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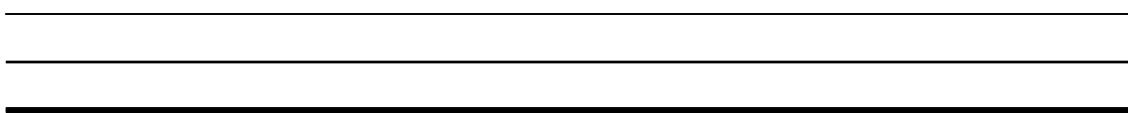


# RV-500EWIN

Perpendicular multi joint robot, RV-500, control program

(for Windows95/98)

Version 1. 1



**【User's manual】**

**MYCOM,INC.**

## Changing history of user's manual

Changing mark	Data of change	Description of change	Changed by
A	99.1.6	RV-500J95⇒ RV-500JWIN へ型番変更 (表紙・目次・P1,6,7,13・付録1,2,4)	井野 謙一
A	99.1.6	Windows98 対応に関する記述追加 (表紙・P1,3,6・付録1,2,4)	井野 謙一

# Attention

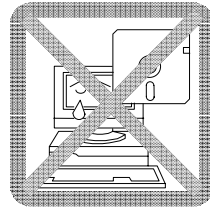
Please keep the following warnings with this software.

Please read this user's manual carefully before using this software.



## Warning

- Please understand that his firm will not be responsible if the use of this software causes any loss or disadvantage to the user.



# Attention

Please keep the following attention with this software.

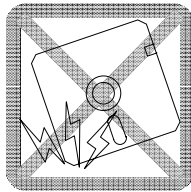
Please read this user's manual carefully before using this software.



## Attention

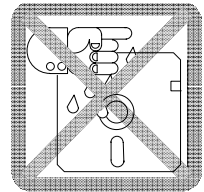
- Do not shock to the floppy diskette.

Do not drop or strike it.  
The floppy diskette may be damaged.



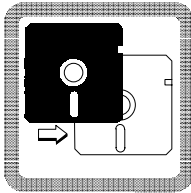
- Do not touch the floppy diskette with wet hands.

It might damage the data on the floppy diskette.



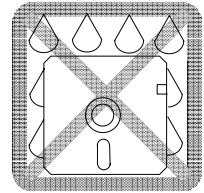
- Make a backup disk.

Make a backup disk, since the data on the floppy diskette might be damaged.



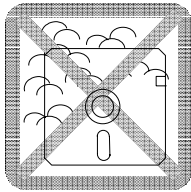
- Avoid using or storing the floppy diskette in a place where the humidity is extremely high or low.

It might damage the data on the floppy diskette.



- Avoid using or storing the floppy diskette in a dusty environment.

Avoid using or storing the floppy diskette in a dusty environment like much dust.



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## 1. Welcome

Thank you very much for purchasing the control program [RV-500JWIN] for our RV-500.

This program controls our perpendicular multi joint robot, RV-500. Controlling button and controller on display by mouse can operate RV-500.

This program is executable on MS-Windows95\* but is not executable on MS-Windows3.x or MS-WindowsNT3.x/4.0.

This program requires our ISA-Bus interfaced stepping motor controller, PPC-2310 x 2 pcs. to control RV-500. Please insert 2 pcs. of PPC-2310 into ISA slots of your PC.

This user's manual describes how to install, display configuration of program and menu. Please refer each user's manual for RV-500 and PPC-2310.

Please understand that MYCOM, INC. and its agents will not be responsible in case that the users incur any loss or disadvantage using this software.

This software is different from other universal Windows applications. When user operates the control display, the operation does not affect display but also move the RV-500 actually. Please operate RV-500, taking care of clash, contact and interference with obstacles and ground near to installed RV-500. Mis-operation may damage and spoil RV-500 it self or interfered pieces. Please pay attention to operate RV-500 and stop the movement by pushing the emergency stop button as soon as possible if danger is aware.

We are releasing this software, [RV-500] and [PPC-2310] making assurance double sure however please inquire us is there are unclear items or troubles.

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\* The execution on MS-Windows98 is also confirmed.

The company names and products mentioned herein may be the trade marks of their respective owners.

MS-Windows, Windows95, Windows98 and MS-WindowsNT are registered trade marks of Microsoft Corp. in U.S.A.

## 1 Attention for using this program and RV-500.

Please always take care of the below to avoid danger

Do not enter the working space of RV-500 to avoid contact accident when RV-500 is moving.

Push the emergency stop button to stop RV-500 when you are aware of any danger. For example RV-500 moves unexpectedly during program executing in case of emergency.

Push the red emergency stop button on front panel of RV-500 driver box when control on display is impossible, for example in case of software trouble.



## 2 Operating circumstance

The operating circumstance of this program is as follows:

OS	MS-Windows 95/98
CPU	More than Pentium 100MHz is recommended.
Memory capacity	More than 32MB
Requires solution	More than 800×600 Pixel (1024 x 768 is recommended.)

This program uses memory to treat RV-500 moving data. An complicated moving or extreme long moving pattern generation may require much memory. In such case Windows system may execute memory swap to keep memory. Frequent memory swap extremely reduces the Windows performance. If the performance is reduced by memory swap, we would recommend to expand memory of your PC. Please refer manuals related to Windows for memory swap. Also please refer the user's manual of your PC for memory increasing.

Because Windows95/98 is multi-task OS, more than two processes can be treated in parallel. During this program is being executed, if hard and heavy process is executed at once, they may be the issue of performance reduced or operation trouble. The performance reduced by increased load of process which is caused for example by file control via network also may be the factor that prevent normal operation under some circumstances. When this program is being used, please take care that the load does not become so heavy by other process if possible.

### 3 About RV-500

This program controls RV-500, which is out vertical multi-joint robot and uses 5 axes open loop control system by stepping motor.

The outline of RV-500 is as follows. (Refer to the appendix of this manual for the features and configuration) Also refer to RV-500 user's manual for details of parts name, specification and so on of RV-500.

#### Specification

Item	Description	
Construction	Vertical multi-joint	
Moving system	Stepping motor (Open Loop)	
Moving Range	Waist	3 0 0 °
	Shoulder	6 0 °
	Elbow	1 8 0 °
	List pitch	2 3 0 °
	List roll	3 0 0 °
	Grip stroke	3 5 mm(Electric hand)
Length of hand	1 5 0 mm + 1 3 5 mm	
Composite maximum speed	1 3 0 0 mm / sec	
Loading weight	3 0 0 g (part of hand, 125g)	
Repeatability	± 0 . 1 mm	
Weight of main body	1 3 kg	

#### Maximum angular speed of each axis

Axis	Maximum angular speed
Waist	180 Deg./sec
Shoulder	80 Deg./sec
Elbow	120 Deg./sec
List pitch	120 Deg./sec
List roll	400 Deg./sec



## 4 About PPC-2310

This program uses 2 of our PPC-2310 to control RV-500. Please pay attention to the followings when you use PPC-2310 with this program.

### **Memory address setting**

It is necessary to set memory address when using because PPC-2310 controls each by memory mapped I/O. Please set your PC so that the memory address does not compete with other device. If the address is set to be competed, your PC may not work normally.

When two PPC-2310 are used by this program, please set the memory address continuously. For example the first PPC-2310 is set at C8000h, please set second PPC-2310 at C9000h. Also in this case, please set the board address of this program at C0000h bank address and 8000h offset address.

Please refer PPC-2310 User's manual about detailed setting of dip switch of the board.

### **Interrupt setting**

This program does not use hardware interrupt but work by board status watching of multi-thread, therefore it is not necessary to assign interrupt (IRQ) resource. You can use all jumper switches opened for interrupt level setting of PPC-2310. If other programs use the interrupt, you may accord with their setting but your PC may not work well if the setting is duplicated with other device.

Please refer PPC-2310 User's manual about detailed setting of jumper switch of the board.

## 5 Installation of software

This chapter describes the procedure to install this software package (RV-500EWIN) to your PC hardware.

### Installation

- Set floppy diskette of this program package at floppy disk drive in the status that Windows 95/98 is working.
- Execute SETUP.EXE of floppy diskette. (A:¥SETUP.EXE)  
Specify "A:¥SETUP.EXE" at dialogue which is displayed by "Start menu" -> "Execute by specifying file name", then click "OK".  
Quit all of other application software when installing. If other application software is working, this software package may not be installed normally.
- Operate in accordance with instruction on the display
- After the setup is finished normally, the program group of "RV-500EWIN" is generated.

When you uninstall this program, execute the uninstall item of "start menu" which is generated by above procedure. Otherwise uninstall the item of "append and delete" of application in control panel.

In Windows 95/98 there is another method to execute A:¥SETUP.EXE besides described method in this page. Please execute SETUP.EXE with the easiest way in the circumstance you are using. (Refer the instruction manual related to Windows for the detail of program execution. Also quit all of other application software when installing).

When installing, re-distributable DLL (MFC42.DLL and MSVCRT.DLL) provided by MFC(Microsoft Foundation Class) is copied at Windows system field (If the Windows folder name is C:¥Windows, it is copied at C:¥Windows¥system¥)  
Also WRTdev0.vxd is copied at virtual device driver filed of system to control PPC-2310. (If Windows folder name is C:¥Windows, it is copied at

C:\Windows\System\VMM32

## 6 Outline

This program is specialized software for our RV-500 vertical multi-joint robot.

This user's manual describes menu configuration, each button on operational display and its function of RV-500EWIN. Please refer separate volume, "Samples of User's manual" for concrete operational procedure and teaching or online help. (Online help can be opened by "Help", "Index")

## 6.1 Menu configuration and function

This chapter describes about menu configuration and function of this program. Refer also on-line help which is displayed by “Help” “Index”.

### 6.1.1 “File” menu

There are following commands on “File” menu.

New file	Generate new data.
Open	Open existing file
Replace	Replace and save the changed data.
Save with	Save the changed or generated data with new name.
File 1,2,3...	Open the file which was opened before.
Quit	Quit the program.

### 6.1.2 ”Display” Menu

There are following commands on “Display” Menu.

Tool bar	Switch the views or non-views of tool bar
Status bar	Switch the views or non-views of status bar.

### 6.1.3 ”Setting” menu

There are following commands on “Setting” menu.

Board address setting	Set using memory address of the board.
Speed setting	Set speed of each moving.
Moving limit setting	Set moving limit of each axis.



#### 6.1.4 "Home search" menu

There are following commands on "Home search" menu.

Waist axis	Execute home search of waist axis.
Shoulder axis	Execute home search of shoulder axis.
Elbow axis	Execute home search of elbow axis.
List pitch axis	Execute home search of list pitch axis.
List roll axis	Execute home search of list roll axis.
All axes	Execute home search of all axes.

#### 6.1.5 "PPC" menu

There are following command on "PPC" menu.

Signal status monitor	Display to monitor the each signal status.
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#### 6.1.6 "Help" menu

There are following command on "Help" menu.

Index	Open the index of on-line help.
Version information	Display version and copyright information of program.

## 6.2 Control

After starting of this program, the control screen is displayed.

When each operation, please confirm that power of RV-500 driver box is ON and the emergency stop button is not pushed.

There are roughly three buttons, program execution button, position teaching button, command input/edit button on the control screen.

Description of each button is as follows:

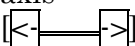
### Upper side of the screen

#### 6.2.1 Automatic execution

[AUTO] button	When pushing this button, it becomes automatic execution mode and executes each command from the lead in order.
[STOP] button	If stop button is pushed during test mode or automatic execution mode, automatic execution mode is quitted after completion of executing command.

### Control screen left side

#### 6.2.2 Position teaching control of RV-500

Side scroll bar of each axis 	Covering each axis, totally 5 scroll bars stands in a line vertically. Pushing any end button of each scroll bar, the covering axis of RV-500 moves.
Hand	There is a hand open and close button under the scroll bat. Each pushing this button hand of top opens or closes. Because the hand operation by this button does not affect position teaching and program edition data, it is available to use for confirmation.

## Center of operation screen

### 6.2.3 Position record

Memory number box	Specify selected position number. This selected position number is used for position recording or input of moving command when program editing. Selection position number can be changed directly by figure or by operating right up-down spin button with mouse.
Position list box	This displays the each axis degree of recorded position data in order. Clicking any position data by mouse can specify the selected position number.
[REC.] button (record button)	This records current position as the data of selected position number.
[POS.] button (position)	This records at the data of selected position number after acquiring current position of RV-500. To acquire this position home search is executed.
[MOVE] button (Move button)	This moves to the position of selected position number. Input of this button works RV-500. Because this does not affect program editing data, it is useful to confirm the position. Double click at any position of position list box also works.
[HOME] button (Home search button)	This executes home search of all axes. When position is invalid by any issue, this button recovers.
[DEL.] button (delete button)	This deletes the position data of selected position number.
[E.STOP] button (Emergency stop button)	Pushing this button stops in emergency. All of current executing operation is cancelled instantly.

## Right side of control screen

### 6.2.4 Program editing

Program list box	Clicking command line displayed in list box becomes highlight then these lines are available to insert or delete program. These are executed from selected command line in order in case of step execution or test execution.
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### Command input

[MOVE] Move	Move to selected position number
[HAND<>] Hand close	Close hand of top
[HAND><] Hand open	Open hand of top
[WAIT] Wait	Wait for specified time, external signal or key/mouse input.
[OUT] Signal output	External signal output
[HRET] Home search	Each axis home search
[SPEED] Speed change	Each axis speed change
[LOOP->] Loop start	Specify loop times
[LOOP<-] Loop end	End of loop
[JUMP] Jump	Jump to specified command
[END] Program end	Quit program instantly

### Program editing

[INS] Switch program insert / append	Switch command insert or append.
[DEL] Delete	Delete command line

### Command execution

(The speed depends on the setting in "Setting" "Speed set" menu.)

[STEP] Step execution	Execute selected one line. Wait command is skipped.
[TEST] Test execution	Execute continuously from later line selected with test mode.

## 7 Product support Offices

If any questions or troubles are issued for RV-500 and RV-500EWIN, please contact with the below offices.

### MYCOM, INC. Head office

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In charge Kang, Kyu Sup

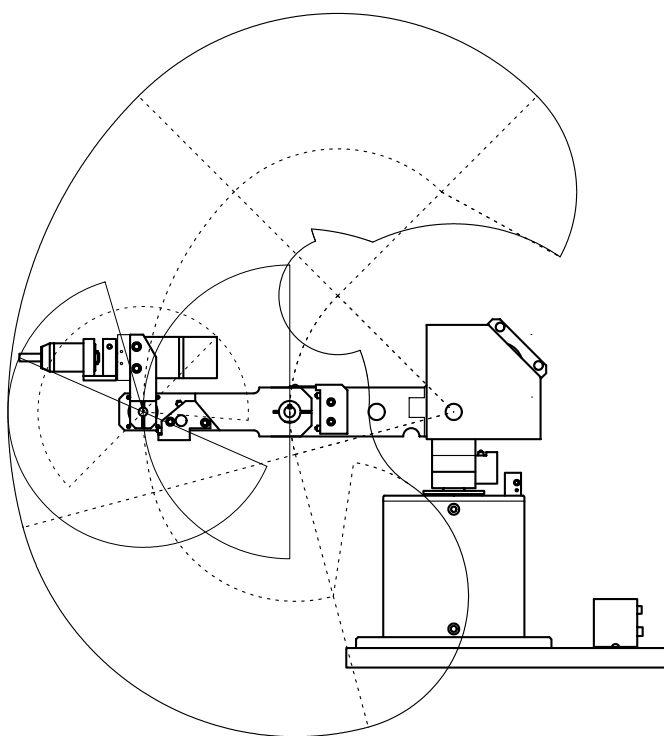
MYCOM TECHNOLOGY (SINGAPORE) PTE. LTD.

No. 1 Sims Lane #05-05 One Sims Lane, Singapore 387355  
Telephone (65)743-4476  
FAX (65)743-4576  
E-mail mycomsin@pacific.net.sg  
In charge Raymond Tay

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# RV-500EWIN Features and configuration

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# RV-500EWIN Features and configuration

## Features

Operation is available by current popular Window screen interface in Windows 95/98.

Each axis control is available by control button on the screen.

Easy control

Moving by program is available.

Moving program is editable on screen.

External synchronized moving is available by program.

Program can change each axis speed during automatic execution.

Random calling of position memory is available in the program.

High speed and accurate home search is available.

Position data acquisition is available after manual positioning.

## Configuration

### Hardware and Machine

Two of PPC-2310 are inserted into PC and connected with RV-500 driver box by cable.

RV-500 driver box and RV-500 main body are connected to use by cable.

(RV-500 configuration)

### Software

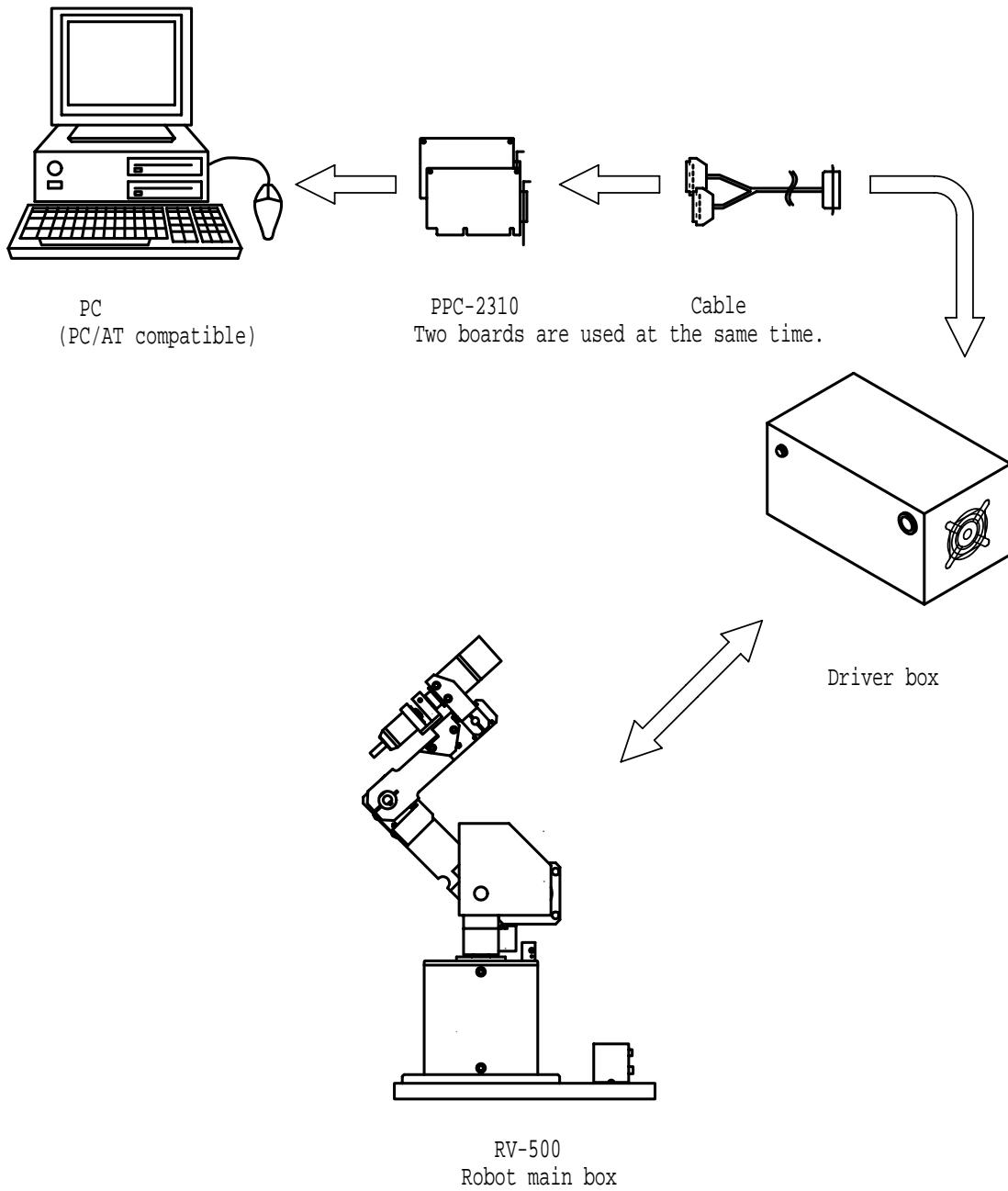
Executing RV-500EWIN at Windows, this software operates RV-500 using each button or controller.

(RV-500 Software configuration)

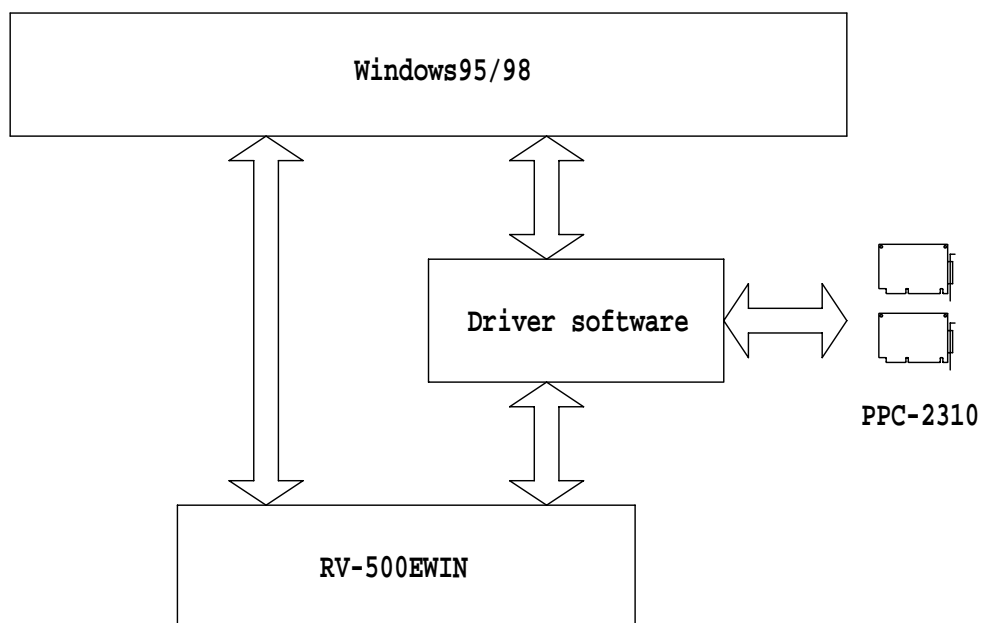


# RV-500 Configuration

## RV-500 Configuration

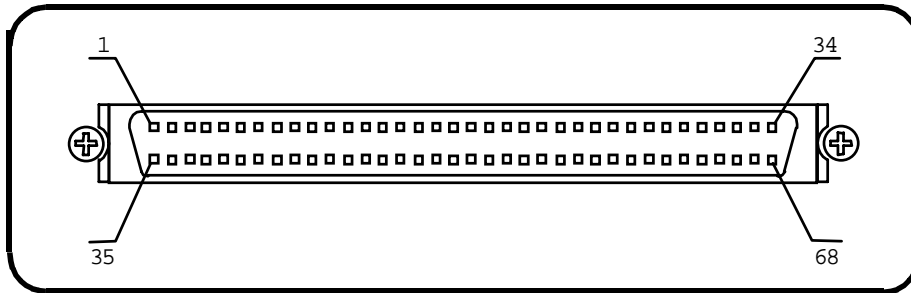


## RV-500JWIN Software configuration



## PPC-2310 Connector pin assignment

The below is the pin assignment when PPC-2310 controls RV-500.



**PPC-2310 connector FCN-231J068-G/E (Fujitsu brand)**

**Pin assignment table (1) (PPC-2310 – first board)**

Pin #	Signal name	Description	Pin calssfication	
1	A-PCW+	A axis CW pulse +	Pulse output pin	
2	A-PCW-	CW pulse -		
3	A-DCCW+	CCW pulse +		
4	A-DCCW-	CCW pulse -		
2 1	B-PCW+	B axis CW pulse +		
2 2	B-PCW-	CW pulse -		
2 3	B-DCCW+	CCW pulse +		
2 4	B-DCCW-	CCW pulse -		
4 1	C-PCW+	C axis CW pulse +		
4 2	C-PCW-	CW pulse -		
4 3	C-DCCW+	CCW pulse +		
4 4	C-DCCW-	CCW pulse -		
5	A-CO	Top hand solenoid ON/OFF		Signal output pin
6	A-SERVO	Timing external signal output A		
7	A-CLR	No connection		
2 5	B-CO	No connection		
2 6	B-SERVO	No connection		

2 7	B-CLR	No connection
4 5	C-CO	No connection
4 6	C-SERVO	No connection
4 7	C-CLR	No connection

**Pin assignment table (2) (PPC-2310 – first board)**

Pin #	Signal name	Description	Pin classification
8	A-INP	No connection	Sensor input pin
9	A-ALM	Emergency stop button of driver box	
10	A-NEAR	No connection	
11	A-FOR	A axis Forward limit	
12	A-REV	Reverse limit	
13	A-IN	Timing external signal input A	
28	B-INP	No connection	
29	B-ALM	Emergency stop button of driver box	
30	B-NEAR	No connection	
31	B-FOR	B axis Forward limit	
32	B-REV	Reverse limit	
33	B-IN	No connection	
48	C-INP	No connection	
49	C-ALM	Emergency stop button of driver box	
50	C-NEAR	No connection	
51	C-FOR	C axis Forward limit	
52	C-REV	Reverse limit	
53	C-IN	I/O unit valid / invalid	
14	A-EA+	No connection	Encoder input pin
15	A-EA-	No connection	
16	A-EB+	No connection	
17	A-EB-	No connection	
18	A-Z+	No connection	
19	A-Z-	No connection	
34	B-EA+	No connection	
35	B-EA-	No connection	
36	B-EB+	No connection	
37	B-EB-	No connection	
38	B-Z+	No connection	

3 9	B-Z-	No connection	
5 4	C-EA+	No connection	
5 5	C-EA-	No connection	
5 6	C-EB+	No connection	
5 7	C-EB-	No connection	
5 8	C-Z+	No connection	
5 9	C-Z-	No connection	
6 1	ES	Connecting to GND	Emergency stop input pin
6 2	GND	Ground for ES	
2 0	GND	A axis Ground for sensor	Power supply pin
4 0	GND	B axis - do -	
6 0	GND	C axis - do -	
6 3 - 6 4	+5V	No connection	
6 5 - 6 6	+24V	Power supply +24V	
6 7 - 6 8	GND	GND	

**Pin assignment table (3)** (PPC-2310 – second board)

Pin #	Signal name	Description	Pin classification	
1	A-PCW+	D axis CW pulse +	Pulse output pin	
2	A-PCW-	CW pulse -		
3	A-DCCW+	CCW pulse +		
4	A-DCCW-	CCW pulse -		
2 1	B-PCW+	E axis CW pulse +		
2 2	B-PCW-	CW pulse -		
2 3	B-DCCW+	CCW pulse +		
2 4	B-DCCW-	CCW pulse -		
4 1	C-PCW+	No connection		
4 2	C-PCW-	No connection		
4 3	C-DCCW+	No connection		
4 4	C-DCCW-	No connection		
5	A-CO	No connection		Signal output pin
6	A-SERVO	Timing external signal output B		
7	A-CLR	No connection		
2 5	B-CO	No connection		
2 6	B-SERVO	No connection		
2 7	B-CLR	No connection		
4 5	C-CO	No connection		
4 6	C-SERVO	No connection		
4 7	C-CLR	No connection		

**Pin assignment table (4)** (PPC-2310 – second board)

Pin #	Signal name	Description	Pin classification
8	A-INP	No connection	Sensor input pin
9	A-ALM	Emergency stop button of driver box	
10	A-NEAR	No connection	
11	A-FOR	D axis Forward limit	
12	A-REV	Reverse limit	
13	A-IN	Timing external signal input B	
28	B-INP	No connection	
29	B-ALM	Emergency stop button of driver box	
30	B-NEAR	No connection	
31	B-FOR	E axis Forward limit	
32	B-REV	Reverse limit	
33	B-IN	No connection	
48	C-INP	No connection	
49	C-ALM	Emergency stop button of driver box	
50	C-NEAR	No connection	
51	C-FOR	No connection	
52	C-REV	No connection	
53	C-IN	I/O unit valid / invalid	
14	A-EA+	No connection	Encoder input pin
15	A-EA-	No connection	
16	A-EB+	No connection	
17	A-EB-	No connection	
18	A-Z+	No connection	
19	A-Z-	No connection	
34	B-EA+	No connection	
35	B-EA-	No connection	
36	B-EB+	No connection	
37	B-EB-	No connection	
38	B-Z+	No connection	



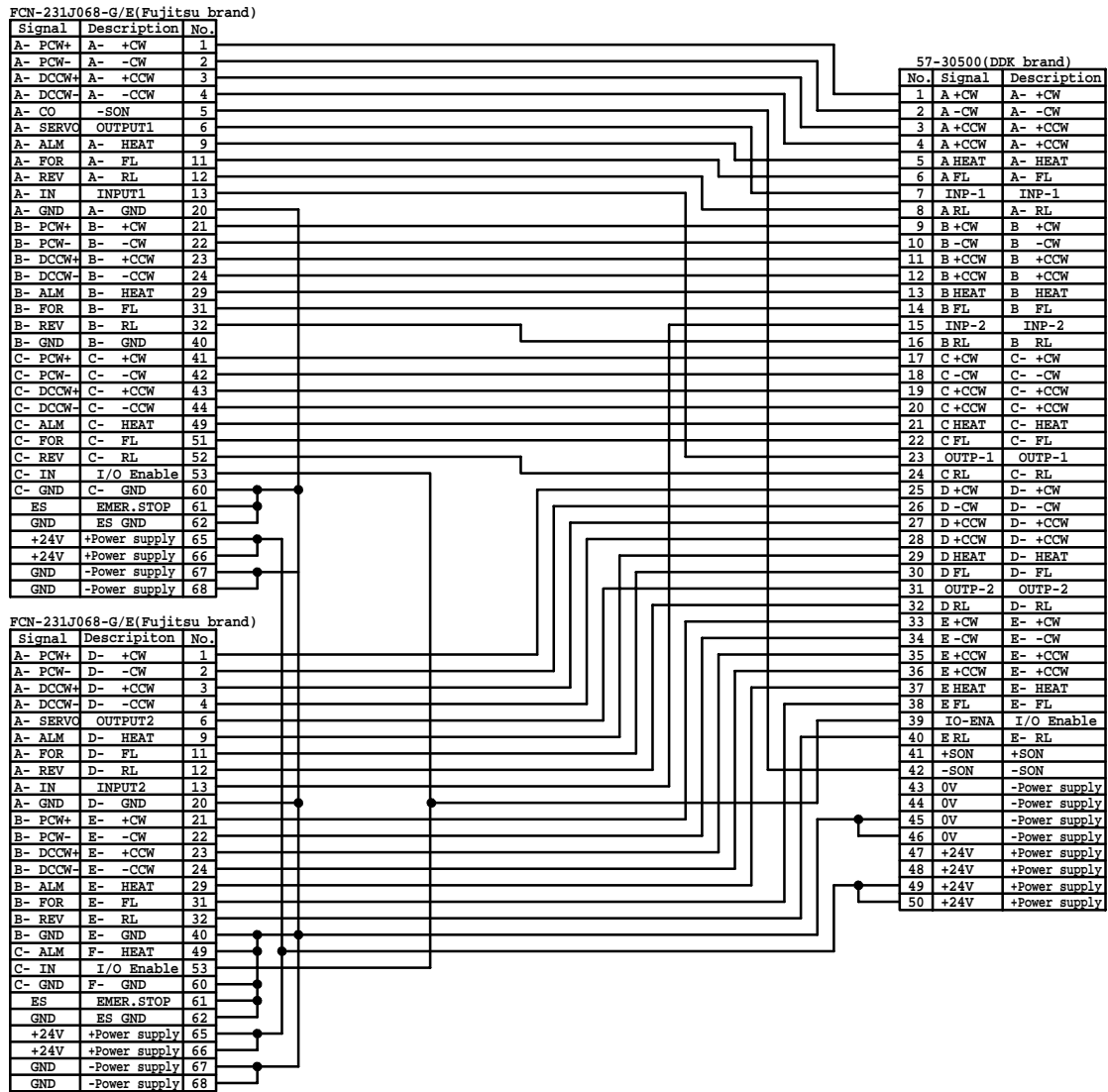
3 9	B-Z-	No connection	
5 4	C-EA+	No connection	
5 5	C-EA-	No connection	
5 6	C-EB+	No connection	
5 7	C-EB-	No connection	
5 8	C-Z+	No connection	
5 9	C-Z-	No connection	
6 1	ES	Connecting to GND	Emergency stop input pin
6 2	GND	Ground for ES	
2 0	GND	D axis Ground for sensor	Power supply pin
4 0	GND	E axis - do -	
6 0	GND	- do -	
6 3 - 6 4	+5V	No connection	
6 5 - 6 6	+24V	Power supply +24V	
6 7 - 6 8	GND	GND	

### Detailed description of pin assignment

Signal name	Detailed description of signal
PCW± DCCW±	This is pulse output terminal to driver. RV-500 uses for CW / CCW pulse output.
CO	This is a control output terminal of solenoid for open and close of top hand.
SERVO	This is signal output terminal for timing.
CLR	Not used terminal.
INP	Not used terminal.
ALM	Alarm input terminal This is used as emergency stop button input terminal of front panel of driver box.
NEAR	Not used terminal.
FOR REV	Overrun limit sensor input terminal of both ends. The home of RV-500 is the position of reverse overrun limit sensor input
IN	This is external input terminal for timing.
EA± EB±	This is an A/B phase input terminal of encoder. RV-500 does not use this terminal.
Z±	Not used terminal.
ES	This is the emergency stop input terminal. This terminal is connected to ground to use inside of RV-500.
GND	This is GND terminal of external supplying power or GND output terminal for input signal.
+5V	In case that all axes are line driver type setting, this +5V is not necessary.
+24V	This is +24V input terminal of external supplying power. This is used as power supply of sensor input.

# Wiring diagram between PPC-2310 and RV-500 driver box

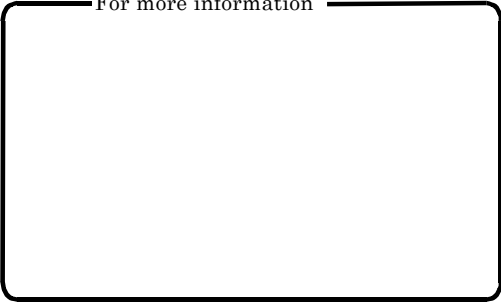
The below is wiring diagram for connecting cable between 2 of PPC-2310 and RV-500 driver box.



Please understand that we may make modifications to our products without notification in order to improve the capabilities and external appearance of our products.

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For more information



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