# MITSUBISHI Mitsubishi Electric Industrial Robots

CR750/700/500 series

# RT ToolBox2 / RT ToolBox2 mini User's Manual

(3D-11C-WINE/3D-12C-WINE)

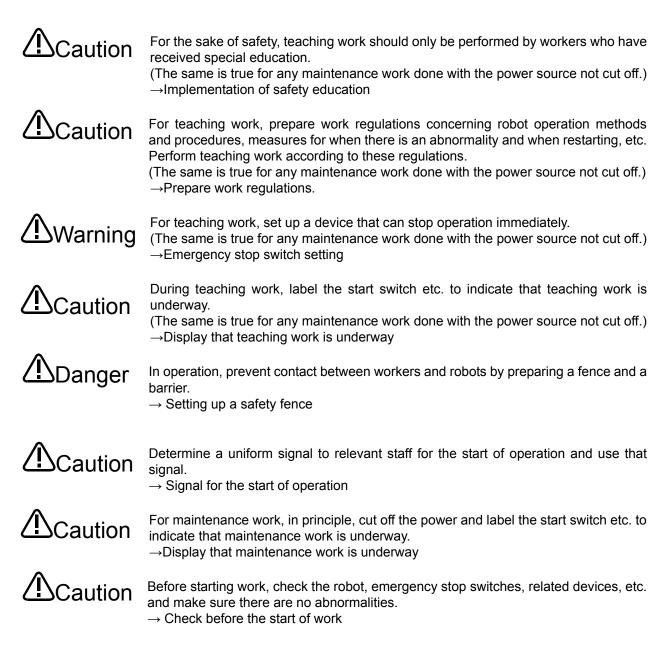


BFP-A8618-T

# A Safety Precautions

Before using the robot, always carefully read the precautions below and the separate "Safety Manual" and take all necessary safety measures.

A. These show precautions based on Labor Health and Safety Regulations (Articles 36, 104, 150, 151).



B. This shows precaution points given in the separate "Safety Manual". For details, please read the text of the "Safety Manual".

▲ Caution	Use the robot in an environment that is within the range of its specifications. Failure to do this can cause a drop in reliability and breakdown.
	(Temperature, humidity, atmosphere, noise, etc.)
<b>A</b> Caution	When transporting the robot, put it into its specified transport posture. Failure to do this can cause a drop in reliability and breakdown.
<b>A</b> Caution	Install the robot on a solid platform. If the robot is in an unstable posture, this can cause positional deviation and vibration.
▲ Caution	Wire cables away from noise sources as much as possible. If cables are brought too close to noise sources, this can cause positional deviation and malfunction.
<b>A</b> Caution	Do not apply excess force to a connector or bend a cable excessively. Doing so can cause a contact defect or cut line.
<b>A</b> Caution	Set work masses, including hands, so that they do not excess rated load or permitted torque. Exceeding either of these can cause an alarm or breakdown.
<b>A</b> Warning	Install hands and tools and hold work securely. Failure to do this can cause objects to fly loose during operation and cause personnel injury or damage.
	Ground the robot and controller reliably. Failure to do this can cause malfunction due to noise or in an extreme case, electrical shock.
<b>A</b> Caution	Display the operating state while the robot is operating. Lack of such a display can result in someone coming too close to the robot by mistake or mistaken operation.
	Always secure the priority right for control of the robot before doing any teaching work within the robot's operating range. Failure to do this can allow the robot to start upon instruction from the outside and cause personnel injury or damage.
▲ Caution	Make the jog speed as slow as possible and do not take your eyes off the robot. Failure to do this may cause a collision between a work piece and peripheral devices.
▲ Caution	After completing program editing but before starting automatic operation, always check operations with step operation. Failure to do this may cause a collision with a peripheral device due to a programming mistake or the like.
<b>A</b> Caution	Set up the safety fence in such a way that, while the equipment is running on automatic, either the safety fence door is locked or if anyone tries to open the door, the robot is stopped. Failure to take these protective measures can cause an accident resulting in injury.



Never on your own judgment make an alterations or use maintenance parts other than those designated. Doing so can cause breakdown and problems.



When moving the robot arm from the outside, never stick a hand or finger into an When moving the robot and non-the outside, note, such and or finger could get caught in the opening. Depending on the posture, the hand or finger could get caught in the equipment.



Do not switch the robot Off or make an emergency stop of the robot by switching Off the robot controller's main power supply.

If the robot controller's main power supply is switched Off during automatic operation, this can reduce the robot's precision. It could also cause the arm to fall or allow inertia to result in collisions with peripheral device or the like.



When rewriting a program, parameters, or other internal information within the robot's controller, do not switch Off the robot controller's main power supply. If the robot controller's main power supply is switched Off during automatic operation or while a program or parameter is being rewritten, there is a danger of the internal information in the robot controller being destroyed.



For using RH-5AH/10AH/15AH series or RH-6SH/12SH/18SH series.

While pressing the brake releasing switch on the robot arm, beware of the arm which may drop with its own weight.

Dropping of the hand could lead to a collision with the peripheral equipment or catch the hands or fingers.

	evision History Manual No.	Pavision Contants
Printing Date		Revision Contents
2008/04	BFP-A8618-*	First edition (Corresponds to the Ver.1.1)
2008/08 2008/10	BFP-A8618-A BFP-A8618-B	Corresponds to the Ver.1.2 (Refer to the software revision history.)
		Corresponds to the Ver.1.3 (Refer to the software revision history.)
2009/01 2009/06	BFP-A8618-C	Corresponds to the Ver.1.3.1
2009/08	BFP-A8618-D BFP-A8618-E	Corresponds to the Ver.1.4 (Refer to the software revision history.) Corresponds to the Ver.1.5 (Refer to the software revision history.)
2010/04	BFP-A8618-F	Corresponds to the Ver.1.6 (Refer to the software revision history.)
2010/04	BFP-A8618-G	Corresponds to the Ver.1.6.1 (Refer to the software revision history.)
2010/00	BFP-A8618-H	Corresponds to the Ver.1.7 (Refer to the software revision history.)
2010/10	BFP-A8618-J	Corresponds to the Ver.1.8 (Refer to the software revision history.)
2011/05	BFP-A8618-K	Corresponds to the Ver.2.00A (Refer to the software revision history.)
2011/07	BFP-A8618-M	
2012/05	BFP-A8618-N	Corresponds to the Ver.2.10L (Refer to the software revision history.)
2012/05		Corresponds to the Ver.2.20W (Refer to the software revision history.)
2012/08	BFP-A8618-P BFP-A8618-Q	Corresponds to the Ver.2.30G (Refer to the software revision history.) Corresponds to the Ver.2.40S (Refer to the software revision history.)
2013/02	BFP-A8618-R	Corresponds to the Ver.2.40S (Refer to the software revision history.)
2013/04	BFP-A8618-S	Corresponds to the Ver.3.00A (Refer to the software revision history.)
2013/09	BFP-A8618-T	Corresponds to the Ver.3.01B (Refer to the software revision history.)

Software Revision History

Software Rev Version	Release Date	Revision Contents
1.0	2008/01	Initial release (Japanese version only)
1.1	2008/04	CRnQ Communications: Added the GOT transparent function. Parameter editing: Added the Multiple CPU setting screen.
1.2	2008/08	<ul> <li>[Communication Setting]</li> <li>Changed the Initial value of USB, TCP/IP and RS-232 setting.</li> <li>Added the CRnQ communication routes when "Ethernet" is selected. (Added the Ethernet port communications.)</li> <li>[Program editor]</li> <li>Added "Comment Selection"/"Uncomment Selection" function.</li> <li>Added the function to edit the backed up program data.</li> <li>[Project]</li> <li>Added the function to import the project.</li> <li>[Parameter]</li> <li>Added the function to display the parameter changed from initial value.</li> <li>[Restore]</li> <li>Added the function to restore individually data backed up by selecting "All files".</li> </ul>
1.3	2008/10	<ul> <li>[Operation of Project Tree]</li> <li>Added the function to copy the robot program by drag and drop.</li> <li>[Operation of Workspace]</li> <li>Added the "Edit project" screen when the new workspace is made.</li> <li>[Parameter]</li> <li>Added the function to print the parameter changed from initial value.</li> <li>Added the screen of setting the CC-Link parameter and PROFIBUS parameter.</li> <li>[Backup]</li> <li>Added the function to save data from all robot controllers by batch processing.</li> <li>etc.</li> </ul>
1.4	2009/06	<ul> <li>[Parameter]</li> <li>Added the function to edit by offline.</li> <li>[Program editor]</li> <li>Added the function to remove comments from all line in the program.</li> </ul>
1.5	2009/10	<ul> <li>[Communication Setting]</li> <li>Added the screen of setting GOT communication.</li> <li>[Parameter]</li> <li>Added the screen of editing the Work coordinate parameters.</li> <li>[SQ Direct]</li> <li>Added the screen of editing the SQ Direct positions.</li> </ul>
1.6	2010/04	<ul> <li>[Program editor]</li> <li>Added the function to check the program name when creating it by offline.</li> <li>Added the function to rename the positional data.</li> <li>Changed an initial value of the position data to the present location.</li> <li>Added the function of jumping to the specified positional data.</li> <li>Added the function of searching the positional data.</li> <li>Added the function of distinguishing online editing and offline editing of program by color.</li> <li>[Simulation]</li> <li>Added the function of the Tool-JOG and Work-JOG on the simulation.</li> <li>Added the function of displaying the User defined area and the Free Plane Limit in 3D viewer of simulation.</li> <li>[Program Management]</li> <li>Added the function of changing the window size.</li> <li>[Monitor]</li> <li>Added the function of stopping the program of all task-slots.</li> </ul>

Version	Release Date	Revision Contents
1.6.1	2010/06	[Parameter] <ul> <li>Added the function of editing the "Temp in RC" parameters.</li> </ul>
1.7	2010/10	<ul> <li>[Communication Setting]</li> <li>Added the GOT(Ethernet) transparent mode.</li> <li>[Simulation]</li> <li>Added the "3D Monitor" button to the screen of simulation operation.</li> <li>"3-axis XYZ" and "Cylinder" are added to JOG mord.</li> <li>[Monitor]</li> <li>Added the function of error record.</li> <li>[Computer syastem]</li> <li>Corresponded to Windows 7.</li> </ul>
1.8	2011/05	[Workspace] <ul> <li>Added the function to change the name of the workspace.</li> <li>[Servo monitor]</li> <li>Added the "ABS", "Speed", "Current", and "Power" of servo monitor.</li> </ul>
2.00A	2011/07	<ul> <li>[Operating Environment]</li> <li>Added the the Operating systems for which operation is warranted.</li> <li>[Maintenance]</li> <li>Added the security function of the robot controller (Setup the password).</li> <li>[Others]</li> <li>Changed the icon.</li> <li>Corresponded to iQ Works(MELSOFT Navigator).</li> <li>etc.</li> </ul>
2.10L	2011/11	<ul> <li>[Simulator]</li> <li>A maximum of eight simulators can be started.</li> <li>[Tool]</li> <li>Added the function "Force control log viewer".</li> <li>[Parameter]</li> <li>Added the "IO unit parameter".</li> <li>Added buttons "Force initial setting", "Force control mode", "Force control feature", and "Force log setting".</li> <li>[Monitor]</li> <li>Added the IO unit monitor.</li> <li>Added the display of 3D monitor of several robots.</li> <li>Added the Encoder temp in the display of Load.</li> </ul>
2.20W	2012/05	<ul> <li>[Parameter]</li> <li>Added "Mode switch judgment/Speed reference" tab in "Force control feature" screen.</li> <li>[Maintenance]</li> <li>Added the function "Tool automatic calculation".</li> <li>Added the File manager</li> <li>[Communications Settings]</li> <li>Corresponded to CC-Link/IE</li> <li>[Tool]</li> <li>Added the user definition screen editing function.</li> <li>[Simulator]</li> <li>Added the function to manage the parts of layout by using a group</li> <li>Added the reading function of 3D model parts.</li> <li>Added the function of designing a robot hand and of displaying it on "3D view" screen.</li> </ul>
2.30G	2012/08	<ul> <li>[Parameter]</li> <li>Added buttons "Force initial setting", "Force control mode", "Force control feature", and "Force log setting".</li> </ul>
2.40S	2013/02	[Parameter] <ul> <li>Added the function of editing the "Collision avoidance area" parameters.</li> </ul>
2.50C	2013/04	Correspond to Windows 8

Version	Release Date	Revision Contents
3.00A	2013/09	<ul> <li>[Computer syastem]</li> <li>Corresponded to Windows 8.1.</li> <li>[Parameter]</li> <li>Changed the project tree.</li> <li>Added "PROFINET", "DeviceNet", "EtherNet/IP" parameters.</li> <li>Added the function "Realtime monitor" to the "Ethernet" parameter.</li> <li>[Tool]</li> <li>Added the function "Oscillograph".</li> <li>[Simulator]</li> <li>Added the supported 3D model formats "3DS", "PLY", and "VRML".</li> <li>The function of designing a robot hand: supported the 3D model parts.</li> <li>Added the function of setting robot flange direction un-display/display.</li> <li>Added the function of calculation of axis load level.</li> <li>[MELFA-3D Vision]</li> </ul>
3.01B	2014/01	<ul> <li>Added the function of setting MELFA-3D Vision.</li> <li>[Parameter]         <ul> <li>Added the function of "Load profile" in the "Robot additional axis" screen.</li> <li>[Tool]                 <ul></ul></li></ul></li></ul>

# PREFACE

Thank you for purchasing this MELFA Mitsubishi Electric industrial robot.

This document is the user's manual for the MELSOFT "RT ToolBox2" and "RT ToolBox2 mini".

This document will help you to use the functions of this software to the maximum over a wide range of stages, from initial robot start to program writing, editing, and management.

In order to operate the robot safely, carefully read this document and the safety manual that comes with the robot main unit before operating the robot. Also, store this manual carefully so that you can take it out and read it whenever needed.

## Target versions for this document

This document is for the MELSOFT "RT ToolBox2" and "RT ToolBox2 mini" Version 3.01B and supports the following robot controllers.

- CRn-500 series controllers
- CR750-Q/CRnQ-700 series controllers
- CR750-D/CRnD-700 series controllers

In this manual, these also have the part written as "CR750/700/500 series".

#### Target readers for this document

This document assumes that the reader understands basic Microsoft Windows operation methods and the robot controller.

Those who have not mastered basic computer operation methods should read the user's manual for their computer.

#### Notation method in this document

This indicates an item for which incorrect handling could present imminent danger of death or injury.



This indicates an item for which incorrect handling could present a danger of death or injury.

This indicates an item for which incorrect handling could present a danger of impairment. It could also present a danger of just physical damage.

This document uses	the following genera	I terms and abbreviations
	and renorming genera	

General Term/Abbreviation	Contents
RT ToolBox2	General name for the RT ToolBox2 and RT ToolBox2 mini To distinguish them in explanations, these two are called the "standard edition" and "mini edition".
Universal model QCPU	General term for Mitsubishi PLC CPU modules of Q02U, Q03UD, Q03UDE, Q04UDH, Q04UDEH, Q06UDH, Q06UDEH, Q13UDH, Q13UDEH, Q26UDH and Q26UDEH.
Built-in Ethernet port QCPU	General term for Mitsubishi PLC CPU modules of Q03UDE, Q04UDEH, Q06UDEH, Q13UDEH and Q26UDEH.
GX Developer	Abbreviation of SW D5C-GPPW-E(-EV) / SW D5F-GPPW-E type of Mitsubishi PLC programming software package.

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Every effort has been made to ensure the accuracy of the contents of this document, but if you should notice any unclear point, mistake, or omission, please notify Mitsubishi Electric.

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	Causes of tact time deviation	
16.13. End	ing Simulation	

# 17. MELFA-3D Vision

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18.2.	Summary CD-ROM Contents User's Manual Reading Guide Installation.	
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# 1. Usage

This explains precautions you need to know before using this software.

# 1.1. How to Use this Document

The manual is in the CR-ROM as the Adobe PDF file. D:/Doc/BFP-A8618.pdf (Example for the CD-ROM drive is "D:".)

For reading the manual, Adobe Acrobat Reader Ver.5.0 or more is required.

If Adobe Acrobat Reader isn't installed, please download from following Adobe Systems Incorporated URL (As of September, 2009)

URL: http://www.adobe.com/

# 1.2. Checking the Product

# 1.2.1. Checking the package

Please check if all items shown below are included in the package.

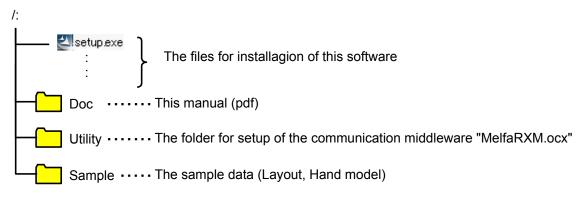
- CD-ROM "RT ToolBox2"
- Setup Guide
- END-USER SOFTWARE LICENSE AGREEMENT
- License Certification

(Please make sure Product ID is printed on it.)

\* Please contact the branch office or the agency if there is some shortage in the package.

# 1.2.2. Checking the CD-ROM contents

The CD-Rom has the following configuration.



# 1.2.3. About the "MelfaRXM.ocx" communications middleware

MelfaRXM.ocx is the ActiveX control that communicates to robot-controller. You can create the Windows Application of "MELFA ROBOT" by using this control.

You can use "MelfaRXM.ocx" in only standard version of this software.

For information on how to set up "MelfaRXM.ocx", refer to "18 MelfaRXM.ocx Communications Middleware Setup".

In case of using only the function of "RT ToolBox2", you don't need to install this software.

# 1.3. Items to be prepared by the customer

This explains what the customer needs to prepare in order to use this software

# 1.3.1. Computer system

Use a computer that meets the specifications given in: "1.4 Operating Environment".

## 1.3.2. Computer cable

Prepare the cable for connecting the controller and the computer. The cable required depends on the connection specifications and controller used, as shown below. For the RS-232 cable refer to the "Standard Specifications" for your robot.

Table 1-1 CR750-D/CRND-700/CRN500 Series Communication Cables					
Method	Description		Model name	Manufacturer	
USB	USB A type, USB mini B type		-	-	
Ethernet	10BASE-T, 100BASE-TX		-	-	
		CRnD-700 series	2D-232CBL03M	Mitsubishi Electric	
RS-232	S-232 For controller front panel		RS-MAXY-CBL RS-AT-RCBL (for expansion serial interface (option))	Mitsubishi Electric	
	For expansion option box (	CR1-EB3)	RS-AT-RCBL	Mitsubishi Electric	

#### Table 1-1 CR750-D/CRnD-700/CRn500 Series Communication Cables

	Table 1-2 OK/30-Q/OKING-100 Genes Communication Cables				
Method	Description	Cables confirmed by Mitsubishi Electric to operate properly			
		Model name	Manufacturer		
		ZUM-430	Loas Co.		
	USB A type to mini B type	USB-M53	Elecom Co.		
USB		GT09-C20USB-5P	Mitsubishi Electric System Service		
		MR-J3USBCBL3M	Mitsubishi Electric		
Ethernet	10BASE-T, 100BASE-TX				
RS-232	For connecting by personal computer - PLC CPU (when Personal computer connector is D-sub, 9-pin)	QC30R2	Mitsubishi Electric		

## Table 1-2 CR750-Q/CRnQ-700 Series Communication Cables

# Caution

# Use of USB to RS-232 does not guarantee normal operation.

When you use USB to RS-232 cable, normal operation is not guaranteed. If you want to use RS-232 as a communication port, use of computer with serial ports is recommended.

# 1.4. Operating Environment

This explains the operating environment.

## 1.4.1. Connectable robot controllers

This software can be connected with the robot controllers shown below

Robot controller	Communications (*1)		Remark
CR750-D/CRnD-700 series	USB (*2)		The commercial item such as computer and cable might be unsuitable to compatibility with our equipment or the FA environments of the temperature and the noise, etc. When it is used, please confirm the operation enough, because you might have to take measures against noise such as EMI measure or addition of ferrite core.
(The photo is a robot	Ethernet (TCP/IP)		
controller of CR3D-700.)	RS-232		Only CRnD-700 series
	GOT communications		Communicate with CR750-D/CRnD-700series controller connected with the GOT via Ethernet by USB / RS-232. GOT 1000 series and the Ethernet communication unit (GT15-J1E71-100) are needed. (*4)
CR750-Q/CRnQ-700 series		USB (*2)	
	CRnQ communications	Ethernet (TCP/IP)	The PLC Ethernet interface module or Built-in Ethernet port QCPU (*3) is required.
(The photo is a robot controller of CR3Q-700.)		RS-232	
CRn-500 series	Ethernet (TCP/IP)		The robot controller must have the "Ethernet interface" option.
	RS-232		

Table 1-3 Connectable Robot Controllers and Communications Types

(\*1) The computer must have each ports for communications.

(\*2) When using USB connection, 1 computer can connect to only 1 robot controller.

(\*3) Built-in Ethernet port QCPU can be used with this software Ver.1.2 or later.

(\*4) GOT communications can be used with this software Ver.1.5 or later.

This software can be connected to a maximum of 32 controllers at the same time. These controllers may be different models.

# 1.4.2. Computer system

This software operates on PC/AT compatible computers that meet the following specifications.

ltom	Decommonded an incoment
Item	Recommended environment
CPU	Pentium III 1 GHz or higher
	However, for using the simulation function, Pentinum IV 2 GHz or higher.
Main memory	512 MB min.
Hard disk	Available capacity 300 MB min.
Display	XGA (1024x768) or higher
Optical device	CD-ROM drive
Keyboard	PC/AT compatible keyboard
Pointing device	Must operate on Windows
	- USB2.0
	(Caution: This cannot be used for connection with the CRn-500 series
Communications	controller.)
functions	- LAN: 100Base-TX/10Base-T
Communications port	<ul> <li>RS-232 communications port that operates on Windows (Minimum</li> </ul>
	9600bps: 1 port)
	Must have one of the above interfaces
	Windows 2000 Professional (32-bit version) (*2)
	Windows XP Professional (32-bit version)
	Windows XP Home Edition (32-bit version)
	Windows Vista Ultimate (32-bit version)
	Windows Vista Business (32-bit version)
	Windows Vista Home Premium (32-bit version)
	Windows Vista Home Basic (32-bit version)
	Windows 7 Starter (32-bit version)
OSs for which	Windows 7 Home Premium (32/64-bit version) (*1)
operation is warranted	Windows 7 Professional(32/64-bit version) (*1)
	Windows 7 Enterprise (32/64-bit version) (*1)
	Windows 7 Ultimate (32/64-bit version) (*1)
	Windows 8 (32/64-bit version) (*3)
	Windows 8 Pro (32/64-bit version) (*3)
	Windows 8 Enterprise (32/64-bit version) (*3)
	Windows 8.1 (32/64-bit version) (*3)
	Windows 8.1 Pro (32/64-bit version) (*3)
	Windows 8.1 Enterprise (32/64-bit version) (*3)

\*1: Windows 7 is corresponded with Version 1.7 or later of software. The 64-bit version of Windows 7 can be used with version 2.00A or later of this software.

\*2 : When you use Windows 2000, it is necessary to install Service Pack4 and internet Explorer version 5.5 or later.

\*3: Windows 8 and Windows 8.1 are corresponded with Version 2.50C or later of software. When you install this software, [.NET Framework 3.5 (includes .NET 2.0 and 3.0)] feature should be turned on. Refer to Chapter 1.5.1.1 for the method of a present state confirmation and turning on.

# 1.5. Installation, Uninstallation

This section explains the method for installing the software and the method for uninstalling it.

# ▲ Caution —

# Uninstall RT ToolBox2 before installing.

If "RT ToolBox2" has already been installed in the personal computer, it is necessary to uninstall it before "RT ToolBox2" is installed.

# 1.5.1. Installation

# **Caution**

# When installing, log in as a user with administrator authority.

When installing, log in as a user with administrator authority. The system will not let you install if you log in as a user who does not have administrator authority.

# 🔨 Caution

Please input product ID attached to RT ToolBox2 again when you install a standard version of RT ToolBox2 in the personal computer in which "iQ Works(MELSOFT Navigator" is installed.

When RT ToolBox2 is installed in the personal computer in which "iQ Works(MELSOFT Navigator)" is installed, product ID for "iQ Works(MELSOFT Navigator)" is displayed on "Input Product ID" screen. RT ToolBox2 is installed in the personal computer as mini version when this software is installed with this Product ID. Please input product ID attached to RT ToolBox2 product again when you install a standard version of RT ToolBox2.

Install this software with the procedure below.

- (1) When you insert this product into the computer's CD-ROM drive, the setup screen is displayed automatically.
- (2) If the setup screen is not displayed when you insert this product into the computer's CD-ROM drive, display the setup screen with the following method.

Table 1-4 Method of displaying the [Run] dialog				
OS	Start method			
Windows 2000 / XP / 7	Select [Start] button -> [Run].			
Windows Vista	<pre>&lt; In Windows Vista, when using the [Start] menu with the classic display&gt; Select [Start] button -&gt; [Run]. &lt; In Windows Vista, when not using the [Start] menu with the classic display &gt; Click [Start] button -&gt; [All Programs] -&gt; [Accessories], then select [Run].</pre>			
Windows 8	Press the [Windows] + [R] key.			

1) Display the [Run] dialog.

2) Check the CD-ROM drive name, then input "drive name":\Setup.exe. (If the CD-ROM drive is "D:", input "D:\Setup.exe".)

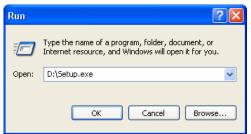
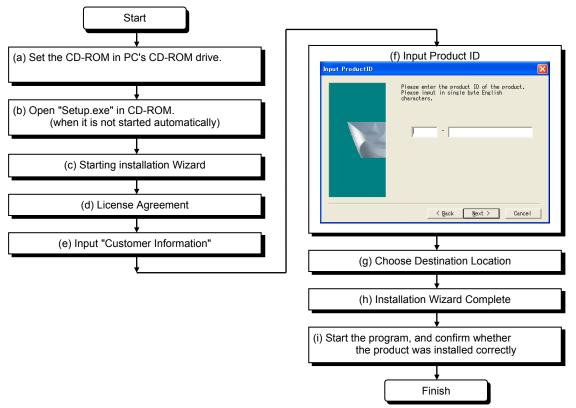


Figure 1-1 Specify the File Name and Execute

With Windows Vista, when using the classic display, when not using the [Start] menu with the classic display, you can use the [Start] menu Search box instead of executing the [Run] command.



\* Product ID is printed on the Certificate of License permission

\* After the installation is completed, the computer should be likely to be rebooted.

# **Caution** *About the confirmation and warning message displayed during installation (version 1.8 or earlier of this software)*

During installation on Windows XP or Windows Vista, the following confirmation and warning messages are displayed, but select to continue installation. If you select not to install, please execute the installation again.

(1) Installation confirmation message for USB driver software (for Windows XP)



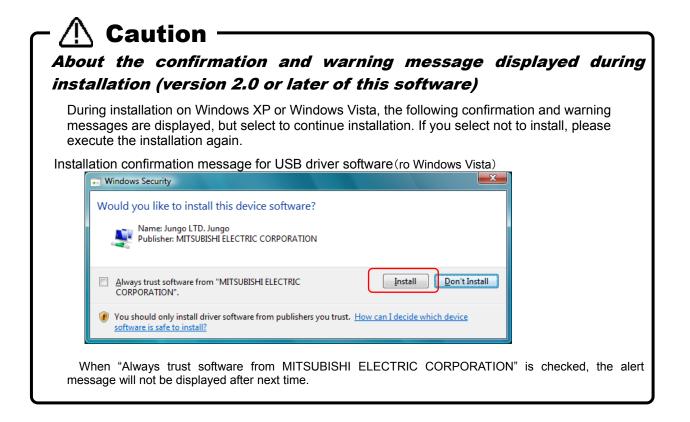
(2) Installation confirmation message for USB driver software (for Windows Vista)



(3) Installation warning message for USB driver software (for Windows Vista)

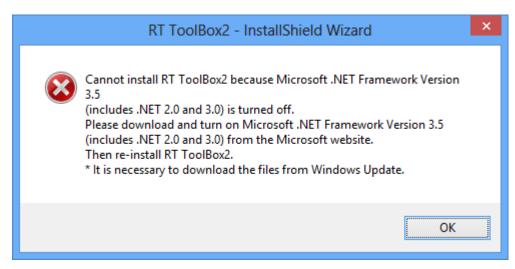


We have confirmed operation at our company. No problem occurs after installation.



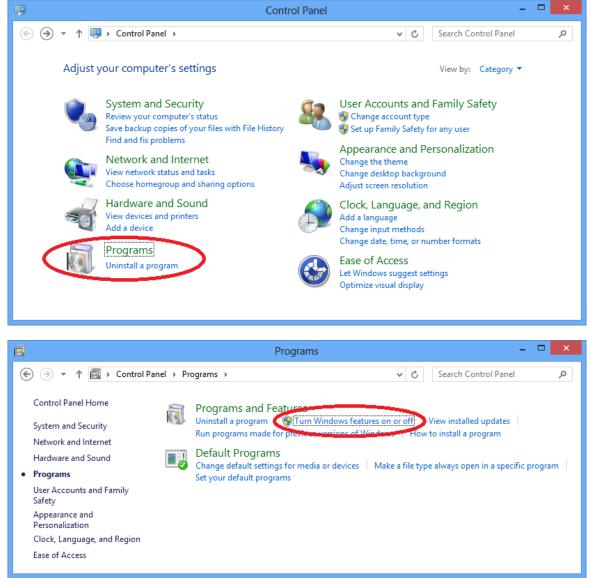
## 1.5.1.1. Installation on Windows 8 or Windows8.1

When you install this software on Windows 8 or Windows8.1, you will need to turn on ".NET Framework Version 3.5 (includes .NET 2.0 and 3.0)" feature of the PC you want to install. If you install this software during turn off the feature, the installation will stop and show the following dialog.

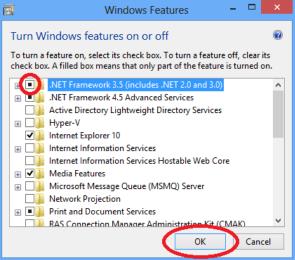


If the dialog is shown, install this software again after you turn on ".NET Framework Version 3.5 (includes .NET 2.0 and 3.0)" feature as following steps.

- (1) Be ready to connect the PC to the Internet.
- (2) Select [Programs] [Turn Windows features on or off] from the Control Panel.



(3) Check [.NET Framework 3.5 (includes .NET 2.0 and 3.0)] check box on Turn Windows features on or off screen and click [OK].



(4) Select [Download files from Windows Update] when the following screen is shown.

🛞 🖾 Windows Features
Windows needs files from Windows Update to finish installing some features.
I → Download files from Windows Update
Don't connect to Windows Update No changes will be made to your PC.
Cancel

(5) This process is complete when the following screen is shown.

e i	🔄 Windows Features	
	Windows completed the requested changes.	
		se

# 1.5.2. Uninstall

Uninstall with the following method.

- Windows 2000 / XP

Execute [Start] - [Control Panel] [Program Add and Delete].

- Windows Vista

Open [Start] – [Control Panel].

When not using the classic display With [Control Panel] [Program], execute [Uninstall Program].

### For classic display

With [Control Panel] [Program Functions], select the application name, then execute the uninstallation.

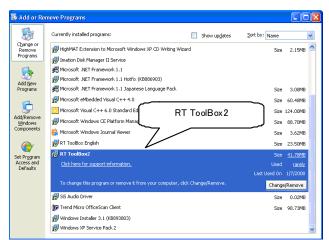
- Windows 7

Execute [Start] – [Program Functions] or [Uninstall Program], select the application name, then execute the uninstallation.

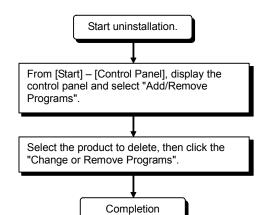
- Windows 8 / 8.1

Press the [Windows] + [X] key, and select the [Program Functions] from the displayed menu.

With [Program Functions], select the application name, then execute the uninstallation.







# 1.5.3. USB driver (CR750-D/CRnD-700 series robot controller) installation

Connecting the CR750-D/CRnD-700 series robot controller with USB requires installation of the robot USB driver. Install with the following procedure.

#### 1.5.3.1. When using Windows 2000

When you connect the CR750-D/CRnD-700 robot controller and the computer with a USB cable, installation starts and completes automatically.

#### 1.5.3.2. When Using Windows XP

Below is the installation procedure for the USB driver using Windows XP (Professional).

Hardware Update Wizard		
	Welcome to the Hardware Update Wizard	
	This wizard helps you install software for:	
	CRnD Robot controller	
	If your hardware came with an installation CD or floppy disk, insert it now.	
	What do you want the wizard to do?	
	<ul> <li>Install the software automatically (Recommended)</li> </ul>	
	<ul> <li>Install from a list or specific location (Advanced)</li> </ul>	
	Click Next to continue.	
	< Back Next > Cancel	
	$\downarrow$	
Hardware Update Wizard		
	Completing the Hardware Update Wizard The wizard has finished installing the software for: CRnD Robot controller	
< Back Finish Cancel		
(Completed)		

 When you connect the computer and CR750-D/CRnD-700 series robot controller with a USB cable, the screen on the left is displayed. Select "Install the software automatically (Recommended)", then click the [Next] button. Installation of the USB driver starts.

2) When the screen on the left is displayed, the installation is complete. Click the [Finish] button to end the installation.

#### 1.5.3.3. When using Windows Vista

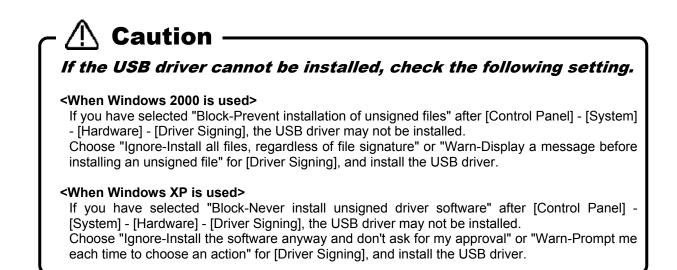
When you connect the CR750-D/CRnD-700 robot controller and the computer with a USB cable, installation starts and completes automatically.

#### 1.5.3.4. When using Windows 7 / 8 / 8.1

When you connect the CR750-D/CRnD-700 robot controller and the computer with a USB cable, installation starts and completes automatically.

# 1.5.4. CRnQ communications USB driver installation

Connecting the CR750-Q/CRnQ-700 series robot controller with USB requires installation of the robot USB driver. Install with the following procedure.



#### 1.5.4.1. When using Windows 2000

The following indicates the procedure for installing the USB driver when using Windows 2000.

Ind New Hardware Wizard	Welcome Hardware This wizard help hardware device	Wizard s you install a de			
	To continue, clic	:k Next.			
		< <u>B</u> ack	<u>N</u> ext≻	Cancel	
	$\downarrow$				
Install Hardware Device I	Ind New Hardware Wizard  Install Hardware Device Drivers  A device driver is a software program that enables a hardware device to work with an operating system.				
This wizard will complete t	he installation for t	his device:			
USB Device					
A device driver is a softwa needs driver files for your i installation click Next.					
What do you want the wiz	ard to do?				
Search for a suitable	le driver for my de	vice (recommen	ded)		
C Display a list of the driver	known drivers for	this device so th	nat I can choose	a specific	
		< <u>B</u> ack	<u>N</u> ext >	Cancel	

 The screen shown on the left appears when you connect the personal computer and Universal model QCPU by the USB cable.
 Click the [Next] button.

 Choose "Search for a suitable driver for my device [recommended]" and click the [Next] button.



(Completed)

3) Check "Specify a location" and click the [Next] button.

4) As the left screen appears, set the "C:\Melsec\EasySocket\USBDrivers" and

If volume MELSOFT products have been installed, browse the installation destination "EasySocket\USBDrivers" of the first installed product. After setting, click the [OK] button.

5) The screen on the left appears to indicate completion of installation. Click the [Finish] button.

#### 1.5.4.2. When using Windows XP

The following indicates the procedure for installing the USB driver when using Windows XP (Professional).

Found New Hardware Wizard				
Welcome to the Found New Hardware Wizard Windows will search for current and updated software by Jooking on your computer, on the hardware installation CD, or the Windows Update Web site (with your permission). Read our privacy policy Can Windows connect to Windows Update to search for software?				
	C Yes, this time only Yes, now and every time I connect a device No, not this time Click Next to continue.			
	< Back Next > Cancel			
Found New Hardware Wiz	ard			
	This wizard helps you install software for: MITSUBISHI Easysocket Driver			
	If your hardware came with an installation CD or floppy disk, insert it now. What do you want the wizard to do?			
	C [nstall the software automatically [Recommended]  finstall from a list or specific location (Advanced]  Click Next to continue.  Back Next Cancel			
Hardware Update Wizard Please choose your sear	ch and installation options.			
	ver in these locations. below to limit or expand the default search, which includes local nedia. The best driver found will be installed.			
Include this loca	ble media (floppy, CD-ROM) ation in the search: ySocket\USBDrivers VBrowse			
O Don't search. I will choose the driver to install. Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.				
	< Back Next > Cancel			
	1			

 The screen shown on the left appears when you connect the personal computer and Universal model QCPU by the USB cable.
 Choose "Yes, now and every time I connect a device" and click the [Next] button.

2) As the screen on the left appears, choose "Install from a list or specific location [Advanced]" and click the [Next] button.

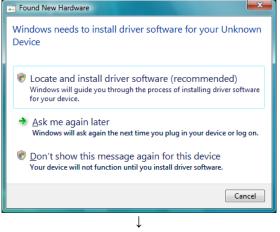
3) As the screen on the left appears, choose "Search for the best driver in these locations".
Check "Include this location in the search" and set the "C:\Melsec\EasySocket\USBDrivers".
If volume MELSOFT products have been installed, browse the installation destination "EasySocket\USBDrivers" of the first installed product.
After setting, click the [Next] button.



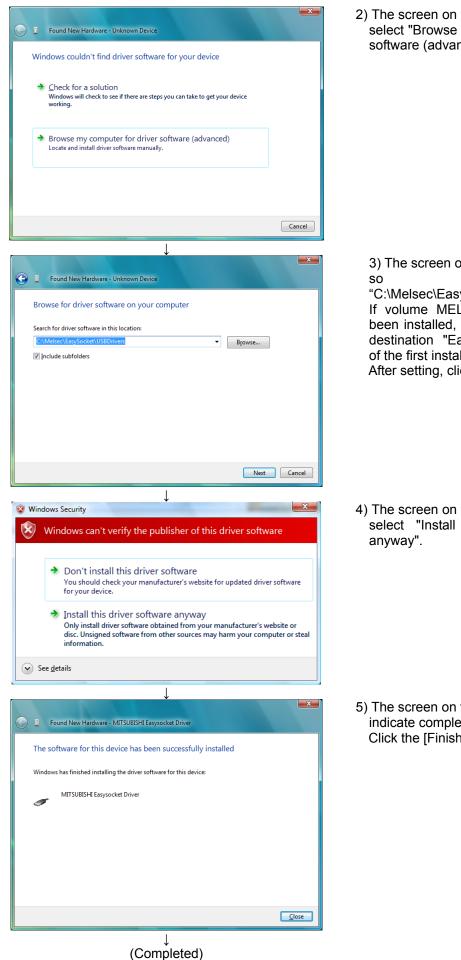
- 4) As the screen on the left appears, click the [Continue Anyway] button to continue the installation of the USB driver.
  (No problem will occur after installation of the USB driver.)
- 5) The screen on the left appears to indicate completion of installation. Click the [Finish] button.

## 1.5.4.3. When using Windows Vista

The following indicates the procedure for installing the USB driver when using Windows Vista (Business).



 The screen shown on the left appears when you connect the personal computer and Universal model QCPU by the USB cable.
 Select "Locate and install driver software (recommended)" and wait for the search to end.



 The screen on the left is displayed, so select "Browse my computer for driver software (advanced)".

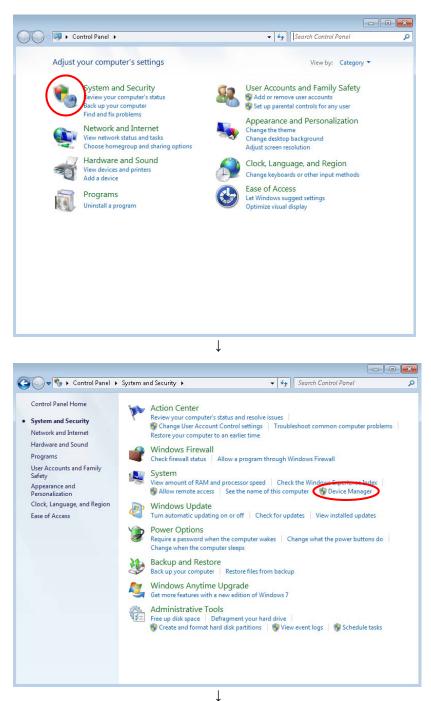
3) The screen on the left is displayed, so select "C:\Melsec\EasySocket\USBDrivers". If volume MELSOFT products have been installed, browse the installation destination "EasySocket\USBDrivers" of the first installed product. After setting, click the [Next] button.

4) The screen on the left is displayed, so select "Install this driver software anyway".

5) The screen on the left appears to indicate completion of installation. Click the [Finish] button.

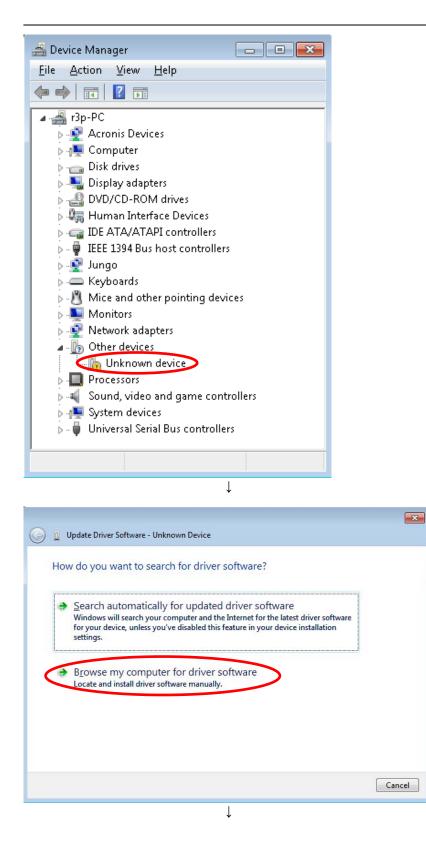
#### 1.5.4.4. When using Windows 7 / 8 / 8.1

The following indicates the procedure for installing the USB driver when using Windows 7 / 8 / 8.1.



 When "Control panel" is selected from the start menu with the USB cable connected, the following screens are displayed. The screen on the left is displayed, clicking the red circle part in this screen.

2) The screen on the left is displayed, clicking the red circle part in this screen.



 The screen on the left is displayed, right-clicks on "Unknown device" is displayed on this screen. Select "Update Driver Software" of the menu that right-clicks on this item and is displayed.

4) The screen on the left is displayed, click lower "Browse my computer for driver software".

🚱 🛽 Update Driver Software - Unknown Device	5) T s
Browse for driver software on your computer	\   1
Seawh for unver software in this location: C:\Melsec\EasySocket\USBDrivers	k ir "
<ul> <li>Include subioiders</li> <li>Let me pick from a list of device drivers on my computer This list will show installed driver software compatible with the device, and all driver software in the same category as the device.</li> </ul>	L L
Next Cancel	
$\downarrow$	
Windows Security	6) T
Would you like to install this device software?	С
Name: Easysocket USB Drivers  Publisher: MITSUBISHI ELECTRIC CORPORATION	
Always trust software from "MITSUBISHI ELECTRIC Install Corporation".	
You should only install driver software from publishers you trust. How can I decide which device software is safe to install?	
$\downarrow$	
Update Driver Software - MITSUBISHI Easysocket Driver	7) TI inc C
Windows has successfully updated your driver software	
Windows has finished installing the driver software for this device:	
MITSUBISHI Easysocket Driver	
Close	
1	
(Completed)	

5) The screen on the left is displayed, set "C:\Melsec\Easysocket \USBdrivers".
If volume MELSOFT products have been installed, browse the installation destination
"EasySocket\USBDrivers" of the first installed product.
After setting, click the "Next" button.

6) The screen on the left is displayed, click "install".

7) The screen on the left appears to indicate completion of installation. Click the [Finish] button.

# 1.5.5. CRnQ Communications USB driver for GOT transparent function / GOT communitation installation

Connecting the CR750-Q/CRnQ-700 series robot controller with USB via GOT transparent mode (Bus, Direct coupled or Ethernet) and connecting the CR750-D/CRnD-700 series robot controller with USB via GOT communication requires installation of the USB driver for the GOT transparent function. Install with the following procedure.

CRnQ communication GOT transparent mode is available from RT ToolBox2 Ver.1.1 or later. GOT communication is available from RT ToolBox2 Ver.1.5 or later. Ethernet is available from RT ToolBox2 Ver.1.7 or later.

#### 1.5.5.1. When using Windows 2000

When you connect the GOT and the computer by the USB cable, installation starts and completes automatically.

#### If the USB driver cannot be installed, click the following setting.

If you have selected "Block-Prevent installation of unsigned files" after [Control Panel] - [System] -

[Hardware] - [Driver Signing], the USB driver may not be installed.

Choose "Ignore-Install all files, regardless of file signature" or "Warn-Display a message before installing an unsigned file" for [Driver Signing], and install the USB driver.

#### 1.5.5.2. When using Windows XP

The following indicates the procedure for installing the USB driver when using Windows (Professional)

	Ū					
Found New Hardware Wiz	ard					
	Welcome to the Found New Hardware Wizard Windows will search for current and updated software by					
	looking on your computer, on the hardware installation ĈD, or on the Windows Update Web site (with your permission). <u>Read our privacy policy</u>					
	Can Windows connect to Windows Update to search for software?					
	○ Yes, this time only					
	Yes, now and every time I connect a device					
	O No, not this time					
	Click Next to continue.					
	< Back Next > Cancel					
	$\downarrow$					
Found New Hardware Wiz	ard					
	Welcome to the Found New Hardware Wizard					
	This wizard helps you install software for:					
	MITSUBISHI GOT1000 USB Controller					
	If your hardware came with an installation CD or floppy disk, insert it now.					
	What do you want the wizard to do?					
	<ul> <li>Install the software automatically [Recommended]</li> <li>Install from a list or specific location (Advanced)</li> </ul>					
	Click Next to continue.					

< <u>B</u>ack

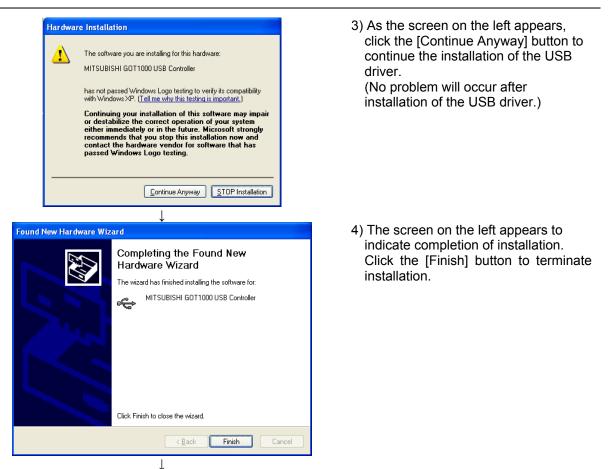
Ţ

<u>N</u>ext>

Cancel

 The screen shown on the left appears when you connect the personal computer and GOT by the USB cable. Choose "Yes, now and every time I connect a device" and click the [Next] button.

2) As the screen on the left appears, select "Install the software automatically (Recommended)", then click the [Next] button.



(Completed)

#### If the USB driver cannot be installed, click the following setting.

If you have selected "Block-Never install unsigned driver software" after [Control Panel] - [System] - [Hardware] - [Driver Signing], the USB driver may not be installed. Choose "Ignore-Install the software anyway and don't ask for my approval" or "Warn-Prompt me each time to choose an action" for [Driver Signing], and install the USB driver.

#### 1.5.5.3. When using Windows Vista

When you connect the GOT and the computer by the USB cable, installation starts and completes automatically.

#### 1.5.5.4. When using Windows 7 / 8 / 8.1

When you connect the GOT and the computer by the USB cable, installation starts and completes automatically.

## **1.6.** When Starting at the Same Time as Another Product

When starting this software and another one of our products at the same time, follow the following precaution. Correct communications and screen display are sometimes not possible.

Product name	Explanation	Precaution
RT ToolBox	Older version of this software	Can not be used at the same time as
computer support software	soltware	this software MELFA-Works Ver.3.0 or lator can be
MELFA-Works	3D robot simulator	used at the same time as this software. Earlier version than Ver.3.0 can not be used.
MELFA-Vision	Network vision sensor software	Start this software first.
E/EN series computer support software for Windows	E/EN series software	Can not be used at the same time as this software
P/P-2	R-250R/R-300R series software	Can be used at the same time as this software

 Table 1-5 Precautions for Starting at the Same Time with Another Product

## 1.7. Upgrade of software

It is possible to download the latest version from MITSUBISHI ELECTRIC FA site where information on MITSUBISHI ELECTRIC Corporation FA equipment product is offered. (It is only a Japanese site.)

http://wwwf2.mitsubishielectric.co.jp/melfansweb/robot/index.html

It is necessary to register to FA members for downloading the software.

Difference update of robot model information can be performed after Ver.3.00A.

# 2. RT ToolBox2 Usage

This explains the usage of this software simply.

#### 2.1. Starting RT ToolBox2

When you install this software, a shortcut is prepared on the desktop. Start RT ToolBox2 by double clicking this short cut.





Version 1.8 or earlier

Version 2.00A or later Figure 2-1 RT ToolBox2 Shortcut

From [Start] button -> [All Programs] -> [MELSOFT Applications], select [RT ToolBox2] and start it.

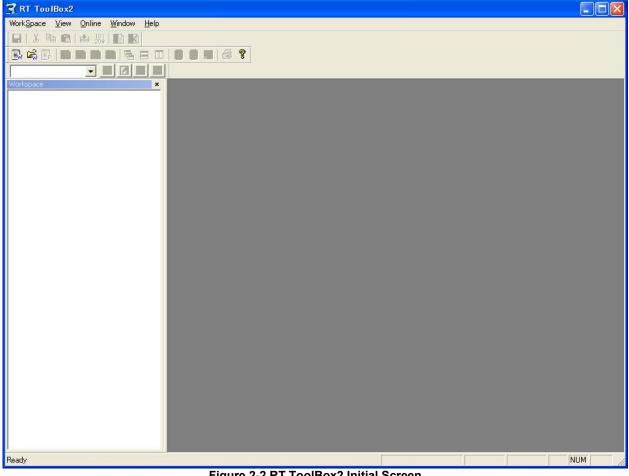


Figure 2-2 RT ToolBox2 Initial Screen

When you start RT ToolBox2, "Communications Server 2" is started up as an icon. This Communications Server 2 has functions for connecting with a robot controller or during a simulation, a virtual controller. Do not close Communications Server 2.



Figure 2-3 Communication Server 2

# 2.2. Explanation of RT ToolBox2 Screens

The composition of the main RT ToolBox2 screen is as follows.

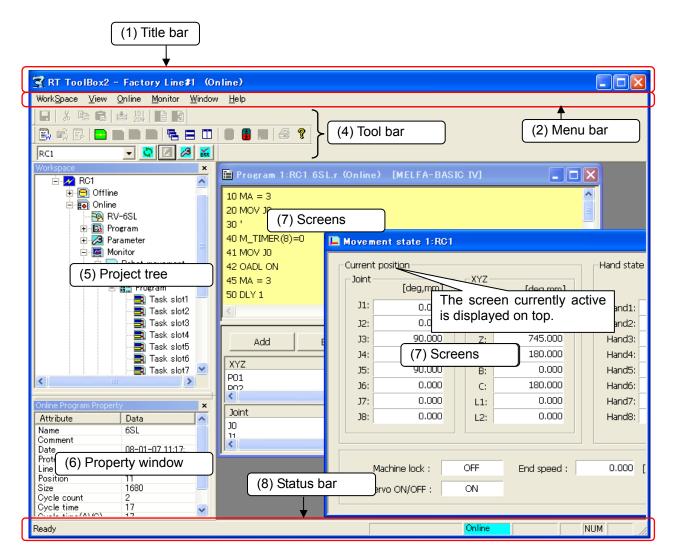
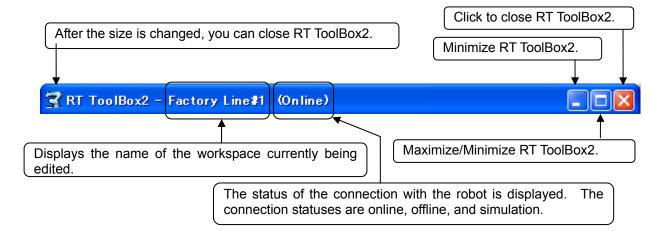


Figure 2-4 Explanation of Main Screen

#### (1) Title bar

Displays the name of the workspace currently being edited.



(2) Menu bar

Displays the names of the menus that can be used in RT ToolBox2. When a menu is selected, a dropdown menu is displayed from which you can use various functions.

WorkSpace View Online File Edit Debug Tool Window Help

The menu bar display contents and their enabled/disabled status depend on which screen is currently active.

(3) Dropdown menu

Displays the names of the functions you can use in RT ToolBox2. When you click a function name, it displays a screen with the settings etc. for the selected function. When """ is displayed at the right end of a dropdown menu, a dropdown menu for the selected function is displayed

New     Ctrl+N       Open     Ctrl+O       SaveAs     Close       Delate     Click to display the screen.	Parameter list Motion Limit Jog Hand Weight and Size(Hand) Tool Slot Table	Displays a dropdown menu.
Open Workspace         Workspace path         C:#RT ToolBox2         Update         Workspace name         Title name         Factory Line#1         Factory Line#2	ienal reset pattern id input/output signals assignment ication Browse Browse be limit bsition Language dditional Axis Detection o operation h parameter d parameter or Setting paramater setting JS setteing	General1 General2 Data Jog Hand Warm Up Start(each slot) Stop(each slot) Servo ON/OFF(each robot) Machine lock(each robot)
Workspace name Title name OK	Cancel	

#### (4) Tool bar

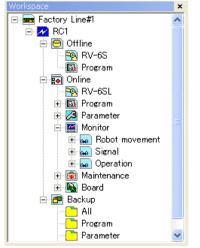
Displays buttons for the functions assigned to the menu bar.

	X @	B		10       20 v	Ê :	Â					
E.	W EP								. (4	3	?
RC1			-	0		<mark>/3</mark>	ERR				_

The tool bar display depends on which screen is currently active and on the robot connection status.

#### (5) Project tree

Displays a list of all the projects registered in the workspace and by functions. From this tree, the program edit screen, monitor screen, etc. can be started.



The project tree is a docking window. By dragging the title section with the mouse, you can dock the project tree at the top, bottom, left, or right edge of the main screen.

When the project tree is closed, you can display it again by clicking on the menu bar [View] -> [Project Tree].

#### (6) Property window

You can reference various attributes of the workspace being edited. If you click an item on the project tree, its attributes are displayed.

Workspace			x	
🖃 🚾 Factory Line#	1	~		
🖻 📈 RC1				
🚊 🕒 Offline				
- 🖓 R\	/-6S			
🗔 Pri	ogram			
🚊 😱 On line		_		
			-1	la va la va al
I ne attrib	outes are b	peing	d	isplayed.
Online Property			×	
Attribute	Data	V		
Controller Type	CRn-500			
Controller Version	Ver.K7			
Serial number	vejol			
Serial Date				
Robot #1	RV-6SL			
Serial number				
Serial Date	00			
Program count	20			
Empty volume	172544			

The property window is a docking window. By dragging the title section with the mouse, you can dock the project tree at the top, bottom, left, or right edge of the main screen.

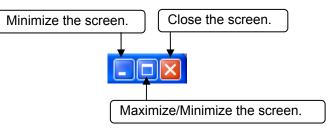
The default setting for the property window is not to be displayed. You can display the property window with the menu bar [View] -> [Property].

#### (7) Screens

Displays the screens that can be started from the project tree, including the program edit screen and monitor screen. The currently active screen is displayed on top.

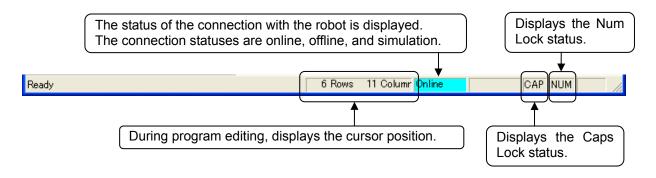
30 H		t 1:RC1					
40 Rob	ot1	↓ 1:	RV-6SL				Parameter list
	meter 🛄 Mo	vement	state 1:RC1				
Par	MODE	rrent posit	ion			Hand state	
AIR	ERR1 ERR2	oint	[deg,mm]	XYZ-	[deg,mm]		
	ERR3	J1:	97.100	X:	-83.880	Hand1:	OPEN
	ERR4	J2:	35.040	Y:	673.540	Hand2:	OPEN
	ERR5 GNTYR	J3:	98.860	Z:	353.500	Hand3:	OPEN
ڬ 🛛 AL I	VENA	J4:	0.000	A:	180.000	Hand4:	OPEN
and an and a second	CH1S CH1T	J5:	46.100	B:	0.000	Hand5:	1 <u>0000</u> 9
		J6:	0.000	C:	-82.900	Hand6:	
	H2T	J7:	0.000	L1:	0.000	Hand7:	10 <del>7777</del> 76
<u>  &lt;</u>		J8:	0.000	L2:	0.000	Hand8:	
		64achi	ne lock :	OFF	End speed :	0.000 fr	mm/sec]

To close a screen, click the [23] button in the upper-right corner of the screen. You can also change the screen size with the button in the upper-right of the screen.



#### (8) Status bar

Displays RT ToolBox2 status information.



(9) Handy menu display

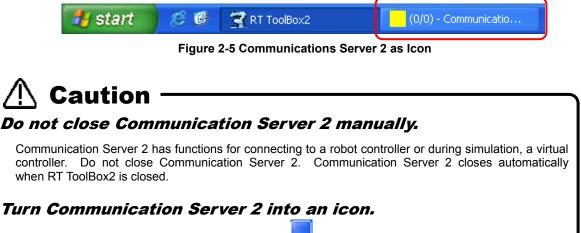
By clicking the right button on the mouse, you can display the right button menu, depending on the work contents. Using this menu can increase work efficiency.

During program editing, the right button menu includes such functions as [Copy], [Paste], and [Cut].

# 2.3. Communications Server 2

When you start RT ToolBox2, "Communications Server 2" is started up as an icon.

This Communications Server 2 has functions for connecting with a robot controller or during a simulation, a virtual controller.



Turn Communication Server 2 into an icon with the 📃 button.

When you return Communications Server 2 from an icon to its original size, you can check the status of the connection with the robot.

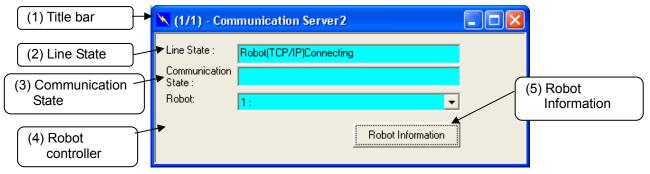


Figure 2-6 Communication Server2

#### (1) Title bar

(AA/BB) AA: shows the number of robot controllers with which connections are established and BB: shows the number of projects switched online.

#### (2) Line State

The connection status of the communication line with the robot is displayed. The status color indicates the status of the robot controller that is currently being selected.

Tab	le 2-1	Line	St	ate	
		~			

Status	Content	Color
Connecting	Indicates that the connection with the robot has been established.	Light blue or Blue
Connection wait	Indicates that a communication to verify connection is being made in the case of RS-232 connection. Indicates the wait status for communication port connection in the case of TCP/IP and USB connection.	Green
Connection error	Displayed when the data reception enable signal cannot be detected because a cable has been disconnected or the robot has not been started in the case of RS-232 connection. Displayed when the communication port cannot be opened in the case of TCP/IP and USB connection. In the case of USB connection, if the USB driver has not been installed, it is also displayed in red.	Red
Communication	Displayed when the communication port cannot be opened in the case of	Red

Status	Content	Color
Setting error	RS-232 connection. This is not displayed in the case of TCP/IP connection	
Waiting	Indicates the idling status displayed at the start of remote maintenance.	Yellow

#### (3) Communication State

The contents of communication with the robot controller are displayed.

(4) Robot

This changes the robot controller for which the "Line status" and "Communication status" are displayed. This is only displayed for robot controllers that are online or have been switched to simulation status.

#### (5) Robot Information

Information on the currently connected robot can be referenced.

📑 Ro	bot Information		
			Close
No.	RC Name	Robot Contoroller	Robot
1		CRnQ-7xx	RV-6SQ
<u>&lt;</u>			>

Figure 2-7 Connected Robot Information

Caution
 Cautions when connected on USB with CRnQ communications
 When connected on USB with CRnQ communications, after connecting normally, if the
 communications are cut off due to any of the following external causes, the line status display

communications are cut off due to any of the following external causes, the line status display remains "Connected". If this happens, return this software offline, remove the cause of the cutoff, and then go back online.

- The robot controller power supply went off.
- The communication cable was disconnected.

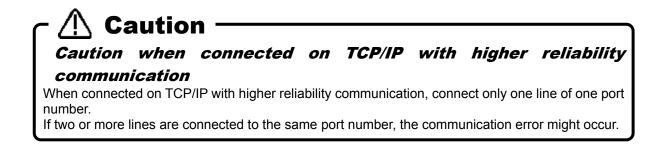
This software Ver.1.5 or later can communicate with robot controller by higher reliability communication. In this case, line state color (connecting) of communication server 2 is "Blue".

		Robot controller software version						
		CRn-500	CR750-D/0	CRnD-700	CR750-Q/CRnQ-700			
		All versions	Ver.P7a or former Ver.P8 or later		Ver.N7a or former Ver.N8 or			
This software	Ver.1.4.1 or former	0	0	0	0	0		
verion	Ver.1.5 or later	0	0	Ø	0	Ø		

#### Table 2-2 Conbination of higher reliability communication

• : Conventional communication (line state color (connecting) : light bule)

◎ : Higher reliability communication (line state color (connecting) : blue)



# 2.4. Closing RT ToolBox2

To close RT ToolBox2, on the menu bar, click [Workspace] -> [Close Application]. You can also close with the [1] button in the upper-right of the screen.

When you close RT ToolBox2, Communications Server 2 also closes automatically.

# 3. Notes of when RT ToolBox2 is used with iQ Works (MELSOFT Navigator)

There are some limitations when robot controller's workspace is made by using iQ Works(MELSOFT Navigator) or RT ToolBox2 is started from iQ Works(MELSOFT Navigator). Please refer to the following notes when you use iQ Works(MELSOFT Navigator).

RT ToolBox2 corresponding to iQ Works(MELSOFT Navigator) is version 2.00A or later.

### 3.1. Notes of when RT ToolBox2 is installed

# Notes 1-1: Please input product ID attached to the product again when you install a standard version of RT ToolBox2 in the personal computer in which "iQ Works(MELSOFT Navigator" is installed.

When RT ToolBox2 is installed in the personal computer in which "iQ Works(MELSOFT Navigator)" is installed, product ID for "iQ Works(MELSOFT Navigator)" is displayed on "Input Product ID" screen. RT ToolBox2 is installed in the personal computer as mini version when this software is installed with this Product ID. Please input product ID attached to RT ToolBox2 product again when you install a standard version of RT ToolBox2.

#### 3.2. Notes concerning workspace operation

#### Notes 2-1: The workspace name and the workspace title cannot be changed.

When RT ToolBox2 is started from iQ Works(MELSOFT Navigator), the workspace name and the workspace title cannot be changed. "Edit workspace" in the dropdown menu of the workspace name is displayed in the gray and cannot be selected. (Refer to "Figure 3-1 Menu of [Workspace] and Dropdown-menu of the Workspace")

#### Notes 2-2: Please close RT ToolBox2 once when you edit another workspace.

The another workspace cannot be opened after closing the editing workspace when RT ToolBox2 is started from iQ Works (MELSOFT Navigator). [New] of the [Workspace] menu and [Open] are displayed in the gray, and cannot be selected. (Refer to "Figure 3-1 Menu of [Workspace] and Dropdown-menu of the Workspace") When you edit another workspace, please exit RT ToolBox2 once and start RT ToolBox2 specifying another workspace from iQ Works(MELSOFT Navigator).

#### Notes 2-3: It is not possible to save as another name when the workspace is edited.

The editing workspace cannot be saved as another name when RT ToolBox2 is started from iQ Works (MELSOFT Navigator). [Save As] in [Workspace] menu is displayed in the gray and cannot be selected.

<u>P</u> rint Ctrl+P Print Pre⊻iew	Dropdown-menu of Workspa (online)
Print Setup	
Exit	
Exit	

Figure 3-1 Menu of [Workspace] and Dropdown-menu of the Workspace

### 3.3. Notes concerning Project operation

#### Notes 3-1: It is not possible to delete, or and import a project.

When RT ToolBox2 is started from iQ Works(MELSOFT Navigator), it is not possible to add a new project, import a project, or delete an existing project. [Add project] and [Import project] ( in the dropdown menu by selecting a workspace name) and [Delete project] ( in the dropdown menu by selecting a project name ) are display in the gray and cannot be selected.



Menu of [Workspace]

Figure 3-2 Menu of [Workspace] and Dropdown-menu of the Workspace

#### Notes 3-2: It is not possible to change a project name.

When RT ToolBox2 is started from iQ Works(MELSOFT Navigator), it is not possible to chage the project in the editing workspace. "Project name" in "Edit project" screen is displayed in the gray, and cannot be selected.

	Edit Project		
Edit Project	Project name: Proj01		
Update Project	Communication setting		
Offline 🕨	R/C type: CRnD-700		
Backup 🕨	Method: TCP/IP 💌 Detail		
	IP Address=localhost Port=10001 Send Timeout=5000msec Recieve Timeout=30000msec		
	Model Selection for Offline		
	Robot model: RV-6S Select		
	Language: MELFA-BASIC V		
	Travel base setting for display         Only travel base information for display is set here. To change the movement range of the travel axis, change the parameters.         Travel base:       Not used         OK       Cancel		

Figure 3-3 Edit project

# 3.4. Notes to edit the workspace created by iQ Works(MELSOFT Navigator)

# Notes 4-1: Do not change the composition of the workspace created by iQ Works(MELSOFT Navigator).

The composition (changing a workspace name, changing a title, adding a project, deleting a project or changing a project name) of the workspace made with iQ Works(MELSOFT Navigator) cannot be changed with RT ToolBox2 started from iQ Works(MELSOFT Navigator). These information can be edited with RT ToolBox2 started directly by the start menu etc. However, it becomes impossible to take the correspondence in iQ Works(MELSOFT Navigator) when these information is changed. Please do not change the composition (changing a workspace name, changing a title, adding a project, deleting a project or changing a project name) of workspace when editing them with RT ToolBox2 started directly.

Prohibited matter in RT ToolBox2 started directly		
Workspace	<ul> <li>Change the workspace name.</li> </ul>	
	<ul> <li>Change the title.</li> </ul>	
Project	<ul> <li>Add a project</li> </ul>	
	<ul> <li>Import a project</li> </ul>	
	<ul> <li>Delete a project</li> </ul>	
	<ul> <li>Change the project name</li> </ul>	

The workspace name made with iQ Works (MELSOFT Navigator) is set as follows. Please note the handling of this workspace.

Workspace name <b>RT Workspace</b>	This is fixation.
------------------------------------	-------------------

# 4. Basic Functions

The basic functions of this software are shown below.

Table 4-1 RT ToolBox2 Basic Functions

Table 4-1 RT ToolBox2 Basic Functions			
Function   Explanation			
Offline Targets files on the computer.			
Robot model	Displays the model of the robot used.		
Program	Displays the names of the robot programs written on the computer.		
SQ Direct	Displays the SQ Direct files written on the computer. (*2)		
Parameter It is possible to set the parameters by offline and save them to t			
	(*1)		
	The saved files can be sent to the robot controllers.		
Online	These are used with the robot controller connected.		
Robot model	Displays the model of the robot connected to the robot controller.		
Program	Displays the names of the programs stored on the robot controller.		
SQ Direct	It is possible to edit SQ Direct variables in the robot controllers. (*2)		
Parameters	It is possible to set the parameters and preserve them to the file without		
	connecting the robot controller. (*1)		
	And, the preserved parameter file can be forwarded to the robot controller.		
Parameter list	The parameters can be set individually.		
Parameter	The parameters can be set by robot function individually.		
settings by	The functions are as follows.		
function	Operating range     Added axes		
	Jog     Collision detection		
	Hand     Heater operation		
	Weight and size     Operation parameters		
	Tool     Program parameters		
	Slot table     User error		
	Output signal reset pattern     Ethernet setting		
	Dedicated input/output signal CC-Link parameter setting		
	allocation • PROFIBUS setting		
	RS-232 settings     IO unit (*4)		
	User-defined area     Work coordinate (*2)		
	Free plane limit     Force control (*4)		
	Evacuation point     Collision avoidance (*6)		
	Robot language		
	5 5		
Monitors			
Operation	You can reference the slot status, program, monitor, operation status, and		
monitor	current errors.		
Signal monitor	You can check the statuses of signals input to the robot and signals output from the robot.		
Work monitor	You can check the robot work time and production information for each robot program.		
Maintenance			
Home position	This sets the robot home position.		
data			
Initialization	This sets the robot controller's internal time, deletes all the programs in the controller, initializes the battery time remaining, and sets the serial number for the connected robot.		
Maintenance forecast	Forecasts the time for maintenance.		
Position repair	Supports recovery from home position deviation		
Tool automatic	The tool length is calculated automatically and the value of a tool parameter is set		
calculation	up. (*5)		
Servo monitor	Monitors servo system information.		
Password Setup	The password to limit controller's right of access is registered, changed or		
	deleted. (*3)		

Function		Explanation		
	File Manager	You can copy, delete and rename the file in the robot controller. (*5)		
Option card		You can check information on option cards mounted in the robot controller		
Tool				
Force control log viewer		This function can display the graph of log data of force control in PC and robot controllers.		
User definition screen		It is possible to edit the user definition screen which can be operated by highly efficient T/B. (*5)		
Oscillograph The		The data of a robot controller is displayed in a graph. (*7)		
Simulation		This can be used connected with a virtual robot. *This can only be used with the standard edition.		
Same functions as online		The same functions can be used with a virtual robot controller as with an online one.		
		The tact time for the robot program with the specified contents can be measured in the simulation.		
Backup, restore		You can back up the information in the robot controller and restore backed up information into the controller.		
MELFA 3D-Vision You can do a setup of MELFA-3D Vision. (*7)		You can do a setup of MELFA-3D Vision. (*7)		
(*1)	This function can be used	with Version 1.4 or later of this software.		

(\*2) This function can be used with Version 1.5 or later of this software.
(\*3) This function can be used with Version 2.00A or later of this software.
(\*4) This function can be used with Version.2.10L or later of this software.

(\*5) This function can be used with Version 2.20W or later of this software.
(\*6) This function can be used with Version 2.40S or later of this software.
(\*7) This function can be used with Version 3.00A or later of this software.

# 5. Workspaces and Projects

This explains about workspaces and projects.

### 5.1. Workspaces and Projects

This software has workspaces and projects.

The information for one controller is managed as one project. A workspace can manage up to 32 projects. If Ethernet is used for communications, you can simultaneously reference information on multiple projects (robot controllers) registered in the workspace.

When using multiple robot controllers, it is convenient to manage with separate workspaces for each manufacturing line and installation location.

(1) Using multiple robot controllers (up to 32)

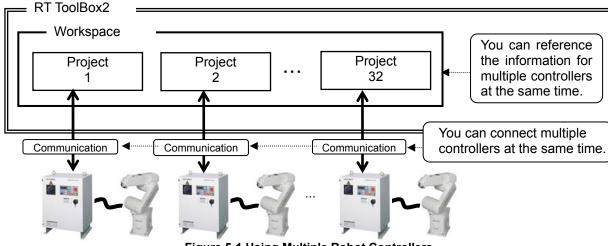


Figure 5-1 Using Multiple Robot Controllers

(2) Using 1 robot controller

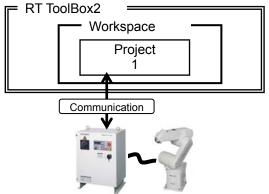


Figure 5-2 Using One Robot Controller

# - \land Caution

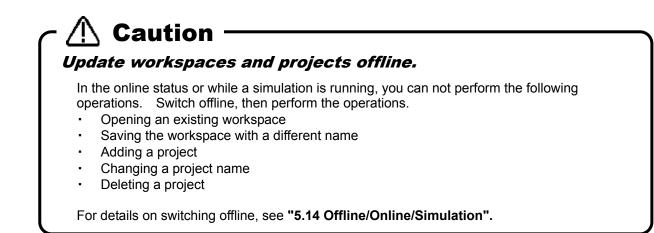
### You cannot edit multiple workspaces at the same time.

With this software, you cannot edit multiple workspaces at the same time. Register into a single workspace all the projects (controllers) you want to reference at the same time.

#### Simultaneous connection with 32 units

The maximum of 32 robot connections is a theoretical value. It does not guarantee that if you actually connect 32 robots, you will achieve the same performance as when only 1 robot is connected. For example, if you monitor all the robots when 32 are connected, status updating is slower than for when 1 robot is connected.

Workspace editing and storage and project addition etc. are explained from the next section on.



### 5.2. Creating a New Workspace

Click [Workspace] -> [New Workspace] or click (Ctrl + N). Creating a New Workspace screen is displayed. Input the workspace name and title, and then click the [OK] button. The project edit screen is displayed, so set the project name (arbitrary name), the communication method and the robot model for offline (both are the information of the robot that you want to connect.), then click the [OK] button.

When you use the softwar	re Version 1.2 or	earlier, the project	ct edit screen	is not displayed.

New Workspace	Edit Project 🔀
Workspace path C:\mathbf{C}:\mathbf{T} ToolBox2 Update Workspace name Title name Version 1.3 or later	Project name: RC1 Communication setting R/C type: CRnD-700 Method: USB Send Timeout=5000msec Recieve Timeout=30000msec Retry=3
Workspace name Title name Factory Line#1 Product AAA Line OK Cancel Version 1.2 or earlier	Model Selection for Offline         Robot model:       RV-6S         Language:       MELFA-BASIC V         Travel base setting for display         Only travel base information for display is set here. To change the movement range of the travel axis, change the parameters.         Travel base:       Not used         OK       Cancel
RT ToolBox2 - Factory Line #1 (Online)   WorkSpace   Workspace   RC1   Factory Line#1   RC1	

Figure 5-3 Creating a New Workspace

The project tree is displayed in the workspace and the "RC1" project is created as the default value. This project name can be change later. For details, see **"5.9 Changing a Project Name".** 

# - \land Caution

#### Workspace names

Workspace names are used as folder names in Windows, so you can not use characters that can not be used in Windows folders names ( $\backslash/$ : \* ? " < > | ).

#### Once a workspace has been created, you can not change its name with version 1.7 or earlier of this software.

Be aware that once a workspace has been created, you can not change its name with version 1.7 or earlier of this software.

When you use version 1.7 or earlier of this software, to change the name of a workspace, select "Workspace"on the menu  $\rightarrow$  "Save As", save with the name you want to change to, then delete the original workspace with the old name.

### 5.3. Opening an Existing Workspace

To open an already existing workspace, click [Workspace] -> [Open] or click 🖾 (Ctrl + O). After selecting the workspace to edit, click the [OK] button.

Open Workspace			
Workspace path C:¥RT ToolBox2			Browse
Update			
Workspace name	Title name		
Factory Line#1			
Factory Line#2			
Workspace name Title name	Factory Line#1		
		ОК	Cancel

Figure 5-4 Opening a Workspace

The names of the last up to four workspaces used are added to [Workspace] on the menu bar. You can open one of these workspaces by clicking its name here.

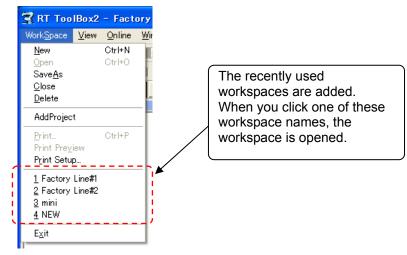


Figure 5-5 Recently Used Workspace Names

### 5.4. Closing a Workspace

To close the workspace being edited, click [Workspace] -> [Close]. Note that to delete a workspce, you must close it first.

### 5.5. Deleting a Workspace

Click [Workspace] -> [Delete]. The "Delete Workspace" screen is displayed, so check the name of the workspace to delete, and then click the [OK] button.

Delete Workspace			X
Workspace path C:¥RT ToolBox2			Browse
Update			
Workspace name	Title name		
Factory Line#1			
		ОК	Cancel

Figure 5-6 Deleting a Workspace

# Caution *Deleting a workspace* To delete a workspace, close that workspace. You can not delete a workspace that is being edited.

### 5.6. Saving a Workspace

The information added to the workspace is saved automatically.

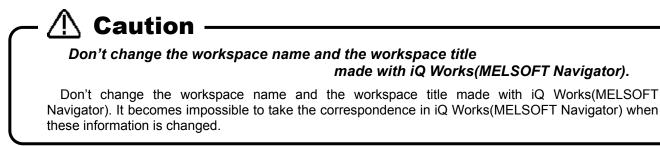
You can also save a workspace with a different name. Click [Workspace] -> [Save As], input the new workspace name and title, then click the [OK] button.

Save As		
Workspace path C:¥RT ToolBox2		Browse
Update		
Workspace name	Title name	
Factory Line#1		
Workspace name Title name	[	
	ОК	Cancel

Figure 5-7 Save As

### 5.7. Changing a Workspace Name and Workspace Title

It is possible to change directly the workspace with version 1.8 or later of this software.



Click the name of the workspace with the right button on the mouse, then click "Edit workspace" on the right button menu. The "Change Workspace" screen is displayed, so input the new workspace name and new workspace title, then click the [OK] button.

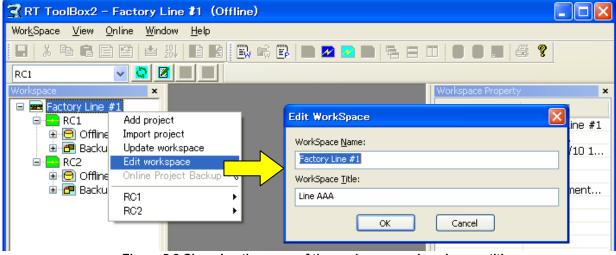


Figure 5-8 Changing the name of the workspace and workspace title

Once a workspace has been created, you can not directly change its name with version 1.7 or earlier of this software. When you use this software of these version, to change a workspace name, use the menu bar [Workspace] -> [Save As] to save the workspace with the desired new name, then delete the old workspace.

When the workspace title is changed, click the name of the workspace with the right button on the mouse, then click "Edit workspace title" on the right button menu. The workspace title screen is displayed, so input the new workspace title, and then click the [OK] button.

🕄 RT ToolBox2 - Factory Line≇1 (Offline)	
Work <u>S</u> pace <u>V</u> iew <u>O</u> nline <u>W</u> indow <u>H</u> elp	
日   3 時 6   4 兆   1 6	
🗈 📽 🕒   🖿 🗖 🖻 🖿   号 🖂   🔍 🔍	
RC1 🔽 🔽 🔳	
Workspace × Factory lines#1 Add project Update workspace Edit workspace title RC1 +	Workspace title Product AAA Line CAncel
Workspace Property	
Attribute Data Name Factory Line#1	
Title Product AAA Line	
Date 2008/01/07 13:45:48	

Figure 5-9 Changing the title of the workspace (version 1.7 or earlier)

# 5.8. Adding a Project

You can create up to 32 projects in one workspace. Click [Workspace] -> [Add Project].

Add Project				
Project name:	RC2			
Communication	setting			
R/C type:	CRnQ-700			
Method:	TCP/IP Detail			
Port=10001 Send Timeou Recieve Time	t=1000msec I			
-Model Selection	for Offline			
Robot model:	RV-6SQ Select			
Language:	MELFA-BASIC V			
Travel base setting for display Only travel base information for display is set here. To change the movement range of the travel axis, change the parameters. Travel base: Not used Detail				
	Cancel			

Figure 5-10 Adding a Project

After setting the project name, information on the robot connected, and the communication method, then click the [OK] button.

The project is added to the workspace.

Projects can also be added from a project tree.

After selecting the workspace, use the mouse right button to select [Add project]. Or, double click the workspace name on the project tree. (Note that this function can be used with Version 1.3 or later of this software)

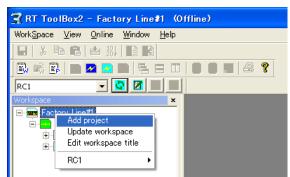


Figure 5-11 Adding a Project from a Project Tree

# ▲ Caution

#### Add a new projects offline.

It is possible to add a new project offline. A new project cannot be added, when the status of either of project is "Online" or "Simulation".

#### Don't add a project to the workspace made with iQ Works(MELSOFT Navigator).

Don't add a project to the workspace made with iQ Works(MELSOFT Navigator). It becomes impossible to take the correspondence in iQ Works(MELSOFT Navigator) when these information is changed.

### 5.9. Changing a Project Name

You can change the name of a project even after it has been created.

Click the name of the project with the right button on the mouse, then click "Edit Project" on the right button menu. The project edit screen is displayed, so input the new workspace title, then click the [OK] button.

🛣 RT ToolBox2 - Factory Line≇1 (Offline)				
Work <u>S</u> pace <u>V</u> iew <u>O</u> nline <u>W</u> indow <u>H</u> elp				
	Edit Project 🛛 🔀			
	Project name: RC1			
Workspace ×	Communication setting			
Factory Line#1	R/C type: CRnQ-700 ▼			
Edit Project	Method: TCP/IP   Detail			
⊕				
Offline	IP Address=			
	Send Timeout=1000msec			
	Model Selection for Offline			
	Robot model: RV-6SQ Select			
	Language: MELFA-BASIC V			
	Travel base setting for display			
	Only travel base information for display is set here. To change the			
	movement range of the travel axis, change the parameters.			
	Travel base: Not used Detail			
	Cancel			

Figure 5-12 Changing a Project Name

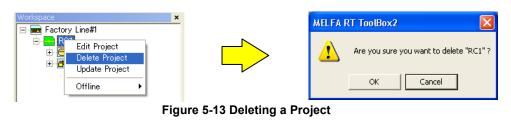
# Don't change a project name in the workspace made with iQ Works(MELSOFT Navigator).

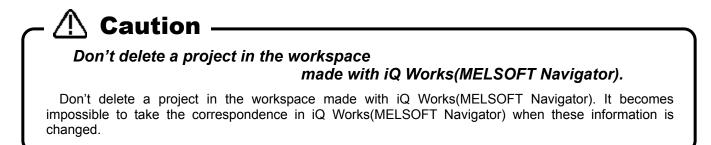
Don't change a project name in the workspace made with iQ Works(MELSOFT Navigator). It becomes impossible to take the correspondence in iQ Works(MELSOFT Navigator) when these information is changed.

# 5.10. Deleting a Project

A project can not be deleted when it is running a simulation or has a robot connected online.

Click the name of the project with the right button on the mouse, then click "Delete Project" on the right button menu. The deletion confirmation message is displayed, so check that you have clicked the correct project name, then click the [OK] button.





## 5.11. Contents of Project Tree

A project tree shows the current workspace's project configuration in a hierarchical manner. You can start all functions from the project tree, including program editing, monitor, etc.

The contents of the project tree depend on the state of connection with the robot controller.

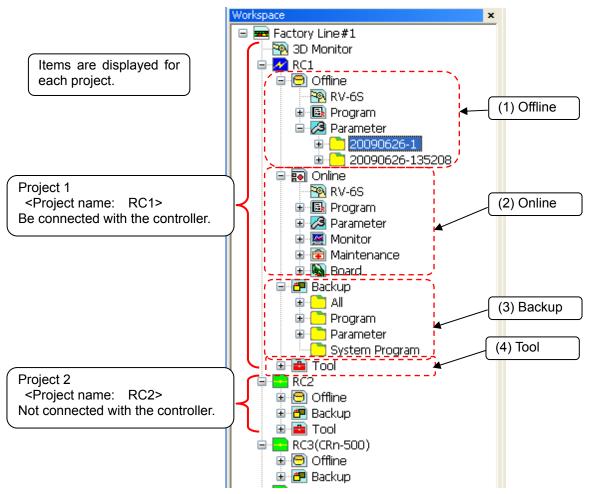


Figure 5-14 Structure of Project Tree in Workspace

#### (1) Offline

Displays the information stored in computer. Displays the robot model set up currently and the name of robot programs created.

#### (2) Online

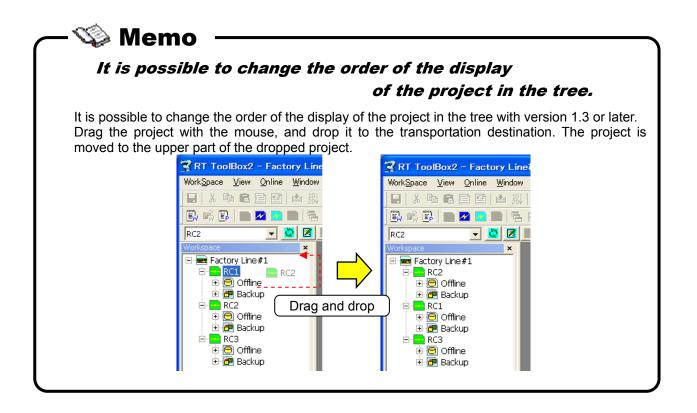
The "Online" section is displayed when a robot is switched into being connected online with its controller or starts a simulation. This section displays the connected robot model and the information items that can be referenced in the controller or a simulation controller.

#### (3) Backup

Controls the information backed up from the controller.

#### (4) Tool

Other functions are displayed.



# 5.12. Copying Programs Between Projects

To copy or move a created robot program to another project, do this with program management. For details on the operation methods, see "8.10 Program Management", "8.10.2 Copy", or "8.10.3 Move".

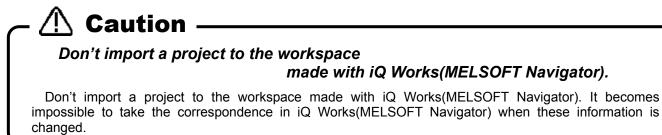
With this software Version 1.3 or later, It is possible to copy by drag and drop the project name on the project tree.

Please refer to "8.10 Program Management" in this manual for details.

## 5.13. Import of project

It is possible that the project in other workspace is imported to the current workspace. Note that this function can be used with Version 1.2 or later of this software.

The project can be imported only at offline. Please operate after change to offline when current mode is online or simulation.



Click [Work space]->[Import project] on the menu bar.

After "Select Workspace" window is displayed, select the workspace including the project that you want to import, and click [OK] button. The list of the project in selected workspace is displayed on "Select the projects" window. Check the project, and click [OK] button.

🕱 RT ToolBox2 - Fact	ory Line≇1 (Offline	)			
Work <u>S</u> pace <u>V</u> iew <u>O</u> nline					
I   X h C C C	■ 影  自 ■				
] 🗈 🛸 🗈   🔳 🗖 🔁		🛢 🔳 🈂 🤶			
Workspace ×	Select Workspace				
🖻 🕂 📥 RC1	Workspace path				
🗉 😁 Offline 🗄 🔁 Backup	C:¥RT ToolBox			Browse	
	Update				
		<b>The serve</b>			
	Workspace name Factory Line#1	Title name			
	Factory Line#2				
	1				
	Workspace name	Factory Line#2	2		
	Title name				
		,	ок	Cancel	
			OK	Cancer	
Check the project.					
		•			
Select t	he projects				🕱 RT ToolBox2 - Factory
Select imp	ort projects				Work <u>S</u> pace <u>V</u> iew <u>O</u> nline <u>W</u> i
No. F	Project	Robot Controller	Robot		
	RC1	CRnD-700	RH-12SDH7		) 🗈 📾 🗈 🖿 🗖 🗖 🖿
	RC2	CRnD-700 CRnD-700	RV-6S RV-6S		RC1 💽 💟
	(0)	CKIID-700	KV-03		Workspace × Engree Factory Line#1
					🖃 🔁 RC1
					⊕ ⊕ Offline
					/ 🖃 📥 RC2 💦 👔
					· · · · · · · · · · · · · · · · · · ·

Figure 5-15 Import of project

The maximum number of the projects in one workspace is 32.

# 5.14. Offline/Online/Simulation

The project status are offline, online, and simulation. The meaning of each status and the contents displayed in the project tree are shown below.

Table 5-1 RT ToolBox2 Status				
Status	Explanation	Project tree display		
Offline	Targets files stored on the computer. When a robot is offline, the icon displayed on the left of the project name on the project tree turns green and Offline and Backup are displayed on the project tree.	EBC1 		
Online	The robot is connected to the robot controller and you can check and change the information in the controller When a robot is online, the icon displayed on the left of the project name on the project tree turns blue and Offline, Online, and Backup are displayed on the project tree.	E <b>A</b> RC1 E <b>⊡</b> Offline		
Simulation *This can only be used with the standard edition.	This targets a virtual robot controller running on the computer and you can check and change the information in the virtual controller When a simulation is running, the icon displayed on the left of the project name on the project tree turns blue and Offline, Online, and Backup are displayed on the project tree.	ternine ⊕ ternine ⊕ ternine ⊕ ternine ⊕ Offline Backup		

When this software starts, it goes into "Offline" status.

You can change a workspace or a project only in the "Offline" status.

# ر \land Caution —

The simulation function only supports the "RT ToolBox2" standard edition. It can not be used with the mini edition.

Also, please be aware that even with the standard edition, the simulation function can not be used when <u>Movemaster commands</u> are selected.

To switch among offline, online, and simulation, do so from [Online] on the menu bar or from the tool bar. With the tool bar, you can switch as follows.

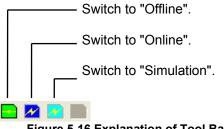


Figure 5-16 Explanation of Tool Bar

The current status and the statuses into which the current status can be switched are as followed.

Current status	Switchable status	Menu bar [Online] display	Tool bar display
Offline	Can be switched to online or simulation.	✓ Offline Online Simulator <u>R</u> emote Maintenance	
Online	Can only be switched to offline.		
Simulation	Can only be switched to offline.	O <u>ffline</u> O <u>n</u> line ✓ <u>S</u> imulator <u>R</u> emote Maintenance	

Table 5-2 Current Status and Switchable Status

The current status is displayed checked at [Online] on the menu bar.

When switching to online or simulation, if multiple projects are registered in the workspace being edited, the project selection screen is displayed as in **"Figure 5-17 Screen for Selecting Project to Switch Online"**. Check only the project to be switched online or to simulation, then click [OK]. Only one project can be switched to simulation.

This screen is not displayed if there is just one project in the workspace.

No. Project	Robot Controller	Robot	Communication
✓ 1 RC1	CRnQ-700	RV-6SQ	TCP/IP: Address=lo
2 RC2	CRnQ-700	RV-65	TCP/IP: Address=1
☑ 3 RC3	CRn-500	RV-65	TCP/IP: Address=1

Figure 5-17 Screen for Selecting Project to Switch Online

# 6. Connecting with the Robot

This explains the method for connecting the robot controller and the computer. With this software, you must make the communication settings for each project.

# ▲ Caution -

### Please do not pull out the cable while communicating.

Please never pull out the cable while communicating with the robot controller. If the communication cable is removed while communicating, the status of the robot controller or the computer might become abnormal. Please remove the cable when the status is not "Online" or this software exited.

Also when communicating by using the USB, please do not pull out the USB cable until the communication is completed.

# 6.1. Robots Connected and Types of Communication

When connecting the robot controller and computer, there are the methods shown below. Be aware that the connection method that can be used is restricted by the robot controller connected.

Robot Controller	Communication Type		Remarks
CR750-D/CRnD-700 series	USB (*4)		The commercial item such as computer and cable might be unsuitable to compatibility with our equipment or the FA environments of the temperature and the noise, etc. When it is used, please confirm the operation enough, because you might have to take measures against noise such as EMI measure or addition of ferrite core.
controller of CR3D-700.)	Ethernet(TCP/IP) (*1)		
	RS-232		Only CRnD-700
	GOT communications		Communicate with CR750-D/CRnD-700 series controller connected with the GOT via Ethernet by USB / RS-232. GOT 1000 series and the Ethernet communication unit (GT15-J1E71-100) are needed. (*6)
CR750-Q/CRnQ-700 series		USB	
	CRnQ commu nication	Ethernet (TCP/IP)	The PLC Ethernet interface module or Built-in Ethernet port QCPU (*5) is required.
	s (*2)	RS-232	
controller of CR3Q-700.)			
CRn-500 series	Ethernet(TCP/IP) (*3)		The robot controller must have the "Ethernet interface" option.
	RS-232		

#### Table 6-1 Robot Controllers That Can Be Connected and Types of Communication

(\*1) For details on the communication settings on the robot controller side for CR750-D/CRnD-700 series controllers, see " **Detailed explanations of functions and operations**" and "**Standard Specifications**" in the user's manual for the robot controller.

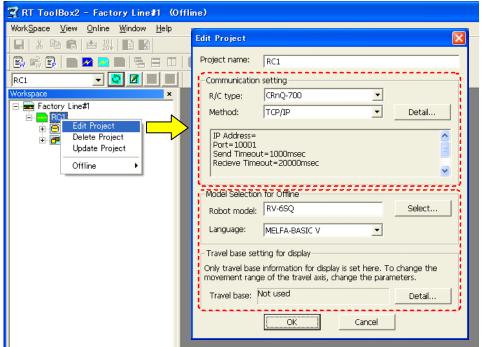
(\*2) For details on the communication settings on the robot controller side for CR750-Q/CRnQ-700 series controllers, see " Detailed explanations of functions and operations" and "Standard Specifications" in the user's manual

for the robot controller.

- Moreover, please use the "GX Developer" to set the communication setting of PLC. (\*3) For details on Ethernet connections on the robot controller side for CRn-500 series controllers, see the **"Ethernet**" Interface Option User's Manual".
- (\*4) When using USB connection, 1 computer can connect to only 1 robot controller.
  (\*5) Built-in Ethernet port QCPU can be used with this software Ver.1.2 or later.
- (\*6) The GOT communication can be used with this software Ver.1.5 or later.

### 6.2. Connection Settings

Click the name of the project to display the project tree for with the right button of the mouse, then from the right button menu, click [Edit Project]. The project edit screen is displayed.



**Figure 6-1 Connection Settings** 

Select the controller to connect to and the communications method, then click the "Detailed Settings" button to set the details.

Normally, the offline robot settings and the travel platform settings for display are also set according to the controller connected to.

After you complete the details settings, click the [OK] button.

The detailed settings screen will be explained from the next item.

# - 🗥 Caution

# *Do not connect from multiple projects to 1 controller at the same time.*

Do not connect from multiple projects to 1 controller at the same time. Data might not be able to be read correctly referring to the same data.

#### Do not connect USB to multiple controllers from 1 computer.

When using USB connection, 1 computer can connect to only 1 robot controller. It is also not possible to connect to multiple controllers by using the USB hub.

## 6.2.1. USB Communication Settings

USB Communication Protocol			
Transmission Timeout Time :	5000 (msec)		
Reception Timeout Time :	30000 (msec)		
Number of Retries :	3		
OK	Cancel		

Figure 6-2 USB Communication Settings

		Default value		
Item	Explanation	Ver.1.1	Ver.1.2	
		or earlier	or later	
Send timeout	Timeout time for sending Range that can be set (*1) Minimum value : 1000 msec Maximum value : 30000 msec	3000 msec	5000 msec	
Receive timeout	Timeout time for receiving Range that can be set (*1) Minimum value : 5000 msec Maximum value :120000 msec	3000 msec	30000 msec	
Retries	Number of communication retries Range that can be set (*1) Minimum value : 0 Maximum value : 10	3	3	

(\*1) The setting range of Send timeout, Receive timeout and Retries are limited function of this software Ver.1.2 or later.

When the USB cable is connected to the computer, the screen for installing the USB driver may be displayed. For details on USB driver installation, see "1.5.3 USB driver (CR750-D/CRnD-700 series robot controller) installation ".

## Table 6-2 TCP/IPCommunication Setting Items and Default values

## 6.2.2. TCP/IP (Ethernet) Communication Settings

Input the IP address assigned to the robot controller connected to, then click the [OK] button.

TCP/IP Communication	Protocol	
IP Address:		
Port :	10001	
Transmission Timeout Time :	5000 (msec)	
Reception Timeout Time :	30000 (msec)	
Number of Retries :	0	
OK	Cancel	

Figure 6-3 TCP/IP Communication Settings

Table 6-3 TCF/IF Communication Setting items and Delaut Values					
		Default value			
Item	Explanation	Ver.1.1	Ver.1.2		
		or earlier	or later		
IP address	Sets the IP address of the robot controller	Dia	n k		
	connected to.	Blank			
Port used	Number of the port used for communications	100	001		
Send timeout	Timeout time for sending				
	Range that can be set (*1)	1000 msec	5000 msec		
	Minimum value : 1000 msec	1000 msec	SOUD MISEC		
	Maximum value : 30000 msec				
Receive	Timeout time for receiving				
timeout	Range that can be set (*1)	20000 msec	30000 msec		
	Minimum value : 5000 msec	20000 11360	50000 msec		
	Maximum value :120000 msec				
Retries	Number of communication retries				
	Range that can be set (*1)	3	0		
	Minimum value : 0	5	0		
	Maximum value : 10				

#### Table 6-3 TCP/IP Communication Setting Items and Default Values

(\*1) The setting range of Send timeout, Receive timeout and Retries are limited function of this software Ver.1.2 or later.

For help with the computer side network settings (IP address, subnet mask, default gateway, etc.), ask the network administrator.

Moreover, for details on the communication settings on the robot controller side, please refer as follow.

: See "Detailed explanations of functions and operations" and "Standard Specifications" in the user's manual for the robot controller.

CRn-500

CR750/700

: See "Ethernet Interface Option User's Manual".

# ▲ Caution

## When connecting to 10 or more robot controllers at the same time.

When connecting to 10 or more robot controllers at the same time, set the reception timeout time to at least 10000 msec, because it takes time to connected processing.

# ↑ Caution

## Caution for connecting with robot controller by Ethernet.

In the program edit function, please change "Receive timeout" and "Retries" of TCP/IP communication setting when it corresponds to all of the following use conditions, and the program is written to robot controller.

- << Use conditions >>
- 1. You use Ethernet .

Caution

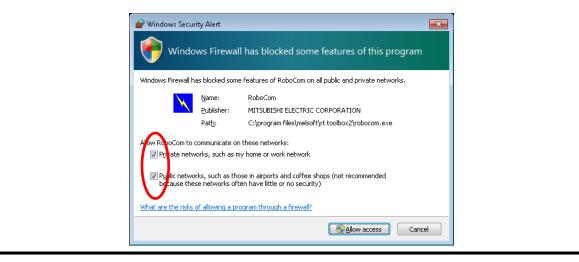
- (\* In CRn-500 controller, Ethernet is an option.)
- 2. When you write only command line in the controller.
- (Only "Command lines" is selected when the program is written to robot controller.)The number of lines of the command line of the robot program is <u>1600 or more</u>.
- 4. In TCP/IP Communication Settings, the both value of "Receive timeout" and "Retries" are numbers except 0.

Ę	}
item	Value
Receive timeout (msec)	30000 or more
Retries	0

When using it on the condition of corresponding without changing the communication setting, the robot program might not be correctly written or the error might occur while writing the robot program. Therefore, it is necessary to check all content of the robot program. So please change the communication setting.

## *When the following screen is displayed connecting by Ethernet.*

When the following screen is displayed connecting by Ethernet, click [Allow access] button with checking all the checkboxes in the screen.



## 6.2.3. RS-232 Communication Settings

Change the RS-232 communication settings to match the robot controller side communications settings.

RS-232 Communicat	tion Protocol			X
Port :	COM1 -	Transmission Timeout Time :	5000	(msec)
Data Transfer Rate :	9600 💌	Reception Timeout Time :	30000	(msec)
Character Size :	8 💌	Number of Retries :	3	
Parity :	EVEN 💌	Protocol :	Procedural	•
Stop Bit :	2 💌			
	OK		Cancel	

Figure 6-4 RS-232 Communication Settings

#### Table 6-4 RS-232 Communication Setting Items and Default Values

Item	Explanation	Default value
Port used	COM1 – COM10 can be selected.	COM1
Communications speed	Select from 4800, 9600, and 19200. + It is possible to select Baud rate 38400 only when connecting this software with CRnD-700 controller.	9600
Character size	7 or 8 can be selected, but select 8.	8
Parity	None, Odd, or Even can be selected.	EVEN
Stop bit	Select from 1, 1.5, and 2.	2
Send timeout	Timeout time for sending Range that can be set (*1) Minimum value : 1000 msec Maximum value : 30000 msec	5000 msec
Receive timeout	Timeout time for receiving Range that can be set (*1) Minimum value : 5000 msec Maximum value : 120000 msec	30000 msec
Retries	Number of communication retries Range that can be set (*1) Minimum value : 0 Maximum value : 10	3
Usage protocol	Non-Procedural or Procedural can be selected.	Procedural

(\*1) The setting range of Send timeout, Receive timeout and Retries are limited function of this software Ver.1.2 or later.

Set the following to perform a high-speed, stable communication.

Baud rate : 19200 bps

Protocol used : Procedural

It is also necessary to change the communication settings to the same value of the robot controllers at this time.

# 

## Use of USB to RS-232 does not guarantee normal operation.

When you use USB to RS-232 cable, normal operation is not guaranteed. If you want to use RS-232 as a communication port, use of computer with serial ports is recommended.

## 6.2.4. GOT Communications Settings

The GOT Communications is the method to connect with the CR750-D/CRnD-700 series controller by using the RS-232 / USB on the GOT which is connected with the controller via Ethernet. GOT Communication can be used with this software Ver.1.5 or later.

e	OT Communication I	Protocol	X		
	– <u>P</u> C side I/F setting – – C RS-232 C <u>O</u> M	COM1	Ŧ		
	⊙ USB <u>B</u> aud	19.2Kbps	~		
	<u>N</u> etwork No.	1	(1 to 239)		
	S <u>t</u> ation No.	64	(1 to 64)		
	Robot controller side I/F Controller IP address				
	Network No.	1			
	<u>S</u> tation No.	1	(1 to 64)		
c	Check at communication time (1 to 9999) 30 Sec				
		ОК	Cancel		

## Table 6-5 GOT Communication Setting Items and Default Values

Item	Explanation	Default value
COM (*1)	COM1 - COM10 can be selected.	COM1
Baud (*1)	Select from 9.6Kbps、19.2Kbps、38.4Kbps、57.6Kbps、115.2Kbps.	19.2Kbps
Network No.	1 - 239 can be set. Be matched to Network No. of the GOT.	1
Station No. (PC side I/F setting)	1 - 64 can be set. Be matched to Station No. of the GOT. Set a value different from the Station No. of Robot controller side I/F setting.	64
Controller IP address	Set the IP address of the controller connected with GOT.	192.168.0.20
Station No. (Robot controller side I/F setting)	1 - 64 can be set. Be matched to Station No. set by GOT.	1
Check at communication time	1 - 9999 can be set. Set the timeout after transmits. Note: If too short time is set, the timeout error occurs.	30 seconds

(\*1) COM and Baud are available only that RS-232 is selected.

## 6.2.5. CRnQ Communications Settings

The CRnQ communication is the method to connect with the CR750-Q/CRnQ-700 series controller by using the PLC Universal model QCPU module or the PLC Ethernet Interface module.

When using RS-232 or USB, please connect to connector of the PLC Universal model QCPU module.

When using Ethernet, please connect to connector of the PLC Ethernet Interface module or Built-in Ethernet port QCPU. (\*Built-in Ethernet port QCPU can be used with this software Ver.1.2 or later.)

CRnQ communication set	tting	
PC Side I/F Serial port PLC mo	odule connection	
Serial port ORS-232		
⊙ USB	Ф —сри	
Network		
O NET/10(H),CC IE		
◯ CC-Link		
Ethernet	**************************************	
O Q Series bus		
Detail		
1 Serial port PLC module connec		
	The communication routes are displayed here.	
8 Serial port Access MNET/10(H 9 Serial port Access MNET/10(H	),CC IE-serial communication other station via PLC module ),CC IE-CC-Link other station via PLC module JET/10(H),CC IE other station via PLC module	~
	ОК Сало	el

Figure 6-5 CRnQ Communications Settings

On the CRnQ communications setting screen, when you select the computer interface, the communications routes using the selected interface are displayed at the bottom of the screen. Select the communications route, then press the [Detailed Settings] button. The detailed settings screen corresponding to the selected communications route is displayed. These detailed settings will be explained from the next item.

## 6.2.5.1. When RS-232 is selected

When "RS-232" is selected as the computer interface, the communications routes that can be selected are as follows.

<u> </u>	Table 6-6 Communications Routes That Can Be Selected for "RS-232"
No.	Communications routes
1	Serial communications CPU unit connection
2	Serial communications Serial communications other station access through CPU unit
3	Serial communication NET/-0(H) other station access through CPU unit
4	Serial communication CC-Link other station access through CPU unit
5	Serial communication Ethernet other station access through CPU unit
6	Serial communication Serial communication through CPU unit - NET/10(H), CC IE other station
	access
7	Serial communication Serial communication through CPU unit-Ethernet other station access
8	Serial communication NET/10(H), CC IE through CPU unit - serial communication other station
	access
9	Serial communication NET/10(H), CC IE through CPU unit - CCLink other station access
10	Serial communication Other station access CCLink - NET/10(H), CC IE through CPU unit
11	Serial communication CCLink through CPU unit - Ethernet other station access
12	Serial communication Ethernet through CPU unit - serial communication other station access
13	Serial communication Ethernet through CPU unit - CCLink other station access
14	Serial communication Serial communication connection
15	Serial communication Other station access serial communication through serial communication
16	Serial communication Other station access NET/10(H), CC IE through serial communication
17	Serial communication Other station access CC-Link through serial communication
18	Serial communication Other station access Ethernet communication through serial communication
19	Serial communication Serial communication through serial communication - NET/10(H), CC IE other
	station access
20	Serial communication Serial communication through serial communication - Ethernet other station
_	access
21	Serial communication NET/10(H), CC IE through serial communication - serial communication other
	station access
22	Serial communication NET/10(H), CC IE through serial communication - CCLink other station access
23	Serial communication CCLink through serial communication - NET/10(H), CC IE other station access
24	Serial communication CCLink through serial communication - Ethernet other station access
25	Serial communication Ethernet through serial communication - serial communication other station
	access
26	Serial communication Ethernet through serial communication - CCLink other station access
27	Serial communication CC-Link other station access through G4
28	Serial communication CCLink through G4 - NET/10(H), CC IE other station access
29	Serial communication CC-Link through G4 – Ethernet other station access
30	Serial communication Serial communication other station access through NET/10(H), CC IE remote
31	Serial communication NET/10(H), CC IE other station access through NET/10(H), CC IE remote
32	Serial communication CC-Link other station access through NET/10(H), CC IE remote
33	Serial communication Ethernet other station access through NET/10(H), CC IE remote
34	Serial communication Serial communication other station access through NET/10(H), CC IE remote
35	Serial communication Serial communication through NET/10(H), CC IE remote - Ethernet other
	station access
36	Serial communication NET/10(H), CC IE through NET/10(H), CC IE remote - Serial communication
	other station access
37	Serial communication NET/10(H), CC IE through NET/10(H), CC IE remote - CC-Link other station
	access
38	Serial communication CC-Link through NET/10(H), CC IE remote - NET/10(H), CC IE other station
	access
39	Serial communication CC-Link through NET/10(H), CC IE remote - Ethernet other station access
40	Serial communication Ethernet through NET/10(H), CC IE remote - Serial communication other
	station access
41	Serial communication Ethernet through NET/10(H), CC IE remote - CC-Link other station access

#### Table 6-6 Communications Routes That Can Be Selected for "RS-232"

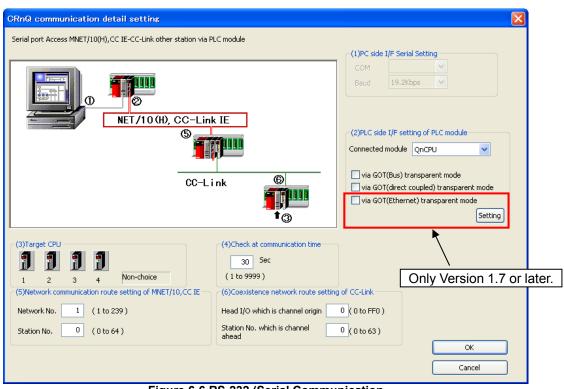


Figure 6-6 RS-232 (Serial Communication NET/10(H), CC IE through CPU Unit – CCLink Other Station Access) Detailed Settings

For some communications routes that you can select, "(5)Network communication route setting of MNET/10" and "(6)Coexistence network route setting of C24" can not be set.

GOT(Ethernet) transparent mode can be used with Version 1.7 or later of software. When you use GOT(Ethernet) transparent mode, please display a set screen clicking the "Setting" button, and set the communication item.

## 6.2.5.2. When USB is selected

When "USB" is selected as the computer interface, the communications routes that you can select are the same as for RS-232. See **"Table 6-6 Communications Routes That Can Be Selected for** "RS-232"**.** 

CRnQ communication detail setting		X	
Serial port Access MNET/10(H),CC IE-CC-Link other station via PLC module			
	(1)PC side I/F S	ierial Setting	
	COM Baud 19.	2Kbps V	
NET/10(H), CC-Link IE	(2)PLC side I/F	setting of PLC module	
CC-Link © T	via GOT(dire	i) transparent mode sct coupled) transparent mode ernet) transparent mode Setting	
(3)Target CPU (4)Check at communication time 30 Sec			
1 2 3 4 Non-choice (1 to 9999)		Only Version 1.7 or	later.
(5)Network communication route setting of MNET/10,CC IE (6)Coexistence network route setting	g of CC-Link		
Network No.         1         (1 to 239)         Head I/O which is channel origin	0 ( 0 to FF0 )		
Station No. 0 (0 to 64) Station No. which is channel ahead	0 ( 0 to 63 )	ОК	
Figure 6.7 USP (Sorial Commun		Cancel	

Figure 6-7 USB (Serial Communication NET/10(H), CC IE through CPU Unit – Serial Communication Other Station Access) Detailed Settings

For some communications routes that you can select, "(5)Network communication route setting of MNET/10" and "(6)Coexistence network route setting of C24" can not be set.

GOT(Ethernet) transparent mode can be used with Version 1.7 or later of software. When you use GOT(Ethernet) transparent mode, please display a set screen clicking the "Setting" button, and set the communication item.

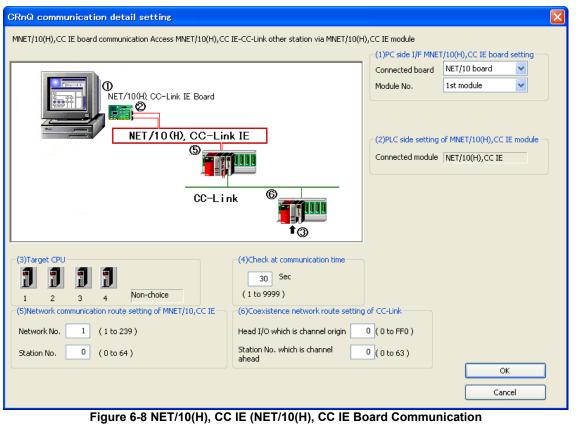
## 6.2.5.3. When NET/10(H), CC IE is selected

In this software version 2.20W or later, it is possible to communicate using "CC-Link IE controller network port" or "CC-Link IE field network port" newly established in QnCPU.

When "NET/10, CC IE" is selected as the computer interface, the communications routes that you can select are as follows.

Table 6-7 Communications Routes That Can Be Selected for "NET/10(H), CC IE	•
--	---

No.	Communications Route					
1	NET/10(H), CC IE board communication unit	Other station access through NET/10(H), CC IE				
2	NET/10(H), CC IE board communication unit – CC-Link other station access	NET/10(H), CC IE through NET/10(H), CC IE				
3	NET/10(H), CC IE board communication Serial communication other station access	NET/10(H), CC IE through NET/10(H), CC IE unit -				



NET/10(H), CC IE (NE I/10(H), CC IE (NE I/10(H), CC IE Board Communication NET/10(H), CC IE through NET/10(H), CC IE Unit – CC-Link Other Station Access) Detailed Settings

For some communications routes that you can select, "(5)Network communication route setting of MNET/10" and "(6)Coexistence network route setting of C24" can not be set.

## 6.2.5.4. When CC-Link is selected

When "CC-Link" is selected as the computer interface, the communications routes that you can select are as follows.

	Table 6-8 Communications Routes That Can Be Selected for "CC-Link"					
No.	Communications Route					
1	1 CC-Link board communication Other station access through CC-link unit					
2	CC-Link board communication CC-Link through CC-link unit – NET/10(H), CC IE					
	other station access					
3	CC-Link board communication	CC-Link through CC-link unit – Ethernet other station				
	access					

**•**•• . . . . . . 

CRnQ communication detail setting	X
CC-Link board communication Access CC-Link-MNET/10(H),CC IE other station via CC-Link module	
CC-Link Board	(1)PC side I/F CC-Link board setting Module No. 1st module
NET/10 (H), CC-Link IE	(2)PLC side setting of CC-Link module Connected module CC-Link module
(3)Target CPU       (4)Check at communication time         1       2       3         (5)Network communication route setting of CC-Link       (1 to 9999)         (6)Coexistence network route settin       (6)Coexistence network route settin         Network No.       0       (0 to 63)         Station No.       0       (0 to 64)	ng of MNET/10,CC IE
	Cancel

Figure 6-9 CC-Link (CC-Link Board Communication CC-Link through CC-Link Unit – NET/10(H), CC IE Other Station Access) Detailed Settings

For some communications routes that you can select, "(5)Network communication route setting of MNET/10" and "(6)Coexistence network route setting of C24" can not be set.

## 6.2.5.5. When Ethernet is selected

When "Ethernet" is selected as the computer interface, the communications routes that you can select are as follows.

	Table 6-9 Communications Routes That Can be Selected for Ethernet	
No.	Communications Route	Special mention
1	Ethernet board communication Access other station via Ethernet module	
2	Ethernet board communication Access Ethernet-serial communication other station via Ethernet module	
3	Ethernet board communication Access Ethernet-CC-Link other station via Ethernet module	
4	Ethernet port direct communication PLC module connection	Ver.1.2 or later
5	Ethernet port direct communication Access serial communication other station via PLC module	
6	Ethernet port direct communication Access CC-Link other station via PLC module	
7	Ethernet port IP address designate communication PLC module connection	
8	Ethernet port IP address designate communication Access serial communication other station via PLC module	
9	Ethernet port IP address designate communication Access CC-Link other station via PLC module	

#### Table 6-9 Communications Routes That Can Be Selected for "Ethernet"

Detail		
Ethernet board communication Access Ethernet-serial of Ethernet Board Ethernet Ethernet Serial Commu	S nications Link S T S T S T S T S T S T S T S S S S S S S S S S S S S	(1)PC side I/F Ethernet board setting Network No. 1 (1 to 239) Station No. 1 (1 to 64) Protocol TCP (2)Network communication route setting Ethernet Module Q371E71 Network No. 1 Station 1 (1 to 64) (* IP address 0, 0, 0, 0 C Host Name Routing parameter transfer method
1       2       3       4       Non-choice         -(5)Network communication route setting of Ethernet -       •       Access to Ethernet module set on PC side I/F         •       Other station in the same loop or access to	30     Sec       (1 to 9999)     (6)Coexistence network route setting of C24       Head I/O which is channel origin     0     (0 to FF	
multilevel system       Network No.     1     (1 to 239)       Station No.     0     (0 to 64)	Station No. which is channel 0 ( 0 to 31 ahead	Cancel

Figure 6-10 Ethernet (Ethernet board communication Access Ethernet-serial communication other station via Ethernet module) Detailed Settings

For some communications routes that you can select, "(1)PC side I/F Ethernet board setting", "(2)Network communication route setting Ethernet", "(5)Network communication route setting of MNET/10" and "(6)Coexistence network route setting of C24" can not be set.

## 6.2.5.6. When Q series bus is selected

When the "Q series bus" is selected as the computer interface, the communication route that can be selected is as follows.

	Table 6-10 Communication Route That Can Be Selected with the "Q Series Bus"
No.	Communications Route
1	Q bus communications CPU unit connection
- (3 - (5 - (5 - (5)	ail       Image: connected         Image: connected       Image: connected         Image: connected module       Image: connected module         Image: connected module       Image: connected module
	Cancel
Eigu	re 6.11 O Sories Rus (O Rus Communications CRU Unit Connection) Detailed Settings

Figure 6-11 Q Series Bus (Q Bus Communications CPU Unit Connection) Detailed Settings

# 7. Robot Program Language Setting

This switches the robot program language used. The languages you can switch to are as follows.

	Robot program language					
Robot controller	MELFA-BASIC V MELFA-BASIC IV		Movemaster command			
CR750-D/CRnD-700	0	0	0			
CR750-Q/CRnQ-700	0	0	0			
CRn-500	×	0	0			

Table 7-1 Robot Program Languages for Each Controller

The Movemaster commands are restricted by the robot models that can be used. Before trying to use Movemaster commands, check in the "Standard Specifications" that the model you are using supports Movemaster commands.

Also, this software allows you to select Movemaster commands for CR750-D/CRnD-700 series and CR750-Q/CRnQ-700 series robot controllers, but these robot controllers themselves do not actually support Movemaster commands. (As of December 2007)

On the project tree, click the desired project name with the right mouse button, then from the right button menu, select "Edit Project". The project edit screen is displayed.

🛐 RT ToolBox2 - Factory Line≇1 (Offline)					
Work <u>Space View O</u> nline <u>Window H</u> elp	Edit Project 🔀 -				
▏▋▎▓▝▆▝▆▏▆▝▓▏▋▝▇ Ĩ▋▓▓₿▎ <b>▌▓</b> ▓ <b>▋</b> ▌▌▌	Project name: RC1				
RC1 🗨 😋 🗷 📕	Communication setting				
Workspace ×	R/C type: CRnQ-700				
E- E Factory Line#1	Method: TCP/IP   Detail				
Edit Project Delete Project Update Project Offline	IP Address= Port=10001 Send Timeout=1000msec Recieve Timeout=20000msec Model Selection for Offline Robot model: RV-6SQ Select Language: MELFA-BASIC V				
	Travel base setting for display         Only travel base information for display is set here. To change the movement range of the travel axis, change the parameters.         Travel base:       Not used         OK       Cancel				

Figure 7-1 Connection Settings

Select the controller connected, the robot model, and the robot language used, then click the [OK] button

# 8. Writing Programs

This chapter explains robot program editing methods. You can directly edit programs in the robot controller or edit programs stored on the computer.

# Caution

## Program names that can not be handled on the computer

If a program name in the robot controller is the same as a "reserved term" in Windows, when you try to open that program for program editing, this causes an error. In this case, it is necessary to change the program name in the controller.

"Reserved terms" are special character strings that the Windows system uses and therefore can not be used as file names. These "reserved terms" are character strings such as the following.

AUX, COM1 to COM9, CON, LPT1 to 9, NUL, PRN

## Program names that can not be handled on the robot controller.

It is not possible to use the program name of the following.

- 1. The program name is too long. (13 characters or more).
- The program name contains the character other than the alphabet or number.
   The top of the program name is "0"(Zero).

Warning is displayed when you input the program name including these conditions in the following operation.

- Writing a New Program
- Copying the program
- Renaming the program name
- Drag and drop operation

This function corresponds with Version 1.6 or later of software.

When the password is registered in "program" by robot controller's security function, the program in the robot controllers cannot be read, cannot be saved, cannot be copied, cannot be renamed or cannot be deleted.

When the password is registered in "program" by robot controller's security function, the program among the robot controllers cannot be operated as follows.

		O : Ena	able、 × : Disable			
	Item to which password of security function is registered.					
	Program Parameter File					
Reading of programs.						
Saving programs	×	0	0			
Copying programs			0			
Renaming programs						

Please delete the password of robot controller's security function when you operate these. Please refer to "12.7.3 Delete the Password" for the method of deleting the password.

The setting(register the password) and the release(delete the password) of robot controller's security function can be used with this software version 2.00A or later. Please refer to "Table 12-15 Compliant version of this function and controller" for robot controller's compliant version.

## 8.1. Writing a New Program

## 8.1.1. Writing a new program on the computer

For the new program you are going to write, select [Offline] -> [Program], then click the right mouse button. The right button menu is displayed, so click [New].

	New Robot program			
Workspace       ×         Factory Line#1       RC1         ROT       RF-6S         ROT       Rew         ROT       Rew         ROT       Program Manager         RC2       Program Convert	Program path s and Settings¥r3p¥My Do Update Robot program	cuments¥Factory Line#1¥F	C1¥Program	Browse
	Robot program	P01		
			OK	Cancel

Figure 8-1 Writing a New Program on the Computer

Input the robot program name, then click the [OK] button.

# - A Caution Folder in which programs are stored

Programs on the computer are managed in units of workspace projects. The folder they are stored into is workspace writing folder\project name\Program.

To store into any other folder, first store in this folder, then copy into the desired folder with the program management copy function.

## 8.1.2. Writing a new program in the robot controller

For the new program you are going to write, select [Online] -> [Program], then click the right mouse button. The right button menu is displayed, so click [New].

	New Robot program				
Workspace     ×       ■ Factory Line#1       ■ Ø RC1       ■ Ø Offline       ■ Ø RV-6S	Robot Controller RC1 Update				Browse,
- 🔂 Program	Robot program	Size	Date	Time	Protect
Online     Online     Poreram     Poreram     Online     Poreram     Online     Poreram     Mon     Program Manager     Maintenance     Maintenance     Manager     Backup     All					
trogram					>
Parameter	Robot program				
System Program				ОК	Cancel

Figure 8-2 Writing a New Program in a Robot Controller

Input the robot program name, then click the [OK] button. The "Read Item" screen is displayed, so check the read items, then click the [OK] button. For details on the read items, see **"8.2.3 Read Items when opening program in robot controller".** 

🗎 Program 1:RC1	P1.r (Online)	[MELFA-BASIC V]		
1				~
				~
<				>
Add	Edit	Delete		
XYZ	X	Y Z	A B	с
0				
<				2
Joint	J1	J2 J3	J4 J5	J6
<				>

Figure 8-3 Editing a New Program

## 8.2. Opening an Existing Program

## 8.2.1. Opening an existing program on the computer

Open the target project in the project tree with [Offline] -> [Program]. The stored programs are displayed on the project tree, so double click the program you want to edit.

Workspace ×	Program 1:RC1 1.p	rg [MELFA-BASIC	> V]			
□       Image: Arrow and the second se	1 Mov p1 2 Mov p2 3 Mov p3 4 Mov p4 5 End					2
			-1			
	AddE	dit Delete				
	XYZ	X Y	Z	A B	С	L1 🔼
	p1 p2	777.450 -0.020 619.030 470.350	928.760 90.44 928.760 90.44		89.570 126.800	x 🚽
	<				]	>
	Joint	J1 J2	J3 J	4 JS	J6	J7
						>

Figure 8-4 Opening a Program on the Computer

## 8.2.2. Opening a program in a robot controller

Open the target project in the project tree with [Online] -> [Program]. The stored programs are displayed on the project tree, so double click the program you want to edit.

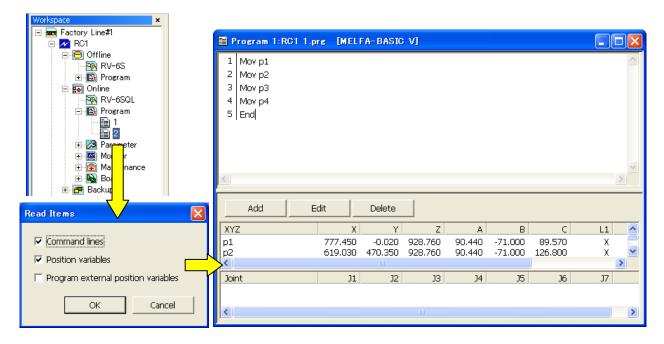


Figure 8-5 Opening a Program in a Robot Controller

Input the robot program name, then click the [OK] button. The "Read Item" screen is displayed, so check the read items, then click the [OK] button. For details on the read items, see "8.2.3 Read Items when opening program in robot controller".

## 8.2.3. Read Items when opening program in robot controller

You can set the robot program read items divided into command lines, position variables, and program external position variables. This function is displayed after H1 edition on CRn-500 series controller.

The default values of read items are as follows

Ζ.	10110W3.	
	Read Items	×
	<ul> <li>✓ Command lines</li> <li>✓ Position variables</li> </ul>	
	Program external position variables	
	OK Cancel	]
1		

Figure 8-6 Read Items

The program external position variable read operations are shown in **"Table 8-1 ".** (For details on program external position variables, see **"Detailed explanations of functions and operations"** in the robot controller's user's manual.)

$\backslash$		R	ead Ite	em		
		Command	Position	External position variable	Position variable, joint variable (P_01, J_02, etc.) (MOVEMASTER command : 901-999)	Position array variable, joint array variable (P_100( ), J_102( ), etc.)
			•	٢	Reads only the external position variables (position variables, joint	Reads all elements used in
	50/700 s robot				variables) used in instruction statements. (*1)	instruction statements. (*2)
contro				١	Reads all external position var	
					variables, position array variables,	joint array variables).
	ter	Z		2	variables (position variables, joint variables) used in instruction statem statements. (*1)	Reads all elements used in
r's	Ver.J1 or later					
CRn-500 series robot controller's software version	er.J1		•	٢		
t con sion	>				variables, position array variables, joint array variables).	
robo: e vers	71					
) series robot col software version	Ver.H1 to H7				Reads all external position var	
00 s€ sof	er.H.				variables, position array variables,	joint array variables).
Rn-5	>					
O	Ver.G9 orearlier	This s	creen	is not di	splayed.	

Table 8-1 Program External Position Variable Read Operations
--

\*1: When Movemaster commands are used, all external position variables are read.

\*2: When only P\_100(1) is used in the command statement, P\_100(1) to P\_100(10) are all read. However, the number of valid elements depends on the robot controller software version used.

## 8.2.4. Opening a program in the backup data

Program data backed up on the personal computer by the backup function can be opened by the program edit. Note that this function can be used with Version 1.2 or later of this software.

Open the target project in the project tree with [Backup]. Select the backup data (All files or Program) stored the program you want to edit. From the right mouse button menu, click [Open Backup program]. The stored programs are displayed on "Open Backup Program" window, so select the program you want to edit, and click [OK] button.

The extension of program data file in the backup data is "\*.MB5" or "\*.MB4".

RC1	×			Program 1:F	IC1 C:¥RT	Tool¥20080	718-131131
Update Robot program	#1¥RC1¥Backup¥20080718-13113 Size Date Time			1         GetM 1           2         Mov P00           3         M01=M01           4         Mov P01           5         Mov P02           6         HOpen 1           7         Mov P03           8         Dly 0.5	+1		
□       □       1.MB5         □       □       100.MB5         □       □       2.MB5         □       □       555.MB5         □       □       NEWMB5.MB5         □       □       0RGN.MB5         □       □       ROBO.MB5         □       □       ROBO.MB5         □       □       TEST567.MB5	586         2008/07/18         13:1           717         2008/07/18         13:1           908         2008/07/18         13:1           1108         2008/07/18         13:1           665         2008/07/18         13:1           1077         2008/07/18         13:1           1077         2008/07/18         13:1           1077         2008/07/18         13:1           1144         2008/07/18         13:1	1:41 1:40 1:42 1:56 1:43 1:44	P	9 HClose 1 Add (YZ 00 01	Edit X 564.466 456.254	Delete Y 0.000 226.841	z 0.000 0.000
	ОК	Cancel	<	oint	J1	32	J3

Figure 8-7 Opening a program in the backup data

The opened program in the backup data can be saved as a usual program (text type file whose extension is "\*.prg").

## Notes of opening the program backed up.

'!\ Caution

The notes of when the program backed up is opened are as follows,

- (1) The program that can be opened is only a program made in the robot program language specified by the current project.
- (2) The program external position variables used in the program cannot be read.
- (3) If the program is opened from Program backup data, the values of the user definition external variables become 0.
- (4) If the program is opened from Program backup data or the data of unsupported robot, joint position variables, the values of the additional axis, and the values of the direct-driven axis used might be not converted correctly.

## 8.3. Explanation of Program Edit screen

This explains the program edit screen.

1       Mov p1         2       Mov p2         3       Mov p3         4       Mov p4         5       End	
3 Mov p3 4 Mov p4	
4 Mov p4	
3 (End	
Command edit screen	
Moves up and down	
Add Edit Delete	
XYZ X Y Z A B C L1	
pi 777.450 -0.020 928.760 90.440 -71.000 89.570 X 🔤	
p2 619.030 470.350 928.760 90.440 -71.000 126.800 X ⊻	
Position variable edit screen	
Joi 1 Oshion Vanable edit screen J3 J4 J5 J6 J7	
<	

Figure 8-8 Explanation of Program Edit screen

The top part of the screen is the program command statement edit screen and the bottom part is the position variable edit screen.

To change the position dividing the top and bottom screens, drag the border line with the mouse. This is handy when you want to expand the command edit screen, for example because there are many lines of commands.

This edit screen display area can be customized. For details, see "8.5.1 Changing the display area".

Also, the background color for the command edit screen depends on the robot language used.

Robot language	Background color						
Robot language	Normal	Debugging					
MELFA-BASIC V	White						
MELFA-BASIC IV	Light yellow	Light blue					
Movemaster commands	Light green						

#### Table 8-2 Command Edit Screen Background Color

Debugging means when the program is opened in debugging status.

## 8.4. Program Editing Menu Bar

During program editing "File", "Edit", "Debug", and "Tool" are added to the menu bar.

WorkSpace View Online File Edit Debug Tool Window Help

Figure 8-9 Program Editing Menu Bar

## The menus are as follows.

Menu item		Explanation	Menu item
File Save Ctrl+S	Save	Saves the program being edited with its current name.	8.7.1
Save <u>A</u> s -> PC Save As -> Robot	Save As -> PC	Saves the program being edited with its current name on the PC	8.7.2
Page Setup	Save As -> Robot	Saves the program being edited with its current name on Robot controller	8.7.3
	Page Setup	You can customize the pages the	8.8.3
Edit	Undo	program is printed with. Cancel the edition by the command	
Undo Ctrl+Z Undo - Position variable Cut Ctrl+X	Undo - Position variable	and return to the previous state Cancel the edition by the position variable and return to the previous state	
<u>C</u> opy Ctrl+C <u>P</u> aste Ctrl+V	Cut	Cuts a character string from the command being edited.	8.6.4.2
Copy – Position <u>v</u> ariable Paste – Position v <u>a</u> riable	Сору	Copies a character string in the command being edited.	8.6.4.1
Eind Ctrl+F Fi <u>n</u> d in Files Replace Ctrl+H	Paste	Pastes the copied or cut character string to the specified location.	8.6.4.3
Jump Transfer all to t <u>h</u> e Controller	Copy - Position variable	Copies position data.	8.6.4.4
Transfer to the controller partially Co <u>m</u> ment Selection Uncomment Selection	Paste - Position variable	This pastes the copied position data.	8.6.4.5
Remove all comments Edit Command line - Online	Find	This searches for the specified character string.	8.6.4.6
Insert Command line - Online Delete Command <u>l</u> ine - Online	Find in Files	This searches for the specified character string in the program files.	8.6.4.7
(version 1.6 or later) * The function of	Replace	This replaces the specified character string with another character string.	8.6.4.8
"Comment Selection" / "Uncomment Selection" can be	Jump	Jumps to the specified step number or label.	8.6.4.9
used in version 1.2 or later. * The function of "Remove comments from all lines" can be used in version 1.4 or later. * The function of "Transfer all to	Transfer all to the controller	Write the all lines of the program to the robot controller. This can not be used when the program is opened in debugging status.	8.6.4.11
the controller" can be used in version 1.6 or later.	Transfer to the controller partially	Writes the selected program lines to the robot controller. This can not be used when the program is opened in debugging status.	8.6.4.10
	Comment Selection Uncommnet Selection	The selected lines are exchanged by the batch as a comment. The comment on the selected lines are released by the batch.	8.6.4.17
	Remove all comments		8.6.4.18
	Edit Command line - Online Insert Command line - Online	Edit the command lines for a program pened in debugging status. Insert the command lines for a program opened in debugging status.	8.9.3

Menu item		Explanation	Menu item
	Delete Command line - Online	Delete the command lines for a program opened in debugging status.	8.9.3

Menu item		Explanation	Menu item
Debug Set a Breakpoint Delete a Breakpoint	Set a Breakpoint	You can set a breakpoint in a program opened in debugging status.	8.9.4
Delete <u>a</u> ll Breakpoints → Show the <u>e</u> xecuted line always	Delete a Breakpoint	You can delete a breakpoint in a program opened in debugging status.	
(This can only operate when the program has been opened in debugging status.)	Delete all Breakpoints	You can delete all breakpoints in a program opened in debugging status	
	Show the executed line always	You can set to dispplay/not to display the executed line always to the program opened in debugging status.	8.9.1
Tool <u>R</u> enumber <u>S</u> ort Syntax Check Command Template	Renumber	The renumbering function can only be used with MELFA-BASIC IV and Movemaster commands. You can renumber line numbers in a batch.	8.6.4.15
<u>XYZ</u> Position variable Batch edit <u>J</u> oint Position variable Batch edit <u>T</u> act time Calculation	Sort	The sorting function can only be used with MELFA-BASIC IV and Movemaster commands. This sorts the edited program by line number.	8.6.4.16
Option (This can not operate when the program has been opened in debugging status.)	Syntax Check	You can check whether or not the edited robot program is syntactically correct.	8.6.4.12
Renumbering and sorting can only be used with MELFA-BASIC IV and	Command Template	You can display a list of the commands and make insertions on the program command edit screen.	8.6.4.13
Movemaster commands. Tact time calculation can only be used in a simulation.	XYZ Position variable Batch Edit Joint Position variable Batch Edit	You can change the position variables in the program being edited in a batch and can sum up all the values	8.6.4.14
	Tact time calculation	Tact time calculation can only be used in a simulation. Tact time of the program can be calculated.	16.12
	Option	You can customize the program edit area, screen display area and syntax check before saving a program	8.5 8.7.5

## 8.5. Customizing the Program Edit Screen

You can customize the program edit screen.

With the program opened, on the menu bar, click [Tool] -> [Option] and set the program edit screen as you want with the displayed option screen.

Clicking the [Restore Defaults] button restores the default settings.

The "Save and Read of the program" function and the "Background color" function can be used with version 1.6 or later of software.

## Figure 8-10 Option Screen

## 8.5.1. Changing the display area

In the "Display area" group, you can set the command display area and position edit area display ratios and for the position edit area, the XYZ (P) variable and joint (J) variable proportions.

## Figure 8-11 Program Edit Screen Display Area Change

## 8.5.2. Command format hints

You can use pop-up hint display to display the format for the robot program command, system functions, and system status variables displayed in the command edit area.

Figure 8-12 Command Edit Area Command Format Hint Display Settings

## 8.5.3. Character colors

You can assign the colors for displaying robot program command, system functions, and system status variables displayed in the command edit area.

Proportion of Window	Command line Edit area	
Commands Position          XYZ type (P)       Joint type (J)         Syntax Check before save       Source and the save         Check automatically       Confirm whether to check beforehand         Never check       Never check         Never check       Never check	Display the hint of command format   Color the Words   Commands - POS, MOVE:   Commands - PROGRAM:   Commands - I/O:   Commands - SLOT, MECHANISM:   Commands - HAND:   Commands - OTHERS:   System functions:   System status variables:   Comment:	Background color         MOVEMASTER command - Offline         MOVEMASTER command - Online         MOVEMASTER command - Debug         MELFA-BASIC IV - Offline         MELFA-BASIC IV - Online         MELFA-BASIC IV - Online         MELFA-BASIC IV - Online         MELFA-BASIC V - Online
Save and Read of the program	Font: Tahoma (10) Regular <u>E</u> dit	]
Get current position Get current position automatically Reset default values		OK Cancel

Figure 8-13 Command Edit Area Character Color Settings

## 8.5.4. Changing the font

You can change the font displayed in the command edit area.

Click the option screen font [Change] button. The font setting screen is displayed, so after setting the font name, style, and size, click the [OK] button.

		Font		?
tion Proportion of Window Commands Position XYZ type (P) Joint type (J)	Command line Edit area Display the hint of command Color the Words Commands - POS, MOVE: Commands - PROGRAM:	Font: Tahoma Terminal O Times New Roman O Trebuchet MS O Tunga O Verdana O Virinda	Font style: Regular Italic Bold Bold Italic	Size: 10 OK 10 Cancel 11 12 14 16 18 20 V
Syntax Check before save Check automatically Confirm whether to check beforehand Never check Vever display the result whenever error is not occurred	Commands - I/O: Commands - SLOT, MECH/ Commands - HAND: Commands - OTHERS: System functions: System status variables: Comment:	, .	Sample AaBbYy Script: Western	
Save and Read of the program Save and Read external position variables Get current position	Font: Tahoma (10) Regular	Edit		
Get current position Get current position automatically Reset default values			ОК	Cancel

Figure 8-14 Command Edit Area Font Setting

## 8.5.5. Save and Read of program

In the reading item at the time of the writing item when the program is preserved and reading, the screen can be started with the check entered "Outside program positional variable". This function can be used with version 1.6 or later of software.

ption		
Proportion of Window	Command	[Read Items] - Reading the program
Commands Position           XYZ type (P)         Joint type (J)	Display 1	Read Items
Syntax Check before save	Comm Comm Comm Comm	Program external position variables     OK Cancel
Check automatically     Confirm whether to check beforehand     Never check	Comm Syster Syster	[Save Items] - Saving the program
Never display the result     whenever error is not occurred      Save and Read of the program     Save and Read external position variables	Comm Font: Ta	Command lines     Position variables     Program external position variables
Get current position	,	OK Cancel
Reset default values		OK Cancel

Figure 8-15 Initial setting of "Program external position variables" in the [Read Items] and the [Save Items].

## 8.5.6. Get current position

When adding a position variable, the current position can be got in automatically if connected to the robot. This function can be used with version 1.6 or later of software.

Option		
Proportion of Window         Commands       Position         YZ type (P)       Joint type (J)         Syntax Check before save       Image: Solution and type (J)         O Confirm whether to check beforehand       Image: Solution automatically         O Confirm whether to check beforehand       Image: Solution automatically         Save and Read of the program       Save and Read of the program         Save and Read of the program       Save and Read of the program	Command line Edit area	Background color         MOVEMASTER command - Offline         MOVEMASTER command - Debug         MOVEMASTER command - Debug         MELFA-BASIC IV - Offline         MELFA-BASIC IV - Online         MELFA-BASIC IV - Online         MELFA-BASIC IV - Offline         MELFA-BASIC V - Online         MELFA-BASIC V - Offline         MELFA-BASIC V - Offline         MELFA-BASIC V - Online         MELFA-BASIC V - Online         MELFA-BASIC V - Debug
Reset default values		OK Cancel

Figure 8-16Setting the get current position.

## 8.5.7. Setting the background color of the program editor

It is possible to set the background color of the command area in the program editor. This function can be used with version 1.6 or later of software.

Figure 8-17Setting the background color of the program editor.

# – \land Caution ————

Please note that it becomes easy to make a mistake in off-line and online, etc. if the same color is used by the background color.

## 8.6. Program Editing

This chapter explains the methods for editing MELFA-BASIC V programs.

For RT ToolBox2 command statement editing, you can input in the same way as with a general editor like a notebook. There is no need to input the [Enter] key for each line as was the case with RT ToolBox.

## 8.6.1. MELFA-BASIC V command statement editing

When writing a program using MELFA-BASIC V, you do not use line numbers, unlike MELFA-BASIC IV or Movemaster commands. Instead the step position is displayed on the left end. These step numbers are automatically displayed with the keyboard [Enter] key.

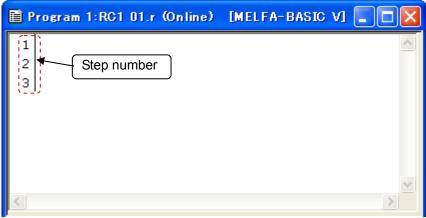


Figure 8-18 MELFA-BASIC V Command Edit Screen

Even if you input MELFA-BASIC V commands with all lowercase characters, when the program is written to the robot controllers, the commands are converted into the correct mixture of uppercase and lowercase letters.

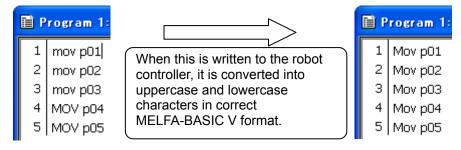
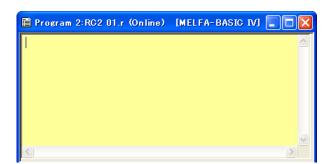


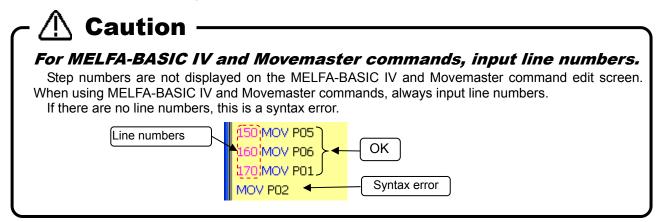
Figure 8-19 MELFA-BASIC V Character Input

## 8.6.2. MELFA-BASIC IV and Movemaster command command statement editing

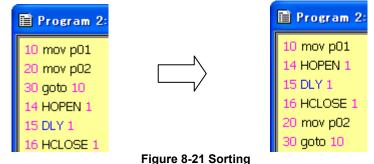
When writing a program using MELFA-BASIC IV or Movemaster commands, step numbers like those of MELFA-BASIC V are not displayed. Input the line number at the front of the command statement.







There is a function for sorting commands in order of line number even if you do not input them in order of line numbers. For details, see "8.6.4.16 Sorting".



There is a function for reordering commands in order of line number even if you do not input them in order of line numbers. For details, see

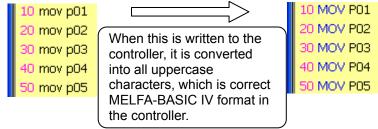


Figure 8-22 MELFA-BASIC IV Character Input

## 8.6.3. Position variable editing

Position variables are edited on the position edit screen. The upper list is a list of XYZ coordinate variables and the lower list is a list of joint coordinate variables.

Program 1:RC1 V6	6.r (Online	») [MELI	FA-BASIC	; V]				
1 MA = 3 2 Mov JO								< <
AddE	dit _	Delete						
XYZ	Х	Y	Z	А	В	С	L1	~
P00	400.120	0.000	644.620	180.000	-0.070	180.000	0.000	
P01	678.740	0.000	353.500	-180.0	0.000	-180.0	0.000	
P02	-657.1	-169.8	353,500	182		11 100		
P03	-657.1	169.880	353,500	1월 XYZ	positio	n variabl	es 000	
P11 012	497.040 407 n4n	-303.6	693.280 536.450	-11				× 1
<	20711211	LAUR 6	536 450	-115 /	6 300	-154 4		>
Joint	J1	J2	J3	J4	J5	J6	J7	
10	0.000	0.000	90.000	0.000	90.000	0.000	0.000	0.0
J1	0.000	50.000	120.000	<u>ممر</u> ح	100.000		9.000	0.0
J2	0.000	-13.910	-91.150	1	Joint po	osition	.000	0.0
13	90.000	50.000	120.000		variat	oles	.000	0.0
34	90.000	-13.910	-91.150	15			000	0.0
<								>
1								

Figure 8-23 Position Variable Edit Screen

Array variables are displayed developed in their own lists.

pa(1)         0.000 <t< th=""><th>Program 1:RC1 V6</th><th>iS.r (Online)</th><th>MELF</th><th>A-BASIC</th><th>VJ</th><th></th><th></th><th></th><th></th></t<>	Program 1:RC1 V6	iS.r (Online)	MELF	A-BASIC	VJ				
XYZ         X         Y         Z         A         B         C         L1           pa(1)         0.000 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>&lt; &lt;</th>									< <
XYZ         X         Y         Z         A         B         C         L1           pa(1)         0.000 <th>&lt;</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	<								
pa(1)         0.000 <t< td=""><td>Add E</td><td>Edit</td><td>Delete</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Add E	Edit	Delete						
pa(2)       0.000       0.000       0.000       0.000       0.000       0.000       0.000         pa(3)       0.000       0.000       0.000       0.000       0.000       0.000       0.000         pa(4)       0.000       0.000       0.000       0.000       0.000       0.000       0.000         pa(5)       0.000       0.000       0.000       0.000       0.000       0.000       0.000         pa(6)       0.000       0.000       0.000       0.000       0.000       0.000       0.000         pa(8)       0.000       0.000       0.000       0.000       0.000       0.000       0.000	XYZ	Х	Y	Z	А	В	С	L1	^
pa(3)       0.000       0.000       0.000       0.000       0.000       0.000       0.000         pa(4)       0.000       0.000       0.000       0.000       0.000       0.000       0.000         pa(5)       0.000       0.000       0.000       0.000       0.000       0.000       0.000         pa(6)       0.000       0.000       0.000       0.000       0.000       0.000       0.000         pa(7)       0.000       0.000       0.000       0.000       0.000       0.000       0.000	pa(1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
pa(4)       0.000       0.000       0.000       0.000       0.000       0.000         pa(5)       0.000       0.000       0.000       0.000       0.000       0.000         pa(6)       0.000       0.000       0.000       0.000       0.000       0.000         pa(7)       0.000       0.000       0.000       0.000       0.000       0.000         ca(2)       0.000       0.000       0.000       0.000       0.000       0.000	pa(2)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
pa(5)         0.000 <th< td=""><td>pa(3)</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td></td></th<>	pa(3)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
pa(6)         0.000 <t< td=""><td>pa(4)</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td></td></t<>	pa(4)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
pa(6)         0.000 <t< td=""><td>pa(5)</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.000</td><td></td></t<>	pa(5)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
pa(7) 0.0000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	pa(6)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	_
		0.000	0.000	0.000	0.000	0.000	0.000	0.000	
		0.000		0.000	0 000	0.000	0.000	0 000	<u>×</u>
loint 11 12 13 14 15 16 17									
	Joint	J1	J2	J3	]4	J5	J6	J7	

Figure 8-24 Array Variable Display

# Caution About uppercase characters and lowercase characters in position variables names With MELFA-BASIC V, you can use lowercase letters in variable names. This software does not differentiate between uppercase letters and lowercase letters in variable names. For example, the position variables PA and pa are recognized as the same position variables. The controller converts all later variables to match the first position variable name defined. For example, if you write a program like that below, the position variable "pa" is used and "PA" is converted into "pa". I | Mov pa | 1 | Mov pa | 2 | Mov pa When this is written to the controller, it is converted in the controller as on the right.

## 8.6.3.1. Adding/changing position variables

To add a position variable, click the [Add] button. The position variable adding screen is displayed. At this time, if position data is selected in the list, the contents of that position data (XYZ/joint, position information) are displayed. When "Get current position automatically" of the option screen is checked and connected to the robot, the current position of the robot is displayed with version 1.6 or later of software. However, the variable name remains blank. The current position is not displayed when not connected to the robot.

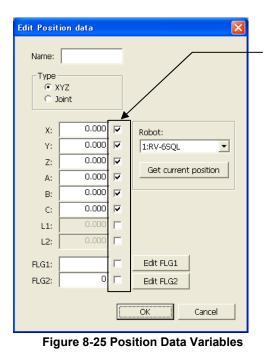
To revise a position variable, select the position variable to be revised in the list, then click the [Change] button.

The position name can be changed with version 1.6 or later of software. However, it is not possible to use it in the following cases.

- In case of opening the program in debugging status.
- With SQ Direct.
- With version 1.5.1 or earlier of this software.

Select either XYZ coordinate type or joint coordinate type, input the values of each element of the position data, input the position variable name, then click the [OK] button.

While editing an online program in online status or simulation status, you can read the current robot position by pressing the [Read Current Position] button.



The validity of the elements is

models, some elements are not

For some robot

checked.

checked.

## 8.6.3.2. Deleting position variables

After selecting the target position variable, click the [Delete] button. The selected position variable is deleted. You can also delete multiple position variables at the same time. You can select multiple position variables by clicking position variables while holding down the [Ctrl] key or the [Shift] key on the keyboard. However, you cannot select XYZ position variables and joint position variables at the same time.

## **Caution** To delete a position array variable, delete the command statement. "Dim" declaration.

With this software, even if a position variable is deleted, if a program with a "Dim" declaration is written to a robot controller, the position array variables declared with the "Dim" are left with 0 for all their components.

## 8.6.4. Edit assist functions

This explains the edit assist functions, which help in command editing.

Edit assist functions such as copy, cut, find, replace, and jump are used from [Edit] and [Tool] on the menu bar.

## 8.6.4.1. Copy

Copies a character string in the command being edited. You can also copy multiple lines.

Selecting the character string to copy, click on the menu bar [Edit] -> [Copy].

You can use the paste function, explained below, to paste this copied character string to another location in the program.

For details on position data copying, see "8.6.4.4 Copy position data".

## 8.6.4.2. Cut

Cuts a character string from the command being edited. You can also cut multiple lines.

Selecting the character string to cut, click on the menu bar [Edit] -> [Cut].

You can use the paste functio

n, explained below, to paste this cut character string to another location in the program.

## 8.6.4.3. Paste

Pastes the copied or cut character string to the specified location.

Put the cursor where you want to paste, then click on the menu bar [Edit] -> [Paste]. The copied or cut character string is inserted at the specified location.

For details on position data pasting, see "8.6.4.5 Pasting position data".

## 8.6.4.4. Copy position data

Copies position data. You can also copy multiple position data items. Selecting the position data to copy, click on the menu bar [Edit] -> [Copy – Position data].

#### 8.6.4.5. Pasting position data

This pastes the copied position data.

Make active the program you want to paste into, then click on the menu bar [Edit] -> [Paste – Position data]. The copied position data is inserted into the specified program.

At this time, if there is already position data with the same name in that program, a confirmation message is displayed.



Figure 8-26 Paste Position Data Confirmation Message

#### 8.6.4.6. Find

This searches for the specified character string. Click on the menu bar [Edit] -> [Find]. The find screen is displayed.

Find Find		×		
Fi <u>n</u> d what:		~		
Find where Command lines Position variables	Match case	Go to <u>T</u> op		
Find Next     Find Previous     Display List     Gose				
	Previous Display List			

Figure 8-27 Find Screen

Input the character string to find, and then click [Find Next] or [Find Previous]. The character string search starts.

If you click [Display List], all the instances of the specified character string are found from programs and displayed in a list.

Find	
Find what: Mov	~
Find where ✓ Command lines ✓ Position variables	Go to <u>T</u> op
Eind Next Find Previous Display List	
Contents	Step#
MOV JD MOV P_01 MOV J0 Type 0,0 MOV J1 MOV J2 MOV J3 MOV J4 MOV J0	2 6 7 9 10 11 12 13
Jump	Clo <u>s</u> e List

Figure 8-28 Find Results List Display

When you select an item from the find results list and click the [Jump] button, the display jumps to the line that includes the selected item.

It is possible to search the name of position variables with version 1.6 or later of software.

## 8.6.4.7. Find in Files

This searches for the specified character string in the "Online" or "Offline" program files registered in the current project.

Click on the menu bar [Edit] -> [Find in Files]. The find in files screen is displayed.

You can also display this screen by clicking the program management [Find in Files] button.

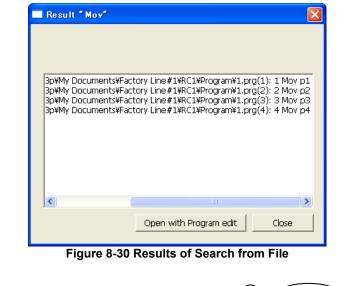
Find in Files		
Find waht:	Mov	•
In Folder:	• PC	C:¥Documents and Settings¥r3p¥M…¥Program
	C Robot	1:RC1
🗌 Match cas	е	
🔽 Never find	l Line#	Find Close

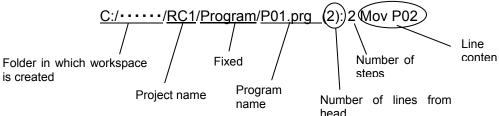
Figure 8-29 Find in Files Screen

Input the character string to find and select the location to search.

When "PC" is selected as the location to search, all the offline programs registered in the current project are searched.

When "Robot" is selected as the location to search, all the online programs registered in the current project are searched. In other words, all the programs in robot controllers in the "online" status connected to a robot are searched. If a simulation is running, all the programs in the virtual controller are searched. When you search in controllers, the communications with the controllers may take time.





With the [Open with Program edit] button, you can open the program that includes the contents of the line selected from the list of search results.

## 8.6.4.8. Replace

This replaces the specified character string with another character string. Click on the menu bar [Edit] -> [Replace]. The Replace Screen is displayed.

Relpace		X
Find waht:	Mov	•
Replace with:	Mvs	<b>•</b>
🗖 Match case	9	Go to Top
Find Next	Replace All s	etting Close

Figure 8-31 Replace Screen

[Find Next] : Searches for the next instance of the character string to be replaced.
[Replace] : Replaces the found character string.
[Replace All] : An item is displayed for specifying the range in which to replace all instances of the specified character string.

With Replace All, you can specify a range in which to replace. When you click the [Replace All] button, all the instances in the specified range are replaced.

Relpace	
Find waht: Mov	•
Replace with: Mvs	•
☐ Match case	Go to Top
[Replace All setting]	Close
Replace Range	
C Selected lines	
C Line#	
1 - 1	
	Replace All

Figure 8-32 Replace All Setting Screen

## 8.6.4.9. Jump to specified line

Jumps to the specified step number or label. Click on the menu bar [Edit] -> [Jump]. The jump screen is displayed.



Figure 8-33 Jump Screen

Input the step number or label to jump to, then click the [OK] button. Display jumps to the specified step number or label.

#### 8.6.4.10. Partial writing

Writes the selected program lines to the robot controller.

This is handy for reflecting the contents of the partially revised program in the robot controller, but be careful. Only the selected part of the program is written.

Select the lines to be written to the robot controller, then click on the menu bar [Edit] -> [Partial Write]. Check the contents to be written, then click [Yes].

🗎 Pr	ogram 1:RC1	M6S.r. (Online) - IMELEA-BASIG M	
9	For M01=1 To	MELFA RT ToolBox2	
10	Mov J1	Are you sure you want to write the selected lines to	
11	Mov J2	the Robot Controller?	
12	Mov J3		
13	Mov J4	Robot: 1:RC1	
14	Next	10 May 11	
15	Mov JO	10 Mov J1 11 Mov J2	
16	For M01=1 To		
17	Mov P01		
18	Mey Pho		
	Add		
XYZ			С
P00			DO
P01		Yes No	
P02			90
<u>د</u>			

Figure 8-34 Partial Writing

#### 8.6.4.11. Transfer all lines of the program

Write the all lines of the program to the robot controller.

Click on the menu bar [Edit] -> [Transfer all to the controller] after opening the program. After displaying the confirmation message, and then click "Yes".

This function can be used with version 1.6 or later of software.

#### 8.6.4.12. Syntax check

You can check whether or not the edited robot program is syntactically correct. Execute this before writing the program to the robot controller.

Click on the menu bar [Tool] ->	[Check Syntax]. If ther	re is a syntax error, t	he error location an	nd details are
displayed.				

Sy	ntax check Error				×
3	Error line 3 Mo JO	Step# 3	Error content Syntax error		
	Jump			ОК	]

Figure 8-35 Syntax Check Results Screen

If you select the detected error and click the [Jump] button, it jumps to the command statement with the error.

#### 8.6.4.13. Command template

You can display a list of the commands and make insertions on the program command edit screen. Click on the menu bar [Tool] -> [Command Template].

Command Template			×
Category: All Program I/O Mechanism Slot Hand Others System function System status variak	Command: Accel Base Cmp Jnt Cmp Off Cmp Tool CmpG Cnt ColChk ColChk ColChk Def Arch Fine IOvrd	Format: Accel Accel <acceleration rate="">, <deceleration rate="">, Accel <acceleration rate="">, <deceleration rate="">, &lt;</deceleration></acceleration></deceleration></acceleration>	
Description:	150/14		
Designate the robot	's acceleration and de	celeration speeds as a percentage (%).	

Figure 8-36 Command Template

When you select the template for the selected command from the list, then either click the [Insert Template] button or double click, the command is inserted onto the program command edit screen.

#### 8.6.4.14. XYZ position data batch editing/joint position data editing

You can change the position variables in the program being edited in a batch and can sum up all the values. For example, you can add 10.00 to the X components of the P00, P01, P02, P03, and P04.

To batch edit XYZ position variables, click on the menu bar [Tool] -> [Batch Edit XYZ Position Data]. To batch edit joint position variables, click on the menu bar [Tool] -> [Batch Edit Joint Position Data]. All the position variables of the respective type are displayed.

The positional variables selected are displayed in the "Target" with version 1.6 or later of software.

Figure 8-37 XYZ Position Data Variable Editing

From the position variable list, select the position variable to change, then add it to the change list with the [->] button.

Input the change value, select the change method [Add] / [Change], then click the [OK] button. You can not set both [Add] and [Change] for the same element.

You can cancel the registration of a position variable for change with the [<-] button.

#### 8.6.4.15. Renumbering

The renumbering function can only be used with MELFA-BASIC IV and Movemaster commands.

You can renumber line numbers in a batch. You can specify the range for renumbering.

With the setting dialog, you can specify the start and end lines numbers, the new starting line number, and the line number interval.

While editing a program created with MELFA-BASIC IV or Movemaster commands, click the tool bar [Tool] -> [Renumber]. The renumber set screen is displayed.

Renumber	
Range	New line# Conditions
	Start line#: 10
O Selected lines	Line pitch: 10
OLine#	Sort lines of the range in ascending order of the line# before renumbering Update the line# of the jump destination outside the range
	OK Cancel

Figure 8-38 Renumber Setting Screen

## **Caution** *Renumbering can only be used with MELFA-BASIC IV and*

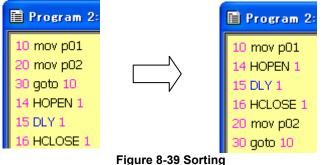
#### Movemaster commands.

The renumbering function can only be used with MELFA-BASIC IV and Movemaster commands. It can not be used with standard MELFA-BASIC V.

#### 8.6.4.16. Sorting

The sorting function can only be used with MELFA-BASIC IV and Movemaster commands. This sorts the edited program by line number.

While editing a program created with MELFA-BASIC IV or Movemaster commands, click the tool bar [Tool] -> [Sort]. The confirmation message is displayed, then the line numbers are sorted in ascending order.



## 🔨 Caution -

# Sorting can only be used with MELFA-BASIC IV and Movemaster commands.

The sorting function can only be used with MELFA-BASIC IV and Movemaster commands. It can not be used with standard MELFA-BASIC V.

#### 8.6.4.17. Comment Selection/Uncomment Selection

The selected lines are exchanged as a comment by the batch. Or the comments in the selected lines are removed comment by the batch.

This function can be used in Ver. 1.2 or later.

In command edit screen, after selecting the lines you want to change into the comment, click [Edit]->[Comment Selection] on menu bar. Comment character " ' " is added to the head of the selected lines. Moreover, after selecting the lines you want to release the comment, click [Edit]->[Uncomment Selection] on menu bar. Then the comments in the selected lines are removed comment.

However, even if you select the line where "Rem" command is included, "Rem" is not removed.

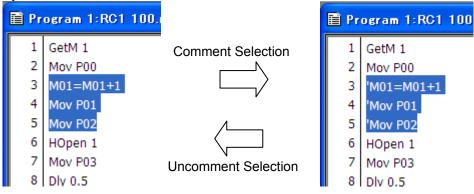


Figure 8-40 Comment Selection / Uncomment Selection

Example for setting / removing of comment is as follows;

program language	Set comment	Remove comment
MELFA-BASIC V	1       Mov P1       1       'Mov P1         2       Mov P2       2       'Mov P2         3       'Mov P3       3       ''Mov P3         4       REM ABCDEFG       4       'REM ABCDEFG	1       'Mov P1       1       Mov P1         2       'Mov P2       2       Mov P2         3       ''Mov P3       3       'Mov P3         4       'REM ABCDEFG       4       REM ABCDEFG         5       REM P4       5       REM P4
MELFA-BASIC IV	10 MOV P1       10 'MOV P1         20 MOV P2       20 ' MOV P2         30MOV P3       30 'MOV P3         40 REM ABCDEFG       40 'REM ABCDEFG	10 'MOV P1       10 MOV P1         20 ' MOV P2       20 MOV P2         30 'MOV P3       30 MOV P3         40 'REM ABCDEFG       40 REM ABCDEFG
		50 REM MOV P4 50 REM MOV P4

Table 8-3 Example for setting / removing comment

# - \land Caution

#### Caution for comment in the robot program in debugging status

When the program is opened in debugging status, it is written as soon as the comment is set or removed. At this time, when the robot controller is driving, it becomes an error.

#### 8.6.4.18. Removing comments from all lines in the program

It is possible to remove comments from all lines in the program. This function can be used with the software Ver.1.4 or later.

Open the program that removes all the comments, and click [Edit]->[Remove comments from all lines] in the menu bar. All comments in the program are removed excluding "" (single quotation) and "Rem" command.

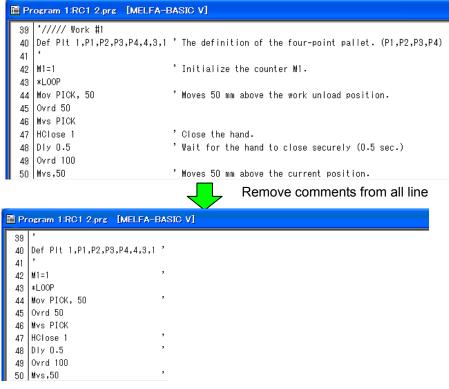


Figure 8-41 Removing comments from all lines in the program

# 🗸 🗥 Caution -

#### Removal processing of special comment command "Rem"

Space division between comment command "Rem" and line number or other command need to inserted. In the case of Robot Controller, it may judge comment command "Rem" as a comment without space division. But this software judges comment command "Rem" as a comment if "Rem" is devided by the space.

If there is a character "Rem" in the command line, this software doesn't remove comment contents. After the processing, these command lines are displayed in the command editing screen. Confirm the contents and remove comment contents in the screen. When you select displayed command line and click [Jump] button, you can jump to command line in the command editing screen.

Remove all comments			
All comments have removed. Unrecognized comment lines, "RE Remove comments manually if ne			
Contents	Step#		
REM===job2===	1		
REM===job3===	2		
Jump	Close		

Figure 8-42 List of command line which includes "Rem" that cannot take as the comment

## 8.7. Saving Programs

Always save the edited program.

There are three methods for saving: saving, saving to computer, saving to robot controller.

# Caution Do not write a program to the controller with duplicate step numbers. Even programs with duplicate step numbers or that are still being edited and are not yet syntactically correct can be saved on the computer. However, be careful not to copy or otherwise transfer such a program to a robot controller with the program management functions. If a program with duplicate step numbers is written to the robot controller, the duplicate step lines are written over each other.

#### 8.7.1. Save

Saves the program being edited with its current name.

When you click on the menu bar [File] -> [Save], the program is saved, overwriting the older version of itself.

If you are editing a program on a robot controller, the "Save Items" setting screen is displayed. Set the items to write, and then click the [OK] button.

For details on the "save items", see "8.7.4 Items written when saving in robot".

Save Items 🛛 🔀			
✓ Command lines			
Program external position variables			
OK Cancel			
Figure 8-43 Writing Items			

#### 8.7.2. Saving on computer

Saves the program being edited to the computer. At this time, you can set a new program name. Click on the menu bar [File] -> [Save to PC].

Save As Robot program Program path Is and Settings¥r3p¥My Doc Update	:uments¥Facto	ry Line#1¥RC2	(Program	Browse,
Robot program	Size	Date	Time	
1.prg ₽ 2.prg	271 42	2008/01/08 2008/01/08	10:35:50 10:35:51	
Robot program			ОК	Cancel
Figure	e 8-44 Savi	ing on Col	nputer	

Input the robot program name, and then click the [OK] button.

# Folder in which programs are stored

Programs on the computer are managed in units of workspace projects. The folder they are stored into is workspace writing folder/project name/Program.

To store into any other folder, first store in this folder, then copy into the desired folder with the program management copy function.

# 🕂 Caution

#### About the program name which is disable on PC

Windows, error is occurred in the Program editing tool when opening that program. To solve this problem, it is necessary to change the program name in the robot controller.

The "Reserved words" are the special words used by Windows system. Therefore, it is impossible to use these words as the file name on PC. The following words are in "Reserved words".

AUX, COM1 to 9, CON, LPT1 to 9, NUL, PRN

#### 8.7.3. Saving in robot controller

Saves the program being edited to the robot controller with a new name. At time, you can set a new program name.

Click on the menu bar [File] -> [Save in Robot]. The "Save Items" setting screen is displayed, so set the save items, then click the [OK] button.

For details on the "save items", see "8.7.4 Items written when saving in robot".

Save As Robot program			
Robot Controller		Browse,	
Update			
Robot program	Size Date Time	Protect	
1	481 08/01/08 1 <u>0:27:50</u>	None	
■ 1	262 08/01/08 10:27:51	. None	↓ ↓
			Save Items
			Command lines
			Position variables
<		>	Program external position variables
Robot program			
,	Ок	Cancel	OK Cancel

Figure 8-45 Saving on Robot Controller

#### 8.7.4. Items written when saving in robot

When saving a robot program in a robot controller, write items can be set by categorizing them into instructions, position variables and program external position variables.

This function is displayed on CRn-500 series robot controllers from the H1 edition on.

This save item default values for when you have read a robot controller program are the same as the "Read Items" when you read the program. When you have created a new program or opened a program on the computer, the display becomes as in **"Save Items"**.

Save Items	×
Command lines	
······	
Position variables	
🔲 Program external position variables	
	-
OK Cancel	
Figure 8-46 Save Items	

We will explain the operations for saving to a robot when only command lines or only position variables are specified, using the following example for illustration.

#### Example: When there are programs in program editing on the computer or in the robot controller << Program in the robot controller>> << Program on computer >> 10 Mov P1 100 Mov P1 20 Mov P2 200 Mov P2 30 Mov P3 300 Mov P5 ' <- Change 40 Fnd 400 End P1=( 400.000, 0.000, 100.000, , , 90.000)(4,0) P1=( 400.000, 0.000, 100.000, , ,-90.000)(4,0) P2=( 0.000, 400.000, 150.000, , , 0.000)(4,0) P2=( 0.000, 400.000, 150.000, , , 0.000)(4,0) P3=(-351.704, -49.369, 22.000, , ,-95.168)(0,0) P3=(-351.704, -49.369, 22.000, , ,-95.168)(0,0) P4=( 276.499,-599.066, 264.966, , , 29.170)(0,0) P5=( 535.786, 295.021, 102.000, , ,148.420)(0,0) (1) When only command line written << Program in the robot controller>> 100 Mov P1 Changing only the command line 200 Mov P2 300 Mov P5 400 End P1=( 400.000, - 0.000, 100.000,,, 90.000)(4,0) P2=( 0.000, 400.000, 150.000,,, 0.000)(4,0) The position variables are not P3=(-351.700, -49.370, 22.000,,,-95.170)(0,0) changed. P4=( 276.500,-599.070, 264.970,,, 29.170)(0,0) (2) When writing position variable only << Program in the robot controller >> 10 Mov P1 20 Mov P2 The command line is not changed. 30 Mov P3 The position variables on the computer are 40 End overwritten. However, position variables P1=( 400.000, 0.000, 100.000,,,-90.000)(4,0) that are in the robot controller, not on the P2=( 0.000, 400.000, 150.000,,, 0.000)(4,0) computer, are left as is. (Reference) P3=(-351.700, -49.370, 22.000,,,,-95.170)(0,0) P4=( 276.500,-599.070, 264.970,,, 29.170)(0,0) P5=( 535.790, 295.020, 102.000,,,148.420)(0,0)

# ▲ Caution -

### Timing from which program external position variables is written.

Timing from which the program external position variable is possible to back up comes to be going to turn on the power supply next time.

Please turn on controller's power supply again when you use the program external position variable written in the controller.

#### 8.7.5. Setting the syntax check for before program saving

You can set whether or not to have the syntax checked when you save a program and whether or not to display a message when there are no syntax errors.

With the program opened, on the menu bar, click [Tool] -> [Option] and set with the option screen. The default setting is automatic syntax checks with no message displayed if there is no syntax error.

Option		
Proportion of Window Commands Position XYZ type (P) Joint type (J)	Command line Edit area	Background color MOVEMASTER command - Offline MOVEMASTER command - Online MOVEMASTER command - Debug MELFA-BASIC IV - Offline MELFA-BASIC IV - Online
Syntax Check before save Check automatically Confirm whether to check beforehand Never check Never display the result whenever error is not occurred	Commands - OTHERS: System functions: System status variables: Comment: Font: Tahoma (10) Regular Edit	MELFA-BASIC IV - Debug MELFA-BASIC V - Offline MELFA-BASIC V - Online MELFA-BASIC V - Debug
Save and Read of the program Save and Read external position variables Reset default values		OK Cancel

Figure 8-47 Settings for Syntax Check Before Saving

## 8.8. Program Printing

You can print programs you have written.

#### 8.8.1. Checking a print image

You can display a print image of the program on the screen.

Make active the program you want to print, then click on the menu bar [Workspace] -> [Print Preview]. The print image for currently active program is displayed.

#### 8.8.2. Printing a program

Make active the program you want to print, then click on the menu bar [Workspace] -> [Print]. The currently active program can be printed.

#### 8.8.3. Setting to print a program

You can customize the pages the program is printed with.

When you click on the menu bar [File] -> [Page Setup], the page setup screen is displayed. You can set whether or not to print the file name, print date and time, and page numbers, the space between lines and the margin sizes.

Page Setup	le l	K
🔽 File name	Margins [mm]	
🔽 Print date	Left: 20 Right: 15	
🔽 Page#	Top: 15 Bottom: 15	
Line pitch: 1 Line 💌	OK Cancel	

Figure 8-48 Page Setup for Printing

## 8.9. Program Debugging

You can debug robot programs you have written.

## - A Caution Debugging is for programs on a controller or on a virtual controller with a simulation running.

When debugging, use a program on a controller or on a virtual controller with a simulation running. You can not debug a program stored on a computer.

The function of the "Position Jump" can be used with version 1.6 or later of software.

#### 8.9.1. Starting debugging

Open the robot program in debugging status. From the project tree [Online] -> [Program], select the program, then click the right mouse button. From the right mouse button menu, click [Debug Open].

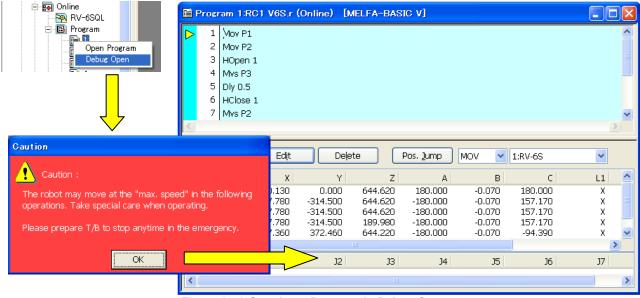


Figure 8-49 Opening a Program in Debug Status

The specified robot program is opened in debugging status. The execution line cursor ">" is displayed at the left end of the command edit area. The line on which this execution line cursor is displayed is the line currently being executed.

The display of this execution line cursor can be switched on/off with the menu bar [Debug] -> [Display/Do not display Execution Line].

#### 8.9.2. Executing programs step by step

## Danger

With program debugging, the robot may operate at 100% speed. Watch out for the safety around the robot. Also, prepare a T/B at hand and use the robot in a status in which an emergency stop can be made at any time.

A program that has been opened in debugging status can be run step by step.

Operate using the debug operation screen that is displayed at the same time the program was opened in debugging status.

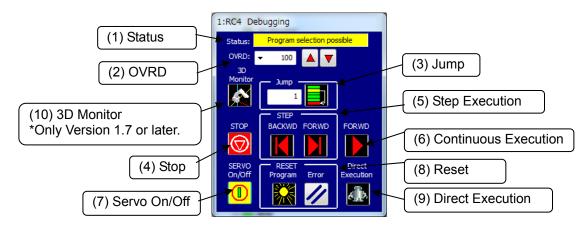


Figure 8-50 Debug Operation Screen

#### (1) Status

The controller's task slot status is displayed.

(2) OVRD

This displays and sets the robot speed override.

You can set by operating the drop down list with Version 3.01B or later of this software. 5%, 2%, and 1% can be selected too in this operation.

(3) Jump

You can specify the line in the program to execute.

(4) Stop

You can stop the program.

(5) Step Execution

This executes the specified program one line at a time. Pressing the [FORWD] button executes the command on the current execution line and advances the current execution line one line. Pressing the [BACKWD] button executes the command on the current execution line and returns the current execution line one line.

(6) Continuous Execution

This executes the program continuously from the current line.

(7) Servo On/Off

You can switch the robot servo On/Off.

(8) Reset

You can reset the program and any errors that have occurred.

#### (9) Direct Execution

You can execute any command without relationship to the robot program.

(10) 3D Monitor

You can display 3D monitor of the robot.

#### 8.9.3. Revising programs

The command statements for a program that has been opened in debugging status can not be edited in the command edit area. You can revise command statements from [Edit] on the menu bar. Click on the menu bar [Edit] -> [Edit Command line (Online)], [Insert Command line (Online)], and [Delete Command line (Online)]. Position variables can be edited as usual.

Edit Comman <u>d</u> line – Online	
Insert C <u>o</u> mmand line – Online	
Delete Command <u>l</u> ine – Online	

#### (1) Edit command line

You can edit the contents of the specified command line.

Click the command line to be edited with the mouse, click on the menu bar [Edit] -> [Edit Command line (Online)]. The screen for editing the command line is displayed.

Edit Command line (Online)	X
Step# 1 Mov p1	
	OK Cancel

Figure 8-51 Command Line Editing (Online)

Revise the command line, and then click the [OK] button.

#### (2) Insert command line

You can insert a command statement at the specified line.

Click the line at which the command statement is to be inserted with the mouse, then click on the menu bar [Edit] -> [Insert Command line (Online)]. The screen for inserting the command line is displayed.

Insert Command line (Online)	
Insert at a front of step# 1	
1	OK Cancel

Figure 8-52 Command Line Insertion (Online)

#### (3) Delete command line

You can delete the specified command line.

Click the line at the line with the command statement to be deleted with the mouse, then click on the menu bar [Edit] -> [Delete Command line (Online)]. The confirmation screen for the command line deletion is displayed.



Figure 8-53 Confirming Command Line Deletion

(4) Edit position variables

For details on the method for editing the position variable, "8.6.3 Position variable editing".

# 🕂 Caution

#### Be careful when changing the value of a variable.

When you change the value of a variable, the operation target position of the robot may change and result in a collision. This is particularly dangerous during robot operation, so check carefully before changing the value of a parameter.

- 🗥 Caution

*Partial writing can not be performed while editing a program in debugging status.* 

#### 8.9.4. Setting and deleting breakpoints

You can set a breakpoint in a program that has been opened in debugging status.

If you set a breakpoint, when you open the program in debugging status, you can stop the program at the line while executing the Continuous execution. After stops, you can execute the program continuously.

Breakpoints can be set up to 128. Moreover, when the program is quitted, every breakpoint is deleted. There are the following two types of breakpoints.

Permanent breakpoint : One-time breakpoint :

After stopping, the breakpoint keeps being set.

: After stopping, the breakpoint is automatically deleted at the same time as stopping.



(1) Set a Breakpoint

- The breakpoint is set according to the following procedure.
- 1) Click the command line where breakpoint is set with the mouse, then click on the menu bar [Debug] -> [Set Breakpoint].
- The breakpoint setting screen is displayed. Select the type of breakpoint to set, then click the [OK] button. The breakpoint is set at the specified command line.

Set a Breakpoint	
-Туре	
Permanent	
C One time	
OK	Cancel

Figure 8-54 Setting a Breakpoint

3) "•" is displayed at the left end of command lines at which breakpoints are set.

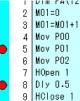


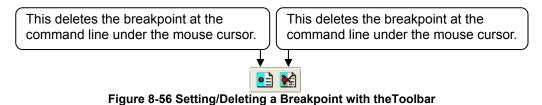
Figure 8-55 Display of Lines with Breakpoints Set

(2) Delete a Breakpoint

To delete a breakpoint, click the command line with the breakpoint to be deleted with the mouse. And then click on the menu bar [Debug] -> [Delete a Breakpoint].

To delete all the breakpoints set in this program, click on the menu bar [Debug] -> [Delete All Breakpoints].

You can also perform the breakpoint setting and deleting operations with tool bar buttons.



#### 8.9.5. Position jump

It is possible to move the robot to the position with the specified interpolation movement. This function can be used with version 1.6 or later of software.

Add	Edit	Deleti		Pos. Jump	MOV 🔽	1:RV-6S	~	
XYZ	X	Y	Z	А	В	С	L1	^
PO	400.130	0.000	644.620	180.000	-0.070	180.000	Х	
P1	287.780	-314.500	644.620	-180.000	-0.070	157.170	Х	
P2	287.780	-314.500	644.620	-180.000	-0.070	157.170	х	
		Figu	re 8-57	Position ju	mp			

The operation of "Position jump" function is as follows.

- (1) Select the robot. (In case of multiple robots)
- (2) Select the interpolation movement.(MOV:Joint interpolation movement, MVS:Linear interpolation movement)
- (3) Select the target position.
- (4) Click [Pos. jump] button.
- (5) In case of moving the actual robot, attention message is displayed. In case of moving the robot in the simulation, it is moved without attention message.

#### 8.9.6. Ending debugging

To end debugging, close the program with the "IM" button at the upper-right of the edit screen for the program opened in debugging status.



At this time, if the program has been changed, a confirmation message is displayed asking if you want to save the changed contents.

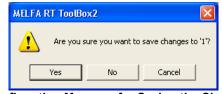


Figure 8-59 Confirmation Message for Saving the Changed Contents

Here, if you select "No", the changed contents are all thrown out. To put the changed contents into effect, always select "Yes".

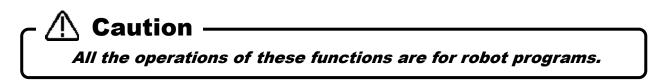
## 8.10. Program Management

You can copy, move, delete, compare the contents of, rename, and set protection for robot programs.

From the project tree, select the target project program, then click the right mouse button. The right button menu is displayed, so select [Manage Programs]. The manage programs screen is displayed.

	Program N	lanager					
Workspace	Source			-Des <u>t</u> ination -			
			Browse				Browse
⊡- 🕞 Offline ⊡- 🛐 Online	Project	1:RC1	*	Project	1:RC1		
RV-6SQL □-B Program	○ Robot	1:RC1(CRnX-7xx)	~	💿 Robot	1:RC1(0	RnX-7xx)	~
New Program Manager	Refresh	Selecti	ion release	R <u>e</u> fresh		Select	ion rele <u>a</u> se
	Name	Size Date	Time 🔼	Name	Size	Date	Time 🔼
	0.prg 1.prg 1.0035.prg 3.prg 5.prg 6.prg CL01.prg DD.prg FFF.prg MB3.PRG MB3XVD MB3XXD	423         2010/03/04           50         2010/09/21           264         2010/03/16           216         2010/03/15           40         2010/03/02           24294         2009/09/16           690         2010/03/03           288         2009/04/09           636         2009/03/06           610         2009/03/06           2115         2009/04/09           2009         2009/04/09	11:41:1 10:03: 14:40: 18:06: 14:11: 14:52: 15:33: 18:41: 09:21: 11:58: 10:01: 10:00: 10:00: 10:00: 10:01: ♥	1 2 5 6 AB AS DD SK TEL TES 16111 GOHI SUZU ≪	317 493 259 424 351 1210 486 727 655 505 275	09/06/17 10/09/14 10/07/06 09/04/14 09/04/14 10/07/07 09/07/01 09/12/21 10/01/06 10/05/17 09/04/14 09/05/25	09:59: 14:49: 09:27: 13:29: 09:44: 09:45: 14:04: 09:35: 16:02: 09:37: 15:32: 09:47: 15:32: 09:47: 15:32
	Free:	1397467136	[Bytes]	Free:		10485760	00 [Bytes]
	File type:	Robot program (*.prg	ı) 🔽	File type:	Robot p	rogram (*.pr	a) 🔽
	Сору	Mo <u>v</u> e <u>D</u> elete	Re <u>n</u> ame	Protect	Compa	ire <u>C</u> los	e

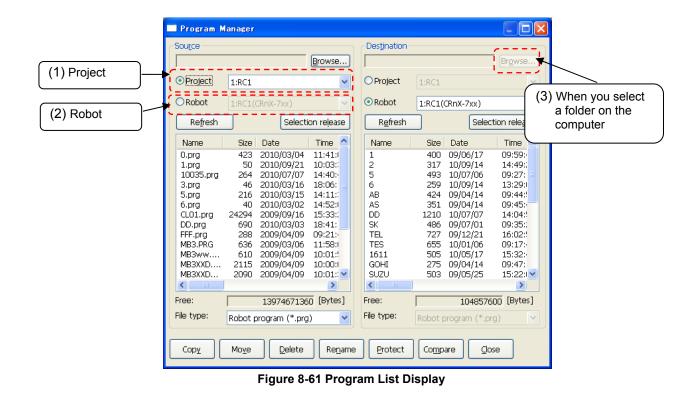
Figure 8-60 Starting Program Management



#### 8.10.1. Program list display

On the left and right lists, the lists are programs of the displayed in the robot controller and the specified folder.

- (1) Project You can specify projects in the workspace.
- (2) Robot You can specify a robot controller that is currently connected.
- (3) [...] button When you select [Project], you can specify any folder on the computer.



#### 8.10.2. Copy

The program files are copied. Copying of the entire program file or only the command statements or only the position variables is possible.

Select <u>the transmission source program names from the list at the left</u>, and designate <u>the transmission</u> <u>destination folder on the right side</u>. The multiple transmission source programs can be selected at the same time, but for copying with changing its name, only one program must be selected. Copying is executed when the [Copy] button is clicked on and [Setting for copy] dialog is set.

🔲 Program M	lanager							]			
Source				-Des <u>tination</u> -							
			Browse				Browse				
Project	1:RC1		~	○ Project	1:RC1		~				
○Robot	1:RC1(	CRnX-7xx)	~	⊙ Robot	1:RC1(	CRnX-7xx)	~		Setting for copy		
Refresh		Selecti	on release	R <u>e</u> fresh		Selec	tion release				
Name	Size	Date	Time 🔼	Name	Size	Date	Time 🔺		Command		
0.prg	423	2010/03/04	11:41:	1	400	09/06/17	09:59:		Position		
1.prg	50	2010/09/21	10:03:	2	317	10/09/14	14:49:		🔽 Rename		
10035.prg	264	2010/07/07	14:40:	5	493	10/07/06	09:27: 🔳				
3.prg	46	2010/03/16	18:06:	6	259	10/09/14	13:29:		2		.PRG
5.prg	216	2010/03/15	14:11:	AB	424	09/04/14	09:44:		,		ii itta
6.prg	40	2010/03/02	14:52:0	AS	351	09/04/14 10/07/07	09:45:		Target files:		
CL01.prg DD.prg	24294 690	2009/09/16 2010/03/03	15:33: 18:41:	DD SK	1210 486	09/07/01	14:04: 09:35:		1		
FFF.prg	288	2009/04/09	09:21:	TEL	727	09/12/21	16:02:				
MB3.PRG	636	2009/03/06	11:58:	TES	655	10/01/06	09:17:				
MB3ww	610	2009/04/09	10:01:	1611	505	10/05/17	15:32:				
MB3XXD	2115	2009/04/09	10:00:	GOHI	275	09/04/14	09:47:				
MB3XXD	2090	2009/04/09	10:01: ⊻	SUZU	503	09/05/25	15:22:1		)		_
<			>	<			>			<b>-</b>	1
Free:		1391574220	8 [Bytes]	Free:		1048576	500 [Bytes]		OK	Cancel	
File type:	Robot p	program (*.prg	i) 🔽	File type:	Robot p	program (*.p	rg) 🔽				
~»											
Сору	Mo <u>v</u> e	Delete	Re <u>n</u> ame	<u>P</u> rotect	Comp	are <u>C</u> lo	se				
NEELS.											

Figure 8-62 Copy Setting Screen

It is possible to copy by using the project tree with this software Version 1.3 or later.

Workspace ×		Copy prog	am						
RC1 □-₩ RC1		Source				Des <u>tination</u>			
Program		 • Project	1:RC1		Browse	 Project	1:RC1		Browse
2.p 2.p Copy Program 2.c Copy Program		ORobot	1:RC1(C	RnX-7xx)	~	ORobot	1:RC1(	(CRnX-7xx)	~
□ 4.p Delete Program	ľ	Refresh		Selecti	ion release	Refresh		Selecti	ion rele <u>a</u> se
🕀 🐻 Online		Name	Size	Date	Time 🔼	Name	Size	Date	Time 🔼
Backup		0.prg 1.prg 10035.prg 3.prg 5.prg 6.prg CL01.prg DD.prg FFF.prg MB3.PRG MB3WW MB3XXD	50 264 46 216 40 24294 690 288 636 610 2115	2010/03/04 2010/09/21 2010/03/15 2010/03/15 2010/03/02 2009/09/16 2010/03/03 2009/04/09 2009/04/09 2009/04/09 2009/04/09	11:41:1 10:03: 14:40: 18:06: 14:11: 14:52: 15:33: 18:41: 09:21: 11:58: 10:01: 10:01: 10:00: 10:01: ▼	0.prg 1.prg 1.0035.prg 3.prg 5.prg 6.prg CL01.prg CL01.prg PTF.prg MB3.PRG MB3XD MB3XXD	423 50 264 46 216 40 24294 690 288 636 610 2115 2090	2010/03/04 2010/09/21 2010/03/15 2010/03/15 2010/03/15 2010/03/02 2009/09/16 2010/03/03 2009/04/09 2009/04/09 2009/04/09 2009/04/09	11:413 10:03: 14:40: 18:06: 14:11: 14:523 15:33: 18:41: 09:21: 11:583 10:01: 10:00: 10:01: ▼
		Free:		1391571763	D [Bytes]	Free:		1391571763	2 [Bytes]
		File type:	Robot p	rogram (*.prg		File type:	Robot	program (*.prg	
		Сору	Mo <u>v</u> e	<u>D</u> elete	Re <u>n</u> ame	Protect		oare <u>C</u> los	e

Figure 8-63 Copying the program by using the project tree(Version 1.3 or later).

With this software Version 1.3 or later, it is possible to copy by drag and drop the project name on the project tree.

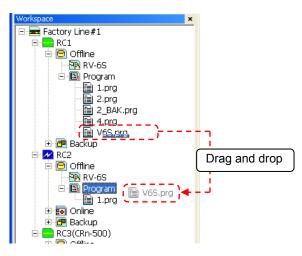


Figure 8-64 Copying the program by drag and drop in the project tree(Version 1.3 or later)

# An operation possible by drag and drop is only a copy of the program. However, the copy that changes the name cannot be done.

An operation possible by drag and drop is only a copy of the program. However, the copy that changes the name cannot be done.

Please operate it on the program management screen when the name of the program is changed, or the program is moved.

#### 8.10.3. Move

The program files can be moved.

Select the transmission source program names from the list at the left, and designate the transmission destination folder on the right side. The multiple programs can be selected at the same time. Movement is executed when the [Move] button is clicked on.

#### 8.10.4. Delete

The program files can be deleted.

Select the names of the programs to be deleted from the lists. The multiple programs can be selected at the same time. The programs can be selected at the both lists. Delete is executed when the [Delete] button is clicked on. The deletion confirmation message is displayed.

Source				-Destination-			
_			Browse				Browse
• Project	1:RC1		~	○ Project	1:RC1		~
⊂ Robot	1:RC1(	CRnX-7xx)	~	💿 Robot	1:RC1(	CRnX-7xx)	~
Refresh		Selecti	on release	R <u>e</u> fresh		Selec	tion rele <u>a</u> se
Name	Size	Date	Time 🔼	Name	Size	Date	🛛 Time 🔼
0.prg	423	2010/03/04	11:41:	1	400	09/06/17	09:59:-
1.prg	50	2010/09/21	10:03:	2	317	10/09/14	14:49::
10035.prg	264	2010/07/07	14:40:	5	493	10/07/06	09:27: 📃
3.prg	46	2010/03/16	18:06: 🔤	6	259	10/09/14	13:29:(
5.prg	216	2010/03/15	14:11:	AB	424	09/04/14	09:44:
6.prg	40	2010/03/02	14:52:0	AS	351	09/04/14	09:45:
CL01.prg	24294	2009/09/16	15:33::	DD	1210	10/07/07	14:04:
DD.prg	690	2010/03/03	18:41:	SK	486	09/07/01	09:35:
FFF.prg	288	2009/04/09	09:21:	TEL	727	09/12/21	16:02:
MB3.PRG	636	2009/03/06	11:58:	TES	655	10/01/06	09:17)
MB3ww	610	2009/04/09	10:01:	1611	505	10/05/17	15:32:
MB3XXD	2115	2009/04/09	10:00:	GOHI	275	09/04/14	09:47:
MB3XXD	2090	2009/04/09	10:01: 💌	SUZU	503	09/05/25	15:22:1
<			>	<			>
Free:		1391571763	2 [Bytes]	Free:		1048576	00 [Bytes]
File type:	Robot p	program (*.prg	) 🔽	File type:	Robot p	program (*.pr	g) 🔽
Сору					Comp		

Figure 8-65 Deleting the program

It is possible to delete the program by operating shown blow with RT ToolBox2 version 1.3 or later. After selecting the program name in the project tree, click the right button of mouse and select the "Delete Program" of right button menu. The deletion confirmation message is displayed.

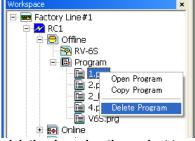


Figure 8-66 Program deletion by using the project tree(Version 1.3 or later).

#### — It is not possible to delete the program which is editing.

When you delete the program which is editing, the error message is displayed. Please go after completing the edit when you delete the program.

Caution

#### 8.10.5. Rename

A program file name is renamed.

Select the name of the only one program to be renamed from the lists. The program can be selected at the both lists. Rename is executed when the [Rename] button is clicked on and a new file name is set at the [Setup for ReName] dialog.

Setup for Rename	×
Input New File Name.	
2	
OK Cancel	

Figure 8-67 Rename Screen

#### 8.10.6. Protect settings

The program files in the controller can be protected. The entire program file can be protected, or just the command statements or position variables can be protected.

You cannot move, delete, or rename a protected file. Release the protection before any of these operations. Select the names of the programs to be protected from the lists. The multiple programs can be selected at the same time. The programs can be selected at the both lists. Protect is executed when the [Protect] button is clicked on and [Setting for protect] dialog is set.

Setting for protect 🔀
<ul> <li>✓ Commands</li> <li>✓ Variables</li> <li>Target files:</li> <li>[Robot:1]1</li> </ul>
OK Cancel

Figure 8-68 Protect Settings Dialog

## ∽ ⚠️ Caution

The only programs to which protect operations apply are programs in robot controllers.

#### 8.10.7. Comparison

The program files can be compared. Comparison of only the command statements or only the position variables is possible. Select the names of the programs to be compared from the left and right lists. A dialog displaying the corresponding comparison results will appear when the [Compare] button is clicked on and [Setting for compare] dialog is set.

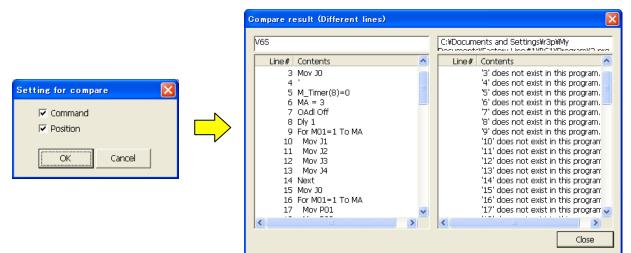


Figure 8-69 Program Comparison Settingsand Comparison Results

When both files are the same, the result dialog displays nothing.

# <u> C</u>aution

# After this software Ver.1.5, the comparison methods of the position variable are changed.

Comparing the program before this software Ver.1.4, It was judged to be different in the notation of the value of each ingredient of the position variable that I showed below with different position variables. After Ver.1.5, the thing that the value of each ingredient of the position variable accords is changed to judge it to be the same position variable.

#	A variable example for the comparison
1	P1=(1.00,2.00,3.00,4.00,5.00,6.00)(7,0) P1=(1.000,2.000,3.000,4.000,5.000,6.000)(7,0)
2	P1=(1.00,2.00,3.00,4.00,5.00,6.00)(7,0) P1=(+1.00,+2.00,+3.00,+4.00,+5.00,+6.00)(7,0)
3	P1=(1.00,2.00,3.00,4.00,5.00,6.00)(7,0) P1=(1.00, 2.00, 3.00, 4.00, 5.00, 6.00)(7, 0)

## 8.11. Program Conversion

You can convert existing robot programs written in a different program language into the currently set program language.

No.	Source	Target	Content
1	MELFA-BASIC III	MELFA-BASIC IV	The position data is converted. If "MELFA-BASIC V" is chosen for the
2	MELFA-BASIC III	MELFA-BASIC V	target, the lines No. are also converted in addition to this conversion.
3	MELFA-BASIC IV	MELFA-BASIC V	The lines No. are converted.
4	MOVEMASTER command (CR-116/356)	MOVEMASTER command	The position data is converted.

Table 8-4 Combination list of program conversion

There are the following two types of conversion.

For details, see "8.11.2 Line number conversion (from MELFA-BASIC IV to MELFA-BASIC V", "8.11.3 Position data conversion (from E/EN/M1/M2 series to CR750/700/500 series".

- Conversion of the lines No. Convert the line No. and relevant command line, because the deal of line No. in MELFA-BASIC IV is different from MELFA-BASIC V.
- (2) Conversion of the position data

Convert the format of position data and relevant command, because the configuration of the E/EN/M1/M2 E/EN/M1/M2 series controller's position data is different from the CR750/700/500 series controller's.

## - 🗥 Caution

#### Only programs on the computer can be converted.

Program conversion is only possible for programs on the computer. It is not possible to directly convert a program on a controller or on a virtual controller with a simulation running. To convert a program on a controller or on a virtual controller with a simulation running, first use program management to copy it onto the computer, then convert it there.

#### 8.11.1. Starting program conversion

From the project tree, select the conversion destination project with [Offline] -> [Program], then click the right mouse button. From the right mouse button menu, click [Program Convert].

The destination is in the program language set for this project.

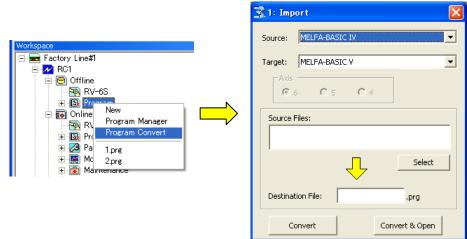


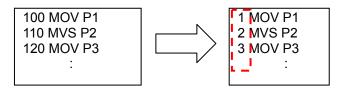
Figure 8-70 Starting Program Conversion

#### 8.11.2. Line number conversion (from MELFA-BASIC IV to MELFA-BASIC V)

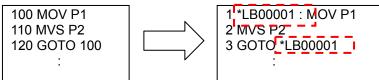
Convert the lines No. and relevant command line, because the deal of line No. in MELFA-BASIC IV is different from MELFA-BASIC V.

For the MELFA-BASIC V, convert as follows.

- The line No. is converted to the step No. (sequential No. which starts from 1).

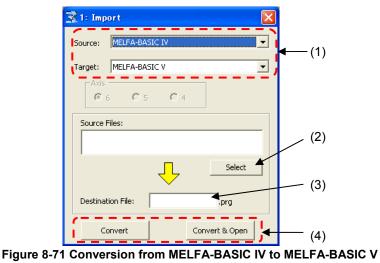


- The command line using line No. jump is converted to the command line using label jump.



\*LB00001 is the label name created automatically by this conversion.

Convert the program according to the following procedure.



(1) Select the program language of the source and target for conversion. Start program conversion with the project set with "MELFA-BASIC V" Choose "MELFA-BASIC IV" for the source and choose "MELFA-BASIC V" for the target. It is NOT necessary to select the axis of robot. (2) Select the file as source.

Click the [Select] button of the source, and select the file of MELFA-BASIC IV program.

Open					? 🗙
Look in:	C Others		•	🗢 🗈 💣 📰•	
My Recent Documents Desktop	ti 1.prg ti 2.prg ti 3.prg ti 4.prg				
My Documents					
My Computer					
My Network Places	File name:	3.prg		•	Open
	Files of type:	Robot program files (*.prg)		<b>_</b>	Cancel

Input the name of the file to save the converted program into.

(3) After designating the conversion source file and the conversion destination file, click the [Convert] button or the [Convert & Open] button.

When [Convert] button is clicked, the designated selected file is converted and written in the target file.

When [Convert & Open] button is clicked, the file is converted, written in the target file and opened through at Program edit tool.

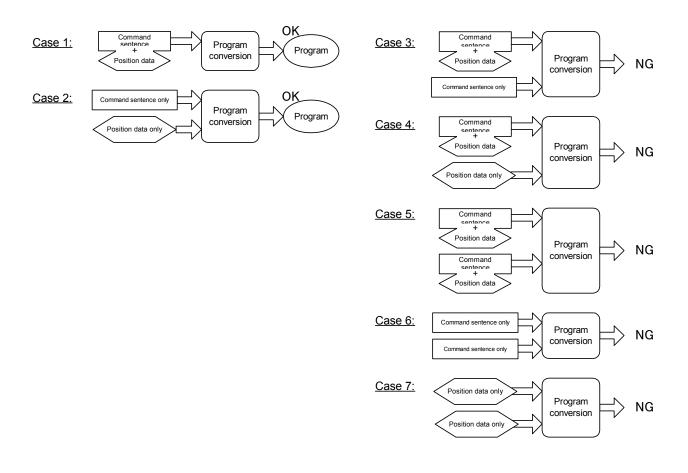
#### 8.11.3. Position data conversion (from E/EN/M1/M2 series to CR750/700/500 series)

This function converts the format of position data and relevant command (DJ, MP and PD command of MOVEMASTER command), because the configuration of the E/EN/M1/M2 series controller's position data is different from the CR750/700/500 series controller's.

**Note1:** The program conversion converts the position data as well as the commands related to the position data.

It is not possible to convert commands automatically. Be sure to make grammatical check using this software before using the program of E/EN/M1/M2 series by the CR750/700/500 series, and change the commands if necessary.

- **Note2:** The position data of the MOVEMASTER command program for M1/M2 series has the base-coordinate rotated 90°. When using the program for M1/M2 by the CR750/700/500 series, convert M1/M2 program into EN program with the E/EN/M1/M2 series support software DOS version, before carrying out the program conversion.
- **Note3:** In the case of the E/EN/M1/M2 series support software DOS version and E/EN series Robot programming supporter for Windows, the data can be saved separately such as command sentence only, position data only or command sentence and position data. In this program conversion, it is possible to convert the file of command sentence only and the file of position data only to one program. The other combinations occurs error. (As following case 3 to 7.)



Convert the program according to the following procedure.

🕱 1: Import 🛛 🔀	
Source: MELFA-BASIC III	<b>(</b> 1)
Target: MELFA-BASIC IV	(.)
Axis	(2)
Source Files:	(2)
	(3)
	(4)
Destination File: .prg	(-)
Convert Convert & Open	(5)

Figure 8-72 Conversion from MELFA-BASIC III to MELFA-BASIC IV

(1) Select the program language of the source and target for conversion.

Start program conversion with a project set for "MELFA-BASIC V" or "MELFA-BASIC IV".

For the source, choose "MELFA-BASIC III" or "MOVEMASTER (CR-116/356)" which is the program language of the E/EN/M1/M2 series.

If "MELFA-BASIC V" is chosen for the target, the lines No. are also converted in addition to this conversion.

(2) Select the axis of robot.

Select the correct number of axes, so that the configuration of the E/EN/M1/M2 series controller's position data is different depending on the number of axes.

(3) Select the file(s) as source.

Click the [Select] button of the source, and select the file(s) of E/EN/M1/M2 series program. When selecting the multiple files, click the file while pushing the [Ctrl] key.

Open					? 🗙
Look jn:	🗀 Others	•	•	⇔ 🗈 💣 📰 -	
My Recent Documents Desktop	1.pos     1.ppd     2.ppd     2.ppd     3.ppd				
My Documents					
My Computer					
<b></b>					
My Network Places	File <u>n</u> ame:	1.ppd		▼	<u>O</u> pen
	Files of type:	Robot program files (*.ppd;*.pos;	;*.prg		Cancel

- (4) This specifies the file to write the converted program into. Input the name of the file to save the converted program into.
- (5) After designating the conversion source file and the conversion destination file, click the [Convert] button or the [Convert & Open] button.

When [Convert] button is clicked, the designated selected file is converted and written in the target file.

When [Convert & Open] button is clicked, the file is converted, written in the target file and opened through at Program edit tool.

## 9. Position data editing for SQ Direct

SQ Direct(PLC Direct Function) can be used with Version 1.5 or later of this software. This function can be used with software version P8 or later of CR750-Q/CRnQ-700 series controller. To use this function, you must set the parameter of controller.

Available position data for SQ Direct is only 999 points of XYZ-origin whose position number is 1 to 999. These numbers are used as external position number P\_DM(1) to P\_DM(999) in controller.

SQ Direct position data can edit online and offline.

Edit screen of SQ Direct position data is different from edit screen of program in command line and orthogonal(J) number being omitted.

Program 1:RC1 1.r (Online) [MELFA-BASIC V]		SQ Direct	1:RC3 (Online	;)				
1 Ovrd 100 2 JOvrd 100 3 OAdl On		<u>A</u> dd	Edit	Deļet	e			_
4 Loadset 1,1		XYZ	Х	Y	Z	А	В	^
5 m1=1		1	0.000	0.000	0.000	0.000	0.000	-
6 Def Plt 1,p101,p102,p103,,2,4,1	2	2	0.000	0.000	0.000	0.000	0.000	
7 Def Plt 2,p104,p105,p106,j,2,4,1	3	3	0.000	0.000	0.000	0.000	0.000	
8 Mov p99	4	1	0.000	0.000	0.000	0.000	0.000	
o liwox baal	5	5	0.000	0.000	0.000	0.000	0.000	
		5	0.000	0.000	0.000	0.000	0.000	
		7	0.000	0.000	0.000	0.000	0.000	
	ا <b>ا /</b>		0.000	0.000	0.000	0.000	0.000	
			0.000	0.000	0.000	0.000	0.000	
Add Edit Delete		10	0.000	0.000	0.000	0.000	0.000	
	1	11	30.000	40.000	50.000	60.000	70.000	
XYZ X Y Z A B 🔼		12	30.000	40.000	50.000	60.000	70.000	
p2 405.000 -100.000 150.000 0.000 0.000		13	30.000	40.000	50.000	60.000	70.000	
pz 403.000 100.000 130.000 0.000 0.000		14	30.000	40.000	50.000	60.000	70.000	
		15	30.000	40.000	50.000	60.000	70.000	
Joint J1 J2 J3 J4 J5		16	30.000	40.000	50.000	60.000	70.000	
		17	30.000	40.000	50.000	60.000	70.000	
		18	30.000	40.000	50.000	60.000	70.000	<u> </u>
		()					>	
,								

Figure 9-1 Program editing and position data editing screen for SQ Direct

# Caution

As edit operation of SQ Direct is similar to XYZ coordinate edit of program editing, the following page explains only different function. For details on the operations for opening a program, see 8.6 Program Editing.

# **Caution**

When the password is registered in "program" by robot controller's security function, the position data for SQ Direct cannot be read, or cannot be write.

When the password is registered in "program" by robot controller's security function, the position data for SQ Direct cannot be read from the robot controller, or cannot be write to the robot controller.

		O : Er	able、 × : Disable				
Item to which password of security function is							
	registered.						
	Program	Parameter	File				
Writing the position data.	~	0	0				
Reading the position data.	~	0	0				

Please delete the password of robot controller's security function when you operate these. Please refer to **"12.7.3 Delete the Password"** for the method of deleting the password.

The setting(register the password) and the release(delete the password) of robot controller's security function can be used with this software version 2.0 or later. Please refer to **"Table 12-15 Compliant version of this function and controller"** for robot controller's compliant version.

## 9.1. Diffence from program editting

#### 9.1.1. Add/Edit position data

When you want to add positiondata, please click [Add] button.

Position data editing screen is displayed.

When position number is selected, those data are displayed.

When "Get current position automatically" of the option screen is checked and connected to the robot, the current position of the robot is displayed with version 1.6 or later of software. However, the variable name remains blank. The current position is not displayed when not connected to the robot.

When you want to revise position data, and select the position data and click [Edit] button.

Selected position data is displayed.

You cannot change the position number.

Please input each element of position data and the number name (1 to 999). And click [OK] button.

When you connect to controler as online mode or simuration mode, you can load current robot position by clicking [Get current position] button.

<mark>Edit Posit</mark> <u>N</u> ame:		_		— [	Input 1 to 999.
Expe-	(YZ			— [	Cannot change variable type.
X: Y: A: B: C: L1: L2:	0.000 0.000 0.000 0.000 0.000 0.000 0.000	<ul> <li></li> <li><td>Robot: 1:RV-6SQL</td><td>L</td><td></td></li></ul>	Robot: 1:RV-6SQL	L	
ELG1: FLG2:	L,B,F	<b>V</b>	Edit FLG1 Edit FLG2 OK Cancel		

Figure 9-2 position number data

#### 9.1.2. Delete position data

After you selected position data which you want to delete, please click [Delete] button.

Selected position data is deleted.

You can delete plural position data.

When you click position number with [Ctrl] or [Shift] key pushing, you can select plural position data.

# After you delete position data, position numbers are not disappear. Element of variables are cleared.

#### 9.1.3. Editing supporting function

Editing supporting function supports only copy of position data and paste of position data.

## 9.2. Online editing

When you connect to controller suppoeted SQ Direct, [SQ Direct] menu is added to [Online] menu in project-tree.

When you doubleclick [Online] - [SQ Direct] in the target project, SQ Direct screen is displayed with position data 1 to 999 loaded.

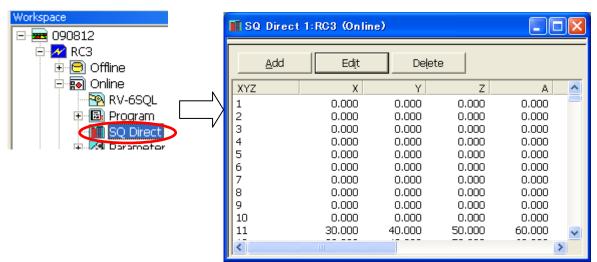


Figure 9-3 position edit screen for SQ Direct (Online)

## - A Caution — Timing from which position data is written.

Timing from which position data is written by the controller comes to be going to turn on the power supply next time.

Please turn on controller's power supply again when you use controller's position data after online edit.

## 9.3. Offline editing

You can edit SQ Direct position data in offline.

Set [R/C-Type] to [CRnQ-7xx/CR75x-Q] and set [Language] to [MELFA-BASIC V] in [Edit Project], then [SQ Direct] menu is added to [Offline] menu in project-tree. You can manage plural SQ Direct files in offline editing.

#### 9.3.1. Creating the new SQ Direct file

Select [Offline] – [SQ Direct] menu in the project you want to create the new SQ Direct File. And click a right button with the mouse.

Then right button menu is displayed, and click [New].

Workspace	New SQ	Direct File				
● ■ 090812 ● ● Offline ● ● Offline ● ● Offline ● ● Program ● ● ● Program ● ● ● Program ● ● ● Program Manager ● ● ● Backu ● ● ● Backu ● ● ● Offline ● ● ○ Offline	Upd. SQ Dire	ate 224.sdp A.sdp A.AAA.sdp Dos.sdp	9¥My Document Size 71826 65844 65828 65835 71826	Date 2009/09/24 2009/09/11 2009/09/11 2009/09/16	Time 09:15:47 11:46:54 17:23:12 08:47:00 09:11:26	Browse
	SQ Direc	t File:				
					OK	Cancel

#### Figure 9-4 position edit screen for SQ Direct (Online)

After you input SQ Direct file name, and click [OK] button.

## \land Caution

#### About SQ Direct restoration folder.

SQ Direct Files are managed by each project in the personal computer. The folder named automatically as follows.

Workspace folder/project name/Program

If you want another folder, please use copy function in program management.

# 9.4. Program management

You can copy, delete, compare and rename SQ Direct file.

After selecting target program in project-tree, and click right button with the mouse. Then right button menu is displayed, and click [Program Manager]. Then the program manager screen is displayed.

Workspace ×	Copy program	n				
- 💻 MELFA	Source		Browse	Des <u>t</u> ination —		Browse
e	Project	1:RC1	•	C Project	1:RC1	<b>_</b>
III SQ Direc+	C Robot	1:RC1(CRnX-7xx)	~	Robot	1:RC1(CRnX-7xx)	•
Call Paramet     New     Program Manager	Refresh	Selection	ı reļease	R <u>e</u> fresh	Selection	on rele <u>a</u> se
	Name	Size Date	Time	Name	Size Date	Time
	Pos1.sdp Pos2.sdp	65859 2009/09/29 65859 2009/09/29	18:08:3 18:08:4	*SQ Direct 1 15 16 33 PR 1000 6SQL	1083 09/09/29 993 09/09/11 961 09/09/15 3309 09/09/15 4976 09/09/15 40277 09/09/11 9058 09/09/15	17:56:5 17:33:5 13:49:4 13:49:4 13:49:4 16:22:1 16:56:2
	<		>	<	J	2
	Free: File type:	14913503232 SQ Direct position (*,		Free: File type:	10485760 SQ Direct position (	
		Mo <u>v</u> e <u>D</u> ele	te Re <u>N</u>	lame Prote	ct Compare	⊆lose

Figure 9-5 Launch program manager

# \_ 🗥 Caution

As the edit operation is similar to the program management, the following page explains only different part.

# ] Caution \_

1 to 999 Position data in the robot files for SQ Direct is shown as [\*SQ Direct] in program manager.

"\*" means that it prevent costomer to use as a file name by mistake.

" \* " NOT means almighty.

## 9.4.1. List of SQ Direct files indication

When you can use SQ Direct, there are some differents in program management screen.

- 1. SQ Direct files in the project are displayed with [sdp] extention.
- 2. SQ Direct file in the robot file is displayed as [\*SQ Direct].
- 3. [SQ Direct position(\*.sdp)] is added in file type.

	Copy progra	m				
	Sou <u>r</u> ce —		Browse	-Des <u>t</u> ination -		Brgwse
1. SQ Direct files in the	Project	1:RC1	•	C Project	1:RC1	<b>_</b>
project.	C Robot	1:RC1(CRnX-7xx)	~	Robot	1:RC1(CRnX-7x	x) 💌
	Refresh	Selectio	n release	R <u>e</u> fresh	Sel	ection rele <u>a</u> se
	Name	Size Date	Time	Name	Size Date	Time
	Pos1.sdp Pos2.sdp	65859 2009/09/29 65859 2009/09/29		*SQ Direct 15 16 33 PR 1000 6SQL	, 1083 09/09/ 993 09/09/ 961 09/09/ 3309 09/09/ 4976 09/09/ 40277 09/09/ 9058 09/09/	11         17:33:5           15         13:49:4           15         13:49:4           15         13:49:4           15         13:49:4           11         16:22:1
	<		>	<		$\mathbf{>}$
	Free: File type:	1491350323 SQ Direct position (?		Free: File type:	SQ Direct positi	on (*.sdp)
	Сору	Mo <u>v</u> e <u>D</u> el	ete Re <u>N</u> ar	me <u>P</u> ote	ect Co <u>m</u> pare	Close
	3. File typ	e			SQ Direct file he robot files.	

Figure 9-6 List of SQ Direct files indication

# Restrictions

SQ Direct files in the personal computer can treat as robot program files similarly, But there are some restrictions.

# **10.Setting Parameters**

You can reference and rewrite parameter information set in a robot controller.

You can set parameters with the method of specifying parameter names and setting them or with the method of making the settings arranged by function.

# ▲ Caution

When the password is registered in "parameter" by robot controller's security function, it is not possible to write the parameters to the robot controller.

When the password is registered in "parameter" by robot controller's security function, it is not possible to write the parameters to the robot controller.

O : Enable、 × : Disable

		•		
	Item to which password of security function is registered			
	Program	Parameter	File	
Writing paraemters	0	×	0	

Please delete the password of robot controller's security function when you operate these. Please refer to **"12.7.3 Delete the Password"** for the method of deleting the password.

Even if the security function has been turned on, it is possible to read the parameters. The setting (register the password) and the release (delete the password) of robot controller's security function can be used with this software version 2.0 or later. Please refer to **"Table 12-15 Compliant version of this function and controller"** for robot controller's compliant version.

# 10.1. Editing from parameter list

You can reference and rewrite individual items of parameter information set in a robot controller by specifying the name of the parameter.

## 10.1.1. Starting

This is used in the state with the robot controller connected. From the project tree, double-click [Online] -> [Parameter] -> [Parameter List].

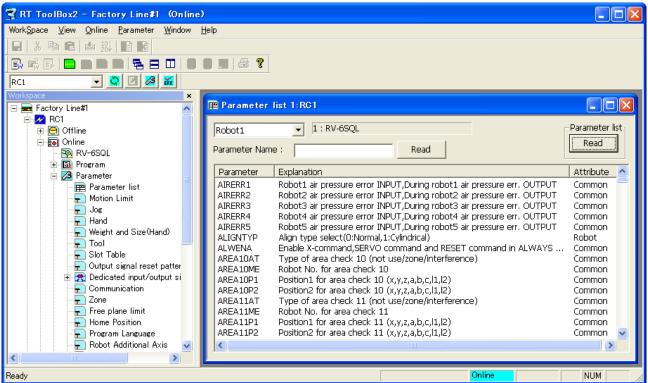


Figure 10-1 Starting the Parameter List

At this time, a confirmation message like the following concerning the parameter list is displayed.

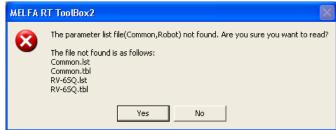


Figure 10-2 Confirmation Message for Parameter List

This window will appear in the following cases.

- When there is no parameter list information in the personal computer.
- When the parameter list used in the robot controller is newer than the parameter list already stored in the personal computer.

# - 🧐 Memo

## What is the parameter list?

The parameter list is a list of parameter information comprised of parameter names, explanatory text, etc. displayed on the parameter list screen. This parameter list can be downloaded from the controller. The version of the parameter list may vary with the version of the software on the controller. We recommend that you download the latest parameter list from the controller.

When parameter list reading is specified, the screen for selecting where to read it from is displayed.

Select parameter list	
Read from RC	Read from file
	COMMON
OK	Cancel

Figure 10-3 Parameter List Select Screen

Select either "Read from RC" or "Read from file", set the parameter list to be read, then click the [OK] button.

## 10.1.2. Parameter editing

Double-click a parameter displayed in the list or input its name, then click the [Read] button. The specified parameter information in the robot controller is displayed.

Robot1	▼ 1:RV-6SQL	Parameter list
Parameter Na	me : UER1 Read	Read
Parameter	Explanation	Attribute 🔼
TEACHMD	No signal, Teach mode OUTPUT	Common
TLC	Direction for TL/MT/MTS comands	Robot
TRBUF	Tracking data number of buffer, size of buffer	Common
TRCWDST	Work check distance for tracking[mm]	Common
TRMODE UER1	tracking permission[0:disable 1:enable] Number of user define error,Message,Cause,Treatment	Common Common
UER10	Number of user define error,Message,Cause, Treatment	Common
UER11	Number of user define error, Messele, Cause, Treatment	Common
UER12	Number of user define error, Messele, Cause, Treatment	Common
UER13	Number of user define error,Messe,Cause,Treatment	Common
UER14	Number of user define error, Messe, Cause, Treatment	Common 🧮
UER15	Number of user define error, Mese, Cause, Treatment	Common 🔽
<		>
ameter edi		
rameter nan	ne : UER1 Robot# : 0	
Explanatio	n : Number of user define error,Message,Cause,Treatment	
1:9900		
2 : messag	3	
3 : cause		
4 : treat		

Figure 10-4 Parameter Editing

After you change a parameter, you can rewrite the specified parameter information in the robot controller by clicking the "Write" button.

You can print the displayed parameter information by clicking the [Print] button.

Caution Use upper case letters when naming the programs in alphabetic characters. Lower case alphabetic characters can be used in this parameter setting. Use upper case letters when naming the programs in alphabetic characters for the parameters of the base program (PRGUSR) or slot table (SLT\*), etc. All of the program names within the robot controller will be expressed in upper case letters. If lower case letters are used, the programs will not be properly recognized. To put a changed parameter value into effect, switch the robot controller power Off, then On again. To validate the rewritten parameter information in the robot controller, the robot controller power must be turned ON again.

## 10.1.3. Edit of parameter changed from initial value

It is possible to confirm the changed parameter by displaying the list of parameter changed from an initial value. This function has the limitation in this software version and the software version of the connected controller. Please refer to the table as follows.

Table 10-1 Compliant version of this function and controller							
		Softwa	are version of robot con	troller			
		CR750-D/CRnD-700 CR750-Q/CRnQ-700 CRn-500					
Version of	Ver.1.1 or earlier	not use	not use	not use			
this software	Ver.1.2 or later	Ver.P6 or later	Ver.N6 or later	not use			

Table 10-1 Com	pliant version of t	this function and	d controller

When combination of "not use", the button for the display switch is not displayed in the upper part of the screen

When the parameter list is displayed after connecting with the controller of corresponding version, the button for the display switch is displayed in the upper part of the screen.

When the parameter list screen is started, "All" has been selected. When "Changed" is selected, the list of the parameters that have been changed from initial value is displayed.

(However, according to the specification of the robot type, some parameters might be changed before shipment.)

Parameter				
Robot1	▼ 1 : RH-12SDH703	35	- View	Parameter list
				Read
arameter Nan	ne: LNG	Read	C Changed	
Parameter	Explanation			Attribute
JOGJSP	Joint JOG speed(High/Lov			Robot
JOGM	JOG mode specification(st			l) Common
JOGNER	Error disregard at JOG INF		rd at JOG OUTPUT	Common
JOGPSP	POSE JOG speed(High/Lo			Robot
JOGSPMX	JOG maximum speed (und	der 250[mm/sec])		Robot
JOGWKCDO	Work coordinate (origin)			Robot
JOGWKCDX	Work coordinate (X axis)			Robot
JOGWKCDY	Work coordinate (Y axis)			Robot
JRCEXE	JRC Enable 1/0 = Enable/	Disable		Robot
JRCORG	Origin of JRC 0			Robot
JRCQTT	Position Shift Quantity of			Robot
JSAFE	Home position (Joint coor			Robot
LINEOUT	Line No. output requirem		ut Line No. OUTPUT	
LLVLERR	No signal, During L-error O			
LIANT				Common
Parameter				
Parameter			View	^
LIANT	list 1:RC1		C All	
Parameter	list 1:RC1 ▼ 1:RH-12SDH703			Parameter list
Parameter Robot1	list 1:RC1 ▼ 1:RH-12SDH703	15	C All	Parameter list
Parameter Robot1 arameter Nam	list 1:RC1 ▼ 1:RH-12SDH703 ne :	r5 Read	C All	Parameter list Read
Parameter Robot1 arameter Nam	list 1:RC1  I:RH-12SDH703  Re: Explanation	15 Read	C All	Parameter list Read Attribute
Parameter Robot1 arameter Nam Parameter AUTOENA	list 1:RC1 ▼ 1:RH-12SDH703 he: Explanation AUTO enable INPUT,AUTO	25 Read	C All Changed	Parameter list Read Attribute Common
Parameter Robot1 arameter Nam Parameter AUTOENA CYCLE IOENA	list 1:RC1 ↓ 1:RH-12SDH703 he : Explanation AUTO enable INPUT,AUTI Cycle stop INPUT,During of	25 Read D enable OUTPUT cycle stop OUTPUT peration enable OUTPU	C All Changed	Parameter list Read Attribute Common Common
Parameter Robot1 arameter Nam Parameter AUTOENA CYCLE	list 1:RO1  I : RH-12SDH703  Explanation AUTO enable INPUT,AUTI Cycle stop INPUT,During c Operation enable INPUT,C	25 Read D enable OUTPUT cycle stop OUTPUT peration enable OUTPU	C All Changed	Parameter list Read Attribute Common Common Common
Parameter Robot1 arameter Nam Parameter AUTOENA CYCLE LOENA LNG	Iist 1:RC1  I:RH-12SDH703  Explanation  AUTO enable INPUT,AUTI Cycle stop INPUT,During c Operation enable INPUT,CUTIC Language(JPN:Japanese,E	25 Read D enable OUTPUT cycle stop OUTPUT peration enable OUTPU	C All Changed	Parameter list Read Attribute Common Common Common Common
Parameter Robot1 arameter Nam Parameter AUTOENA CYCLE IOENA LNG MECHA1 MEINSD	list 1:RO1 I : RH-12SDH703 T : RH-12SDH703 I : RH-12SDH703 I : RH-12SDH703 I : RUTO Substantion AUTO enable INPUT, AUTI Cycle stop INPUT, During c Operation enable INPUT, C Language(JPN:Japanese, E Robot1 name Check data for install Decimal place	25 Read D enable OUTPUT cycle stop OUTPUT peration enable OUTPU NG:English)	C All C Changed	Parameter list Read Attribute Common Common Common Common Common
Parameter Robot1 arameter Nam Parameter AUTOENA CYCLE IDENA LING MECHA1 MECHA1 MECHA1 SLOTINIT	Iist 1:RC1  I:RH-12SDH703  E:  Explanation  AUTO enable INPUT,AUTT Cycle stop INPUT,DUT,OUTIG Operation enable INPUT,CUTA Cycle stop INPUT,CUTA Cycle stop INPUT,CUTA Check data for install Decimal place Program reset INPUT,Prgr	25 Read D enable OUTPUT cycle stop OUTPUT poperation enable OUTPU NG:English) am select enable OUTPI	C All C Changed	Parameter list Read Attribute Common Common Common Common Common Common Common Common Common Common Common
Parameter Robot1 arameter Nam Parameter AUTOENA CYCLE IOENA LING MECHA1 MEINSD PRGDPNT SLOTINIT SRVOFF	Iist 1:RC1 I:RH-12SDH703 he: Explanation AUTO enable INPUT,AUTO Cycle stop INPUT,During c Operation enable INPUT,CLanguage(JPN:Japanese,E Robot1 name Check data for install Decimal place Program reset INPUT,Prgr Servo off INPUT,Servo on	25 Read D enable OUTPUT cycle stop OUTPUT operation enable OUTPU NG:English) am select enable OUTPU disable OUTPUT	C All C Changed	Parameter list Read Attribute Common Common Common Common Common Common Common Common Common Common Common Common
Parameter Robot1 arameter Nam Parameter AUTOENA CYCLE IDENA LING MECHA1 MEINSD PRGDPNT SLOTINIT SLOTINIT SRVOFF SRVON	list 1:RC1 ↓ 1 : RH-12SDH703 he : Explanation AUTO enable INPUT,AUTO Cycle stop INPUT,During c Operation enable INPUT,C Language(JPN:Japanese,E Robot1 name Check data for install Decimal place Program reset INPUT,Prgr Servo off INPUT,Servo on Servo on INPUT,During se	25 Read D enable OUTPUT cycle stop OUTPUT operation enable OUTPU NG:English) am select enable OUTPU disable OUTPUT	C All C Changed	Parameter list Read Attribute Common Common Common Common Common Common Common Common Common Common Common Common Common
Parameter Robot1 arameter Nam Parameter AUTOENA CYCLE IOENA IDENA IDENA IMECHA1 MECHA1 MECHA1 MECHA1 METINSD PRGDPNT SLOTINIT SRVOFF SRVON SRVVER	list 1:RO1 I : RH-12SDH703 T : RH-12SDH703 T : RH-12SDH703 I : RH-12SDH703 T : RH-12SDH703 I : RUPUT, AUTI Cycle stop INPUT, During c Operation enable INPUT, AUTI Cycle stop INPUT, During c Robot1 name Check data for install Decimal place Program reset INPUT, Prgr Servo of INPUT, Servo on Servo on INPUT, During se Servo S/W Version	25 Read D enable OUTPUT cycle stop OUTPUT cycle stop OUTPUT NG:English) am select enable OUTPU disable OUTPUT rvo on OUTPUT	C All C Changed	Parameter list Read Attribute Common Common Common Common Common Common Common Common Common Common Common Common Common Common Common
Parameter Robot1 arameter Nam Parameter Nam AUTOENA CYCLE IOENA LNG MECHA1 MEINSD PRGDPNT SLOTINIT SRVOFN SRVOFN SRVVER SRVVER	Iist 1:RC1  I:RH-12SDH703  E:  Explanation  AUTO enable INPUT,AUTI Cycle stop INPUT,During of Operation enable INPUT,Curing of Operation enable INPUT,Curing of Check data for install Decimal place Program reset INPUT,Prgr Servo of INPUT,Servo on Servo of INPUT,Servo on Servo of VVersion Mecha1 Servo S/W Version	25 Read D enable OUTPUT cycle stop OUTPUT poperation enable OUTPU NG:English) am select enable OUTPU disable OUTPUT rvo on OUTPUT n of each axis	C All C Changed	Parameter list Read Attribute Common Common Common Common Common Common Common Common Common Common Common Common Common Common Common
Parameter Robot1 arameter Nam Parameter Nam Parameter CYCLE IOENA LNG MECHA1 MECHA1 MECHA1 MECHA1 MECHA1 SUOTINIT SUOTINIT SRVOFF SRVON SRVVER	list 1:RO1 I : RH-12SDH703 T : RH-12SDH703 T : RH-12SDH703 I : RH-12SDH703 T : RH-12SDH703 I : RUPUT, AUTI Cycle stop INPUT, During c Operation enable INPUT, AUTI Cycle stop INPUT, During c Robot1 name Check data for install Decimal place Program reset INPUT, Prgr Servo of INPUT, Servo on Servo on INPUT, During se Servo S/W Version	25 Read D enable OUTPUT cycle stop OUTPUT Operation enable OUTPU NG:English) am select enable OUTPU disable OUTPUT rvo on OUTPUT n of each axis p execute OUTPUT	UT	Parameter list Read Attribute Common Common Common Common Common Common Common Common Common Common Common Common Common Common Common

Figure 10-5 List of parameter changed from initial value

It is possible to print only the parameters changed from initial value with RT ToolBox2 version 1.3 or later. Please refer to **"10.9. Parameter printing"** in this manual for details.

## 10.1.4. Parameter list reading

If no parameter name is displayed on the parameter list screen, you can read the parameter list. Click the parameter list [Read] button in the upper-right of the parameter list screen. The parameter list select screen is displayed.

Parameter	list 1:RC1		×	Select parameter list	×
Robot1	• 1:RV-6SQL	Parameter list	1	Read from RC	Read from file
Parameter Nam					COMMON
Parameter	Explanation	Attribute	^		C ROBOT
AIRERR1 AIRERR2	Robot1 air pressure error INPUT, During robot1 air pressure err. OUTPUT Robot2 air pressure error INPUT, During robot2 air pressure err. OUTPUT	Common Common		I KOBOT	U KOBU I
AIRERR3	Robot3 air pressure error INPUT, During robot3 air pressure err. OUTPUT	Common			
AIRERR4	Robot4 air pressure error INPUT,During robot4 air pressure err. OUTPUT	Common		OK	Cancel
AIRERR5	Robot5 air pressure error INPUT, During robot5 air pressure err. OUTPUT	Common			
ALIGNTYP	Align type select(0:Normal,1:Cylindrical)	Robot			
ALWENA	Enable X-command,SERVO command and RESET command in ALWAYS	Common			
AREA10AT	Type of area check 10 (not use/zone/interference)	Common			
AREA10ME	Robot No. for area check 10	Common			
AREA10P1	Position1 for area check 10 (x,y,z,a,b,c,l1,l2)	Common			
AREA10P2 AREA11AT	Position2 for area check 10 (x,y,z,a,b,c,l1,l2) Type of area check 11 (not use/zone/interference)	Common Common			
AREA11AT	Robot No. for area check 11	Common			
AREA11ME	Position1 for area check 11 (x,y,z,a,b,c,l1,l2)	Common			
ADDA1100	Position3 for area check 11 (x,y,z,a,b,c,11,2)	Common	×		

Figure 10-6 Parameter List Reading

Select the source to read from ("Read from RC" or "Read from file"), then set the parameter list to read and click the [OK] button.

## 10.1.5. Finding parameters

You can find a character string in the displayed parameter list. With the "Parameter List" screen active, click on the menu bar [Parameter] -> [Find]. The character string find screen is displayed.

Find			
Find What : SPEED		•	Eind
Match <u>C</u> ase	Direction С <u>U</u> р С <u>D</u> own		Cancel
Eiguro 10	7 Einding a Chara	tor C	String

Figure 10-7 Finding a Character String

Input the character string to search for, and then click the [Find] button. Parameters that include the input character string are displayed.

# 10.2. Robot Controller Operation Modes for Parameter Writing

With CRn-500 series robot controllers, when you write parameters to the robot controller, controller software version may place restrictions on the operating mode in which you can write. For details, see below.

However, parameters cannot be written while any program with any startup condition other than Always has been started. In such a case, stop the program, then write the parameters.

CRn-500 series robot	Operating mode					
controller	TEACH Auto (OP) Auto (E					
J1 edition or later	0	0	0			
H7 edition or earlier	0	×	×			

#### Table 10-2 Download Operating Modes for Writing (for CRn-500 series only)

o: Writing possible ×: Writing impossible

# 10.3. Movement Parameters

#### 10.3.1. Motion limit parameter

Set the operating range of the robot

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Motion limit].

After you change the parameter value, you can rewrite the operating range parameter in the robot controller by clicking the [Write] button.

🗕 Motio	on limit parar	meter 1:RC1 (	(Online)					- • •
Robot1		▼ 1:R	V-7F-Q			]		
- <u>J</u> oint I	imit (MEJAR)		- <u>U</u> ser defined	d origin (USER	ORG)	- <u>x</u> yz I	imit (MEPAR)	
	- [mm,	deg] +		[mm,deg]			- [m	m] +
J1:	-240.00	240.00	J1 :	0.00		X :	-10000.00	10000.00
J2:	-115.00	125.00	J2:	0.00		Y:	-10000.00	10000.00
J3 :	0.00	156.00	J3 :	90.00		Ζ:	-10000.00	10000.00
J4:	-200.00	200.00	J4 :	0.00				
J5 :	-120.00	120.00	J5 :	0.00				
J6:	-360.00	360.00	J6 :	0.00				
J7:	-80000.00	80000.00	J7 :	0.00				
J8 :	-80000.00	80000.00	J8 :	0.00			Evolution	Write
							<u>E</u> xplain	W <u>r</u> ite

Figure 10-8 Motion limit parameter (Ver.1.2 or later)

F	Moti	ion Limit 1:	RC1						
	Robot:	1	<b>→</b> 1:1	RV-6SQL					
	ABS li	mit (MEMAR)		Joint l	imit (MEJAR)		-User defined	l origin (USER	ORG)
		- [mm,g	deg] +		- [mm,	,deg] +		[mm,deg]	
	J1 :	-20.00	20.00	J1 :	-170.00	170.00	J1 :	0.00	
	J2 :	-20.00	20.00	J2 :	-92.00	135.00	J2 :	0.00	
	J3 :	-20.00	20.00	J3 :	-129.00	166.00	J3 :	90.00	
	J4 :	-20.00	20.00	J4 :	-160.00	160.00	J4 :	0.00	
	J5 :	-20.00	20.00	J5 :	-120.00	120.00	J5 :	0.00	
	J6 :	-20.00	20.00	J6 :	-360.00	360.00	J6 :	0.00	
	J7 :	-30.00	30.00	J7:	-80000.00	80000.00	J7 :	0.00	
	J8 :	-30.00	30.00	J8 :	-80000.00	80000.00	J8 :	0.00	
	-XYZ li	mit (MEPAR) - [mr	n] +	]					
	X:	-10000.00	10000.00						
	Y:	-10000.00	10000.00						
	z :	-10000.00	10000.00				E	(plain	Write

Figure 10-9 Motion limit parameter (Ver.1.1 or earlier)

## 10.3.2. Jog parameter

Set the speeds for joint jogging and orthogonal jogging.

Set parameters while connected to the robot controller. From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Jog].

After you change the parameter value, you can rewrite the jog parameter in the robot controller by clicking the [Write] button.

🕞 Jog parameter 1:R	RC1 (Onli	- • •
Robot1	•	
1 : RV-7F-Q		
Joint JOG speed (JC	OGJSP)	
H-Inching :	0.10	[deg]
L-Inching :	0.01	[deg]
Override :	100.00	[%]
XYZ JOG speed (JO	GPSP)	
H-Inching :	1.00	[mm]
L-Inching :	0.50	[mm]
Override :	100.00	[%]
	Explain	Write

Figure 10-10 Jog parameter

## 10.3.3. Parameters of the Hand

Set the parameters about the Hand of the robot.

#### 10.3.3.1. Hand parameter

Set the type of the hand (single solenoid/double solenoid, etc.) and work holding/non-holding when HOPEN\* (open hand) and HCLOSE\* (close hand) are executed. Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Hand] -> [Hand parameter].

After you change the parameter value, you can rewrite the parameters concerning the hand in the robot controller by clicking the [Write] button.

Hand parameter 1:RC1 (Online)
Robot1 VI: RV-7F-Q
Hand1 -
Hand type (HANDTYPE)
<u>N</u> one <u>Single</u> <u>D</u> ouble
Signal#: 900
IO-Macro
Open: UMACA - Close: UMACA -
Workpiece grasp definition (HNDHOLD1)
At hand open: Workpiece non-grasp -
At hand close: Workpiece grasp
Explain Write

Figure 10-11 Hand parameter

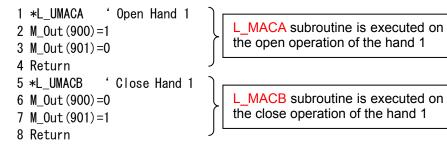
#### Hand macro function

You can specify the macro name of UMACA – UMACZ to HANDTYPE parameters, by providing a subroutine  $L_UMACA - L_UMACZ$  the appropriate user base program (PRGUSR parameter), you run the hand macro open and close operation from TB.

#### 1. Parameter setting

🗈 Hand parameter 1:RC1 (Online) 💷 📧	
Robot1 v 1:RV-2F-D	
Hand1 v	HANDTYPE = UMACA/UMACB, , , , , , ,
Hand type (HANDTYPE)	
None Single Double	
Signal#: 900	
IO-Macro Open : UMACA → Close : UMACB →	
Workpiece grasp definition (HNDHOLD1)	
At hand open: Workpiece non-grasp 🗸	
At hand close: Workpiece grasp V	
Explain Write	

#### 2. Macro programing (User base program)



It is possible to subroutine, to describe signal output (e.g. M\_Out(900)=1), variable assignment (e.g. M\_Data=1) and the timer (Dly 0.5).

#### Figure 10-12 Hand macro settings

## 10.3.4. Weight and size parameter

You can set the conditions for the hand mounted on the robot and the conditions for the work the robot grasps. Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Weight and size].

After you change the parameter value, you can rewrite the weight and size parameters in the robot controller by clicking the [Write] button.

Robot	:1		▼ 1:RV-4	F-D							
		Γ	WRKDAT0	WRKDAT1	WRKDAT2	WRKDAT3	WRKDAT4	WRKDAT5	WRKDAT6	WRKDAT7	WRKDAT8
	Weight [Kg] :		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Cine	X:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Size [mm]	Y:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Work		Z:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Center of	X:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	gravity position [mm]	Y:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Z :	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Г	HNDDATO	HNDDAT1	HNDDAT2	HNDDAT3	HNDDAT4	HNDDAT5	HNDDAT6	HNDDAT7	HNDDAT8
	Weight [Kg] :		4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
	<b>C</b> 1	X:	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Size [mm]	Y:	78.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hand		Z :	90.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Center of	X:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	gravity position	Y:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	[mm]	Z :	85.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
										Explain	Write

Figure 10-13 Weight and size parameter

## 10.3.5. Tool parameter

Set the standard tool coordinates and standard base coordinates. Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Tool].

After you change the parameter value, you can rewrite the tool parameters in the robot controller by clicking the [Write] button.

🗗 Tool p	arameter 1:RC1 (	Online)							×	
Robot	1	▼ 1 : R\	/-4F-D					ne tools is di ater of this s		
STD	<u>B</u> ase coordinate	-STD <u>T</u> o	ol coordinate	Too	l <u>coordinate</u> d Tool1-4	lata 🗸				
	(MEXBS) [mm, deg]		MEXTL) Im, deg]		MEXTL1 [mm, deg]	MEXTL2 [mm, deg]	MEXTL3 [mm, deg]	MEXTL4 [mm, deg]		
X:	0.00	X :	0.00	X :	0.00	0.00	0.00	0.00		
Y:	0.00	Y:	0.00	Y:	0.00	0.00	0.00	0.00		
Z :	0.00	Z :	0.00	Ζ:	0.00	0.00	0.00	0.00		
A :	0.00	A :	0.00	Α:	0.00	0.00	0.00	0.00		
В:	0.00	В:	0.00	В:	0.00	0.00	0.00	0.00		
C:	0.00	C :	0.00	C :	0.00	0.00	0.00	0.00		
	airing positions tool base coordinate (MEXDBS) [mm, deg] 0.0000	STD to	/) ol coordinate IEXDTL) Im, deg] 0.0000	Тоо х:	MEXDTL1 [mm, deg]	MEXDTL2 [mm, deg] 0.0000	MEXDTL3 [mm, deg] 0.0000	MEXDTL4 [mm, deg] 0.0000		
Y:	0.0000	Y:	0.0000	Y :	0.0000	0.0000	0.0000	0.0000	- i -	
z:	0.0000	z :	0.0000	z :	0.0000	0.0000	0.0000	0.0000	1	
A :	0.0000	A :	0.0000	A :	0.0000	0.0000	0.0000	0.0000		
I B:	0.0000	в:	Displaye	d whe	n vou are	connecte	d to a )0	0.0000		
C:	0.0000	C :				osition rep		0.0000	i	
<b>-</b>							<u>E</u> xplain	W <u>r</u> ite	_! ]	

Figure 10-14 Tool parameter

### 10.3.6. User-defined area parameter

You can specify the region (cuboid) defined with two points in the robot XYZ coordinates and set the behavior for when the robot enters this region. You can set up to 8 User-defined area.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [User-defined area].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

User-defined area parameter 1:RC1 (Online)				
User-defined area1  Type (AREA1AT)	Position (	AREA1P1)	Position (A	REA1P2)
None O Signal O Error		[mm, deg]		m, deg]
	X :	0.00	X :	0.00
Signal# (USRAREA)	Y: Z:	0.00	Y:	0.00
Start: -1 End: -1	A :	-360.00	Z:A:	360.00
<u>S</u> et	в:	-360.00	В:	360.00
	C :	-360.00	с:	360.00
Robot No.(AREA1ME)	L1 :	0.00	L1 :	0.00
	L2:	0.00	L2 :	0.00
1 : RV-4F-D		Te <u>a</u> ch		<u>T</u> each
			<u>E</u> xplain	W <u>r</u> ite

Figure 10-15 User-defined area parameter

### 10.3.7. Free plane limit parameter

You can set the overrun limit for using the robot on a free plane.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Free Plane Limit].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

🕞 Free plane limit paramet	er 1:RC1 (Online)	_ = ×
Free plane limit1 Attribute (SFC1AT) OFF ON(Inside) ON(Outside)	Robot# (SFC1ME)	
Position (SFC1P1) [mm] X : 0.00 Y : 0.00 Z : 0.00 Tea <u>c</u> h	Position (SFC1P2) [mm] X: 0.00 Y: 0.00 Z: 0.00 <u>T</u> each	Position (SFC1P3) [mm] X : 0.00 Y : 0.00 Z : 0.00 Teach
		Explain Write

Figure 10-16 Free plane limit parameter

You can reference explanations of displayed parameters by pressing the [Explain] button.

#### 10.3.8. Home position parameter

Set the position of the escape point.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Escape Point].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

🗗 Home position p	arame 🗔	- • •
Robot1	•	
1:RV-4F-D		
-Home position (J	SAFE)	
	[mm, deg]	
J1 :	0.00	
J2 :	0.00	
J3 :	90.00	
J4 :	0.00	
J5 :	-90.00	
J6 :	0.00	
37:	0.00	
J8 :	0.00	
	<u>T</u> each	
Ē	Explain	W <u>r</u> ite

Figure 10-17 Home position parameter

### 10.3.9. Robot additional axis parameter

You can set information related to addition axes of robots.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Robot additional axis].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

#### (1) In the case of using version 3.01B or later

You can set an addition axis by reading the profile of an electric actuator (SMC Ltd. THK Ltd. etc.). Please download the profile from the homepage of each company.

AX	AXMENO	ONCXA	AXUNT	AXSPOL	AXACC	AXDEC	AXGRTN
1	1	9:Force control	0:deg	0:CCW	0.67	0.67	40
2	1	7:L1(J7)	1:mm	0:CCW	0.67	0.67	40
3	2	1:J1	1:mm	0:CCW	0.67	0.67	40
4	2	2:J2	1:mm	0:CCW	0.67	0.67	40
5	2	3:J3	1:mm	0:CCW	0.67	0.67	40
6	3	1:J1	1:mm	0:CCW	0.67	0.67	40
7	3	2:J2	1:mm	0:CCW	0.67	0.67	40
8	0:Not used	0:Not used	1:mm	0:CCW	0.67	0.67	40
•		III					
<u>N</u> um	ber of multi me	chanisms used(AXU	NUM) 2	•	Set.		.o <u>a</u> d profile

Figure 10-18 Robot additional axis parameter (Version 3.01B or later)

You can load the profile to selected axis by pressing the [Load profile] button. You can reference explanations of displayed parameters by pressing the [Explain] button. You can read Additional Axis data saved in the file by pressing the [Read from file] button. You can save Additional Axis parameter to the file by pressing the [Save to file] button. You can edit the information of the selected axis by pressing the [Set] button.

Joint limit(MEJAR) 0.00 -> 200.00 [mm] AXACC AXDEC (sec) Rotation direction(AXSPOL) 0:CCW CCW:counterclockwise CCW CCW CCW:counterclockwise CCW CCW CCW:counterclockwise CCW CCW CCW CCW:counterclockwise CCW CCW CCW CCW CCW CCW CCW CCW CCW CCW	<b></b> ×		•	A <u>x</u> is #(AXJNO) 7:L1(J7)	ot additional axis parameter setting tting axis #2 (AX2) ubot #(AXMENO) 1
I otal speed ratio denominator(AXGRTD)       1         I_otal speed ratio denominator(AXGRTD)       1         I_unit system(AXUNT)       1:mm         User defined origin(USERORG)       -50.00 [mm]         Joint limit(MEJAR)       0.00       ->       200.00 [mm]         Rotation direction(AXSPOL)       Imm       AXACC       AXDEC (sec)         Rotation direction(AXSPOL)       Imm       3000       ->       3000         0:CCW       CCW:counterclockwise       Imm       3000       ->			rement specification	Mo	otor/Encoder
0:CCW CCW:counterclockwise CCW Acceleration time(AXACC) 0.6700	→ time	AXDEC		1 1:mm • -50.00 [mm]	Total speed ratio denominator(AXGRTD) Unit system(AXUNT) User defined origin(USERORG)
Encoder resolution(AXENCR)     Maximum speed(AXJMX)     3300       262144 [pulse/rev]     JOG smoothening time constant(AXJOGTS)     150.00	00 [sec] 00 [sec] 00 [rpm]	0.6700 0.6700 3300 150.00	cceleration time(AXACC) gceleration time(AXDEC) aximum spee <u>d</u> (AXJMX) DG smoothening time constant(AXJOGTS)		0:CCW CCW:counterclockwise CW:clockwise Encoder resolution(AXENCR)

Figure 10-19 Robot additional axis parameter setting (Version 3.01B or later)

## 10.3.10. Collision detection parameter

You can set information related to the robot's collision detection functions.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Collision detection].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

Robot1 1:RV-4F-D		•			
- Collision Det					
- The impact	t detection <u>f</u> i	unction	Duri	ng jog opera	ation
Can	Cann	ot be used	H (	Enable 🛛	
<u>I</u> nitial state	at automatic	operation		Disable	
🔘 Enable	e 💿 Disab	ole	0	NOERR m	ode
Detection <u>l</u> e	vel(COLLVL) [%]			n level(COLL og operation [%]	n İ
J1:	100		J1:	100	1
J2:	100		J2:	100	
J3:	100		J3:	100	
J4:	100		J4:	100	
35:	100		J5:	100	
J6:	100		J6:	100	
J7:	100		J7:	100	
38:	100		J8:	100	
			<u>E</u> xplai	n V	V <u>r</u> ite

Figure 10-20 Collision detection parameter

## 10.3.11. Warm-up operation parameter

You can set information related to the robot's warm-up function.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Warm-up].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

🕞 Warm-up operation pa	arameter 1:RC1 (C	Online)				×
Robot1						
Warm-up operation mod	de(WUPENA)	Warm-up op	peration mo	ode target a	axis(WUPAXIS)	)
<ul> <li>Invalid</li> </ul>	Invalid		<b>J</b> 2	<b>I</b> ] ]3	<b>V</b> ]4	
		<b>V</b> 35	V 16	17	<b>I</b> ] 38	
Warm-up operation mod (WUPTIME)	le control <u>t</u> ime	–Warm- <u>u</u> p op	peration ov	erride(WUP	OVRD)	
(WOPTIME)	[min]				[%]	
Valid time 1.0	0		]	Initial value	70	
Resume time 60.	00	Ratio o	of value cor	istant time	50	
				<u>E</u> xplain	W <u>r</u> ite	;

Figure 10-21 Warm-up operation parameter

## 10.3.12. Movement parameter

You can set information related to the optimum acceleration/deceleration for robot operation and set compliance errors.

The information that can be set concerning movement parameters depends on the robot controller connected.

 Table 10-3 The controller which you can set information related to optimum acceleration/deceleration for robot operation and set compliance errors

	CR750/700 series	CRn-500 series
Maximum acceleration/deceleration		J2 edition or later
correction ratio		
Compliance error function settings	Can be used with all versions	H6 edition or later
Optimum acceleration/deceleration	Can be used with all versions	G1 edition or later
setting		
Direction of gravity		H4 edition or later

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Movement].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

P Movement parameter 1:RC1 (Online)								
Robot1	-	1:RV-4F-D						
Optimum acceleration (JADL) /deceleration adjustment rate [%]			Functional setting of compliance error(CMPERR) <ul> <li>Enable error generation</li> <li>Disable error generation</li> </ul>					
J1:	70.00		Maximum acceleration/deceleration setting(ACCM0	DDE)				
J2:	70.00		e Enable					
J3:	70.00		O Disable					
J4:	70.00							
J5:	70.00		The gravity direction(MEGDIR)	nm/second2]				
J6:	70.00		installation posture	0.00				
J7:	70.00		gravitational acceleration in the X axis direction	0.00				
J8:	70.00		gravitational acceleration in the Y axis direction	0.00				
			gravitational acceleration in the Z axis direction	0.00				
			Explain	Write				

Figure 10-22 Movement parameter

## 10.3.13. Work coordinate paramater

Work coordinate parameters define the coordinate system for the work jog.8 work coordinates can define. This function can be used with Version 1.5 or later of this software.

Tuble 10-4 The controller that can use the work jog							
Robot controller	Software version of robot controller						
CR750-D/CRnD-700	Ver.N8 or later						
CR750-Q/CRnQ-700	Ver.P8 or later						

Table 10-4 The controller that can use the work jog	

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Work coordinate].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

Work coordinate paran	neter 1:RC1 (Online)		
Work1	•		
Origin WO (WK1WO)	+X WX (WK1WX)	+Y WY (WK1WY)	WORK coordinate data (WK1CORD)
[mm]	[mm]	[mm]	[mm, deg]
X: 0.00	X: 0.00	X: 0.00	X: 0.00
Y: 0.00	Y: 0.00	Y: 0.00	Y: 0.00
Z: 0.00	Z: 0.00	Z: 0.00	Z: 0.00
Teach	Teach	Teach	A: 0.00
Teach	Teach	Teach	B: 0.00
			C: 0.00
Robot#			
1 : RV-7F-Q	•		
			Explain Write

Figure 10-23 Work coordinate parameter

Work coordinates are defined by "Origin WO", "+X WX" and "+Y WY".

You can reference explanations of displayed parameters by pressing the [Explain] button.

These parameters cannot be set by the offline editing.

## 10.3.14. Parameters of Force control

You can set parameters of force control in PC and robot controllers. The force control function can be used with Version 2.10L or later of this software. For details of these parameters, refer to the user's manual of the force control function.

#### 10.3.14.1. Force sensor parameter

From the project tree, double-click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Force control] -> [Force sensor].

Set the parameters, [Assign sensor], [Sensor coordinates], [Filter time constant], [Restriction], and [Tolerance level] which are used by the force control function.

R	obot #	Axis #	Robot1		- 1:R	V-7F-Q				
	XMENO) (		Sensor coo	rdinates			Restriction			
1:	0	0	<u>C</u> oordina	ate systems	(FSHAN	D)	Max. offset(FS	CORMX)		
2:	0	0	۹ Le	eft-Handed			Position:	10.00	[mm]	
3:	0	0	© Ri	© Right_Handed				10.00	[deg]	
4:	0	0	Place /	Angle(FSXT	L)	Tolerance level(FSLMTMX)				
5:	0	0		[mm]	-	[deg]		 [N,Nm]		
5:	0	0	X:	0.00	A:	0.00	Fx:	0.00		
7:	0	0	Y:	0.00	в:	180.00	Fy:	0.00		
в:	0	0	Z:	0.00	C:	0.00	Fz:	0.00		
							Mx:	0.00		
			- Filter time	constant(FS	FLCTL)		My:	0.00		
			Eilter time constant(FSFLCTL) Mz: Sensor data: 1.70 [ms]							

Figure 10-24 Force sensor parameter

You can reference explanations of displayed parameters by pressing the [Explain] button.

After you change the parameter values, you can rewrite the parameters in the robot controller by clicking the [Write] button.

#### 10.3.14.2. Force control mode parameter

From the project tree, double-click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Force control] -> [Force control mode].

Set the parameters, [Coordinate system], [Control mode of axes], [Stiffness coefficients], and [Dumping coefficients] which are used by the control mode of force control function.

Force control mode parameter 1:RC1 (Online)								
Robot1 • 1 : RV-7F-Q								
Control mode1	_	dinate syster Tool coordina		© XYZ co	ordinate syste	m		
Control mode of <u>a</u> xes(FSFMD01)	<u>S</u> tiffn	ess coefficier	nts(FSSTF01)	Dum	ping coefficier	nts(FSDMP01)		
X: Position 👻	X:	0.10	[N/mm]	X:	0.00	[N/(mm/s)]		
Y: Position 🗸	Y:	0.10	[N/mm]	Y:	0.00	[N/(mm/s)]		
Z: Position 🔹	Z:	0.10	[N/mm]	Z:	0.00	[N/(mm/s)]		
A: Position -	A:	0.10	[Nm/deg]	A:	0.00	[Nm/(deg/s)]		
B: Position -	B:	0.10	[Nm/deg]	B:	0.00	[Nm/(deg/s)]		
C: Position 🗸	C:	0.10	[Nm/deg]	C:	0.00	[Nm/(deg/s)]		
L1: Position 💌	L1:	0.00		L1:	0.00			
L2: Position	L2:	0.00		L2:	0.00			
				Ē	xplain	W <u>r</u> ite		

Figure 10-25 Force control mode parameter

You can reference explanations of displayed parameters by pressing the [Explain] button.

After you change the parameter values, you can rewrite the parameters in the robot controller by clicking the [Write] button.

#### 10.3.14.3. Force control characteristics parameter

From the project tree, double-click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Force control] -> [Force control characteristics].

Set the parameters, [Force gain], [Force cmd.], and [Force detection] which are used by the control characteristics of force control function.

"Speed condition" tab is displayed in this software version 2.20W or later. The controller which can set the parameters [Mode switch judgment] and [Speed command] is as follows.

e con	itroller which can set the para	meters	[Mode switch]	juagment	and	Speed co
	Robot controller	Softw	are version of	the robot	t cont	roller
	CR750-D/CRnD-700		Ver.S3	3g or later	•	
	CR750-Q/CRnQ-700		Ver.R3	Bg or later	•	

## Table 10-5 The controller which can set the parameters [Mode switch judgment] and [Speed command]

	Force control feature 1:RC1 (Online)         Robot1       I: RH-3FH3515-Q							
	Control feature1							
- <u>G</u> ain(I	-SFGN01)-		Instruc	tion(FSFCMD	01)	Dete	ction(FSFLMT	
X:	0.00	[10 <sup>-3</sup> mm/N]	X:	0.00	[N]	X:	2000.00	[N]
Y:	0.00	[10 <sup>-3</sup> mm/N]	Y:	0.00	[N]	Y:	2000.00	[N]
Z:	0.00	[10 <sup>-3</sup> mm/N]	Z:	0.00	[N]	Z:	2000.00	[N]
A:	0.00	[10 <sup>-3</sup> deg/(Nm)]	A:	0.00	[Nm]	A:	200.00	[Nm]
B:	0.00	[10 <sup>-3</sup> deg/(Nm)]	В:	0.00	[Nm]	В:	200.00	[Nm]
C:	0.00	[10 <sup>-3</sup> deg/(Nm)]	C:	0.00	[Nm]	C:	200.00	[Nm]
L1:	0.00		L1:	0.00				
L2:	0.00		L2:	0.00				
	Explain Write							

Figure 10-26 Force control characteristics parameter (version 2.10N or earlier)

Force control chara     Robot1     Control char.1	cteristics parameter 1:	RC1 (Online)				×			
Force condition S	`					_			
X: 0.00 Y: 0.00	0 [10 <sup>-3</sup> mm/N]	Rob 1		teristics parameter 1 ↓ 1: RV-7F-Q	RC1 (Online):		_		
Z: 0.00 A: 0.00 B: 0.00	0 [10 <sup>-3</sup> deg/(Nm)]	Control char Force con		eed condition					
C: 0.00	5, 6, 73			ment(FSSWF01)	Speed cor				
L1: 0.00	_	X: Y:	0.00	[N] [N]	X: Y:	0.00	[mm/s] [mm/s]		
		Z: A:	0.00	[N] [Nm]	Z: A:	0.00	[mm/s] [deg/s]		
		B:	0.00	[Nm]	В:	0.00	[deg/s]		
		C: L1:	0.00	[Nm]	C: L1:	0.00	[deg/s]		
		L2:	0.00		L2:	0.00			
								<u>E</u> xplain	Write

Figure 10-27 Force control characteristics parameter (version 2.20W or later)

You can reference explanations of displayed parameters by pressing the [Explain] button.

After you change the parameter values, you can rewrite the parameters in the robot controller by clicking the [Write] button.

#### 10.3.14.4. Force log parameter

From the project tree, double-click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Force control] -> [Force log setting].

Set the parameters, [Configuration] and [FTP setting] which are used by the force control function.

🕞 Force log parameter 1:RC1 (Online)						
Configration(FSLOGFN)						
Log	Invalid					
Kind of sensor data	Transformed data 👻					
FTP	Not used 🗸					
FTP setting User name(FTPID)	ftpuser ftppassword					
Password(FTPPASS) IP address of FTP server						
	Explain Write					
Figure	10-28 Force log parameter					

You can reference explanations of displayed parameters by pressing the [Explain] button.

After you change the parameter values, you can rewrite the parameters in the robot controller by clicking the [Write] button.

## 10.3.15. Parameters of Collision avoidance

You can set parameters of collision avoidance in PC and robot controllers.

For details of these parameters, refer to the robot controller's operations manual, see "Detailed explanations of functions and operations".

#### 10.3.15.1. Collision avoidance area parameter

From the project tree, double-click the target project [Online] -> [Parameter] -> [Movement parameter] -> [Collision avoidance] -> [Collision avoidance] -> [Collision avoidance].

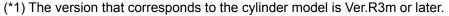
You can set information related to the Collision avoidance area.

This function can be used with Version 2.40S or later of this software.

The controller which can set the parameters [Collision avoidance area] is as follows.

#### Table 10-6 The controller and the robot model which can set the parameters [Collision avoidance area]

	Robot controller	Software version of the robot controller	Robot model
	CR750-Q/CRnQ-700	Ver.R3a or later (*1)	RV-F, RH-F
/*	A) The complete the statement	an da ta tha au lindan madal in Man Dûna an Ista	-



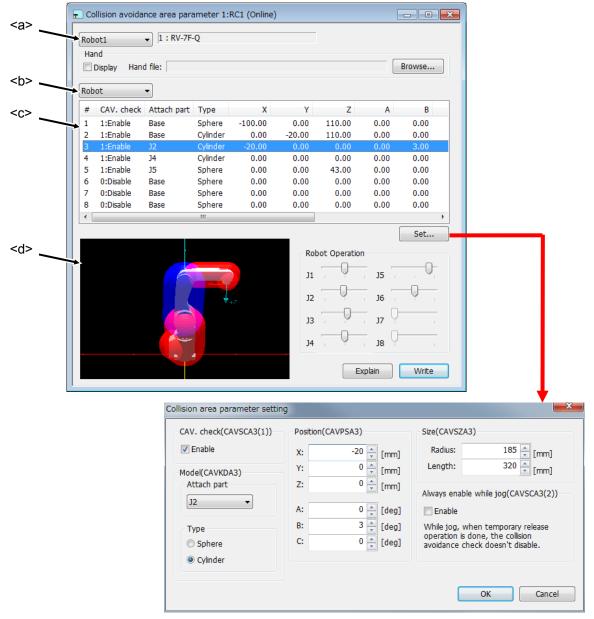


Figure 10-29 Collision avoidance area parameter

You can switch the robot by the combo box<a>.

You can switch the collision avoidance area type (robot/hand/work) by the combo box<b>.

If you select one collision avoidance area from the list<c>, and click set button or double-click list, the dialog for the collision avoidance area setting is displayed. The selected collision avoidance area becomes displayed in blue color on the 3D model<d>.

After you change the parameter values, you can rewrite the parameter in the robot controller by clicking the [Write] button.

The perspective of 3D model<d.> can be changed as follows.

Table 10-7 3D Model Perspective Change Operations				
Viewpoint of changing	Mouse operations on the graphic			
Rotation	While clicking the left button, move left/right $\rightarrow$ Rotation around Z axis Move up/down $\rightarrow$ Rotation around X axis Move left/right while clicking the left + right buttons $\rightarrow$ Rotation around Y axis			
Move	Move up/down/left/right while clicking the right button			
Enlargement/reduction	Move up/down/left/right while clicking pressing [Shift] key and clicking the left button A similar operation can be used by the mouse wheel with Version 3.01B or later of this software.			

Table 10-7 3D	Model Pers	pective Change	e Operations
		poolino onang	oporationio

If you operate slider of [Robot Operation], the robot of 3D model<d> is moved.

When a tick mark (for true) is set in the [Display] checkbox and a hand file is set, the robot hand is displayed on 3D model<d>. Refer to "16.3.11 Hand" for designing the robot hand.

# 10.4. Program Parameters

### 10.4.1. Slot table parameter

Slot tables set the operating conditions of each task slot during multi-task operation.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Program parameter] -> [Slot Table].

After you change the parameter value, you can rewrite the operating range parameter in the robot controller by clicking the [Write] button.

No.	Program name	Mode	Conditions	Priority
1		REP	START	1
2		REP	START	1
3		REP	START	1
4		REP	START	1
5		REP	START	1
6		REP	START	1
7		REP	START	1
8		REP	START	1

Figure 10-30 Slot table parameter

Select the task slot number you are changing and click the [Set] button.

Slot table parameter setting	
SLT1 Slot# : 1	Conditions Mode : REP -
Program files  Clear  Program list	Conditions : START   Priority : 1
	<u>W</u> rite <u>Close</u>

Figure 10-31 Slot table parameter setting

When the modification window appears, set the program name, operating conditions, startup conditions and task priority, and then click [Write].

#### 10.4.2. Program language parameter

You can set the robot program language used in a robot controller (MELFA-BASIC V/MELFA-BASIC IV/Movemaster commands). From the project tree, double click the target project [Online] -> [Parameter] -> [Program parameter] -> [Program language].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

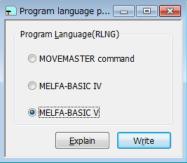


Figure 10-32 Program language parameter

You can reference explanations of displayed parameters by pressing the [Explain] button.

For the usable robot program languages, see "Table 7-1 Robot Program Languages for Each Controller".

## · // Caution — About MELFA-BASIC V

MELFA-BASIC V. can only be used with CRn-700 series robot controllers.

#### About Movemaster commands

The Movemaster commands are restricted by the robot models that can be used. For details on whether you can use Movemaster commands with your robot, refer to its standard specifications.

#### 10.4.3. Command parameter

You can set parameters related to robot programs.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Program parameter] -> [Command].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

🕞 Command parameter 1:RC1 (Online)	
Program gelection(SLOTON) <ul> <li>Disable storage, do not maintain</li> <li>Enable storage, do not maintain</li> <li>Disable storage, maintain</li> <li>Enable storage, maintain</li> </ul>	Unit setting for the rotational element of position (PRGMDEG) © RAD © DEG Extension of external variable PRGGBL 1
<u>C</u> ontinue function(CTN)	Explain Write

Figure 10-33 Command parameter

#### **10.4.4. User error parameter**

You can set the message, cause, and recovery method for user errors set with a program.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Program parameter] -> [User error].

UER	Error#	Error message	Cause	Method ( 📤
1	9900	message	cause	treat
2	9900	message	cause	treat
3	9900	message	cause	treat
4	9900	message	cause	treat
5	9900	message	cause	treat
6	9900	message	cause	treat
7	9900	message	cause	treat
8	9900	message	cause	treat
9	9900	message	cause	treat
10	9900	message	cause	treat
11	0000	maccona	C31160	troot
(	Gam		- and	•

Figure 10-34 User error parameter

Double click the error number from the list. The "User error parameter setting" edit screen is displayed.

h	) User e	error para	meter 1:RC1 (Online)				
	UER	Error#	Error message	Cause		Method	no , hor
	1	9900	message	cause		treat	
	2	9900	message	cause	Use	er error parameter se	r setting
	3	9900	message	cause		User error setting(UER	
	4	9900	message	ca se		User entitisecting(UEK	JEK)
	5	9900	message			UER1	
	6	9900	message				
	7	9900	Davible allali	cause		Error number	9900 (Can have up to 200 characters in total)
	8	99	Double click	cause			message
	9	9900	message	cause		Error message	
	10	9900	message	cause			
	11	0000		C3116A			cause
	•					Cause	ISE
						Method of recovery	treat
1							
						,	OK Cancel

Figure 10-35 User error parameter setting

Input the error number, error message, cause, and recovery method, then click the [OK] button. The user errors input to the list are displayed.

At this time, input an error number from "9000" - "9200".

After you confirm the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

Please note that the list display is not sorted by error number.

# 10.5. Signal Parameters

### 10.5.1. Output signal reset pattern parameter

These parameters set the operation when resetting the general-purpose output signals such as the CLR instruction and dedicated input (OUTRESET).

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Signal parameter] -> [Output signal reset pattern].

Reset o	utput signals sin	TIO) <u>No Y</u> es			
0 - 255	•	ORSTO - OF	RST224		
Signal	1	2	3	4	
0 - 31	00000000	00000000	00000000	00000000	Signal# : 0
32 - 63	00000000	00000000	00000000	00000000	
64 - 95	00000000	00000000	00000000	00000000	
96 - 127	00000000	00000000	00000000	00000000	OEF (0) ON (1) Hold (*)
128 - 159	00000000	00000000	00000000	00000000	
160 - 191	00000000	00000000	00000000	00000000	
192 - 223	00000000	00000000	00000000	00000000	<u>S</u> et
224 - 255	00000000	00000000	00000000	00000000	

Figure 10-36 Output signal reset pattern parameter

Set a signal number, and then select one of [OFF]/[ON]/[Hold]. The value of the signal having the specified number displayed in the list changes. After you changed the parameter value, you can rewrite the output signal reset parameter in the robot controller by clicking the [Write] button.

Also, selecting a signal group (for example, "32-0") and then clicking the [Set] button changes 32 signals at once.

I/O rese	et pattern parame	eter setting
	Meaning	
	0:0	FF
	1:0	N
	* : H	old
	0 - 7:	0000000
	8 - 15:	0000000
	16 - 23:	0000000
	24 - 31:	0000000
	ОК	Cancel

Figure 10-37 I/O reset pattern parameter setting

You can reference explanations of displayed parameters by pressing the [Explain] button.

# 

Use this screen after reading the parameter list file of the connecting controller. And you can see the output signals corresponding to the function of the connecting controller. You can read the parameter list file on the "Parameter list" screen.

## 10.5.2. Assigning Dedicated Input/Output Signals

Assign signal numbers to functions in order to perform the remote operations to execute and stop robot programs, and display/operate the execution progress information and servo power supply status, etc. Set parameters while connected to the robot controller.

#### 10.5.2.1. General1 parameter

From the project tree, double click the target project [Online] -> [Parameter] -> [Signal parameter] -> [Dedicated input/output signals assignment] -> [General1].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

]	INPUT		0	<u>J</u> TPUT	
AUTO enable	AUTOENA		AUTO enable	AUTOENA	
START	START	3	During execute	START	0
STOP	STOP	0	During wait	STOP	
STOP2	STOP2		During wait 2	STOP2	
			STOP IN	STOPSTS	
Program reset	SLOTINIT		Prg select enable	SLOTINIT	
Error reset	ERRRESET	2	During error	ERRRESET	2
Cycle-Stop	CYCLE		During Cycle-Stop	CYCLE	
Servo OFF	SRVOFF	1	Servo ON disable	SRVOFF	
Servo ON	SRVON	4	During servo ON	SRVON	1
Operation enable	IOENA	5	Operation enable	IOENA	3
				<u>E</u> xplain	W <u>r</u> ite

Figure 10-38 Dedicated input/output signals assignment - General1 parameter

You can reference explanations of displayed parameters by pressing the [Explain] button.

#### 10.5.2.2. General2 parameter

From the project tree, double click the target project [Online] -> [Parameter] -> [Signal parameter] -> [Dedicated input/output signals assignment] -> [General2].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

<u>I</u> N	PUT	<u> </u>	O <u>U</u> TPUT		
Move home	SAFEPOS	Moving home	SAFEPOS		
General Output reset	OUTRESET				
Machine lock	MELOCK	During Machine lock	MELOCK		
		H-Error	HLVLERR		
		L-Error	LLVLERR		
		Caution	CLVLERR		
		During EMG-Stop	EMGERR		
		TEACH-mode	TEACHMD		
		AUTO(OP.)-mode	ATTOPMD		
		AUTO(EXT.)-mode	ATEXTMD		
			Explain Write		

Figure 10-39 Dedicated input/output signals assignment - General2 parameter

#### 10.5.2.3. Data parameter

From the project tree, double click the target project [Online] -> [Parameter] -> [Signal parameter] -> [Dedicated input/output signals assignment] -> [Data].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

Data parameter 1:RC1	(Online)				_	
INPUT			OUTPUT			
Program select	PRGSEL					
OVRD specification	OVRDSEL					
			RC ready		RCREADY	
			Low battery		BATERR	
Prog.# output req.	PRGOUT		During output Prog.#		PRGOUT	
Line# output req.	LINEOUT		During output Line#		LINEOUT	
OVRD output req.	OVRDOUT		During output OVRD		OVRDOUT	
Err.# output req.	ERROUT		During output Err.#		ERROUT	
Temp. in RC output req.	TMPOUT		During output Temp. in RC		TMPOUT	
	Start	End			Start	End
Value input IODA	TA		Value output	IODAT/	A	
			User-defined area	USRARE	A	
					Explain	Write

Figure 10-40 Dedicated input/output signals assignment - Data parameter

"Temp. in RC output req" and "During output Temp in RC" parameter is available with Ver.1.6.1 or later of this software. Moreover, the software version of the controller which can use this parameter is as follows.

Table 10-8 The controller which you can set the parameters about "Temp. in RC output reg." and "During output Temp. in RC"

Controller	S/W Ver. of the controller		
CR750-D/CRnD-700	Ver.S1c or later		
CR750-Q/CRnQ-700	Ver.R1c or later		

You can reference explanations of displayed parameters by pressing the [Explain] button.

#### 10.5.2.4. Jog parameter

From the project tree, double click the target project [Online] -> [Parameter] -> [Signal parameter] -> [Dedicated input/output signals assignment] -> [Jog].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

д Jog parameter 1:RC1 (Online)						
INPUT				ОЦТРИТ		
JOG mode specification	JOGENA			JOG valid JOGENA		
		<u>S</u> tart	E <u>n</u> d			
JOG(+) specification	JOG+					
JOG(-) specification	JOG-			S <u>t</u> art En <u>d</u>		
JOG mode specification	JOGM			JOG mode JOGM		
Error disregard at JOG	JOGNER			During error disregard at JOG JOGNER		
				Explain W <u>r</u> ite		

Figure 10-41 Dedicated input/output signals assignment - Jog parameter

You can reference explanations of displayed parameters by pressing the [Explain] button.

JOGNER(JOG command INPUT signal, During JOG OUTPUT signal) can be used with Version J2 or later of the CRn-500 series controller, or CR750/700 series controller

### 10.5.2.5. Hand parameter

From the project tree, double click the target project [Online] -> [Parameter] -> [Signal parameter] -> [Dedicated input/output signals assignment] -> [Hand].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

Hand parameter 1:RC	1 (Online)		_ • • ×
Hand O <u>u</u> tput State		Hand <u>I</u> nput Signal (8)	
	OUTPUT		OUTPUT
	Start End		Start End
1 HNDCNTL1		1 HNDSTS1	
2 HNDCNTL2		2 HNDSTS2	
3 HNDCNTL3		3 HNDSTS3	
Hand Error		Air pressure Error	
	INPUT OUTPUT		INPUT OUTPUT
1 HNDERR1		1 AIRERR1	
2 HNDERR2		2 AIRERR2	
3 HNDERR3		3 AIRERR3	
		Ext	plain W <u>r</u> ite

Figure 10-42 Dedicated input/output signals assignment - Hand parameter

You can reference explanations of displayed parameters by pressing the [Explain] button.

### 10.5.2.6. Warm up parameter

The warm-up operation parameters can be set when you are connected to a CRn-500 series robot controller of J8 edition or later or a CR750/700 series robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Signal parameter] -> [Dedicated input/output signals assignment] -> [Warm up].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

🕞 Warm up parameter 1:RC1 (Online)				
INPUT	OUTPUT			
Warm up mode setting	Warm up mode enable			
Robot 1 M1WUPENA	Robot 1 M1WUPENA			
Robot 2 M2WUPENA	Robot 2 M2WUPENA			
Robot 3 M3WUPENA	Robot 3 M3WUPENA			
	Warm up mode in progress			
	Robot 1 M1WUPMD			
	Robot 2 M2WUPMD			
Explain Write	Robot 3 M3WUPMD			

Figure 10-43 Dedicated input/output signals assignment - Warm up parameter

### 10.5.2.7. Start (each slot) parameter

From the project tree, double click the target project [Online] -> [Parameter] -> [Signal parameter] -> [Dedicated input/output signals assignment] -> [Start (each slot)].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

		<u>I</u> NPUT	OUTPUT			I <u>N</u> PUT	OUTPUT		INP <u>U</u> T	OUTPU
1:	S1START			12:	S12START			23: S23START		
2:	S2START			13:	S13START			24: S24START		
3:	S3START			14:	S14START			25: S25START		
4:	S4START			15:	S15START			26: S26START		
5:	S5START			16:	S16START			27: S27START		
6:	S6START		Í	17:	S17START		Í	28: S28START		ĺ
7:	S7START		Î	18:	S18START			29: S29START		Î
8:	S8START			19:	S19START			30: S30START		
9:	S9START		Í	20:	S20START			31: S31START		ĺ .
10:	S10START		Í	21:	S21START			32: S32START		Î
11:	S11START		Î	22:	S22START		Í			
					,			Explai		Write

Figure 10-44 Dedicated input/output signals assignment - Start (each slot) parameter

You can reference explanations of displayed parameters by pressing the [Explain] button.

### 10.5.2.8. Stop (each slot) parameter

From the project tree, double click the target project [Online] -> [Parameter] -> [Signal parameter] -> [Dedicated input/output signals assignment] -> [Stop (each slot)].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

		INPUT	OUTPUT			INPUT	OUTPUT			INPUT	OUTPU
1:	S1STOP			12:	S12STOP			23:	S23STOP		
2:	S2STOP			13:	S13STOP			24:	S24STOP		
3:	S3STOP			14:	S14STOP			25:	S25STOP		
4:	S4STOP			15:	S15STOP			26:	S26STOP		
5:	S5STOP			16:	S16STOP			27:	S27STOP		
6:	S6STOP			17:	S17STOP		ii	28:	S28STOP		
7:	S7STOP			18:	S18STOP			29:	S29STOP		
8:	S8STOP			19:	S19STOP			30:	S30STOP		
9:	S9STOP			20:	S20STOP		i i	31:	S31STOP		
10:	S10STOP		1	21:	S21STOP		Í	32:	S32STOP		ĺ
11:	S11STOP		Í	22:	S22STOP		Í				
	,				,				Explai		Write

Figure 10-45 Dedicated input/output signals assignment - Stop (each slot) parameter

### 10.5.2.9. Servo On/Off (each robot) parameter

From the project tree, double click the target project [Online] -> [Parameter] -> [Signal parameter] -> [Dedicated input/output signals assignment] -> [Servo On/Off (each robot)]. After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

	INPUT	OUTPUT
	INPOT	001201
M1SRVOFF	Servo OFF Robot 1	Servo ON disable Robot 1
M2SRVOFF	Robot 2	Robot 2
M3SRVOFF	Robot 3	Robot 3
	INPUT	OUTPUT
,		
MISRVON	Servo ON Robot 1	During servo ON Robot 1
M1SRVON M2SRVON	Servo ON Robot 1 Robot 2	During servo ON Robot 1 Robot 2

Figure 10-46 Dedicated input/output signals assignment – Servo ON/OFF (each robot) parameter

You can reference explanations of displayed parameters by pressing the [Explain] button.

### 10.5.2.10. Machine lock (each robot) parameter

From the project tree, double click the target project [Online] -> [Parameter] -> [Signal parameter] -> [Dedicated input/output signals assignment] -> [Machine lock (each robot)].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

🕞 Machine lock	(each robot) parameter 1:RC1 (Online)	
	<u>I</u> NPUT	O <u>U</u> TPUT
M1MELOCK	Machine lock Robot 1	During Machine lock Robot 1
M2MELOCK	Robot 2	Robot 2
M3MELOCK	Robot 3	Robot 3
		Explain Write

Figure 10-47 Dedicated input/output signals assignment - Machine lock (each robot) parameter

### 10.6. Communication Parameters

### 10.6.1. RS-232 parameter

These parameters set up the communication environment of the RS-232 interface of the robot controller.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Communication parameter] -> [RS-232].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

RS- <u>2</u> 32	
Baud rate (CBAU232):	9600 👻
Data :	8 🔹
Parity (CPRTY232) :	Even 👻
Stop bit (CSTOP232) :	2 🔻
Termination (CTERM232) :	CR 🗸
Protocol (CPRC232) :	Procedure 👻
	Explain W <u>r</u> ite

Figure 10-48 RS-232 parameter

### 10.6.2. Ethernet parameter

You can set robot controller Ethernet information.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Communication parameter] -> [Ethernet].

The "Ethernet" screen is different with versions of this software.

### (1) In the case of using version 3.00A or later

Click a menu. The screen corresponding to the selected menu is displayed.

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

You can reference explanations of displayed parameters by pressing the [Explain] button.

### 10.6.2.1. IP address

You can set the parameters related to IP address in the robot controller.

🖬 Ethe	rnet parameter	1:RC1 (Online)	
Men <u>u</u> :	Copy PC netw	ork settings	
IP address	IP address:	(NETIP)	192 . 168 . 0 . 20
Device & Line Realtime monitor	Subnet <u>m</u> ask:	(NETMSK)	255 . 255 . 255 . 0
Real-time external command	Default gateway:	(NETGW)	192 . 168 . 0 . 254
			Explain Write

Figure 10-49 Ethernet parameter – IP address (Version 3.00A or later)

You can copy network settings of the computer to the screen by clicking the [Copy PC network settings] button.

### 10.6.2.2. Device & Line

You can set the parameters related to devices and lines in the robot controller.

F.	-	Ethe	rnet param	eter 1:	RC1 (Online)					x
Menu:	Device list							Device all	ocation: (COMD	EV)
IP address	Device	Mode	IP address	Port #	Protocol	Exit code	Packet type	COM1:	RS232	~
Device & Line	OPT11	1: Server	192.168.0.2	10001	0: No-procedure	0: No-included	0: CR	COM2:	(no selection)	~
Realtime monitor	OPT12	1: Server	192.168.0.3	10002	0: No-procedure	0: No-included	0: CR	COM3;	(no selection)	~
	OPT13	1: Server	192.168.0.4	10003	0: No-procedure	0: No-included	0: CR	COM4:	(no selection)	~
Real-time external command	OPT14	1: Server	192.168.0.5	10004	0: No-procedure	0: No-included	0: CR	COM5:	(no selection)	~
	OPT15	1: Server	192.168.0.6	10005	0: No-procedure	0: No-included	0: CR	COM6:	· · ·	_
	OPT16	1: Server	192.168.0.7	10006	0: No-procedure	0: No-included	0: CR		(no selection)	
	OPT17	1: Server	192.168.0.8	10007	0: No-procedure	0: No-included	0: CR			
	OPT18	1: Server	192.168.0.9	10008	0: No-procedure	0: No-included	0: CR	COM8:	(no selection)	~
	OPT19	1: Server	192.168.0.10	10009	0: No-procedure	0: No-included	0: CR			
	Set									
								Explain	Write	
								CAPIGIT	741108	

Figure 10-50 Ethernet parameter – Device & line (Version 3.00A or later)

Select the device to edit and click the [Set] button. The "Device parameter setting" screen is displayed.

Device parameter setting					
<u>D</u> evice:		OPT11			
Auto <u>c</u> onfigrati	on:	None	<b>~</b>		
<u>M</u> ode:	(NETMODE(1))	0: Client	<b>v</b>		
IP address:	(NETHSTIP(1))	192 . 168 . 0 . 2			
<u>P</u> ort #:	(NETPORT(2))	1000	1		
Pro <u>t</u> ocol:	(CPRCE11)	2: Data link	<b>~</b>		
Pac <u>k</u> et type:	(CTERME11)	0: CR	<b>~</b>		
<u>A</u> llocation:	(COMDEV)	(no selection)	<b>~</b>		
		OK Cancel			

Figure 10-51 Ethernet parameter – Device parameter setting (Version 3.00A or later)

If you select the [MELFA-3D Vision] or [Network Vision Sensor (2D)] item from the [Autoconfiguration] combobox, contents of the screen take on the value corresponding to the selected item.

### 10.6.2.3. Realtime monitor

You can set the parameters related to the "Realtime monitor" function in the robot controller. The controller which you can use the "Realtime monitor" function is as follows.

Table 10-9 The controller which you can set the parameters about the "Realtime monitor" function

Robot controller	Software version of the robot controller
CR750-D/CRnD-700	Ver. S3q or later
CR750-Q/CRnQ-700	Ver. R3q or later

🖬 Ethe	ernet parame	ter 1:RC1 (Online)		- • ×
Men <u>u</u> :	Mode of realti	ime monitor:		
IP address	□ E <u>n</u> able	(MONMODE)		
Device & Line				10000
Realtime monitor	Por <u>t</u> #:	(MONPORT)	Receive port #	12000
Real-time external command			Send port #	0
			Explain	Wrjite

Figure 10-52 Ethernet parameter – Realtime monitor (Version 3.00A or later)

### 10.6.2.4. Real-time external command

You can set the parameters related to communication settings for the real-time external command in the robot controller.

Ethernet parameter 1:RC1 (Online)									
Men <u>u</u> :	Communication destination IF	address: ——							
IP address	IP address # <u>1</u> :	(MXTCOM1)	ļ192 . 168 .	ο.	2				
Device & Line	IP address # <u>2</u> :	(MXTCOM2)	192 . 168 .	Ο.	3				
Realtime monitor Real-time external command	IP address # <u>3</u> :	(MXTCOM3)	192 . 168 .	Ο.	4				
	 ∏meout (-1: timeout disablec	I): (MXTTOUT)	7.11[msec] x		-1				
			Explain	W	rite				

Figure 10-53 Ethernet parameter – Real-time external command (Version 3.00A or later)

### (2) In the case of using version 2.50C or earlier

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

Ethernet setting 1:RC1						
Line and Device	Device List					
COM1: RS232 💌	Device	IP Address	Port	Protocol	Server	Packet Type
COM2: OPT12 -	OPT11	192.168.0.2	10101	0	1	0
сомз:	OPT12	192.168.0.3	10102	0	1	0
	OPT13 OPT14	192.168.0.4 192.168.0.5	10103 10104	0	1	0
COM4:	OPT14 OPT15	192.168.0.6	10104	0	1	0
COM5:	OPT16	192.168.0.7	10106	Ō	1	0
COM6:	OPT17	192.168.0.8	10107	0	1	0
COM7:	OPT18 OPT19	192.168.0.9 192.168.0.10	10108 10109	0	1	0
	OPTIS	192,100,0,10	10109	0	T	0
COM8:						
Communication destination IF real-time external control cor		Communic	ation Setting			
IP address #1. MXTCO	M1 192.168.0.2	IP ad	dress NE			
IP address #2. MXTCO	M2 192.168.0.3	Sub-net-	mask NET	MSK 255.255	5.255.0	
IP address #3. MXTCO	M3 192.168.0.4					
	UT -1				Explain	Write
				_		

Figure 10-54 Ethernet parameter (Version 2.50C or earlier)

You can reference explanations of displayed parameters by pressing the [Explain] button.

Select the device to edit and double click. A screen is displayed for setting a variety of device information.

Device Setting	×
Device:	OPT11
🗖 Change the Para	ameter to connect Vision.
IP Address: (NETHSTP(1))	192.168.0.2
Port: (NETPORT(2))	10001
Protocol: (CPRCE11)	0
Server: (NETMODE(1))	1
Packet Type: (CTERME11)	0
OK.	Cancel

Figure 10-55 Device parameter setting (Version 2.50C or earlier)

If you check the [Change the Parameter to connect Vision] checkbox, the items from "Port" downward take on the values for a network vision sensor.

$\sim \Lambda$ Caution ————————————————————————————————————
Using a CRn-500 series robot controller
When using Ethernet with a CRn-500 series robot controller, the "Ethernet interface" option is required.

### 10.7. Field Network Parameters

### 10.7.1. CC-Link parameter

Set the information of CC-Link in the robot controller. This function can be used with Version 1.3 or later of this software.

This function can only be used with a CRn-500 series or CRnD-700 series robot controller. Also, this function can not be used with CRnQ-700 series robot controller. If you use CRnQ-700 series robot controller, please set it with the software of the PLC.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Field network parameter] -> [CC-Link].

After you change the parameter value, you can rewrite the parameter in the robot controller by clicking the [Write] button.

CC-Link parameter 1:R	C1 (Online)		CC-Link parameter 1:RC1 (Online)
	INPUT OUTPUT		INPUT OUTPUT
Register value setting	DIODATA -1 -1		Register value setting DIODATA -1 -1
CC-Link exchange numb	er setting (CCINFO)		CC-Link exchange number setting (CCINFO)
Station num	ber		Station number 1
Occupation	bureaux 🚽		Occupation bureaux 1 -
Magnificatio	n 📃 🗸		Magnification 1
CC-Link transmission spea	ed CCSPD -		CC-Link transmission speed CCSPD 10M -
The status of input whe	en CC-Link data link is abnormal (CC 🔿 Save	CLR)	<ul> <li>The status of input when CC-Link data link is abnormal (CCCLR)</li> <li>O Clear</li> <li>O Save</li> </ul>
The exchange number	of CC-Link is fixed (CCFIX)		The exchange number of CC-Link is fixed (CCFIX)
Oisable	Enable		<ul> <li>Disable</li> <li>Enable</li> </ul>
CC-Link error is canceled	temporarily CCERR Err. Car	ncel	CC-Link error is canceled temporarily CCERR Err. Cancel
Adjustment of filter whic	h detects error CCFIL		Adjustment of filter which detects error CCFIL 1000 200
	Explain Wr	ite	Explain Write
CRn-500 se	ries robot controller		CRnD-700 series robot controller

Figure 10-56 CC-Link parameter

You can reset the error of the CC-Link interface card by pressing the [Err. Cancel] button. After that the same error doesn't occur. It is valid while the power supply of the Robot Controller is ON. When the power supply is turned OFF, the error comes to occur.

### 10.7.2. PROFIBUS parameter

Set the information of PROFIBUS in the robot controller. This function can be used with Version 1.3 or later of this software.

- A Caution - This function can only be used with a CRn-500 series or CRnD-700 series robot controller. Also, this function can not be used with CRnQ-700 series robot controller. If you use CRnQ-700 series robot controller, please set it with the software of the PLC.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Field network parameter] -> [PROFIBUS].

After you change the parameter value, you can rewrite the parameter in the robot controller by clicking the [Write] button.

PROFIBUS parameter 1:RC1 (Online)									
PROFIBUS mode setting (PBMODE)									
Normal O Se	elf check								
PROFIBUS Master's Class setting (PBMC)									
Class1     Class2     Cla									
PROFIBUS error is canceled temporarily	E8500 Err. Cancel								
PROFIBUS Error filter	PBCNT 40								
PROFIBUS exchange number	PBNUM 126								
Exp	olain Write								

Figure 10-57 PROFIBUS parameter

You can reset the error of the PROFIBUS interface card by pressing the [Err. Cancel] button. After that the same error doesn't occur. It is valid while the power supply of the Robot Controller is ON. When the power supply is turned OFF, the error comes to occur.

### 10.7.3. PROFINET parameter

Set the information of PROFINET in the robot controller. This function can be used with version 3.00A or later of this software.

- A Caution This function can only be used with CR750-D/CRnD-700 series robot controller. Also, this function cannot be used with CR750-Q/CRnQ-700 series robot controller. If you use CR750-Q/CRnQ-700 series robot controller, please set it with the software of the PLC.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Filed network parameter] -> [PROFINET].

After you change the parameter value, you can rewrite the parameter in the robot controller by clicking the [Write] button.

PROFINET parameter	1:RC1 (Online) 🗖 🗖 🎫
Network base card information:	
IP address:	
Subnet mask:	
Default gateway:	
Send receive data size: (PNIOL)	N) 16 V [Byte]
	<u>E</u> xplain W <u>r</u> ite

Figure 10-58 PROFINET parameter

You can reference explanation of displayed parameters by pressing the [Explain] button.

When the PROFINET IO 2-Port module is mounted, in "Network base card information", contents of the option card information are displayed. When the module is not mounted, nothing is displayed.

Image: Constraint of the server of the se		Communication p. Field network par Field network par PROFIBUS PROFIBUS PROFINET DeviceNet EtherNet/IP Monitor Slott:Network B: Slott:Ethernet	ameter	Netwo IP ac Subr Defa	OFINET paramet k base card information dress: et mask: ult gateway: aceive data size: (PNI		line)
Attribute     Data     [Output] 255(2000 - 4039)       Kind     PROFINET IO 2-Port     [Status] 0xb       LED_1     Off     [IP]       Juput     255(2000 - 4039)       Output     255(2000 - 4039)       Status     0xb       Input     255(2000 - 4039)       Status     0xb       [H/W Ver] 0       MAC       Subnet	⊕ <mark>⊕</mark> ⊕ <b>30</b> Mi	Tool ELFA-3D Vision	[LED_1] Off [LED_2] Green			Explain	Write
Kind         PROFINET IO 2-Port         [Status] 0xb           LED_1         Off         [MAC]         [IP]           Input         255(2000 - 4039)         [Subnet]         [Gateway]           Output         255(2000 - 4039)         [Gateway]         [H/W Ver] 0           Status         0xb         [H/W Ver] 0         [E]							
Kind     PROFINET IO 2-Port       LED_1     Off       LED_2     Green       Input     255(2000 - 4039)       Output     255(2000 - 4039)       Status     0xb       IP     Image: Subnet       Gateway     Image: Subnet				10057			
LED_2 Green [1P]	1						
Input         255(2000 - 4039)         [Sobnet]           Output         255(2000 - 4039)         [Gateway]           Status         0xb         [H/W Ver] 0           MAC			[IP]				
Output 255(2000 - 4039) Status 0xb [H/W Ver] 0 IP Subnet Gateway	-		[Subnet]	10.0			
Status 0xb [H/W Ver] 0 MAC IP Subnet Gateway			[Gateway]				
MAC [H/W Ver] 0		and the second se					
IP Subnet Gateway			[H/W Ver] 0				
Subnet Gateway		the second second second second second					
Gateway		and the second second					
H/W Ver 0							
Figure 10-59 PROFINET parameter (Network base card information)	H/W Ver						

### 10.7.4. DeviceNet parameter

Set the information of DeviceNet in the robot controller. This function can be used with version 3.00A or later of this software.

- A Caution This function can only be used with CR750-D/CRnD-700 series robot controller. Also, this function cannot be used with CR750-Q/CRnQ-700 series robot controller. If you use CR750-Q/CRnQ-700 series robot controller, please set it with the software of the PLC.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Filed network parameter] -> [DeviceNet].

After you change the parameter value, you can rewrite the parameter in the robot controller by clicking the [Write] button.

DeviceNet para	ameter 1:RC1 (Onlin	e) 🗖	• 🗙
Send data size:	(DNSDLN)	8	[Byte]
Receive data size:	(DNRDLN)	8	[Byte]
Error detection filter:	(DNFIL)		
	Unit number overlaps	5000	[msec]
	Communication error	200	[msec]
Error is canceled tem	porarily: (DNERR)	Err. Cancel	
	Explain	Write	

Figure 10-60 DeviceNet parameter

You can reset the error of the DeviceNet interface card by pressing the [Err. Cancel] button. After that the same error doesn't occur. It is valid while the power supply of the robot controller is ON. When the power supply is turned OFF, the error comes to occur.

### 10.7.5. EtherNet/IP parameter

Set the information of EtherNet/IP in the robot controller. This function can be used with version 3.00A or later of this software.

- A Caution This function can only be used with CR750-D/CRnD-700 series robot controller. Also, this function cannot be used with CR750-Q/CRnQ-700 series robot controller. If you use CR750-Q/CRnQ-700 series robot controller, please set it with the software of the PLC.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [Filed network parameter] -> [EtherNet/IP].

After you change the parameter value, you can rewrite the parameter in the robot controller by clicking the [Write] button.

EtherNet/IP	paramete	r 1:RC1	(0	Dnlir	ne)	)	(	-	• 🛛
Copy PC networ	k settings								
IP address:	(EPIP)	192	•	168	•	0	•	200	
Subnet mask:	(EPMSK)	255	•	255	•	255	•	0	]
Default gateway:	(EPGW)	192	•	168	•	0	•	254	]
Send data size:	(EPSDLN)							8	[Byte]
Receive data size:	(EPRDLN)							8	[Byte]
		Expla	in			W	/rit	e	

Figure 10-61 EtherNet/IP parameter

You can copy network settings of the computer to the screen by clicking the [Copy PC network settings] button.

### 10.8. PLC Cooperation Parameters

### 10.8.1. Multiple CPU parameter

You can set the parameters related to the Multiple CPU to use the CR750-Q/CRnQ-700 series robot controller. These parameters can be set when you are connected to CR750-Q/CRnQ-700 series robot controller. This function is available from RT ToolBox2 Ver.1.1 or later.

Set parameters while connected to the robot controller.

From the project tree, double click the target project [Online] -> [Parameter] -> [PLC cooperation parameter] -> [Multiple CPU].

After you change the parameter value, you can rewrite the parameters in the robot controller by clicking the [Write] button.

Multiple CPU parameter 1:RC1 (Online)      Multiple CPU parameter 1:RC1 (Online)      Multiple CPU synchronous     startup setting      Please set the number of Multiple CPU.      Multiple CPU.      Multiple CPU.      Multiple CPU synchronous     startup setting      OCPU1      OCPU2      CPU3      CPU4      Multiple CPU high speed transmission area setting (QMLTCPU1 - QMLTCPU4)									
			Send ra	ange for e	ach CPU				
CPU			User set	ting area		Automatic Refresh			
	Point(K)	I/O No.	Point	Start	End	Point			
No.1	1	U3E0	1024	G10000	G11023	0			
No.2	1	U3E1	1024	G10000	G11023	0			
No.3									
No.4									
Total 2K Point Advanced setting The total is up to 14K points.									
<u>C</u> heck <u>E</u> xplain <u>Wr</u> ite									

Figure 10-62 Multiple CPU parameter

You can reference explanations of displayed parameters by pressing the [Explain] button. You can check the number of points input and range of total by pressing the [Check] button.

Please refer to the manual of Universal model QCPU (QCPU User's Manual (Multiple CPU System)) for details of Multiple CPU setting.

### 10.8.2. IO unit parameter

You can set information related to the I/O unit of the PLC. Set parameters while connected to the robot controller. This function can be used with Version 2.10L or later of this software.

Set parameters while connected to the robot controller.

From the project tree, double-click the target project [Online] -> [Parameter] -> [PLC cooperation parameter] -> [IO unit].

🗗 IO unit parame	eter 1:RC1 (Online	)			- • •
Unit # 3	•	IO sharing when us Inputs Outputs	ing Multip © Don't © Don't	t read	(QXYREAD)
PC IO unit (QXY	(UNIT3)				
Base # Ex Slot # 2	tension 2 🔹	Start XY (Hex)			AB9
Unit type IO	combined 👻	IO combined unit	<b>,</b> (		
Points 25	i6 <b>•</b>	Response time [ms	ec] [1	.0	•
			Ext	plain	Write

Figure 10-63 IO unit parameter

When a unit number in [Unit #] is specified, the parameter of the specified unit number is displayed in the PC IO unit.

In the [IO sharing when using Multiple CPUs], it is set up whether XY signals read or they don't read

You can reference explanations of displayed parameters by pressing the [Explain] button.

After you change the parameter values, you can rewrite the parameters in the robot controller by clicking the [Write] button.

### 10.9. Parameter printing

You can print the parameter values held in a robot controller.

Display the parameters to print, then click on the menu bar [Workspace] -> [Print]. The print screen is displayed, so check the printer, then click the [OK] button. Printing starts. Also, you can click on the menu bar [Workspace] -> [Print Preview] to look at the print image.

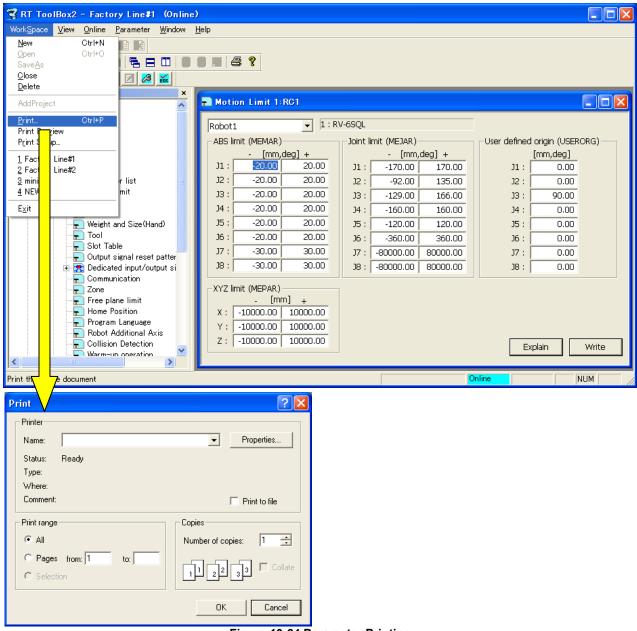


Figure 10-64 Parameter Printing

## \land Caution

### Install the printer beforehand.

Install the printer beforehand. For details on the installation method for the printer, refer to the operations manuals for your printer and computer.

It is possible to print only the parameter changed from initial value. This function can be used with Version 1.3 or later of this software. This function has the limitation in this software version and the software version of the connected controller. Please refer to the table as follows.

Table 10-10 compliant version of this function and controller					
	Robot controller				
	CR750-D/CRnD-700	CR750-Q/CRnQ-700	CRn-500		
Software version of robot controller	Ver.P6 or later	Ver.N6 or later	not use		

Table 10-10 Compliant version of this function and controlle	r
--	---

After selecting "Changed" in View group on the Parameter list screen, click [Workspace] -> [Print] on the menu bar. The screen for the print is displayed. Click [OK] button after confirming the printer. The print is begun.

Moreover, you can see the print image by clicking [Workspace]->[Print Preview] on the menu bar.

🕱 RT ToolBox2 - Factory Li	ne≇1 (On lin			
Work <u>Space V</u> iew <u>O</u> nline <u>P</u> aram	neter <u>W</u> indow	lelp		
New Ctrl+N				
Open Ctrl+O				
Save <u>A</u> s Close				
Delete	<u> /3</u> 👬			
Add Project	×	Parameter list 1:RC1		
Import Project			View	Parameter list
Print Ctrl+P		obot1 RV-6S	C All	Read
Print Preview		arameter Name :	Read © Changed	
Print Setup		1		
1 Factory Line#1		Parameter Explanation		Attribute
2 Factory Line#4 er list	+	3ATERR No signal,Low battery OUT		Common
3 Factory Line#3 imit			nt INPUT, During output Err. No. OUTPUT	Common
4 Factory Line#2		ODATA Value input signal(start,end .NG Language(JPN:Japanese,EN	d) INPUT, Value output signal(start, end) OUT	Common Common
		MG Language(JPN:Japanese,En MECHA1 Robot1 name	va:Englisri)	Common
E <u>x</u> it and S	Size(Hand)	MECHAI RODOCITIANIE MEINSD Check data for install		Robot
- F Tool			INPUT, During output OVRD OUTPUT	Common
🚽 🚽 🚽 🚽 🚽		OVRDSEL OVRD specification INPUT,	, , ,	Common
🚽 🚽 🕞 🕞 🕞	ıl reset patt 📘	RGOUT Prog. No. output requirem	ent INPUT,During output Prg. No. OUTPUT	Common
🕀 🛃 Dedicated inp	put/output	PRGSEL Program number select INF	vUT,No signal	Common
🚽 🚽 🕞 🕞	on 📘	SRVVER Servo S/W Version		Common
Zone		SRVVER1 Mecha1 Servo S/W Version	) of each axis	Common
🛛 🚽 🕞 Free plane lim	nit 🚺			>
🚽 🚽 Home Position	in 📘			
🚽 🚽 🚽 🚽 🚽	guage 📘			
🕞 🕞 Robot Additio	onal Axis			

Figure 10-65 Printing the parameter changed from initial value

### 10.10. Offline editing of parameters

It is possible to make newly the parameters of robot and preserve them in the file without connecting this software to the robot controller. The file which read to the personal computer by the batch backup or the parameter backup can be edited directly, and it can be edited by copying.

The file of these parameters edited by offline can be written to the robot controller by using the restoration function.

This function can be used with the software Ver.1.4 or later. However, the function of restoring this parameter file to the robot controller can be used with the software Ver.1.1 or later.

### 10.10.1. Compliant version

The version of the robot controller and this software that corresponds to the offline editing of the parameter is as follows.

	Subject robot controller	Compliant version				
1	CR750-D/CRnD-700 series	Ver.P6k or later				
2	CR750-Q/CRnQ-700 series	Ver.N6e or later				
3	CRn-500 series	Ver.K9 or later				

Table 10-11 Compliant version of the robot controller

### Table 10-12 Compliant version of this software

	Function	Version of RT ToolBox2
1	Offline editing	Ver.1.4 or later
2	The parameter file made by the offline editing is restored by the backup and the restoration function.	Ver.1.1 or later

## 🗋 Caution

### Please use Ver.1.1 or later of this software, if you restore the parameter edited by offline.

It is possible to restore the parameters edited by offline in the function of backup/restore. The robot controller might not operate correctly, if the parameters edited without connecting the robot controller were restored with the software earlier than Ver.1.1. Please use this software Ver.1.1 or later to restore the parameter edited without connecting the robot controller.

### 10.10.2. Creating the new parameter file

For creating the new parameter file, select [Offline] -> [Parameter], then click the right mouse button. The right button menu is displayed, so click [New].

Workspace       ×         Factory Line#1       RC1         Copy from the Backup       Program         Program       Program <tr< th=""><th>New Parameter Backup folder path: C:#RT ToolBox2#Factor Update Backup folder</th><th>ry Line #1¥RC1¥Offline Parameter Browse</th></tr<>	New Parameter Backup folder path: C:#RT ToolBox2#Factor Update Backup folder	ry Line #1¥RC1¥Offline Parameter Browse
	Backup folder:	20090626-1 OK Cancel
		Workspace × Factory Line#1 RC1 RV-6S Program Parameter 20090626-1 Recup

Figure 10-66 Creating the new parameter file

After inputting the backup folder name, click the [OK] button. Please refer to **"10.10.4 Offline editing of parameter"** for the edit of the parameter.

## 

### Folder in which Parameter edited by offline are preserved.

Because the parameter is composed of some files, the parameter edited by offline is preserved in one folder.

The folder where the parameter files is stored in follows:

/Workspace folder/project name/Offline Parameter

Please change [Place of the backup folder] with the reference button when preserving it in a place other than the above.

### 10.10.3. Edit of parameter backed up

It is not possible to edit directly the parameter files read to the personal computer by "All files" or "Parameter" of the backup function. Please edit these parameter files after copying them by "Copy from the Backup". The folder of the same name is made under [Offline]->[Parameter] in the project tree when it is copied.

Workspace ×	Select Backup folder	
RC1 Copy from the Backup	Backup folder path: C:#RT ToolBox2#Factory Line#1#RC1#Backup Update Backup folder Backup type 20081007 All Files 20090626-135208 Parameter files 20090626-135231 Program 20090626-135305 All Files	Browse
	Backup folder: 20090626-135208 Backup type: Parameter files OK	Cancel

Figure 10-67 Edit of parameter backed up

Please refer to "10.10.4 Offline editing of parameter" for the edit of the parameter.

### 10.10.4. Offline editing of parameter

When the parameter file for the offline editing is made by "10.10.2 Creating the new parameter file" or "10.10.3 Edit of parameter backed up", the file name is displayed in "Parameter" of the project tree. Select the edited parameter folder, and click the right mouse button. Select the parameter to edit with the mouse. Please refer from "10.1 Editing from parameter list" to "10.7.2 PROFIBUS parameter" for the setting method of each parameter.

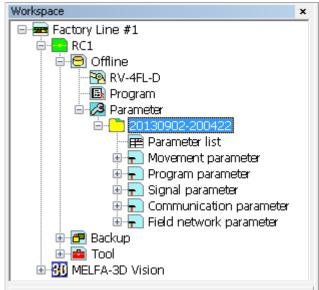
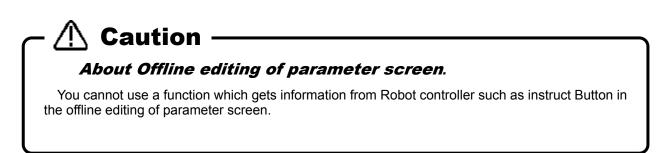


Figure 10-68 Offline editing of parameter

When the parameter was set outside the range of the value, it is not written in the file and it makes an error.



### 10.10.5. Restoring the edited parameter to the robot controller

Open the target parameter in the project tree with [Offline] -> [Parameter], and select the parameter folder, and then click the right mouse button. The right button menu is displayed, so click [Restore]. After the restore window is displayed, confirming the model of the robot and restore them.

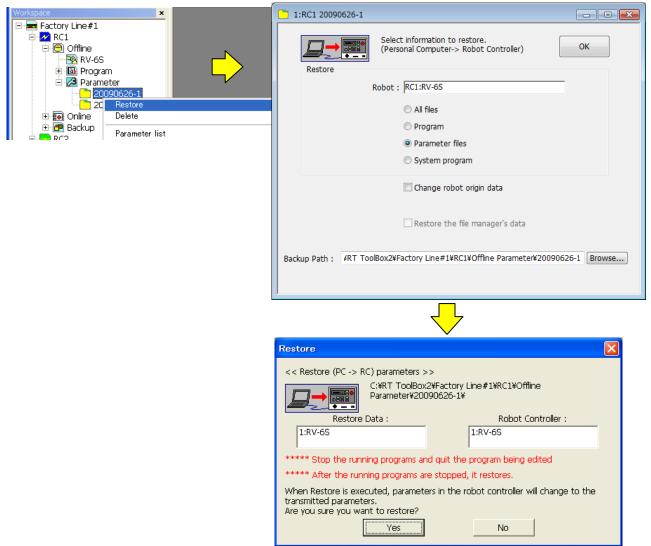


Figure 10-69 Restoring the edited parameter to the robot controller

# Caution All parameters in the robot controllers are changed, when the parameters edited by offline are restored. All parameters in the robot controllers are changed, when the parameters edited by offline are restored.

All parameters in the robot controllers are changed, when the parameters edited by offline are restored. These parameters are initialized when the parameters set beforehand in the robot controller is not in the file edited by offline.

Moreover, it is possible to restore the edited parameter by using the restoration function of the backup. Select [Online]->[Backup] in the project tree, and click the right mouse button. The right button menu is displayed, so click [Restore]. After changing "Backup path" to the parameter folder edited by offline, restore them. The folder for the offline editing is as follows.

### Workspace folder/project name/Offline Parameter

However, this function can be used with the software Ver.1.1 or later.

Workspace ×	1:RC1 20090626-1	
Factory Line #1     Rc1     G Offline     G Online     G Backup     All Restore	Select information to restore. (Personal Computer-> Robot Controller)	ок
● Pro Delete All ● Par Online Project Backup	Robot : RC1:RV-65	
_ Sys All	◯ All files	
E ■ RC2 Program ► The ■ ● Offline Parameter ►	Program	
🕀 🖅 Backup System Program	Parameter files	
⊡	System program	
	🗌 Change robot origin data	
	Restore the file manager's data	
	Backup Path : #RT ToolBox2¥Factory Line#1¥RC1¥Offline Parameter¥200	990626-1 Browse
	Select Backup folder	×
	Backup folder path: C:¥RT ToolBox2¥Factory Line#1¥RC1¥Offline Parameter	Browse
	Update	
	Backup folder Backup type	
	▶ 20090626-1 Parameter files ▶ 20090626-135208 Parameter files	
	Backup folder: 20090626-135208	
	Backup type: Parameter files	
	OK	Cancel

Figure 10-70 Restoring of parameter file by using backup function

### 10.10.6. Deletion of parameter folder edited by offline

Open the target parameter in the project tree with [Offline] -> [Parameter], and click the right mouse button. The right button menu is displayed, so click [Delete]. The delete contribution is displayed.

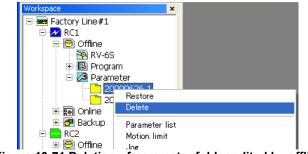


Figure 10-71 Deletion of parameter folder edited by offline

# You can not delete the parameter files being edited currently.

It is not possible to delete the parameter folder when as much as one screen for the offline editing is opened. In that case, the error is displayed.



it cannot be recovered.

### **11.Status Monitoring**

You can set various information in the currently connected robot controllers to be constantly displayed. The monitor functions are roughly divided into the following three.

- 1. Robot movement monitor ....... Items related to robot movement are monitored.
- 2. Operation monitor ..... Items related to the robot's operation are monitored.
- 3. Servo monitor ...... The robot's servo system information is monitored.

	Table 11-1 Summary of Each Monitor					
	Monitor name	Explanation				
	Slot run state	The operation state of each slot can be confirmed.				
及	Program monitor	The program execution line set for each slot, the contents of the				
Robot movement monitor		variable used in the program, and the robot current position, etc., can				
notr		be confirmed.				
ot move monitor	Movement State	The current position information and hand open/close state of each				
or en	_	connected mechanism can be confirmed.				
ler	Error	The currently occurring error can be confirmed.				
Ħ	2D Maritan	The history of the errors that have occurred can be confirmed.				
	3D Monitor	You can display the robot and its movements in 3D to check them.				
	General signals	You can check the statuses of signals input to the robot controller				
		from outside equipment and signals output from the robot controller				
		to outside equipment.				
Ś	Mana a di si sua a l	Pseudo-input and forced output of signals are also possible.				
Signal monitor	Named signal	The status can be checked by naming the status of the dedicated I/O				
าล		signal that has been set in the robot controller, as well as each bit or				
В		within the range of 32 bits of the general-purpose signal.				
n.	Otan airmal	The signals are set via parameter setting (maintenance tool).				
đ	Stop signal	The stop signal input into the robot controller can be confirmed.				
-	Registers (CC-Link)	You can monitor the input registers and output registers for the				
		CC-Link functions.				
		Pseudo-input and forced output of registers are also possible.				
	IO unit monitor	You can monitor XY devices of IO unit.				
	On a set line of line of	The ask of an article time (arrange ONL at a) and he are firmed				
дğ	Operating time	The robot operation time (power ON, etc.) can be confirmed.				
Operating monitor	Production	The operating time of the program in the robot controller and the No.				
ior tin	information	of program cycles can be confirmed.				
Û						

#### Table 11-1 Summary of Each Monitor

### 11.1. Robot Operation Monitoring

### 11.1.1. Slot operation status

The state of the slots in the robot controller can be monitored.

From the project tree, double click the target project [Online] -> [Monitor] -> [Movement Monitor] -> [Slot Status].

It is possible to stop All slots for which the start condition is "ALWAYS" by clicking [Stop All Program] button with Version 1.6 or later of software.

It is necessary to stop all slots to edit the program for which the start condition is "ALWAYS".

Slot	run state 1:RC1					
No.	Status	Program	Robot	Conditions	Mode	Priority
1	Program selection possible			START	REP	1
2	Program selection possible			START	REP	1
3	Program selection possible			START	REP	1
4	Program selection possible			START	REP	1
5	Program selection possible			START	REP	1
6	Program selection possible			START	REP	1
7	Program selection possible			START	REP	1
8	Program selection possible			START	REP	1

Version 1.5.1 or earlier

Slot	run state 1:RC1					
No.	Status	Program	Robot	Conditions	Mode	Priority
1	Program selection possible			START	REP	1
2	Program selection possible			START	REP	1
3	Program selection possible			START	REP	1
4	Program selection possible			START	REP	1
5	Program selection possible			START	REP	1
6	Program selection possible			START	REP	1
	Program selection possible			START	REP	1
8	Program selection possible			START	REP	1
					<u>S</u> top All Pi	rogram

Version 1.6 or later

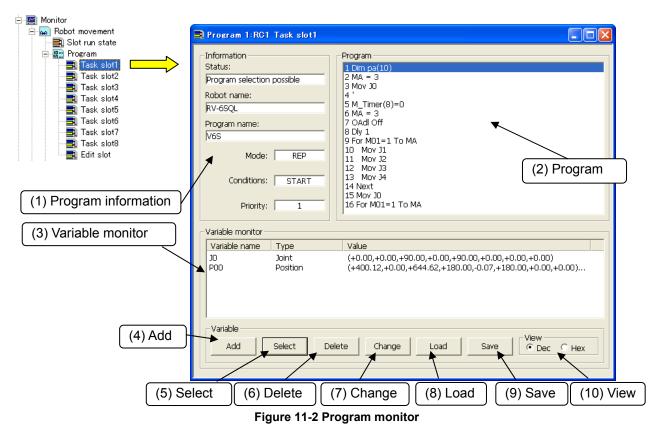
Figure 11-1 Slot Run Status

The No. of displayed slots is determined with the parameters.

### 11.1.2. Program monitoring

Information on the running program can be monitored.

From the project tree, click the target project [Online] -> [Monitor] -> [Movement Monitor] -> [Program Monitor], then double click the "Task slot" to monitor.



### (1) Program information

You can check the currently selected program name and operation status and the name of the currently connected robot model.

### (2) Program

The currently selected program is displayed. The currently executing line is displayed inverted.

### (3) Variable monitor:

You can check the names of variables being used in the selected program. You can select the variables to monitor with the buttons displayed at the bottom of the screen.

### (4) Adding variables

This adds more variables to monitor.

Add display variables		
Variable name: JO	•	A dropdown list is displayed.
	Update	lis displayed.
Variable type		
C Character string		
<ul> <li>Position</li> <li>Joint</li> </ul>		
ОК	Cancel	

Figure 11-3 Add Variables

Input the variable name or select it from the dropdown menu, set the variable type, then click the [OK] button.

The variables being used in the program are displayed in a dropdown list. When you select variables from the dropdown list, the variable type is automatically selected.

### (5) Selecting variables

You can batch select variables to monitor from the variable list used in the program.

Select display va	riables						×	
⊢Variables not displ	ayed		1		Displayed variables	;		
Variable name	Variable type	~			Variable name	Variable type		
J1 J2 J3 J4 M01 MA MTM P01 P02 P03 P11 P12 P13 P14 P21 P22	Joint Joint Joint Numerical value Numerical value Numerical value Position Position Position Position Position Position Position Position Position Position Position Position Position		Add -> <- Delete		JO POO	Joint Position		
Se	lect all				s	elect all		
Update	Update OK Cancel							

Figure 11-4 Variable Selection

The "variables not to display" are displayed in the list on the left side and the "variables to display" are displayed in the list on the right side. From the "variables not to display" list, select the variables to monitor, then click the [Add->] button. The selected variables are added to the "variables to display" list. If you select variables from the "variables to display" list, then click the [<-Delete] button, the selected variables are deleted from the "variables to display" list and added to the "variables not to display" list.

When you click the [OK] button, the variables registered in the "variables to display" list are displayed on the variables monitor and you can reference their values.

### (6) Deleting variables

This deletes variables registered on the variables monitor from the monitor list. This operation does not delete the variables themselves from the program.

### (7) Changing variables

You can change the values of variables registered on the variables monitor. On the variables monitor, select the variables to change the values, then click the [Change] button.

	Edit Position data
	Name: P00 Type © XYZ © Joint
Change value of variable	X:       400.120       ▼         Y:       0.000       ▼         Z:       644.620       ▼         A:       180.000       ▼         B:       -0.070       ▼         C:       180.000       ▼         L1:       0.000       ▼         L2:       0.000       ▼
Variable name: MTM Value of variable: 0 OK Cancel	FLG1: R,A,N V Edit FLG1 FLG2: V Edit FLG2 OK Cancel

Figure 11-5 Changing Variable Values

After confirming the variable name, input the value of the variable, then click the [OK] button.

## Caution Be careful when changing the value of a variable.

When you change the value of a variable, the operation target position of the robot may change and result in a collision. This is particularly dangerous during robot operation, so check carefully before changing the value of a parameter.

### (8) Load

You can load variables to be monitored on the variables monitor from a file.

When you click the [Load] button, you can load variable names and variable types and add them as variables to be monitored.

### (9) Save

You can save as a file a list of the variables being monitored on the variables monitor.

When you click the [Save] button, you can save the names, types, and values of the variables currently being monitored into a file. This file is saved in text format.

(10) View

You can switch the values of the variables displayed on the variables monitor between hexadecimal display and decimal display.

The variables that can be displayed in hexadecimal, see below.

Table 11-2 Tovallables that can be displayed in Hexadecillar				
The displayed variable can be switched to the hexadecimal number /				
the decimal number.				
When it is 0 below the decimal point, it is possible to switch to the				
hexadecimal number / the decimal number.				
However, the value is the one within the range of -99999999 - 99999999.				
The hexadecimal number is not displayed.				
The hexadecimal number is not displayed.				

Table 11-2 16Variables that can be displayed in Hexadecimal

As for the value displayed by the hexadecimal number, "&H" is added to the head of the value.

### 11.1.3. Movement status

You can check the robot current position, destination position, hand open/close status, etc. \* Destination position corresponds with RT ToolBox2 Ver1.1 or later.

From the project tree, double click the target project [Online] -> [Monitor] -> [Movement Monitor] -> [Movement Status].

📕 Mov	And the state 2:RC2 RV-6SQL #1								
XYZ	Current	[deg,mm] Destination	Join	t	[deg,mm] Destination	-Hand sta	ate		
X	13.640	0.000	J1	150.210	0.000	Hand1:			
Y	-7.810	0.000	J2	-0.020	0.000	Hand2:	OPEN		
Z	1555.950	0.000	JЗ	-0.010	0.000	Hand3:	OPEN		
A	0.000	0.000	J4	-0.010	0.000	Hand4:	OPEN		
В	-0.050	0.000	J5	-0.020	0.000	Hand5:			
C	150.150	0.000	J6	-0.050	0.000	Hand6:			
	0.000	0.000		0.000	0.000	Hand7:			
	0.000	0.000		0.000	0.000	Hand8:			
FL1:	0 L,B,F	0 L,B,F							
	J1-J4 J5-J8	J1-J4 J5-J8					[mm/sec]		
	0 0	0 0		Machine lock :	OFF '	TCP speed :	0.000		
FL2:	0 0	0 0							
1.22.				Servo ON/OFF :	OFF				
	0 0	0 0							

Figure 11-6 Movement Status

### 11.1.4. Errors

The errors currently occurring in the robot controller are displayed.

### 11.1.4.1. Referencing the current error

From the project tree, double click the target project [Online] -> [Monitor] -> [Movement Monitor] -> [Error].

Error 1:RC1						X		
No. Error message	Date	Time	Level	Program	Line	R		
<								
		<u>D</u> etail:	; Н	istory	<u>R</u> ecord			
Figure 11-7 Error Screen Only Version 1.7 or later.								

[Details] You can check details (cause and recovery method) on errors.

[History] You can reference the history of errors that have occurred.

[Record] You can reference the record of errors that have occurred. Note that this function can be used with Version 1.7 or later of this software and with Version R1j/S1j or later of. connected controller.

### 11.1.4.2. Details

You can check details (cause and recovery method) on errors. On the error screen, select an error, then either click the "Details" button or double click the error.

		Fror 1:RC1					- 🗆 🗙
		No. Error message 2602 DSTN pos. exceed	Dat s the limit 10-0	e Time 19-24 10:0		Program TESTRH12SH	Line R
Error detail			Click or dou	ble click th	ne [Details] b	outton.	
Error #: Cause:	260200100	DSTN pos. exceeds the limi	t				
Cause.	Desunation po	sition data exceeds the limit					
Recovery:	Change the po	osition data					
			Ĺ		se		>
					<u>D</u> etails	History <u>F</u>	<u>ecord</u>

Figure 11-8 Error Details Screen

### 11.1.4.3. History information

The history of errors that have occurred in the past can be referred to.

You can check the error history in the robot controller for each error level (high level, low level, caution). You can also save the error history into a file.

Click the [History] button. After selecting the level to reference, click the [OK] button.



Figure 11-9 History Information Error Level Setting

	Error his	story						×
(1) Error lebel (display switching)	Error level Select High le Couv le Cautio	all evel error evel error		nformation ite:  08-10-03 me:  15:24:16	Cour	nt of registerd i	tems:	5
	No. Err	ror message		Date	Level	Program	Line	Robot
	5010 AU 5010 AU 5010 AU	gal position data (c ITOENA signal is O ITOENA signal is O ITOENA signal is O ITOENA signal is O	)FF )FF )FF	10-02-24 10:56:18 10-02-24 10:53:54 10-02-23 20:21:20 10-02-23 17:57:42 09-06-26 13:51:52	Low Low Low Low	V6S	1 0 0 0	
	<			1111				>
	Details	<u>Save</u>	<u>R</u> efresh					
(2) Details	; ;	(3) Save	(4) Re	fresh				

Figure 11-10 Error History

This display is not constantly displayed. To refresh information, click the [Refresh] button.

(1) Error level (display switching)

You can redisplay the displayed error history for each error level.

(2) Details

After selecting a displayed error, you can check the cause and recovery method for the error by clicking this button.

You can also check details by double checking a displayed error.

(3) Save

This saves the displayed error history information into a file. For the saved error history information, select "Read from file" with **"Figure 11-9**". Refer to **"Figure 11-11**" on the screen, after you selected "From history file".

This file is saved in text format. You can also print it with Notepad or other general text editors. The file name of the error history file is set by, "Controller's serial number"\_"Present data"\_"Present time".

Example of file name: AR0703001\_20100924\_092623.txt

(4) Refresh

If you refresh error history, click the [Refresh] button.

Error history			×
Error level Select all High level error Low level error Caution	Tabulation informationStart date:08-10-03Start time:15:24:16Logged date:2010-2-24Logged time:10:59:2	Log file informati Type: Version: Serial#: Count of reg	01 RV-6S Ver.P8dA AR0703001 isterd items: 5
No. Error message 2802 Illegal position data 5010 AUTOENA signal is 5010 AUTOENA signal is 5010 AUTOENA signal is 5010 AUTOENA signal is 2000 The servo is OFF 6080 Com mesg is too lor 7090 Parameter commen	OFF         10-02-24         10:53:54           OFF         10-02-23         20:21:20           OFF         10-02-23         17:57:42           OFF         09-06-26         13:51:52           O8-01-08         13:37:00           ug         08-01-08         11:34:40	Level Progr. Low V6S Low Low Low Low Low Low V6S Caution Caution	am Line Robot 1 0 0 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Details Save	Refresh C:¥RT Tool¥AR0703		

Figure 11-11 Error History Information Read from File

### 11.1.4.4. Record information

The record of errors that have occurred in the past can be referred to.

You can check the error record in the robot controller for each error level (high level, low level, caution). You can also save the error record into a file.

## **Timing from which error information is registered in error record**

When you reset the error, error information is registered in the robot controller's error record file. Please note that the occurring error is not registered in error record when the power supply is turned off without doing error reset.

The software version of the controller which can use this function is as follows.

Controller	S/W Ver. of the controller
CR750-D/CRnD-700	Ver.S1j or later
CR750-Q/CRnQ-700	Ver.R1j or later

Click the [Record] button. After selecting the level to reference, click the [OK] button.

Error level	$\mathbf{X}$
Select a source or an error	level.
Read from RC Select all High level error Low level error	Read from file
◯Caution	
	OK Cancel

Figure 11-12 Record Information Error Level Setting

	ror record			
(1) Error level (display switching)	or level     Tabulation information       Select all     Start date: 10-02-10       OHigh level error     Start time: 17:59:58       Dow level error     Count of registered items	Count of registered items: 13		
	lo. Error message Level Detail Frequency Last da	ite 🔼		
	i00 System error (No robot setted) High 160000000 3 10-07-2	2 18:18:52		
		2 13:18:28		
		14:25:36		
		14:25:00		
		24 10:08:20 🚽		
		14:27:50		
		15 14:18:34		
		15 14:23:12 👝 🚺		
	R10. Posture flag is disagree Low 281000100 24 10-07-1	4 10:16:12		
	etails Save Refresh			
(2) Deta	(3) Save (4) Refresh			
	Figure 11-13 Error record			

Figure 11-13 Error record

This display is not constantly displayed. To refresh information, click the [Refresh] button.

### (1) Error level (display switching)

You can redisplay the displayed error record for each error level.

### (2) Details

After selecting a displayed error, you can check the details of occurred history of the selected error can be confirmed.

You can also check details by double checking a displayed error.

However, detailed information cannot be confirmed when reading from the error record file.

E	rror detail				X
	Error #: 2602001	00 DSTN p	os, exc	eeds the limit	
	Date	Program	Line	Robot#	^
	10-09-24 10:08:20	TESTRH12SH	2	1	
	10-09-24 09:52:00	TESTRH12SH	2	1	
	10-07-23 14:30:22	SimProg	3	1	=
	10-07-23 14:19:04	SimProg	З	1	
	10-07-15 13:45:22	TESTRHSH55	12	1	
	10-07-15 13:45:16	TESTRHSH55	12	1	
	10-07-15 13:44:50	TESTRHSH55	12	1	
	10-07-15 13:43:10	TESTRHSH55	10	1	
	10-07-15 11:51:52	TESTRHSH85	16	1	
	10-07-15 11:46:30	TESTRH20SH	16	1	
	10-07-15 11:01:28	TESTRH20SH	24	1	~
					Close

Figure 11-14 Details of occurred history of error

### (3) Save

This saves the displayed error record information into a file. For the saved error record information, select "Read from file" with **"Figure 11-9**". Refer to **"Figure 11-15"** on the screen, after you selected "From record file".

This file is saved in text format. You can also print it with Notepad or other general text editors.

The file name of the error record file is set by, "Controller's serial number"\_"Present data"\_"Present time"\_"Character string that shows error record, "REC".".

Example of file name: AR0703001\_20100924\_092623REC.txt

### (4) Refresh

If you refresh error record, click the [Refresh] button.

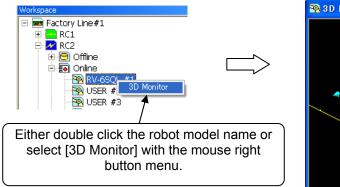
Error record							X
Error level	- Tabulation	information		Log file inform	natior	า	
<ul> <li>Select all</li> </ul>	Start o	late: 10-02	-10	Тур	e:	RV-2SD	_
O High level error	Start t	ime: 17:59	:58	Versio	n:	Ver.S1dC	- 1
O Low level error	Logged date: 2010-9-22		9-22	Serial	Serial#: AR0703001		
OCaution	Logged time: 13:23:49		:49	Count of registered items: 13			
No. Error message		Level	Detail	Frequ	ency	Last date	^
1600 System error (No ro		High	16000000	-	З	10-07-22 18:18:5	_
1781 Cannot set origin (S	RVON)	Caution	17810010	-	1	10-09-22 13:18:2	
2000 The servo is OFF	- /	Low	20000000	-	8	10-07-15 14:25:3	
2131 J1 Speed is excessive (comma		High	21310000	-	4	10-07-15 14:25:0	
2602 DSTN pos. exceeds the limit		Low	26020010 26030010	-	31 5	10-07-23 14:30:2 10-07-15 14:27:5	_
2603 Med pos. data exceeds the limit 2802 Illegal position data (dstn)		Low Low	28020010	-	э 46		-
2803 Illegal position data (ustri)		Low	28020010	-	40	10-07-15 14:18:3	
2810. Posture flag is disagree		LOW			24	10-07-13 14.23.1	
<							>
Details Save	<u>R</u> efresh	C:¥Doc…¥	AR0703001_	20100922_1323	349RE	EC.txt	

Figure 11-15 Error Record Information Read from File

### 11.1.5. 3D Monitor

You can display the robot and its movements in 3D to check them.

From the project tree, either double click the target project [Online] -> [<Robot model name>] or select [3D Monitor] with the mouse right button menu. The robot 3D display screen is displayed. If the "display travel table setting" is made for the project, the travel table is also displayed.



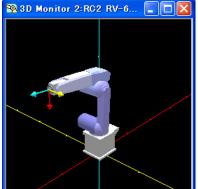


Figure 11-16 Starting Robot View

You can change the robot view perspective with mouse operation.

Table 11-3 Robot View Perspective Change Operation					
Perspective to change	Graphic mouse operation				
Perspective rotation	While clicking the left button, move left/right→ Rotation around Z axis Move up/down→Rotation around X axis Move left/right while clicking the left + right buttons→ Rotation around Y axis				
Perspective movement	Move up/down/left/right while clicking the right button				
Graphic enlargement/reduction	Move up/down/left/right while clicking pressing [Shift] key and clicking the left button A similar operation can be used by the mouse wheel with Version 3.01B or later of this software.				

### Table 11-3 Robot View Perspective Change Operation

You can change the enlargement/reduction mode with the following buttons of the toolbar, with Version 3.01B or later of this software.

Table 11-4 Change the enlargement/reduction mode in robot view					
Button	Explanation of enlargement/reduction mode				
M	If you select this button, enlargement/reduction toward origin to the Robot View.				
অ	If you select this button, enlargement/reduction toward screen center to the Robot View.				

### Table 11-4 Change the enlargement/reduction mode in robot view

The change of the enlargement/reduction mode is applied in the operation of the following screens too.

- 10.3.15.1Collision avoidance area parameter
- 16.3.11Hand

### 11.2. Signal Monitoring

#### 11.2.1. General signal

You can check the statuses of signals input to the robot controller from outside equipment and signals output from the robot controller to outside equipment.

From the project tree, double click the target project [Online] -> [Monitor] -> [Signal Monitor] -> [General Signals].

The upper level displays the status of input signals and the lower level displays the status of output signals.

A continuous range of signals to display can be set freely with [Monitor Settings].

Pseudo-input and forced output of registers are also possible.

K	🖁 Gene	ral P	urpo	ose	sign	al 1	:RC	1											
Γ	Input sig	gnal																	
	Signa	1#	F	Е	D	C	В	A	9	8	7	6	5	4	3	2	1	0	Pseudo
	15-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Input
	31-	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Output : Signa		F	E	D	с	в	A	9	8	7	6	5	4	3	2	1		Monitor
	15-	0	0	0	0		0	Ō	0	0	,	0	0	0	0	0		0	
	31-	16	Ō	Ō	Ō	l ñ	Ō	Ō	Ō	0	Ō	0	0	Ō	n	Ō	l ñ	ŏ	
				-			-	-			-					-			Forced Output

Figure 11-17 General Signals

#### 11.2.1.1. Monitor settings

For the displayed signals, the continuous range can be set freely.

Set the lead numbers for the input signal number and output signal numbers to display, set their respective display ranges on the line, and then click the [OK] button.

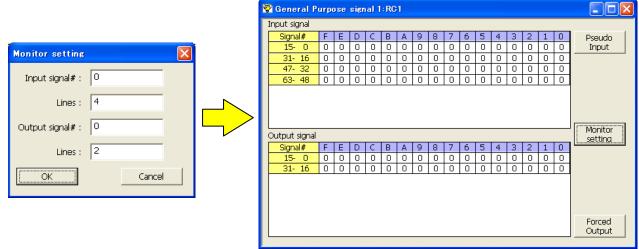


Figure 11-18 General Signal Monitor Settings

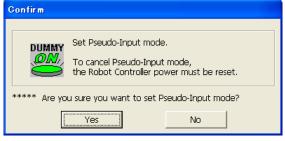
#### 11.2.1.2. Pseudo-input

Pseudo-input means signals that are input to the robot controller from the computer, not from outside equipment.

Click the [Pseudo-Input] button. A screen for inputting pseudo signals is displayed.

# **Caution** While the robot controller is in pseudo-input mode, signal input from outside devices is not accepted.

To use pseudo-input, put the robot controller into pseudo-input mode. While the robot controller is in pseudo-input mode, the robot controller does not accept signal input from outside devices. Click the [Pseudo-Input] button. The confirmation message below is displayed before the robot controller goes into pseudo-input mode.



To release a robot controller from pseudo-input mode, switch the power for the robot controller Off, then On again.

General-purpose INPUT signal << Pseudo-INPUT >>		X
Head signal #: > SetRefresh		Exit
15       0         15-0       0 </td <td>=</td> <td>0000 (Hex) Set 0000 (Hex)</td>	=	0000 (Hex) Set 0000 (Hex)
Bit Pseudo-INPUT		Port Pseudo-INPUT

Figure 11-19 Pseudo-Input

- First, read the signals you want to pseudo input. You can set 32 signals at the same time. Input the head number for the signals you want to read, and then click the [Set] button.
- (2) The input statuses of the 32 signals starting from the specified head signal number are displayed. Set the pseudo-input status, and then click the [Bit Pseudo-INPUT] button.
- ③ You can specify the hexadecimal values and make pseudo input for the 32 signals starting from the head signal number.

Input the values in hexadecimal, and then click the [Port Pseudo-INPUT] button.

#### 11.2.1.3. Forced output

You can force signals to outside equipment from robot controllers. Click the [Forced Output] button. A screen for forcibly outputting signals is displayed.

General-purpose OUTPUT signal << Forced OUTPUT >>		×
Head signal #: 5 Set Refresh	]	Exit
15 0 15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	=	0000 (Hex) Set 0000 (Hex)
Bit Forced OUTPUT		Port Forced OUTPUT

Figure 11-20 Forced Signal Output

- First, read the signals you want to forcibly output. You can output 32 signals at the same time. Input the head number for the signals you want to read, and then click the [Set] button.
- 2 The output statuses of the 32 signals started from the specified head signal number are displayed. Set the output status, and then click the [Bit Forced OUTPUT] button.
- ③ You can specify the hexadecimal value and force output for the 32 signals starting from the head signal number.

Input the values in hexadecimal, then click [Port Forced OUTPUT] button.

# - A Caution —

- Signal numbers assigned (used) as dedicated output signals cannot be forcibly output.
- Forced output is possible if the robot controller mode is either [AUTOMATIC] or [MANUAL] (for a CRn-500 series robot controller, [TEACH], [AUTO (OP)], OR [AUTO (EXT.)]), but if even one program is running, forced output is not possible. (Except an ALWAYS program)

#### 11.2.2. Named signals

You can give names to general input/output signals and check their statuses.

With "Named signals", you can check the status of dedicated input/output signals and named general input/output signals. When starting up, you can load a definition file for named signals in the robot controller. From the project tree, double click the target project [Online] -> [Monitor] -> [Signal Monitor] -> [Named Signals].

😵 Named signal 1:RC1					
INPUT Signal	No.	State	View	Туре	^
Move home	10013	0	Bin	Special	
General output reset	10015	0	Bin	Special	
Program number select	10020	0	Bin	Special	
OVRD specification	10021	0	Bin	Special	
Prog. No. output requirement	10022	0	Bin	Special	
Line No. output requirement	10023	0	Bin	Special	
OVRD output requirement	10024	0	Bin	Special	
Err. No. output requirement	10025	0	Bin	Special	
Value input signal	10032:Start, 16:Num	000	Bin	Special	~
					_
OUTPUT Signal	No.	State	View	Туре	^
During output Line No.	10023	0	Bin	Special	
During output OVRD	10024	0	Bin	Special	
During output Err. No.	10025	0	Bin	Special	
Value output signal	10032:Start, 16:Num	000	Bin	Special	
Within user defined area	10:Start, 32:Num	000	Bin	Special	
R/C ready	10001	1	Bin	Special	
Low battery	10014	0	Bin	Special	
Robot1 hand output signal <mech. 1=""></mech.>	10048:Start, 8:Num	010	Bin	Special	
Robot1 hand input signal <mech. 1=""></mech.>	10056:Start, 8:Num	000	Bin	Special	~
General-purpose signal					
Add Edit Delete	Load	Save	Delete signal file	e in robot	

Figure 11-21 Named Signal

[Add] [Edit]	<ul> <li>This registers a new general input/output signal name.</li> <li>This changes the setting for an existing general input/output signal selected in the list.</li> </ul>
[Delete]	: This deletes a signal selected in the list.
[Load]	: This loads a file defining saved named signals in the robot controller and in the computer.
[Save]	: This saves the information on the set named signals to the robot controller or computer.
[Delete signal file in robot]	: This deletes the named signal information in the robot controller.

#### 11.2.2.1. Adding new named signal or revising one

To add a new named signal, click the [Add] button. To revise one, select the signal to be revised from the list and click the [Edit] button.

Signal name	edit 🛛 🔀
Start #:	0 End #: 0
Signal name:	
_Signal ——	
Input	C Output
View	
Binary	C Decimal(Signed) C Hexadecimal
	C Decimal(Unsigned)
	1
Add	Change Close

Figure 11-22 Signal Name Editing

Input the general signal numbers and names, select the signal type and display method, then when adding a new named signal, click the [Add] button. The set signal is added to the list.

The [Add] and [Change] buttons do not close the "Signal name edit" screen, so you can continue to add more signals.

#### 11.2.2.2. Deleting a named signal

Select the signals to delete from the list. You can select multiple signals by clicking them while holding down the [Ctrl] key or the [Shift] key on the keyboard.

However, dedicated input/output signals can not be deleted.

Also, you can not delete input signals and output signals at the same time. Finally, delete the select signals in the list with a mouse click.

#### 11.2.2.3. Named signal definition information reading

When you click the [Load] button, a message asking you to confirm that you want to delete a registered general input/output signal is displayed.

This message asks you to confirm that you want to clear the current general input/output signal display.



Figure 11-23 Deletion Confirmation Message for Registered General Input/Output Signal

If you select [Yes] on this confirmation screen, the "Select locate" screen asking you to select the load source is displayed.

Select locate						
C Robot controller						
ОК	Cancel					

Figure 11-24 Device Selection

Select the device to load from, then click the [OK] button.

If you select the local device, the screen for selecting a file in the computer is displayed.

If you select the robot controller, the named signal definition file is loaded from the robot controller.

#### 11.2.2.4. Saving definition information for named signals to a controller

When you click the [Save] button, the "Select locate" screen asking you to select the save destination is displayed.

<ul> <li>Local Device</li> <li>Robot controller</li> </ul>	Select locate	×
	1	
OK Cancel	ОК	Cancel

Figure 11-25 Device Selection

Select the device to save to, then click the [OK] button.

If you select the local device, the screen for selecting a file in the computer is displayed. If you select the robot controller, the named signal definition file is saved to the robot controller.

### 11.2.3. Stop signal

You can reference the statuses of stop signals (stop/not stop) input to the robot controller. From the project tree, double click the target project [Online] -> [Monitor] -> [Signal Monitor] -> [Stop Signals].

🖴 Stop signal 1:RC1	
Stop	Emergency stop
O/P: OFF	O/P: OFF
T/B: OFF	T/B: OFF
I/O: OFF	I/O: OFF
PC : OFF	

Figure 11-26 Stop Signal

#### 11.2.4. Register (CC-Link)

# **Caution** *This can only be used if the CC-Link option card is mounted in the robot controller.*

This function can only be used with a CRn-500 series or CRnD-700 series robot controller with the CC-Link option card mounted. Also, this function can no be used with CRnQ-700 series robot controllers.

You can check the statuses of registers input to the robot controller from outside equipment and registers output from the robot controller to outside equipment.

From the project tree, double click the target project [Online] -> [Monitor] -> [Signal Monitor] -> [Register (CC-Link)].

The left side of the screen displays the status of input registers and the right side displays the status of output registers.

A continuous range of registers to display can be set freely with [Monitor Settings]. Pseudo-input and forced output of registers are also possible.

🚾 Registe	r (CC-Link) 1	:RC1				
Input regist	ter		C	)utput reg	jister	
No.	Dec	Hex		No.	Dec	Hex
6000	0	0000		6000	0	0000
6001	0	0000		6001	0	0000
6002	0	0000		6002	0	0000
6003	0	0000		6003	0	0000
6004	0	0000		6004	0	0000
6005	0	0000		6005	0	0000
6006	0	0000		6006	0	0000
6007	0	0000		6007	0	0000
6008	0	0000		6008	0	0000
6009	0	0000		6009	0	0000
6010	0	0000		6010	0	0000
6011	0	0000		6011	0	0000
6012	0	0000		6012	0	0000
6013	0	0000		6013	0	0000
6014	0	0000		6014	0	0000
6015	0	0000		6015	0	0000
Pseudo-I	input		1onito etting			Forced-Output

Figure 11-27 Registers (CC-Link)

#### 11.2.4.1. Monitor setting

A continuous range of registers to display can be set freely.

Set the lead numbers for the input register number and output register numbers to display, set their respective display ranges on the line, then click the [OK] button.

				Input regist	ter			Output reg	jister	
donitor setting		$\mathbf{X}$		No.	Dec	Hex	_	No.	Dec	Hex
				6032	0	0000	-	6032	0	0000
INPUT	6032			6033	ō	0000		6033	ō	0000
				6034	0	0000		6034	0	0000
OUTPUT	6032			6035	0	0000		6035	0	0000
001101	1			6036	0	0000		6036	0	0000
				6037	0	0000		6037	0	0000
				2038	0	0000		6038	0	0000
Т			6039	0	0000		6039	0	0000	
		-	6040	0	0000		6040	0	0000	
				6041	0	0000		6041	0	0000
·				6042	0	0000		6042	0	0000
OK	Ca	ncel 🛛		6043	0	0000		6043	0	0000
				6044	0	0000		6044	0	0000
				6045	0	0000		6045	0	0000
				6046	0	0000		6046	0	0000
				6047	0	0000		6047	0	0000
				Pseudo-I	input		Monit settir			Forced-Output

Figure 11-28 Registers (CC-Link) Monitor Settings

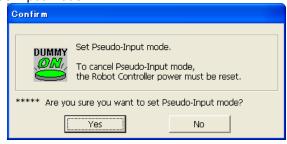
#### 11.2.4.2. Pseudo-input

Pseudo-input means registers that are input to the robot controller from the computer, not from outside equipment.

Click the [Pseudo-Input] button. A screen for inputting pseudo signals is displayed.

# While the robot controller is in pseudo-input mode, register input from outside devices is not accepted.

To use pseudo-input, put the robot controller into pseudo-input mode. While the robot controller is in pseudo-input mode, the robot controller does not accept register input from outside devices. Click the [Pseudo-Input] button. The confirmation message below is displayed before the robot controller goes into pseudo-input mode.



To release a robot controller from pseudo-input mode, switch the power for the robot controller Off, then On again.

P	seudo-I	NPUT				×
	First regist	ter numbe	r:	6032		
					Set	
	• Dec	C Hex		Re	efresh	
	6032	0	60	40	0	
	6033	0	60	41	0	
	6034	0	60	42	0	
	6035	0	60	43	0	
	6036	0	60	44	0	
	6037	0	60	45	0	
	6038	0	60	46	0	
	6039	0	60	47	0	
	INP	JT			Exit	

Figure 11-29 Pseudo-Input

(1) Read the signal you want to pseudo input.

You can set 16 registers at the same time. Input the head number for the signals you want to read, then click the [Set] button. The input statuses of the 16 registers starting from the specified head signal number are displayed.

- (2) Set the pseudo-input status, and then click the [Input] button. The set register values are pseudo input to the robot controller.
- (3) You can display and make pseudo input in hexadecimal for register values. If you have selected [Hex], input values as hexadecimals.

When you click the [Refresh] button, the latest register information is displayed.

#### 11.2.4.3. Forced Output

You can forcibly output register values to outside equipment from robot controllers. Click the [Forced Output] button. A screen for forcibly outputting registers is displayed.

F	Force-OUTPUT						
	First regist	ter number	· :		5032		
				9	Set		
	• Dec 🔿 Hex			Re	fresh		
	6032	0	60	40	0		
	6033	0	60	41	0		
	6034	0	60	42	0		
	6035	0	60	43	0		
	6036	0	60	44	0		
	6037	0	60	45	0		
	6038	0	60	46	0		
	6039	0	60	47	0		
	OUTPUT Exit						

Figure 11-30 Forced Signal Output

(1) First, read the registers you want to forcibly output.

You can output 16 registers at the same time. Input the head number for the registers you want to forcibly output, then click the [Set] button. The output statuses of the 16 registers starting from the specified head register number are displayed.

- (2) Set the output status, then click the [OUTPUT] button. The specified register values are forcibly output from the robot controller.
- (3) You can also display and forcibly output register values in hexadecimal. If you have selected [Hex], input values as hexadecimals.

When you click the [Refresh] button, the latest register information is displayed.

## - \land Caution

#### Forced register output

Forced output is possible if the robot controller mode is either [AUTOMATIC] or [MANUAL] (for a CRn-500 series robot controller, [TEACH], [AUTO (OP)], OR [AUTO (EXT.)]), but if even one program is running, forced output is not possible. (Except an ALWAYS program)

#### 11.2.5. IO unit monitor

You can monitor XY device variables of IO unit.

From the project tree, double-click the target project [Online] -> [Monitor] -> [Signal Monitor] -> [IO unit].

The status of input signals are displayed on the upper table, and the status of output signals are displayed on the lower table.

The signal values can display a 16-bit integer with a mark, or 32-bit integer with a mark by the decimal number or the hexadecimal number.

The signasl to display can set up the continuous range freely with [Monitor setting].

This function can be used with Version R3 or later of CR750-Q/CRnQ-700 robot controllers and Version 2.10L or later of this software.

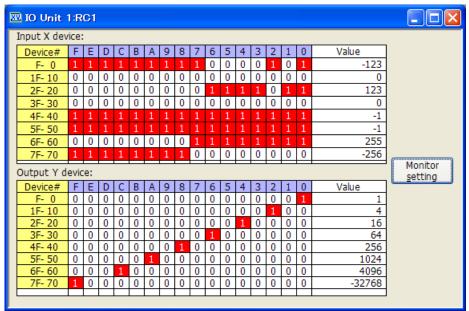


Figure 11-31 IO unit monitor

#### 11.2.5.1. Monitor setting

Click the [Monitor setting] button. The setting screen of PLC IO unit monitor is displayed.

Set the starting number of each device and set the number of lines to display. And, set the data size in display singles and the display method.

After setting, click the [OK] button.

IO Unit monitor setting	
Grid Input X Device# : 0 Lines : 3 Dutput Y Device# : 0 Lines : 3	Size
ОК	Cancel

Figure 11-32 IO unit seting screen

### 11.3. Production Condition Monitoring

#### 11.3.1. Operation hours

You can check the robot work time, battery usage time, etc.

From the project tree, double click the target project [Online]  $\rightarrow$  [Monitor]  $\rightarrow$  [Operation Monitor]  $\rightarrow$  [Operation Time].

🕲 Operation Hours 1:RC1								
Time	Time08-01-08 14:12:36							
Operating time —								
Power ON time :	136	hours						
Operation time :	Operation time : 25 hours							
Servo ON time :	Robot# 1	Servo ON 59 hou						
Battery Battery remaining time : 14058 hours								

Figure 11-31 Operating Hours

You can initialize the battery remaining time with [Maintenance]  $\rightarrow$  [Initialize]. For details on operation methods, see "12.2.4 Initializing the battery remaining time".

#### 11.3.2. Production information

You can check the latest tact time, run time, cycle count, and average tact time for each program in the robot controller. The latest tact time, run time, and average tact time can be measured up to 1193 hours (about 49 days).

From the project tree, double click the target project [Online]  $\rightarrow$  [Monitor]  $\rightarrow$  [Operation Monitor]  $\rightarrow$  [Production Information].

E Production Info	rmation 1:RC1			
Program name	Operation time	Cycle#	New cycle time	Average cycle time
1	21:08:09	5962	00:00:12.821	00:00:12.762
2	00:00:00	0	00:00:00.000	00:00:00.000
3	00:00:00	0	00:00:00.000	00:00:00.000
4	00:00:00	0	00:00:00.000	00:00:00.000
5	00:00:00	0	00:00:00.000	00:00:00.000
123	00:00:19	931	00:00:00.021	00:00:00.021
146	00:00:47	2233	00:00:00.021	00:00:00.021
V6S	00:00:00	0	00:00:00.000	00:00:00.000
LONG	00:00:00	0	00:00:00.000	00:00:00.000
V6SL	00:00:00	0	00:00:00.000	00:00:00.000
KURA2	00:00:00	0	00:00:00.000	00:00:00.000
				Refresh

Figure 11-32 Production Information

The production information is not constantly updated. Click the [Refresh] button as necessary.

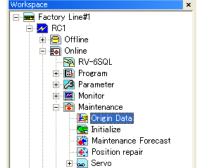
### 12. Maintenance

With maintenance, you can maintain the robot in various ways, including setting origin data and initializing various informations.

### 12.1. Setting Origin Data

You can save robot origin data to a file, edit it, and transfer it to a robot controller.

Set origin data while connected to the robot controller. From the project tree, double click the target project [Online]  $\rightarrow$  [Maintenance]  $\rightarrow$  [Origin Data].



#### Figure 12-1 Starting up the Origin Data Setting Screen

# ∽ ⚠ Caution

#### About controller modes in which origin data can be read/written

The controller modes (TEACH/AUTO (Op.)/AUTO (Ext.)) in which origin data can be read/written depend on the CRn-500 series robot controller version. For details, see **"Table 10-1 Origin Data Reading Robot Control Operation Mode"** and **"Table 10-2 Origin Data Writing Robot Control Operation Mode"**.

📙 Origin Data 1	:RC1
Origin data input	The origin data string is input from RT ToolBox2.
Mechanical stopper	The origin posture is set by contacting each axis against the mechanical stopper.
TOOL	The origin posture is set with the calibration jig installed.
ABS	This method is used when the encoder backup data lost in the cause such as battery cutting.
User origin method	A randomly designated position is set as the origin posture.
Backup origin parameter	Backup or restore the origin parameter.

Figure 12-2 Origin Data Screen

#### \* About robot controller run modes when origin data is read/written

<u>With CRn-500 series robot controllers</u>, when robot origin data is read/written using this software, there are restrictions on the controller run mode according to the robot controller software version. Reference the table below.

#### (1) Reading

Table 12-1 Origin Data Reading Robot Control Operation Mode

CRn-500 series robot controller	Operating mode			
	TEACH	Auto (OP)	Auto (Ext)	
J1 edition or later	0	0	0	
H7 edition or earlier	×	×	0	

o: Reading possible, ×: Reading not possible

#### (2) Writing

#### Table 12-2 Origin Data Writing Robot Control Operation Mode

CRn-500 series robot controller	Operating mode			
	TEACH	Auto (OP)	Auto (Ext)	
J1 edition or later	0	0	0	
G9 edition – H7 edition	0	×	0	
G8 edition or earlier	0	×	×	

o: Writing possible, ×: Writing not possible

#### 12.1.1. Origin data input technique

You can save robot origin data to a file, edit it, and transfer it to a robot controller. Click the origin data screen "origin data input technique" to display the screen.

Origin	data setting	:			X
Robot	1	•			
1 : RV	-6SQL				
D :	Z1TR08			_	Write
J1 :	000001	dJ1 :	0.0000		
J2 :	000002	dJ2 :	0.0000		
J3 :	016KB1	dJ3 :	0.0000		Save to file
J4 :	000000	d34 :	0.0000		Read from file
J5 :	000003	dJ5 :	0.0000		
J6 :	Z2#?AF	dJ6 :	0.0000		Refresh
J7 :					
J8 :					Close

Figure 12-3 Origin Data Input Technique Screen

[Write] [Save to file] [Read from a file] [Refresh]

- Writes the origin data displayed on the screen to the robot controller.
- : The displayed origin data can be saved to a file.
- : Stored origin data can be read from a file and displayed on the screen.
  - : Reads the origin data from a robot controller and displays the latest status.

# - \land Caution

:

#### Input the correct values for the J7 and J8 origin data.

For the J1-J6 axis origin data, the compatibility of values in the robot controller are checked but the J7 and J8 origin data are not checked. Always input correct values.

The J7 and J8 axis origin data is only displayed when there is a supported additional axis.

### Memo About DJNT (origin error) parameters

DJNT shows the origin position error. When revising the origin position using the position repair tool, the value is set in DJNT. (When not revising the origin position using the position repair tool, all the elements become 0. However, for RV-4A, the values are entered beforehand.) DJNT is not released to general customers, so the values can not be directly changed.

#### About DJNT parameter display

Sometimes DJNT parameters are not displayed for certain robots (for example, robots that do not support the position repair function).

#### 12.1.2. Mechanical stopper technique

This uses the robot mechanical stoppers to set the robot origin. Click the origin data screen [Mechanical stopper] button to display the screen.

After moving the robot to a mechanical stopper origin position, select the axis to set the origin for with the checkbox, and then click the [Set origin] button.

"Last" displays the origin setting technique used the previous time. For some robot controller software versions, this is sometimes not displayed.

Set orig	in (Mechanic	al stopper)	
Robot1		•	
1:RV-6	SQL		
_Origin (	data	Last	Setting origin
J1:	[mm, deg]	100	State
11.	-171.50	ABS	31
J2 :	-95.00	ABS	J2 🗖 📕
J3 :	169.00	ABS	J3 🗖
J4 :	161.00	ABS	J4 🗖
J5:	123.00	ABS	J5 🔽 Set origin
J6:	0.00	ABS	J6 🗖
J7 :	0.00	Not set	J7 🗖 Set
J8:	0.00	Not set	J8 🔽 Not set
			Close

Figure 12-4 Origin Setting (Mechanical Stopper) Screen

#### 12.1.3. Tool technique

This uses the origin setting tool to set the robot origin. Click the origin data screen [Tool] button to display the screen.

After moving the robot to the tool origin position, select the axis to set the origin for with the checkbox, and then click the [Set origin] button.

"Last" displays the origin setting technique used the previous time. For some robot controller software versions, this is sometimes not displayed.

Set ori	gin (Tool)		2	K
Robot1		•		
1 : RV-6	iSQL			
⊢Origin	data	–Last –	Setting origin	
	[mm, deg]		State	
J1 :	0.00	ABS	J1 🗖 🗖	
J2 :	-83.00	ABS	32	
J3 :	158.00	ABS	J3 🗖	
J4 :	0.00	ABS	34 🗖 📕 Set origin	
J5 :	4.00	ABS	J5 🗖 🔳 Set origin	
J6 :	0.00	ABS	J6 🗖	
J7 :	0.00	Not set	J7 🗖 Set	
J8 :	0.00	Not set	J8 🔽 Not set	
			Close	

Figure 12-5 Origin Setting (Tool Technique)

#### 12.1.4. ABS origin technique

This uses the robot's ABS origin position robot to set the robot origin. Click the origin data screen [ABS] button to display the screen.

After moving the robot to the ABS origin position, select the axis to set the origin for with the checkbox, and then click the [Set origin] button.

"Last" displays the origin setting technique used the previous time. For some robot controller software versions, this is sometimes not displayed.

Set origin (ABS)		×
Robot1	•	
1:RV-6SQL		
Origin data [mm, deg]	Last	Setting origin State
J1: 0.00	ABS	J1 🗖
J2: 0.00	ABS	]2
J3 : 90.00	ABS	J3 🔽
J4 : 0.00	ABS	J4 🗖 📕 Set origin
J5 : 0.00	ABS	J5 🗖
J6 : 0.00	ABS	J6 🗖
J7 : 0.00	Not set	J7 🗖 Set
J8 : 0.00	Not set	J8 Not set
		Close

Figure 12-6 Origin Setting (ABS Origin Technique) Screen

#### 12.1.5. User Origin Technique

This uses the robot user origin to set the robot origin.

Click the origin data screen [User origin method] button to display the screen.

After moving the robot to the user origin position, use the checkbox to select the axis to set the origin of, and then click the [Set origin] button.

"Last" displays the origin setting technique used the previous time. For some robot controller software versions, this is sometimes not displayed.

Set origin (User orig	in method)		×
Robot1	•		
1:RV-6SQL			
Origin data [mm, deg]	Last	Setting origin State	
J1: 0.00	ABS	J1 🗖	
J2 : 0.00	ABS	J2 🗖	
J3 : 90.00	ABS	J3 🗖	
J4 : 0.00	ABS	J4 🗖 📕 Set origin	
J5 : 0.00	ABS	J5 □	
J6 : 0.00	ABS	J6 🗖	
J7 : 0.00	Not set	J7 🗖 Set	
J8 : 0.00	Not set	J8 🔽 Not set	
		Close	

Figure 12-7 Origin Setting (User Origin Technique) Screen

#### 12.1.6. Origin Parameter Backup

You can back up the parameters that make up the origin data. Also, you can transfer the backed-up data to a robot controller.

Click the origin data screen [Backup origin parameter] button to display the screen.

Robot origin parameter <backup></backup>	×
Robot1	
RV-6SQL	
Robot Orign Data (Parameter) : MEINSD :	Save to file
MEINST : 3F MEINSZ : 14563, -43691, 3269518, 29128, -7281,	Select file for writing to Robot
MEOFFZ : 116509, 43691, 7282, 101944, 7281, 0,	
DJNT : 0.0000, 0.0000, 0.0000, 0.0000, 0.0000	Close

Figure 12-8 Robot Origin Parameter Backup Screen

[Save to file]	:	This saves origin parameters read from a robot controller (displayed parameters) to a file.
[Select file for writing to robot]	:	Transfer origin parameters stored in a file to a robot controller. When transferring to a CRn-500 series robot controller with edition H7 or earlier, set "Teach" mode.

# 🕂 Caution

# When the password is registered in "Parameter" by robot controller's security function, it is not possible to restore the origin data string to the robot controller by "origin parameter backup" screen.

When the password is registered in "Parameter" by robot controller's security function, it is not possible to restore the origin data string to the robot controller by "origin parameter backup" screen.

O : Enable、 × : Disable

		-	
	Item to which password of security function is registered.		
	Program	Parameter	File
Restore the origin data	0	×	0

Please delete the password of robot controller's security function when you operate these. Please refer to **"12.7.3 Delete the Password"** for the method of deleting the password.

The setting(register the password) and the release(delete the password) of robot controller's security function can be used with this software version 2.0 or later. Please refer to **"Table 12-15 Compliant version of this function and controller"** for robot controller's compliant version.

### 12.2. Initialization

This initializes information in a robot controller.

Here, you can initialize the following information in a robot controller.

- (1) Set the robot controller clock
- (2) Initialize all programs in the robot controller
- (3) Initialize the remaining battery time in the robot controller
- (4) Check the serial number in the robot controller and set the serial number for the connected robot (Serial number checking and setting can only be used with CR750/700 series robot controllers.)

#### 12.2.1. Starting

Use the initialization function while connected to the robot controller. From the project tree, double click the target project [Maintenance]  $\rightarrow$  [Initialize].

	😪 Initialize 1:RC1	
	Time in the RC 2008 / 01 / 08 14 : 21 : 38	Set time
Workspace       ×         Image: Factory Line#1       Image: Factory Line#1         I	Program Erase all programs in the RC. The program will be initialized even if the program protection or variable protection is set to ON. Battery remaining time Please initialize the battery remaining time always after changing the battery. The RC warns when the battery is spent. This time can be checked [Operation hours monitor].	Initialize
	Serial number Please set the serial number of the allocated robot of each robot. This function is used to identify the robot.	Set

Figure 12-9 Starting Initialization Screen

#### 12.2.2. Setting the time in the robot controller

You can set the robot controller clock.

On the initialization screen, click the [Set time] button.

×
Get PC time
14:24:25
Cancel

Figure 12-10 Time Setting Screen

Set the new date and time, then click the [OK] button.

You can set the current date and time from your computer by clicking the [Get PC time] button.

#### 12.2.3. Deletion of all robot programs

This deletes all the programs in the robot controller.

On the initialization screen, click the program group [Initialize] button. A confirmation screen is displayed, so input "Yes", then click the [OK] button.



Figure 12-11 Confirmation Screen for Program File Initialization

# – 🗥 Caution ·

When the password is registered in "program" by robot controller's security function, it is not possible to delete all the programs in the robot controller.

When the password is registered in "program" by robot controller's security function, it is not possible to delete all the programs (initialize the programs) in the robot controller.

O : Enable、 × : Disable

		U . LII	
	Item to which password of security function is registered.		
	Program	Parameter	File
Deletion of all robot programs.	×	0	0

Please delete the password of robot controller's security function when you operate these. Please refer to **"12.7.3 Delete the Password"** for the method of deleting the password.

The setting(register the password) and the release(delete the password) of robot controller's security function can be used with this software version 2.00A or later. Please refer to **"Table 12-15 Compliant version of this function and controller"** for robot controller's compliant version

#### 12.2.4. Initializing the battery remaining time

This initializes the remaining battery time in the robot controller. On the initialization screen, click the remaining battery time [Initialize] button. A confirmation screen is displayed, so input "Yes", then click the [OK] button.

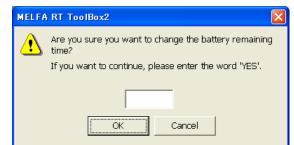
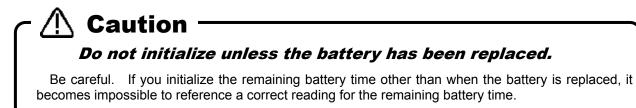


Figure 12-12 Confirmation Screen for Battery Time Remaining



#### 12.2.5. Serial number

This checks the serial number in the robot controller and sets the serial number for the connected robot On the initialization screen, click the serial number group [Set] button.

This function can only be used with CR750/700 series robot controllers.

The first time you start up a CR750/700 series robot controller after purchase, the C0150 warning (robot main unit serial number not set) is generated. On this screen, set the robot main unit serial number.

Serial Number			X
Controller	Serial Number	Last Update	Write to File
Controller: Robot #1: RV-6SOL	ABCDEFGHIJK		Read from File
KUDUL #1: KV-DSQL	abc	2007/12/04 09:38:56	Write
			Close

Figure 12-13 Serial Number Input Screen

### 12.3. Maintenance Forecasting

With "Maintenance forecasting", you can reference the parts replacement timing (greasing and battery and belt replacement) from operation data collected up till now in the robot controller.

### **Caution** *The results of calculations in Maintenance Forecast merely show reference values. Please execute the daily inspection and the periodic inspection to prevent the breakdown beforehand, and to secure safety.*

#### 12.3.1. Specifications

With CRn-500 series robot controllers, there are restrictions on the maintenance forecast functions according to robot models and versions supported. The robot controller software versions and models supported by the maintenance forecast function are as follows.

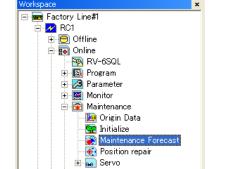
	Table 12-3 Supported models and software versions				
No.	Robot	CR750/700 series Robot controller	CRn-500 series Robot controller		
1	RV-6S series RV-12S series		Ver. <b>J2</b> or later		
2	RV-3S series RV-3SJ series	The supported	Ver. <b>K1</b> or later		
3	RH-6SH series RH-12SH series RH-18SH series	models are not restricted	Ver. <b>K4</b> or later		
4	RV-2S series		-		

#### Table 12-3 Supported models and software versions

#### 12.3.2. Starting

Use the maintenance forecast function while connected to the robot controller.

From the project tree, double click the target project [Online]  $\rightarrow$  [Maintenance]  $\rightarrow$  [Maintenance Forecast].





#### 12.3.3. Forecasting

You can reference the "time until battery replacement", "time until regreasing, and time until belt replacement".

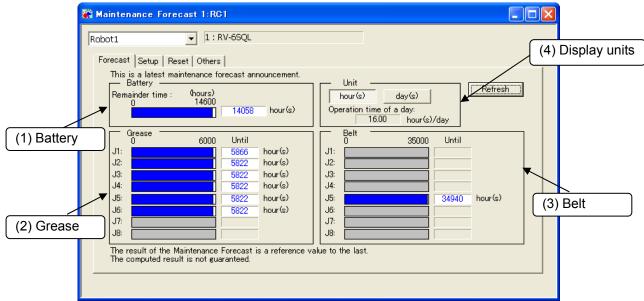


Figure 12-15 Forecast Screen

By clicking the [Refresh] button, you can reacquire information on maintenance from the robot controller.

#### (1) Battery

If the number of remaining hours of battery life has reached

(Remainder time) < [The remainder days until presumed maintenance time] on the Setup screen) x (24 - [Operation time of a day])

the hours and bar graphs are displayed in orange.

(The battery replacement time is calculated during the time when the controller's power is not on.)

#### (2) Grease

If the hours until replenishment time has reached

(Hours until replenishment time) < ([The remainder days until presumed maintenance time] on the Setup screen) x ([Operation time of a day]),

the hours and bar graphs are displayed in orange.

(3) Belt

If the hours until belt replacement time has reached

the hours and bar graphs are displayed in orange.

(4) Display unit

You can switch the display units for "Grease" and "Belts" between hours and days. When days are selected as the display unit, the number of days of operation is calculated from the number of operating hours per day and that number of days is displayed.

#### 12.3.4. Settings

Here, you can set the timing for collecting information concerning maintenance forecasts, the notification method, etc.

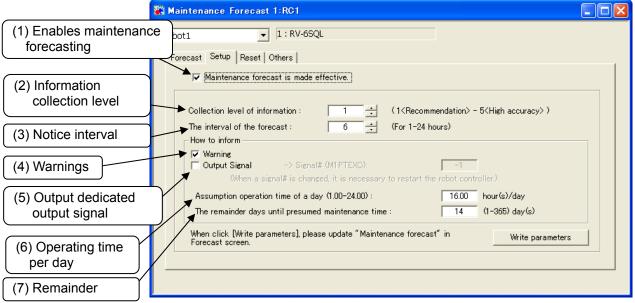
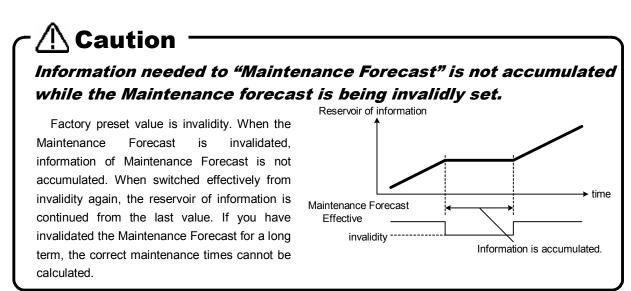


Figure 12-16 Setup

When the [Write parameters] button is clicked after setting each item, the setting values are written into the controller. All items other than the signal numbers of dedicated outputs take effect after they are written into the controller. If a dedicated output signal has been changed, it is necessary to power on the controller again.

For details on the setting items, see "Table 12-4 Description of the Setup Screen".



#### Table 12-4 Description of the Setup Screen

Item	Explanation		
(1) Maintenance Forecast is made effective.	If this is checked, the Maintenance Forecast function takes effect. * If a checkmark is removed, the collection of the information for Maintenance Forecast stops, and the correct maintenance times cannot be calculated.		
(2) Collection level of information	<ul> <li>Five levels can be specified to collect the information about the maintenance.</li> <li>* As an information collection level gets higher, the accuracy of the maintenance improves, but it affects the tact time more.</li> </ul>	1 (Recomm ended)	
(3) The interval of the forecast	Specify the interval to notify the maintenance time.	6 hours	
How to inform	When the grease replenishment, belt replacement and other maintenance tim have reached, they can be notified by generating a warning or outputting a dedicated signal. As for the battery replacement time, one of warnings, C7500, C7510 and C7520, is generated, regardless of whether or not [Warning] under [How to inform] is checked. A warning to be generated varies depending on each situation.		
(4) Warning	If this item is checked, the maintenance time is notified as a warning. The warning numbers are listed as follows: Grease : C753* (* is the axis No.) Belt : C754* (* is the axis No.)	Check ON	
(5) Output Signal	If this item is checked, signal numbers can be entered. If this item is checked and a signal number is entered correctly, the maintenance time is notified using the output of the designated signal.		
(6) Assumption operation time of a day	Enter an estimated robot operation hours per day.		
(7) The remainder days until presumed maintenance time Specify the number of days remaining until presume time to be used as a reference to notify the maintenance		14 days	



#### Methods for resetting the alarm and alarm signal output

As a method of notifying the replacement time of each part, an alarm (C753\* and C754\* (\* represents the axis number)), or a dedicated output signal (M\*PTEXC (\* represents the robot number)) will be output.

If both are set up as the notification methods, executing the error reset operation will reset the alarm and end the signal output.

If the "alarm" method is disabled and only the output of the dedicated output signal is selected as the notification method, pushing the reset button on the front side of the controller will not end the signal output. In this case, push the [ERROR RESET] key on the teaching box or enter the error reset signal (ERRRESET) to end the signal output.

	on method ting		Methods to reset the notification (alarm or dedicated signal output)		
Warning	Output Signal	Notification method	[RESET] key on the front of the controller	[ERROR RESET] key on the T/B	External error reset signal
<b>N</b>		Alarm	Will reset the alarm	Will reset the alarm	Will reset the alarm
V		Alarm and dedicated signal output	Will reset the alarm and the dedicated signal output	Will reset the alarm and the dedicated signal output	Will reset the alarm and the dedicated signal output
		Dedicated signal output	Will not reset the dedicated signal output	Will ENABLE reset the dedicated signal output	Will ENABLE reset the dedicated signal output

#### 12.3.5. Reset screen

The information (about battery, grease and belt) for Maintenance Forecast kept in the controller can be reset.

🎇 Maintenance Forecast 1:RC1	
Robot1 • I : RV-65QL	
Forecast Setup Reset Others	
The information for the Maintenance Forecast which has been	kept in the controller is reset.
Reset of battery remaining time	
At the time of battery exchange:	Reset
Tt resets per joint axis	
	Reset axis
<ul> <li>At the time of grease replenishment</li> <li>At the time of belt exchange</li> </ul>	J1 J5 J2 J6
	Reset J3 J7 Reset J4 J8

Figure 12-17 Reset

#### Table 12-5 Description about each reset

Types of resets	Explanation	Note
At the time of battery exchange	It is used when an alarm urging to replace the batteries (C7500, C7510 or C7520) occurs and the batteries have been replaced. Be sure to reset the battery remaining time after a battery has been replaced.	
At the time of grease replenishment	When an alarm urging to perform periodic inspections and replenish grease (alarm numbers in the 7530s) occurs, replenish the grease and reset the replenished axis.	Axes are reset in units of joint axes. Multiple joint axes can be reset at the same time.
At the time of belt exchange	When an alarm urging to perform periodic inspections and to replace the belt when it is damaged (alarm numbers in the 7540s) occurs, replace the belt and reset the axis for which the belt is replaced.	Axes are reset in units of joint axes. Multiple joint axes can be reset at the same time.

These reset operations can be executed using the teaching box. See the following section for further details.

When the [Log] button is clicked in the upper-right corner of the window, the previous reset date/time and reset count can be checked.

However, the battery reset count is not displayed. If no reset has not made previously, "----/-- --:---" is displayed.

	neasurement	began: 2	007/12/10	18:04:50
'he last rese Item	et day:	date	time	count
Battery		2007/12/11	11:50:42	
Grease	J1	2007/12/11	11:50:46	3
	J2	2007/11/29	17:25:22	1
	J3	2007/11/29	17:25:22	1
	J4	2007/11/29	17:25:22	1
	35	2007/11/29	17:25:22	1
	J6	2007/11/29	17:25:22	1
Belt	35	2007/11/29	17:25:32	1

Figure 12-18 Log of Resets

#### 12.3.6. Resetting maintenance forecast information with teaching box

When an alarm urges to replace the batteries, replenish the grease, or to replace the belt based on the Maintenance Forecast function and these parts are replaced or replenished, the information that has been accumulated within the controller needs to be reset for the axis where such replacement or replenishment has been performed.

The information that has been accumulated within the controller can be reset using not only this software, but also the teaching box.

(1) Resetting the time of battery remaining

	Table 12-6 Resetting the time of battery remaining			
	Explanation	Operation		
the time of battery remaining	It is used when an alarm urging to replace the batteries (C7500, C7510 or C7520) occurs and the batteries have been replaced. Be sure to reset the battery remaining time after a battery has been replaced.	From the teaching box (R32TB) menu screen, execute "5. Settings and Initialization" $\rightarrow$ "1. Initialization" $\rightarrow$ Battery.		

Table 12-6 Resetting the time of battery remaining

For details on the method for initializing the battery remaining time using the teaching box, in the robot controller's operations manual, see **"Detailed explanations of functions and operations"**.

#### (2) Resetting the grease and belt information

The grease and belt information can be reset by entering parameters to the controller. The following is the list of parameter names and the values to be entered.

#### Table 12-7 Resetting the grease and belt information

	Explanation	Parameter	Value
Grease information	When an alarm urging to perform periodic inspections and replenish grease (alarm numbers in the 7530s) occurs, replenish the grease and reset the replenished axis.	MFGRST	0 : Reset information on all axes
Belt information	When an alarm urging to perform periodic inspections and to replace the belt when it is damaged (alarm numbers in the 7540s) occurs, replace the belt and reset the axis for which the belt is replaced.	MFBRST	1 to 8 : Reset information on the specified axis

(\* These parameters cannot be read not to input all characters in the teaching box.)

The grease or belt information will be reset immediately after a parameter name and the value are entered. (In this case, the controller power does not need to be restarted.) If a value other than 0 is entered, the reset process will be executed for each axis.

Repeat the parameter input operation when resetting information on two or more axes.

Also note that the value read is always 0 regardless of the previously entered value. If you continue the input operation in this state, all axes will be reset. Exercise with caution.

See "Controller INSTURCTION MANUAL – Detailed explanations of functions and operations" for how to input parameters using the teaching box.

#### 12.3.7. Others

The information for Maintenance Forecast kept in the controller can be backed up and/or restored.

# **Caution** The backup and restore operations are performed when the controller (CPU) is replaced.

When the controller (CPU) is replaced, perform both backup and restore operations in a batch using the Backup/Restore tool. Also, be sure to back up the information for Maintenance Forecast before replacement, and restore the backed up information after replacement.

Please Backup/Restore between controllers of the same version. When the version is different, the error might occur.

After the controller (CPU) has been replaced, if the information for Maintenance Forecast is not restored, or it is restored after a substantial time has elapsed since the time of backup, please note that the reliability of Maintenance Forecast will be degraded.

Search Maintenance Forecast 1:RC1	
Robot1 I:RV-6SQL	
Forecast Setup Reset Others	
The information for the Maintenance forecast which has been kept in the Robot Controller is backed up/restored.	
Robot Controller -> PC : Backup	
PC -> Robot Controller : Restore	
Caution	
When exchanging the Robot Controller(CPU UNIT) :	
Before exchanging, backuping the information of the Maintenance forecast,and after exchanging, restoring the information.	

Figure 12-19 Others

### 12.4. Position repair Function

The position repair function is restricted by the usable models and controller software versions. See **"Table 12-9 Supported Robot Controllers and Model"**.

The "position repair function" is used when a tool is deformed by a collision or the origin is out of place because the motor has been replaced. Just reteaching part of the position data within the robot program makes it possible to use the previous position data in the controller. (Position repair generates parameters to correct the position deviation and corrects all the position data in the robot controller.)

However, please understand that there are some cases that position repair can not restore, such as applications requiring high precision and major mechanical damage to a robot from a collision.

Also, restrictions on a robot's degrees of freedom can make it impossible to recover with position repair. Since vertical 5-axis robots and horizontal 4-axis robots are restricted as shown in **"Table 12-8 The limit by degree of freedom"**, positional deviations related to these restrictions can not be corrected with this function. In this case, either reteach manually or correct the deviating section (for example, by replacing a bent hand).

	1 4010			
No.	Robot model	I The limit by degree of freedom		
1	Vertical 5-axis robot	It can't move in the direction of C element of the Cartesian position.		
2	Horizontal 4-axis robot	It can't move in the direction of A, B element of the Cartesian position.		

#### Table 12-8 The limit by degree of freedom

## 🚹 Caution -

#### The position repair function is only supported by MELFA-BASIC IV and MELFA-BASIC V.

The position repair function is only supported by MELFA-BASIC IV and MELFA-BASIC V. It cannot be used with Movemaster commands.

# 🔨 Caution -

When the password is registered in "parameter" or "file" by robot controller's security function, it is not possible to operate Position repair Function.

When the password is registered in "parameter" or "file" by robot controller's security function, it is not possible to operate Position repair Function.

O : Enable、 × : Disable

		0	Ellablet Eleable
	Item to which password of security function is registered.		
	Program	Parameter	File
Position repair Function	0	×	×

Please delete the password of robot controller's security function when you operate these. Please refer to **"12.7.3 Delete the Password"** for the method of deleting the password. The setting(register the password) and the release(delete the password) of robot controller's security function can be used with this software version 2.0 or later. Please refer to **"Table 12-15 Compliant version of this function and controller"** for robot controller's compliant version.

#### 12.4.1. Specifications

The robot models and robot controller versions with which the position repair function can be used are as follows.

_	1001		
No.	Robot model	CR750/700 series Robot Controller	CRn-500 series Robot Controller
1	Vertical 6-axis robot		Version <b>J2</b> or later Only correction of origin data is supported in versions prior to <b>J2</b> .
2	Vertical 5-axis robot	The supported models are not restricted by the	Version <b>K1</b> or later Only correction of origin data is supported in versions prior to <b>K1</b> .
3	Horizontal 4-axis robot (RH-SH series only)	version	Version <b>K4</b> or later Any versions prior to <b>K4</b> are not available. Moreover, This function cannot be used for the RH-AH series robot.

#### Table 12-9 Supported Robot Controllers and Models

#### 12.4.2. Starting

Use the position repair function while connected to the robot controller. From the project tree, double click the target project [Online]  $\rightarrow$  [Maintenance]  $\rightarrow$  [Position repair].

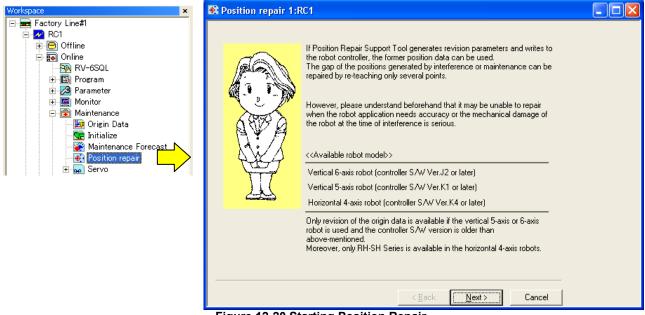


Figure 12-20 Starting Position Repair

#### 12.4.3. Flow of operations

The position repair takes the form of a wizard. You can automatically generate the parameters by proceeding with operations according to the instructions on each screen. You can directly set parameter values.

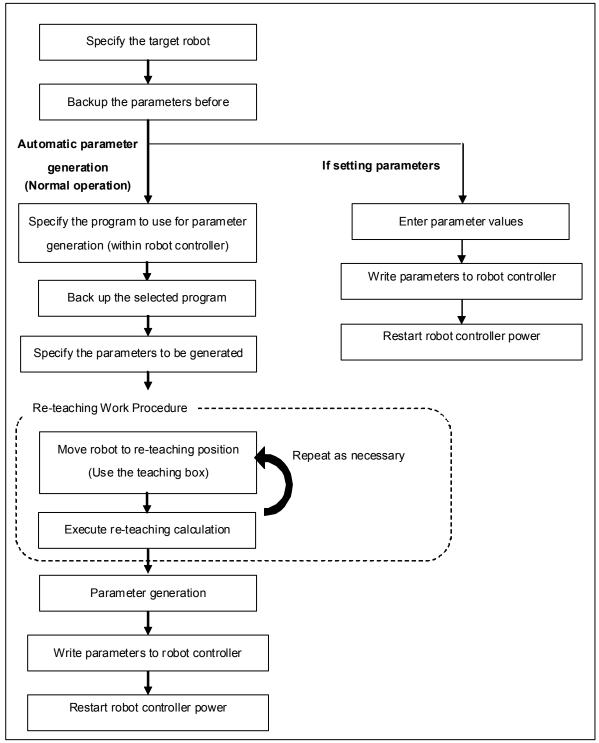


Figure 12-21 Operation Flow

The explanation follows the normal operations flow. For the explanation when setting parameter values, see "12.4.16 Revision parameter editing".

#### 12.4.4. Introduction

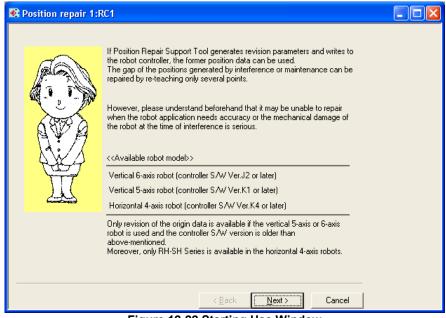
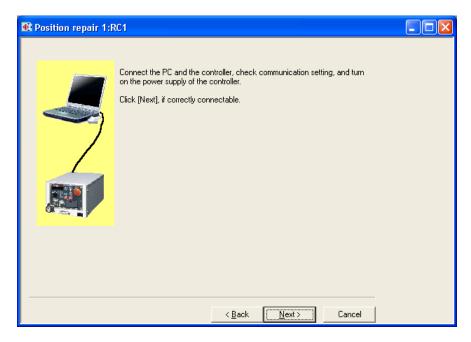


Figure 12-22 Starting Use Window

This is an explanation of the position repair function. Read it carefully, then click the [Next] button.

#### 12.4.5. Communications settings



Check the communication settings and connected to the robot controller, click the [Next] button. For the setting method, see **"6 Connecting with the Robot".** 

#### 12.4.6. Robot selection and parameter backup

Reposition repair 1:Re	91	
	Select the target robot.          1:RV-6SQ#1         Image: Comparison of the parameters?         Back up (Recommended)	
	< <u>B</u> ack <u>N</u> ext> Cancel	

Figure 12-23 Robot and Backup Parameters Selection Window

Select the robot to execute the re-teaching. The Robot is displayed as follows.

Ver.1.1 or earlier	Controller number : Controller Name + Mechanism Name <u>#Mechanism No.</u>
Ver.1.2 or later	Controller number : Mechanism Name <u>#Mechanism No.</u>
	Displayed only in multi-mechanism mode.

To backup parameters, click [Backup].

The dedicated backup screen starts. For more details on backups, see "14 Backup and Restore". Backed up parameter files can be written back to a robot controller using the "backup/restore" functions of this software.

When the preparations are completed, click the [Next] button.

## 🍄 Memo 🛾

#### Parameter Backup

During its operation, this software overwrites parameters to the robot controller. It is recommended that the parameters be backed up at this point to allow the controller to revert to the original parameters.

#### 12.4.7. Revision parameter generation procedure selection

🚯 Position repair 1:R	IC1	
	Target robot:       1:+RV-6SQ         Select a procedure.       Generate revision parameter automatically.         (Usually select this)       Edit the value of revision parameter directly.	
	< Back Next > Cancel	

Figure 12-24 Select generation procedure of revision parameter Window

In the next step, the software can either automatically generate parameters or accept manually entered parameter values. Normally, [Generate revision parameter automatically] is selected.

Select [Generate revision parameter automatically] and click [Next] to proceed to "Select Program" window.

Select [Edit the value of revision parameter directly] to proceed to "Edit Revision Parameter" window.

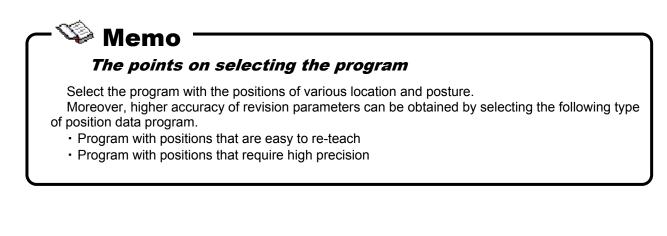
#### 12.4.8. Program selection

Target rob	ot: 1:+	-RV-6SQ					
with re-teac	n data (only o h work.	cartesian type	) of the selecte	d program is	used <u>A</u> b	out Number of Position	
Robot program	n list Size	Date	Time	Protect	Number of	Position v., 🔨	
1	545	08-01-08	15:08:00	None	5		
123	525	08-01-07	18:20:08	None	21		
146	525	08-01-07	18:20:08	None	21		
2	262	08-01-07	18:20:08	None	2		
3	262	08-01-07	18:23:02	None	2		
4	495	08-01-07	18:20:08	None	5		
5	262	08-01-07	18:23:16	None	2		
500	262	08-01-08	14:50:22	None	2		
KURA2	236	08-01-07	18:19:04	None	3		
LONG	279	08-01-07	18:20:08	None	1	_	
V6S	2538	08-01-08	16:53:24	None	35	1 🤜	
V001	1005	00.01.07	10.00.00	klassa.	25	>	

Figure 12-25 Select Program Window

Select the robot program to use for revision parameter generation, then click the [Next] button. Here, perform the reteaching using the XYZ-coordinate position data in the selected program.

For details on the required position data numbers, see "Table 12-10 Selecting Revision Parameters".



#### 12.4.9. Program reading and backing up

🚯 Position repair 1:F	RC1	
	Target robot:       1:+RV-6SQ         The following robot program is used for re-teach work.         1.PRG         Do you want to back up the program?         Back up (Recommended)	
	< Back Next> Cancel	

Figure 12-26 Read and Backup Program Window

To backup a program, click [Backup].

The special screen for backup is started. For details on backups, see "14 Backup and Restore".

You can use the backup/restore functions in this software to write a backed up parameter file back into a robot controller.

When the preparations are completed, click the [Next] button.

### Memo *Robot Program Backup* During its operation, this software may overwrite robot controller program (position data).

During its operation, this software may overwrite robot controller program (position data). It is recommended that the program be backed up at this point to allow the controller to revert to the original program.

#### 12.4.10. Tool setting check

l arget r	obot: 1:	+RV-6SQ						
Set up the	e tool data use	ed by teaching	with a teach	ning box.				
The tool o	lata selected	now is displaye	d in red.					
Tool data list	t							
Parameter	Outline	X	Y	Z	A	В	C	
MEXTL	Standar	0.00	0.00	0.00	0.00	0.00	0.00	
MEXTL1	Tool 1	0.00	0.00	0.00	0.00	0.00	0.00	
MEXTL2	Tool 2	0.00	0.00	0.00	0.00	0.00	0.00	
MEXTL3 MEXTL4	Tool 3 Tool 4	0.00	0.00	0.00	0.00	0.00	0.00	
MEATL4	10014	0.00	0.00	0.00	0.00	0.00	0.00	
						-	lenew list	

Figure 12-27 Check of Setting Tool Window

Parameter values set in the present robot controller for tool data are displayed. The row for the tool selected by the tool number (MEXTLNO) is highlighted in red.

Please check if the tool data and tool number used during teaching is set.

If necessary, change the value from parameter setting in teaching box. Click [Renew List] to update the contents of the display.

(If the CRn-500 series robot controller's version is older than **J2**, only the standard tool (MEXTL) will be displayed.)

Click [Next] when ready to proceed.

### Caution

#### Do not change tool data or base data.

After this window, do not change tool data or base data.

If they are changed during re-teaching operation, re-teach calculation cannot be done correctly. When correcting tool data, if teaching was performed switching back and forth between multiple tools, perform re-teaching operation for each tool.

#### 12.4.11. Revision parameter selection

€ Position repair 1:RC1		
Target robot:     1:+RV-6SQ       Select revision parameter       Image: Compared to the second seco	Details When the joint axes shifts or the motor is exchanged,	
<ul> <li>(About 1-6 points)</li> <li>Tool exchange or modified (3-6 points)</li> <li>Transfer the robot (6 points)</li> <li>Exchange the robot (10-11 points)</li> <li>Select all (13-16 points)</li> <li>Select arbitrarily</li> </ul>	the origin data is rectified. Specify the targeted axes. (Origin data)	
Revision Parameter Origin data	J3   J4   J5   J6	
Use the posture elements of position	data Details	
	< <u>B</u> ack <u>N</u> ext > Cancel	

Figure 12-28 Select Revision Parameter Window

Select the revision parameter that becomes the target for re-teaching calculation.

Revision parameter will be selected automatically if an item is selected from [Select revision parameter]. Choose [Select all] to select all the revision parameters. If you wish to specify a particular combination of revision parameters, choose [Select arbitrarily] and specify the revision parameters.

Vertical 6-axis robot	If the CRn-500 series robot controller's version is older than <b>J2</b> , only
Vertical 0-axis robot	[Error of joint axis] can be selected.
Vertical 5-axis robot	If the CRn-500 series robot controller's version is older than K1, only
Vertical 5-axis Tobol	[Error of joint axis] can be selected.
Horizontal 4-axis robot	The CRn-500 series robot controller's any versions prior to K4 are not
	available.
(RH-SH series only)	(This function cannot be used for the RH-AH series robot.)

The supported models are not restricted by the version in CR750/700 series robot controller.

Click [Details] to see the description of the difference between checking and not checking [Use the posture elements of position data].

In the following section, details regarding revision parameters and posture elements of position data are explained.

After choosing the revision parameters, click [Next].

#### 12.4.11.1. Revision parameters

Parameters revised by items selected with "Select revision parameters" become as in "Table 12-10 Selecting Revision Parameters".

-Select revision parameter
Error of joint axis
(About 1-6 points)
C Tool exchange or modified
(3–6 points)
🔿 Transfer the robot (6 points)
C Exchange the robot
(10-11 points)
C Select all (13-16 points)
C belect all tra-ro points/
C Select arbitrarily

### 🥸 Memo

### Some elements cannot be calculated according to the robot type and the combination of revision parameters.

In this function, the amount of the gap of the robot is calculated as a correction value, and the revision parameter is generated. However, some elements cannot be calculated (the value becomes 0) as the following two kinds of cases.

\* The case which cannot be calculated by the limits of degree of freedom of robot Some elements of revision parameter cannot be reflected because the Vertical 5-axis robot and horizontal 4-axis robot have the limitation.

#### \* The case which condensed by the combination of robot mechanism and revision parameter Some elements of revision parameter become the value on the same rotation axis according to the combination of robot mechanism and revision parameter. In such case, calculated value of gap is condensed to the one element of revision parameter.

At this case, though the other element becomes 0, it condenses in other elements and it is corrected. So it is not necessary to reflect it again.

		Table 12-10 Selecting Revision Parar	lielei 3			
				Minimum	n number o points	of teach
No.	Item	Description	Revised Parameter	Vertical 6-axis robot	Vertical 5-axis robot	Horizo ntal 4-axis robot
1	Error of joint axis	Rectifies origin data when joint axis moves or when motor is replaced. Specify the target axes using the check boxes. The number of teaching points is different according to how the axis was specified.	Origin data Revision Parameter Origin data Tool data Base data	1 to 6 points	1 to 5 points	1 to 4 points
2	Tool exchange or modified	Rectifies attachment error when robot tool is exchanged. In addition, rectifies tool data error when the tool is transformed due to interference between robot and peripheral devices. Vertical 5-axis robot: * Only Z element of position data is corrected.	Tool data Revision Parameter Origin data Tool data Base data	3 to 6 points	1 point	3 to 4 points
3	Transfer the robot	Rectifies base data of robot position setup when the robot is transferred to another location. Vertical 5-axis robot: * Only X, Y, Z elements of position data are corrected.	Base Data Revision Parameter Origin data Tool data Base data	6 points	3 points	4 points
4	Exchange the robot	<ul> <li>When robot is exchanged with the tools on, rectifies origin data error and base data of robot position setup.</li> <li>Only for horizontal 4-axis robot, attachment error is also rectified.</li> <li>Vertical 6-axis robot: <ul> <li>* Origin data J1 is included in base data.</li> </ul> </li> <li>Vertical 5-axis robot: <ul> <li>* As to base data, only X, Y, Z elements are Corrected.</li> </ul> </li> <li>Horizontal 4-axis robot: <ul> <li>* Origin data J1 and J3 are included in base data.</li> </ul> </li> <li>* Origin data J1 and J3 are included in tool data.</li> <li>* Select which to be requested because Z elements of tool data and base data are not corrected at the same time.</li> <li>Z element to calculate <ul> <li>Tool data</li> <li>C Base data</li> </ul> </li> </ul>	Base data Origin data Tool data (4-axis robot only) Revision Parameter Origin data Origin data Base data (5-axis and 6-axis robot) Revision Parameter Origin data Origin data Origin data Dol data Base data (4-axis robot)	10 to 11 points	7 to 8 points	7 to 8 points
5	Select all	<ul> <li>Selects all revision parameters.</li> <li>Vertical 6-axis robot: <ul> <li>Origin data J1 is included in base data.</li> <li>Origin data J6 is included in tool data.</li> </ul> </li> <li>Vertical 5-axis robot: <ul> <li>As to tool data, only Z element is corrected.</li> <li>As to base data, only X, Y, Z elements are corrected.</li> </ul> </li> <li>Horizontal 4-axis robot: <ul> <li>Origin data J1 and J3 are included in basedata.</li> <li>Origin data J3 and J4 are included in tooldata.</li> </ul> </li> <li>Select which to be requested because Z elements of tool data and base data are not corrected at the same time.</li> <li>Z element to calculate <ul> <li>Tool data</li> <li>Base data</li> </ul> </li> </ul>	Origin data Tool data Base data Revision Parameter Origin data Origin data Tool data Base data	13 to 16 points	8 to 9 points	7 to 8 points

#### Table 12-10 Selecting Revision Parameters

				Minimum	number o points	of teach
No.	ltem	Description	Revised Parameter	Vertical 6-axis robot	Vertical 5-axis robot	Horizo ntal 4-axis robot
6	Select Arbitrarily	<ul> <li>Specify revision parameters.</li> <li>Vertical 6-axis robot: <ul> <li>* Since origin data J1 is included in base data, if base data is selected, turn off the Checkbox of origin data J1.</li> <li>* Since origin data J6 is included in tool data, if tool data is selected, turn off the Checkbox of origin data J6.</li> </ul> </li> <li>Vertical 5-axis robot: <ul> <li>* As to tool data, only Z element is corrected.</li> <li>* As to base data, only X, Y, Z elements are corrected.</li> </ul> </li> <li>Horizontal 4-axis robot: <ul> <li>* If base data is selected, turn off the Checkboxes of origin data J1 and J3.</li> <li>Origin data J1 and J3 are included in base data.</li> </ul> </li> <li>* If tool data and base data are selected together, select which Z element to be requested, because Z elements of tool data and base data</li> </ul> <li>* If tool data C Base data</li>				

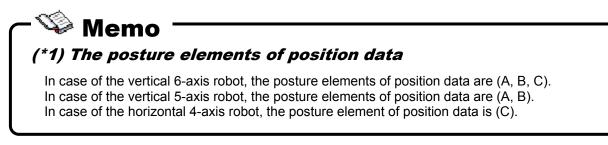
Revision parameter names correspond to the following.

Origin data: Tool data: Base data:

DJNT MEXDTL, MEXDTL1 to 4 (Parameter of the tool selected by tool number) MEXDBS

#### 12.4.11.2. Position data posture components

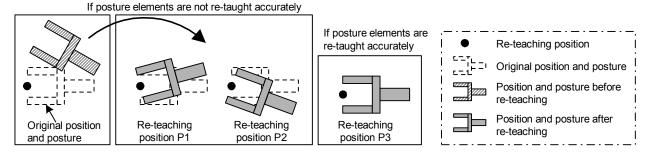
Position data of MELFA-BASIC IV consists of tip position (X, Y, Z) and tip posture elements (A, B, C) (\*1). This section describes the cases where [Use the posture elements of position data] is checked and not checked.



### (1) [Use the posture elements of position data] is checked 🔽 Use the posture elements of position data

Not just the robot tip position (X, Y, Z) but also the tip posture elements are used for position correction calculation.

Precision of generated revision parameter improves if the tip posture elements are also re-taught correctly. However, if the tip posture elements are not re-taught correctly, as shown in the diagrams below (re-teaching positions P1 and P2), error occurs in position correction calculation, decreasing the precision of the calculation result.



(2) [Use the posture elements of position data] is not checked 🔽 Use the posture elements of position data

Posture elements in the position data taught during re-teaching are not used for position correction calculation.

If it is not necessary to match exactly the tip posture elements during re-teaching, clear the checkbox [Use the posture elements of position data]. In such case, position correction calculation is performed using only the tool tip position data (X, Y, Z), ignoring the error from posture deviation. This increases the precision of location correction.

However, there are some restrictions. For details, see "Table 12-11 About Posture Elements of Re-teaching Position Data".

Condition	Merit	Note
When using posture elements of position data  Use the posture elements of position data	Precision of generated revision parameter improves if the tip position (X, Y, Z) and tip posture elements are re-taught correctly.	During re-teaching, posture must be taught correctly. If posture data is incorrect, <i>precision of</i> <u>revision parameter actually</u> <u>decreases.</u>
When not using posture elements of position data Use the posture elements of position data	During re-teaching, revision parameters can be generated simply by correctly teaching position (X, Y, Z). (Posture elements need not be accurate.)	<ul> <li>In case of the vertical 6-axis robot :         <ul> <li>* Posture elements (A, B, C) of tool revision parameters cannot be obtained.</li> <li>* J6 axis of origin revision parameter cannot be obtained if both X and Y components of the tool parameter are 0.0.</li> </ul> </li> <li>In case of the vertical 5-axis robot :         <ul> <li>* J6 axis of origin revision parameter cannot be obtained.</li> </ul> </li> <li>In case of the horizontal 4-axis robot :         <ul> <li>* Posture elements (C) of tool revision parameters cannot be obtained.</li> <li>* J4 axis of origin revision</li> </ul> </li> </ul>
		parameter cannot be obtained if both X and Y components of the tool parameter are 0.0.

 Table 12-11 About Posture Elements of Re-teaching Position Data

#### 12.4.12. Reteaching work

Target r	obot: 1	:+RV-6SQ				1.PRG		
Repeat re-t	each work ur	ntil the remain	hing points be	ick [Re-teach] ecome 0 point. wer even if it r				
				e tool taught v ierable at one				
				rs, redo this fu				
								1
Remaind	ler about 1 po	pint(s)	<u>R</u> e-teach	. <u>C</u> lear		heck of tool	data	
Remaind Position	der about 1 po	pint(s)	<u>R</u> e-teach Z	<u>C</u> lear	r <u> </u>	Check of <u>t</u> ool	data L'	
Position						- ,	data L'	
	X	Y	Z	A	]B	- C (	data L'	
Position	+777.45	-0.02	Z	A +90.44	-71.00	- C   +89.57	data L'	
Position p1 p2	+777.45 +619.03	-0.02 +470.35	Z +928.76 +928.76	A +90.44 +90.44	B -71.00 -71.00	C +89.57 +126.80	data L'	
Position p1 p2 p3	× +777.45 +619.03 +688.41	+470.35 +273.60	- - +928.76 +928.76 +391.92	A +90.44 +90.44 +158.10	B -71.00 -71.00 -19.08	C +89.57 +126.80 +37.87	data L'	

Figure 12-29 Reteach Work Window

[Remainder]	Displays the number of remaining points until revision parameters are
Remainder about 1 point(s)	generated. However, at some positions, re-teaching may not decrease the number
	of remaining points.
[Re-teach] button	Specifies the positions selected in the list and opens " <b>Re-teach the position</b> " screen.
[Clear] button	Clears the re-teaching information for positions selected in the list.
[Check of tool data]	Displays current tool data setting in the robot controller.

### \land Caution

#### Position data of the targeted program is write-protected.

During showing this window, the position data of the targeted program in the controller is write-protected. If this tool is interrupted when not communicating with the controller, the position data cannot be unprotected. Please release the protect by using the Teaching Box or Program manager of this software.

Position data for the program selected are displayed. Select the position to re-teach from the list and repeat re-teaching to generate revision parameters.

Re-teaching work procedure can be described as follows. While the "Re-teach the position" screen is open, move the robot to the re-teaching position and click the [Load current position] button on the screen.

Re-teach the	position 🛛
The re-teach positi	on data was specified. Is this tool correct?
Standard tool	(0.00, 0.00, 0.00, 0.00, 0.00)
p1	(+777.45,-0.02,+928.76,+90.44,-71.00,+89.57,0,0)(6,0)
Move the robot to	the re-teach position by using teaching box, and click [Load current position] button.
	Load current position

Figure 12-30 Re-teach the position Screen

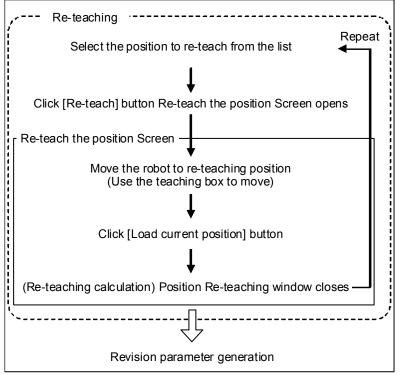


Figure 12-31 Re-teaching Work Procedure

Row for re-taught position will be highlighted in light blue. Re-teaching does not change the position data values shown in the list.

### Caution *Do not perform position correction using the teaching box.* When you move the robot to the re-teaching position using the teaching box, be careful not to correct the position.

During re-teaching, position data of the applicable program in the controller is write-protected.

### Caution

#### Do not change tool data, tool number, or base data.

Do not change tool data, tool number, or base data during re-teaching. Re-teaching calculation will not be performed correctly.

In correcting tool data, if teaching was performed switching back and forth between multiple tools, perform re-teaching operation for each tool.

### Caution

#### Select position data with a different posture element, when re-teaching two or more positions.

Select position data with a different posture element, when re-teaching two or more positions. When position data of the same posture element are selected, there is a possibility that the parameter is not correctly calculated.

### 1 Caution

#### The cautions when using a robot with the additional axis.

When restoring the position with a robot with a travel axis, reteach at a position where the travel position becomes the same as in the original position travel axis data. (Move the robot so that the travel axis data becomes the same as the original position.) If the retaught position travel axis data differs from the original travel axis data, it is impossible to find the correct revision parameters.

It is possible to change the revision parameters to be generated.

Go back one step to the **"Select revision parameter"** window to change the setting. Note that if you return one more step to **"Check of setting tool"** window, all information set by re-teaching work will be cleared.

### Caution

When go back to "Check of setting tool" window, all information set by re-teaching work will be cleared.

#### 12.4.13. Writing parameters

Target ro Revision p	obot: 1:+RV-6SG parameters were genera	-	ameters are	written to th	1.PRG e controller.		
Parameter	Outline	1	2	3	4	5	
DJNT	Error of origin data	-0.0015	0.0000	0.0000	0.0000	0.0000	
<						>	
<u>P</u> rint	[	n data to file.	1				

Figure 12-32 Write Parameters Window

[Print]

[Save position data to file]

Prints the revision parameter information displayed in the list.

Saves position data used in re-teaching as a robot program with positions only. Position data will be values converted by the revision parameters.

Revision parameters and their values generated by re-teaching are displayed. Click [Next] button to write the parameters into the robot controller.

### ← ▲ Caution ———

#### If revision parameters could not be generated

If revision parameters could not be generated, parameters are not displayed in the list. If you click the [Next] button, position data used in re-teaching is written into the robot controller. Since parameters are not generated, position data will not be converted.

Parameters may not be generated under the following conditions.

- \* When one of the specified re-teaching positions is of a significantly low precision
- \* When one of the original position data is of a significantly low precision
- \* When the difference between the original position data and the re-teaching position is too large
- \* When tool data or base data was changed during re-teaching

Clicking the [Back] button and redoing a part of the re-teaching may generate revision parameters. Please delete the re-teaching information for the position data that meets one of the criteria mentioned above and perform re-teaching again.

#### 12.4.14. Controller power supply Off, On

🕂 Position repair 1:F	RC1	
	Revision parameters were written to the controller. To validate changed parameter, re-start (turn DFF->ON) the robot controller. Click [Next] button, when the power of controller has been turned on and the communication server is connecting. Reset the power supply. To validate the written parameter, turn on the power of the robot controller again. Otherwise, if re-teach working is continued succeedingly, it cannot calculate correctly.	
	< <u>B</u> ack Cancel	

Figure 12-33 Re-start the power supply of the controller Window

To activate the written parameters, turn off and then turn on the power of robot controller.

#### 12.4.15. Exit

€ Position repair 1:R	C1	
	Make sure to check before exit this function Make sure to check whether it is satisfactory to all position data before exit this function. Revision parameter is effective in all the position data in the controller. Back up parameter Revision parameters were changed. To save the parameter is recommended. Back up Return to reteach	
	< Back	

Figure 12-34 Finish Window (After Re-teaching)

When the writing of revision parameters is done, operation of this function is complete.

### - A Caution Perform an operation check before exit this function.

Before exit this window, make sure that all position data works properly. If revision is not correct, click the [Return to re-teach] button to continue re-teaching. (However, if you exited from "Edit revision parameters" window, [Return to re-teach] button will not be shown.)

### 🗥 Caution

#### Back up the parameters.

This Function has changed the revision parameters. Back up the parameters before exit this window.

### $\sim$ $m m / m \Lambda$ Caution

### *Position data close to operation area boundaries may not be rectifiable.*

Around the operation area boundaries, position error may put a point outside the operation area, in which case this function cannot rectify the point.

#### 12.4.16. Revision parameter editing

When you select "Edit the value of revision parameter directly" with "12.4.7 Revision parameter generation procedure selection", this screen is displayed.

lect a pro	ocedure.							Input	the parameter	value	
(Usuall	te revision para ly select this) value of revis				<b>`</b> }			MEX0	DTL of standard tool data	3	
Position rep	pair 1:RCT				ŕ		_	1: 2: 3:	0.0000 (mm) 0.0000 (mm) 0.0000 (mm)	4: 0.0000 (c 5: 0.0000 (c 6: 0.0000 (c	deg]
If you click	ck the revision paramet [next], parameters are parameter is displayed i	written to the	e controller.		(	Doubl	e click		ОК	Cancel	
Parameter	Outline	1	2	3	4	5	/				
MEXDTL	Error of standard	0.0000	0.0000	0.0000	0.0000	0.0000	-				
MEXDTL1	Error of tool data 1	0.0000	0.0000	0.0000	0.0000	0.0000					
MEXDTL2	Error of tool data 2	0.0000	0.0000	0.0000	0.0000	0.0000					
MEXDTL3 MEXDTL4	Error of tool data 3 Erorr of tool data 4	0.0000	0.0000	0.0000	0.0000	0.0000					
MEXDIL4	Error of base data	0.0000	0.0000	0.0000	0.0000	0.0000					
DJNT	Error of origin data	-0.0015	0.0000	0.0000	0.0000	0.0000					
Print	1					<u>R</u> eset					
Print			< <u>B</u> a		Next >	<u>R</u> eset Cancel					

Figure 12-35 Edit Revision Parameters Window

[Print]Prints the revision parameter information displayed in the list.[Reset]Reset all changes.

Displays values of current revision parameters in the robot controller.

Select parameter from the list and double-click it to display the setting screen. Set the parameter values. (If the CRn-500 series robot controller's version is older than **J2**, only the origin revision parameter (DJNT) is shown.)

Click [Next] to write all parameters into the robot controller and proceed to "**Re-start the Power Supply of the Controller**" window.

#### 12.5. Tool automatic calculation

With the "Tool automatic calculation", the tool length is calculated automatically by teaching a same position by 3 to 8 points to the robot that is attaching an actual tool, and the value of a tool parameter (MEXTL) is set up.

This function can be used with Version 2.20W or later of this software. Refer to **"Table 12-12 Supported Robot Controllers and Models"**.

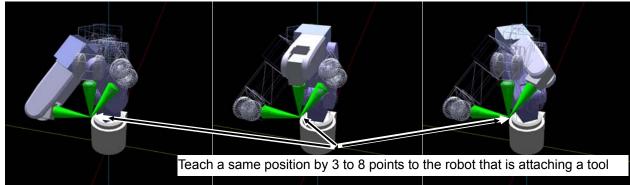


Figure 12-36 Summary the "Tool automatic calculation"

#### 12.5.1. Specifications

The robot models and robot controller versions with which the "Tool automatic calculation" can be used are as follows.

No.	Robot model	CR750/700 series Robot Controller	CRn-500 series Robot Controller				
1	Vertical 6-axis robot	Version R3e/S3e or later					
2	Vertical 5-axis robot	not use	not use				
3	Horizontal 4-axis robot	Version R3e/S3e or later					

#### Table 12-12 Supported Robot Controllers and Models

#### 12.5.2. Starting

The "Tool automatic calculation" is used in the state with the robot controller connected.

When the robot model and robot controller which have connected, correspond to this function, a [Tool automatic calculation] is displayed under [Maintenance] in the project tree. Double-click [Online] -> [Maintenance] -> [Tool automatic calculation] in the project tree.

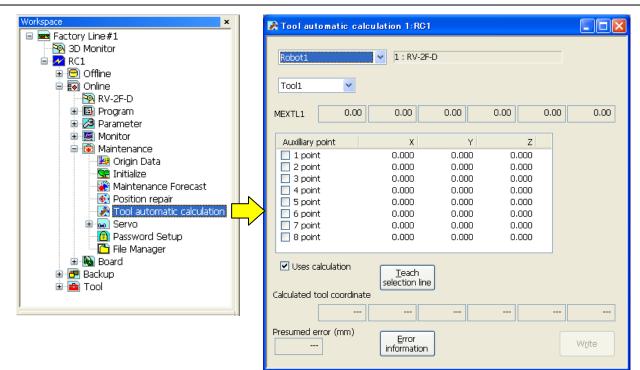


Figure 12-37 Starting the "Tool automatic calculation"

#### 12.5.3. Flow of operations

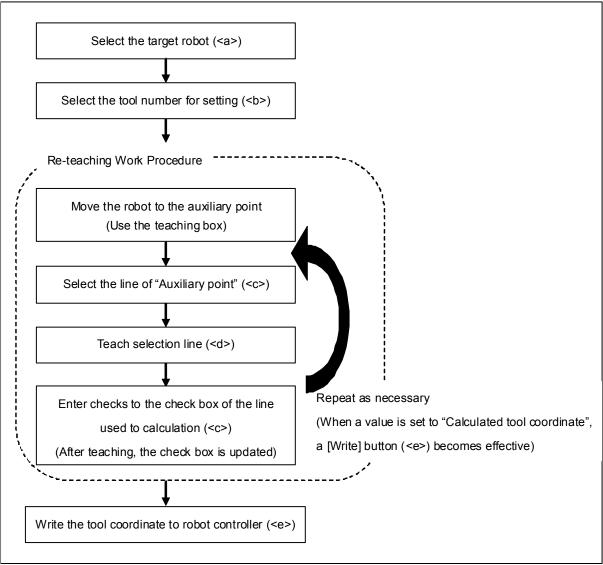


Figure 12-38 Operation Flow

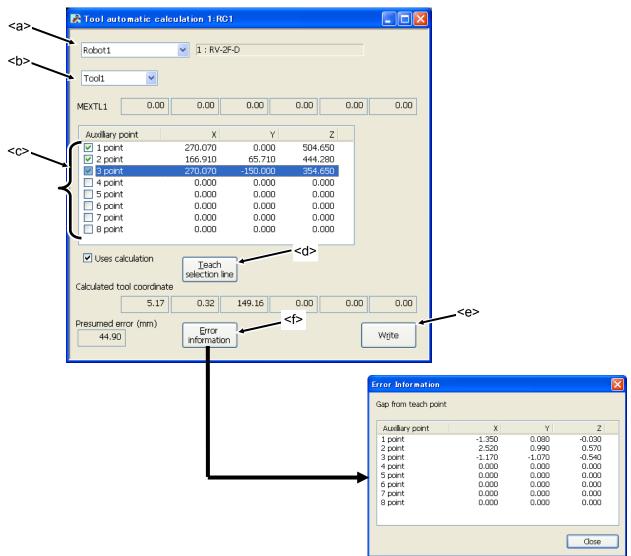


Figure 12-39 The "Tool automatic calculation" screen

Select the robot (<a>) and the tool number (<b>).

Move the robot which is attaching a tool. After selecting the line of "Auxiliary point" list (<c>), click a [Teach selection line] button (<d>). Teach a same position by 3 to 8 points with different posture.

When a value is set to "Calculated tool coordinate", a [Write] button (<e>) becomes effective. When the [Write] button (<e>) is clicked, the values of a tool parameter (MEXTL) are written to the robot controller.

When a [Error information] button (<f>) is clicked, it is possible to check the gap from a teaching point.

# **Caution Teach the position with greatly different posture of the robot.**If the teaching points look like each other, the tool coordinate might be not computable

If the teaching points look like each other, the tool coordinate might be not computable. (e.g. when only A axis is different)

#### 12.6. Servo Monitor

This monitors servo information.

Table 12-13 Supported robot						
		Supported robot				
		CR750/700	CR500	Simulation		
Version	Ver.2.50C or earlier	All robot	All robot	Not available		
VEISION	Ver.3.00A or later	All robot	All robot	RV-F/RH-F series		

Table 12-14 Supported servo data items by simulation

The servo data items can be monitored by simulation as follows.

Table	Table 12-14 Supported servo data items by simulation				
	Items	possible			
1	Position feedback	0			
2	Position in 1 rotation	×			
3	Fdt command	×			
4	Position droop	0			
5	Max. position droop	0			
6	Position command	0			
7	Speed command	0			
8	Speed feedback	0			
9	Speed MAX.	0			
10	Current cmd	0			
11	Current feedback	0			
12	Max. current cmd1	0			
13	Max. current cmd2	0			
14	RMS current	0			
15	Tolerable cmd-	0			
16	Tolerable cmd+	0			
17	Axis load level	0			
18	Max. axis load level	0			
19	Encoder temp.	×			
20	Motor power voltage	×			
21	Motor power voltage (MAX)	×			
22	Motor power voltage (MIN)	×			
23	Regeneration level	×			

#### 12.6.1. Position (ABS)

Data concerning the position of each axis motor can be monitored. The following data can be monitored.

- Position feedback
   Current motor rotation position is displayed by the pulse value of the encoder.
- Position in 1 rotation
   Present position in one rotation of the encoder is displayed.
   (It is not displayed in the CR750/700 series controller. It always becomes 0.)
   Fdt command
  - The amount of the change of the position command between the control cycles is shown. (It is not displayed in the CR750/700 series controller. It always becomes 0.)
- Position droop

The amount of deflection at the motor rotation position to a position command is shown.

Max. position droop

The maximum value of position droop after robot controller's power supply is turned on is displayed. When the [Reset] button on the screen is clicked, this value is reset in 0.

Position command
 The command of the motor rotation position for the servo is displayed by the pulse value.

Click [Reset] button to reset all Servo Monitor.

This function can be used with Version 1.8 or later of this software.

ABS 1:F	RC1				
					Reset
Position	feedback	-Position ir	1 rotation	-Fdt comr	mand
	[Pulse]		[Pulse]		[Pulse/iT]
J1:	0	J1:	0	J1:	0
J2:	808	J2:	0	J2:	0
J3:	2622786	J3:	0	J3:	0
J4:	0	J4:	0	J4:	0
35:	2402985	J5:	0	35:	0
J6:	0	J6:	0	J6:	0
J7: J8:	0	J7: J8:	0	J7: J8:	0
10.	0	10.	0	10.	U
Position	droop	Max. posi	tion droop	Position	command
	[Pulse]		[Pulse]		[Pulse]
J1:	0	J1:	0	J1:	0
J2:	0	J2:	0	J2:	808
J3:	0	J3:	0	J3:	2622787
J4:	0	J4:	0	J4:	0
35:	0	J5:	0	J5:	2402987
J6:	0	J6:	0	J6:	0
J7:	0	J7:	0	37:	0
J8:	0	J8:	0	J8:	0

Figure 12-40 Servo monitor - ABS

#### 12.6.2. Speed

The following data concerting the rotational speed of each axis motor can be monitored.

- Speed feedback

A present motor speed is displayed by the unit of rpm.

- Speed MAX.
   The maximum value of the speed feedback after robot controller's power supply is turned on is displayed.
  - When the [Reset] button on the screen is clicked, this value is reset in 0.
- Speed command

The command of the motor speed is displayed by the unit of rpm.

Click [Reset] button to reset all Servo Monitor.

This function can be used with Version 1.8 or later of this software.

SPEED	) 1:RC1					
Speed						Reset
Spee	d feedback [rpm]	amount of feedback / MAX.	Spe	ed MAX. [rpm]	Spe	ed command [rpm]
J1:	0		J1:	0	J1:	0
J2:	0		J2:	0	J2:	0
J3:	0		J3:	0	J3:	0
J4:	0		J4:	0	J4:	0
J5:	0		J5:	0	J5:	0
J6:	0		J6:	0	J6:	0
J7:	0		J7:	0	J7:	0
J8:	0		J8:	0	J8:	0

Figure 12-41 Servo monitor - Speed

#### 12.6.3. Current

Data concerning the current value of each axis motor can be monitored. The following data can be monitored.

Current cmd

The current command of the motor is displayed.

 Max. current cmd1 The maximum value of the current command after robot controller's power supply is turned on is displayed.

When the [Reset] button on the screen is clicked, this value is reset in 0.

- Max. current cmd2
- The maximum value of the current command for the last 2 seconds is displayed.
- Current feedback

A present value of the motor current is displayed.

Tolerable cmd-/+

The limitation value of the minus side and the plus side of the current command set to the motor is displayed.

- RMS current

Present RMS value of the motor current is displayed.

Click [Reset] button to reset all Servo Monitor.

This function can be used with Version 1.8 or later of this software.

CURRE	ENT 1:RC1							- 0 2
Current	cmd			urrent cmd1	-Max. c	urrent cmd2		Reset
	[Arms]	Current cmd / Max cmd1	Max. C	[Arms]		[Arms]		
J1:	0.000		J1:	0.000	J1:	0.000		
J2:	0.000		J2:	0.000	J2:	0.000		
J3:	0.000		J3:	0.000	J3:	0.000		
J4:	0.000		J4:	0.000	J4:	0.000		
J5:	0.000		J5:	0.000	J5:	0.000		
J6:	0.000		J6:	0.000	J6:	0.000		
J7:	0.000		J7:	0.000	37:	0.000		
J8:	0.000		J8:	0.000	J8:	0.000		
Current	feedback						RMS cu	rrent
			То	erable cmd-	T	olerable cmd+		
_	[Arms]	- / Current feedback / +		[Arms]	-	[Arms]		[Arms]
J1:	0.000		J1:	-0.000	J1:	0.000	J1:	0.000
J2:	0.000		J2:	-0.000	J2:	0.000	J2:	0.000
J3:	0.000		J3:	-0.000	J3:	0.000	J3:	0.000
J4:	0.000		J4:	-0.000	J4:	0.000	J4:	0.000
J5:	0.000		J5:	-0.000	J5:	0.000	J5:	0.000
J6:	0.000		J6:	-0.000	J6:	0.000	J6:	0.000
J7:	0.000		J7:	0.000	J7:	0.000	J7:	0.000
J8:	0.000		J8:	0.000	J8:	0.000	J8:	0.000

Figure 12-42 Servo monitor - Current

#### 12.6.4. Load

The load state of each axis motor and the temperature of the encoder (Only the robot that corresponds to the function of the encoder temperature) can be monitored.

The following data can be monitored.

- Axis load level

A preset load ratio of each motor is displayed as an alarm level. The overload error occurs when this value reaches 100%.

- Max. axis load level

The maximum value of the axis load level after robot controller's power supply is turned on is displayed.

When the [Reset] button on the screen is clicked, this value is reset in 0.

Click [Reset] button to reset all Servo Monitor.

The encoder temperature is not displayed with the software before Version 2.00A. And the robot controller that corresponds to the function of the encoder temperature is as follows.

Robot controller	Software version of the robot controller
CR750-D/CRnD-700	Ver.S3 or later
CR750-Q/CRnQ-700	Ver.R3 or later

LOA	D 1:RC1				
			Reset	Amb. temp.	40
	oad level			-Encoder tem	p. [deg C]—
Axis I	oad level [%]	Max.	axis load level [%]	Cur. I	Max.
J1:	0.000	J1:	0.000	20	30
J2:	0.000	J2:	0.000	20	29
J3:	0.000	J3:	0.000	21	34
J4:	0.000	J4:	0.000	25	28
J5:	0.000	J5:	0.000	30	45
J6:	0.000	J6:	0.000	29	41
J7:	0.000	J7:	0.000		
J8:	0.000	J8:	0.000		

Figure 12-43 Servo monitor - Load

#### 12.6.5. Power

The following data concerning robot controller's main circuit power supply can be monitored.

Motor power voltage A present power-supply voltage value is displayed. Motor power voltage (MAX) The maximum value of the motor power voltage in servo ON is displayed. When the [Reset] button on the screen is clicked, this value is reset in 0. Motor power voltage (MIN) The minimum value of the motor power voltage in servo ON is displayed.

When the [Reset] button on the screen is clicked, this value is reset in 0. Regeneration level

The regenerative current value of each axis is displayed as an alarm level. The excessive regeneration error occurs when this value reaches 100%.

Click [Reset] button to reset all Servo Monitor.

This function can be used with Version 1.8 or later of this software.

V POWER 1:RC1		- • •
		Reset
Motor power	Regene	ration level
		[%]
Motor power voltage :	J1:	0
0 [V]	J2:	0
	J3:	0
Motor power voltage (MAX) :	J4:	0
0 [V]	J5:	0
Motor power voltage (MIN) :	J6:	0
	J7:	0
0 [V]	J8:	0

Figure 12-44 Servo monitor - Power

#### 12.7. Security function of the robot controller (Password Setup)

It is possible to forbid to accessing the robot programs, parameters and files in the robot controller. The security function can be achieved by setting the password to the robot controller. This function can be used with Version 2.00A or later of this software. And the software version of the robot controller which can be used is as follows.

Table 12-15 Compliant ver	SION OF THIS TUNCTION and CONTONER
Robot Controller	Software version of robot controller
CR750-D/CRnD-700 series	S3
CR750-Q/CRnQ-700 series	R3
CRn-500 series	not use

#### Table 12-15 Compliant version of this function and controller

The function that the password can be set is as follows. It is possible to setup the password to access of the program, parameters, and files individually. The factory default setting of "Password Setup" are off.

Туре	Limited functions	Remarks
Program	Writing the programs.	
	Reading the programs.	
	<ul> <li>Copying the programs.</li> </ul>	
	<ul> <li>Renaming the programs.</li> </ul>	
	<ul> <li>Deleting the programs.</li> </ul>	
	<ul> <li>Writing the position data for SQ Direct.</li> </ul>	
	Reading the position data for SQ Direct.	
	<ul> <li>Deletion of all robot programs.</li> </ul>	
	· File Manager	It is not possible to delete the file, or
		rename the file.
Parameter	Writing the parameters.	It is possible to read the parameters from the robot controller.
	Position repair function.	It is not possible to write the revision parameter created by "Position repair function" in the robot controller.
	Restore the origin data.	
	Restoring the program information	Program information is correctly restored though < Write the task slot# > error is displayed when program information is restored before this software version 1.8 or earlier.
File	Backup	
	Restore	
	<ul> <li>Position repair function</li> </ul>	

#### Table 12-16 Function that access is limited.

Use the registration, change, and the deletion of the password while connected to the robot controller. From the project tree, click on the menu bar [Online]  $\rightarrow$  [Password Setup], or double click the target project [Online]  $\rightarrow$  [Maintenance]  $\rightarrow$  [Password Setup].

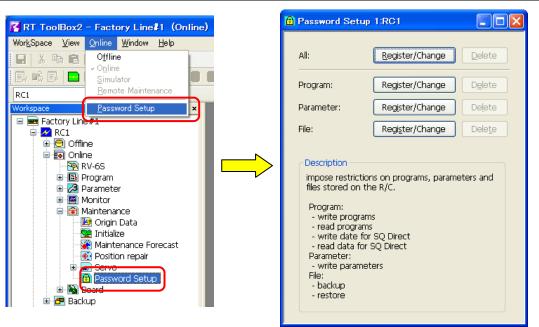


Figure 12-45 Password setup

When the security function has been turned on in the controller, the mark  $\widehat{}$  is displayed in the left of the button of the item to which access is forbidden.

(for example: 🖻 Register/Change )

#### 12.7.1. Register the Password

The password is registered to the robot controller.

Click the "Register/Change" button of the item to which register the password in "Password Setup" screen. After inputting the password in the "Register/Change Password" screen, click the [OK] button. The input password is displayed by "\*".

Please input the password by 8 characters or more, and 32 characters or less. The character that can be used is as follows.

#### Table 12-17 Character that can be used by password

Character that can be used by password (8 characters or more, and 32 characters or less) Number ( from 0 to 9 ) Alphabet (from A to Z, and from a to z) (Notes)The capital letter and the small letter of the alphabet are distinguished.

Password Setup 1:RC1	Register/Change Password
All:       Register/Change       Dele         Program:       Register/Change       Dele         Parameter:       Register/Change       Dele         File:       Register/Change       Dele         Description       Impose restrictions on programs, parameters an files stored on the R/C.       Program:         Program:       - write programs       - read programs         - write date for SQ Direct       - read data for SQ Direct         Parameter:       - write parameters         File:       - backup         - restore       - restore	All Please enter the password, and click OK.  Old password: New Password: ******* Re-enter Password: ******* Re-enter Password: *******  Description of Available Characters Please use 8 to 32 single-byte characters, which include numbers, A to Z, a to z for the password. Password. Passwords are case-sensitive.  Note Keep passwords in a secure place, and never forget the registered password!  OK Cancel

#### Figure 12-46 Register Password

### **Caution**

#### Please note the management of the password enough.

It becomes impossible to release the security function of the robot controller when the password is forgotten. Please note the management of the password enough.

#### 12.7.2. Change the Password

The password being set in the controller is changed.

Click the "Register/Change" button of the item to which change the password in "Password Setup" screen. After inputting a password set now and a new password in the "Register/Change Password" screen, click [OK] button.

🖻 Password Setup 1:RC1	Register/Change Password
All: <ul> <li>Register/Change</li> <li>Delete</li> </ul> Program:              Register/Change       Delete         Parameter:              Register/Change       Delete         File:              Register/Change       Delete         File:              Register/Change       Delete         Program:              Register/Change       Delete         Program:              read programs               read programs          - write programs              write date for SQ Direct               Parameter:          - write parameters              File:               write parameters          - write parameters              File:               varite parameters	All Please enter the password, and click OK.  Qld password: ******* New Password: ******* Re-enter Password: *******  Description of Available Characters Please use 8 to 32 single-byte characters, which include numbers, A to Z, a to z for the password. Passwords are case-sensitive.  Note Keep passwords in a secure place, and never forget the registered password!  OK Cancel

Figure 12-47 Change Password

When the password is changed by "All" button, it is necessary to register the same password to all items.

#### 12.7.3. Delete the Password

The password being set in the controller is deleted.

Click the "Delete" button of the item to which delete the password in "Password Setup" screen. After inputting a password set now in the "Delete Password" screen, click [OK] button.

Password Setup 1:RC1		Delete Password		
All: 🖻 Register/Ch Program: 🖻 Register/Ch	hange D <u>e</u> lete	All Please enter the passv  Password:	word, and click OK.	
Parameter: 🖻 Register/Cr File: 🖻 Register/Cr				OK Cancel
Description Impose restrictions on program files stored on the R/C. Program: - write programs - read programs - write date for SQ Direct - read data for SQ Direct Parameter: - write parameters File: - backup - restore	s, parameters and			

Figure 12-48 Delete Password

When the password is delete by "All" button, it is necessary to register the same password to all items.

#### 12.8. File Manager

You can copy, delete and rename the file in the robot controller. This function can be used with Version 2.20W or later of this software.

Double-click [Online] ->	[Maintenance] ->	[File Manager]	in the project tree.
--------------------------	------------------	----------------	----------------------

Workspace ×	🔁 File Manager 💿 💷 🖻	3
Factory Line#1	PC -> Robot	
🖶 📈 RC1		
🕀 😇 Offline	Source	
🖻 🐨 🗑 Online	PC C:¥RT Too¥Others Browse     O PC C:¥RT Too¥Others Browse	
ian in the second seco		
🗈 🧭 Parameter		
□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □	Refresh Selection release Refresh Selection release	
Origin Data		
🖳 🔛 Initialize	Name Size Date Time Name Size Date T	
Maintenance Foreca	text1.txt 48 2012/03/22 11:39: DATA1.DAT 48 12/03/24 16:	
Position repair	text2.txt 75 2012/03/22 11:40:	
Bervo		
File Manager		
ia is Board		
	Free: 29360463872 [Bytes] Free: 104857600 [Bytes]	
		1
	Copy Delete Rename Close	
		,

Figure 12-49Starting File Manager

## Caution If the robot controller's version is earlier than R3e/S3e: You cannot delete or rename the file without an extension. If the robot controller's version is earlier than R3e/S3e: You cannot delete or rename the file of a name that is longer than 16 characters. If the robot controller's version is earlier than R3e/S3e: You cannot operate the file which '0' is attached at the head of a file name.

### \land Caution –

### When the password is registered in "program" by robot controller's security function, the file cannot be deleted, or cannot be renamed.

When the password is registered in "program" by robot controller's security function, the file cannot be deleted, or cannot be renamed.

		O : Er	able、 × : Disable
	Item to which p	password of securit registered.	y function is
	Program	Parameter	File
Delete the file	× ×	0	0
Rename the file	^	0	0

Please delete the password of robot controller's security function when you operate these. Please refer to **"12.7.3 Delete the Password"** for the method of deleting the password. The setting(register the password) and the release(delete the password) of robot controller's security

function can be used with this software version 2.0 or later. Please refer to **"Table 12-15 Compliant version of this function and controller"** for robot controller's compliant version.

#### 12.8.1. File list display

On the left and right lists, the lists are files of the displayed in the robot controller and the specified folder.

- (1) Setup of transmission
- (2) PC
- (3) Robot
- (4) [Browse...]

You can select "PC->Robot" or "Robot -> PC". You can specify files in the personal computer. You can specify a robot controller that is currently connected When you select [PC], you can specify any folder on the computer.

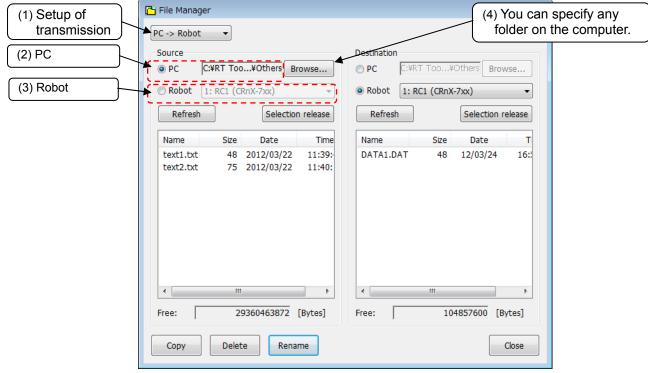


Figure 12-50 File list display

There are files which you cannot operate on this screen, such as robot programs, parameter files in the robot controller, etc. The file which cannot be operated is not displayed on a list. The file which cannot be operated on this screen is as follows.

No.	Files	File name or
		extension
1	Robot program files	.MB4/.MB5/.prg
2	Parameter files	.PRM
3	Error log files	AError.log
		CError.log
		HError.log
		LError.log
4	I/O Log (Input/Output)	IOLogInp.log
		IOLogOut.log
5	Trap function log files(program execution log files)	.trp
6	Servo data log files	.sdl/.sdb
	(This file is reconstructed at the time of the power supply ON.)	
7	Force control log file	.fsl
	(This file is deleted at the time of the power supply	
	OFF.)	
8	Error record log files	TTLERROR.DAT
9		ERRORLOG.CSV
10	Command information file	COMMANDS.XML
11	System files	.SYS
	(Backup information etc.)	
12	Serial information file	.ser
	(This file is created at the time of backup)	

Table 12-18 The file which cannot be operated on a file management screen, and its extension

#### 12.8.2. Copy

The files are copied.

Select the transmission source file names from the list at the left, and designate the transmission destination folder on the right side. The multiple transmission source files can be selected at the same time Click [Copy] button after choosing the file to copy and setting up a transmission place. The file is copied after a copy confirmation message display.

When the file of a same name exists in a transmission place, an overwrite confirmation message is displayed.

#### 12.8.3. Delete

The files are deleted.

Select the file to delete in the list. It is possible to select some files simultaneously. All the files selected by a list of both right and left are deleted. Click [Delete] button after selecting some files in the lists. A deletion confirmation message is displayed.

#### 12.8.4. Rename

The file is renamed.

Select one file in the list. It is possible to select a file from both of the lists. Click [Rename] button, and input new file name in "Setup for Rename" dialog.

Setup for Rename	<b>×</b>
Input New File Name.	
text2.txt	
ОК	Cancel

Figure 12-51 Setup for Rename

### 13. Option Card

You can check information on option cards mounted in the robot controller.

When you open [Option Card] on the project tree, the slots in which option cards are currently mounted and the option card names are displayed. If you place the mouse cursor on an option card name, the information for that option card is displayed.

If no option card is mounted on the robot controller, nothing is displayed.

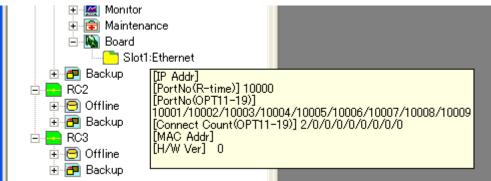


Figure 13-1 Option Card Information

### 14. Backup and Restore

You can back up information in a robot controller to the computer. You can also restore backup information saved to the computer back into a robot controller.

Backup	Saves the backup data on the robot controller to the personal
(Robot -> Personal computer)	computer.
Restore	Transfers the backup data saved on the personal computer to the
(Personal computer -> Robot)	robot controller.

### ▲ Caution

#### Please do not pull out the cable while communicating.

Please never pull out the cable while communicating with the robot controller. If the communication cable is removed while communicating, the status of the robot controller or the personal computer might become abnormal. Please remove the cable when the status is not "Online" or this software exited.

Also when communicating by using the USB, please do not pull out the USB cable until the communication is completed.

### **▲** Caution

Precautions when executing a backup/restore operation during the replacement of a controller (CPU) that supports Maintenance Forecast

When executing a backup/restore operation during the replacement of a controller (CPU) that supports Maintenance Forecast, also perform the backup/restore operation using the Maintenance Forecast tool.

After a backup operation is performed on a controller that supports Maintenance Forecast, the following message is displayed:

Backup/Restore
When backing up for controller (CPU unit) exchange
The Maintenance forecast is effective in this controller.
Please back up information of the "Maintenance forecast" with "Maintenance forecast tool".
To do correctly the "Maintenance forecast" after exchanging the controller (CPU unit), please restore information of the "Maintenance forecast" with the "Maintenance forecast tool".
If the difference of the time of "back up" and "restore" is great, or if you do not "restore", take care the reliability of the "Maintenance forecast" falls.
Maintenance forecast tool" is started.
ОК
Figure 14-1 Backup When Maintenance Forecasting Information Is Enabled
g a CRn-500 series robot controller, maintenance forecasting is supported 2 and later.

# 🗥 Caution -

When the password is registered in "file" by robot controller's security function, it is not possible to back up information in a robot controller to the personal computer, or to restore backup information saved to the computer back into a robot controller.

When the password is registered in "file" by robot controller's security function, it is not possible to back up the information in the robot controller to the personal computer or to restore backup information saved to the computer back into a robot controller.

			O :	Enable, × : Disable
	Item to which password of security function is registered.			on is registered.
		Program Prameter File		
	All files	0	0	×
backup	Program	0	0	×
kup	Parameter files	0	0	×
	System program	0	0	×
	All files	0	0	×
Restore	Program	0	0	×
tore	Parameter files	0	0	×
	System program	0	0	×

Please delete the password of robot controller's security function when you operate these. Please refer to **"12.7.3 Delete the Password"** for the method of deleting the password. The setting (register the password) and the release (delete the password) of robot controller's security function can be used with this software version 2.0 or later. Please refer to **"Table 12-15 Compliant version of this function and controller"** for robot controller's compliant version.

# 14.1. Backup(Robot -> PC)

You can save information in a robot controller to a file in the computer. Use the backup function while RT ToolBox2 connected to the robot controller.

There are two methods for saving data as follows.

<1> Saving data from one robot controller.

<2> Saving data by batch processing from all robot controllers which connected with this software. (Note that this function can be used with Version 1.3 or later of this software.)

# ▲ Caution

## **Cautions for backups**

When backing up system status variable values and program external variable values, switch the robot controller power Off, then On again, then perform the backup operations.

The files BKUP.SYS and MECHA.SYS are automatically created in the specified folder. These files record the saved robot controller mechanical information and save format. Be careful. If you delete or rewrite these files, this may make it impossible to restore them to the robot controller.

The objective of backup data is to back up robot controller information. However, with this software version 1.2 or later, it is possible to open a backed up program with program editor. Please refer to **"8.2.4 Opening a program in the backup data"** in this manual for details.

# 🔨 Caution

# Cautions when backup is interrupted

Backup again when the communication fault occurs while backing up or the backup is interrupted clicking the "cancel" button.

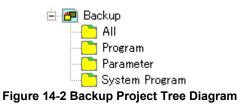
"[NG]" is added to the head of folder name when the backup is interrupted. Do not restore the backup folder because the folder's information is imperfect. There is a possibility that the controller doesn't start when restoring is continued. When you select the folder whose name has "[NG]" when restoring, the warning dialog as follows is displayed. Select "No" normally.

This function is available from RT ToolBox2 Ver.1.3.1 or later.

MELFA	RT ToolBox2	
♪	The selected backup folder is imperfect. There is a possibility that the controller doesn't start when restoring is continued. Are you sure you want to continue restoring?	
	Yes No	

# 14.1.1. Saving data from one robot controller

(1) From the project tree, open the target project [Backup]. In the backup tree, "All file", "Program information", "Parameter files", and "System program" are displayed.



All Files	Saves all files (robot program, parameter files, etc.) in the robot controller into the designated folder.
Program	Saves the robot program file into the designated folder.
Parameter Files	Saves the parameter files into the designated folder.
System Program	Saves the system base program file into the designated folder.

(2) Double click the items to backup.

	📫 All 1:R01	
Double click	Select information to backup.       OK         Backup       Robot : RC1:RV-3SQJ         Image: All files       Image: All files	
	F Program	
	Parameter files	
	🔽 System program	
	Parameter list files Backup Path : ings¥r3p¥My Documents¥Factory Line#1¥RC1¥Backup¥20080108-153354 .	]

Figure 14-3 Backup (When Batch Is Selected)

[Parameter List Files] :

This is used to edit the parameter information saved by backup in offline mode, and is not required for backup. If this is not checked, the time required to save all files will be shortened.

(3) Specify the backup destination. The default value is the folder that created the workspace/project name/Backup/today's date and time.

You can change the backup destination folder with the [...] button at the right of the displayed backup destination.

You can back up other items at the same time too by putting checkmarks in their checkboxes. In this case, the data is backed up to the selected backup destination, with the identifier by the backup type is added to the folder name. The identifiers are as follows.

All...ALL Program information...PRG Parameter information...PRM System program...SYS

The folder name at this time is displayed on the right side of the respective backup items.

📥 All 1:RC1
Select information to backup. (Robot Controller -> Personal computer) OK
Robot : RC1:RV-3SQJ
I All files¥20080108-153354ALL
✓ Program¥20080108-153354PRG
✓ Parameter files¥20080108-153354PRM
✓ System program¥20080108-153354SYS
Parameter list files
Backup Path : jings¥r3p¥My Documents¥Factory Line#1¥RC1¥Backup¥20080108-153354

Figure 14-4 Backup (When Multiple Selected)

- (4) Specify the back destination, then click the [OK] button.
  - The confirmation screen is displayed. When you confirm, then click [Yes], the backup is started.



When the backup is completed, the backup data is displayed at [Backup] on the project tree.



## 14.1.2. Saving data from all robot controllers(Online Project Backup)

It is possible to save data by batch processing from all robot controllers which connected with RT ToolBox2. This function can be used with Version 1.3 or later of this software.

(1) After selecting the name of workspace, click the right button of mouse. Or, after selecting the "Backup" of the project that is online, click the right button of mouse. Select "Online project backup" in the right mouse button menu. The screen to select the item of backup is displayed.

orkSpace       View Online Window Help         workSpace       View Online Window Help         workSpace       WorkSpace         ct       Import project         workSpace       Import project         workSpace <th>RT ToolBox2 - Factory Line#1 (Online</th> <th>🛣 RT ToolBox2 - Factory Line≇1 (Onlin</th>	RT ToolBox2 - Factory Line#1 (Online	🛣 RT ToolBox2 - Factory Line≇1 (Onlin	
CL       Image: Cl         Image: Cl	ork <u>S</u> pace <u>V</u> iew <u>O</u> nline <u>W</u> indow <u>H</u> elp	Work <u>S</u> pace <u>V</u> iew <u>O</u> nline <u>W</u> indow <u>H</u> elp	
Cl       Importe project         Importe project       Importe project         Importe project       Backup	. X <b>b C</b> E E <b>2 4 3 1 1 1</b>		
Contraction       Contraction	) 📽 📴 🖿 🖿 🖿 🗮 🗧 🗖 🛑	🗈 📽 🗳 🗖 🖿 🖿 🗖 🗧 🗆 I I	
RC1 Add project     Import project     RC1 Mode workspace     Bochine Project Backup     RC2     Online Project Backup     RC3     RC3     RC3     RC3     RC4     RC4     RC4     RC4     RC5     RC5	C1 🔍 💐 🗷 🔀 🔛	RC1 🗨 🔽 🗷 📶	
RC3 RC3 RC3 RC3 RC3 RC3 RC3 RC3	orkspace ×		
Onlie project backup 1:RC1     Select information to backup.     (Robot Controller -> Personal computer)     OK     Backup	RC1       Add project         Import project       Import project         Import project       Update workspace         Import Project Backup       Edit workspace title         RC2       Online Project Backup         Import Project Backup       RC1         Import Project Backup       RC1         Import Project Backup       RC2         Import Project Backup       RC2         Import Project Backup       Import Backup         Import Project Backup       Import Back	C1  COffline  E C0 Online  C2 Restore  C3 O Delete All  E C0 O Online Project Backup  C4 C2 All  C5 C3 Program  C5 C3 Program  C6 C4	
(Robot Controller -> Personal computer) OK Backup  All files  Program  Parameter files  System Program  Parameter list files  Folder Name : 20081007	Conlie project backup 1:RC1		
	(Robot Controller -> Personal computer) Backup All files Program Parameter files System Program Parameter list files		
Figure 14-1 Online Project Backup			

Figure 14-1 Online Project Backup

(2) Select the item of backup in "Backup" group. Input a folder name of the backup destination to "Folder Name", and click [OK] button.

The input folder name is added to "Backup" of each project.

The confirmation screen of the backup is displayed. After confirming, click [Yes] button. Then the communications for saving data is begun.

Backup	×
<< Backup (RC -> PC) >>	
Information among the robot controllers is written in a specified folder.	
Back up the following projects. "RC1", "RC2"	
Are you sure you want to start backup?	
No	

Figure 14-2 Confirmation screen of "online project backup"

(3) When the batch processing for saving data from all robot controllers is completed, the saving data is displayed in [Backup] of the project tree.

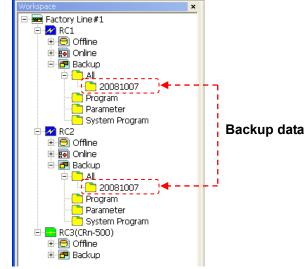
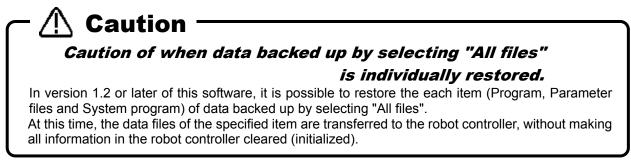


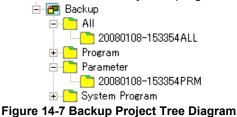
Figure 14-3 The information of saving data from all robot controllers by batch processing.

# 14.2. Restore (PC -> Robot)

You can take information back up to the computer and transfer it to robot controller information. Use the restore function while connected to the robot controller.



(1) From the project tree, open the target project [Backup]. In the backup tree, the information back up for "All file", "Program information", "Parameter files", and "System program", respectively, is displayed.



(2) Select the information listed on the controller, then click the right mouse button. From the right mouse button menu, select [Restore].

batton mena, select free	storoj.		
	Restore Delete 54PRM	Restore 1:RC1         Select information to restore. (Personal Computer-> Robot Controller)         Restore         Robot : RC1:RV-7F-D         Image: All files         Image: Program         Parameter files         System program	OK
		Change robot origin data	
		Change Robot Arm Serial Number	
		Restore the file manager's data	
		Backup Path :	Browse
		re 14-8 Restore	
All Files :		(except BKUP.SYS and MECHA.SYS) in th ontroller after all information in the robot contro	
Program :	· /	program file in the designated folder to the rob	ot controller.
Parameter Files :	Transfers the param	neter file in the designated folder to the robot c	ontroller.
System Program :		em base program file in the designated folde	r to the robot
Ohan an Dahat Oriain	controller.		and the second second
Change Robot Origin : Data		ormation and it only valid when All or Para ons for when this checkbox is checked and whe	
Change Robot Arm		eckbox, the robot main unit serial number is al	so rewritten.
Serial Number Restore the file : manager's data		heckbox, the data treated with file manager of ed. This function can be used with Version 3.0	

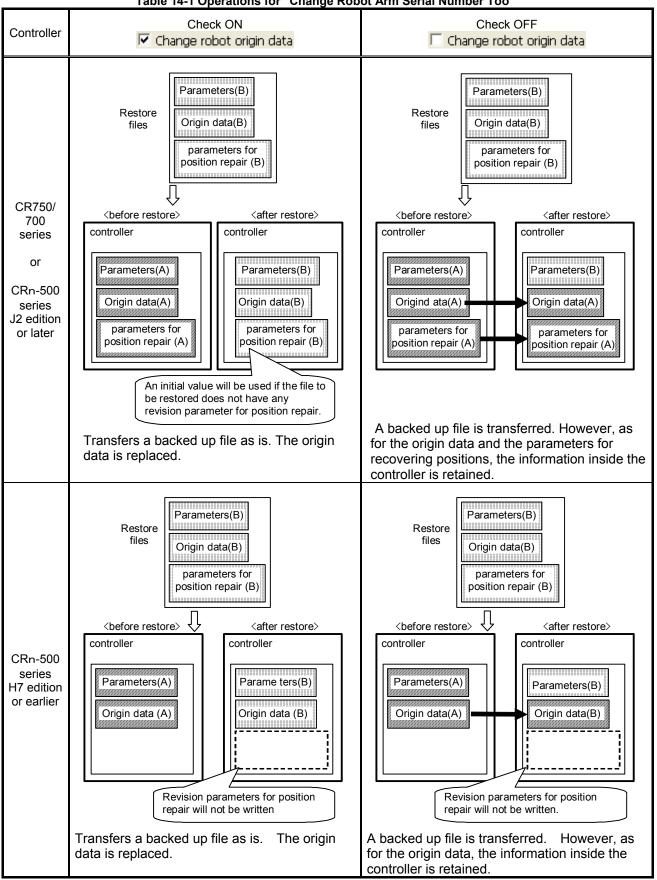


Table 14-1 Operations for "Change Robot Arm Serial Number Too"

Be careful. If communication is cancelled during a series of restore processing, the position revision parameters generated with the "Position repair" function and the origin data may be changed.

# 🕂 Caution

# **Precaution for Restore**

If a batch restoration or a program restoration is executed when the program is being started, the program will automatically be stopped.

At this time, if there is an error in the controller, the program in operation cannot be stopped, and the message shown on the right will be displayed. Although a restoration process can be executed even in such a case, the program currently selected or the program that is started by ALWAYS cannot be re-written. If it is possible to remove the cause of the error, reset the error and execute the restoration process again.

MELFA P	RT ToolBox2 🛛 🛛	
♪	< Clear the task slot table fail. > Do you continue the restoring ?	
	Yes No	

# ▲ Caution

# Do not restore the backup information whose name has "[NG]"

Do not restore the backup information whose name has "[NG]" because the folder's information is imperfect.

"[NG]" is added to the folder name when the communication fault occurs while backing up or the backup is interrupted clicking the "cancel" button. Do not restore the backup folder because the folder's information is imperfect. There is a possibility that the controller doesn't start when restoring is continued. When you select the folder whose name has "[NG]" when restoring, the warning dialog as follows is displayed. Select "No" normally.

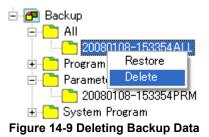
This function is available from RT ToolBox2 Ver.1.3.1 or later.

The selected backup folder is imperfect. There is a possibility that the controller doesn't start when restoring is cont Are you sure you want to continue restoring?	
	Yes No

# 14.3. Deleting Backup Data

You can delete the backed up information.

Select the information to delete, then click the right mouse button. From the right mouse button menu, select [Delete].



It is also possible to delete all the backup data.

Right click [Backup] for the target project. From the right mouse button, click "Delete All".

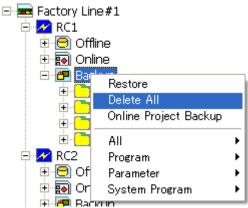


Figure 14-10 Deleting All the Backup Data



Be aware that once backup data is deleted, you can not restore it.

# **15.Tool function**

# 15.1. Force control log file viewer

Force control log file viewer is the function to display the graph of log data of force control in PC and robot controllers.

From the project tree, double-click the target project [Tool] -> [Force control log file viewer].

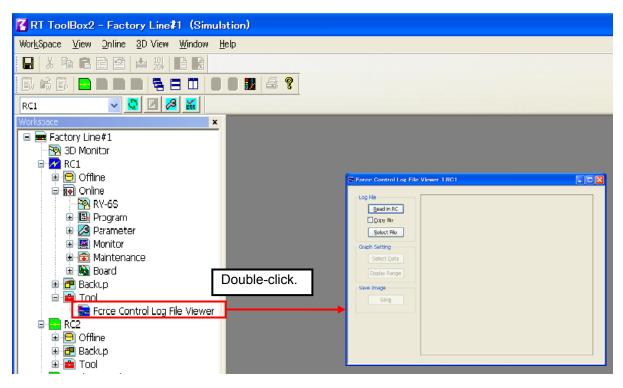


Figure 15-1 Force control log file viewer

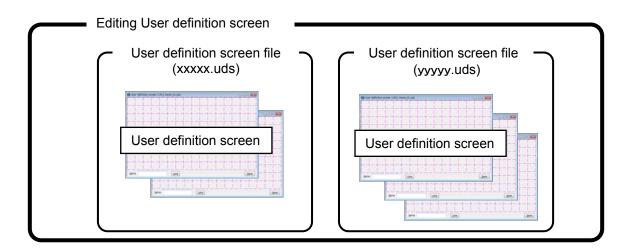
This screen can be used when connected with a machine compliant with the force control function. For details, refer to the user's manual containing complete description of the force control function.

# 15.2. User definition screen

It is possible to edit the user definition screen which can be operated by highly efficient T/B.

You can make the customized screen by arranging the parts such as the button and the lamp that synchronize with the I/O signal. You can make two or more pages of definition screens. These pages are managed by a file (called "User definition screen file") as one group. It is possible to create two or more user definition screen files.

You can make the customized screen on T/B by arranging the parts such as the button and the lamp that synchronize with the I/O signal. You can make two or more pages of definition screens.



This screen can be used by the following usages.

- This screen is used as an operation monitor.
- When the state of T/B is enabling, the peripheral devices such as conveyers is made to work by the button on the screen.

T/B which you can use an user definition screen, and its software version are as follows.

Table 15-1 T/B which yo	ou can use an user definition screen,	and its software version
-------------------------	---------------------------------------	--------------------------

T/B	Software version of T/B
R56TB	Version 2.2 or later
R57TB	Version 2.2 or later

This function can be used with Version 2.20W or later of this software.

Parts that can be displayed on the user definition screen are as follows.

#### List 15-2 List of parts

	Parts		Explanation
1	Button		The signal can be output from the robot controller by clicking
			the button.
			The signal can be output only in T/B Enabling state.
2	Lamp		The lamp can be turning on/off by the state of the I/O signal.
3	Robot	Variable	The value of the specified variable can be displayed.
	information	Exe lines	The executing program lines can be displayed.
		Program name	The executing program name can be displayed.
		Exe line num.	The executing line number of the program can be displayed.
		Cur pos	Current positional data of the XYZ coordinate system can be displayed.
		Cur jnt	Current positional data of the joint coordinate system can be displayed.
4	Label		The character string can be displayed.

## 15.2.1. Creating a new User definition screen file

In order to create an user definition screen, it is necessary to create an user definition screen file.

After selecting [Tool]->[User definition screen] in the project tree, click the right button of mouse and select the "New" of right button menu. Click [OK] button after inputting a new file name. The user definition screen file created newly is added to the bottom row of [user definition screen].

Workspace ×	
🖃 🛲 Factory Line#1	
🛱 🚾 RC1	r
🕀 🔁 Offline	New user definition screen file
iandrei Backup iandrei Backup	New Name:
RC2 New	
i - Offline Import	OK Cancel
Tool Export	

Figure 15-1 Creating a new User definition screen file

# About User definition screen files

It is possible to create a user definition screen file name freely. But a user definition screen file is used as folder names in Windows, so you can not use characters that can not be used in Windows folders names  $( \ \ )$ : \*? " <> |).

An error occurs when the inputted user definition screen file already exists.

# About the extension of an user definition screen file

The extension of the user definition screen file is ".uds". When an extension is omitted, or when the wrong extension is inputted, .uds extension is attached automatically.

### 15.2.2. Editing the page of user definition screen

Double-click [Tool] -> [User definition screen] -> ["User definition screen file"]->["Page name"] in the project tree. The edit dialog of an user definition screen is displayed.

When you create a new user definition screen, after selecting [Tool]->[User definition screen] -> ["User definition screen file"]-in the project tree, click the right button of mouse and select the "New" of right button menu. A new "User definition screen" is displayed.

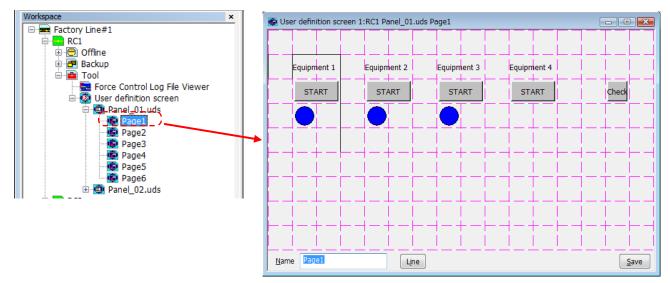


Figure 15-2 Editing the existing user definition screen

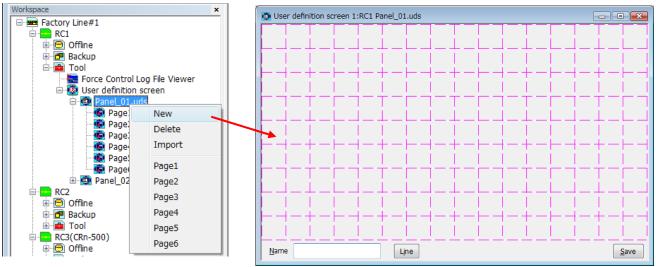
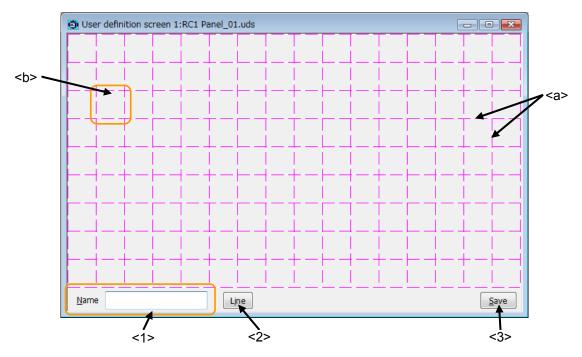


Figure 15-3 creating a new user definition screen

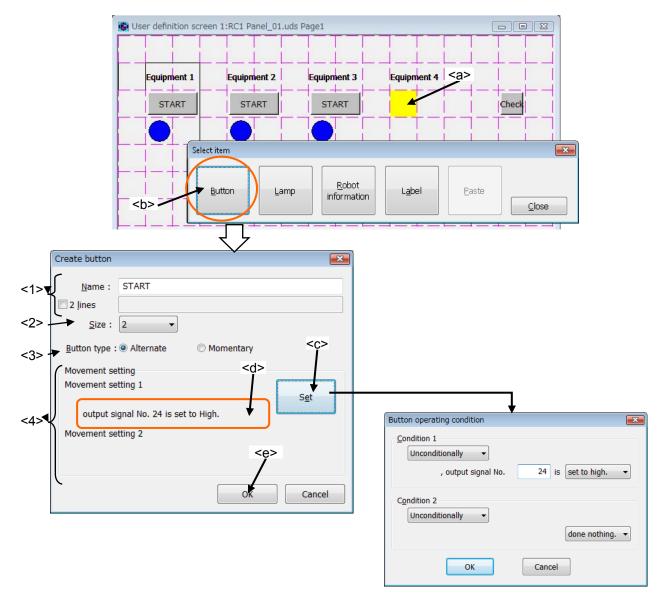
The grid line (<a>) is displayed in the edit display of the user definition screen. Each part can be registered with the block unit (<b>) delimited in this grid line.



- <1> Name : Page name is set. The name can be input by [Edit] button.
- <2> Line : The ruled line is drawn on "User definition screen".
- <3> Save : The content of the edit is preserved.

#### 15.2.2.1. Button

- (1) Click the position (block) in which the button is made (<a>). Left side of the button is arranged in this position.
- (2) After "Select item" window is displayed, click [Button] button (<b>).
- (3) Set the button name, button size and the kind of button on "Create button" windows.
- (4) The movement of when the button is clicked is set by [Set] button (<c>). The set content is displayed in "Movement setting" (<d>).
- (5) After the setting is completed, click [OK] button (<e>).



<1> Name	:	The name of the button is set. The button name can be input by [Button name edit] button. The button name can be displayed by two lines by checking "2 lines".	
<2> Size	:		e button can be set. e button that can be set is 1/2/3.
<3> Button type	:	The kind of the button can be set.         Alternate       When the button is clicked once, the button keeps ON state. And when the button is clicked again, it returns to OFF state. The signal output is kept too.         Momentary       The button keeps ON state while it is being pushed.	

#### <4> Movement setting : The condition and the signal output operation when the button ON can be set.

The condition can be selected as follows. Please set the signal number etc. when you make the signal state the condition. When the button is ON or OFF, the condition is judged.

- Unconditionally
- State of the specified Input signal
- State of the specified output signal

The signal output operation can be selected as follows. Please set the signal number etc. when you output the signal.

- Done nothing
- Output the specified output signal

Operation setting can be set up to two.

Two operation settings operate individually by using each condition.

Moreover, when High and Low are set to output to the same signal, and both conditions become true, the Condition2 is given priority.

If the operation is set signal output, when the button is OFF, the signal is output in the state opposite High/Low state at the time of ON.

#### Example of setting the movement of button

For example:

The button that output signal number 20 to High when input signal number 20 is High.

(1) A default value of "Button operating condition" window is shown in a right picture.

Button operating condition	<b>X</b>
Condition 1 Unconditionally	done nothing. 💌
Condition 2 Unconditionally	done nothing. 👻
ОК	Cancel

(2) Set the condition of operation.

Click <d>, and select the signal type. When things except "Unconditionally" are selected, the input area of signal number and the combo box to select the state are displayed. Now, select "input signal".

(	
Button operating condition	×
Condition 1	
Unconditionally - <d></d>	
Unconditionally	done nothing
input signal output signal	
C <u>o</u> ndition 2	
Unconditionally 👻	
	done nothing
ОК Салс	ol

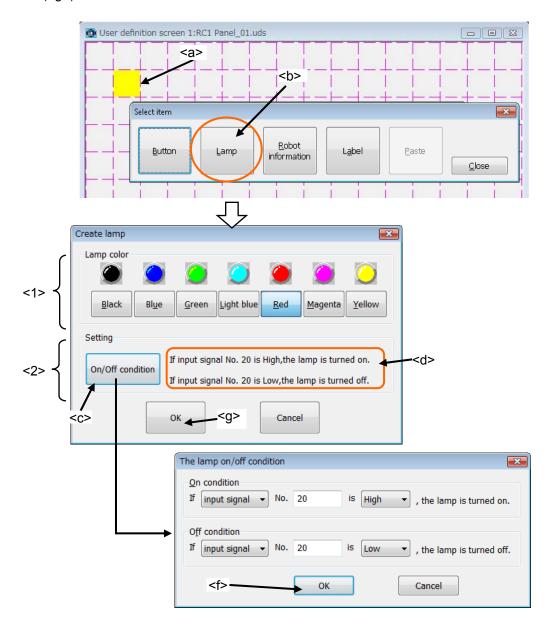
(3) Input "20" to signal number (<f>).Click the state of the signal (<g>), and select "High".Now, select "Input signal".

Button operating condition <u>C</u> ondition 1 If input signal C <u>o</u> ndition 2 Unconditionally	lo. 20 is Low ▼ Low Ing. ▼ <f> done nothing. ▼</f>
ОК	Cancel
Button operating condition	

- (4) Select "High" as signal operation of when clicking on a button (<h>).
- Condition 1 If input signal 20 is High 🔻 • No. done nothing. 👻 done nothing. <h> set to low. 4 Condition 2 et to hiał Unconditionally Ŧ done nothing. 👻 ОК Cancel Button operating condition X Condition 1 If input signal • No. 20 is High 🔻 , output signal No. 20 is set to high. Ŧ Condition 2 <i> Unconditionally • done nothing. 👻 <k> ОК Cancel
- (5) The input area of output signal number is displayed. Input "20" to the signal number (<i>).
- (6) After the setting is completed, click [OK] button (<k>).

#### 15.2.2.2. Lamp

- (1) Click the position (block) in which the lamp is made (<a>). The lamp is arranged at this position.
- (2) After "Select item" window is displayed, click [Lamp] button (<b>).
- (3) Select the lighting color of the lamp on "Create lamp" window.
- (4) Click [On/Off condition] button (<c>), and set the lighting condition and the turning off condition on "The lamp on/off condition" window.
   After setting the lighting condition and the turning off condition, click [OK] button (<f>). The set
- content is displayed (<d>) in the right of the [On/Off condition] button.
  (5) After setting the lamp color and lighting condition and the turning off condition, click [OK] button (<g>).



<1> Lamp color <2> Setting : The lighting color of the lamp can be selected.

The condition of turning on / turning off the lamp can be set.
 If only one condition is set, the lamp is operated like the other condition is set the opposite High/Low state to the same signal number.
 Moreover, when both the ON condition and the OFF condition are true, the ON condition is given priority.

#### Example of setting lamp ON/OFF

For example:

Lamp that is turned on when the input signal number 20 is High, and is turned off when the input signal number 20 is Low. The lamp on/off condition

- (1) A default value of "The Lamp on/off condition" window is shown in a right picture.
  - On condition Not use • Off condition Not use • ОК Cancel The lamp on/off condition x Click <h>, and Select the signal type. On condition Not use :h> Not use Off output signal Not use OK Cancel The lamp on/off condition X On condition No. 20 If input signal 👻 is Low , the lamp is turned on. Off condition <i> Not use • ОК Cancel The lamp on/off condition × On condition If input signal 👻 No. 20 is Low -, the lamp is turned on. Low Off condition Not use • <k> ОК Cancel The lamp on/off condition × On condition If input signal No. 20 is High • , the lamp is turned on. • Off condition If input signal 👻 No. 20 is Low • , the lamp is turned off. ОК Cancel <|>-

(2) Set "On condition".

Now, select "input signal".

(3) Input "20" to signal number (<i>).

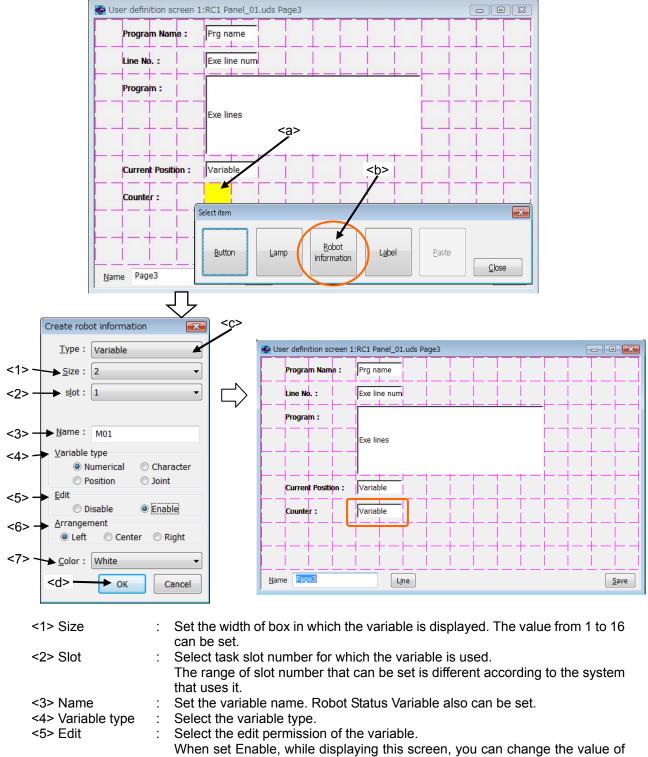
(4) Select "High" (<k>), as a state of signal to light the lamp.

(5) Similarly, set the condition for turning off the lamp, and click [OK] button (<I>). х

#### 15.2.2.3. Variable

The value of the specified variable is displayed.

- (1) Click the position (block) in which the variable is displayed (<a>). Left side of the variable is arranged in this position.
- (2) After "Select item" window is displayed, click [Robot information] button (<b>).
- (3) Select "variable" (<c>) as the type on "Create robot information" window.
- (4) After setting the information of the variable, click [OK] button (<d>).

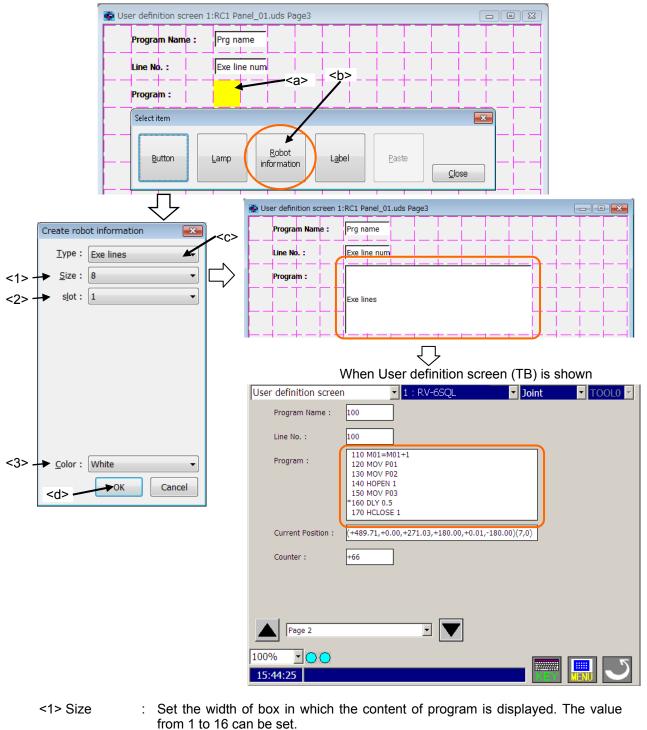


- this variable by touching this parts and displaying the input value screen. (Only at T/B state is enabling.)
  <6> Arrangement : Select the position in which the variable is arranged.
- <7> Color : Select the background color of the area where the variable is displayed.

#### 15.2.2.4. Program execution content

The content of the program being executed is displayed. The amount of 7 lines, the execution line, upper 3 lines and lower 3 lines, are displayed.

- (1) Click the position (block) in which the content of the program is displayed (<a>). Left side of the content of the program is arranged in this position.
- (2) After "Select item" window is displayed, click [Robot information] button (<b>).
- (3) Select "Exe line" (<c>) as the type on "Create robot information" window.
- (4) After setting the information on the content of the program, click [OK] button (<d>).

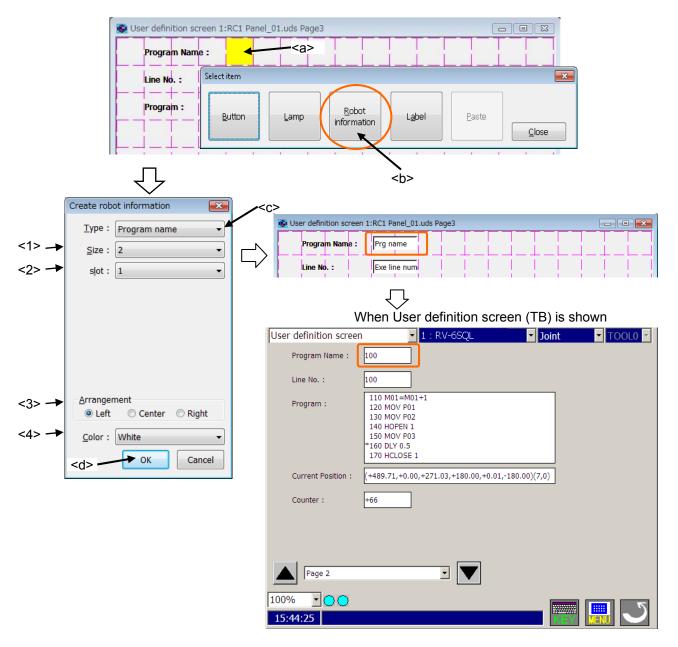


 <2> Slot : Select task slot number for which the program is executed. The range of slot number that can be set is different according to the system that uses it.
 <3> Color : Select the background color of the area where the content of program is displayed.

#### 15.2.2.5. Program name

The name of program being executed is displayed.

- (1) Click the position (block) in which program name is displayed (<a>). Left side of the box is arranged in this position.
- (2) After "Select item" window is displayed, click [Robot information] button (<b>).
- (3) Select "Program name" (<c>) as the type on "Create robot information" window.
- (4) After setting the information of program name, click [OK] button (<d>).

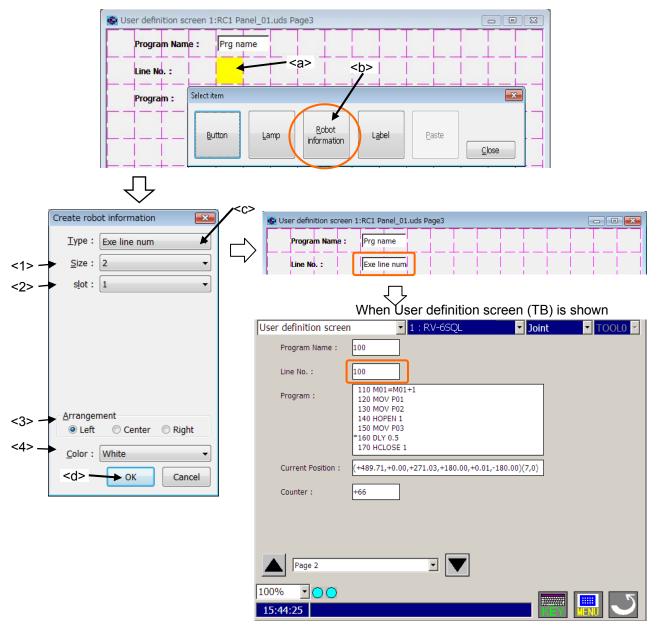


<1> Size	: Set the width of box in which program name is displayed. The value from 1 to 16 can be set.
<2> Slot	: Select task slot number for which the program is executed. The range of slot number that can be set is different according to the system that uses it.
<3> Arrangement <4> Color	<ul><li>Select the position in which the program name is arranged.</li><li>Select the background color of the area where the program name is displayed.</li></ul>

#### 15.2.2.6. Execution line number of program

The line number of program being executed is displayed.

- (1) Click the position (block) in which execution line number is displayed (<a>). Left side of the box is arranged in this position.
- (2) After "Select item" window is displayed, click [Robot information] button (<b>).
- (3) Select "Exe line num" (<c>) as the type on "Create robot information" window.
- (4) After setting the information of execution line number, click [OK] button (<d>).



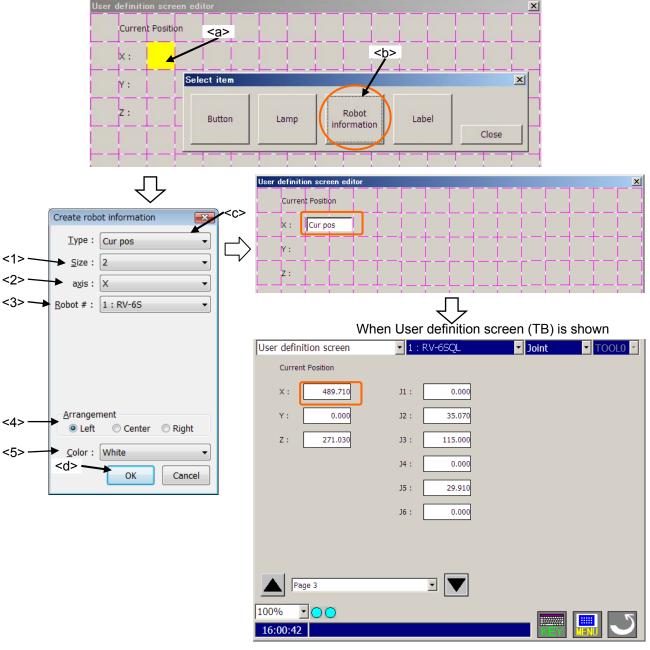
<1> Size	: Set the width of box in which execution line number is displayed. The value from 1 to 16 can be set.
<2> Slot	<ul> <li>Select task slot number for which the program is executed.</li> <li>The range of slot number that can be set is different according to the system</li> </ul>
	that uses it.
<3> Arrangement <4> Color	<ul><li>Select the position in which execution line number is arranged.</li><li>Select the background color of the area where execution line number is</li></ul>
	displayed.

#### 15.2.2.7. Current position data (the XYZ coordinate system)

The current position data of robot is displayed with each XYZ coordinate system axis.

If you want to display the current position data (the XYZ coordinate system) all together, please use "Variable" type and set the Robot Status Variable "P\_CURR". Please refer to "**15.2.2.3 Variable**" for details.

- (1) Click the position (block) in which the current position data is displayed (<a>). Left side of the box is arranged in this position.
- (2) After "Select item" window is displayed, click [Robot information] button (<b>).
- (3) Select "Cur pos" (<c>) as the type on "Create robot information" window.
- (4) After setting the information of the current position data (the XYZ coordinate system), click [OK] button (<d>).



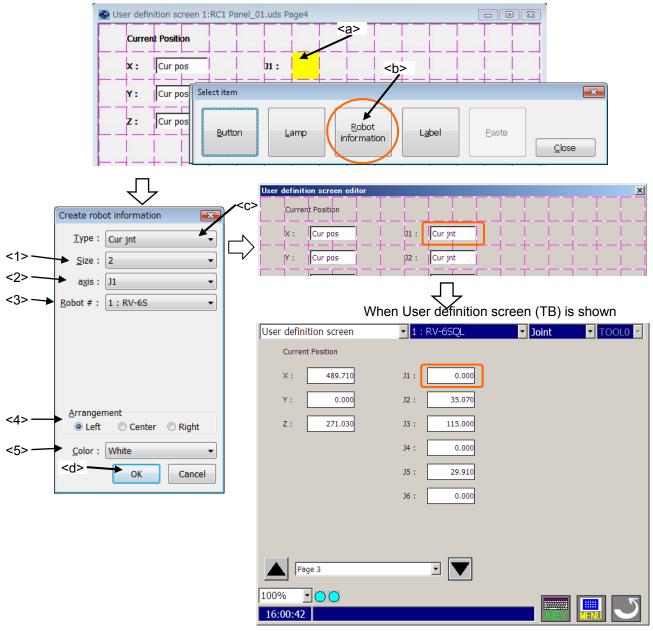
<1> Size	: Set the width of box in which the current position data (the XYZ coordinate system) is displayed. The value from 1 to 16 can be set.
<2> axis	: Select the displayed axis of the current position data (the XYZ coordinate system).
<3> Robot #	: Select the robot number which displays the current position data.
<4> Arrangement	: Select the position in which the current position data (the XYZ coordinate system) is arranged.
<5> Color	: Select the background color of the area where the current position data (the XYZ coordinate system) is displayed.

#### 15.2.2.8. Current position data (the joint coordinate system)

The current position data of robot is displayed with each joint coordinate system axis.

If you want to display the current position data (the joint coordinate system) all together, please use "Variable" type and set the Robot Status Variable "J\_CURR". Please refer to "15.2.2.3 Variable" for details.

- (1) Click the position (block) in which the current position data is displayed (<a>). Left side of the box is arranged in this position.
- (2) After "Select item" window is displayed, click [Robot information] button (<b>).
- (3) Select "Cur jnt" (<c>) as the type on "Create robot information" window.
- (4) After setting the information of the current position data (the joint coordinate system), click [OK] button (<d>).

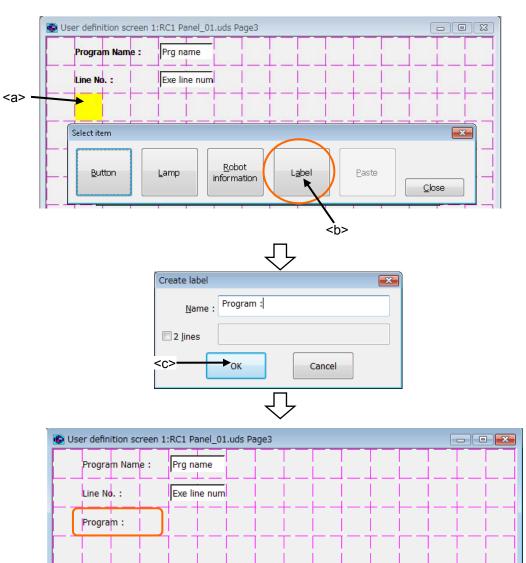


<1> Size	: Set the width of box in which the current position data (the joint coordinate system) is displayed. The value from 1 to 16 can be set.
<2> axis	<ul> <li>Select the displayed axis of the current position data (the joint coordinate system).</li> </ul>
<3> Robot #	: Select the robot number which displays the current position data.
<4> Arrangement	: Select the position in which the current position data (the joint coordinate system) is arranged.
<5> Color	: Select the background color of the area where the current position data (the joint coordinate system) is displayed.

#### 15.2.2.9. Label

The label can be displayed at the specified position.

- (1) Click the position (block) in which the label is made (<a>). The label is arranged in this position.
- (2) After "Select item" window is displayed, click [Label] button (<b>).
- (3) After setting the label on "Create label" window, click [OK] button (<c>). T



#### 15.2.2.10. Save and end of editing user definition screen

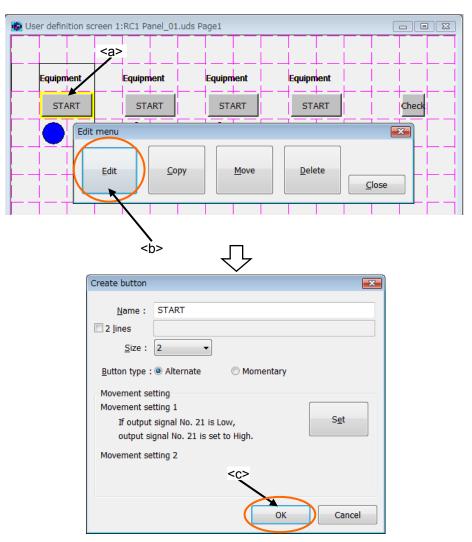
After the editing of user definition screen is completed, click [Save] button (<a>). To end the edit, click [x] (<b>).



## 15.2.3. Edit of existing parts

Edit of existing parts is as follows:

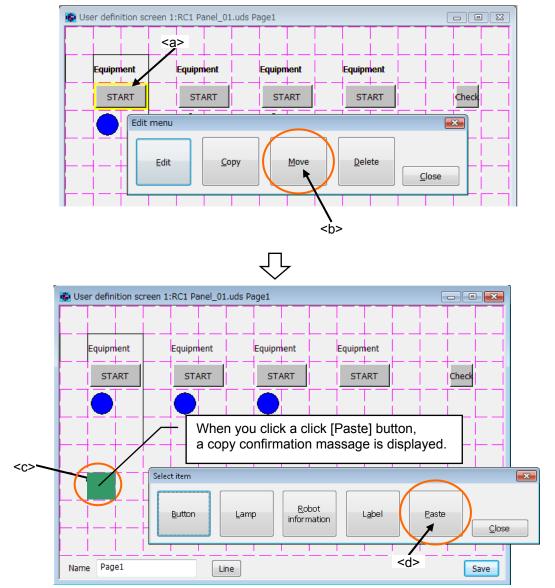
- (1) Click a part which is edited (<a>).
- (2) After "Edit menu" window is displayed, Click [Edit] button (<b>).
- (3) The edit displays of selected parts are displayed. After changing contents, click [OK] button (<c>).



# 15.2.4. Copy/Paste of parts

Parts can be copied.

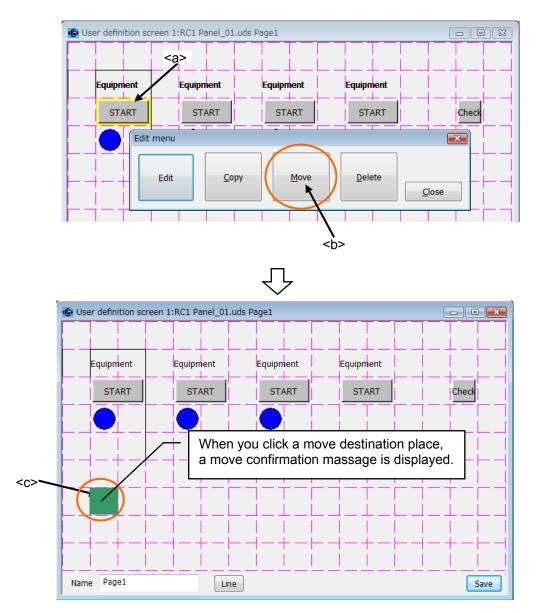
- (1) Click the part to copy, and select it (<a>).
- (2) After "Edit menu" window is displayed, click [Copy] button (<b>).
- (3) Click the position (block) where the part is copied onto (<c>).
- (4) After "Select item" window is displayed, click [Paste] button (<d>).
   At this time, the position (block) where the part is copied onto is green.



# 15.2.5. Movement of parts

Parts can be moved.

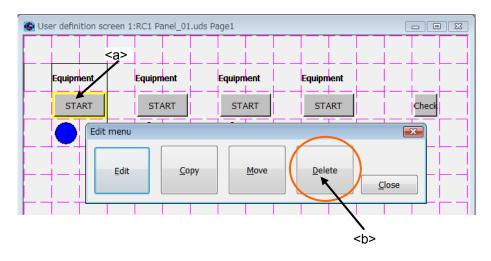
- (1) Click the part to move, and select it (<a>).
- (2) After "Edit menu" window is displayed, click [Move] button (<b>).
- (3) Click the position (block) where the part is moved to.
- At this time, the current position (block) of part is red, and the position (block) where the part is moved onto is green.



# 15.2.6. Deletion of parts

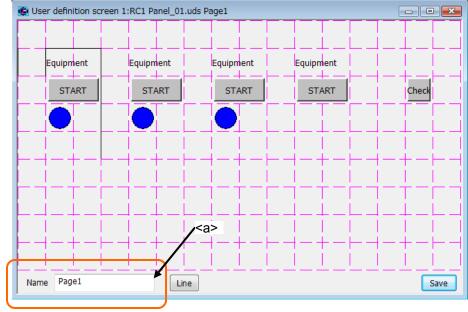
Parts can be deleted.

- (1) Click the part to delete, and select it (<a>).
- (2) After "Edit menu" window is displayed, click [Delete] button (<b>).
- (3) Click [Yes] button on the confirmation message.



# 15.2.7. Change of page name

Page name can be changed by inputting in <a> under the left of the window.



# ▲ Caution

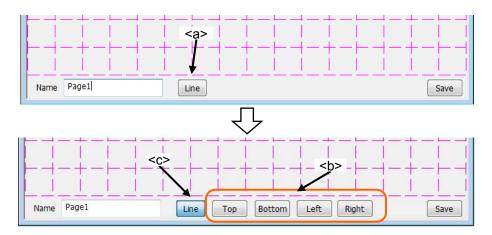
When page name that has already been registered is input, it becomes an error.

# 15.2.8. Edit of ruled line

The ruled line can be drawn on the user definition screen.

#### 15.2.8.1. Drawing the ruled line

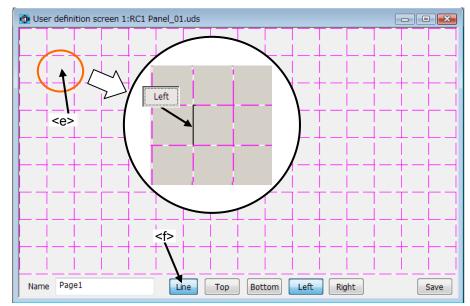
- (1) Click [Line] button (<a>) on the window.
- (2) The button ("[Top],[Bottom],[Left],[Right]") (<b>) for the ruled line is displayed in the right of [Line] button. These buttons to draw the ruled line disappear when [Line] button (<c>) is clicked again.



(3) Select the kind of ruled line (<d>). Only one kind of the ruled line can be selected.



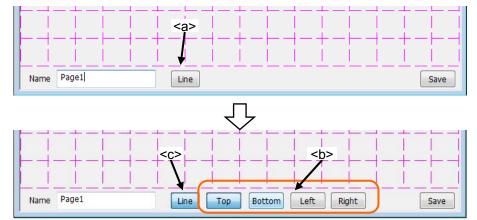
(4) Click the block (<e>) where the ruled line is drawn. The ruled line of the specified position on the selected block can be drawn.



(5) After editing the ruled line, click [Line] button (<f>) again.

#### 15.2.8.2. Erasing the ruled line

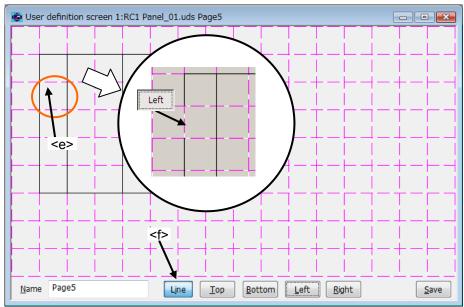
- (1) Click [Line] button (<a>) on the window.
- (2) The button ("[Top],[Bottom],[Left],[Right]") (<b>) for the ruled line is displayed in the right of [Line] button. These buttons to draw the ruled line disappear when [Line] button (<c>) is clicked again.



(3) Select the kind of ruled line (<d>). Only one kind of the ruled line can be selected.



(4) Click the block (<e>) where the ruled line is erased. The ruled line of the specified position on the selected block can be erased.



(5) After editing the ruled line, click [Line] button (<f>) again.

## 15.2.9. Deletion of user definition screen

It is possible to delete the existing "User definition screen". There are two methods in deletion of an user definition screen.

- (1) Deleting the user definition files. In this case, all the user definition screens in a user definition screen file are deleted.
- (2) The selected user definition screen from the inside of a user definition screen file is deleted.

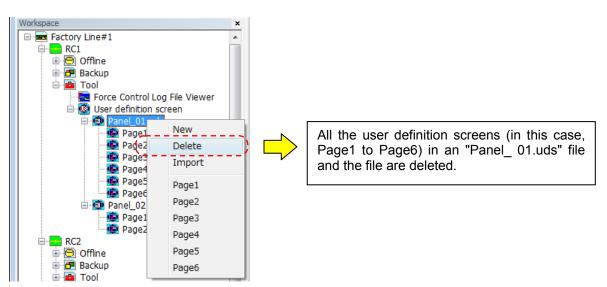
However, the user definition screen during editing cannot be deleted.

#### 15.2.9.1. Deletion of user definition screen file

All the user definition screens in a user definition screen file are deleted.

After selecting [Tool]->[User definition screen]->["User definition screen file"] in the project tree, click the right button of mouse and select the "Delete" of right button menu. A confirmation message is displayed, click [OK] button. All of the selected user definition screen file and the user definition screen in it are deleted.

The user definition screen during editing cannot be deleted.





#### 15.2.9.2. Deletion of page

The selected user definition screen page in the user definition screen file is deleted .

After selecting [Tool]->[User definition screen]->["User definition screen file"]->["User definition screen page"] in the project tree, click the right button of mouse and select the "Delete" of right button menu. A confirmation message is displayed, click [OK] button. The selected user definition screen page is deleted.

The user definition screen during editing cannot be deleted.

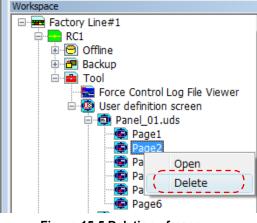


Figure 15-5 Deletion of page

## 15.2.10. Import of the user definition screen

It is possible to import the user definition screen file created in other work space and projects. There are two methods for import.

- (1) Importing the user definition screen files.
- In this case, all the pages in the user definition screen files are imported.
- (2) Importing the selected pages in the user definition screen file.

#### 15.2.10.1. Importing the user definition screen files.

All the pages in the user definition screen files are imported.

After selecting [Tool]->[User definition screen]-in the project tree, click the right button of mouse and select the "Import" of right button menu. "Select import user definition screen file" screen is displayed. After selecting the importing files, Click the [OK] button. The selected user definition screen file and all the pages in the file are imported to the current project. Two or more user definition screen files can be imported simultaneously. When the same name file is existing in the project, the confirmation message of overwrite is displayed.

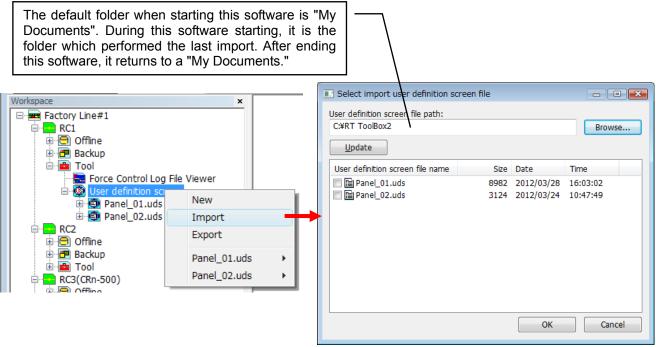


Figure 15-6 Importing the user definition screen files

#### 15.2.10.2. Importing the page of the user definition screen

Importing the selected pages in the user definition screen file.

After selecting [Tool]->[User definition screen]->["User definition screen file"] in the project tree, click the right button of mouse and select the "Import" of right button menu. "Select import user definition screen file" screen is displayed. After selecting the importing files, click [OK] button. "Select import user definition screen" screen is displayed, and all the pages in the selected file are displayed. After selecting the importing pages, click [OK] button. The selected the pages in the file are imported to the current project. Two or more pages can be imported simultaneously. The imported pages are added to the lowest row.

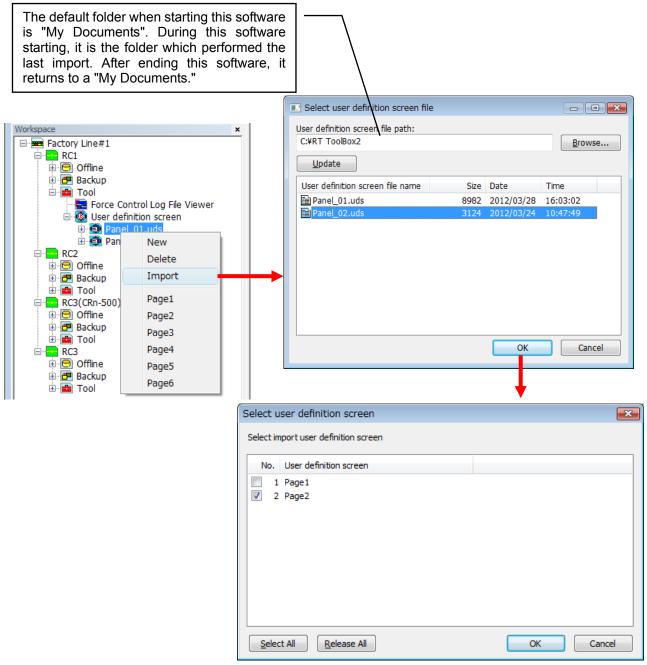


Figure 15-7 Importing the page of the user definition screen

When the same name file is existing in the project, the confirmation message of overwrite is displayed. When you click the "Overwrite" button, all the pages in the file will replace. The page name can be changed and imported.

## 15.2.11. Export of the user definition screen

It is possible to export the user definition files in the current project so that it can be used in other project. The user definition screen is exported by a file

After selecting [Tool]->[User definition screen] in the project tree, click the right button of mouse and select the "Export" of right button menu. "Select export user definition screen file" screen is displayed. After setting the export path and selecting exporting file, click [OK] button. The selected user definition screen file is copied in "export path" folder. Two or more pages can be exported simultaneously.

The default folder v Documents". During folder which perforr this software, it retur	g this software ned the last ex	starting, it is t port. After endi	the					
/orkspace		×	S III S	elect export use	r definition screer	file		
E · ₩ Factory Line#1 				ort path: RT ToolBox2	\			<u>B</u> rowse
E Tool	trol Log File Viewer		Us	er definition scree	en file name	Size	Date	Time
	ition scroon			Panel_01.uds		8982		16:03:02
🗄 🗐 Pa	New			Panel_02.uds		3124	2012/03/24	10:47:49
⊡ RC2 —	Import							
E ··· ⊖ Offline	Export							
⊕ Backup     ⊕ Tool	Panel_01.uds Panel_02.uds	•						
RC3(CRn-50	Panei_02.uus							
							ОК	Cancel

Figure 15-8 Export of the user definition screen

When the same name file is existing in the "export path" folder, the confirmation message is displayed. When you click the "Overwrite" button, all the pages in the file will replace. The page name can be changed and exported.

E	Export user definition screen file
	Panel_01.uds already exists.
	Export As     Overwrite     Skip     Write All     Cancel
Change name	
New Name: Panel	_01
ОК	Cancel

Figure 15-9 Export of the user definition screen- confirmation message

## 15.3. Oscillograph

The oscillograph function is explained.

# - $\triangle$ Caution

Since an oscillograph function needs the memory and CPU power of a personal computer, the screen to open has been restricted to a maximum of 8 screens. If many screens which need memories, such as program editor and parameter editor, are opened, please keep in mind that a memory may be insufficient

## 15.3.1. Outline

The oscillograph can display the graphical representation of a robot's various internal data. The data acquired from the robot can be saved at a CSV file. By specifying a preservation interval, prolonged data recording is possible. A program name, an execution row number, and an input-and-output signal are also simultaneously recordable on a CSV file.

## 15.3.2. Communication method

The following two systems are among the communication methods which acquire various internal data from a robot.

### 15.3.2.1. Ordinary communication

It is a communication method which uses a communications server.

Therefore, it can be used if it is the environment where a communications server is connectable. The feature is explained.

item	explanation				
Recoding numbers	30,000				
	(When intervals to receive are 100msec, about 50-minute				
	room arrangement profit is possible.)				
Data kind	Fixed number				
Intervals to receive	50, 100, 200, 500, 1000, 2000, 5000, 10000, 30000msec				

#### Table 15-3 Ordinary communication

#### 15.3.2.2. High speed communication

The high-speed communication can use a real-time function, and can acquire data at intervals of 7.1msec. The real time monitor function cannot be used if it is not the environment which a robot controller can **connect with a personal computer by Etherne**t.

The feature is explained.

Table 15-4 High speed comm	unication
----------------------------	-----------

item	explanation	
Recoding numbers	80,000	
	(About 9-minutes)	
Data kind	maximum of 4 data selection	
	The continuous signal of 32 points(IN/OUT)	
Intervals to receive	Highest 7.1msec	
Robot software version	S4b,R4b or later	

When the simulator starts, a real-time function can be used only for the first project since this software Ver.3.01B.

## 15.3.3. Acquirable data

The list of the data that can be acquired from the robot is shown below.

			5-5 Oscillograph data list	1	
	Notation on the graph         Unit         Explanation		High	Ord	
Cur	rent feedback	[Arms]	Present value of the motor current.	0	0
Max	k current cmd2	[Arms] The maximum value of the current command for the last 2 seconds.		-	0
Max	k current cmd1	[%]	The maximum value of the current command after robot controller's power supply is turned on.	-	0
Axis	s load level	[%]	A preset load ratio of each motor is displayed as an alarm level.	0	0
Мах	k axis load level	[%]	The maximum value of the axis load level after robot controller's power supply is turned on is displayed.		0
Pos	Position feedback [Pulse] Current motor rotation position is displayed by the pulse value of the encoder.		0	0	
Joir	nt position(CMD)	[mm deg]	Joint position (command)	0	0
XYZ	Z position(CMD)	[mm deg]	XYZ position (command)	0	0
Joir	nt position (FB)	[deg]	Joint position (feedback)	0	-
XYZ	Z position (FB)	[mm deg]	XYZ position (feedback)	0	-
Pos	ition droop	[Pulse]	The amount of deflection at the motor rotation position to a position command is shown.	0	0
Spe	ed (FB)	[rpm]	The feedback of the motor speed is displayed by the unit of rpm.	0	0
Volt	age	[V]	A present power-supply voltage value is displayed.	0	0
	S current	[Arms]	Present RMS value of the motor current is displayed.	0	0
Reg	generation level	[%]	The regenerative current value of each axis is displayed as an alarm level.	0	0
Enc	oder temperature	[deg C]	Temperature of the encoder of each axis Correspondence since F series.		0
Cur	rent command	[Arms]	The current command of the motor.	0	-
Tolerable command +		[Arms]	The limitation value of the plus side of the current command set to the motor.	0	0
Tole	erable command -	[Arms]	The limitation value of the minus side of the current command set to the motor is displayed.	0	0
For	ce sensor data	[N Nm]	The input value from a force sensor.	0	_
	ce pos CMD(XYZ)	[mm rag]	Force sense position command(XYZ)	0	-
	L threshold +	[0.1%] rated current	The higher rank side detection threshold of a collision detection function (plus side)	0	-
CO	L threshold -	[0.1%] rated current	The higher rank side detection threshold of a collision detection function (minus side)	0	-
CO	L presumed torque	[0.1%] rated current	Presumed torque of the collision detection function.	0	-
CO	L torque	[0.1%] rated current	Actual torque of the collision detection function.		-
	Tool point speed(FB)	[mm/s]	Speed of a tool center point (feedback)	0	-
	Remaining distance(FB)	[mm]	The remaining distance to the target position (in mm) while the robot is moving (feedback).		-
ation	Tool point speed(CMD) [mm/s]		Speed of a tool center point (command) Same as status variable values "M RSpd"		-
Robot information	Remaining distance(CMD) [mm]		The remaining distance to the target position (in mm) while the robot is moving (command). Same as status variable values "M_RDst".		-
Rol	Gap of CMD and FB	[mm]	The gap of a command position and a feedback position. Same as status variable values "M Fbd".	0	-

1	Transport factor(CMD) [%] Speed of a tool center point (feedback)		0	-	
		-	The current acceleration/deceleration status.	0	-
			(command)		
	Acceleration state(CMD)		[0=Stopped,1=Accelerating, 2 = Constant speed, 3		
			= Decelerating]		
			Same as status variable values "M_AclSts".		
	Controller temperature	[deg C]	Controller temperature	0	0
INF	TUY	-	Consecutive input signal for 32 points		-
OU	OUTPUT		Consecutive output signal for 32 points		-

%High :High speed communication Ord :Ordinary communication

## 15.3.4. Starting

From the project tree, double-click [Tool] -> [Oscillograph]

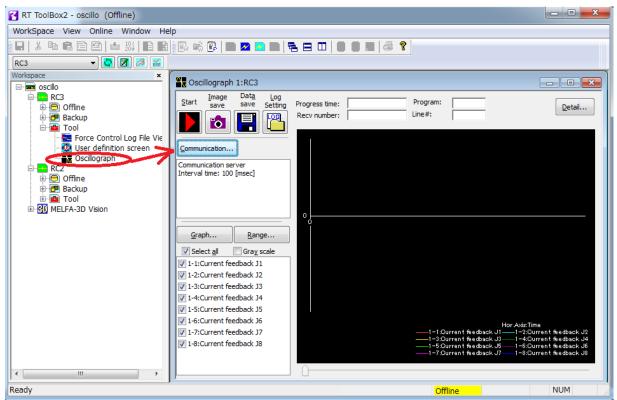


Figure 15-10 Starting the Oscillograph

## 15.3.5. Communication settings

Please display the Communication setting dialog by clicking the [Communication...] button. Ordinary communication can be used as choosing the [Communications server]. High speed communication can be used as choosing the [Real time monitor].

Communication setting	Communication setting
Method: Communication server	Method: Real time monitor
Select the interval to receive	Select the request data
▼ 100 [msec]	Data# <u>1</u> : Current feedback
	Data#2: Joint position(CMD)
	Data# <u>3</u> : RMS current ▼
	Data# <u>4</u> : Robot Information
	Signal <u>I</u> N: 400 OU <u>T</u> : 500
Set Cancel	<u>S</u> et Cancel

Figure 15-11 Communication setting dialog

The interval to receive is chosen in the ordinary communication via a communications server.

In the High speed communication which uses the real time monitor function, the start number of a maximum of four kinds, and an input signal/output signal is specified for the data to acquire.

To use high-speed communication, it is necessary to validate real-time monitor mode on an Ethernet parameter screen.

🕞 Ethernet parameter 1:RC3 (	Ethernet parameter 1:RC3 (Online)					
Men <u>u</u> :	Mode of realt	ime monitor:				
IP address	Enable	(MONMODE)				
Device & Line						
Realtime monitor	Por <u>t</u> #:	(MONPORT)	Receive port #	12000		
Real-time external command			Send port #	0		
			<u>E</u> xplain	W <u>r</u> ite		

Figure 15-12 Real time monitor mode setting

-  $\triangle$  Caution

- •To display a program name and an execution row number by high-speed communication, it is necessary to include "robot information" in demand data.
- In "Ordinary communication", IN and OUT signals are unacquirable.
- •By a simulator, high-speed communication is impossible.

## 15.3.6. Start/Stop

Please check before a start that the target project is in an on-line state.

If it clicks a [Start]( ) button, data will be acquired from a robot and drawing of a graph will be started. A click of a [Stop] ( ) button will stop acquisition of data.

## 15.3.7. Graph setting

The [Graph...] button of an oscillograph screen can be clicked and the item displayed on a graph can be set up. The graph setup can be changed also in data acquisition.

Graph setting	x
Refresh time:     Display points:       • 30 [msec]     Fixed number • 500	
Graph #1 Graph #2 Horizontal Axis: Horizontal Axis:	
Time Time	-
Graph Output: Graph output:	
Current feedback   Robot Information	
1-1:     Current feedback J1       2-1:     Tool point speed(FB)	•
1-2: Current feedback J2   2-2: Remaining distance(FB)	
1-3: Current feedback J3  2-3: Tool point speed(CMD)	•
Current feedback J3           1-4:           Current feedback J4           2-4:           Remaining distance(CMD)	•
Current feedback J5 1-5: Current feedback J6 2-5: Gap of CMD and FB	•
Current feedback J7 1-6: Current feedback J8 2-6: Transport factor(CMD)	-
input signal 0 1-7: input signal 1 2-7: Acceleration state(CMD)	
input signal 2 1-8: input signal 3 2-8: Controller temperature	•
input signal 4 input signal 5	
	lear a <u>l</u>
input signal 8 input signal 9 input signal 10	Cancel
input signal 10	Cancel
input signal 12 input signal 13	
input signal 14	
input signal 15	
input signal 16 input signal 17	
input signal 18	
input signal 19	
input signal 20	
input signal 21	
input signal 22 input signal 23	

#### Figure 15-13 Graph setting dialog

Table 15-6 Settin	g Items
Item	Explanation
Refresh time	Select the interval of time to refresh the graph.
Display points	Specify the number of points displayed in the graph with fixed number or time scale.
Horizontal Axis	Select the horizontal axis of the graph from acquisition data or time.
Graph Output Select the category of data displayed to the graph.	
1-1 -> 2-8	Select the data displayed to each graph.

Moreover, display/non-display of the data selected by the graph setting screen can be switched from the lower left list of the oscillograph screen.

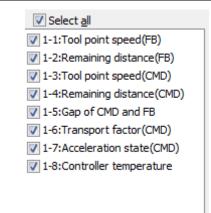


Figure 15-14 Switch of display/non-display of graph

## 15.3.8. Graph range setting

The [Range...] button of an oscillograph screen can be clicked and the range of the display of the vertical axis of each data can be set. When [Auto adjust] is checked, the range of the display of the vertical axis in the graph is automatically adjusted.

Graph range setting		_	×
Auto Adjust			
Set up a range for every r	request data.		
Name	Minimum	Maximum	<u>E</u> dit
Current feedback	-7.26	7.75	
Joint position(FB)	-12.95	119.17	Reset
COL threshold +	-1.00	1.00	
Tolerable command +	0.00	13.12	
input signal	0.00	1.00	
output signal	0.00	1.00	
		Set	Cancel

Figure 15-15 Graph range setting dialogue

The [Edit...] and [Reset] can make two data or more a target at the same time.

aph range setting				
Set up a range for every i	request data.			
Name	Minimum	Maximum	<u>E</u> dit	
Current feedback	-7.26	7.75		
Joint position(FB)	-12.95	119.17	Re et	
COL threshold +	-1.00	1.00		
Tolerable command +	0.00	13.12		
input signal	0.00	1.00		
output signal	0.00	1.00		
	Range edit	or	-	×
	Target:	Current feedba Joint position(F		
	Minimum:	-12.9	95 Ma <u>x</u> imum:	119.17
	-		Set	Cancel

Figure 15-16 Range editor of the graph

## 15.3.9. Data reproducing / confirmation

The [Detail...] button of an oscillograph screen can be clicked and the data displayed in the graph can be confirmed by the numerical value. When the data acquisition is executing, the current value is displayed in [Data].

Agree the graph		Data	Minimum	Maximum	
Current feedback J1	-	6.872	-7.255	7.099	Arms
Current feedback J2	-	7.071	-6.235	7.750	Arms
Current feedback J3	-	-0.716	-2.787	2.265	Arms
Current feedback J4	-	1.047	-1.178	1.189	Arms
Current feedback J5	•	-0.279	-0.387	0.673	Arms
Current feedback J6	-	-0.407	-0.477	0.447	Arms
Current feedback J7	-	0.000	0.000	0.000	Arms
Current feedback J8	-	0.000	0.000	0.000	Arms
Joint position(FB) J1	-	70.600	-12.952	99.327	deg
Joint position(FB) J2	-	57.164	4.974	63.201	deg
-	-				
-	-				
COL threshold + J1	-	0	0	0	0.1%
COL threshold + J2	<b>-</b>	0	0	0	0.1%
-	-				
-	-				
Clear all					Close

Figure 15-17 Detailed data dialogue

Moreover, drawing of the graph can temporarily be interrupted by clicking [Stop drawing] while executing data acquisition. In that case, the reproduction display of the acquired data is possible by slider operation.

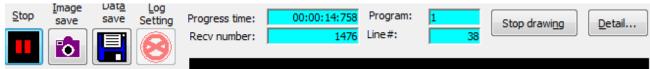


Figure 15-18 Inside of data acquisition

The cursor is displayed while operating the slider. the current value is displayed in [Data] of detailed data dialogue. The value of the selected position is displayed in [Data] in detailed data dialogue.



Figure 15-19 Cursor movement by slider operation

# 15.3.10. Data saving / Log setting / Log file reading

The [Data save] (LCC) button of an oscillograph screen can be clicked and the data acquired by the point in time can be saved by a CSV file format.

The newest data can be written out to a log file for every interval for a definite period of time. Click the [log

file] (**L**\_\_\_\_) button of an oscillograph screen, and [Log file operation] dialog is displayed. The time interval written in a log file is specified by a [Select the interval log] combo box. Click a [Set] button and it completes a setup of a log file.

Save Lotting FULLESS INTE	Trodi di la	
Log file operation		×
Setup of a log file I Log the measurement data		
Log file folder		
Desktop¥oscil	lo¥RC3¥Oscillograph¥Log	Browse
Select the interval to log:	▼ 100 [msec]	
Load Log file	100 [msec] 200 [msec] 500 [msec] 1000 [msec]	Cancel
peed(FB)	2000 [msec] 5000 [msec] 10000 [msec]	
istance(FB) 0 peed(CMD)	30000 [msec] 60000 [msec]	
and FB	120000 [msec] 180000 [msec] 300000 [msec]	

Figure 15-20 Log file operation

The folder of data storage / log file name, and its preservation place is as follows.

I du	ble 15-7 Data saving file name / Log file name / Data saving folder
項目	説明
Data saving file name	Store< <i>time stamp</i> >.csv
	The <time stamp=""> shows the time which clicked the [Data save] button. "<a.d(4chars)>&lt; month(2chars)&gt;<day(2chars)> - <time(2chars)><minutes(2char)><second(2chars)>"</second(2chars)></minutes(2char)></time(2chars)></day(2chars)></a.d(4chars)></time>
	Example: Store20130911-183525.csv
Log file name	Log <time stamp="">.csv</time>
	The <time stamp=""> shows the time at the time of a data acquisition start.</time>
	Example:
	Log20130911-183525.csv
Data saving folder	"Workspace \ Project \ Oscillograph \ Log"

Table 15-7 Data saving file name / Log file name / Data saving folder

The data file and log file which were saved can click [Load Log file] button, and can display it on a graph.

## 15.3.11. Graph image saving

The [Image save] ( ) button of an oscillograph screen can be clicked and the graph currently displayed can be saved in bitmap image

The image file name and the image saving folder name are as follows.

Table 15-6 image mename & image saving folder		
項目	説明	
Image file name	Img< <i>time stamp</i> >.bmp The <time stamp=""> shows the time which clicked the [Image save] button.</time>	
	Example: Img20130911-183525.csv	
Image saving folder	"Workspace \ Project \ Oscillograph \ Image"	

#### Table 15-8 image filename & Image saving folder

## 15.3.12. Gray scale

When the check box of the gray display is turned on, the graph is displayed by the gray scale. This function can be used with Version 3.01B or later of this software.

# $\_$ $\triangle$ Caution

## The display of a graph will be confused if operation which needs

## a CPU power is carried out.

When operation which needs a CPU power is carried out, it becomes impossible to receive the communication from a robot normally.

Please keep in mind that a graph is mainly notably confused by the next operation.

Data saving operation

- Image saving operation
- Graph setting operation

# 16.Simulation

This chapter explains the simulation operation methods.

# Simulation can not be used with the mini edition.

Simulation can not be used with the mini edition.

The simulation function only supports the "RT ToolBox2" standard edition. It can not be used with the mini edition.

## Simulation can not be used with Movemaster commands.

Be aware that even with the standard edition, the simulation function can not be used when Movemaster commands are selected.

# You can not communicate with the robot controller during a simulation.

You can not communicate with the robot controller during a simulation. To communicate with the robot controller, click on the menu bar [Online]  $\rightarrow$  [Offline] to end the simulation, then again click on the menu bar [Online]  $\rightarrow$  [Online] to connect the robot controller.

## With an actual robot, an overload error might occur.

Be aware that even if you run the simulation with the work and hand weight set and this works properly in the simulation, when you actually operate with the robot, an overload may occur and make operation impossible.

## If there is an input signal wait in the program, use pseudo-input.

When you execute a program in simulation and there is an input signal wait in the program, the program does not move to the next step until that command is executed. Therefore, if there is an input signal wait, use the pseudo-input function from the signal monitor.

## 16.1. Starting a Simulation

Click on the menu bar [Option]  $\rightarrow$  [Simulator]. At that time, if there are two or more projects in the workspace, the screen for selecting the screen to conduct the simulation is displayed.

- You can simulate eight projects or less.

Select the projects			×
Select 8 or less projects which	start the simulator.		
No. Project	Robot Controller	Robot	
✓ 1 RC1 2 RC2	CRnQ-700/CR75x-Q CRnD-700/CR75x-D	RH-3FH3515-Q RV-25D	
Select All Release A		ОК	Cancel

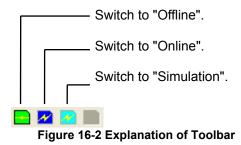
Figure 16-1 Project Selection When Simulation is Started

[Select All] [Release All] Select all projects at a time. Release all projects at a time.

Select the project to start the simulation, and then click the [OK] button.

	∧ Caution     →
	In case of several projects, simulators may be unable to be
5	tarted.
	It may be caused by a low-performance computer. Please check your computer.

You can also start a simulation through operations from the tool bar.



When the simulation start-up is complete, the operation screen for the simulation is displayed on the screen. Also, the virtual controller for the simulation is automatically started stored in task tray. (Figure 16-3)

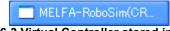


Figure 16-3 Virtual Controller stored in task tray

The simulation is run by this virtual controller. The virtual controller ends automatically when the simulation ends. Do not end the virtual controller manually.

3D monitor is automatically started when the simulation starts, with Version 1.7 or later of this software. The explanation of 3D monitor, see "16.3 Robot View (3D Monitor)".

## 16.1.1. About the warning at first-time startup simulation

After installing RT ToolBox2, when you first start the simulation, the following warning screen may be shown. If the screen is shown, click [Allow access]. You need to select [Allow access] button to use all function of the simulation.

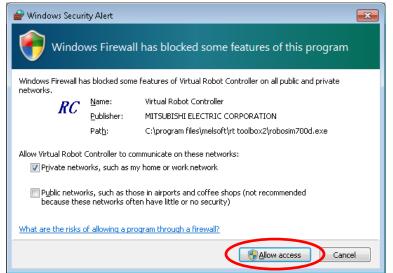


Figure 16-4 The warning screen at first-time startup simulation

# 16.2. Explanation of the Simulation Operation Screen

1:RC4 Simulation (3) Jump Status Program Status OVRD: 100 (2) OVRD (4) Jog operation N X (6) Step execution (11) 3D Monitor BACKWD FORWD ORWD Only Version 1.7 or later. (7) Continuous execution (5) Stop (9) Reset

 $\square$ 

This is a simple explanation of the simulation operation screen.

Figure 16-5 Simulation Operation Screen

(10) Direct execution

#### (1) Status

This shows the task slot status for simulation.

(8) Servo On/Off

#### (2) OVRD

This displays and sets the robot speed override.

You can set by operating the drop down list with Version 3.01B or later of this software. 5%, 2%, and 1% can be selected too in this operation.

(3) Jump

You can specify the line in the program to execute.

(4) Jog operation

This conducts jog operations for the simulation robot. When you click this button, the jog operation screen is displayed.

(5) Stop

When a program is running in a simulation, this stops the program.

(6) Step execution

This executes the specified program one line at a time.

(7) Continuous execution

You can execute the stopped program again from the line on which is was during with a stop instruction or a breakpoint during program running.

(8) Servo On/Off

You can switch the simulation robot servo On/Off.

(9) Reset

You can reset the program and any errors that have occurred.

(10) Direct execution

You can execute any command without relationship to the robot program.

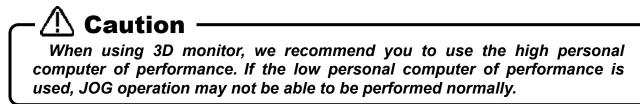
(11) 3D Monitor

You can display 3D monitor of the robot.

# 16.3. Robot View (3D Monitor)

You can display the robot whose simulation you are running and its movements in 3D to check them. Moreover, you can display robots of several projects and their movements in 3D on one screen.

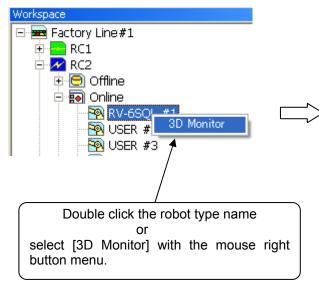
It is possible to display the robot's model name and robot path in this software version 2.20W or later.



## 16.3.1. Robot View (3D View) Start

With the simulation running, from the project tree, either double-click [Online]  $\rightarrow$  [<Robot model name>] or select [3D Monitor] with the mouse right button menu. The 3D display screen for the set robot is displayed.

When the robot view (3D monitor) is started, [3D View] is displayed in the menu bar.



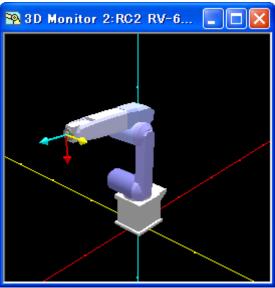


Figure 16-6 Robot View Start

The robot view perspective can be changed by mouse operation.

Viewpoint of changing	Mouse operations on the graphic
Rotation	While clicking the left button, move left/right $\rightarrow$ Rotation around Z axis Move up/down $\rightarrow$ Rotation around X axis Move left/right while clicking the left + right buttons $\rightarrow$ Rotation around Y axis
Move	Move up/down/left/right while clicking the right button
Enlargement/reduction	Move up/down/left/right while clicking pressing [Shift] key and clicking the left button A similar operation can be used by the mouse wheel with Version 3.01B or later of this software.

Table 16-1	Robot View	Perspective	Change C	perations
			, enange e	porationo

## 16.3.2. Displaying robots of more than one projects in 3D

With the simulation running, from the project tree in the workspace, double-click [3D Monitor]. All robots set by "Select the projects" screen (Figure 16-1) are displayed.

This function can be used with Version 2.10L or later of this software.

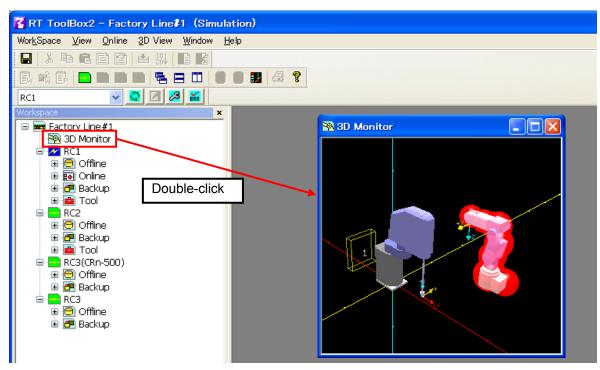


Figure 16-7 Displaying multiple projects

The robot view perspective can be changed by mouse operation with the same usages as 3D monitor of each project.

Table 10-2 Nobel View 1 dispective onlinge operations		
Viewpoint of changing	Mouse operations on the graphic	
Rotation	While clicking the left button, move left/right $\rightarrow$ Rotation around Z axis Move up/down $\rightarrow$ Rotation around X axis Move left/right while clicking the left + right buttons $\rightarrow$ Rotation around Y axis	
Move	Move up/down/left/right while clicking the right button	
Enlargement/reduction	Move up/down/left/right while clicking pressing [Shift] key and clicking the left button A similar operation can be used by the mouse wheel with Version 3.01B or later of this software.	

Table 16-2 Robot View Pers	nective Change Operations
Table 10-2 Robot view Pers	pective change Operations

## 16.3.3. The panel to change the perspective of robot view.

Click the menu bar [3D View] -> [Panel Display]. The panel to change the perspective of robot view is displayed.

It is possible to change the size and the perspective of robot view with this panel.

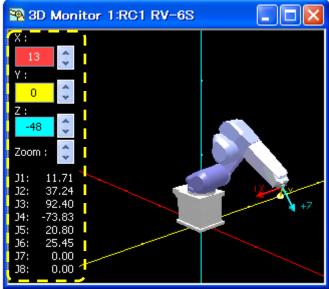


Figure 16-8 the panel to change the perspective of robot view

## 16.3.4. Displaying floor

If you click button of the toolbar, the floor is displayed in the robot view. The length of one grid of the floor is 500(mm)x500(mm). This function can be used with Version 3.01B or later of this software.

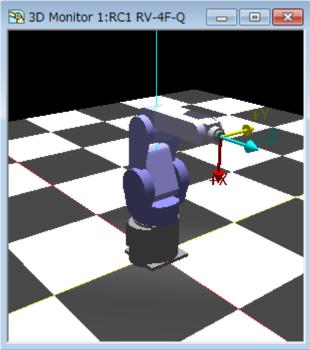


Figure 16-9 Displaying floor

## 16.3.5. Changing the background color.

If you click **button** of the toolbar, the background color of robot view can be changed. This function can be used with Version 3.01B or later of this software.

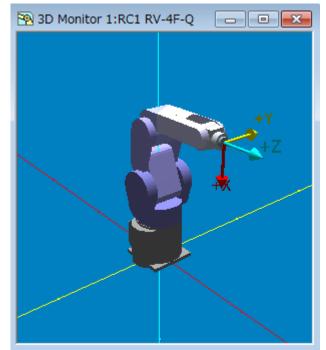


Figure 16-10 Example of changing the background color

## 16.3.6. Click movement of the robot

After starting the simulation, if you click the object in the 3D monitor screen with Ctrl key, the robot move to the position where you clicked.

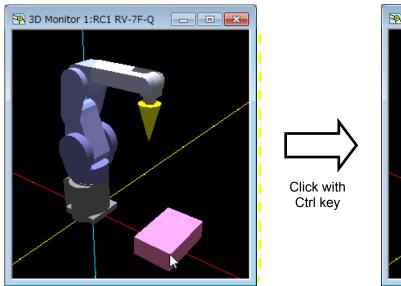
If there is no object where you clicked or the robot can't move to the place where you clicked, the robot doesn't move.

The robot move keeping the posture and multi-rotation flag. Then the robot doesn't move depending on the posture and multi-rotation flag.

This function doesn't work during the robot is running.

This function can use the following robot type.

	Robot models
The robot models which can use click movement.	RV-F, RH-F, RV-S, RH-S, RV-A, RH-A, RP-A, RV-T, RH-L
The robot models which can't use click movement.	RH-G, RC-G, RH-U



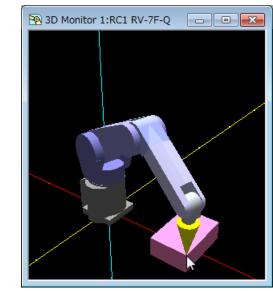


Figure 16-11 Operation of click movement

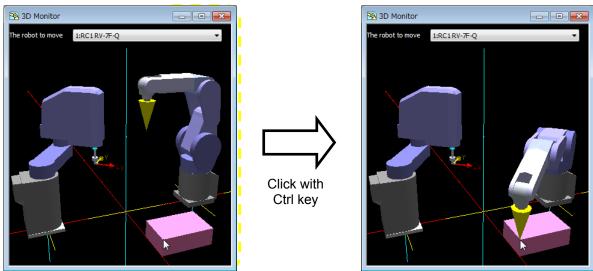


Figure 16-12 Operation of click movement (3D monitor of more than one projects)

The robot selecting [The robot to move] is moved on 3D monitor of more than one projects.

## 16.3.7. Robot display option

Click the menu bar [3D View] -> [Robot display option]. The robot display option screen is displayed.

In this software version 3.00A or later, it is possible to set the display state of the following information on the robot view (3D monitor).

Flange direction

	Version 3.00A or later
Robot display option 1:RC1 RV-7F-Q	Robot display option 1:RC1 RV-7F-Q
User-defined area       Free plane limit         ♥1       9       17       25         2       10       18       26       2         3       11       19       27       3         4       12       20       28       4       Plane length(mm)         5       13       21       29       5       3000        >         6       14       22       30       6       6       14       22       33       7         8       16       24       32       8       8       8       8       8       8       8       8       8       9 <th>User-defined area       Free plane limit</th>	User-defined area       Free plane limit
Iool     Collision area       Image: Display     Image: Display       Image: Color:     Image: Display       Image:	Iool       Flange direction       Color:       Color:         Ø Display       Ø Display       Display       Image: Color:       Image: Color:         Robot information       Ø Display the project name       Work:       Work:       Work:         Ø Display the robot model       Doptot nath       Display the robot model       Display
Image: Display the robot model       Size:       Middle       Hand       Display       Hand file:       Browse       Refresh       Close	Image: Widdle widdle     Robot path       Size:     Middle widdle       Hand       Display       Hand file:       Refresh

Figure 16-13 Robot display option setting screen

The checkbox in the [User-defined area] and [Free plane limit] where the value is set to the parameter can be operated. Moreover, the settings for [Tool] and [Collision area] are displayed.

#### (1)Project

Select a project to set the robot display option from several projects.

This is not displayed when selecting the robot display option from each project.

### (2)User defined area

If the checkbook of the [User-defined area] is set on, it is displayed in "3D monitor".

### (3)Free plane limit

If the checkbox of the [Free plane limit] is set on, it is displayed in "3D monitor".

Robot display option 1:RC1 RV-7F-Q	
User-defined area       Free plane limit         1       9       17       25         2       10       18       26         3       11       19       27         4       12       20       28         5       13       21       29         5       13       21       29         5       13       21       29         6       14       22       30         6       14       22       30         7       15       23       31         7       15       23       31         7       15       23       31         7       15       23       31         7       15       23       31         7       15       23       31         7       16       24       32         8       16       24       32         8       16       24       32         8       16       24       32         9       Display       Hand       Work:         9       Work:       Work:       Work:         9       Displa	Image: Solution 1:RC1 RH-3

Figure 16-14 Display of Robot display option

(4)Tool

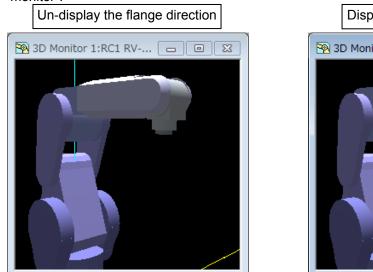
If the checkbox of the [Tool] is set on, a tool of the controller selected now can be display in "3D monitor".

Un-display Display 🐴 3D Monitor 1:RC1 RV-6SD 🛓 🥦 3D Monitor 1:RC1 RV-6SD 📃 🗖 🗙 Figure 16-15 Un-display / display of tool

This function can be used with Version 2.10L or later of this software.

#### (5)Flange direction

If the checkbox is set off, the arrows that indicate the flange direction are un-displayed in "3D monitor".



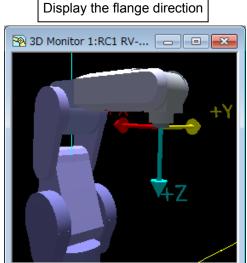


Figure 16-16 Un-display / display of the flange direction

#### (6)Collision area

If the checkbox is set on, the model of collision area is displayed in "3D monitor". The model is displayed the color which is set in "Color" of robot display option. (A default is red.) The color of a model is set up per robot.

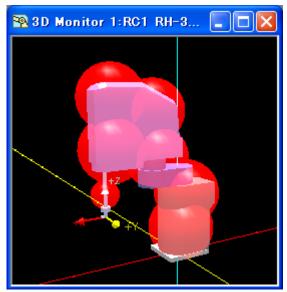


Figure 16-17 Un-display / display of Collision area

### (7) The project name

When a tick mark (for true) is set in the checkbox, the project name is displayed on "3D monitor" screen. The project name is displayed near a robot's flange position. When the project name and the robot's model name are displayed, the project name is displayed on the upper row and the robot's model name is displayed lower row.

It is possible to select the size of the character from three kinds.

#### (8) The robot model

When a tick mark (for true) is set in the checkbox, the robot's model name is displayed on "3D monitor" screen. The robot's model name is displayed near a robot's flange position. When the project name and the robot's model name are displayed, the project name is displayed on the upper row and the robot's model name is displayed lower row.

It is possible to select the size of the character from three kinds.

Robot information     Robot path       Image: Display the project name     Display       Display the robot model     Display	
Size: Middle	+Y V1:RC1 RV-65

Figure 16-18 Robot information

(9) Robot path

When a tick mark (for true) is set in the checkbox, the robot path is displayed on "3D monitor" screen.

This function can be used only in a simulation.

The robot path is displayed with green color. Some operations are displayed and the robot path are erased sequentially from an old one.

# Caution ·

Under the following situations, the plot interval of the robot path might become long.

- When the operation speed of the robot is fast.
- When the performance of the computer is low.
- When you start two or more simulators.
- When you display the complicated CAD model in 3D monitor.
  - When another application is operating, etc.

When [Delete] button is clicked, the robot path is erased.

The robot path has restriction in robot's model which can be used. The model which can be used is as follows.

	Robot model		
The robot model which can use the robot path.	RV-F, RH-F, RV-S, RH-S, RV-A, RH-A, RP-A, RV-T, RH-L		
The robot model which can not use the robot path.	RH-G, RC-G, RH-U		

When the robot model which can not use the robot path is connected, "Robot Path" is not displayed on "Robot display option" screen.

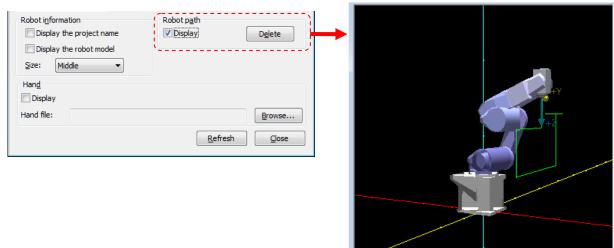


Figure 16-19 Robot path

#### (10) Hand

When a tick mark (for true) is set in the checkbox and a hand file is set, the robot hand is displayed on "3D monitor" screen. Refer to "16.3.11 Hand" for designing the robot hand .

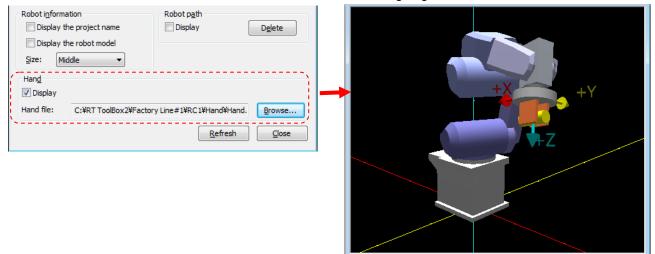


Figure 16-20 Hand

## 16.3.8. Layout

The object of the hexahedron(rectangular parallelepiped), the column, and the sphere can be displayed on "3D Monitor".

This function can be used with Version 1.6 or later of software. A layout list screen is different by versions of this software.

#### (1) In the case of using version 2.20W or later

It is possible to manage the layout parts with a group. Moreover, it is possible to set the referenced part and move and rotate with every group.

When a white space (for false) is set in the checkbox, the parts are not displayed.

Layout list 5:RC5 RV-6S		×
conveyer	Item	Contents
Parts1	Name	converyer
V Parts2	Group	conveyer
Parts3	Ref.	*
	Figure	Hexahedron
Table	File	
	Unit of scale	
	Magnification	
machine	Position	500, 0, 0
E test	Size	100, 300, 200
	Angle	0, 0, 0
······································		
······ 🗸 🛕 2		
Add Edit Copy	<u>D</u> elete	Load Save

Figure 16-21 Layout list(version 2.20W or later)

It is possible to move each part by drag and drop.

Refer to the following table for explanation of the icon displayed on a layout list.

Table 16-3 ICON of layout list			
icon	explanation		
	The group to which each part belongs		
A	A part of referenced layout		
P	Parts other than the above		

#### Table 16-3 Icon of layout list

### (2) In the case of using version 2.1N or earlier

The "Layout list" window is displayed with the menu bar [3D View] -> [Layout]. The list of the layout parts registered beforehand is displayed on "Layout list" windows.

When each checkbox in the left of names of the object is set off, the object becomes invisible. The order of the objects can be changed with the [Up] or [Down] button in the right of this window.

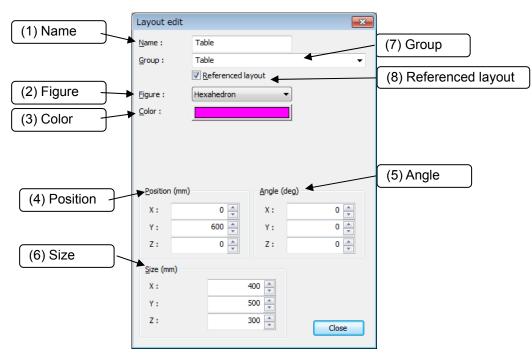
Layout lis	t 1:RC1 RV-6S					X
	Name	Figure	Position	Size	Angle	
Up D <u>o</u> wn	<ul> <li>Table 1</li> <li>Table 2</li> <li>Table 3</li> <li>Sphere 1</li> <li>Parts 1</li> <li>Parts 2</li> <li>Parts 3</li> <li>Parts 4</li> <li>Parts 5</li> <li>Parts 6</li> <li>Parts 7</li> <li>Parts 9</li> </ul>	Hexahedron Column Column Sphere Sphere Sphere Sphere Sphere Sphere Sphere Sphere Sphere Sphere	600, 0, 0 0, 600, 0 0, -600, 0 0, 0, 1200 500, 0, 200 620, 0, 200 740, 0, 200 500, 120, 200 620, 120, 200 740, 120, 200 500, -120, 200 620, -120, 200	400, 500, 200 200, 200, 200 300, 100, 198 50 50 50 50 50 50 50 50 50 50 50 50 50	0, 0, 0 0, 0, 0 0, 0, 0	
	Add	<u>E</u> dit	Сору	Delete	Read	<u>S</u> ave

Figure 16-22 Layout list (example)

### 16.3.8.1. Editing of Layout

When the object is newly added, click [Add] button in "Layout" windows. When the object is changed, click [Edit] button after selecting the object in "Layout" windows. The "Layout edit" window is displayed. With the software version 1.7 or later, similar operation can be done by right-click.

"(7) Group" and "(8) Referenced layout" are displayed with this software version 2.20W or later.



#### Figure 16-23 Layout edit

	Name	説明
(1)	Name	The name of the object can be input.
(2)	Figure	The figure type of the object can be selected. It is possible to select a hexahedron (rectangular parallelepiped), a column, a sphere, and 3D model. When "3D model" is selected, the data created by CAD can be read. "3D model" can be used with Version 2.20W or later of this software.
(3)	Color	The color of the object can be selected.
(4)	Position	The position of the object can be input.
(5)	Angle	The posture of the object can be input. The angle is set in order of X, Y, Z axis. The order is different from the robot arrangement.
(6)	Size	The size of the object can be input.
(7)	Group	Set up the group which belongs. A group name can be chosen from a combo box. When a new group name is inputted, a new group is added in the list. (This function can be used with Version 2.20W or later of this software.)
(8)	Referenced layout	It is set up whether it is a layout used as the standard within a group. This referenced layout is used when moving and rotating the whole group. Refer to <b>"16.3.8.5 Movement and rotation of the layout</b> ". A referenced layout can be set up only one within a group. When the referenced layout is already in the group, the conventional referenced layout is canceled and the parts set up newly serve as a referenced layout. (This function can be used with Version 2.20W or later of this software.)

The explanation of each object is as follows.

Windo		Dianation of the layout				
		Explanation				
Hexahedron(rectangular parallelepiped)						
Layout edit Name : Table Group : Table ☑ Referenced layou Eigure : Hexahedron Color :	• • • • • • • • • • • • • • • • • • •	Angle (Z) Size (Y) Size (Z)				
Position (mm)A $X :$ $0 \checkmark$ $Y :$ $600 \checkmark$ $Z :$ $0 \checkmark$ Size (mm) $X :$ $400$ $Y :$ $500$ $Z :$ $300$	yngle (deg) X: 0 ↓ Y: 0 ↓ Z: 0 ↓ × × × Close	Angle(Y) X Position (X, Y, Z)				
Column (Cone)						
Layout edit						
Name :         Table 2           Group :         Table           Referenced layou           Eigure :         Column           Color :	-	Angle (Z) Size (Height)				
X: -80 Y: 600 Z: 300 Size (mm) Upper radius : 50	ngle (deg) X: 0 \[ V] Y: 0 \[ V] Z: 0 \[ V] \[ V] Close	Size (Lower radius) Angle (Y) X Position (X, Y, Z) * If a different value is set to an upper radius and a lower radius, it becomes a conic type.				

Table 16-4 Explanation of the layout

	Window	Explanation			
Sphere		· · · · · · · · · · · · · · · · · · ·			
	Layout edit				
	Name : Sphere	7			
	Group : Table 🗸	Angle (Z)			
	Referenced layout				
	Figure : Sphere 🔻	Ĭ			
	Color :	Angle			
		Size (X)			
		(Radius)			
	Position (mm)	Angle(Y)			
	X: 0	Position			
	Y: -500	X Position (X, Y, Z)			
	Z: 493 (*				
	Size (mm)	* There is no rotation in the ophere editing			
	Radius : 100 🛓	* There is no rotation in the sphere editing.			
	Close				
3D mod					
	r`				
	Layout edit	Z			
	Name : CV	Angle (Z)			
	Group : Table				
		Angle			
	Color :	(X)			
	File : C:¥RT ToolBox2¥CAD¥cv.STL				
	Unit of scale : Millimeter [mm] (Standard)				
	(Magnification: x 1.0 Edit)				
	Position (mm) Angle (deg)				
		Angle (Y)			
	X:         500         X:         0         v           Y:         0         v         Y:         0         v	X Position			
	Z: 0 × Z: 0 ×	(X, Y, Z)			
		The position and a rotational reference position of			
		3D model are reference positions at the time of CAD data creation.			
	Close	"3D model" can be used with Version 2.20W or			
		later of this software.			
		When 3D model is selected, the CAD file to read			
		can be specified. The CAD file which can be read is as follows.			
		file extension			
		STL (Stereolithography) file .stl			
		OBJ (Wavefront format) file .obj			
		3DS (3D Studio) file .3ds			
		PLY (Stanford Triangle Format) .ply			
		VRML 2.0 (Virtual Reality .wrl Modeling Language) file			
		When the file of OBJ form is read, the information			
		on a texture is not reflected.			
		The file of 3DS, PLY, and VRML 2.0 form can be			
		used with Version 3.00A or later of this software.			

Window	Explanation		
3D model (Continuation)			
Layout edit	The unit of scale that display in 3D monitor can be		
Layout edit         Name :       CV         Group :       Table         Referenced layout         Ejgure :       3D model         Color :	<ul> <li>The unit of scale that display in 3D monitor can be specified with Version 3.00A or later of this software. The millimeter is standard unit in 3D monitor. The unit of scale that can be specified is as follows.</li> <li>Millimeter[mm]</li> <li>Meter[m]</li> <li>Inch[in]</li> <li>Magnification specification (Magnification of 1.0-10000.0 can be specified.)</li> </ul>		

▲ Caution –

*If 3D model of big size is read, screen drawing processing will become heavy.* 

### 16.3.8.2. Copy of the object

The object of the layout can be copied. After selecting the object, click [Copy] button. With the software version 1.7 or later, similar operation can be done by right-click.

It is possible to copy the whole group in this software version 2.20W or later.

#### 16.3.8.3. Delete of the object

The object of the layout can be deleted. After selecting the objects, click [Delete] button. Click [Yes] button after the confirming message is displayed. With the software version 1.7 or later, similar operation can be done by right-click.

It is possible to delete the whole group in this software version 2.20W or later.

That once the objects are deleted, they cannot be recovered.

### 16.3.8.4. Editing of Layout group

It is possible to move and rotate the whole group, and rename the Layout group. Refer to **"16.3.8.5 Movement and rotation of the layout "**.

This function can be used with Version 2.20W or later of this software.

Click [Edit] button after selecting the layout group which you change the name. Or select [edit] in the menu displayed when you click a mouse right button. A layout group edit screen is displayed.

Layou	t group edit				<b>X</b>
Group	: conveyer				-
- <u>P</u> osit	ion (mm)		- <u>A</u> ngle	(deg)	
x :	0	*	х:	0	·
Υ:	0	*	Υ:	0	×
Ζ:	0	*	Ζ:	0	×
					Close

Figure 16-24 Layout group edit

When a new group name is input, the name of the selected group is changed. When the existing group name is selected, all parts in the group move to the selected group. In this case, the original group in the list is deleted

### 16.3.8.5. Movement and rotation of the layout

#### (1) Movement and rotation of the parts of layout

When you move or rotate the part of layout, change the position and rotational value in the edit screen of each part. Refer to "16.3.8.1Editing of Layout ".

#### (2) Movement and rotation of the layout group

It is possible to move and to rotate all parts in the group at the same time in this software version 2.20W or later.

Click [Edit] button after selecting the group which you move or rotate it. "Layout group edit" screen is displayed. You can do the same operation by clicking the right button of a mouse.

Set up the position or the degree of rotation angle after selecting the group. All parts in the group are moved or is rotated.

The layout group moves on the basis of the center of the whole group. The group moves in the direction of coordinates of a referenced layout part regardless of a robot's coordinate.

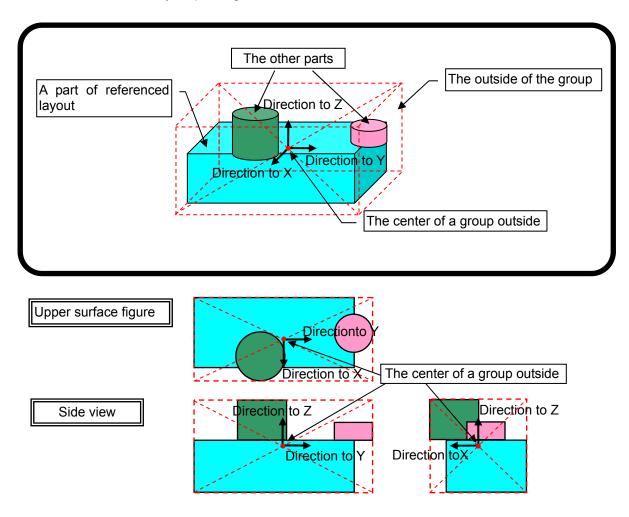


Figure 16-25 Movement of the layout group

A layout group rotates focusing on the center of the whole group. The group rotates in the direction of coordinates of a referenced layout parts.

#### 16.3.8.6. Save and Read the information of the layout.

The objects of the layout can be preserved in the file. And, the objects of layout in the file can be read. By saving the file, layout parts can be used by another project.

Click [Save] button when preserving them in the file. Click [Save] button after confirming the folder and the file name on "Save as" windows.

Click [Read] button when reading them from the file. Click [Open] button after selecting the file on "Open" window.

Please note that all objects of the current layout are deleted when the file is read.

# Caution for Saving As Workspace with MELSOFT Navigator

When Saving As Workspace with MELSOFT Navigator version 1.28E, information of layout used in 3D monitor for more than one projects don't be saved to new Workspace. Edit object of layout in the new Workspace again.

### 16.3.9. Robot arrangement

With the simulation running, click the menu bar [3D View] -> [Robot arrangement]. The robot arrangement window is displayed.

You can set up each robot arrangement displayed in "3D monitor".

This function can be used with Version 2.10L or later of this software.

Robot arrangement list					
Name	Robot# R	obot Type	Position	Angle	
♥ RC1 ♥ RC2		1-3FH3515-Q 7-25D	0, 0, 0 600, 600, 0	0, 0, 0 0, 0, 180	
Edit				Load	<u>S</u> ave

Figure 16-26 Robot arrangement list

The project list of online state is displayed. If the checkbox is set on, the robot is displayed on "3D monitor".

#### (1)[Edit]

For displaying the robot arrangement screen, click a robot to edit with "Robot arrangement list", and then the [Edit] button or double-click a robot to edit.

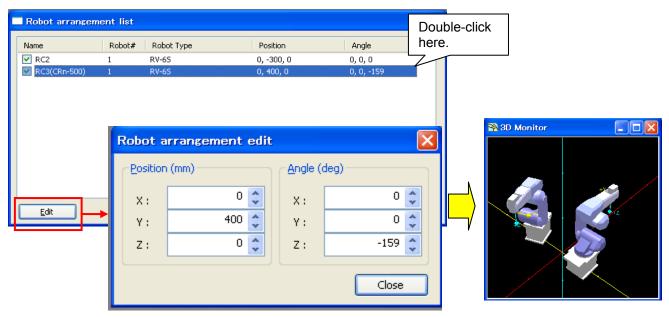


Figure 16-27 Editing Robot arrangement list

Edit the position and the angle and click the [Close] button. The angle is set in order of Z, Y, X axis. The order is the same as "Common coordinates for Collision avoidance" (RBCORD) parameter. The order is different from the layout object.

#### (2)[Load]

Load a saved file of robot arrangement information.

#### (3)[Save]

Save the contents of robot arrangement list displayed now at a file.

## 16.3.10. XYZ position variables

It is possible to display the XYZ position variable on 3D monitor. This function can be used with Version 2.20W or later of this software.

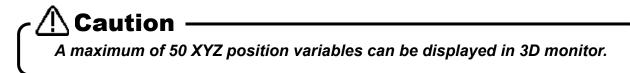
When some XYZ position variables in a robot program are selected, these all of positions are displayed on 3D monitor.

When selection of the XYZ position variables is released, the positions on 3D monitor are vanished.

It is possible to display the XYZ position variables on some 3D monitors. When both 3D monitor of a robot simple substance and the whole 3D monitor are displayed, the XYZ position variable is displayed in both screens.

When two or more XYZ position variables in some programs in a project are selected, all selected position variable is displayed. When the XYZ position variables of the same name in some programs are selected, all selected position data is displayed.

It is possible to display only XYZ position variables.Joint position variables cannot be displayed on 3D monitor.



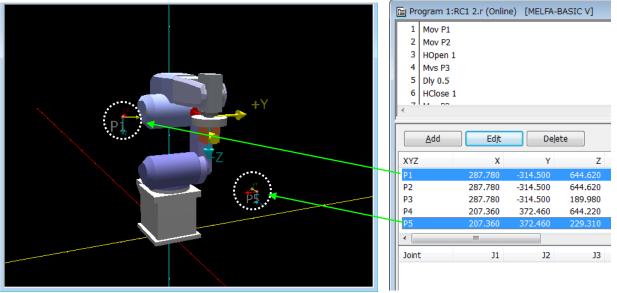


Figure 16-28 XYZ position

The position data which can be displayed is as follows.

Table 16-5 The position data which can be displayed					
Preservation place	Kinds of program	Remarks			
Robot program in the robot controller	Movemaster command	A simulation cannot be used when Movemaster command is selected.			
	MELFA-BASIC IV				
	MELFA-BASIC V				
	SQ Direct	Only a CRnQ type can be displayed.			
Robot program in the project	Movemaster command	A simulation cannot be used when Movemaster command is selected.			
	MELFA-BASIC IV				
	MELFA-BASIC V				
	SQ Direct				
	Backup programs				

#### Table 16-5 The position data which can be displayed

## 16.3.11. Hand

A robot hand can be displayed on the tool of the robot on 3D monitor. This function can be used with Version 2.20W or later of this software.

Click the menu bar [3D View] -> [Hand]. The "Hand" screen is displayed. The parts of the hand registered are displayed on a "Hand" screen. Nothing is displayed when the hand is not created.

When you set a white space (for false) in the checkbox of the parts on "Hand" screen, the parts of the hand are not displayed.

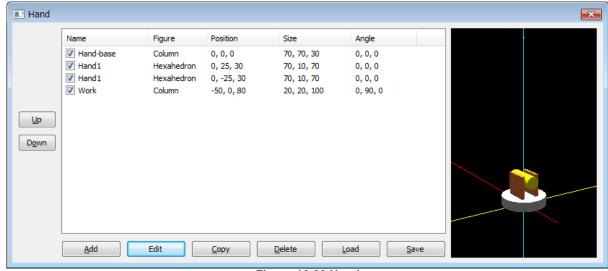
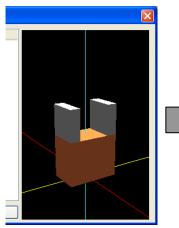
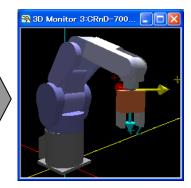


Figure 16-29 Hand

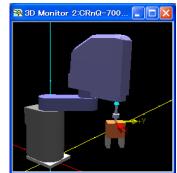
The origin of Hand screen (Figure 16-29) becomes the flange center of the robot. The parts arranged to + direction of Z pole is displayed in front of the flange of the robot. Arrange the parts like Figure 16-30.



Example of making hand



Vertical robot Figure 16-30 the way of arranging hand



Horizontal 4-axis robot

#### 16.3.11.1. Editing of Hand

Hand edit			<b>-</b> ×
<u>N</u> ame :	Hand-base		
<u>Figure</u> :	Column	•	
<u>C</u> olor :			
Position (mr	n)	- <u>A</u> ngle (deg	J)
Position (mr	n) 100 🚔	Angle (deg X :	a) 0 (*)
	100 🛋		0
X :	100 📮	X :	0
X: Y:	100 💌 0 👻	X: Y:	
X: Y: Z:		X: Y:	
X : Y : Z : <u>S</u> ize (mm)	100 🔍 0 🔪 0 🔦	X : Y : Z :	
X : Y : Z : <u>S</u> ize (mm) Upper radi	100 🔍 0 🔊 0 🔊 us :	X: Y: Z:	

Click [Add] button. Click [Edit] button when editing the existing parts. "Hand edit" screen is displayed.

Figure 16-31 Hand edit

It is possible to set up a Hexahedron(rectangular parallelepiped), a Column (Cone), a Sphere, and a 3D model. The setting method of each part article is the same as layout parts. Refer to **"16.3.8.1 Editing of Layout "**.

#### 16.3.11.2. Copy of the hand object

It is possible to copy the parts of hand displayed on "Hand" screen. Click [Copy] button after selecting the parts of hand in the list. The copy of the parts is added to the lowest row in the list. Two or more parts can be chosen and copied.

#### 16.3.11.3. Delete of the hand object

It is possible to delete the parts of hand displayed on "Hand" screen. Click [Delete] button after selecting the parts of hand in the list. The selected parts in the list are deleted. Two or more parts can be chosen and deleted. That once the objects are deleted, they cannot be recovered.

#### 16.3.11.4. Read the hand file

It is possible to read the hand information from a file, and to edit it.

Click [Read] button in "Hand" screen and select the file. The hand information in the selected file is displayed on "Hand" screen. Please keep in mind that the information on the hand read now is deleted at this time.

#### 16.3.11.5. Save the hand file

It is possible to save the created hand information at a file.

Click [Save] button in "Hand" screen and input the file name. The hand information saves at the file. It is possible to display the saved hand on "3D view" screen.

Refer to "16.3.7 Robot display option" for the display method of a hand.

# 16.4. Robot Program Selection

Select the robot program to run the simulation. Step operation or direct execution in the simulation is not possible unless a program is selected.

In the simulation, from the project tree, with [Online]  $\rightarrow$  [Program], execute "Open in debugging status" for the program from the right mouse button.

If the robot program being simulated is not [Online], use program management to copy to the virtual controller.

💬 🐻 Online	🗎 Program 1:RC1 1	.r (Online)	[MELFA-	BASIC IV	]				
RV-6S Program Debug Open Paramever	<ul> <li>1 MOV P1</li> <li>2 MOV P2</li> <li>3 MOV P3</li> <li>4 MOV P4</li> <li>5 END</li> </ul>								<ul> <li></li> <li></li> </ul>
	Add	Edit	Delete						
	XYZ	X	Y	Z	A	В	С	L1	<b> ^</b>
	P1	777.450	-0.020	928.760	90.440	-71.000	89.570	Х	<u> </u>
	67 K	610 020	470 350	<u>028 760</u>	ON 44N	-71 000	126 800	Y	>
	Joint	J1	J2	J3	J4	J5	J6	37	J8
	<								>

Figure 16-32 Program Selection for Simulation

The specified robot program is opened in debugging status. The execution line cursor ">" is displayed at the left end of the command statement edit area. The line on which this execution line cursor is displayed is the line currently being executed.

The display of this execution line cursor can be switched on/off with the menu bar [Debug]  $\rightarrow$  [Display/Do not display].

# 16.5. Program Execution

You can execute a program that has been opened in debugging status.

Start the simulation, and then open the robot program in debugging status. When you click the [Continuous Execute] button on the simulation operation screen, automatic operation of the program is started. This automatic operation completes in one cycle. Be careful. If the program repeats infinitely, it does not stop automatically.

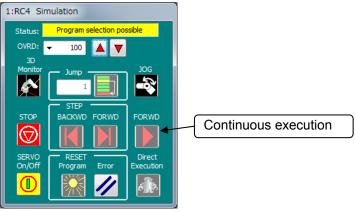


Figure 16-33 Program Execution

To forcibly stop a program that is executing, click the [Stop] button on the simulation operation screen.

# **16.6.** Specifying the Starting Line for Program Execution

You can freely specify the line in the program from which to start execution. Use [Jump] on the simulation operation screen Input the step number to start execution from, then click the button on the right side of the input box. The current execution line moves to the specified step number.

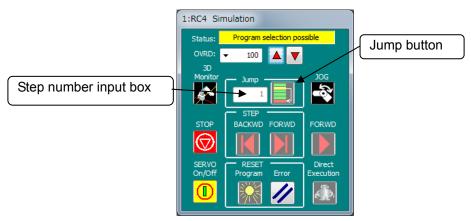


Figure 16-34 Program Execution Line Execution

# 16.7. Breakpoint Setting

You can also use breakpoints in a simulation. For details on the operation method for breakpoints, see "8.9.4 Setting and deleting breakpoints".

# 16.8. Step Operation

A program that has been opened in debugging status can be executed step by step.

Start the simulation, and then open the robot program in debugging status. Step operation in simulation is performed from the simulation operation screen.

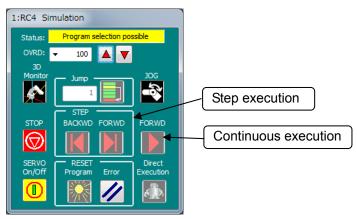


Figure 16-35 Simulation Operation Screen

Operate with the [FORWD] button and [BACKWD] button in the [Step Execution] group on the simulation operation screen.

Pressing the [FORWD] button executes the command on the current execution line and advances the current execution line by line. Pressing the [BACKWD] button executes the command on the current execution line and returns the current execution line by line.

# 16.9. Direct Execution

You can input command statements and operate the robot directly. Click the simulation operation screen [Direct execution] button.

1:RC4 Simulation	1:RC1 Direct execution
Status: Program selection possible	
OVRD: 🖵 100 🔺 🔻	Robot: 1:RV-6SQL
3D Monitor Jump JOG	Command:
	History: Clear
STOP BACKWD FORWD FORWD	
SERVO RESET Direct On/Off Program Error Execution	
Direct execution	Execute Close

Figure 16-36 Starting Direct Execution

Input the command to execute into the command box, then either press the keyboard [Enter] key or click the [Execute] button. The input command is executed. At this time, if a position variable is specified in a move command or a like, the position variables defined in the currently open program are used. A position variable not defined in the program can not be used.

A command that has been input once into the command box is added to the history and can be selected from the command box dropdown list. However, when the simulation is ended, the history and dropdown list commands are commanded

1:RC1 Direct execution						
Robot:	1:RV-6SQL		•			
Command:	HOPEN		•			
History:	HOPEN Mov					
HOPEN Mov						
	Execute	Close				

Figure 16-37 Command Dropdown Liston Direct Execution Screen

This operation is not possible during automatic running with the [Continuous Execution] button.

# Caution When executing directly, select the program to execute. Direct execution can not be used unless a program is selected. Always open a program in debugging status and put it in selected status.

# 16.10. Jog Operation

You can perform the jog operations displayed in the robot view in the simulation status.

Click the simulation operation screen [Jog] button. The screen for jog operations is displayed at the bottom of the simulation operation screen.

It is possible to move the robot by the "TOOL JOG" or "WORK JOG" with Version 1.6 or later of software. However, in the following cases, it is not possible to use the "WORK JOG" operation.

- Without setting the "Work coordinate" parameter.

- connecting with the CRn-500 series controller.

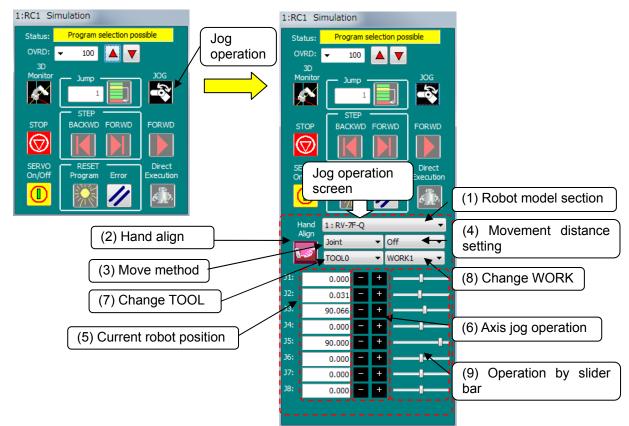


Figure 16-38 Starting Jog Operation

#### (1) Robot model select

When multiple robots are set as connected, select the robot model to operate.

(2) Hand align

You can align the posture of a hand installed on the robot in units of 90 degrees.

This function moves the value to the multiple of 90° that is closest to the A, B, and C components of the current position.

(3) Move method

Select the robot move method. Move method that can be selected is as follows. For a detailed explanation of each Jog Feed, see "Detailed explanations of functions and operations" in the robot controller's user's manual.

Version 1.5.1 or earlier	Version 1.6 to 1.6.1	Version 1.7 or later
Joint	Joint	Joint
XYZ	XYZ	XYZ
	TOOL	TOOL
	WORK	3-axis XYZ
		Cylinder
		WORK

The robot current position display and the jog operation button display for each axis use the method selected here. Also, these displays depend on the axis configuration of the connected robot.

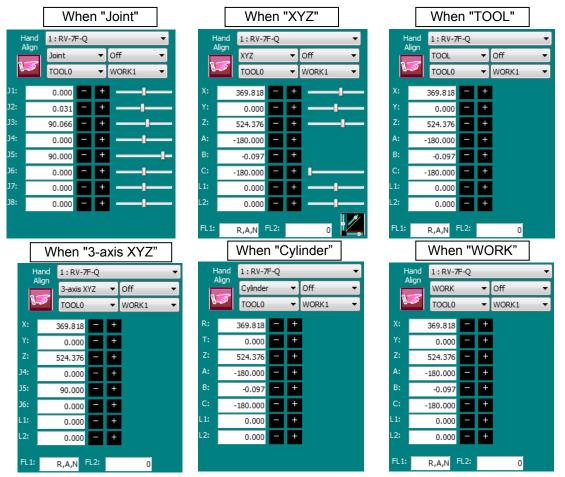


Figure 16-39 Screens for Jog Operation with Different Move Methods Selected

(4) Distance setting for moving

This selects the robot move distance. The robot move distances are "off", "High", and "Low". For a detailed explanation of the move distance, see "Detailed explanations of functions and operations" in the robot controller's user's manual.

(5) Robot current position

This displays the current robot position.

(6) Jog operations on each axis

This conducts jog operations on each robot axis.



Moves the selected robot axis in the "-" direction.

Moves the selected robot axis in the "+" direction.

These buttons move the robot while the mouse button is held down.

#### (7) Changing TOOL

Selecting the tool when moving the robot with the "TOOL JOG".

The tool which can be selected is different depending on the software version of the robot controller connected.

		The Tool which can be selected
	Ver.1.5 or earlier	Not use
Version of RT	Ver.1.6 - Ver.1.7	"TOOL0" to "TOOL4"
ToolBox2	Ver.1.8 or later	It is different depending on the specification of the robot controller connected.

Table 16-6 The Tool which can be selected by each version

#### (8) Changing WORK

Selecting the WORK when moving the robot with the "WORK JOG". The WORK that can be selected is "WORK1" to "WORK8".

This function can be used with Version 1.6 or later of software. However, in the following cases, it is not possible to use the "WORK JOG" operation.

- Without setting the "Work coordinate" parameter.

- connecting with the CRn-500 series controller.

#### (9) Operating by slider bar

When you select Joint or XYZ jog, by dragging the slider bar, you can move the corresponding pole.

The following matters might occur about the operation range of X, Y or Z pole of XYZ jog by your environment.

- 1. The range of the robot is out of the range of slider bar.
- 2. The range of the slider bar is too wide to operation.

In this case, you can change the operation range of X, Y and Z pole at XYZ slider range screen which

you can display by clicking the Les button in the lower right corner of XYZ jog screen.

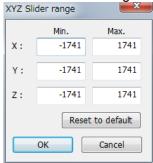


Figure 16-40 XYZ Slider range screen

When you use a vertical 6-axis robot, you can use the slider bar in other than A and B pole

#### 16.11. Simulation Robot Position Variable Editing

You can edit position variables by moving the simulation robot and reading the position variables from the simulation robot posture.

Move the robot to the target position with jog operations.

Click the [Add] button or [Change] button for position variables in a program opened in debugging status to display the position edit screen, then click the [Read current position] button. You can read in the current position of the simulation robot.

#### **Tact Time Calculation** 16.12.

You can use the simulation function to calculate the tact time for a program prepared and the axis load level. The robot that can calculate the axis load level is RV-F and RH-F series.

 Table 16-7 The Function of axis load level which can be used by each version

		Series of robot.
Version of RT	Ver.2.50C or earlier	Not use
ToolBox2	Ver.3.00A or later	RV-F,R-HF series

# **Caution**

## Tact time calculation

The calculated tact time varies with the capacity of the computer used and its load status and does not completely match the actual robot operating time (tact time).

Use this function as a rough yardstick for tact time study.

Under correct conditions, the results of tact time calculation with this software have an error of about ±3% compared to the actual robot operating time (tact time).

For details on tact time deviation, see "16.12.3 Causes of tact time deviation".

# /!\ Caution

## Axis load level calculation

The axis load level is expressing of the motor load numerically.

The robot causes the overload error and stops to protect the motor when the axis load level exceeds 100%. The axis load level assumes that the robot repeated the same operation and is calculated.

There is a possibility not to be able to operate continuously in an actual robot when the calculated axis load level is high. You should lower the operation frequency by the Dly command, and lower operation speed and the acceleration by Accel and the Ovrd command, etc. There is a possibility that the axis load level falls by changing the operation point.

It is likely not to agree to the calculated axis load level completely because the axis load level of an actual robot is influenced in a robot individual difference, an environmental temperature, and the state etc. of the robot. Use this function as a rough vardstick for robot movement study.

# Caution

When XYZ position variables, the parts of layout or Robot information is displayed in 3D monitor, tact time may not be calculated correctly.

#### 16.12.1. Conditions for tact time measurement

Be aware of the following restrictions on tact time calculation.

# ▲ Caution

#### Do not start some simulators.

It is not measured correctly because of a lot of load for your computer.

## Do not set ON a display of [Tool] and [Collision area].

It is not measured correctly because of a lot of load for your computer.

# Do not use a program that has signal input or robot status

#### changes.

For programs that have signal input from the outside or that have changes in robot status variables or the like, either comment out such sections or extract just the section you want to calculate the tact time for and calculate it.

When studying the tact time for such a program, take this into account by adding an approximate input wait time to the calculation results.

#### Do not use a program with an infinite loop.

The tact time for a program that falls into an infinite loop cannot be correctly calculated. Confirm that the robot program does not fall into an infinite loop with a FOR statement or GOTO statement.

## Do not use M\_TIMER(1).

Do not use M\_TIMER(1). This software's tact time calculation uses M\_TIMER(1). If M\_TIMER(1) is used during the program, the tact time can not be calculated accurately. Change the program to use any timer from M\_TIMER(2) to M\_TIMER(8) instead, then calculate the tact time.

# *If a position array variable or joint array variable is included, also include the corresponding "Dim" declaration in the tact time calculation range.*

If a program whose tact time is being measured includes a position array variable or joint array variable, also include the corresponding "Dim" declaration in the tact time calculation range.

# Set the hand data correctly when you measure the axis load level.

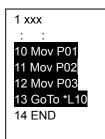
Please set the hand and work condition (mass, center of gravity, and shape) actually used correctly. When the setting is different from an actual robot, the axis load level cannot be correctly calculated. The setting of the hand and work condition is set by parameter HNDDAT\*, WRKDAR \*. The condition of the hand and work is specified by the Loadset command.

# ▲ Caution

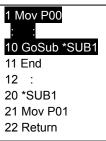
# Include the destinations for any GoTo or GoSub's in the tact time calculation range.

For example, the tact time can not be calculated for a program like the following. The location displayed inverted in black in the program is set for tact time calculation.)

No destination selected for GoTo statement



No destination selected for sub-routine



## Do not use a program with excluding commands of move.

As for the program that doesn't accompany the movement of robots of the calculation processing and the divergence processing, etc. , tact time is not correctly calculated.

#### 16.12.2. Tact time measurement

This explains tact time measurement.

#### 1. Start simulation.

Start simulation. For details, see "16.1 Starting a Simulation".

#### 2. Open the program.

Open the program whose tact time you will calculate. You can calculate the tact time for "offline" and "online" programs. However, you can not calculate the tact time for a program that has been opened in debugging status. Always open the program with "Open program".



For details on the operations for opening a program, see "8.2 Opening an Existing Program".

#### 3. Specify the range for measuring the program tact time.

Drag the section to measure the program tact time for, then drag it to select it.

Program 1:RC	1 V6S.r (Online	) [MELI	FA-BASIC	; V]			
5 M_Timer(8):	=0						^
6 MA = 3							
7 OAdl Off							
8 Dly 1							
9 For M01=1	To MA						
10 Mov J1							
11 Mov J2							
12 Mov J3							
13 Mov J4							~
<							>
Add	Edit	Delete					
XYZ	X	Y	Z	A	В	C	L1 🔼
POO	400.120	0.000	644.620	180.000	-0.070	180.000	0.000 -
P01 P02	678.740 -657.1	0.000 -169.8	353.500 353.500	-180.0 180.000	0.000 0.000	-180.0 14.490	0.000
<	-037.1	-109.0		100,000	0.000	14,450	0.000
			20			26	
Joint		J2	J3	J4		J6	J7 🔺
JO J1	0.000 0.000	0.000 50.000	90.000 120.000	0.000 0.000	90.000 120.000	0.000 0.000	0.000
J2	0.000	-13.910	-91.150	11.410	-116.8	0.000	0.000
<							>
P=							

Figure 16-41 Tact time Measurement Range Selection

4. Click on the menu bar [Tool] -> [Tact time].



Figure 16-42 Toolbar "Tool" Menu

#### 5. Check the range over which you will calculate the tact time.

Open the program whose tact time you will calculate. Check the contents of this range, then click the [OK] button.

Tact calculation	×
Caution The robot's movement tact time can be calculated with this software using the simulation function. Note that the calculated tact time will differ according to the performance of the personal computer used and the load state, and will not completely match the actual robot movement time (tact time). Use this function as a guide for considering the tact time.	У
Program: 1 ME_MO0# = M_TIMER(1)	
5 M_TIMER(8)=0	-
6 MA = 3	
7 OADL OFF 8 DLY 1	
9 FOR MD1=1 TO MA	
10 MOV J1	
11 MOV J2 12 MOV J3	
13 MOV 34	
14 NEXT	
15 MOV J0	
16 FOR M01=1 TO MA 17 MOV P01	
18 MOV P02	
	2
OK Cancel	

Figure 16-43 Checking the Tact time Measurement Range

The tact time calculation is started. During tact time calculation, "Calculating tact time" is displayed on the simulation operation screen. Do not perform any other operations until this display goes out.

#### Figure 16-44 Simulation Operation Screen During Tact time Measurement

#### 6. The tact time measurement results are displayed.

When tact time measurement is complete, the "Take time calculation results" screen is displayed. The tact time measurement results are displayed in ms [milli seconds].

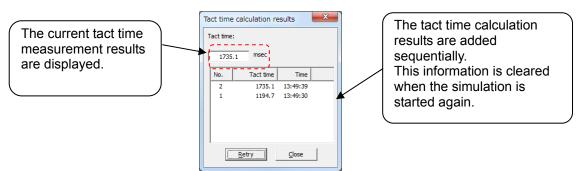


Figure 16-45 Tact time Measurement Results (The axis load level calculation is impossible.)

The axis load level (J1-J6 each axis) and the tact time are displayed for the robot that can measure the axis load level. The calculation result of the axis load is displayed with %.

The current axis load level Tact time calculation results X The current tact time Axis load level: JI J2 J3 J4 J5 J6 mset 76 67 84 89 46 42 % measurement results are measurement results Tact time: displayed. are displayed. 4807.0 ┢ - - - -Tact time J1 J2 J3 J4 J5 J6 Time No. 
 4807.0
 76
 67
 84
 89
 46
 42
 14:35:18

 4807.0
 76
 67
 84
 89
 46
 42
 14:35:09
 3 The tact time and axis load 2 4437.5 78 69 88 89 38 43 14:34:43 1 level calculation results are added sequentially. This information is cleared Retry Close when the simulation is started again.

Figure 16-46 Tact time Measurement Results (The axis load level calculation is possible.)

## 16.12.3. Causes of tact time deviation

With this software, you can use the simulation function to calculate the robot movement tact time.

However, the calculated tact time varies with the capacity of the computer used and its load status and does not completely match the actual robot operating time (tact time).

Use this function as a rough yardstick for tact time study.

Also, there are the following causes for the tact time calculation results deviating from actual robot tact time.

#### (1) An application other than "program editing" of this software is running.

This software's tact time calculation has parts that are processed on the computer in the background. For example, if you are working running an application such as a Word document that is saved automatically, it takes more time for the background processing for this software and sometimes the correct tact time is not calculated. The tact time is increased.)

When calculating the tact time with this software, first close other applications.

Also, on this software itself, first close all the screens beside "Program edit".

#### (2) This uses commands that depend on the robot main unit status and external equipment.

There is no connection with the robot main unit or external equipment in this software's tact time calculation. Therefore, commands that are executed communicating with that equipment are executed as if ideal information were sent from that equipment. Therefore, the calculated cycle time is shorter than the actual cycle time.

	Function	Command	Explanation
1	Positioning	FINE(*1)	Monitors the robot's status until it
	completion wait		reaches the target position.
2	Compliance	CMP JNT/POS/TOOL/OFF CMPG	Monitors external force on the robot.
3	Collision detection	COLCHK、COLLVL	Monitors external force on the robot.
4	Servo control	SERVO ON/OFF	Monitors the servo amp status

The commands to which this applies are shown in the following table.

(\*1) The Fine command be used with this software Ver.2.40S or later and selection RV-F/RH-F series.

For example, if the servo On command is executed in the program, the actual robot takes a few seconds, but the simulation requires almost no time at all (500 ms or less). In order calculate the tact time precisely, program using only movement commands and none of the above commands. If you are executing a program you already have, either comment out such commands or extract and use just the part you want to measure.

#### (3) This uses functions that depend on the CPU processing speed and OS.

The tact time calculation in this software runs on Windows, but the robot controller control software runs on a real-time OS, so the internal operations are different. For example, with a real-time OS, the tact time may be increased by the postponement of calculations with a high load that could not be fully processed, but in this software's tact time calculations, such an increase in the tact time can not be calculated. Therefore, if you use the high-load functions below, the calculated tact time may be a few percent less than the actual tact time.

	Function	Cause of increased processing on actual robot
1	CC-Link	Because there is more signal processing with the CC-Link
		option than without it
2	Multi tasking	Because multiple robot programs are executed at the same
		time
3	Added axes	Because of the need to control the additional axes
4	Maximum	Because the optimum movement for the robot load is
	acceleration/deceleration control	calculated
5	Collision detection	Because processing to detect collisions is executed (*1)
6	Maintenance forecast	Because the processing time is longer when the maintenance
		forecasting information collection level is raised (*1)
		In tact time calculation, the same results are calculated as for
		information collection level 1 (the factory default setting).

The commands to which this applies are shown in the following table.

(\*1) On actual robots, the tact time is roughly 3-10% longer.

By changing a robot program to eliminate the above factors, you can reduce the difference between the simulation tact time and that on the actual robot. However,

because the simulation executes the next movement command without waiting for static determinacy after movement or for the conditions to be established, the tact time calculated differs from the tact time on the actual robot. We recommend that you finally confirm operation on the actual robot.

# 16.13. Ending Simulation

To end the simulation, close the robot program in debugging status. Then click on the menu bar [Online]  $\rightarrow$  [Offline] or click the tool bar "Offline".

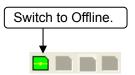


Figure 16-47 Toolbar "Switch to Offline"

When the simulation ends, the virtual robot controller, robot view, and simulation operation screen end and the controller goes back offline.

# 17.MELFA-3D Vision

Set the control unit of MELFA-3D Vision. This function can be used width Version 3.00A or later this software.

To add a control unit to set to the workspace, double click the [MELFA-3D Vision] - [Setup/Add] in the project tree.

Workspace ×			Setting and	Add Control Un	it		×
Factory Line #1 □	Please select the co Control Unit	ontrol unit, and click th	e Set Communicatio	on button and the Ad	d/Update to Worksp	ace button.	
😟 💼 Tool	Unit Name	MAC Address	IP Address	Subnet Mask	Default Gateway	Port #	Result
⊟	MELFA-Eye Co					23365	Result
	LIf you click Add/U	odate to Workspace bu				orkspace. <u>A</u> dd/Update to	o Workspace

Figure 17-1 "Setting and Add Control Unit" window

When the control unit is double clicked, the MELFA-3D Vision window is displayed.

Workspace	×		MELFA-30	) Vision -	1: MELFA-Eye Contr	ol Unit [Top]	
Factory Line #: RC1     G Offline     G Offline	Vision	Sho Star Mor		Start U 1. C 2. C 3. M Monito	Ip onnection Setup: alibration: leasuring/Recognition: Ir	Setting network parameters of cameras Executing the Z, XY, Robot-Calibration Creating/Editing/Executing the Job. Monitoring images of the measuring/re	
MELFA-3D Vision Property Attribute Unit Name MAC Address IP Address	Data MELFA-Eye Control Unit	Statu: Mode		Mainte Back Rest	up:	The data is backed up from the unit. The data is restored to the unit.	
Port # Version	23365	ID 1 2 <	State         MAC Address           Offline         00-00-00-00-00				<u> </u>

Figure 17-2 MELFA-3D Vision window

For details, refer to the user's manual containing complete description of the MELFA-3D Vision.

# 18.MelfaRXM.ocx Communications Middleware Setup

# 18.1. Summary

MelfaRXM.ocx is an ActiveX controller that communicates with CR750/700/500 series robot controllers. MELFARXM.ocx can only be used if you have purchased the standard edition of RT ToolBox2. (Customers who have purchased the mini edition can not install MELFARXM.ocx.)

When using only the RT ToolBox2 functions, there is no need to set up "MELFARXM.ocx".

Using MELFARXM.ocx enables you to simply produce Windows applications connected to a robot controller on the customer's device.

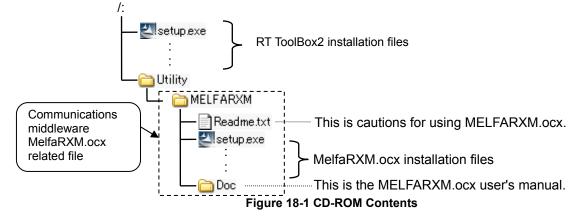
The user's manual for using MelfaRXM.ocx and the cautions are on the RT ToolBox2 standard edition CD-ROM.

The ways to communicate with CR750/700 series robot controllers are RS-232(CRnD-700), Ethernet and USB(CR750-D/CRnD-700).

To communicate with CRnQ and GOT, RT ToolBox2 must be installed.

# 18.2. CD-ROM Contents

The contents of the "RT ToolBox2" (standard edition) CD-ROM are as follows.



For details on MelfaRXM.ocx usage methods, refer to the user's manual on the CD-ROM.

# 18.3. User's Manual Reading Guide

The manual is in the CR-ROM as the Adobe PDF file.

#### D:/Utility/MELFARXM/Doc/MelfaRXME.pdf

\* Example for the CD-ROM drive is "D:".

- (1) Preparation for viewing
  - 1) Preparing computer

Prepare a computer that has a CD-ROM drive.

2) Preparation of viewing software

Viewing requires Acrobat Reader Ver 5.0 or higher.

- If neither Acrobat Reader (nor Adobe Reader) is installed, please download it from the Adobe Systems web site. (As of December 2007) URL: http://www.adobe.com
- (2) Viewing methods
  - 1) Starting From Windows Explorer
    - When you start Windows Explorer, then select the file, Acrobat Reader (or Adobe Reader) starts and the user's manual is displayed.
  - 2) Starting directly from Acrobat Reader (or Adobe Reader)
    - When you start Windows Explorer Acrobat Reader (or Adobe Reader), then select the file, the user's manual is displayed.

# 18.4. Installation

Perform installation according to the following procedure

- (1) Insert the program CD-ROM into the CD-ROM drive of your personal computer. Setup of "RT ToolBox2" automatically starts. Please click "cancel".
- (2) Select [Run] from the [Start] button.



(3) Check the drive name of the CD-ROM drive. Enter the following and click the [OK] button. "Drive name":/Utility/MelfaRXM/Setup.exe

(If the CD-ROM drive is "D", enter "D:/Utility/MelfaRXM/Setup.exe")

Run	? 🔀
-	Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.
Open:	D:\Utility\MelfaRXM\Setup.exe
	OK Cancel Browse

Figure 18-3 [Run] Screen

(4) Installer starts and the Setup screen appears. Install according to the instructions that appear on the screen.

The Product ID is needed when this "MelfaRXM.ocx" is installed. Input the Product ID same as the Product ID of "RT ToolBox2". "MelfaRXM.ocx" can be installed with the Product ID of standard version, but can not be installed with Mini version.

Input ProductID		X
Input ProductID	Please enter the product ID of the product. Please input in single byte English characters.	×
	<u> &lt; B</u> ack <u>N</u> ext > Cancel	

Figure 18-4 Input Product ID

The product is installed as in "Table 18-1 Files to be Installed".

#### Table 18-1 Files to be Installed

No.	Description	Install destination
110.		
1	MelfaRXM.ocx	/Windows/System folder
2	EZSocketRC.dll	ex) Windows 2000 :/Winnt/System32
2	(communication DLL)	Windows XP :/Windows/System32
3	NarcServerApiM.dll (communication DLL)	MelfaRXM.ocx and EzSocketRC.dll are registered in the registry.
4	RoboCom.exe	A folder specified during install operation (Normally, C:/ is used.)
4	(communication DLL)	L_[MelfaRXM_Dev]
		ReadMe.txtext file which indicated notes
_		[RoboCom]folder of communication server
5 Instruction Manual		[Doc]folder of Instruction Manual
		[Sample]folder of sample programs
		-[BCB]Borland C++ Builder (5.0)
6	Sample programs	—[VB]Visual Basic (6.0)
		└─[VC++]Visual C++ (6.0)
		⊢ [Redist]
		—[Installer]folder of system files Installer (for redistribution)
7	Redistribution files	[SysFiles] folder of system files (for redistribution)

# 19. Appendix

# 19.1. Q&A

This explains frequently asked questions in a Q&A format.

#### Version

(1) Where is the	ne software version information?		
		is software. screen displayed with this software's menu b	ar [Help] →
	About RT Tool Box2	About RT ToolBox2	
	MELFA RT ToolBox2	MELFA RT ToolBox2	
	RT ToolBox2 Version 1.0 COPYRIGHT(C) 2008 MITSUBISHI ELECTRIC CORPORATION ALL RIGHTS RESERVED	RT ToolBoxa Version 2.00A COPYRIGHT(C) 2008-2011 MITSUBISHI ELECTRIC CORPORATION ALL RIGHTS RESERVED	
	This product is licensed to:	This product is licensed to:	
	Name:TARO MITSUBISHI	Name:TARO MITSUBISHI	
	Company:MITSUBISHI ELECTRIC CORPORATION	Company: MITSUBISHI ELECTRIC CORPORATION	
	ProductID:000-00000000	ProductID:000-00000000	
	This computer program is protected by copyright law and international treaties. Unauthorized reproduction or distribut ion of this program, or any portion of it, may result in sever e civil and criminal penalties, and will be prosecuted to maxi mum extent possible under the law.	This computer program is protected by copyright law and international treaties. Unauthorized reproduction or distribut ion of this program, or any portion of it, may result in sever e civil and criminal penalties, and will be prosecuted to maxi mum extent possible under the law.	
	ОК	ОК	
	Version 1.8 or earlier	Version 2.00A or later	

(2) Where is the robot controller software version information displayed.

When this software is connected, you can check with the project tree, [Online] properties. The version information is also displayed on the title screen for the optional teaching box.

## **Product ID**

(1) Where can I check the product ID?

This software requires the product ID for installation.

The package containing your software contains a sheet of paper on which is written the product ID. Also, after this software has been installed, you can also check the product ID on the screen displayed with the menu bar [Help]  $\rightarrow$  [About RT Tool Box2].

About RT Tool Box2
MELFA RT ToolBox2
RT ToolBox2 Version 1.0 COPYRIGHT (C) 2008 MITSUBISHI ELECTRIC CORPORATION ALL RIGHTS RESERVED
This product is licensed to:
Name:TARO MITSUBISHI
Company:MITSUBISHI ELECTRIC CORPORATION
ProductID:000-000000000
This computer program is protected by copyright law and international treaties. Unauthorized reproduction or distribut ion of this program, or any portion of it, may result in sever e civil and criminal penalities, and will be prosecuted to maxi mum extent possible under the law.
ОК

#### (2) I checked "About RT ToolBox2" from the menu, but the product ID is not displayed.

#### Is "No Product ID!" displayed?

If "No Product ID!" is displayed in the version information, the installation of this software may have failed. Unfortunately, you need to install the software again.

#### **Communications (general)**

(1) What are the means for communication with the robot controller?

With a CR750/700 series robot controller, you can communicate via USB, Ethernet, and RS-232. With a CRn-500 series robot controller, you can communicate via Ethernet and RS-232. However, when using Ethernet with a CRn-500 series robot controller, the robot controller must have the optional Ethernet card.

For details, see "6.1 Robots Connected and Types of Communication".

#### (2) Where are the communications settings made?

They are made on the project edit screen. For details, see **"6.2 Connection Settings"**. For the robot controller side, change the communications parameters with the optional teaching box. For details, see **"Detailed explanations of functions and operations"** in the robot controller's user's manual. [Caution] The communication settings must be made on both this software and the robot controller. If you change the robot controller settings, you must change the settings in this software too.

#### (3) I can not communicate with the robot controller.

If you can not communicate with the robot controller, check the following. Also see "0Communications (RS-232)", "0Communications (Ethernet)", and "0Communications (USB)".

Check item or cause	Solution
Is the connected robot controller selected correctly?	Check if the correct project is selected with this software. For details, see <b>"5.14 Offline/Online/Simulation"</b> .
Is the robot controller power supply On?	Switch On the robot controller's power supply and check that the robot controller starts up normally.
Is Communications Server 2 running? Communications Server 2 is started automatically when this software is started. Communication Server 2 is started as an icon.	If you closed Communications Server 2 by mistake, close this software, then restart it.
Are you connected to a robot controller except for CR750/700/500 series?	Check the robot controller model name in its user's manual (or standard specifications or the like).
Are the robot controller's network settings correct?	The robot controller's network settings are made with parameters. Check the robot controller's network settings with the optional teaching box.
Are the communications settings on this software correct?	Set the correct communications settings. For details, see <b>"6.2 Connection Settings"</b> .
Is some other MELFA product running? For example is E/EN series computer support software or P/P or P/P-2 running?	Close any MELFA product other than this software. For details, see <b>"1.6 When Starting at the Same Time</b> <b>as Another Product"</b> .

Oh e ala ita na a a a a a		O a lasti a s		
Check item or cause		Solution		
What color is Communications Server 2? Return Communications Server 2 to icon status and check the color displays for the line state.	Red	The problem may be that the robot controller is not connected correctly. Check the items in "(4) When Communications Server 2 is red (overall)".		
Line State : RobotConnection Error Communication State : Robot: 1: Robot Information	Green	The problem may be that the robot controller and the computer have different communications settings. Check the items in "(5) When Communications Server 2 is green (overall)".		
	Yellow	Check the items in "(6) When Communications Server 2 is yellow (overall)".		
	Light blue	Check the items in "(7) When		
	Blue	Communications Server 2 is light blue or blue.(overall)".		

## (4) When Communications Server 2 is red (overall)

When Communications Server 2 is displayed red, check the following.

Check item or cause	Solution
Is the communications cable connected correctly?	Connect the cable correctly.
Are you using the correct communication cable?	Check the communication cable specifications. Be careful. RS-232 cables and Ethernet cables can be either cross cables or straight cables. For the cable specifications, check your robot's "Standard Specifications".
When connected with CRnQ communications, is the target CPU set correctly?	

## (5) When Communications Server 2 is green (overall)

When Communications Server 2 is displayed green, check the following.

Check item or cause	Solution
Do the communications settings in this software and on the robot controller match?	

#### (6) When Communications Server 2 is yellow (overall)

When Communications Server 2 is displayed yellow, check the following.

Check item or cause	Solution
Is this software in the "Online" status?	This software started up in the "Offline" status. When you put it into "Online" status, it communicates with the robot controller. For details, see <b>"5.14 Offline/Online/Simulation"</b> .

#### (7) When Communications Server 2 is light blue or blue.(overall)

If Communications Server 2 is displayed light blue or blue, but communications are still not possible, check the following.

Check item or cause	Solution
Is there a communications error in this software?	Check the contents of the communications error and close the communications error window.
Is a simulation underway? (Note) Only the standard edition has the simulation function.	End the simulation.
Is the screen server running on the computer?	End the computer's screen server.
Is the computer's hard disk is power save mode?	End computer hard disk power save mode setting.

#### (8) Communications with the robot controller are cut off mid-way through.

If you can not communicate with the robot controller, check the following.

Check item or cause	Solution
	If any of these functions are running, they may cause a communications time-out, so do not use any of these functions.
Is some other product running that uses communications? Or is any permanent resident software running that uses communications?	A computer communications port can not be opened for two applications, so either close the other application or change the port that this software uses.

#### Communications (RS-232)

If you can not communicate with the robot controller using RS-232, check the following. Also, see **"0Communications (general)"**.

Check item or cause		Solution
What color is Communications Server 2? Return Communications Server 2 to icon status and check the color displayed for the line state.	Red	The problem may be that the robot controller is not connected correctly.Check the items in "(1) When Communications Server 2 is red (RS-232)".
(0/1) - Communication Server2         Line State :         Communication         State :         Robot:         1:         Robot Information	Green	The problem may be that the robot controller and the computer have different communications settings.Check the items in "(2) When Communications Server 2 is green (RS-232)".
	Yellow	See "0Communications (general)".
	Light blue	Check the items in "(3) When Communications Server 2 is light blue or
	Blue	blue.(RS-232)".

#### (1) When Communications Server 2 is red (RS-232)

If Communications Server 2 is displayed red with communications with the robot controller set to RS-232, check the following.

Check item or cause	Solution
Is Communications Server 2 set for the correct communications port (COM1-COM10)?	The default value for this software is COM1. On some computers, COM1 is not allocated to RS-232, but to an infrared port, modem, or the like. Also, when using RS-232 over USB, the port used for RS-232 may be other than COM1. Use the Windows device manager or the like to check the COM number allocated to RS-232 and change the "Port" setting in the communications settings to that port.
Is some other product running that uses the communication port? Or is any permanent resident software running that uses the communications port?	A computer communications port can not be opened for two applications, so either close the other application or change the port that this software uses.
In the communications settings for this software, is the communications method set to TCP/IP or USB?	Change the communications method to RS-232.

#### (2) When Communications Server 2 is green (RS-232)

If Communications Server 2 is displayed green with communications with the robot controller set to RS-232, check the following.

Check item or cause	Solution
Do the communications settings in this software and on the robot controller match?	The communications settings in this software and on the robot controller must match.
In particular, check that the protocol settings	The default protocol for this software is "Procedural", but
match.	for CRn-500 series robot controllers, the default protocol is "Non-Procedural"

(3) When Communications Server 2 is light blue or blue.(RS-232)

If Communications Server 2 is displayed light blue with communications with the robot controller set to RS-232, check the following.

Check item or cause	Solution
Is anti-virus software running virus checks on RS-232 communications?	Switch off virus checking for RS-232.
When a computer starts up, sometimes this generates noise. This noise can cause a communications error in the robot controller.	Either start the computer before connecting the cable or start the computer before starting the robot controller.

## **Communications (Ethernet)**

[Note] When using Ethernet with a CRn-500 series robot controller, the robot controller must have the optional Ethernet card.

If you can not communicate with the robot controller using Ethernet, check the following. Also, see **"3. Communications (general)"**.

Check item or cause		Solution
What color is Communications Server 2? Return Communications Server 2 to icon status and check the color displayed for the line state. (0/1) - Communication Server2 Line State: Robot(TCP/IP)Connection wait Communication State: Robot: 1: Robot Information	Red Green	The problem may be that the robot controller is not connected correctly. See the items in "(1) When Communications Server 2 is red (Ethernet)". The problem may be that the robot controller and the computer have different communications settings. See the items in "(2) When Communications Server 2 is green (Ethernet)".
	Yellow	See "0Communications (general)".
	Light blue	See "0Communications (general)".
	Blue	See vooninumcations (general)

#### (1) When Communications Server 2 is red (Ethernet)

If Communications Server 2 is displayed red with communications with the robot controller set to Ethernet, check the following.

Check item or cause	Solution
In the communications settings for this software, is the communications method set to USB or RS-232?	Change the communications method to TCP/IP.

#### (2) When Communications Server 2 is green (Ethernet)

If Communications Server 2 is displayed green with communications with the robot controller set to Ethernet, check the following.

Check item or cause	Solution
Are the robot controller's network settings correct?	Make the computer's network settings. Check that the IP address, gateway, subnet mask, and other network settings are correct. Check on the computer [Control Panel] – [Network Settings]. * For details on the network settings, please consult with your network administrator.
Is the robot controller's IP address set correctly in the communications settings?	Correctly set the IP address of the robot controller connected to.

#### (3) The communication time is taken very long when using the backup etc.

In Windows Firewall setting, if inbound communication of Communications Server 2 (RoboCom.exe) is blocked, change to allow the connection.

Check item or cause	Solution
If there are one or more "RoboCom" lines in	If there are "RoboCom" lines selected [Block the connection], change them to [Allow the connection].
	Enabled  Action Allow the connection Rildwide connection if it is gecure  Customize Block the connection  Learn more about these settings
	OK Cancel Apply

## **Communications (USB)**

If you can not communicate with the robot controller using USB, check the following. Also, see "**0**Communications (general)".

Check item or cause		Solution
What color is Communications Server 2? Return Communications Server 2 to icon status and check the color displayed for the line state.		The problem may be that the robot controller is not connected correctly. Check the items in "(1) When Communications Server 2 is red (RS-232)".
Line State : Robot (USB)Connection Error Communication State : Robot: 1:	Green	The problem may be that the robot controller and the computer have different communications settings. See <b>"0Communications (general)"</b> .
Robot Information	Yellow	See "0Communications (general)".
	Light blue	Check the items in "(2) When Communications Server 2 is light blue
	Blue	or blue (USB)".

#### (1) When Communications Server 2 is red (USB)

If Communications Server 2 is displayed red with communications with the robot controller set to USB, check the following.

Check item or cause	Solution
In the communications settings for this software, is the communications method set to TCP/IP or RS-232	Change the communications method to USB.
Is the USB driver installed?	Communicating with USB requires that the USB driver be installed. For details, see "1.5.3 USB driver (CR750-D/CRnD-700 series robot controller) installation", "1.5.4 CRnQ communications USB driver installation" and "1.5.5 CRnQ Communications USB driver for GOT transparent function / GOT communitation installation".

#### (2) When Communications Server 2 is light blue or blue (USB)

With communications with the robot set to USB, if Communications Server 2 is displayed light blue or blue, but communications are still not possible, check the following.

Check item or cause	Solution
Is the robot controller power supply Off?	When connected on USB with CRnQ communications, if the robot controller power goes Off after a normal connection was established, the display remains light blue. Switch Offline with this software, switch the robot controller power On, then go back online.
Is the communications cable connected correctly?	When connected on USB with CRnQ communications, if the communications cable is disconnected after a normal connection was established, the display remains light blue. Switch Offline with this software, connect the communications cable, then go back online.

#### Robot program

(1) Did you write the program with Movemaster commands?

The robots that can use Movemaster commands are restricted. Check in your robot's standard specifications to see whether it supports Movemaster commands. If your robot supports Movemaster commands, change the language used with **"7 Robot Program Language Setting"** in this document

(2) Is it possible to use programs as is that we used with an E/EN series robot controller?

Position data prepared with MELFA-BASIC III (for E/EN series) can not be used as is. Convert the position data with the "Program conversion" function. For details, see "8.11 Program Conversion". Also, some commands have changed. For details, see "Detailed explanations of functions and operations" in the robot controller's user's manual.

(3) Is it possible to use R-250R series and R-300R series programs?

R-250R series and R-300R series robot programs written in the MELFA II language can not be used as is. Write new programs.

#### Program edit

(1) When we check syntax, "Error in input command statement syntax" occurs frequently.

Check item or cause	Solution
Is the command statement syntax correct?	Program in correct syntax.
Are double-byte spaces used?	Use only single-byte spaces.
Is the language to use set correctly? This software supports MELFA-BASIC IV, MELFA-BASIC V, and Movemaster commands, but there are terms that must be switched and set for whichever one of these you use.	, , , , , , , , , , , , , , , , , , , ,
Does the version of this software support your robot controller? For some robot functions, new commands are added.	<ul> <li>Please purchase a version that supports your robot controller. (Please contact the store you purchased from or one of our branches.)</li> <li>* A program can be written to the robot controller even if the syntax check finds many "syntax errors".</li> </ul>

(2) How should we change the robot program language setting?

They are made on the project edit screen. For details, see **"7 Robot Program Language Setting"**. The robot program language set here is enabled when you edit a program offline. Online programs are displayed in the robot program language set with the connected robot controller.

(3) When you open a program, the robot program language is different from the one set for this project.

Is there any online program open?

Online programs are displayed in the robot program language set with the connected robot controller. The robot program language set with the project is enabled when you edit a program offline.

(4) Is it possible to edit or copy a program that is running?

You can neither edit nor copy a program that is running. Stop the program, then edit or copy it.

#### (5) How should we edit a program for which the start condition is "Always"?

A program for which the start condition is "Always" is executed immediately after the robot controller power comes On. To edit such a program, use the following procedure.

- (1) Change the starting condition in the "Slot table (SLT \* \* 1-32)" parameter to "Start (normal)". (Write this parameter to the robot controller.)
- (2) Reset the power supply for the robot controller.
- (3) Edit the target program and save it to the robot controller.
- (4) Return the starting condition in the "Slot table (SLT \* \* 1-32)" parameter to "Always". (Write this parameter to the robot controller.)
- (5) Reset the power supply for the robot controller.

# (6) Is it possible to change the font for a robot program displayed with the program edit tool?

#### Yes.

Change the font used with "8.5.4 Changing the font" in this document.

(7) We are not using joint position variables (J variables), so is it possible to make the display area smaller?

#### Yes.

Change the display proportions with "8.5.1 Changing the display area" in this document.

#### (8) Is it possible to edit a backed up program data with program editor?

In version 1.2 or later, it is possible to open a backed up program data with program editor. Please refer to **"8.2.4 Opening a program in the backup data"** in this manual for details.

When you use the software Ver.1.1 or earlier, please restore the backed up program to robot controller, then open it with program editor or copy it to the computer with program management, and edit it.

# (9) "Use defined external variable can not be used (481000000)" is displayed and the program can not be edited.

This error is displayed if a user defined external variable is used even though the user base program is not defined. (Normally, a user base program is defined with the "PRGUSR" parameter, but if nothing is set in the "PRGUSR" parameter, this error occurs.)

To use a user defined external variable, define the user base program.

Also, for details on user base programs, see "Detailed explanations of functions and operations" in the robot controller's user's manual.

#### (10) Is it possible to copy position data to another program?

#### Yes.

For details, see "8.6.4.4 Copy position data" and "8.6.4.5 Pasting position data" in this document.

(11) Does it cause an error to not discriminate uppercase and lowercase letters when inputting commands?

#### No.

You can input either uppercase letters or lowercase letters with the program editor, but when the program is saved to a robot controller, the commands are converted correctly.

#### Variable monitor

(1) How are external variables (system status variables, program external variables, and user defined external variables) monitored?

#### Use the program monitor.

For details, see "11.1.2 Program monitoring" in this document.

#### Option card

(1) How should one check what option cards are mounted in a robot controller?

Check from the project tree. For details, see **"13 Option** Card" in this document.

#### Parameter editing

(1) No parameter list is displayed in the parameter editing tool.

Download the parameter list from the robot controller. For details, see **"10.1.4 Parameter list reading"**.

(2) We changed a parameter, but the new value does not take effect.

After you changed the parameter, did you switch the power for the robot controller Off, then On again? The new parameter value does not take effect until you switch the robot controller power Off, then On again. Switch the robot controller power Off, then On again.

## Backup/restore

(1) Is it possible to edit a backed up program data with program editor?

In version 1.2 or later, it is possible to open a backed up program data with program editor. Please refer to **"8.2.4 Opening a program in the backup data"** in this manual for details.

When you use the software Ver.1.1 or earlier, please restore the backed up program to robot controller, then open it with program editor or copy it to the computer with program management, and edit it.

#### Other

(1) Characters are displayed on the screen on top of each other or with some characters missing.

Is the font size in the computer screen settings something other than "Standard"? Use this software with the font size set to "Standard". For Windows XP, to make the screen settings, click [Control Panel]  $\rightarrow$  [Display]. Now from the "Display Properties" window's "Appearance" tab, set the font size with [Font Size].

(2) A program is not printed correctly.

In some printer types, tab characters into a program may be printed correctly. Replace them with a space character with the program editing, or change a printer setting and use TrueType font.

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