernet, or USB port USB key: USB port (one port)
Display	1024×768 or higher resolution, 256 colors or higher
Other	CD-ROM drive Dedicated communication cable (for D-Sub or for USB) Ethernet cable (category 5 or higher)
Applicable robot controllers	RCX340

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries. Other company names and product names listed in this manual may be the trademarks or registered trademarks of their respective companies.

Functional limitations depending on USB key presence

Function	USB key present	USB key absent
Connecting to the controller	○	×
Saving the file data	○	×
Emulator function	○	○
Real Time Trace	○	△ Emulator only
Cycletime Calculator	○	×
iVY2 editor	○	×
Data Difference	○	△ Except data saving

Data cables

Communication cable for RCX-Studio Pro.
Select from USB cable or D-sub cable.

USB

D-Sub

Model	USB type (5m)	KBG-M538F-00	LCC140 ERCD SR1-X SR1-P RCX320 RCX221 RCX222 RCX340
	D-Sub type 9pin-9pin (5m)	KAS-M538F-10	

Note. This USB cable supports Windows 2000/XP or later.
Note. Data cable jointly used for POPCOM+, VIP+, RCX-Studio Pro.
Note. USB driver for communication cable can also be downloaded from our website.

YC-Link/E master board

Model	KCX-M4400-M0	RCX320 RCX340

YC-Link/E slave board

Model	KCX-M4400-S0	RCX320 RCX340

YC-Link/E cable (1m)

Model	KCX-M6479-10	RCX320 RCX340

Support software for PC

TS-Manager

Besides basic functions, such as point data edit and backup, this support software TS-Manager incorporates various convenient functions to efficiently process the system debugging and analysis. The TS-Manager helps you in every scene from the system setup to the maintenance.

▼Applicable controllers

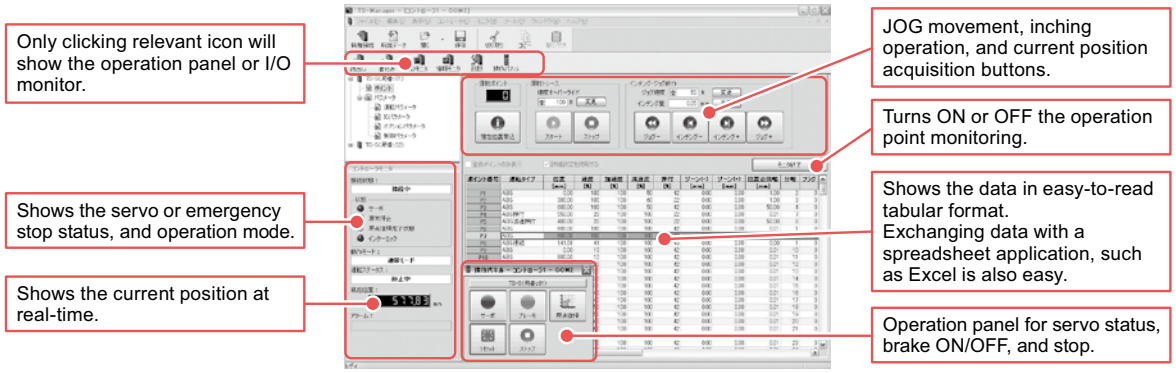
TS-S2
TS-SH
TS-X
TS-P
P.514

TS-SD
P.524

Features

1 Basic functions

Detailed settings by point, such as the position information, operation pattern, speed, acceleration, and deceleration settings, and robot parameter settings can be set, edited, and backed up. Additionally, the basic operation of the robot, such as JOG movement or inching operation can also be controlled through the TS-Manager.



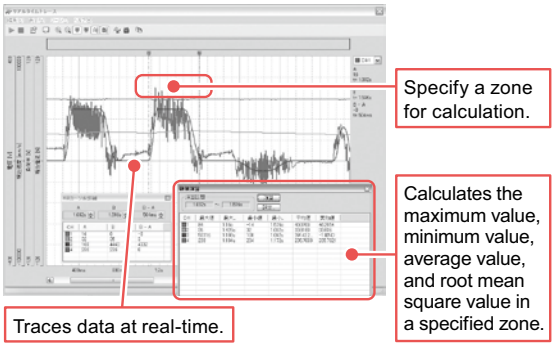
Note. Excel is a registered trademark of Microsoft Corporation in the United States and/or other countries.

2 Real-time trace

This function traces the current position, speed, load factor, current value, and voltage value at real-time. Additionally, as trigger conditions are set, data can be automatically obtained when these conditions are satisfied. Furthermore, as a zone is specified from the monitor results, the maximum value, minimum value, and average value can be calculated. These values are useful for the analysis if a trouble occurs.

Real-time traceable items (up to four items)		
• Voltage value	• Commanded position	• Current position
• Command speed	• Current speed	• Internal temperature
• Command current value	• Present current value	• Motor load factor
• Input/output I/O status	• Input pulse count *1	• Movement pulse count *1
• Word input/output status*2		

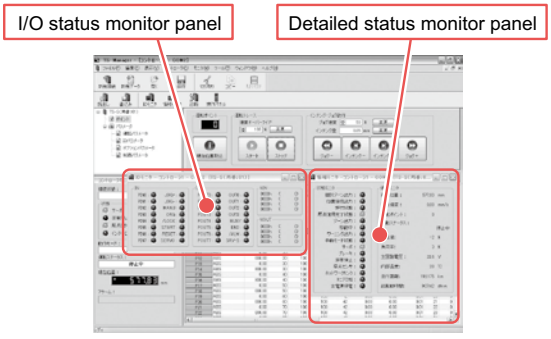
*1: Only on TS-SD *2: Only on TS controllers



3 Various monitor functions and detailed error logs

The robot operation status (operation mode or servo status) and I/O status can be monitored.

Additionally, the Alarm Log screen also displays the input/output I/O status in addition to the carrier position, speed, operation status, current value, and voltage value in case of an alarm. This greatly contributes to the status analysis.

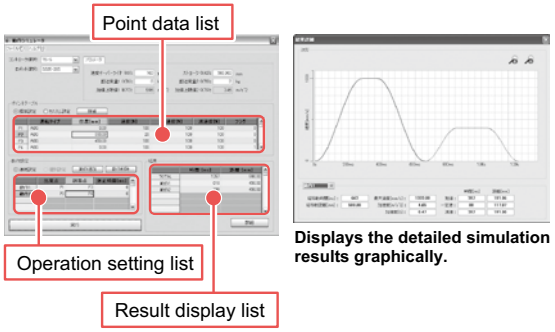


4 Operation simulation

As the operation condition data or point data is input, a period of time necessary for operation is simulated.

Use of this function makes it possible to select an optimal model before purchase and simulate the speed and acceleration/deceleration settings without use of actual machine.

It is also possible to link this operation simulation function with the TS-Manager main software. This easily affects the point data you have edited in the actual machine.



Displays the detailed simulation results graphically.

TS-Manager

Model	KCA-M4966-0J (Japanese)
	KCA-M4966-0E (English)

TS-Manager environment

OS	Windows 2000, XP (32bit), Vista, 7, 8 / 8.1, 10 (Supported version: V.1.4.5 or later)
CPU	Exceeding the environment recommended by the OS being used
Memory	Exceeding the environment recommended by the OS being used
Hard disk	Vacant capacity of more than 20MB in the installation destination drive
Communication port	Serial (RS-232C), USB
Applicable controllers	TS series

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

Data cables (5m)

Communication cable for TS-Manager.
Select from USB cable or D-sub cable.

TS-S2
TS-SH
TS-X
TS-P
TS-SD

Model	USB type (5m)	KCA-M538F-A0
	D-Sub type (5m)	KCA-M538F-01

Note. USB driver for communication cable can also be downloaded from our website.

Support software for PC

POPCOM+

POPCOM+ is an easy to operate application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

▼Applicable controllers

LCC140	P.508
ERCD	P.534
SR1-X SR1-P	P.540

Features

1 Easy to use

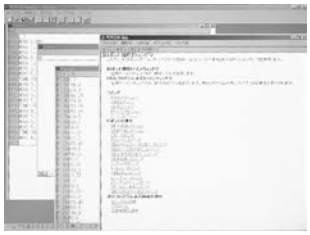
All items necessary for robot operation are displayed on single screen. There is no need to remember the menu structure so that it can be easily operated with mouse control by anybody.

2 Program editing

Edit amendment, cut, copy, paste, syntax check and program entry can be performed efficiently with function keys.

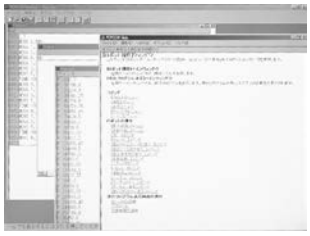
3 Point editing

Edit amendment, cut, copy, paste, syntax check, teach and trace functions are provided.



4 Help function

If you need some detailed information, robot language etc. during operation, operate [F1] key or [HELP] key to recall useful information on the screen.



5 Robot operation

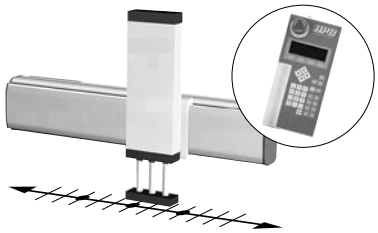
By connecting between a computer and the controller with a communication cable, the controller can control the robot in the same way as a HPB / HPB-D (programming box).

6 Creating point data

There are three methods available for creating the point data.

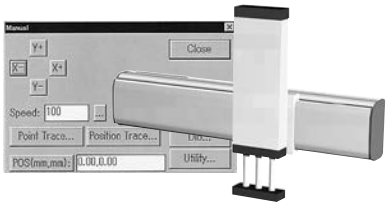
MDI (Manual Data Input) teaching

The numeric keyboard is used to enter position coordinate data directly.



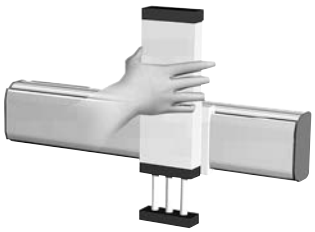
Remote teaching

The robot arm is actually moved to the target position using the keys for point data registration.



Direct teaching

The robot arm is manually moved to the target position with the servo motors off for point data registration.



PC supporting software POPCOM+

POPCOM+ software model	KBG-M4966-00

POPCOM+ environment

OS	Windows XP (32bit), Vista, 7, 8 / 8.1, 10 (Supported version: V.2.1.1 or later)
CPU	Processor that meets or exceeds the suggested requirements for the OS being used.
Memory	Suggested amount of memory or more for the OS being used.
Hard disk	50MB of available space required on installation drive.
Disk operation	RS-232C
Applicable controllers	SRCX to SR1, DRCX, TRCX, ERCX, ERCD, LCC140 Note 1

Note 1. LCC140 is applicable to Ver. 2.1.1 or later.
Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

Data cables (5m)

Communication cable for POPCOM+.
Select from USB cable or D-sub cable.

	USB	D-Sub
Model	USB type (5m)	KBG-M538F-00
	D-Sub type 9pin-9pin (5m)	KAS-M538F-10

LCC140 ERCD SR1-X SR1-P RCX320 RCX221 RCX222 RCX340

Note. This USB cable supports Windows 2000/XP or later.
Note. Data cable jointly used for POPCOM+, VIP+, RCX-Studio Pro.
Note. USB driver for communication cable can also be downloaded from our website.

9Pin-25Pin converter adapter

This is an adapter for converting the female D-sub25Pin to a female D-sub9Pin.
This adapter is needed if using the ERCX and DRCX.

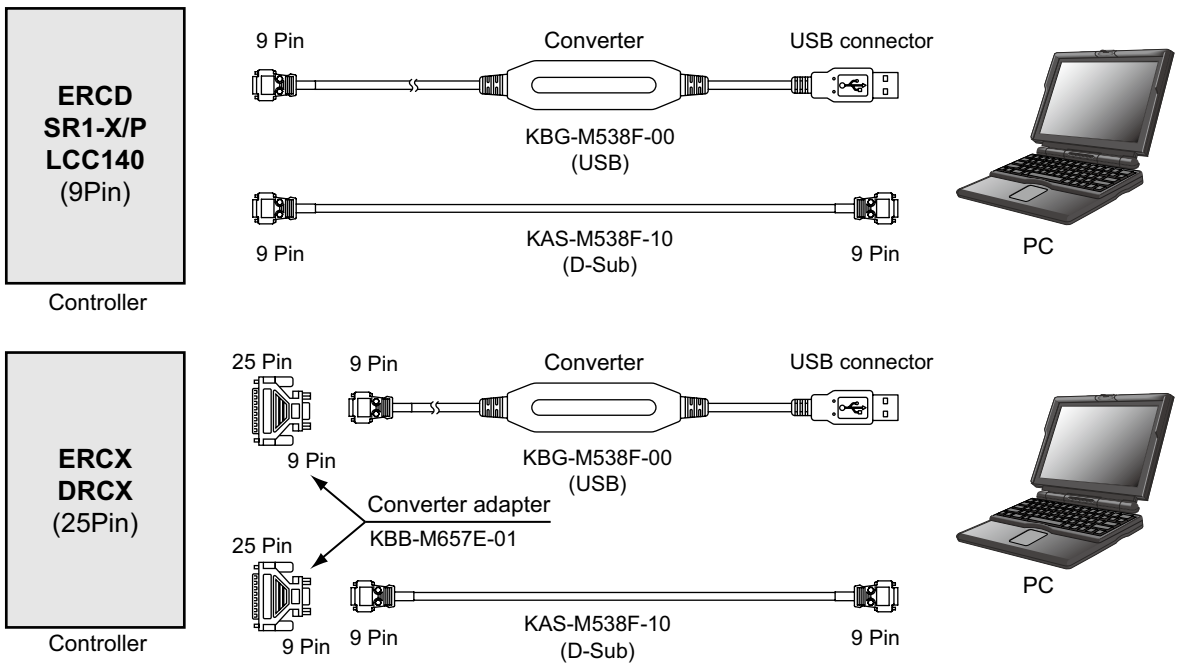
Model	KBB-M657E-01

Note. It is unnecessary when using ERCD or SR1-X, SR1-P.

Controller & data cable / converter adapter matchup table

Controller / Data cables	ERCD SR1-X/SR1-P LCC140 (9Pin)	ERCX DRCX (25Pin)
[9Pin-9Pin cable] • KAS-M538F-10 (SSC-2-5L)	Needs no converter adapter	9Pin-25Pin converter adapter KBB-M657E-01

Controller and data cable connection diagrams



Option details

Support software for PC

VIP+ Windows

Visual Integrated Programming

▼Applicable controllers

RCX221
RCX222

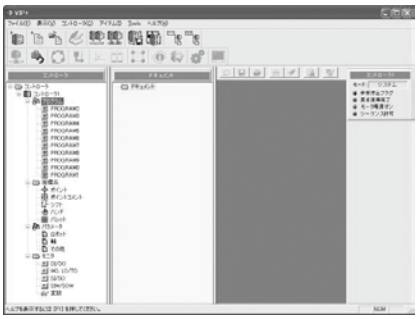
P.558

VIP+ is an easy to operate application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

Features

1 GUI updated for enhanced usability

The user interface has been improved with the VIP Windows function kept as it is so as to achieve more ease of use.



2 Data displayed in the tree view form

The data included in the controller is displayed legibly.

3 Fully equipped tool bar

Each of various functions can be executed by simple one click on the tool bar.

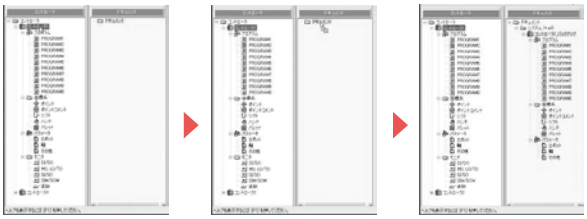
4 Expanded monitor function

The I/O conditions and variables in the controller can be monitored at real time. In the advanced mode, it is also possible to attach any label (Note) to general purpose input/output and others.

Note. The label is stored in PC.

5 Data operation using the new drag & drop function

The data can be stored easily by using the drag & drop function. Likewise, the stored data can be restored to the controller by operating the mouse only.



Select the data to be stored.

Drag the selected data to the document window and drop it there.

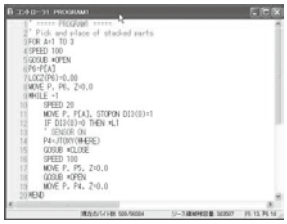
Specify the file name and this completes the storage procedure.

6 Input the data in the work sheet form (Parameter, Point data)

It is also possible to copy and paste the data from the other spread sheet (chart calculation software).

7 Syntax coloring when editing the program

When reserved words (character string reserved as the robot language) are inputted, they are colored automatically, making them noted at one glance for easier program editing.



8 Program execution monitor

The step being performed during the program execution can be monitored. Thus, it ispossible to check which step is performed without stopping the program, thereby debugging of the program is made much easier.

9 List appointing (point where the system is restored)

It is possible to create the system restoration point at any timing. By doing so at important points in the system constructing process when, for example, something faulty is found after the system was changed, the system can be returned to the state before such change easily.

VIP PLUS function

1 Easy to use

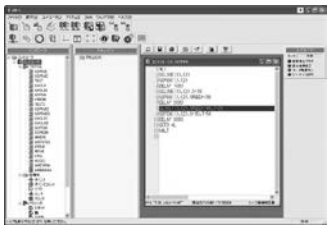
With a number of robot operation items provided on one screen, any operator can operate easily without memorizing the menu construction.

2 Programming editing

The program, point, parameter, shift, and hand can be edited on the PC alone. Equipped with the function selector having the command searching function which enables to input the robot language with ease.

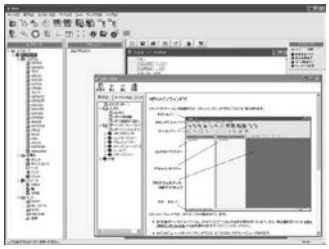
3 Data check function

Provided with the equivalent data check function to that of a robot controller, it is possible to correct data errors before operation.



4 Help function

When more information is needed during operation, press the [F1] or [HELP] key, and the help screen will appear.

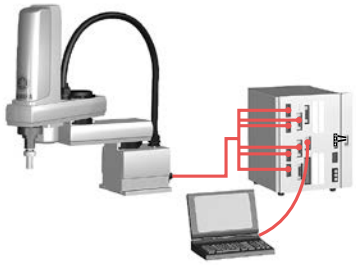


5 Robot operation

By connecting PC and controller with communication cable, robot operation will be available by the on-line command.

6 On-line editing

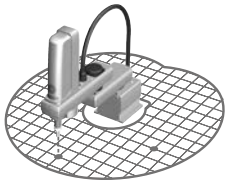
Connecting a PC and the controller with a communication cable enable to edit data from robot controllers just as with RPB / RPB-E.



7 Creating point data There are three methods available for creating the point data.

MDI (Manual Data Input) teaching

The numeric keyboard is used to enter position coordinate data directly.



Remote teaching

The robot arm is actually moved to the target position using the keys for point data registration.

Direct teaching

The robot arm is manually moved to the target position with the servo motors off for point data registration.

Support software for PC VIP+

Model	KX0-M4966-00

Data cables (5m)

Communication cable for VIP+.
Select from USB cable or D-sub cable.

USB

D-Sub

Model	USB type (5m)	KBG-M538F-00
	D-Sub type 9pin-9pin (5m)	KAS-M538F-10

Note. This USB cable supports Windows 2000/XP or later.
Note. Data cable jointly used for POPCOM+, VIP+, RCX-Studio Pro.
Note. USB driver for communication cable can also be downloaded from our website.

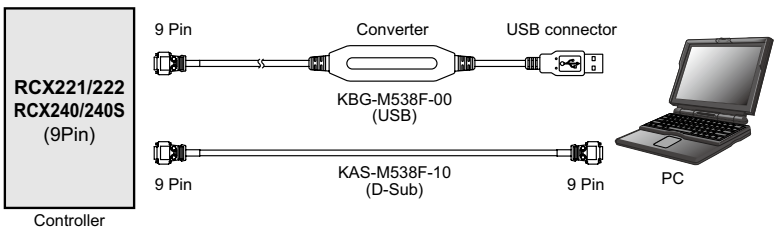
LCC140
ERCD
SR1-X
SR1-P
RCX320
RCX221
RCX222
RCX340

Environment

OS	Windows 2000, XP (32bit), Vista, 7, 10 (Supported version: V.2.8.4 or later)
CPU	Processor that meets or exceeds the suggested requirements for the OS being used.
Memory	Suggested amount of memory or more for the OS being used.
Hard disk	40MB of available space required on installation drive.
Communication method	RS-232C, Ethernet Note. For Ethernet communication, Ethernet unit for RCX series controller is required.
Applicable robot controllers	RCX22x / 240

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.
Note. ADOBE and ADOBE READER are registered trademarks of Adobe Systems Incorporated.
Note. Ethernet is a registered trademark of Xerox Corporation.

Controller and data cable connection diagrams



Support software for PC

RDV-Manager

RDV-Manager is software for RDV-X/RDV-P. Using the Windows operating computer, it is possible to set parameters, to monitor the position, speed and torque and to have graphics displayed, assuring pleasant and easy operation in the Windows Vista, Windows 7 or Windows 8 / Windows 8.1 environment.

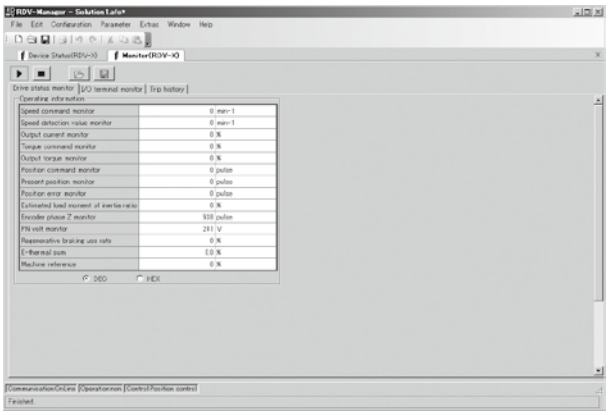
▼Applicable controllers

RDV-X
RDV-P
P.528

Features

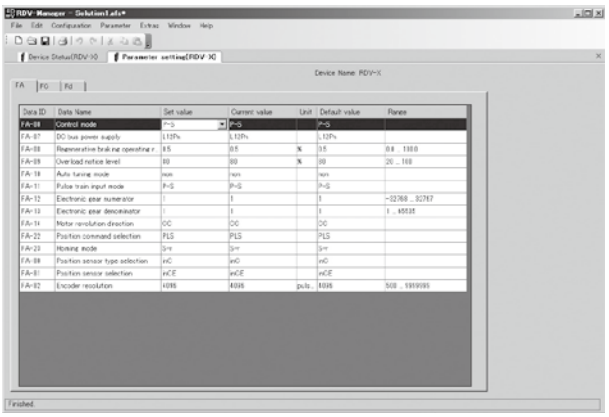
1 Monitoring function

It is possible to monitor the operation condition and output state in real time. Additionally, the terminal can be operated forcibly to check the operation.



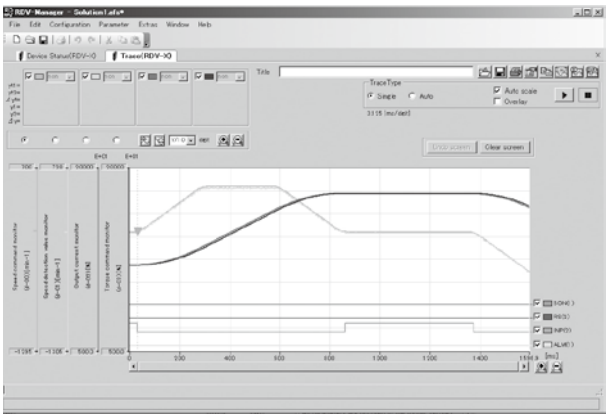
2 Setting parameters

It is possible to set, change, print and store the parameters.



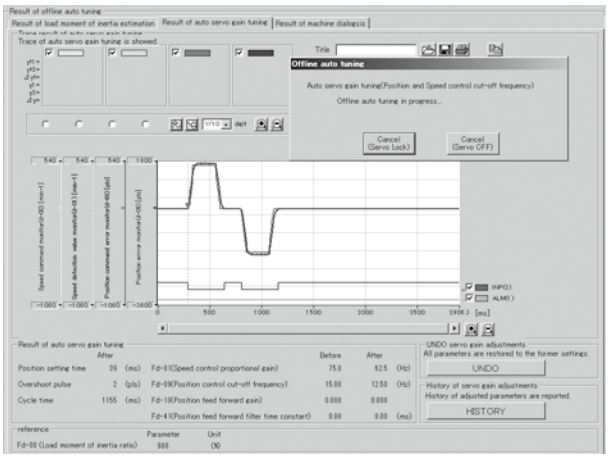
3 Operation tracing function

It is possible to have the servo motor speed and electric current displayed in the form of graphics.



4 Offline auto tuning function

The load moment of inertia can be estimated and the automatic servo gain can be adjusted.



Support software RDV-Manager

RDV-Manager is RDV-X / RDV-P dedicated software.

Model	KEF-M4966-00

Environment

OS	Windows Vista SP1 (32bit) Note 1, 7, 8 / 8.1
CPU	Pentium4 1.8GHz or more (Recommend)
Memory	1GB or more
Hard disk	1GB of available space required on installation drive.
Disk operation	USB
Applicable controllers	RDV series

Note 1. SP1 (service pack 1) or higher.
Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

Communication cable for PC supporting software RDV-Manager (3m)

Communication cable to connect PC and a controller.

Model	KEF-M538F-00

Support software for PC

RCX-Studio Pro

This is dedicated support software for the RCX320/RCX340 controller. It is a further advance in ease-of-use over the previous RCX-Studio. Emulator functionality is also provided, contributing to full-scale system startup.

▼Applicable controllers

RCX320	P.548
RCX340	P.566

Features

1 Evaluation

Emulator function provided

By operating the controller on a PC, programs can be created and debugged even without a controller.
Cycle time can also be calculated, greatly reducing the time for software design.

Cycle time calculator

Cycle time between two points can be easily calculated in two steps.
Choosing a model is easily done; simply select a model and enter the position.

2 Design

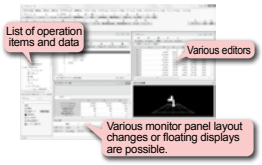
Easy-to-use operation allows speedy setup

Program entry support functionality is provided.
Program editing and data editing.

Inter-operation with other manufacturer's line simulators

Software made by other companies can be connected to the emulator of the RCX-Studio Pro, allowing checking for interference between robots in the facility.

Note. Software made by other companies is provided by the customer.



iVY2 editor provided

Integration of iVY2 Studio makes it unnecessary to switch between software; this improves productivity.

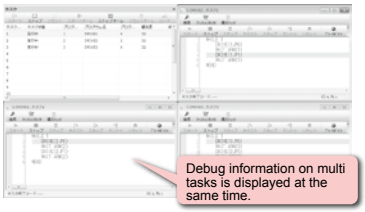
3 After installation

Realtime trace

Continuous output of the controller's internal data allows the status to be checked at any time.
Even if no measuring device is present, the current waveform can be obtained for peace of mind.

Application debugging function

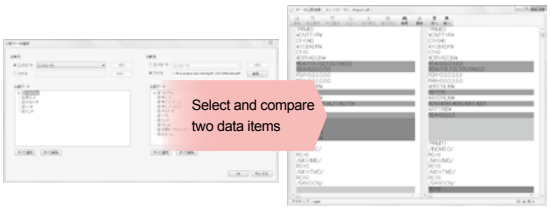
Debugging information for multiple tasks can be displayed simultaneously.



4 Maintenance

Data comparison tool

Two specified data items can be compared, and the difference shown.
Comparison of entire ALL files and comparison of individual programs is also possible.
Direct comparison with online data is also possible, greatly shortening the time required for maintenance tasks.



RCX-Studio Pro software

RCX-Studio Pro Note.

Note. This software is only downloaded from the website.

USB key (Dongle)

Model	RCX-Studio Pro (USB key)	KCX-M4990-20

Note. Although it is possible to install this software on multiple PCs, the functionality is limited if there is no USB key (see P.575).
Additional USB keys (additional licenses) are available at a special price. Please contact Yamaha for details.

Environment

OS	Windows XP (32bit), Vista, 7, 8 / 8.1, 10 (Supported version: V.2.1.3 or later)
CPU	Intel® Core™ 2 Duo 2 GHz or higher is recommended
Memory	1 GB or more is recommended
Hard disk	80MB or more free space in the RCX-Studio Pro installation destination
Communication port	Communication cable: serial communication port, Ethernet, or USB port USB key: USB port (one port)
Display	1024×768 or higher resolution, 256 colors or higher
Other	CD-ROM drive Dedicated communication cable (for D-Sub or for USB) Ethernet cable (category 5 or higher)
Applicable robot controllers	RCX320/RCX340

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.
Other company names and product names listed in this manual may be the trademarks or registered trademarks of their respective companies.

Data cables (5m)

Communication cable for RCX-Studio Pro.
Select from USB cable or D-sub cable.

USB

D-Sub

Model		
	USB type (5m)	KBG-M538F-00
	D-Sub type 9pin-9pin (5m)	KAS-M538F-10

LCC140 ERCD
SR1-X SR1-P
RCX320 RCX221
RCX222 RCX340

Note. This USB cable supports Windows 2000/XP or later.
Note. Data cable jointly used for POPCOM+, VIP+, RCX-Studio Pro.
Note. USB driver for communication cable can also be downloaded from our website.

Handy terminal

HT1/HT1-D

**This Handy Terminal is a device that can perform any operation such as robot manual operation, point data edit, teaching, and parameter setting, etc.
Has graphic LCD display with backlight for easy viewing.**

▼Applicable controllers

TS-S2
TS-SH
TS-X
TS-P

P.514

HT1 / HT1-D basic specifications

Name		HT1	HT1-D
External view			
Applicable controllers		TS-S2 / TS-SH / TS-X / TS-P	
Model	Japanese specifications	KCA-M5110-0J(3.5m) KCA-M5110-6J(10m)	KCA-M5110-1J(3.5m) KCA-M5110-7J(10m)
	English specifications	KCA-M5110-0E(3.5m) KCA-M5110-6E(10m)	KCA-M5110-1E(3.5m) KCA-M5110-7E(10m)
Display		Dot matrix monochrome display (with backlighting) 32 characters × 10 lines	
Operation keys		Mechanical switch	
Emergency stop button		Normally closed contact point (with lock function)	
Enable switch		-	3-position
Safety connector		-	15 pin D-sub connector (male)
CE marking		Not supported	Applicable
Operating temperature		0°C to 40°C	
Operating humidity		35% to 85%RH (non-condensing)	
Dimensions		W88 × H191 × D45mm (Emergency stop button not included.)	
Weight		260g (not including cable)	300g (not including cable)
Cable length		3.5m / 10m	

Part names and function

Strap holder
Attaching a short strap or necklace strap here prevents dropping the HT1 while operating it or installing it onto equipment.

LCD screen
This is a liquid crystal display (LCD) screen with 32 characters × 10 lines (pixel display), showing the operation menus and various types of information.

Data edit keys
Use these keys to select menus and edit various data.

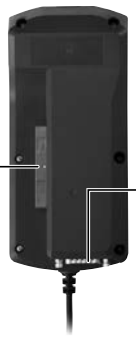
Connector cable
This cable connects to the controller. One end of this cable is terminated with an 8-pin MD connector (male). Plug this cable into the COM1 connector on the controller front panel.

Emergency stop button
Pressing this button during operation immediately stops robot movement. To release this button, turn it clockwise. Releasing this button also cancels emergency stop.

Run/stop keys
Use these keys to operate the robot for teaching or positioning, or to stop operation.
The ⊖ and ⊕ keys are also provided to move the robot in jog mode.

HT1-D rear side

Enable switch (only on HT1-D)
This switch is effective for use with remote safety circuits. This switch cuts off the circuit when pressed or released but allows circuit operation when in the middle position.



Safety connector (only on HT1-D)
Use with remote safety circuits triggered by the emergency stop button or enable switch.

Programming box

HPB/HPB-D

All operations can be performed from this device including manual robot operation, programming entry and editing, teaching and setting parameters. The display works interactively with the operator so even an absolute beginner can easily learn how to use programming box.

▼Applicable controllers

LCC140	P.508
ERCD	P.534
SR1-X SR1-P	P.540

■ HPB / HPB-D basic specifications

Name		HPB	HPB-D
External view			
Model	Using with ERCD, SR1-X, SR1-P	KBB-M5110-01 (without a conversion adaptor)	KBB-M5110-21 (without a conversion adaptor)
	Using with ERCX, SRCP30, DRCX	KBB-M5110-0A (with a conversion adaptor)	KBB-M5110-2A (with a conversion adaptor)
Display		LCD (20characters × 4 lines)	
Emergency stop button		Normally closed contact point (with lock function)	
Enable switch		–	3-position
CE marking		Not supported	Applicable
Memory back-up device		SD Memory card	
Operating temperature		0°C to 40°C	
Operating humidity		35% to 85%RH (non-condensing)	
Dimensions		W107 × H230 × D53mm (Strap holder, emergency stop button not included.)	
Weight		650g	
Cable length		3.5m	

■ Part names and function

Emergency stop button

Performs a robot emergency stop when pressed during robot operation. Release the button lock (locks when pressed) by turning the button in the CW direction. After releasing the button, a servo recovery must be performed from the HPB (or by I/O operation) in order to recover from the emergency stop status.

Liquid crystal display

This is a 20-character, 4-line LCD screen. The operation menu and other information are displayed here.

Connector cable

Connects the HPB to the controller. A D-Sub 9-pin connector (male) is provided at one end of the cable.

Strap hole

Attaching a short strap or necklace strap here prevents dropping the HPB while operating it or installing it onto equipment.

SD memory card connector

An SD memory card can be inserted here. SD memory cards are provided by the customer.

Operation keys

These keys are used to operate the robot and to enter programs and data, etc.
The keys are divided into 2 main groups: function keys and data entry/operation keys. (For operation key details, see Chapter 3, “Basic operations”.)

■ HPB-D rear side

Safety connector (HPB-D only)

Use this connector with the emergency stop or enable switch to configure an external safety circuit. Attaching the supplied 15-pin D-sub connector (KS9-M532A-01 female) directly to this safety connector enables the emergency stop button only.

3-position enable switch (HPB-D only)

This switch is effective for use with an external safety circuit.
This switch opens (cuts off) the circuit when pressed or released.
Pressing it to mid-position connects the circuit. Use this switch as the enable switch in Service mode, so that the external safety circuit triggers emergency stop on the robot when this switch is pressed or released.

■ A conversion adapter for HPB

The adapter converts from 25 pins to 9 pins. If the HPB was ordered along with a converter adapter then this adapter comes packed along with the unit.

Model	KBB-M657E-01

Note. It is unnecessary when using ERCD or SR1-X, SR1-P.

Programming box

RPB/RPB-E

All operations can be performed from this device including manual robot operation, programming entry and editing, teaching and setting parameters. The display works interactively with the operator so even an absolute beginner can easily learn how to use programming box.

▼Applicable controllers

RCX221
RCX222 P.558

RCX240
RCX240S P.658

RPB / RPB-E basic specifications

Name	RPB	RPB-E
External view		
Applicable controllers	RCX221 / RCX222 / RCX240 / RCX240S	
Model	KBK-M5110-10	KBK-M5110-00
Display	LCD (40characters 8 lines)	
Emergency stop button	Normally closed contact point (with lock function)	
Enable switch	–	3-position
CE marking	Not supported	Applicable
Operating temperature	0°C to 40°C	
Operating humidity	35% to 85%RH (non-condensing)	
Dimensions	W180 × H250 × D50mm (Strap holder, emergency stop button not included.)	
Weight	600g	
Cable length	5m (Standard), 12m (Options)	

Part names and function

Display (screen)
Liquid crystal display (LCD) shows different types of information with 8 lines × 40 characters. Contrast is adjustable.

Sheet keys
These are key switches for operating the robot or entering programs, etc. These are broadly grouped into 3 blocks consisting of function keys, control keys, and data keys.

Emergency stop button
Pressing this button during robot operation sets the robot to emergency stop. These are B contact type switches.

RPB connector
This is a connector for connecting the RPB to the controller.

RPB-E rear side

3-position enable switch (only on RPB-E)
This switch is usable as part of an external (remote) safety circuit.
Pressing this switch inwards or releasing it cuts off the (RPB/robot) circuit. However that circuit is operable when this switch is in middle position.
This enable switch is usually operable in service mode. It functions as part of an external safety circuit so that releasing the enable switch or pressing it inwards set the robot to emergency stop.

Programming box

PBX/PBX-E

▼Applicable controllers

RCX320 P.548
RCX340 P.566

This programming box is applicable to three languages, “Japanese”, “English”, and “Chinese”. Use of a color display makes it possible to improve the visibility. Work to add or edit functions becomes easy, allowing even personnel without programming skill to operate this programming box.
A function to save the controller data into the USB memory is incorporated.

PBX/PBX-E basic specifications

Name		PBX	PBX-E
External view			
Applicable controllers		RCX320 / RCX340	
Model	Japanese language model	KCX-M5110-1J (5m) KCX-M5110-3J (12m)	KCX-M5110-0J (5m) KCX-M5110-2J (12m)
	English language model	KCX-M5110-1E (5m) KCX-M5110-3E (12m)	KCX-M5110-0E (5m) KCX-M5110-2E (12m)
	Chinese language model	KCX-M5110-1C (5m) KCX-M5110-3C (12m)	KCX-M5110-0C (5m) KCX-M5110-2C (12m)
Display screen		Color LCD (320 × 240 dot)	
Emergency stop button		Normally-closed contract (with lock function)	
Enable switch		Not provided	3-position type
Manual lock selector switch		90°, 2-notch	
Power		+12 V DC	
Operating environment		Ambient temperature for use: 0 to 40 °C, Ambient temperature for storage: -10 to 60 °C Humidity: 35 to 80% (no condensation)	
Dimensions (mm)		W141 × H245 × D45 (excluding projecting parts)	
Cable length		5 m or 12 m (Select either)	
Weight		440 g (excluding the cable)	460 g (excluding the cable)

Part names and function

Display (screen)
This is a liquid crystal display (LCD), showing various types of information.

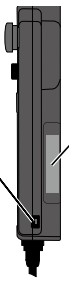
Operation keys
Use these keys to operate the robot or edit any data.

PB connector
Use this connector to connect the programming box to the robot controller.

Emergency stop button
This is a normally closed, self-lock switch.

Manual lock switch
Switches the controller operation mode between AUTO and MANUAL.

PBX-E rear side



USB connector
Connects the USB memory and programming box.

3-position enable switch (PBX-E only)
This switch is provided for safety. Pressing it to mid-position only allows robot operation.

Display language switching USB for PBX

	Model
Display language switching USB for PBX	KCX-M6498-00
USB cable	KCX-M657E-00

LCD Monitor option

TS-Monitor

Integrated into the controller unit, the TS-monitor needs no connections to the handy terminal or PC and checks operation status, current position, error information, etc. The TS-monitor even allows the operator on the scene or service personnel to easily check the controller status.
Total operating time is also displayed which is convenient to schedule maintenance periods.

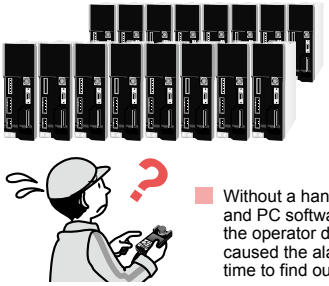
Note. The TS-Monitor cannot be installed on the controller when using a daisy-chain connection or when using a gateway connection.

▼Applicable controllers

TS-X
TS-P
P.514

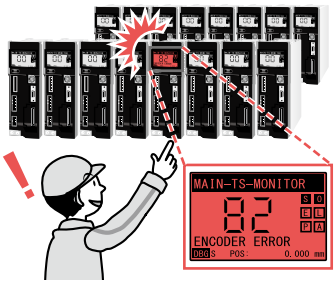
The TS Monitor Advantage

Before installing TS Monitor



Without a handy terminal "HT1" and PC software "TS-Manager", the operator does not know what caused the alarm and it takes a time to find out the cause.

After installing TS-Monitor

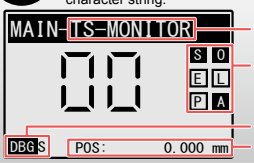


- Operator instantly knows various information without hooking to a handy terminal or PC.
- During errors the backlit display turns red and operator can see what error occurred on what controller at a glance.
- Display shows total operating time, so scheduling maintenance periods is easy.
- Backlit display is bright and easy to read even on dark panels.

Features

MAIN screen — Shows basic info

in normal operation — Displays optional name or character string.

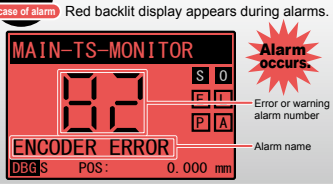


Desired character string specified by the user.
Simple status display ■: ON / □: OFF
Run mode
Current position

MAIN screen — Easy to see error messages

Error

in case of alarm — Red backlit display appears during alarms.



Error or warning alarm number
Alarm name

■ Simple status display

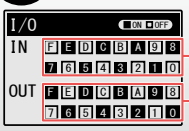
Display	Meaning
S	Servo status
E	Emergency stop
P	Main power failure
O	Return-to-origin completion status
L	Interlock status
A	Alarm

■ Run mode

Display	Meaning
NRM	Normal mode
MON	Monitor mode
DBG	Debug mode

I/O screen — Shows I/O status

Displays input/output bit states.



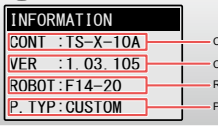
Input signal status
* Displays the status of input bit 0 to 15.
Output signal status
* Displays the status of output bit 0 to 15.

■ Bit signal correspondence table

	F	E	D	C	B	A	9	8
IN	SERVO	RESET	START	/LOCK	ORG	MANUAL	JOG-	JOG+
	7	6	5	4	3	2	1	0
	PIN7	PIN6	PIN5	PIN4	PIN3	PIN2	PIN1	PIN0
	F	E	D	C	B	A	9	8
OUT	SRV-S	/ALM	END	BUSY	OUT3	OUT2	OUT1	OUT0
	7	6	5	4	3	2	1	0
	POUT7	POUT6	POUT5	POUT4	POUT3	POUT2	POUT1	POUT0

INFORMATION screen — Shows machine info

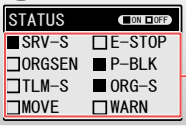
Displays the connected robot and version.



Controller name
Controller software version
Robot name
Point type

STATUS screen — Shows status info

Info such as error status or movement status is all at a glance.



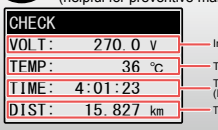
Status display ■: ON, □: OFF

■ Status display

Display	Meaning
SRV-S	Servo status
ORGSEN	Origin sensor
TLM-S	Push status
MOVE	Move status
E-STOP	Emergency stop
P-BLK	Main power failure
ORG-S	Return-to-origin completion status
WARN	Warning output

CHECK screen — Shows operating status

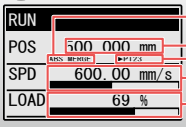
Displays total drive distance (helpful for preventive maintenance).



Internal voltage of controller
Temperature inside controller
Total startup time of controller (Day : Hour : Minute)
Total movement distance of robot

RUN screen — Shows operation status and data

Info includes position, speed, load factors and run type.



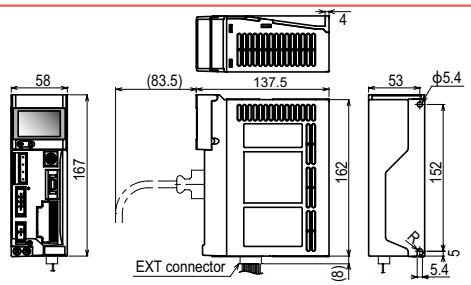
Run type
Robot current position
Run point
Robot operation speed
Load rate

■ Run type

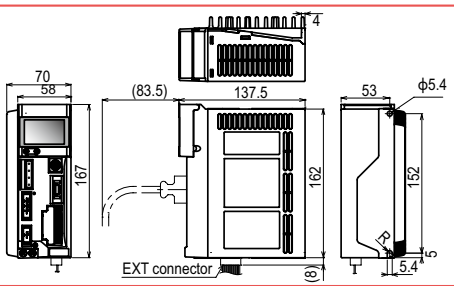
Display	Meaning
HOLD	Servo is off or robot is stopping
ABS	ABS
INC	INC
ABS MERGE	ABS merge operation
INC MERGE	INC merge operation
ABS PUSH	ABS push operation
INC PUSH	INC push operation
ABS->PUSH	ABS deceleration push operation
INC->PUSH	INC deceleration push operation
ORG	Return-to-origin

TS-X/TS-P dimensions (with TS-Monitor)

TS-X/TS-P (105/110/205/210) with TS-Monitor



TS-X/TS-P (220) with TS-Monitor



TS-Monitor basic specifications

Model	TS-X	KCA-M5119-00
	TS-P	KCA-M5119-10
Effective display size		W40.546 × H25.63mm
Screen display		Graphic monochrome LCD

Backlight	Blue and red, 2-color LCD
Contrast adjustment	5 steps
Number of display dots	128 × 64 dots

Touch operator interface

Pro-face GP4000 series

Applicable controllers

TS-S2
TS-SH
TS-X
TS-P

P.514

Connecting GP4000 Series made by Pro-face to Robot Positioner, TS-S2, TS-SH, TS-X, TS-P enables you to use a lot of functions as well as basic operations on Touch Operator Interface.

Free download of the program file from the Pro-face home page
https://www.proface.com

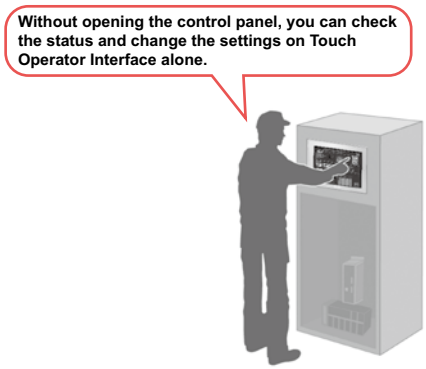
Features

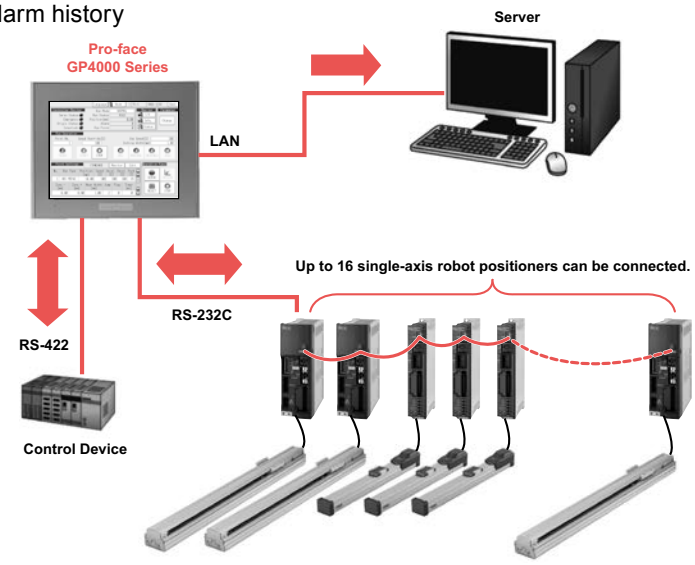
1 Can easily check a state and change settings.

- Check the status (the current position, speed etc)
- Basic operations such as Jog operation, inching operation, return to origin, error reset etc.
- Set, edit, or back up point data and parameters
- Check triggered alarms and detailed descriptions of alarm history

2 Supports 3 languages

- Supports Japanese, English, and Chinese (simplified, traditional)

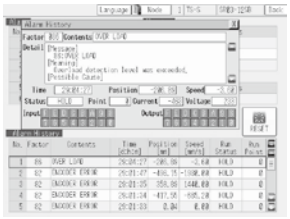




Screen details

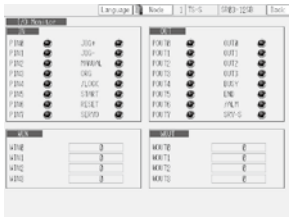
Diagnostic Screen

When a problem occurs, you can check the detailed descriptions of the alarm history, so you can understand easily what the cause is.



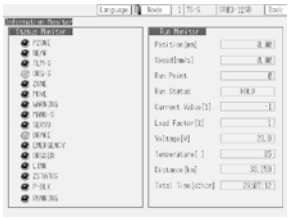
I/O Monitor Screen

Displays both general I/O and dedicated I/O together. You can quickly check the I/O status.



Information Monitor Screen

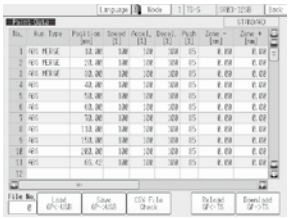
The screen can display the robot status and the operation status. You can check immediately the robot condition.



Position Data Editing Screen

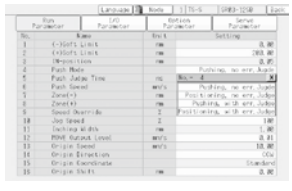
You can edit and back up point data (255 points).[Note]

Note. Settings for it and a USB storage required.



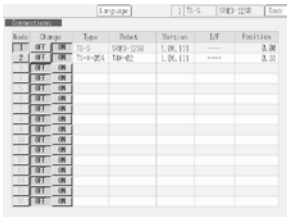
Parameter Editing Screen

While checking parameters of robot positioners in the list, you can set them with the pull-down menu.



Connecting Selection Screen

You can connect up to 16 robot positioners simultaneously with GP-Pro EX Ver.3.0 multi-axis feature.



Contact; Pro-face web site (Schneider Electric Japan Holdings Ltd)
https://www.proface.com

Field network system with minimal wiring

NETWORK

LCC140

Each field path setting file ca be downloaded from the website.
https://global.yamaha-motor.com/business/robot/download/fieldbus/

P.508

CC-Link Basic specifications for network modules

Item	Network modules CC-Link
Applicable controllers	LCC140
CC-Link compatible version	Ver. 1.10
Remote station type	Remove device station
Number of occupied stations	Fixed to 2 stations
Station number	1 to 63 (Set from HPB)
Communication speed	10M/5M/2.5M/625K/156Kbps (Set using HPB or POPCOM+.)
Shortest length between stations	0.2 m or more
Total length	100m/10Mbps, 160m/5Mbps, 4000m/2.5Mbps, 900m/625Kbps, 1200m/156Kbps
Monitor LED	None
CC-Link I/O points	General-purpose input 32 points, General-purpose output 32 points Dedicated input 16 points, Dedicated output 16 points Input register 8 words Output register 8 words

DeviceNet Basic specifications for network modules

Item		Network modules DeviceNet™	
Applicable controllers		LCC140	
Applicable DeviceNet™ specifications		Volume 1 Release2.0 Volume 2 Release2.0	
DeviceNet™ Conformance test		Compliant with CT24	
Device profile / Device type number		Generic Device (keyable) / 2B Hex	
Vendor name/Vendor ID		YAMAHA MOTOR CO.,LTD. / 636	
Product code		21	
Product revision		1.0	
EDS file name		Yamaha_LCC1(DEV).eds	
MAC ID setting		0 to 63 (Set using HPB or POPCOM+.)	
Communication speed setting		500K/250K/125Kbps (Set using HPB or POPCOM+.)	
Communication data		Predefined Master/Slave Connection Set: Group 2 only server Dynamic connection support (UCMM): None Support for divided transmission of explicit message: Yes	
Network length	Total length	100m/500Kbps, 250m/250Kbps, 500m/125Kbps	
	Branch length/Total branch length	6m or less/39m or less, 6m or less/78m or less, 6m or less/156m or less	
Monitor LED		None	
Number of DeviceNet™ I/O points/ number of occupied channels		General-purpose input 32 points, General-purpose output 32 points Dedicated input 16 points, Dedicated output 16 points Input register 8 words Output register 8 words	Input: 24byte Output: 24byte

EtherNet/IP Basic specifications for network modules

Item	Network modules EtherNet/IP™	
Applicable controllers	LCC140	
Applicable software version	LCC140: Ver. 64.07 or higher HPB/HPB-D: Ver. 24.06 or higher POPCOM+: Ver. 2.1.0 or higher	
Applicable EtherNet/IP™ specifications	Volume 1: Common Industrial protocol(CIP™) Edition 3.14 Volume 2: EtherNet/IP™ Adaptation of CIP™ Edition 1.15	
EtherNet/IP™ Conformance test	Compliant with CT11	
Device profile/Device type number	Generic Device (keyable) / 2B Hex	
Vendor name/Vendor ID	YAMAHA MOTOR CO.,LTD. / 636	
Product code	23	
Product revision	1.1	
EDS file name	Yamaha_LCC1(EIP2).eds	
Communication speed	10Mbps / 100Mbps	
Connector specifications	RJ-45 connector (8-pole modular connector), 2 ports	
Applicable cable specifications	STP cable (double shield) with CAT 5e or higher	
Maximum cable length	100m	
Monitor LED	Module Status(MS), Network Status(NS), Link/Activity: Port1-2	
Number of EtherNet/IP™ I/O points/ number of occupied channels	General-purpose input 32 points, General-purpose output 32 points Dedicated input 16 points, Dedicated output 16 points Input register 8 words Output register 8 words	Input: 24byte Output: 24byte

NETWORK

Each field path setting file ca be downloaded from the website.
https://global.yamaha-motor.com/business/robot/download/fieldbus/

TS-S2/TS-SH/TS-X/TS-P

P514

CC-Link Basic specifications for network modules

Item	Network modules CC-Link
Applicable controllers	TS-S2 / TS-SH / TS-X / TS-P
Version supporting CC-Link	Ver. 1.10
Remote node type	Remote device node
Number of occupied nodes	1 node
Node number setting	1 to 64
Communication speed setting	10Mbps, 5Mbps, 2.5Mbps, 625Kbps, 156Kbps
No. of CC-Link inputs/outputs	Input 16 points , Output 16 points
Shortest distance between nodes Note1	0.2m or more
Overall extension distance Note1	100m/10Mbps, 160m/5Mbps, 400m/2.5Mbps, 900m/625Kbps, 1200m/156Kbps
Monitor LED	L RUN, L ERR, SD, RD

Note 1. These values apply when a cable that supports CC-Link Ver.1.10 is used.

DeviceNet™ Basic specifications for network modules

Item		Network modules DeviceNet™
Applicable controllers		TS-S2 / TS-SH / TS-X / TS-P
Applicable DeviceNet™ specifications		Volume 1 Release2.0/Volume 2 Release2.0
Device type		Generic Device (device number 0)
Number of occupied CH		Input 6ch, Output 6ch
MAC ID setting		0 to 63
Communication speed setting		500Kbps, 250Kbps, 125Kbps
DeviceNet™ inputs/outputs		Input 16 points, Output 16 points
Network length	Overall extension distance	100m/500Kbps, 250m/250Kbps, 500m/125Kbps
	Branch length	6m or less
	Overall branch length	39m or less/500Kbps, 78m or less/250Kbps, 156m or less/125Kbps
Monitor LED		Module, Network

EtherNet/IP™ Basic specifications for network modules

Item	Network modules EtherNet/IP™
Applicable controllers	TS-S2 / TS-SH / TS-SH / TS-X / TS-P Note
Applicable EtherNet/IP™ specifications	Volume1: Common Industrial Protocol (CIP™) Edition 3.8 Voluime2: EtherNet/IP™ Adaptation Edition 1.9
Device type	Generic Device (device number 43)
Number of occupied CH	Input 6ch, Output 6ch
Ethernet interface	10BASE-T/100BASE-TX
Network length	100m
Monitor LED	MS, NS, Activity, Link

Note. Supported by controller software version V1.10.121 or later. Necessary parameters can be set with the support tool, HT-1 (V1.13 or later) and TS-Manager (V1.3.3 or later).

PROFINET Basic specifications for network modules

Item	Network modules PROFINET
Applicable controllers	TS-S2 / TS-SH / TS-X / TS-P Note
Network specification conformance	PROFINET IO V2.2
Conformance class	Conformance Class B / IO Device
Input/output data size	Input 6 words, output 6 words
Transmission speed	100Mbps(Auto-negotiation)
Network length	100m
Monitor LED	MS, NS, Activity, Link

Note. Supported by controller software version V1.14.136 or later. Necessary parameters can be set with the support tool, HT-1 (V1.16 or later) and TS-Manager (V1.4.4 or later).

Field network system with minimal wiring

NETWORK

SR1-X/SR1-P

Each field path setting file ca be downloaded from the website.
https://global.yamaha-motor.com/business/robot/download/fieldbus/

P.540

CC-Link Basic specifications for network modules

Item	Network modules CC-Link
Applicable controllers	SR1-X / SR1-P
Version supporting CC-Link	Ver. 1.10
Remote node type	Remote device node
Number of occupied nodes	Two nodes fixed
Node number setting	1 to 63
Communication speed setting	10Mbps, 5Mbps, 2.5Mbps, 625Kbps, 156Kbps
No. of CC-Link I/O Note1	General input 32 points, General output 32 points, Dedicated input 16 points, Dedicated Output 16 points
Parallel external I/O (ERCX, SRCP30, DRCX only)	All points usable as parallel external I/O for controller. Each point controllable from master station sequencer (PLC) by emulated serialization, regardless of robot program.
Shortest distance between nodes Note2	0.2m or more
Overall length Note2	100m/10Mbps, 160m/5Mbps, 400m/2.5Mbps, 900m/625Kbps, 1200m/156Kbps
Monitor LED	RUN, ERR, SD, RD

Note 1. Controller I/Os are updated every 10ms.
Note 2. These values apply when a cable that supports CC-Link Ver 1.10 is used.

DeviceNet Basic specifications for network modules

Item		Network modules DeviceNet™
Applicable controllers		SR1-X / SR1-P
Applicable DeviceNet™ specifications		Volume 1 Release2.0/Volume 2 Release2.0
Device type		Generic Device (device number 0)
Number of occupied CH		Input 2ch Note1, Output 2ch Note1
MAC ID setting		0 to 63
Communication speed setting		500Kbps, 250Kbps, 125Kbps
DeviceNet™ I/O Note2		General input 16 points Note3, General output 16 points Note3, Dedicated input 16 points, Dedicated Output 16 points
Parallel external I/O (ERCX, SRCP30, DRCX only)		All points usable as parallel external I/O for controller. Each point controllable from master station sequencer (PLC) by emulated serialization, regardless of robot program.
Network length	Overall length Note4	100m/500Kbps, 250m/250Kbps, 500m/125Kbps
	Branch length/Overall branch length	6m or less/39m or less, 6m or less/78m or less, 6m or less/156m or less
Monitor LED		Module, Network

Note 1. Inputs / Outputs are 12ch each when using SR1-P / SR1-X with extension model.
Note 2. Controller I/Os are updated every 10ms.
Note 3. General Inputs / Outputs are 32 each when using SR1-P / SR1-X with extension model.
Note 4. These values apply when a thick cable is used. The distance is less when a fine cable is used or when thick and fine cables are mixed in use.

PROFIBUS Basic specifications for network modules

Item	Network modules PROFIBUS
Applicable controllers	SR1-X / SR1-P
Communication profile	PROFIBUS-DP slave
Number of occupied nodes	1 node
Setting of station address	0 to 126
Communication speed setting	9.6Kbps, 19.2Kbps, 93.75Kbps, 187.5Kbps, 500Kbps, 1.5Mbps, 3Mbps, 6Mbps, 12Mbps (automatic recognition)
PROFIBUS I/O Note	General input 32 points, General output 32 points, Dedicated input 16 points, Dedicated Output 16 points
Parallel external I/O (ERCX / DRCX only)	All points usable as parallel external I/O for controller. Each point controllable from master station sequencer (PLC) by emulated serialization, regardless of robot program.
Overall length	100m/12Mbps, 200m/1.5Mbps, 400m/500Kbps, 1000m/187.5Kbps, 1200m/9.6K · 19.2K · 93.75Kbps

Note. The shortest I/O update interval of the controller is 10ms but the actual I/O update time varies depending on the update time with the master station.

Ethernet Basic specifications for network modules

Item	Network modules Ethernet
Applicable controllers	SR1-X / SR1-P
Network specification	As specified for Ethernet (IEEE802.3)
Connector specification	RJ-45 connector (8-pole modular connector) 1 port
Baud rate / Communication mode	10Mbps (10BASE-T) / Half Duplex (Half-duplex)
Network protocol	Application layer: TELNET / Transport layer: TCP / Network layer: IP, ICMP, ARP / Data link layer: CSMA/CD / Physical layer: 10BASE-T
Number of simultaneous log inputs	1
Setting of IP address, etc.	Set from HPB / HPB-D
Monitor LED	Run, Collision, Link, Transmit, Receive

Field network system with minimal wiring

NETWORK

Each field path setting file ca be downloaded from the website.
https://global.yamaha-motor.com/business/robot/download/fieldbus/

RCX320 P.548 RCX221/RCX222 P.558 RCX340 P.566

CC-Link Basic specifications for network modules

Item	Network modules CC-Link
Applicable controllers	RCX320 / RCX221 / RCX222 / RCX340
Version supporting CC-Link	Ver. 1.10
Remote station type	Remote device node
Number of occupied stations	Fixed to 4 stations
Station number setting	1 to 61 RCX320/RCX221/RCX222 (Set from the rotary switch on the board) RCX340 (Set from the programming box or support software)
Communication speed setting	10Mbps, 5Mbps, 2.5Mbps, 625Kbps, 156Kbps (set from the Rotary swich on board)
No. of CC-Link I/O Note1	General input 96 points, General output 96 points, Dedicated input 16 points, Dedicated output16 points
Parallel external I/O Note2	A function that simulates serial communication enables individual control of the various points from a master sequencer, regardless of the robot program.
Shortest distance between nodes Note3	0.2 m or more
Overall length Note3	100m/10Mbps, 150m/5Mbps, 200m/2.5Mbps, 600m/625Kbps, 1200m/156Kbps
Monitor LED	RUN, ERR, SD, RD

Note 1. In case of RCX320/RCX221/RCX222, the controller I/Os are updated every 10ms.
For RCX 340, the controller I/Os are updated every 5ms for the shortest. The actual update time changes depending on the communication cycle of the master unit.
Note 2. With RCX 141/142, the exclusive input of the parallel I/O cannot be used other than the interlock input.With RCX221 / 222, the exclusive input of the parallel I/O cannot be used. (The interlock input terminal is located on the SAFETY connector side.)
Note 3. These values apply when a cable that supports CC-Link Ver.1.10 is used.

DeviceNet Basic specifications for network modules

Item		Network modules DeviceNet™
Applicable controllers		RCX320 / RCX221 / RCX222 / RCX340
Applicable DeviceNet™ specifications		Volume 1 Release2.0 / Volume 2 Release2.0
Device Profile Name		Generic Device (device number 0)
Number of occupied CH Note1		Normal: Input/output 24ch each, Compact: Input/output 2ch each
MAC ID setting		0 to 63
Transmission speed setting		500Kbps, 250Kbps, 125Kbps (set using DIP switch on board)
DeviceNet™ I/O Note2	Normal	General input 96 points, General output 96 points, Dedicated input 16 points, Dedicated output 16 points
	Compact	General input 16 points, General output 16 points, Dedicated input 16 points, Dedicated output 16 points
Parallel external I/O Note3		The master module and up to four ports can be controlled regardless of the robot program by using the pseudoserialization function.
Network length	Overall length Note4	100m/500Kbps, 250m/250Kbps, 500m/125Kbps
	Branch length / Overall branch length	6m max./39m max., 6m max./78m max., 6m max./156m max.
Monitor LED		MS (Module Status), NS (Network Status)

Note 1. Use the robot parameter to select Normal or Compact. However, with the controllers earlier than Ver.9.08 of RCX221 / 222, this selection is not available and the setting remains the same as Normal.
Note 2. In case of RCX320/RCX221/RCX222, the controller I/Os are updated every 10ms.
For RCX 340, the controller I/Os are updated every 5ms for the shortest. The actual update time changes depending on the communication cycle of the master unit.
Note 3. With RCX221 / 222, the exclusive input of the parallel I/O cannot be used. (The interlock input terminal is located on the SAFETY connector side.)
Note 4. These values apply when a thick cable is used. The distance is less when a fine cable is used or when thick and fine cables are mixed in use.

PROFIBUS Basic specifications for network modules

Item	Network modules PROFIBUS
Applicable controllers	RCX320 / RCX221 / RCX222 / RCX340
Communication profile	PROFIBUS-DP slave
Number of occupied nodes	1 node
Setting of station address	1 to 99 (set using Rotary switch on board)
Setting of communication speed	9.6Kbps, 19.2Kbps, 93.75Kbps, 187.5Kbps, 500Kbps, 1.5Mbps, 3Mbps, 6Mbps, 12Mbps (automatic recognition)
PROFIBUS I/O Note1	General input 96 points, General output 96 points, Dedicated intput 16 points, Dedicated output 16 points
Parallel external I/O Note2	The master module and up to four ports can be controlled regardless of the robot program by using the pseudoserialization function.
Overall length	100m/3M·6M·12Mbps, 200m/1.5Mbps, 400m/500Kbps, 1000m/187.5Kbps, 1200m/9.6K·19.2K·93.75Kbps
Monitor LED	RUN, ERR, SD, RD, DATA-EX

Note 1. In case of RCX320/RCX221/RCX222, the shortest I/O update interval of the controller is 10ms but the actual I/O update time varies depending on the update time with the master station.
For RCX 340, the controller I/Os are updated every 5ms for the shortest. The actual update time changes depending on the communication cycle of the master unit.
Note 2. With RCX221 / 222, the exclusive input of the parallel I/O cannot be used. (The interlock input terminal is located on the SAFETY connector side.)

Ethernet Basic specifications for network modules

Item	Network modules Ethernet
Applicable controllers	RCX320 / RCX340
Network specification	As specified for Ethernet (IEEE802.3)
Connector specification	RJ-45 connector (8-pole modular connector) 1 port
Baud rate	10Mbps (10BASE-T)
Communication mode	Half Duplex (Half-duplex)
Network protocol	Application layer: TELNET / Transport layer: TCP / IP Network layer: IP, ICMP, ARP / Data link layer: CSMA/CD / Physical layer: 10BASE-T
Number of simultaneous log inputs	1
Setting of IP address, etc.	Set from RPB
Monitor LED	Run, Collision, Link, Transmit, Receive

Field network system with minimal wiring

NETWORK

Each field path setting file ca be downloaded from the website.
https://global.yamaha-motor.com/business/robot/download/fieldbus/

RCX320 P.548 RCX340 P.566

EtherNet/IP Basic specifications for network modules

Item	Network modules EtherNet/IP™		
Controller model	RCX320 / RCX340		
Network specifications	Conforms to Ethernet (IEEE 802.3).		
Applicable EtherNet/IP™ specifications	Volume 1 : Common Industrial protocol (CIP™) Edition 3.14 Volume 2 : EtherNet/IP™ Adaptation Edition 1.15		
Device type	Generic Device (Device No. 43)		
Data size	48 bytes each for input/output		
Transmission speed	10 Mbps/100 Mbps		
Connector specifications	RJ-45 connector (8-pole modular connector) 2 port		
Cable specifications	Refer to “2.1 LAN cable” in Chapter 2 of this user's manual.		
Max. cable length	100 m		
EtherNet/IP™ input/output points Note	Input (48 bytes in total)	byte 0-3 byte 4-31	Dedicated word input : 2 words General purpose word input : 14 words
		byte 32-33 byte 34-47	Dedicated bit input : 16 points General-purpose bit input : 96 points
	Output (48 bytes in total)	byte 0-3 byte 4-31	Dedicated word output : 2 words General-purpose word output : 14 words
		byte 32-33 byte 34-47	Dedicated bit output : 16 points General-purpose bit output : 96 points
Parallel external input	Regardless of the robot program, the master module and up to four ports can be controlled using the emulated serialization function.		
Settings, such as IP address	The settings are made with the programming box (PBX) or RCX-Studio Pro.		
Monitor LEDs	Network Status, Module Status		

Note. The controller I/Os are updated every 5ms for the shortest. The actual update time changes depending on the communication cycle of the master unit.

PROFINET Basic specifications for network modules

Item	Network modules PROFINET	
Applicable controllers	RCX320 / RCX340	
Supported software versions	RCX320 / RCX340 : V1.21 or later PBX/PBX-E : V1.08 or later RCX-Studio : V1.0.1 or later RCX-Studio Pro : V2.0.0 or later	
Network specification conformance	PROFINET IO V2.2	
Conformance class	Conformance Class B / IO Device	
Vendor Name / Vendor_ID	YAMAHA MOTOR CO.,LTD. / 0x02D5	
Station Type / Device_ID	YAMAHA RCX3 PROFINET / 0x0001	
Product revision	1.00	
Transmission speed	100 Mbps (Auto-negotiation)	
Connector specifications	RJ-45 connector (8-pole modular connector) 2 ports	
Conforming cable specifications	CAT 5e or higher STP cable (double shield)	
Max. cable length	100 m	
Monitor LEDs	Module Status(MS), Network Status(NS), Link/Activity:Port1-2	
Input/output data size Note	Input : 48bytes	Dedicated word input 2 words (4 bytes)
		General-purpose word input 14 words (28 bytes)
		Dedicated bit input 16 bits (2 bytes)
		General-purpose bit input 96 bits (12 bytes)
		Reserved area 2 bytes
	Output : 48bytes	Dedicated word output 2 words (4 bytes)
		General-purpose word output 14 words (28 bytes)
		Dedicated bit output 16 bits (2 bytes)
		General-purpose bit output 96 bits (12 bytes)
		Reserved area 2 bytes

Note. The controller I/Os are updated every 5ms for the shortest. The actual update time changes depending on the communication cycle of the master unit.

Field network system with minimal wiring

NETWORK

Each field path setting file ca be downloaded from the website.
https://global.yamaha-motor.com/business/robot/download/fieldbus/

RCX320 P.548 RCX340 P.566

EtherCAT® Basic specifications for network modules

Item	Network modules EtherCAT	
Applicable controllers	RCX320 / RCX340	
Supported software versions	RCX320 / RCX340 : V1.62 or later PBX/PBX-E : V1.13 or later RCX-Studio Pro : V2.1.9 or later	
ESI file name	YAMAHA RCX340 EtherCAT 1_00.xml	
Transmission speed	100 Mbps (Auto-negotiation)	
Connector specifications	RJ-45 connector (8-pole modular connector) 2 ports	
Conforming cable specifications	CAT 5e or higher STP cable (double shield)	
Max. cable length	100 m	
Monitor LEDs	RUN, ERROR, Link/Activity:Port1-2	
Input/output data size Note	Input : 48bytes	Dedicated word input 2 words (4 bytes)
		General-purpose word input 14 words (28 bytes)
		Dedicated bit input 16 bits (2 bytes)
		General-purpose bit input 96 bits (12 bytes)
		Reserved area 2 bytes
	Output : 48bytes	Dedicated word output 2 words (4 bytes)
		General-purpose word output 14 words (28 bytes)
		Dedicated bit output 16 bits (2 bytes)
		General-purpose bit output 96 bits (12 bytes)
		Reserved area 2 bytes

Note. The controller I/Os are updated every 5ms for the shortest. The actual update time changes depending on the communication cycle of the master unit.